DS #: 4716

APN: 125-30-502-007 & MORE

PROJECT: CENTENNIAL & TEE PEE
PROJECT IN C.C. FOR CITY OF L.V. CONCURRENCE

SUBMITTAL: 1ST & ADDENDUM

SCANNED BY/DATE:

CHECKED BY/DATE:

CITY OF LAS VEGAS NEVADA

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: January 13, 2015
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: **Centennial and Tee Pee** (Project in Clark County for CLV Concurrence)			**COPIES TO:** RCI Engineering
Cross Streets:	SEC of Centennial Parkway & Tee Pee Lane			Lennar Communities Nevada
File Number:	F:\Depot\DSMemos\DS4716A.doc			Bart Anderson, P.E., DevCo
Parcel Number:	125-30-502-007 & More			CCPW
Zoning Action:	N/A			
FEMA Flood Zone	YES	NO	X	
Proposed Storm Drain	YES	NO	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	12/30/2014	1/13/2015	See Comments Below	$400.00	381424: $400
			TOTAL FEES (LDDRS):	**$400.00**	**----**

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.

City of Las Vegas Flood Control staff has reviewed the Technical Drainage Study, including the Addendum #1 for the subject development "***Centennial and Tee Pee***" within the jurisdiction of the ***County of Clark***. ***City of Las Vegas*** concurs with the acceptance of the drainage study by the ***Clark County Public Works Department***. The review of this project was limited to issues of flood control significance to the ***City of Las Vegas***.

1. Sanitary sewer may be provided by the *City of Las Vegas*, please contact *City Sanitary Sewer Planning* at 229-6541 to determine sewer service requirements immediately to avoid any potential delays in the development process.

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.

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.

END OF REMARKS

ays

T/R/S: T19S/R60E/30
AREA G-30

Albert Sung

From: Rick Read <rread@rcinevada.com>
Sent: Wednesday, December 31, 2014 11:12 AM
To: Albert Sung
Subject: Centennial and Tee Pee Drainage Study-Concurrence
Attachments: nwns-sheet 4.pdf

Albert,

Our runner will be down this afternoon to pick up the receipt and pay for the review. After our conversation yesterday I have answers to a couple of your questions.

1. The original drainage study was done in 2006 and was not sent to CLV for concurrence.
2. The Northwest Neighborhood Study shows flow draining east in Centennial Parkway at the Centennial Parkway/Tee Pee Lane intersection.

I have included a copy of the appropriate sheet from that study.

Rick J. Read, PE
RCI Engineering
Office 702-453-0800
Direct 702-998-2102

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

Drainage Study Approval Letter

Date: December 23, 2014
Firm: RCI Engineering
Engineer: Rick J. Read, P.E.
Address: 4325 Dean Martin Drive, Suite 300, Las Vegas. NV 89103
Phone: (702) 453-0800
Fax: (702) 453-0801
E-mail: rread@rcinevada.com

Subject: Technical Drainage Study Update for Centennial and Tee Pee
Location: SEC of Centennial Parkway and Tee Pee Lane
APN: 125-30-502-007, -012, -013, 125-30-601-007
Sec, Township, Range: S30, T19S, R60E
Flood Zone & Panel: Zone X, 1745E, Revised September 27, 2002
Application Tracking #: 14-14210UP

HTE14-14210

Submittals	Date Received	Date Returned	Reviewer	Miscellaneous
Technical	04/10/2014	05/19/2014	AK	
Addendum 1	11/13/2014	12/12/2014	AK	
Supplement 1	12/16/2014	12/23/2014	AK	Phone and meeting

Concurrence Required: (Must be obtained prior to permit issuance)		Reason Concurrence is required
	City of Henderson	Adjacent to or Impacts Henderson
X	City of Las Vegas	Adjacent to or Impacts Las Vegas
	City of North Las Vegas	Adjacent to or Impacts North Las Vegas
	Nevada Department of Transportation	Adjacent to or Impacts NDOT Facility
	Union Pacific Rail Road	Adjacent to or Impacts a UPRR Facility
	US Army Corp of Engineers	Impacts a USACE Facility
	Clark County Regional Flood Control District	Regional Significance, Adjacent to or Impacts CCRFCD MPU Facility or in a SFHA

BOARD OF COUNTY COMMISSIONERS
STEVE SISOLAK, Chairman • LARRY BROWN, Vice Chairman
SUSAN BRAGER • TOM COLLINS • CHRIS GIUNCHIGLIANI • MARY BETH SCOW • LAWRENCE WEEKLY
DONALD G. BURNETTE, County Manager

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

This update is to revise the entire site. The previously approved Technical Drainage Study is: HTE# 06-37189.

The site shall be graded with respect to drainage as shown on "Centennial and Tee Pee Unit 1", sheets C-1, N-1, G-1-G-4, D-1-D-2, and P-1 through P-6 signed and sealed by Christopher R. Zrinyi P.E., on November 13, 2014 and "Centennial and Tee Pee Unit 2", sheets C-1, N-1, G-1-G-4, D-2, and P-1 through P-6 signed and sealed by Christopher R. Zrinyi, P.E., on November 13, 2014 and sheet D-1 signed and sealed by Christopher R. Zrinyi, P.E., on December 16, 2014.

Check appropriate conditions

	Retaining/screen wall combination may be in excess of current **Clark County Unified Development Code, Chapter 30.64.050.**
	A FEMA Elevation Certificate, completed by a licensed surveyor, must be submitted to and approved by CCPW Development Review Plan Check prior to the issuance of Certificates of Occupancy for those structures.
X	Mylars of the grading plan must be submitted to the CCPW Development Review Plan Check for approval signatures prior to map recordation (residential) or permit issuance (commercial).
X	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 CCPW Development Review front counter after drainage study approval and prior to offsite final review.
X	The grading plan will be reviewed by the Building Office Operations Division to ensure compliance with the ADA 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.
	The plans show work is proposed on another property. Notarized written permission must be obtained **prior to** plan approval. A grading permit must be obtained from Building Dept prior to grading.
X	Right-of-way dedication must be verified.
	Any previously approved drainage easements that are not being used must be vacated.
	Per *Regional Flood Control District policies and Procedures manual, Section VIII. D. 13. Uniform Regulations for the Control of Drainage*, the Engineer of Record shall provide As-Built plans or record drawings to the District after completion and final inspection of such privately installed flood control facilities that have regional flood control significance.
	Structural calculations are required. The structural calculations, plans, and details must be approved prior to "Offsite" submittal and prior to CCRFCD submittal, if applicable.
X	Plan revisions can be found on the red-lined plans and must be addressed.
X	Prepare drainage easement documents as shown on the grading plans.

Additional Conditions:

1. Address the redlined comments on the grading plans.

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.

By _____

W. Layne Weber, P.E., CFM
Principal Engineer
Clark County Public Works
Development Review

Redd: 12/30/14
DS 4716

G-30

$400

Project in C.C. for CLV Conc.

TECHNICAL DRAINAGE STUDY UPDATE FOR CENTENNIAL AND TEE PEE (FORMERLY CENTENNIAL/TEE PEE) (HTE#06-37189)

Prepared for:

Lennar Communities Nevada LLC
2490 Paseo Verde Parkway, Suite 120
Henderson, NV 89074
Phone: (702) 736-9100
Fax: (702) 736-9200

April 2014

PROJECT 3040.0038

RCI Engineering
4325 Dean Martin Drive, Suite 300 * Las Vegas, NV 89103
Tel: 702.453.0800 * Fax: 702.453.0801
www.rcicnevada.com

TECHNICAL DRAINAGE STUDY UPDATE FOR CENTENNIAL AND TEE PEE (FORMERLY CENTENNIAL/TEE PEE) (HTE#06-37189)

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April 2014

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www.rcicnevada.com

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: CENTENNIAL AND TEE PEE Date: April 2014

Location of Development: a) Descriptive (Cross Streets) North/South: Tee Pee Lane

East/West: Centennial Parkway

b) Section: 30 Township: 19 South Range: 60 East

c) APN : 125-30-502-007, 012, 013, 125-30-601-007

Name of Owner: Lennar Communities Nevada, LLC

Telephone No.: 702-739-9100 Fax No.: 702-736-9200 E-Mail Address:

Address: 2490 Paseo Verde Parkway, Suite 120, Henderson, NV 89074

Contact Person-Name: Rick J. Read, P.E. **Telephone No.:** 702-453-0800

* **E-Mail Address:** rread@rcinevada.com **Fax No.:** 702-453-0801

Firm: RCI Engineering

Address: 4325 Dean Martin Drive, Suite 300 Las Vegas, Nevada 89103

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: 17.5 acres Being Developed/Disturbed: 17.5 acres
2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ **Yes**** ☒ **No**
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☐ **Yes**** ☒ **No**
4. Proposed type of development (Residential, Commercial, Etc.): Residential
5. Approximate upstream land area which drains to the subject site: 330+/- acres
6. Has the site drainage been evaluated in the past? ☒ **YES** ☐ **NO** If yes, please identify documentation: Technical Drainage Study for Centennial/Tee Pee (HTE # 06- 37189)
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Regena Avenue, Azure Drive, Bright Angel Way
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 subject property. This form may provide sufficient information to serve as the Conceptual Drainage Study.

*New Required Field

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

Revision	Date

Local Entity File No.

REFERENCE:

STANDARD FORM 1

Updated 05/01/2008

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name:	Centennial and Teepee		Map ID:
Firm Name:	RCI Engineering		Engineer: Rick Read, P.E.
Address:	4325 Dean Martin Drive, Suite 300		
City:	Las Vegas	State: Nevada	Zip: 89103
Phone Number:	453-0800	Fax Number: 453-0801	

Property Owner: Lennar Communities Nevada LLC		
Address: 2490 Paseo Verde Parkway, Suite 120		
City: Henderson, NV	State: Nevada	Zip: 89074
Reviewed By:	Date Received:	Date Accepted for Review:

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

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

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

I. GENERAL REQUIREMENT:

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

Reference:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS

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

III. DRAINAGE PLAN

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

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

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

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

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

IV. HYDROLOGIC ANALYSIS

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

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

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

REFERENCE:	STANDARD FORM 2

April 9, 2014

Clark County Department of Public Works
Flood Control Division
500 South Grand Central Parkway
Las Vegas, NV 89155-1799

Subject: Technical Drainage Study Update for Centennial and Tee Pee
Formerly Centennial/Tee Pee (HTE# 06-37189)

Lennar is proposing to develop a 17.5+/- acre site as residential housing, located along Tee Pee Lane bordered by Centennial Parkway on the north and Bright Angel Way on the south. The northeast half of the project is located on the east side of Tee Pee Lane and the southwest half of the project is located on the west side of Tee Pee Lane. The Project will consist of 32 lots on 17.5 acres with an average lot size of 19,371 SF. The purpose of this report is to provide an Update to the *Technical Drainage Study for Centennial/Tee Pee* (Reference 1, hereinafter referred to as the Original Study) that was prepared by CVL Consultants, Inc. The Original Study was approved by Clark County Public Works (CCPW) in January of 2007. Pertinent references from the Original Study have been included in Appendix C.

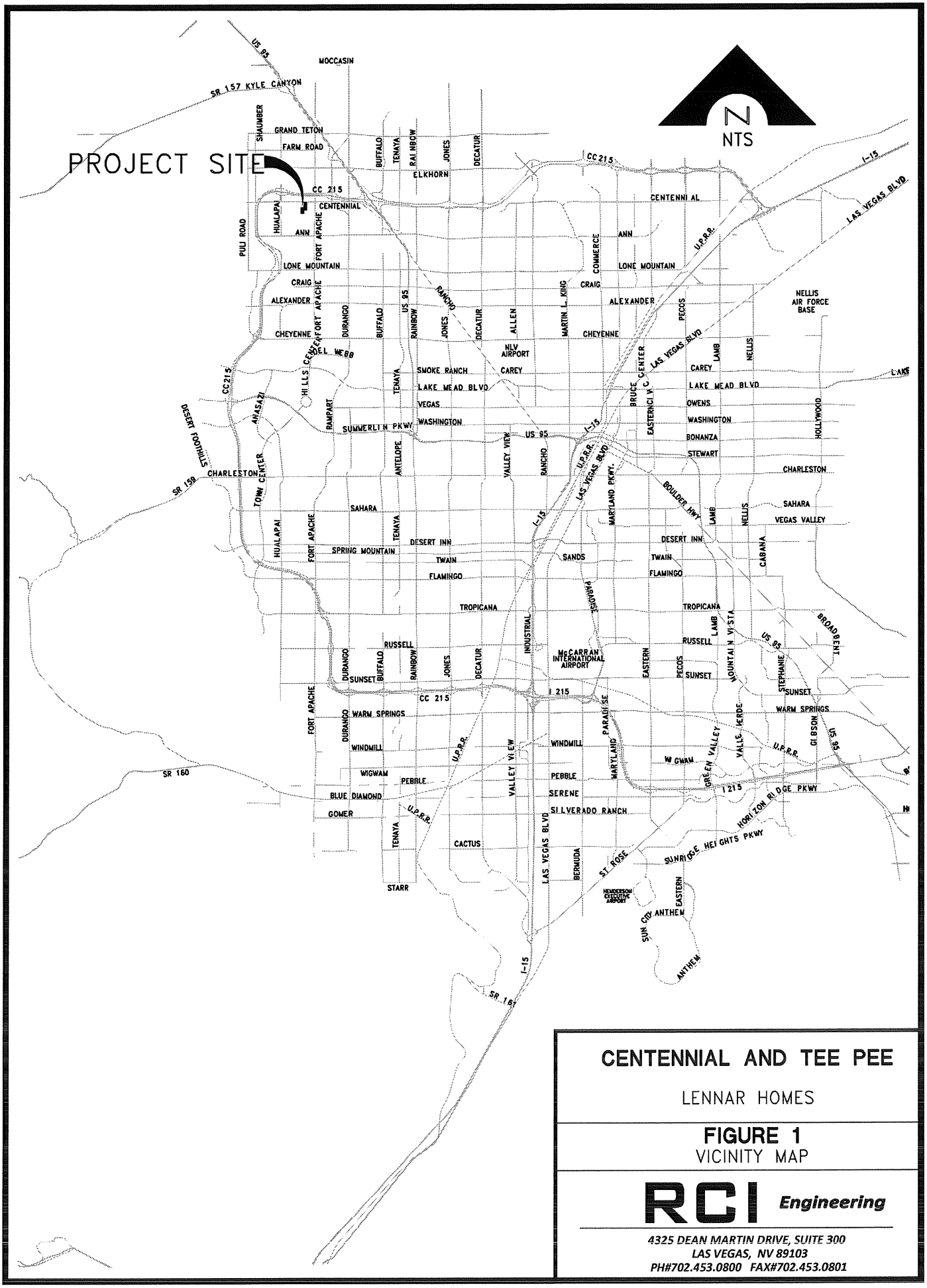
The Project is bordered by Centennial Parkway on the north which has been constructed as a nonurban street on the south half and a full half street section for a 100-ft right-of-way on the north. The northeast half of the site extends from Centennial Parkway south to approximately half way between Regena Avenue and Azure Drive. Regena Avenue and Azure Drive have been constructed as a nonurban street section with approximately 30 feet of asphalt paving and v-ditches on both sides.

The southwest half of the project is bordered on the north by Regena Avenue and extends south past Azure Drive to Bright Angel Way. Azure Drive runs through the site and has been constructed the same as Regena Avenue as a nonurban street section with

approximately 30 feet of asphalt paving and v-ditches on both sides. Tee Pee Lane has not been constructed north of Regena Avenue along the west side of the project, but has been constructed along the east side of project south of Regena Avenue as a nonurban half street section. There are existing residences that border the site on the east and west along the southwest portion of the site and open desert borders the east and west sides of the northeast portion of the site.

The Project will be constructed in one phase. The improvements will include construction of the south half of Centennial Parkway adjacent to the Project with pavement, "L" Type curb and gutter and a meandering 5-foot wide sidewalk. The majority of Tee Pee Lane will be constructed with one half of a nonurban street section including 16-feet of asphalt pavement, a 4-foot shoulder and a v-ditch on the Project side of the road. Regena Avenue, Azure Drive and Bright Angel Way will also be constructed with a nonurban street section as half street or full street improvements depending on development being on one or both sides of the roads.

The proposed development will consist of residential housing with Type "A" and Type "B" drainage and an average lot size of 19,371 square feet. The Project will have four entrances with two entrances off Regena Avenue, one off Azure Drive and one off Bright Angel Way. The interior streets will consist of 39-foot (back of curb to back of curb) private roadways with normal crown sections and roll type curb and gutter. Please refer to Figures 1 and 2 for the vicinity and location of the Project.



CENTENNIAL AND TEE PEE

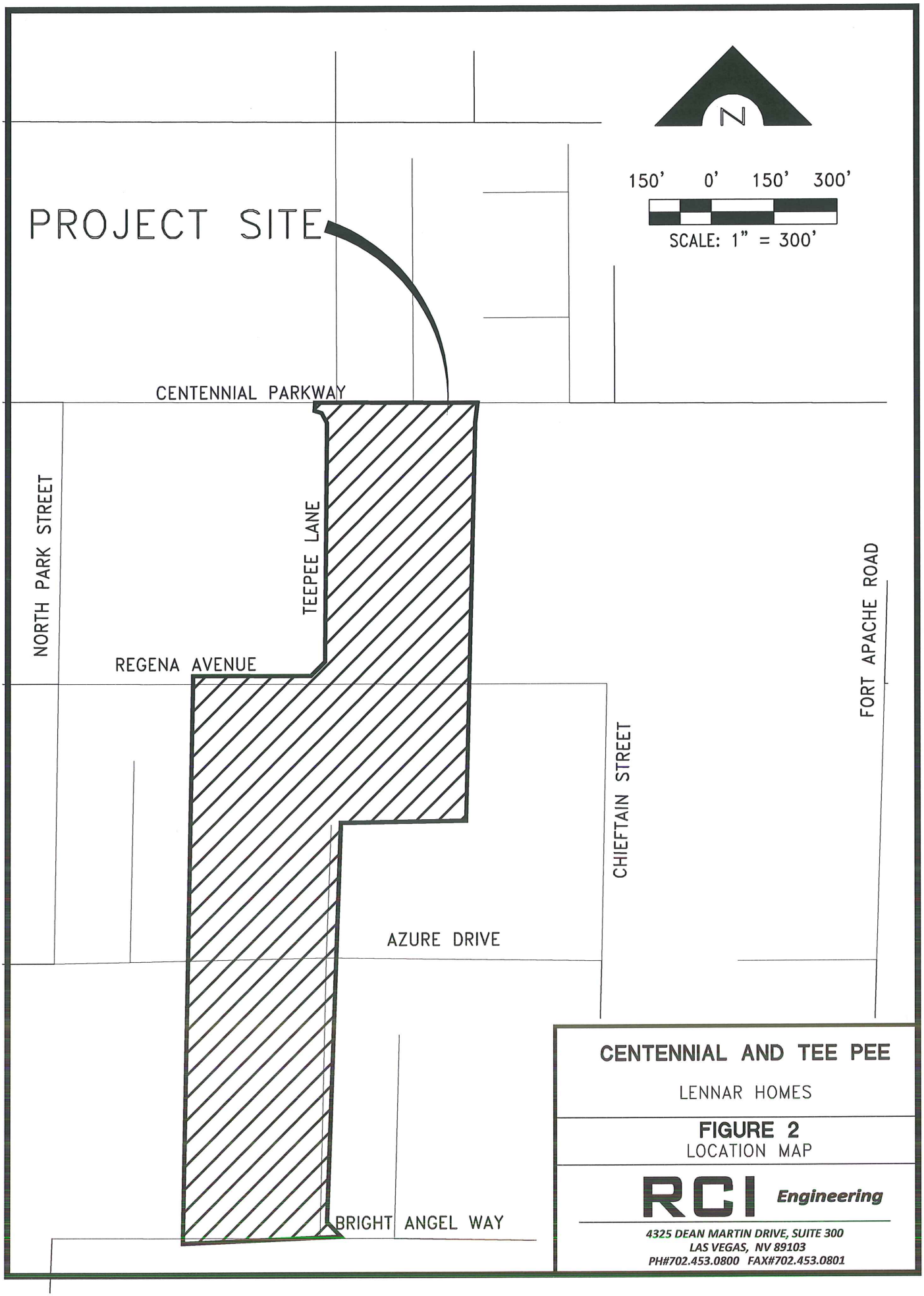
LENNAR HOMES

FIGURE 1
VICINITY MAP

RCI Engineering

4325 DEAN MARTIN DRIVE, SUITE 300
LAS VEGAS, NV 89103
PH#702.453.0800 FAX#702.453.0801

O:\3040_LENR\0038_Centennial and Tee Pee_DRAIN\FIGURES\ORIGINAL\figure1.dwg rread 4/08/14 1:56pm



CENTENNIAL AND TEE PEE

LENNAR HOMES

FIGURE 2
LOCATION MAP

RCI Engineering
4325 DEAN MARTIN DRIVE, SUITE 300
LAS VEGAS, NV 89103
PH#702.453.0800 FAX#702.453.0801

O:\3040_LENR\0038_Centennial and Tee Pee_DRAIN\FIGURES\ORIGINAL\figure2.dwg rread 4/08/14 1:57pm

This update to the Original Study has been prepared due to the following revisions:

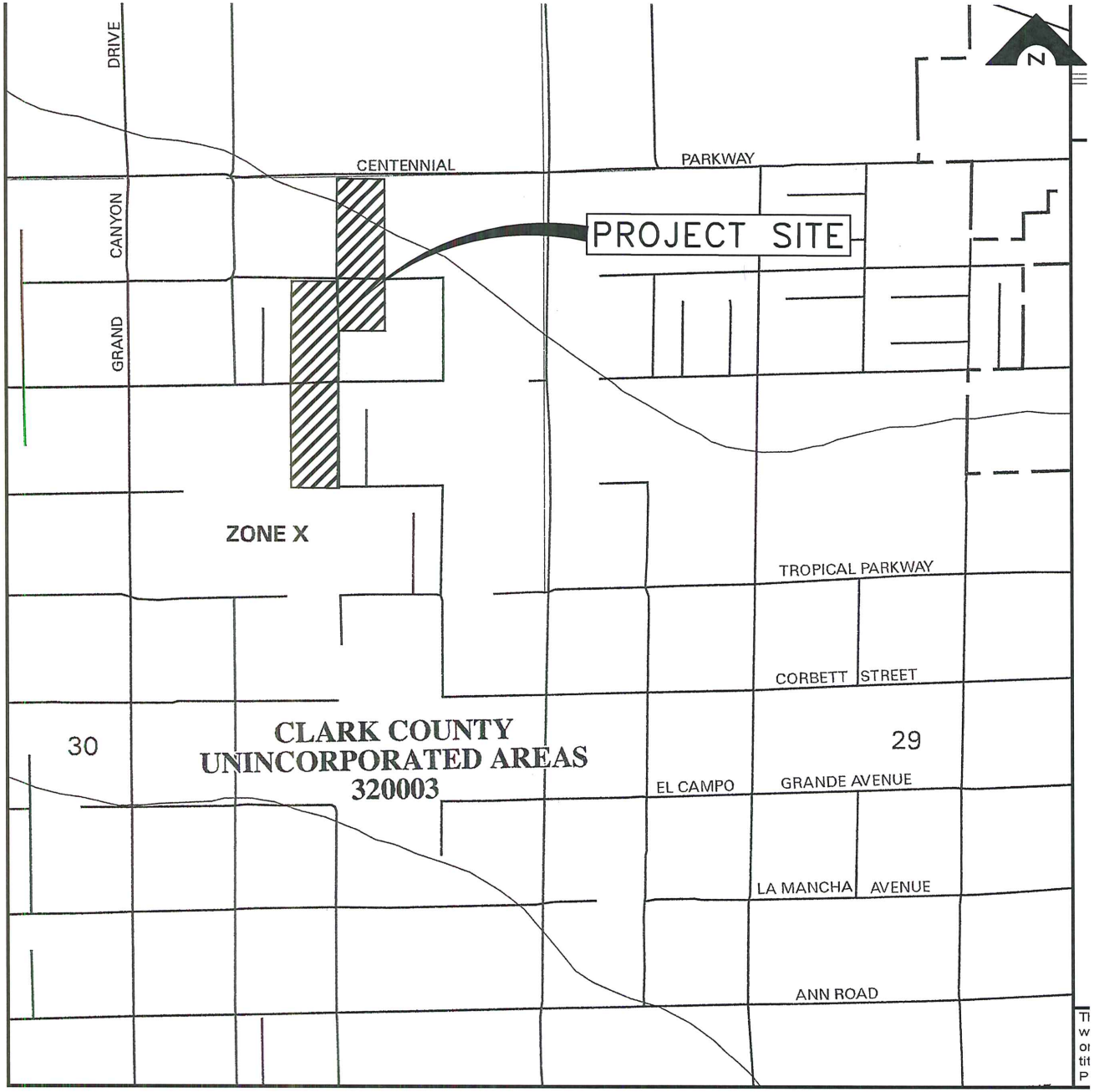
1. The onsite street layout and lot configuration have been revised.
2. Onsite street slopes and finish floor elevations have been revised.
3. Roadway grades have been revised in Tee Pee Lane, Regena Avenue, Azure Drive and Bright Angel Way.
4. Offsite storm flows tributary to the site have not been revised, but the flow split calculations for storm flows at the Regena Avenue/Tee Pee Lane intersection and at the Azure Drive/Tee Pee Lane intersection have been revised.
5. Regena Avenue, Azure Drive and Bright Angel Way will be constructed with a nonurban street section instead of with curb and gutter as was proposed in the Original Study per the Notice of Final Action for the tentative map (See Appendix C).
6. Revisions have been made to the onsite grading for the site.

FEMA

Figure 3 was reproduced from the FIRM containing Community Panel Number 32003C1745E, dated September 27, 2002. Review of the FIRM shows that the Project is currently located within a Zone X. Zone X areas are defined as areas determined to be outside of 0.2% annual chance floodplain.

CCRFCD Revisions

The Original Study referenced the *2002 Clark County Regional Flood Control District (CCRFCD) Master Plan Update*. Since approval of the Original Study the 2002 MPU has been replaced with the 2013 MPU (Reference 2). Figures 4A and 4B have been reproduced from Figure F-13 and F-19 of the 2013 CCRFCD Master Plan Update. This figure depicts the project site in relation to existing and proposed CCRFCD facilities. As shown on the figure, the site is not bordered by any proposed or existing CCRFCD facilities. The nearest facility is GONO 0486 and 0511, which is approximately 1000 feet west of the site. Therefore, this study will not be submitted to CCRFCD for concurrence.



NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1745 E

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY,
NEVADA AND
INCORPORATED AREAS

PANEL 1745 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

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

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

MAP NUMBER
32003C1745 E

MAP REVISED:
SEPTEMBER 27, 2002

Federal Emergency Management Agency

MAP SCALE 1" = 1000'

00 0 1000 2000 FEET

CENTENNIAL AND TEE PEE

LENNAR HOMES

FIGURE 3

F.I.R.M. MAP

RCI Engineering
4325 DEAN MARTIN DRIVE, SUITE 300
LAS VEGAS, NV 89103
PH#702.453.0800 FAX#702.453.0801

O:\3040_LENR\0038_Centennial and Tee Pee_DRAIN\FIGURES\ORIGINAL\figure3.dwg rread 4/08/14 1:47pm

REGIONAL FLOOD CONTROL DISTRICT

2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F- 13
FLOOD CONTROL FACILITIES

LEGEND

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

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

Remove & Replace/Parallel Facilities

Category A	Category B
Channel	Channel
Stormdrain	Stormdrain

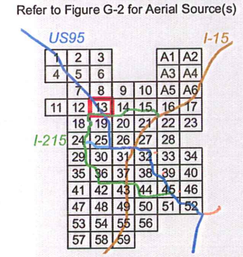
FIGURE 4A

N

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

Scale: 1 inch = 2,000 feet

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



AREA OF STUDY

REGIONAL FLOOD CONTROL DISTRICT

2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F- 19
FLOOD CONTROL FACILITIES

LEGEND

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

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

Remove & Replace/Parallel Facilities

Category A	Category B
Channel	Channel
Stormdrain	Stormdrain

AREA OF STUDY

FIGURE 4B

N

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

Scale: 1 inch = 2,000 feet

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

US95 I-15 I-215

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

Hydrology Revisions

The Original Study determined that the onsite and offsite subbasins lie outside the McCarran Rainfall Area as delineated on Figures 501 and 503 from the Manual. The 10-year and 100-year point precipitation values used for this update will be 1.74 inches and 3.00 inches during a 6-hour storm event, respectively. This equates to a 0.58 ratio between the 10-year and 100-year storm events. The rainfall used for this drainage study matches what was presented in the Original Study. Since the drainage area for the project will be less than 8 square miles, an SDN 3 design storm distribution per Table 503 of the Manual was selected for use in the HEC-1 computer model.

The offsite drainage basins for this update have been referenced from the Original Study. Onsite drainage basins closely match what was presented in the Original Study with some minor revisions to reflect changes in drainage slopes and lot configurations. The soil boundaries for the subject study area were obtained from electronic GIS data distributed with the 2002 MPU. The electronic GIS soil coverage delineates families of soil types and the soil name and map symbol of each family. The onsite subbasins have been delineated on the Soils Map exhibit included in Appendix A for proposed conditions. The site itself is comprised of soil types 190 and 191, Dalian.

The 2002 MPU GIS soil coverage was based on the soil information provided in the SCS Soil Survey of Las Vegas Valley Area (Reference 3, hereinafter referred to as the SCS Study). References from the SCS Study have been included in Appendix A that delineates Soil Type 190 as HSG "B" and Soil Type 191 as HSG "B" which is consistent with the Original Study. Pertinent soil references have been included in Appendix A.

For the given soils, CN values were determined from the appropriate columns of Table 602 of the Manual. Under proposed conditions the site was modeled as HSG "B" type soil for Residential development for lots with an average lot size of 20,000 sf. The hydrological model prepared with this study used HEC-1 and a CN value of 70 for the onsite drainage basins.

The onsite and adjacent street subbasins and flow patterns used in the hydrologic modelling were determined from electronic files of the grading plans for the Project. RCI Engineering has

reviewed the hydrological input parameters and basin boundaries for existing conditions for the site as presented in the Original Study and concur with the approved analysis. Please refer to Figure 3 (in Appendix C) from the Original Study for the existing drainage patterns and storm flows. Additionally, the offsite future conditions storm flows have been referenced from the Original Study. Please refer to Figure 5 (in Appendix C) from the Original Study for the future offsite drainage patterns and storm flows.

Existing Conditions

Existing conditions were addressed in the Original Study and will not be revised for this update. Existing conditions drainage patterns and a summary of existing conditions storm flows are shown on Figure 3 (in Appendix C). Existing conditions offsite storm flows have been referenced for hydraulic calculations at five locations. Hydraulic sections will be discussed in detail later in this report. The first is at the downstream end of Subbasin *EXOF4 at the intersection of Tee Pee Lane and Centennial Parkway. The 100-year storm flows under existing conditions west of the Centennial Parkway/Tee Pee Lane intersection will be 58 cfs during a 100-year storm event. The capacity of the north half of Centennial Parkway at Section 1E is 45 cfs and 13 cfs will spill out of the roadway and drain south along the west side of Tee Pee Lane with 45cfs continuing east in the north half of Centennial Parkway.

The second location is along the west side of Lots 29 through 32 at the southwest end of the project. Under existing conditions Subbasin *EXOF11 will generate 13 cfs during a 100-year storm event. Existing conditions are the worst case storm flows tributary to the project at that location, since a CN value of 75 was used for existing conditions and a CN value of 70 was used for that area in the ultimate condition. The 13 cfs that drains to the site will drain to a low point in Subbasin *EXOF11 and then east through a proposed 10-foot wide concrete lined easement, into Flaxa Ranch Court and then south to Bright Angel Way. Normal depth calculations for the easement have been included in Appendix B.

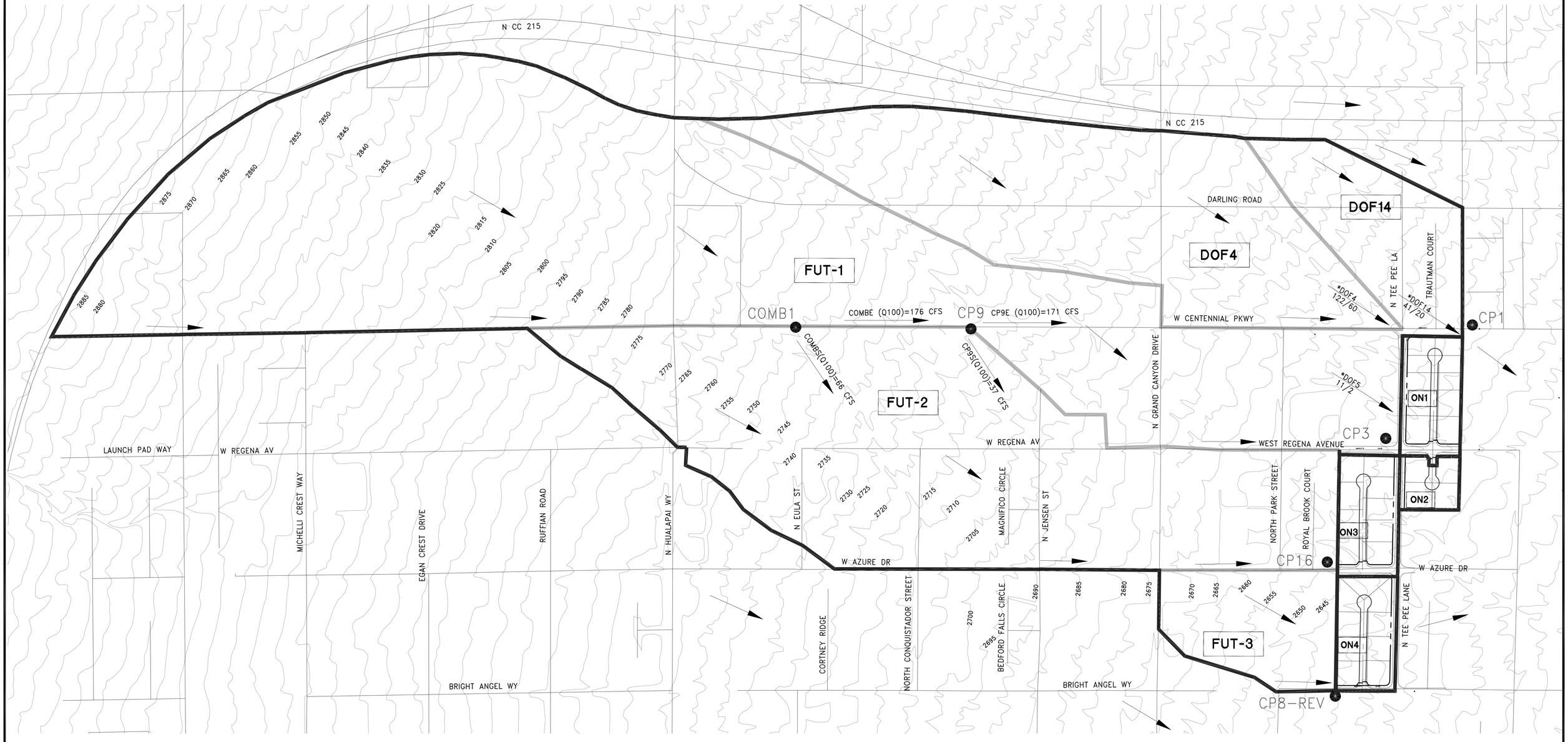
The third location is Subbasin *EXOF13 that was delineated for the existing Darnell Elementary School on the south side of Bright Angel Way across the street from Lots 24 and 32. A portion of the school has been graded to drain into Bright Angel Way and Subbasin *EXOF13 (on Figure 3

in Appendix C) will generate 5 cfs during a 100-year storm event. The runoff from *EXOF13 has been added to the storm flows at Concentration Point CP-BA2. Section 8F has been cut for Bright Angel Way and uses the combined storm flows at Concentration Point CP-BA2 which included referenced Subbasin *EXOF13.

The two other locations where existing conditions storm flows were referenced was at the Regena Avenue/Tee Pee Lane intersection (Concentration Point CP3) and at the Azure Drive/ Tee Pee Lane intersection (Concentration Point 6) for existing conditions flow split calculations at those intersections. The existing conditions flow split calculations have been performed for comparison to future conditions storm flow calculations to ensure that existing drainage patterns will be preserved with development of the project.

Developed Offsite Flow Summary

Figure 5 has been created to depict a summary of the referenced offsite drainage basins that have been combined together to simplify the 100-year and 10-year storm flows referenced from the Original Study. Please refer to Figure 5 referenced from the Original Study in Appendix C. As is shown on the referenced figure the drainage basins tributary to the site were broken into multiple subbasins. The subbasins referenced from the Original Study have been combined into larger basins on Figure 5 for references purposes and show the drainage areas that drain to the major concentration points adjacent to the site. In the Original Study the basin delineation did not change from existing conditions to ultimate conditions. The only change was that the CN values were changed from the existing condition to developed conditions to calculate future condition storm flows. Figure 5 shows the future conditions storm flow summary for the offsite basins because it is the worst case storm flows tributary to the site. No changes were made to the offsite flow characteristics as presented in the HEC-1 model from the Original Study.



FUT-1
DCHS1
CHS2
CHS3
DOF51
DOF61
DOF3
DOF2
DOF6
DOF5
RG2
TP1
CP3=246/153

FUT-2
DOF1
DOF8
DOF7
DOF9
DOF10
CP16= 168/18

FUT-3
DOF11
DOF12
CP8-REV=12/1

DOF4
122/60

DOF14
41/20

CP1
DOF4
DOF14
CNT-1
CP1=162/80

LEGEND

- FLOW DIRECTION
- DRAINAGE BASIN BOUNDARY LINE
- COMBINED BASIN LINE
- FUT-3 — COMBINED DRAINAGE SUBBASINS FROM ORIGINAL STUDY
- CP8 — PROPOSED CONCENTRATION POINT
- COMBE= 176 CFS — FLOW SPLIT LOCATION
- 20/6 — 100YR/10YR STORM FLOWS

N

150' 0' 150' 300'

SCALE: 1" = 300'

CENTENNIAL AND TEE PEE
LENNAR

FIGURE 5
OFFSITE FLOW SUMMARY MAP

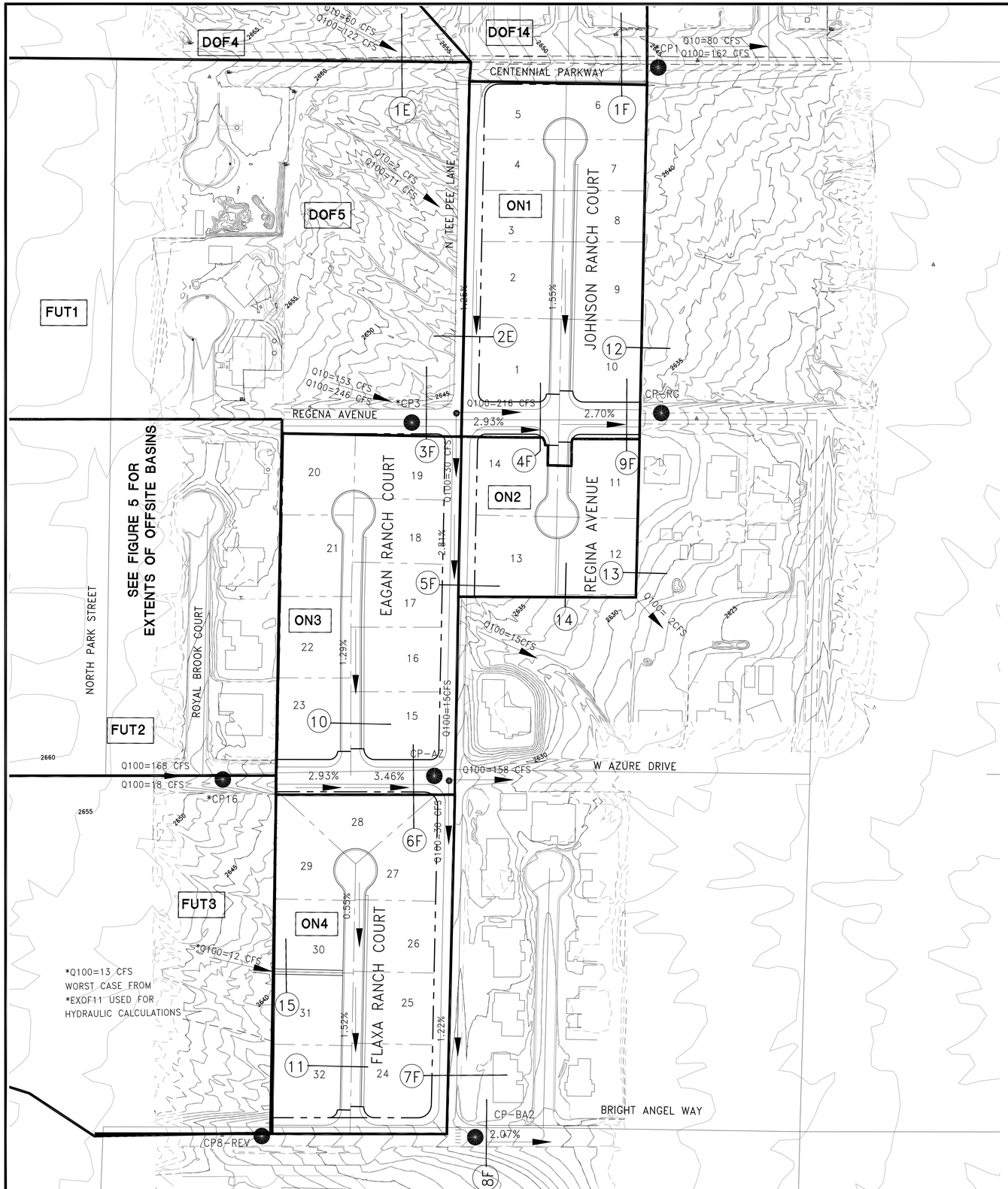
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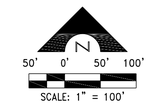
Ultimate Conditions

For ultimate conditions it is assumed that the site and all offsite areas tributary to the site have been developed which are the worst case storm flows. Ultimate conditions presented in this update assume that CCRFCD Facilities in Grand Canyon Drive have not been constructed and the tributary areas west of Grand Canyon Drive will drain toward the site. The Original Study also assumed the facility in Grand Canyon Drive was not constructed in the Future Conditions analysis. When that facility is constructed all of the tributary areas that produce storm runoff from the west side of Grand Canyon Drive will be conveyed to that facility and not drain toward the site. In the Original Study the future condition offsite areas that are tributary to the site match existing condition basin areas but CN values for developed conditions were used for the hydrologic analysis. A copy of Figure 5 (Future Conditions Drainage Basins), the Future Conditions HEC-1 model and the CN values from the Original Study have been included in Appendix C.

Figure 6 depicts the ultimate condition subbasins and flow patterns for the site. The ultimate condition HEC-1 model has been included in Appendix A. Table 1 summarizes the HEC-1 model for ultimate condition 100-year and 10-year flow rates. Please note that the ultimate conditions storm flows in Table 1 and on Figure 6 include the referenced storm flows for offsite subbasins from the Original Study that have been added directly to the HEC-1 output for the onsite basins.

Referenced Subbasin DOF4 will generate 100-year and 10-year storm flows of 122 cfs and 60 cfs, respectively. Referenced Subbasin DOF14 will generate 100-year and 10-year storm flows of 41cfs and 20 cfs, respectively. The runoff generated in those subbasins will drain east in the north half of Centennial Parkway and combine at referenced Concentration Point CP1 for a total 100-year and 10-year storm flows of 162 cfs and 80 cfs, respectively.





LEGEND

- FLOW DIRECTION
- ULTIMATE DRAINAGE BASIN BOUNDARY LINE
- ON1 — ULTIMATE DRAINAGE SUBBASINS
- CP-AZ — PROPOSED CONCENTRATION POINT
- Q100=176 CFS — STORM FLOW AND DIRECTION
- 1F — CROSS SECTION LOCATION
- Q100=XX CFS / Q10=XX CFS → *CP8 — REFERENCED STORM FLOWS FROM ORIGINAL STUDY
- Q100=176 CFS / Q100=176 CFS — FLOW SPLIT FLOWS AND DIRECTION

100-YEAR OFFSITE ULTIMATE HYDRAULIC SECTIONS

Location	Slope (%)	Q_{100} (cfs)	D_{100} (ft)	V_{100} (ft/sec)	$D*V_{100}$
SECT 1E CENTENNIAL PKWY	2.70	45	1.02	5.54	N/A
SECT 1F CENTENNIAL PKWY	2.65	162	0.95	8.62	8.2
SECT 2E TEE PEE LANE WEST	1.25	24	0.88	3.62	N/A
SECT 2E TEE PEE LANE EAST	1.25	1	0.28	1.76	N/A
SECT 3F REGENA AVE	2.70	246	1.21	7.71	9.3
SECT 4F REGENA AVE	2.93	216	1.16	7.54	8.7
SECT 5F TEE PEE LANE	2.81	30	0.65	4.7	3.1
SECT 6F AZURE DRIVE	3.46	173	1.07	7.34	7.9
SECT 7F TEE PEE LANE	1.22	30	0.78	3.14	2.4
SECT 8F BRIGHT ANGEL WAY	2.07	52	0.84	4.45	3.7
SECT 9F REGENA AVENUE	2.70	221	1.18	7.4	8.7
SECT 10 EAGAN RANCH (FLATTEST)	1.29	5	0.28	2.57	0.7
SECT 11 FLAXA RANCH (STEEPEST)	1.52	18	0.40	3.61	1.4

10-YEAR OFFSITE ULTIMATE HYDRAULIC SECTIONS

Location	Slope (%)	Q_{10} (cfs)	D_{10} (ft)	V_{10} (ft/sec)	$D*V_{10}$
SECT 3F REGENA AVE	2.70	153	1.07	6.49	6.9
SECT 6F AZURE DRIVE	3.46	19	0.53	4.53	2.4

100-YEAR HYDRAULIC SECTIONS - CURB AND GUTTER

Location	Slope (%)	Q_{100} (cfs)	D_{100} (ft)	V_{100} (ft/sec)	$D*V_{100}$
SECT 3F REGENA AVENUE	2.70	246	0.85	9.19	7.8
SECT 4F REGENA AVENUE	2.93	216	0.81	8.94	7.2
SECT 6F AZURE DRIVE	3.46	173	0.74	8.60	6.4
SECT 7F TEE PEE LANE	1.22	30	0.54	3.46	1.9
SECTION 8F BRIGHT ANGEL WAY	2.07	52	0.59	4.72	2.8
SECTION 9F REGENA AVENUE	2.70	221	0.83	8.8	7.3

100-YEAR ONSITE CONCRETE DITCH HYDRAULIC SECTIONS

Location	Slope (%)	Q_{100} (cfs)	D_{100} (ft)	V_{100} (ft/sec)
SECTION 12	0.55	1	0.53	2.42
SECTION 13	1.82	1	0.42	3.79
SECTION 14	0.50	1	0.15	1.67
SECTION 15	1.00	13	0.35	4.31

ULTIMATE CONDITIONS HEC-1 SUMMARY

SUBBASIN OR CP	BASIN AREA (AC)	100 YR (cfs)	10 YR (cfs)
ON1	5.06	5	1
CP-RG	N/A	221	147
ON2	2.19	2	<1
ON3	5.1	5	1
CP-AZ	N/A	188	19
ON4	4.77	5	1
CP-BA2	N/A	52	4

CP-RG= ON1 + FLOW SPLIT REGENA EAST
CP-AZ= CP16 + ON3 + FLOW SPLIT REGENA SOUTH
CP-BA2= ON4 + CP8-REV + FLOW SPLIT AZURE SOUTH + EXOF13

CENTENNIAL AND TEE PEE
LENNAR

FIGURE 6
ULTIMATE CONDITION DRAINAGE MAP

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TABLE 1 ULTIMATE CONDITIONS HEC-1 MODEL SUMMARY			
SUBBASIN OR CP*	BASIN AREA (AC)	100 YR (cfs)	10 YR (cfs)
ON1	5.06	5	1
**CP-RG	N/A	221	147
ON2	2.19	2	<1
ON3	5.1	5	1
***CP-AZ	N/A	188	19
ON4	4.77	5	1
****CP-BA2	N/A	52	4

*See Figure 6

** CP-RG=ON1+FLOW SPLIT REGENA EAST

***CP-AZ=CP16+ON3+FLOW SPLIT REGENA SOUTH

****CP-BA2=ON4+CP8-REV+FLOW SPLIT AZURE SOUTH+EXOF13

Subbasin FUT-1 represents the combined drainage basins for the developed conditions storm flows that are tributary to Concentration Point CP3 at the Regena Avenue/Tee Pee Lane intersection. Please refer to Figure 5 which shows a summary of the basins from the Original Study that were combined to delineate Subbasin FUT-1. The Original Study calculated flow splits at COMB1 and at CP9 which have been accepted by this update and shown on Figure 5. Subbasin FUT-1 will generate 246 cfs and 153 cfs during 100-year and 10-year storm events, respectively. Runoff from Subbasin FUT-1 will drain southeast to Concentration Point CP3 located at the Regena Avenue/Tee Pee Lane intersection. A flow split will occur at the Regena Avenue/ Tee Pee Lane intersection with 216 cfs draining east in Regina Avenue and 30 cfs draining south in Tee Pee Lane. The flow split calculation (Appendix B) that was performed for the storm flows at the Regena Avenue/Tee Pee Lane intersection showed that 30 cfs will spill south in Tee Pee Lane during a 100-year storm event. The flow split will be discussed in detail in the Hydraulics Section of this report. The east half of Tee Pee Lane will be constructed only to the southwest corner of Lot 13. The 100-year storm flow of 30 cfs will be split evenly in Tee Pee Lane and 15 cfs will spill out of the east half of the street where the Tee Pee Lane swale on the east side of the road drains into an existing wash.

Subbasin ON1 will generate 5 cfs and 1 cfs during 100-year and 10-year storm events,

respectively. Runoff from Subbasin ON1 will drain to Regena Avenue and then east to Concentration Point CP-RG where it will combine with the storm flow draining east in Regena Avenue for a combined 100-year and 10-year storm flow of 221 cfs and 148 cfs, respectively. Please see the Hydraulics Section of this report for a detailed discussion of the 100-year and 10-year storm flow splits.

Subbasin ON2 will generate 2 cfs and less than 1 cfs during 100-year and 10-year storm events, respectively. Runoff from Subbasin ON2 will drain southeast to the southeast corner of Lot 12. The 100-year storm runoff will drain in concrete line drainage ditches within private drainage easements, to a block wall opening and then discharge into the natural wash to the south. Drainage patterns for Subbasin ON2 match historical drainage patterns and the developed drainage patterns from the approved Original Study.

The 15 cfs in the east half of Tee Pee Lane south of Regena Avenue will spill out of the road and drain southeast in the natural wash where it will combine with the 100-year storm flow of 2 cfs from Subbasin ON2 for a combined 100-year storm runoff of 17 cfs in the natural wash. This is approximately 45 cfs less than the 60 cfs that was calculated in the approved Original Study (See Appendix C). Therefore, the grading at the Regina Avenue/Tee Pee Lane intersection and within Subbasin ON2 will not have a negative impact on the downstream residences. Hydraulic calculations for this area will be discussed in more detail in the hydraulics section of this report.

Subbasin FUT-2 represents the combined drainage basins for the developed conditions storm flows that are tributary to Concentration Point CP16 at the Azure Drive/Tee Pee Lane intersection. Subbasin FUT-2 will generate 168 cfs and 18 cfs during 100-year and 10-year storm events, respectively. Subbasin ON3 will generate 5 cfs and 1 cfs during 100-year and 10-year storm events, respectively. Runoff from Subbasin ON3 will drain south to Azure Drive and then east to Concentration Point CP-AZ. As was discussed in the previous paragraph there will be a 100-year storm flow of 15 cfs in Tee Pee Lane that will combined with the 100-year storm flows from Subbasin ON3 and Concentration Point CP16 for a combined 100-year storm flow at CP-AZ of 188 cfs. The 10-year storm flow at the intersection will be 19 cfs which is the combined 10-year storm flows of 18 cfs from *CP16 plus the 1 cfs from Subbasin ON3.

A flow split will occur at the Azure Drive/Tee Pee Lane intersection with 158 cfs draining east in

Regina Avenue and 30 cfs draining south in Tee Pee Lane. Subbasin FUT-3 (Original Study) will generate 12 cfs and 1 cfs during 100-year and 10-year storm events, respectively. However the existing condition flow of 13 cfs is higher due to a higher CN value as discussed under existing conditions. Hydraulic calculations have been based on the worst case storm flows of 13 cfs. The storm runoff from FUT-3 will drain east to the west property line of Subbasin ON4 where it will drain through a proposed 10-foot wide concrete lined drainage easement east to Flaxa Ranch Court. Subbasin ON4 will generate 5 cfs and 1 cfs during 100-year and 10-year storm events, respectively. Runoff from Subbasin will drain to Bright Angel Way where the flows will combine with the 13 cfs from Subbasin FUT-3 for a combined 100-year and 10-year storm flow of 18 cfs and 2 cfs, respectively. The 100-year storm flow from Flaxa Ranch Court will drain east in Bright Angel Way where it will combined with the 100-year storm flow of 30 cfs that splits out of the Azure Drive/Tee Pee Lane intersection and the referenced 100-year storm flow from Subbasin *EXOF13 for a combined 100-year and 10-year storm flow of 52 cfs and 4 cfs, respectively.

Hydraulics Section

The Original Study calculated a flow split under future conditions at the Regena Avenue/Tee Pee Lane intersection with 55 cfs draining south (CP3S on Figure 6 in Appendix C) and 191 cfs draining east (CP3E on Figure 6 in Appendix C). The Original Study used a weir calculation to determine the storm flows that will split out of the Regena Avenue/Tee Pee Lane intersection and drain south in Tee Pee Lane. The Original Study also assumed that all of the 100-year storm flow would drain east in Azure Lane (CP6E=228 cfs) during a 100-year storm due to a proposed hump in Tee Pee Lane that would have prevented any runoff from draining south. It is unclear why a hump was provided in Tee Pee Lane at that intersection since that does not match existing conditions. Additionally, providing a hump would negatively impact the wall of the existing property on the east side of Tee Pee Lane.

Revised flow split calculations were performed for this update for the existing conditions and future conditions 100-year storm flows at the Regena Avenue/Tee Pee Lane intersection and at the Azure Drive/Tee Pee Lane intersection. The flow split calculations were first performed for the intersections in the existing condition to determine quantities that would drain south and east. Flow split calculations were then performed using developed conditions slopes and street sections

to closely match the drainage patterns that occurred under the existing condition.

Under existing conditions there will be a 100-year storm flow of 211 cfs (referenced existing condition at Concentration Point *CP3 from Original Study) at the Regena Avenue/Tee Pee Lane intersection. Regena Avenue is currently graded with a 1 foot deep swale along both sides of the road and in the existing conditions approximately 8 cfs will spill out of the swale and drain south with 203 cfs continuing east in Regena Avenue. The flow split calculations for existing conditions at this intersection was based on a normal depth calculation for Regena Avenue and then a weir calculation that is 60-feet long (width of Tee Pee Lane). The 100-year storm flow will drain at a depth of 1.12 feet and a water surface elevation of 0.12 feet deep over the existing top of swale that is 1 foot deep (See Appendix B for flow splits).

The ultimate condition is based on the same criteria of maintaining a 1-foot high point in Tee Pee Lane south of Regena Avenue. In the ultimate condition (worst case) there will be a 100-year storm flow of 246 cfs at the intersection (referenced future condition at Concentration Point CP3 from Original Study). A high point has been graded in Tee Pee south of the intersection to an elevation of 1 foot over the flowline in Regina Avenue to match existing conditions. A weir calculation for the developed condition shows that a 100-year storm flow of 30 cfs will spill and drain south in Tee Pee Lane with 216 cfs continuing east in Regina Avenue. A 10-year flow split calculations was performed for the intersection with a flow depth of 1.1 feet as calculated in Cross Section 3F on Figure 6. That calculations shows that 6 cfs of the 153 cfs at the intersection will split and drain south in Tee Pee Lane. The Original Study showed 60 cfs draining south in Tee Pee Lane during a 100-year event. The revised split of 30 cfs is based on matching the existing condition hump of 1-foot with the ultimate condition hump of 1-foot.

Under existing conditions there will also be a 100-year storm flow split that will occur at the Azure Drive/Tee Pee Lane intersection. Under existing conditions there will be a 100-year storm flow of 127 cfs (referenced existing condition Concentration Point *CP6 from Original Study) at the intersection. Azure Drive is currently graded with a 0.4 foot deep swale along the south side of the road and in the existing conditions approximately 26 cfs will spill over the graded swale and drain south with 101 cfs continuing east in Azure Drive. The flow split calculations for existing conditions at this intersection is based on normal depth calculations for Azure Drive and then a weir that is 60-feet long and a water surface elevation of 0.4 feet deep over the weir

elevation.

The Azure Drive/Tee Pee Lane intersection has been graded to closely match the existing grades at the intersection. In the ultimate condition there will be 188 cfs at the intersection due to upstream development. Azure Drive slopes at 2.36 percent toward the east and Tee Pee Lane slopes at 0.61 percent south at the intersection. The flow split calculation for developed conditions has been performed by equalizing the water surface elevation in Flowmaster with the developed conditions slopes for each road. It is assumed the flow in the north half of the road (94) cfs will continue east. By equalizing the normal depth calculations it has been determined that 30 cfs will drain south in Tee Pee Lane and 64 cfs of the 94 cfs in the south half of Azure Drive will continue east in Azure Drive for a total flow of 158 cfs (94 + 64). The existing condition flowline in the south half of Azure Drive just east of the intersection was lowered to ensure that homes along Tee Pee Drive will not see an increase in WSE from the adjacent swale. A 10-year flow split calculation was not performed for this intersection since there will be only 19 cfs in Azure Drive on the north half of the street. Calculations for the existing and developed conditions for the flow splits along with a figure for each condition at the Tee Pee/Azure Drive and at the Tee Pee Lane/Regena Drive intersection have been enclosed in Appendix B.

Hydraulic cross sections were calculated in Flowmaster to determine hydraulic characteristics and check finish floor elevations. The section locations have been shown on Figure 6, included in Appendix B, and summarized below in Table 2. Table 3 is a summary of the major flows cross sections in the same locations as Table 2 but with a 60-foot urban cross section including curb, gutter, and sidewalk. The flow rates for each section are based on the calculated 100-year storm flows for the future conditions or referenced future conditions offsite flow rates. The exception is that the flow rates for the north half of Centennial Parkway at Section 1E and for the west half of Tee Pee Lane at Cross Section 2E are based on the existing conditions storm flows since Centennial Parkway west of the site has been constructed as a nonurban street section and the 100-year storm flows than drain to Tee Pee Lane on the west side are higher under existing conditions than under ultimate conditions.

All of the offsite streets adjacent to the site will be constructed as nonurban 60-foot wide streets, with the exception of Centennial Parkway which will be constructed with full half street improvements for a 100-foot right-of-way. When the D*V product is less than 6 for the 100-year

storm event 10-year calculations were not required for those cross sections. Ten year storm flow calculations were conducted for Regena Avenue and Azure Drive since Manual criteria for a 10-year storm event is not met during a 100-year storm event (D*V less than 6). Onsite streets will be constructed 39 feet wide with roll curb and gutter and a sidewalk on one side. Cross sections were cut for the flattest and steepest slopes for the interior streets. Additionally, future conditions storm flow calculations were conducted for the adjacent 60-foot streets assuming that curb, gutter and sidewalk may be required at some future date and to ensure that Manual criteria is met under those conditions.

TABLE 2
100-YEAR
HYDRAULIC SECTIONS

Location*	Slope (%)	Q_{100} (cfs)	D_{100} (ft)	V_{100} (ft/sec)	$D*V_{100}$
Section 1E Centennial Parkway	2.70	45	1.02	5.54	N/A
Section 1F Centennial Parkway-North Half	2.65	162	0.95	8.62	8.2
Section 2E Tee Pee Lane West	1.25	24	0.88	3.62	N/A
Section 2E Tee Pee Lane East	1.25	1	0.28	1.76	N/A
Section 3F Regena Avenue	2.70	246	1.21	7.71	9.3
Section 4F Regena Avenue	2.93	216	1.16	7.54	8.7
Section 5F Tee Pee Lane	2.81	30	0.65	4.7	3.1
Section 6F Azure Drive	3.46	173	1.07	7.34	7.9
Section 7F Tee Pee Lane	1.22	30	0.78	3.14	2.4
Section 8F Bright Angel Way	2.07	52	0.84	4.45	3.7
Section 9F Regena Avenue	2.70	216	1.18	7.40	8.7
Section 10 Eagan Ranch Court (flattest)	1.29	5	0.28	2.57	0.7
Section 11 Flaxa Ranch Court (steepest)	1.52	18	0.40	3.61	1.4

*See Figure 6

In most cases the streets do meet the Manual 100-year criteria for a depth times velocity (D*V) product to be less than 8 except for the north half of Centennial Parkway and in Regena Avenue. The north half of Centennial Parkway is existing and was calculated as a check to show that the flow doesn't overtop the crown and affect the Project. Regena Avenue adjacent to the site is a nonurban street section without curb and gutter. Table 3 shows that at Sections 3F and 4F the D*V product will be 9.3 and 8.7, respectively. The sections are based on offsite flows only that do not include any runoff from the site itself. The only runoff to Regena Avenue is the 5 cfs

produced from Subbasin ON1. Cross Sections 9F conservatively includes the 5 cfs from the site along with the 216 cfs in Regena Avenue as combining peak to peak for a total flow rate of 221 cfs. The depth itself changes by two hundredths and the velocity changes by 0.14 fps due to the addition of 5 cfs from development of the site. The D*V product for this section is 8.7 which matches the D*V product of 8.7 for the upstream cross section 4F. Therefore, development of the site does not impact the D*V product in Regena Avenue. Additionally, this is an interim condition until the future CCRFCD facility is built in Grand Canyon Drive which would cutoff the majority of the offsite flows tributary to Regena Avenue. Cross Sections 3F, 4F and 9F were modelled with curb and gutter in the event it is installed in the future and show the D*V product will be less than 8.

TABLE 3
100-YEAR
HYDRAULIC SECTIONS – CURB AND GUTTER

Location*	Slope (%)	Q_{100} (cfs)	D_{100} (ft)	V_{100} (ft/sec)	$D*V_{100}$
Section 3F Regena Avenue	2.70	246	0.85	9.19	7.8
Section 4F Regena Avenue	2.93	216	0.81	8.94	7.2
Section 6F Azure Drive	3.46	173	0.74	8.60	6.4
Section 7F Tee Pee Lane	1.22	30	0.54	3.46	1.9
Section 8F Bright Angel Way	2.07	52	0.59	4.72	2.8
Section 9F Regena Avenue	2.70	221	0.83	8.8	7.3

*See Figure 6

TABLE 4
10-YEAR
HYDRAULIC SECTIONS

Location*	Slope (%)	Q_{10} (cfs)	D_{10} (ft)	V_{10} (ft/sec)	$D*V_{10}$
Section 3F Regena Avenue (worst case)	2.70	153	1.07	6.49	6.9
Section 6F Azure Drive	3.46	19	0.53	4.53	2.4

*See Figure 6

As is shown in Table 4 Regena Avenue does not meet the Manuals criteria for a V*D product of less than 6 during a minor storm event. As was discussed previously the runoff generated on site by Subbasin ON1 (1 cfs) will not change the D*V product or characteristics in the road.

Centennial Parkway is a 100-foot right of way street. The 100-year and 10-year storm flows tributary to Centennial Parkway are generated from Subbasins DOF4 and DOF14 north of the roadway as shown on Figure 5. A 12-foot wide dry lane is maintained on the south half of Centennial Parkway during a 100-year storm event since the only runoff on the south side of the street is what falls in the roadway itself. Therefore, dry lane will be met during a 10-year storm event. A 10-year storm flow cross section calculation was not performed for Centennial Parkway since the 10-year storm flows will be negligible.

Section 1F was cut in Centennial Parkway using the combined developed storm flows from future Subbasins DOF4 and DOF14. There will be a 100-year ultimate condition storm flow of 162 cfs in Centennial Parkway (CP1 from the Original Study). As is shown in the cross section the ultimate condition 100-year storm flow in Centennial Parkway will be contained in the north half of the street and will not have a negative impact on the site.

Cross Section 2E West was cut in Tee Pee Lane just north of Regena Avenue. Subbasin *EXOF5 (worst case) will generate 11 cfs during a 100-year storm event and will drain along the west side of Tee Pee Lane to the Regina Avenue/Tee Pee Lane intersection. The 100-year storm flow along the west side of Tee Pee Lane will be the 11 cfs generated from Subbasin *EXOF5 plus the 13 cfs from Subbasin *EXOF4 that will overtop the centerline of Centennial Parkway during a 100-year storm event for a combined 100-year storm flow of 24 cfs. During a 100-year storm event the flow rate of 24 cfs will be conveyed at a depth of 0.88 feet with a velocity of 3.63 feet per second. The 100-year storm runoff will drain south along the west side of the street to the Regena Avenue/Tee Pee Lane intersection. The velocity of the 100-year storm flows are considered non-erosive. Additionally, flows will not overtop the crown and will not have a negative impact on the site. Section 2E East was cut in Tee Pee Lane on the east half of the road. The only runoff that will be in the east half of the road is what falls on the road itself since storm flows from the west do not overtop the crown of road. Cross Section 2E East used 1 cfs in the calculation which is the estimated 100-year storm flow generated by 1 cfs per acre from Subbasin ON1. The 1 cfs will drain at a depth of 0.28 feet and a velocity of 1.76 fps.

Section 3F was cut in Regena Avenue just west of Tee Pee Lane. Under developed conditions Regena Avenue will be constructed as 60-foot wide non urban street improvements. The worst case 100-year storm flows tributary to Regena Avenue will be the future conditions storm flows

of 246 cfs at Concentration Point CP3 referenced from the Original Study. During a 100-year storm event the flow rate of 246 cfs will be conveyed at a depth of 1.21 feet with a velocity of 7.71 feet per second for a D*V product of 9.3. Velocities in Regena Avenue are considered erosive and Regena Avenue will be constructed with a 3-foot deep by 1- foot wide lean concrete cutoff wall to protect against undercutting of the asphalt.

Section 4F was cut in Regena Avenue just east of Tee Pee Lane. The 100-year storm flows tributary to Regena Avenue at this location will be the future conditions storm flows of 216 cfs that continues east in Regina Avenue after the 100-year storm flows split at Tee Pee Lane. During a 100-year storm event the flow rate of 216 cfs will be conveyed at a depth of 1.16 feet with a velocity of 7.54 feet per second for a D*V product of 8.7. A hump has been provided in the entrance street for Lots 11-14 on the south side of Regina Avenue to a minimum elevation of 1.8 feet above the flowline. Therefore freeboard to an elevation of 0.6-feet above the 100-year storm event water surface elevation has been provided to keep runoff from draining onto the site.

Section 5F was cut in Tee Pee Lane south of Regena Avenue. The 100-year storm flows tributary to Tee Pee Lane at this location will be the future conditions storm flows of 30 cfs that drains south after the 100-year storm flow splits at Regena Avenue. During a 100-year storm event the flow rate of 30 cfs will be conveyed at a depth of 0.65 feet with a velocity of 4.70 feet per second for a D*V product of 3.1. Just south of Section 5F Tee Pee Lane on the east half of the nonurban section includes a low point in the flowline. The flows are split evenly at Section 5F and the 15 cfs draining in the west half of the road will continue south to Azure Drive. The 15 cfs in the east half of the road will spill out of the road and drain southeast through an existing wash where it will drain into Azure Drive east of the site. In the Original Study it was determined that 60 cfs would drain through the existing wash. Pertinent excerpts from the Original Study have been provided in Appendix C. Since the storm flows in the wash are less than what drains in the wash under existing conditions the proposed grading will not have a negative impact on the downstream properties in this area.

Section 6F was cut in Azure Drive just west of Tee Pee Lane. The 100-year storm flows tributary to Azure Drive will be the future conditions storm flows of 168 cfs at Concentration Point CP16 referenced from the Original Study plus 5 cfs generated from Subbasin ON3 for a combined 100-year storm flow of 173 cfs. During a 100-year storm event the flow rate of 173

cfs will be conveyed at a depth of 1.07 feet with a velocity of 7.34 feet per second for a D*V product of 7.9 which meets the manual criteria for a major storm event. Velocities in Azure Drive are considered erosive and Azure Drive will be constructed with a 3-foot deep by 1- foot wide lean concrete cutoff wall to protect from undercutting of the asphalt.

There will be a 100-year storm flow of 188 cfs at Concentration Point CP-AZ at the Azure Drive/Tee Pee Lane intersection. Section 7F was cut in Tee Pee Lane south of Azure Drive. The 100-year storm flows tributary to Tee Pee Lane at this location will be the future conditions storm flows of 30 cfs that drains south after the 100-year storm flows split at Azure Drive. During a 100-year storm event the flow rate of 30 cfs will be conveyed at a depth of 0.78 feet with a velocity of 3.14 feet per second for a D*V product of 2.4.

Section 8F was cut in Bright Angel Way just east of Tee Pee Lane. The 100-year storm flows tributary to Bright Angel Way will be a combination of the future and existing conditions storm flows of 52 cfs at Concentration Point CP-BA2. During a 100-year storm event the flow rate of 52 cfs will be conveyed at a depth of 0.84 feet with a velocity of 4.45 feet per second for a D*V product of 3.7 which meets the manual criteria for a major storm event.

The interior streets will be constructed 39-feet wide with roll type curb and gutter, and a 5-foot sidewalk on one side. Sections 10 and 11 were cut for the onsite interior streets. Section 10 used the 100-year storm flow of 5 cfs generated by Subbasin ON3 and Section 11 used a 100-year flow rate of 18 cfs with 5 cfs being generated by Subbasin ON4 and 13 cfs being generated by referenced *EXOF11 west of the site that drains through the 10-foot easement. Section 11 shows that the maximum onsite flow depth will be 0.40-feet during a 100-year storm event. Therefore, all onsite streets meet Design Manual criteria for storm flows to be less than 1 foot in the gutter flow line and the depth times velocity shall be less than or equal to 6 (10-year storm criteria) during a 100-year design storm event.

Lots 6 through 10 will be constructed with "B" Type drainage. The high point for those lots has been set at the middle of the lot with half the lot draining east into Johnson Ranch Court and half of those lots draining east to a private concrete lined easement with private maintenance along the east property line. The "B" Type drainage for this area is to keep the retaining walls to a minimum height of 3 feet per Title 30 criteria. The area that drains to the concrete lined

easement on the east is approximately 20 percent of the Subbasin ON1 or 1 cfs of 100-year storm runoff at the downstream end of the easement. Section 12 was cut in the easement. The perimeter wall will be solid grouted 3 courses above the concrete (See Detail 32 on Sheet D-2). An area drain is proposed at the downstream end of the easement. The area drain will be a Zurn Z1737 drain with an open area of 55 sq. inches (0.38 sq. ft.). See Details 30 and 31 on Sheet D-2. The inlet will intercept the 100-year storm flow at a depth of 1.0 feet with a 50-percent clogging factor. A grate inlet calculation has been included in Appendix B.

Lots 11 through 14 will be constructed with "A" and "B" Type drainage. The "B" Type drainage for this area is to keep the retaining walls to a minimum height of 3 feet per Title 30 criteria. All of the lots in this cul-de-sac will drain south and east to a private concrete lined easement with private maintenance along the south and east property line. Section 13 and 14 were cut in the easement and the normal depth cross section calculations have been included in Appendix B. The perimeter wall will be solid grouted 3 courses above the concrete ditch (See Details 16, 24, and 25 on Sheets D-1 and D-2). The 100-year storm runoff generated by Subbasin ON2 (2 cfs) will be conveyed southeast into the existing wash through a block wall opening which matches existing drainage patterns and the approved Original Study. A calculation using a 50-percent clogging factor applied has been included in Appendix B. The block wall opening detail is shown on Detail 26 on Sheet D-2.

The property is bordered on the west by USA owned property that is under the jurisdiction of the BLM. Offsite permission to grade will not be allowed by the BLM. Therefore a flood wall will be constructed along the entire western boundary along the backside of Lots 29 through 32. Storm flows from the west will pond up along the wall and either spill west into the easement located between Lots 30 and 31 or spill to the south into the Bright Angel Way right-of-way. The flood wall will be elevated to a minimum of two feet above the adjacent grade to provide for flood protection.

A 10-foot wide concrete easement with private maintenance is proposed between Lots 31 and 32 on the west side of Flaxa Ranch Court. Under existing conditions the 100-year storm runoff referenced from Subbasin *EXOF11 (13 cfs) will drain to the low point along the west property line and to the easement between Lots 31 and 32. The easement has been graded with a steep slope of 10 percent on the west and then flattens out to 1 percent. Section 15 has been cut in the

easement and the walls on either side will be solid grouted to 3 courses above the highest adjacent grade. A normal depth calculation has been included in Appendix B. Please refer to Detail 22 on Sheet D-2.

The drainage patterns for this update match what was approved with the Original Study with two exceptions. The first exception is that in the future condition the 100-year storm runoff that drains east in Regena Avenue is 25 cfs more than was calculated in the Original Study with 30 cfs less draining south in Tee Pee Lane. The Original Study was approved 10-years ago and grading at the intersection has been modified since that time as shown by the existing topography. Providing a 1-foot hump in Tee Pee Lane matches the existing grading at that intersection.

The second exception is that the grading at the Azure Drive/Tee Pee Lane intersection allows 70 cfs less runoff during a 100-year storm event to drain east than was calculated in the Original Study. A hump was provided in Tee Pee Lane just south of Azure Drive in the Original Study. It is unclear why a hump was provided in Tee Pee Lane at that intersection in the Original Study since there was not a hump in the existing condition. In the existing conditions flow split analysis for this update using existing conditions contours it was calculated that 26 cfs will turn the corner and drain south it Tee Pee Lane during a 100-year storm event. The proposed grading using ultimate conditions flows rates at the intersection directs 30 cfs south in Tee Pee Lane. The swale along the east side of Tee Pee Lane has been lowered from the existing grading which improves drainage on the east side of the road. The 100-year storm runoff is not erosive and flows 0.78 feet deep at cross section 7F just north of Bright Angel Way. Finish floor elevations of the existing lots on the east side of Tee Pee Lane are at or above the future condition 100-year water surface elevation. Therefore, an additional 4 cfs of 100-year storm runoff draining will not have a negative impact on the adjacent residences. A normal depth calculation using the existing conditions storm flows of 26 cfs was run and comparing the existing condition calculation with the ultimate conditions calculations shows that the 100-year WSE is raised by .03 feet using the additional 4 cfs of runoff in the calculation.

Per Design Manual criteria, the onsite finish floor elevations shall be set at a vertical distance of twice the depth of flow in the gutter flow line up to a maximum of 18-inches above the water surface elevation. Based on the street capacity calculations, the maximum depth of surface flow in the interior streets will be 0.4-feet and 1.21-feet in the adjacent streets for the 100-year storm

event. To meet 2* depth of flow criteria the finish floor elevations should be set to a minimum of 0.8-feet above the flow line on the interior and 2.42-feet above the flow line along the perimeter. However, the more stringent criteria required by Clark County, is to set the finish floor elevation 18-inches above the adjacent street centerline elevation. Lots 1 through 4 are below Tee Pee Lane. The retaining wall along the west side of those lots will be solid grouted to a minimum of 3 courses above the grades in Tee Pee Lane. The only runoff in Tee Pee Lane adjacent to Lots 1 through 4 will be what falls on the east half of the road itself A normal depth calculation for the east half of Tee Pee Lane assuming 1 cfs has been included in appendix B. Lot 11 is not 18-inches above the street centerline at the high point in the adjacent street. It is set 6-inches above the high point which is 6-inches above the WSE in Regena Avenue. Therefore, the finish floor is 1-foot above the 100-year WSE in Regena Avenue.

The proposed development of Centennial and Tee Pee is in conformance with the approved Original Study and other referenced drainage studies and the existing drainage patterns for the area. Therefore, the proposed project will not result in any adverse impacts on downstream facilities or properties.

REFERENCES

1. CVL Consultants, Inc., *Technical Drainage Study for Centennial/Tee Pee,* January 2007.

2. Regional Flood Control District, *Clark County Regional Flood Control District - The 2013 Las Vegas Valley Master Plan Update,* September 2013.

3. U.S. Department of Agriculture, Soil Conservation Service. SCS Soil Survey of Las Vegas Valley Area. July 1985.

APPENDIX A – HYDROLOGIC CALCS

Precipitation References

Soils Map

Soils References

Curve Number References

Ultimate Conditions

- Curve Number Calculations
- Standard Form 4
- Ultimate Conditions HEC-1 Model

Precipitation References from Original Study

PRECIPITATION ADJUSTMENT RATIOS

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

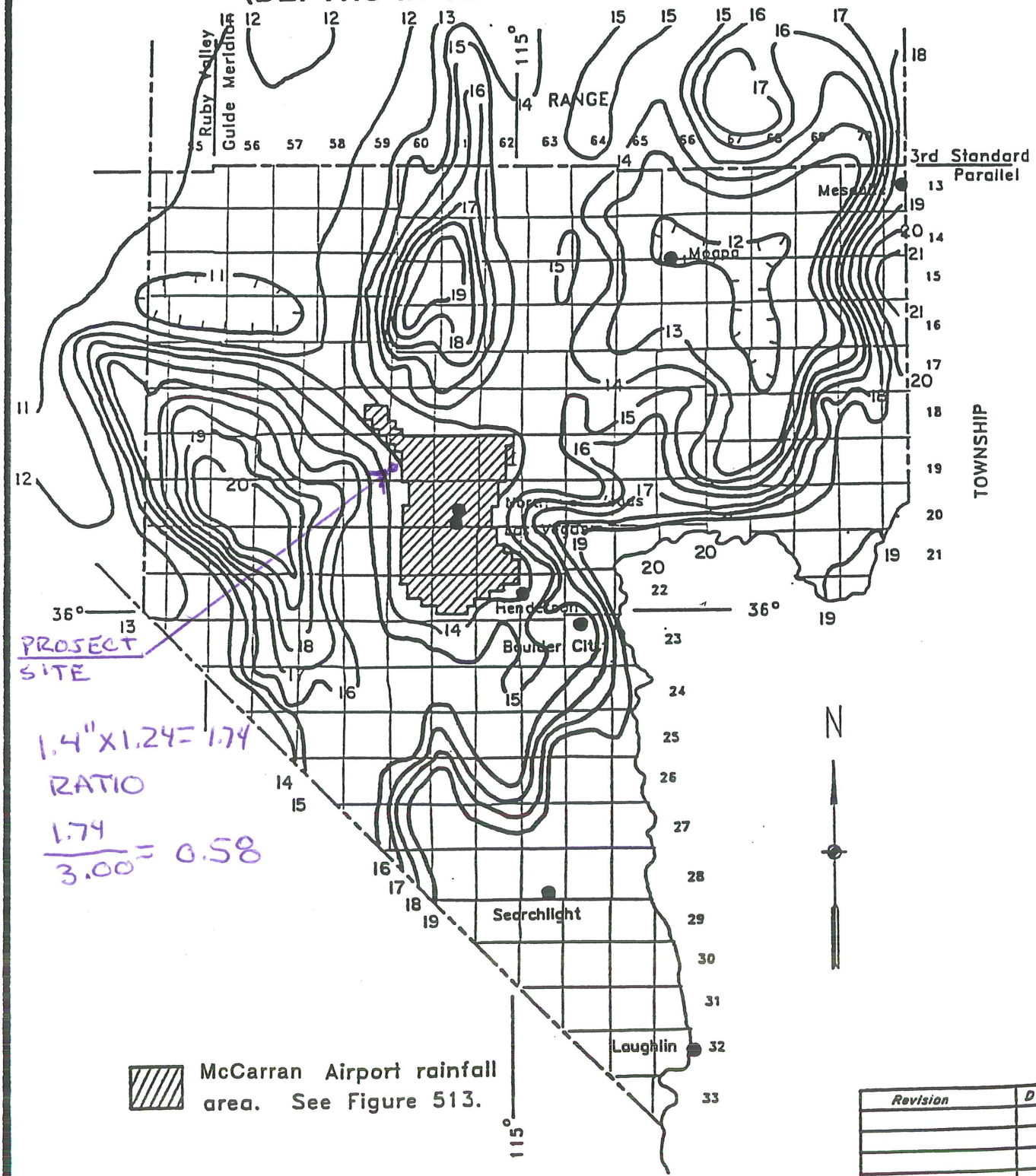
NOTE: 1. Multiply the values obtained from the NOAA Atlas 2 by the above ratios to obtain the adjusted precipitation values.

2. NOAA Atlas 2 values for use with TR-55 shall not be adjusted by the above ratios.

3. Tables 505 and 506 require no adjustments.

Revision	Date

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



Revision	Date

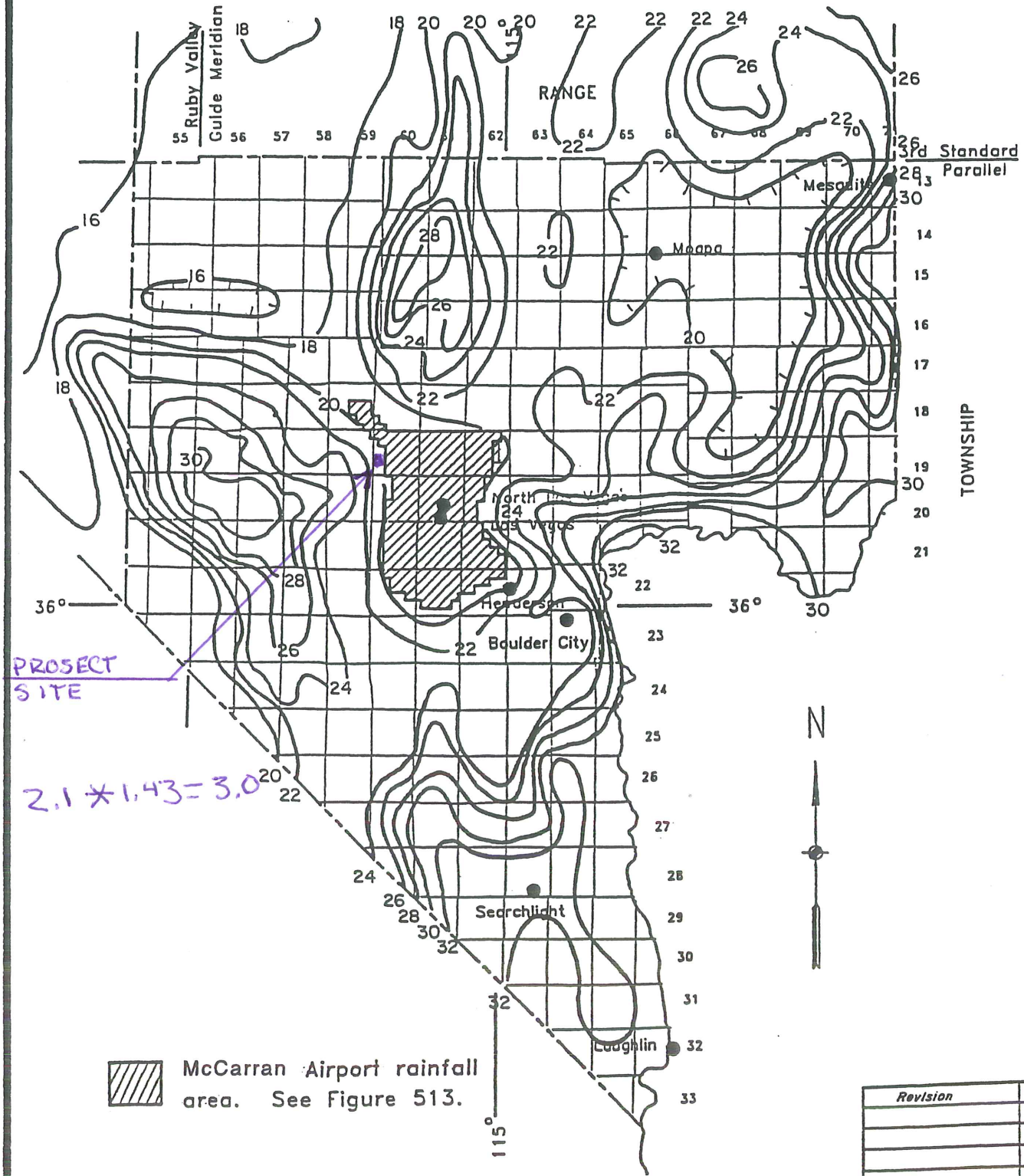
WRC ENGINEERING

REFERENCE:
NOAA ATLAS 2, VOLUME VII NEVADA, 1973

FIGURE 503

RAINFALL DEPTH-DURATION-FREQUENCY 100-YEAR, 6-HOUR

(DEPTHS IN TENTHS OF INCHES)

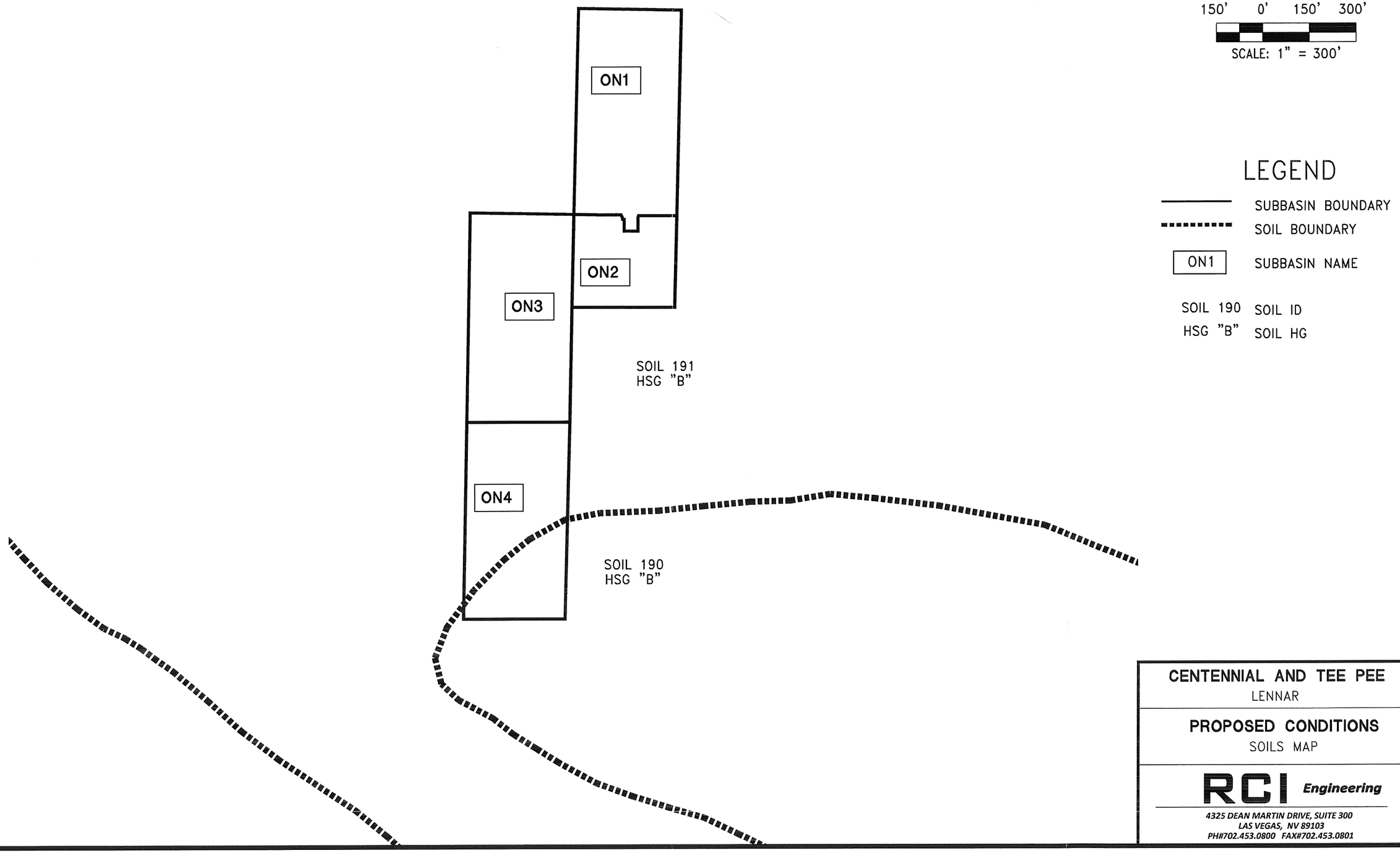


Revision	Date

WRC ENGINEERING

REFERENCE:
NOAA ATLAS 2, VOLUME VII NEVADA, 1973

FIGURE 506



CENTENNIAL AND TEE PEE

LENNAR

PROPOSED CONDITIONS

SOILS MAP

RCI Engineering
4325 DEAN MARTIN DRIVE, SUITE 300
LAS VEGAS, NV 89103
PH#702.453.0800 FAX#702.453.0801

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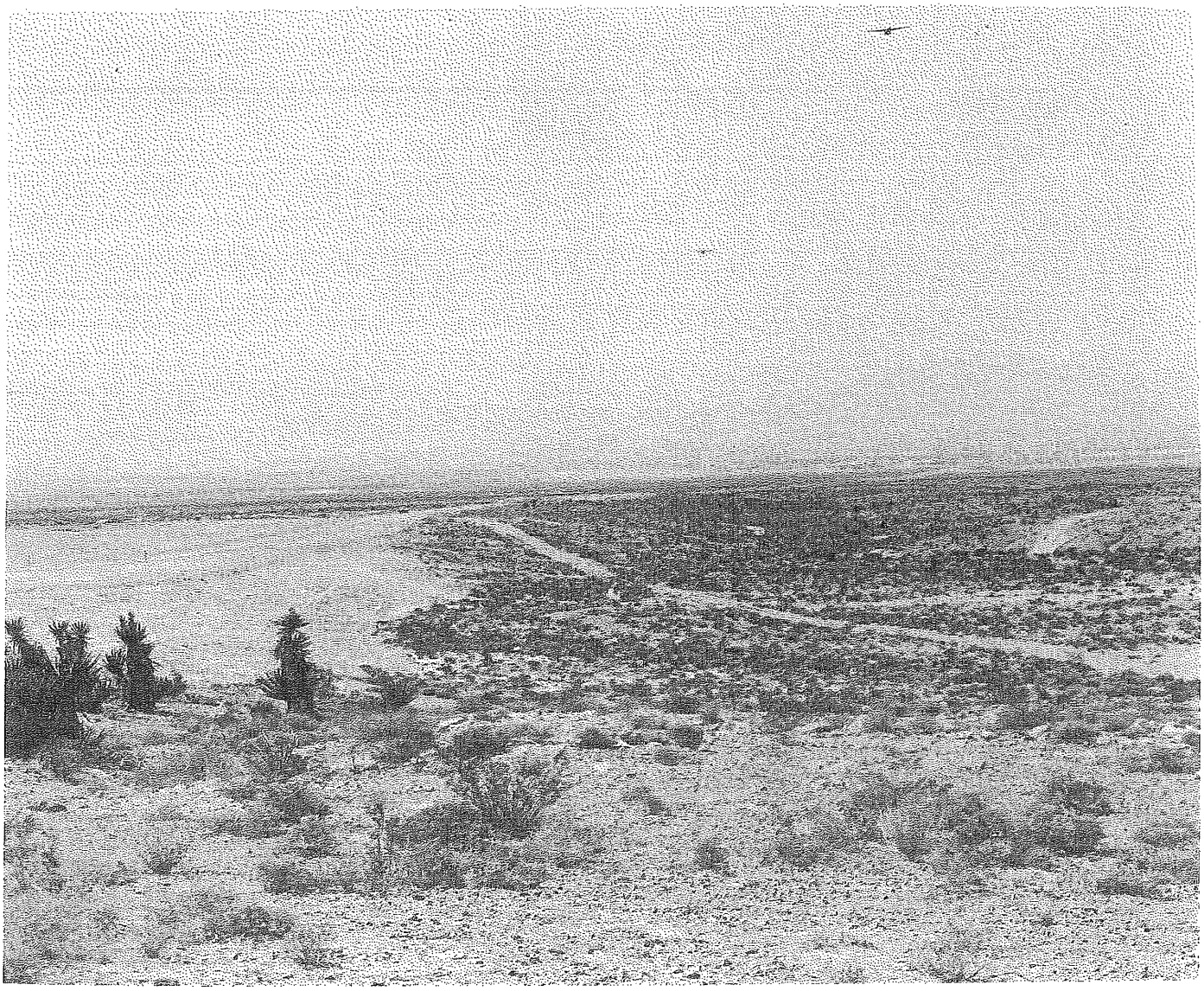
United States Department of Agriculture

Soil Conservation Service

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

Soil Survey of Las Vegas Valley Area Nevada

Part of Clark County



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

This unit is well suited to the construction of dwellings.

Unless the density of housing is too high, septic tank absorption fields normally function well on this unit.

Roads can easily be constructed and maintained on this unit.

The main limitations for lawns and landscaping are the cobbles and pebbles throughout the soil. Topsoil is needed for best results when landscaping, particularly in areas used for lawns. Lawn grasses, shrubs, and trees that are not sensitive to lime-induced chlorosis are well suited to use in landscaping. Annual applications of iron chelates reduce the effects of chlorosis.

This map unit is in capability subclass VIIs, nonirrigated, and in horticultural group 2.

184—Caliza very gravelly sandy loam, 2 to 8 percent slopes. This very deep, well drained soil is on erosional fan remnants. It formed in alluvium derived from various kinds of rock.

Typically, the surface layer is light brown very gravelly sandy loam about 3 inches thick. The upper 13 inches of the underlying material is light brown very gravelly sandy loam, and the lower part to a depth of 60 inches or more is light brown, stratified very gravelly coarse sand to very gravelly loamy sand.

Included in this unit is about 5 percent Aztec soils on erosional fan remnants. The percentage varies from one area to another.

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

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

The main limitation for construction of dwellings is the hazard of flooding.

Dikes and channels that have outlets for floodwater can be used to protect onsite sewage disposal systems from flooding.

Channeling and deposition can be minimized and maintenance costs reduced by protecting roads from flooding.

The main limitation for lawns and landscaping is the content of pebbles in the soil. Topsoil is needed for best results when landscaping, particularly in areas used for lawns. Lawn grasses, shrubs, and trees that are not sensitive to lime-induced chlorosis are well suited to use in landscaping. Annual applications of iron chelates reduce the effects of chlorosis.

This map unit is in capability subclasses IVs, irrigated, and VIIs, nonirrigated. It is in horticultural group 2.

187—Caliza extremely cobbly fine sandy loam, 2 to 8 percent slopes. This very deep, well drained soil is on inset fan remnants. It formed in alluvium derived from various kinds of rock.

Typically, about 85 percent of the surface is covered with a desert pavement of cobbles, stones, and pebbles. The surface layer is a light brown extremely cobbly fine sandy loam about 2 inches thick. The upper 12 inches of the underlying material is light brown and pink very gravelly sandy loam, and the lower part to a depth of 60 inches or more is light brown and pink, stratified material that averages very gravelly loamy coarse sand. In some areas of similar included soils, the surface layer is extremely stony fine sandy loam.

Included in this unit are about 5 percent Arizo soils, flooded, in channels; 5 percent Pittman soils on erosional fan remnants; and 5 percent Aztec soils on erosional fan remnants. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Caliza soil is moderately rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is moderate if the surface is disturbed.

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

This unit is well suited to the construction of dwellings.

Unless the density of housing is too high, septic tank absorption fields normally function well on this unit.

Roads can easily be constructed and maintained on this unit.

The main limitation for lawns and landscaping is the stones, cobbles, and pebbles on the surface and throughout the soil. Topsoil is needed for best results when landscaping, particularly in areas used for lawns. Lawn grasses, shrubs, and trees that are not sensitive to lime-induced chlorosis are well suited to use in landscaping. Annual applications of iron chelates reduce the effects of chlorosis.

Intermittent streams form the drainageways in this unit. These drainageways are subject to rare or occasional periods of high-velocity flooding. Care should be taken during urbanization to accommodate the runoff from the drainageways. If drains become plugged during a major flood, accelerated erosion and damage to roads, buildings, and other structures can occur.

This map unit is in capability subclass VIIs, nonirrigated, and in horticultural group 2.

190—Dalian very gravelly fine sandy loam, 2 to 4 percent slopes. This very deep, well drained soil is on fan skirts. It formed in alluvium derived dominantly from limestone and dolomite.

Typically, 65 percent of the surface is covered with a weakly developed desert pavement of pebbles. The surface layer is light yellowish brown very gravelly fine

sandy loam about 4 inches thick. The upper 7 inches of the underlying material is light yellowish brown extremely gravelly fine sandy loam, the next 6 inches is light yellowish brown very gravelly sandy loam, and the lower part to a depth of 61 inches is light yellowish brown extremely gravelly fine sandy loam. Pebbles cover 50 to 75 percent of the surface.

Included in this unit are about 5 percent Tencee soils on erosional fan remnants and 10 percent Arizo soils, flooded, in channels. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Dalian soil is moderately rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

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

This unit is well suited to the construction of dwellings.

Septic tank absorption fields generally function well unless the density of housing is too high.

Roads are easily constructed and maintained.

The main limitation for lawns and landscaping is the pebbles on the surface and throughout the soil. Topsoil is needed for best results when landscaping, particularly in areas used for lawns. Lawn grasses, shrubs, and trees that are not sensitive to lime-induced chlorosis are well suited to use in landscaping. Annual applications of iron chelates reduce the effects of chlorosis.

Intermittent streams form the drainageways in this unit. These drainageways are subject to rare or occasional periods of high-velocity flooding. Care should be taken during urbanization to accommodate the runoff from the drainageways. If drains become plugged during a major flood, accelerated erosion and damage to roads, buildings, and other structures can occur.

This map unit is in capability subclasses IVs, irrigated, and VIIs, nonirrigated. It is in horticultural group 2.

191—Dalian very cobbly fine sandy loam, 2 to 8 percent slopes. This very deep, well drained soil is on fan skirts. It formed in alluvium derived dominantly from limestone and dolomite.

Typically, about 85 percent of the surface is covered with a desert pavement of rock fragments. The surface layer is light yellowish brown very cobbly fine sandy loam about 5 inches thick. The underlying material to a depth of 60 inches or more is light yellowish brown very gravelly sandy loam to extremely gravelly fine sandy loam.

Included in this unit are about 10 percent Tencee soils on erosional fan remnants and 5 percent Arizo soils, flooded, in channels. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

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

Most areas of this unit are used as habitat for desert wildlife and for recreation. A few areas are used for urban development.

The main limitation for construction of dwellings is the hazard of flooding. Dikes and channels that have outlets for floodwater can be used to protect buildings from flooding.

Dikes and channels that have outlets for floodwater can be used to protect onsite sewage disposal systems from flooding.

Channeling and deposition can be minimized and maintenance costs reduced by protecting roads from flooding.

The main limitations for lawns and landscaping are the cobbles and pebbles on the surface and throughout the soil. Topsoil is needed for best results when landscaping, particularly in areas used for lawns. Lawn grasses, shrubs, and trees that are not sensitive to lime-induced chlorosis are well suited to use in landscaping. Annual applications of iron chelates reduce the effects of chlorosis.

This map unit is in capability subclass VIIs, nonirrigated, and in horticultural group 2.

192—Dalian-McCullough complex, 0 to 4 percent slopes. This map unit is on fan skirts.

This unit is 55 percent Dalian very gravelly fine sandy loam, 0 to 4 percent slopes, and 35 percent McCullough very gravelly very fine sandy loam, gravelly substratum, 0 to 4 percent slopes. Both the Dalian and McCullough soils are on alluvial fan skirts. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 5 percent Las Vegas soils on basin floor remnants and 5 percent Tencee soils on erosional fan remnants. Included areas make up about 10 percent of the total acreage.

The Dalian soil is very deep and well drained. It formed in alluvium derived from various kinds of rock. Typically, about 75 percent of the surface is covered with a desert pavement of pebbles. The surface layer is light yellowish brown very gravelly fine sandy loam about 5 inches thick. The underlying material to a depth of 60 inches or more is light yellowish brown very gravelly sandy loam.

Permeability of the Dalian soil is moderately rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is

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

Soil name and map symbol	Hydrologic group	Flooding		High water table		Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Months	Depth	Months	Depth	Thickness	Depth	Hardness	Uncoated steel	Concrete
				Ft		In		In			
182*:											
Caliza	B	None	---	>6.0	---	>60	---	---	---	High	Low.
Pittman	C	None	---	>6.0	---	>60	---	20-30	Thick	High	Low.
Arizo	A	Occasional	Mar-Sep	>6.0	---	>60	---	---	---	High	Low.
183--- Caliza	B	None	---	>6.0	---	>60	---	---	---	High	Low.
184--- Caliza	B	Rare	---	>6.0	---	>60	---	---	---	High	Low.
187--- Caliza	B	None	---	>6.0	---	>60	---	---	---	High	Low.
190--- Dalian	B	None	---	>6.0	---	>60	---	---	---	High	Low.
191--- Dalian	B	Rare	---	>6.0	---	>60	---	---	---	High	Low.
192*:											
Dalian	B	Rare	---	>6.0	---	>60	---	---	---	High	Low.
McCullough	B	Rare	---	>6.0	---	>60	---	---	---	High	Low.
200--- Glencarb	B	Rare	---	>6.0	---	>60	---	---	---	High	Moderate.
206--- Glencarb	C	Occasional	Jul-Sep	3.0-5.0	Jul-Jun	>60	---	---	---	High	High.
222--- Glencarb	C	Rare	---	3.0-5.0	Jul-Jun	>60	---	---	---	High	High.
236--- Glencarb	B	Rare	---	>6.0	---	>60	---	---	---	High	High.
237--- Glencarb	B	Rare	---	>6.0	---	>60	---	40-60	Thick	High	Low.
240--- Goodsprings	D	None	---	>6.0	---	>60	---	9-20	Thick	High	Low.
252, 255--- Grapevine	B	Rare	---	>6.0	---	>60	---	---	---	High	High.
260--- Jean	A	Rare	---	>6.0	---	>60	---	---	---	High	Low.
262*:											
Jean	A	Rare	---	>6.0	---	>60	---	---	---	High	Low.
Jean	A	Occasional	Jun-Sep	>6.0	---	>60	---	---	---	High	Low.
Goodsprings	D	Rare	---	>6.0	---	>60	---	9-20	Thick	High	Low.
263*:											
Jean	A	Rare	---	>6.0	---	>60	---	---	---	High	Low.
Jean	A	Occasional	Jun-Sep	>6.0	---	>60	---	---	---	High	Low.
264--- Jean	A	Rare	---	>6.0	---	>60	---	---	---	High	Low.

See footnote at end of table.

RUNOFF CURVE NUMBERS - RESIDENTIAL DISTRICTS

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

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

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

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

Revision	Date

REFERENCE:

TABLE 602A

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

RCI ENGINEERING

CENTENNIAL AND TEE PEE
DEVELOPED CONDITIONS

BY: RJR
DATE: 4/8/14

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check	Tlag	REMARKS
DESIG:	DEV./EX. (D or E)	CN	K	AREA Ac	AREA Mi^2	INITIAL LENGTH Feet	SLOPE %	Ti Min	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY FPS	V2 VELOCITY FPS	Tt Min	Min	Min	Tlag= 0.6Tc/60 Hours	
(1)			(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9a)	(9b)	(10)	(13)	(14)		
ON1	D	70.0	0.5340	5.06	0.0079	187	1.4	12.4	695	1.7	2.7	4.0	3.9	16.3	14.9	**0.149**	
ON2	D	70.0	0.5340	2.19	0.0034	232	2.1	12.1	315	1.6	2.6	3.9	2.0	14.1	13.0	**0.130**	
ON3	D	70.0	0.5340	5.10	0.0080	218	1.1	14.8	750	1.6	2.5	3.8	4.4	19.2	15.4	**0.154**	
ON4	D	70.0	0.5340	4.77	0.0075	260	1.1	16.2	620	1.1	2.2	3.3	4.5	20.6	14.9	**0.149**	

Tc = Ti + Tt Tlag = 0.6 Tc

Ti = 1.8 (1.1 - K) L^1/2 / S^1/3

K = 0.0132 (CN) - 0.39

Tc Check (Developed) = L/180+10

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
Developed V1 = 20.2*(S/100)^1/2

Existing V2 = 29.4*(S/100)^1/2
Developed V2 = 30.6*(S/100)^1/2

Minimum Tc (EX) = 10 Min per Section 602
Minimum Tc (DEV) = 5 Min per Section 602.1

REFERENCE :

STANDARD FORM 4

CN CALCULATIONS - DEVELOPED CONDITIONS CENTENNIAL AND TEE PEE

			CN- DESERT SHRUB POOR CONDITION		CN - RNP/RURAL (20,000 SF)		
Basin	% SOIL TYPE	HYDRO					WEIGHTED CN
ON1, ON2, ON3, ON4		A		63		54	0.0
	100	B		77	100	70	70.0
		C		85		80	0.0
		D		88		85	0.0
							70.0

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*               JUN   1998             *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   08APR14  TIME  15:18:34  *
*                                      *
****************************************
```

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

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

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

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

1 HEC-1 INPUT PAGE 1

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

                        *DIAGRAM
            1           ID     CENTENNIAL AND TEE PEE
            2           ID     ULTIMATE DEVELOPED CONDITIONS
            3           ID     DESIGN STORM = 100-YEAR 6-HOUR STORM
            4           ID     STORM DISTRIBUTION = SDN3
            5           ID
            6           IT       5       0       0     300
            7           IO       5       0       0
            8           IN       5       0       0
            9           JR    PREC    1.00    0.58
                        *

           10           KK     ON1
           11           KM    SUBBASIN ON1
           12           BA   .0079
           13           PB    3.00
           14           PC   0.000   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
           15           PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
           16           PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
           17           PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
           18           PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
           19           PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
           20           PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
           21           PC   0.998   0.999   1.000
           22           LS       0      70
           23           UD   0.149
                        *

           24           KK     ON2
           25           KM    SUBBASIN ON2
           26           BA   .0034
           27           LS       0      70
           28           UD   0.130
                        *

           29           KK     ON3
           30           KM    SUBBASIN ON3
           31           BA   .0080
           32           LS       0      70
           33           UD   0.154
                        *

           34           KK     ON4
           35           KM    SUBBASIN ON4
           36           BA   .0075
           37           LS       0      70
           38           UD   0.149
                        *
           39           ZZ
```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

    10         ON1
                 .
                 .
    24           .         ON2
                 .           .
                 .           .
    29           .           .         ON3
                 .           .           .
                 .           .           .
    34           .           .           .         ON4
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *               JUN  1998               *
 *            VERSION 4.1                *
 *                                       *
 *  RUN DATE   08APR14  TIME  15:18:34   *
 *                                       *
 *****************************************
```

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

CENTENNIAL AND TEE PEE
ULTIMATE DEVELOPED CONDITIONS
DESIGN STORM = 100-YEAR 6-HOUR STORM
STORM DISTRIBUTION = SDN3

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

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

                    COMPUTATION INTERVAL     .08 HOURS
                         TOTAL TIME BASE   24.92 HOURS

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

      JP          MULTI-PLAN OPTION
                        NPLAN           1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                      RATIOS OF PRECIPITATION
                     1.00       .58
1
```

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .58
HYDROGRAPH AT						
+	ON1	.01	1	FLOW	5.	1.
				TIME	3.58	3.67
HYDROGRAPH AT						
+	ON2	.00	1	FLOW	2.	0.
				TIME	3.58	3.67
HYDROGRAPH AT						
+	ON3	.01	1	FLOW	5.	1.
				TIME	3.58	3.67
HYDROGRAPH AT						
+	ON4	.01	1	FLOW	5.	1.
				TIME	3.58	3.67

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

APPENDIX B – HYDRAULIC CALCS

Flow Split Calculations Regena Avenue/Tee Pee Lane
    Existing and Future

Flow Split Calculations Azure Drive/Tee Pee Lane
    Existing and Future

Interim/Existing Cross Sections
    Centennial Parkway-capacity
    Tee Pee Lane-west

100-Year Ultimate Cross Sections Non-Urban/Urban

10-Year Ultimate Cross Section Calculations

100-Year Ultimate Cross Section Easements

Block Wall Opening Calculation

Area Drain Calculation

FLOW SPLIT EXISTING CONDITIONS

100-YEAR WEIR FLOW CALCS. REGINA AND TEEPEE EXISTING CONDITION

FLOWLINE ELEV	2642
C =	3

$Q = CLH^{3/2}$

100 - Year Q (South Half)	106
WSE Depth	1.12

WEIR ELEVATION		WSE	Avg. H	Weir Length	Q
	2643	2643.12	0.12	60	7.5

Total Weir Flow	7.5
Ratio	0.07

NORMAL DEPTH FOR FLOW SPLIT

Worksheet for Sect RE1 Regina Avenue Existing 100-year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.70000	%
Discharge	211.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	2644.00
1+08.0	2643.00
1+16.0	2642.00
1+25.8	2642.70
1+36.2	2643.00
1+53.5	2642.80
1+59.5	2642.00
1+70.5	2643.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 2644.00)	(1+25.8, 2642.70)	0.025
(1+25.8, 2642.70)	(1+36.2, 2643.00)	0.016
(1+36.2, 2643.00)	(1+53.5, 2642.80)	0.016
(1+53.5, 2642.80)	(1+70.5, 2643.00)	0.025

Results

Normal Depth	1.12	ft
Elevation Range	2642.000 to 2644.000 ft	
Flow Area	30.03	ft²
Wetted Perimeter	63.738	ft
Top Width	63.424	ft
Normal Depth	1.12	ft
Critical Depth	1.35	ft

Worksheet for Sect RE1 Regina Avenue Existing 100-year

Results

Critical Slope		0.00739	ft/ft
Velocity		7.03	ft/s
Velocity Head		0.77	ft
Specific Energy		1.88	ft
Froude Number		1.80	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.12	ft
Critical Depth	1.35	ft
Channel Slope	0.02700	ft/ft
Critical Slope	0.00739	ft/ft

Cross Section for Sect RE1 Regina Avenue Existing 100-year

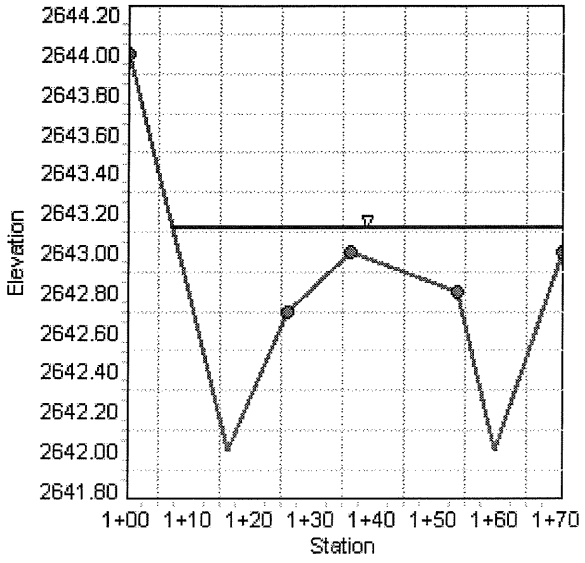
Project Description

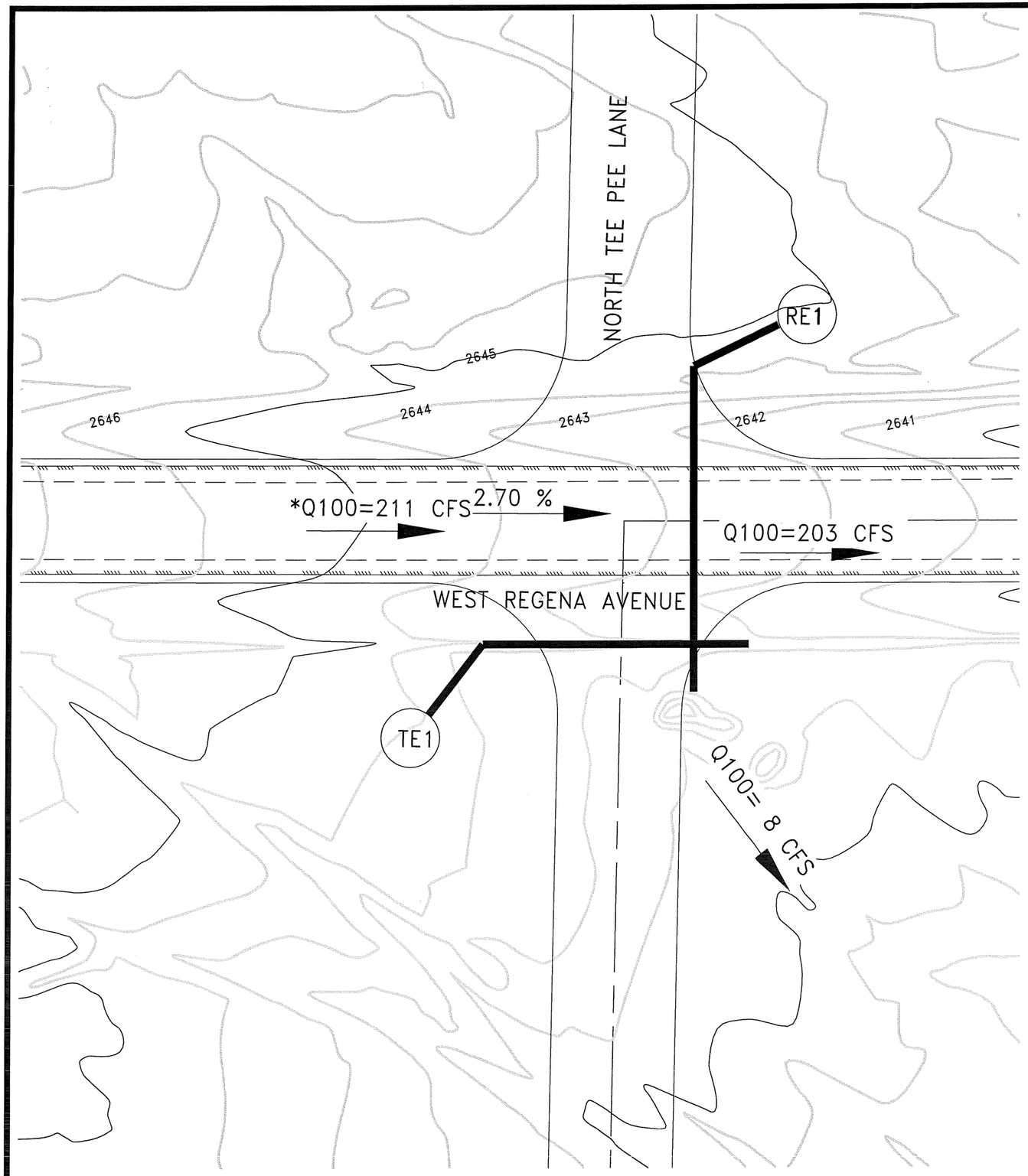
Friction Method	Manning Formula
Solve For	Normal Depth

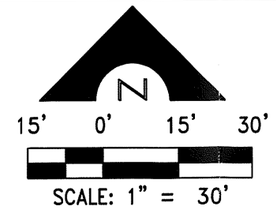
Input Data

Channel Slope	2.70000	%
Normal Depth	1.12	ft
Discharge	211.00	ft³/s

Cross Section Image







*Q100=211 CFS → *EXISTING 100-YR STORM FLOWS REFERENCED FROM CENTENNIAL TEEPEE STUDY BY CVL

WEST REGENA AVENUE — STREET NAME

2.70 % → STREET SLOPE/DIRECTION

TE1 — WEIR LOCATION

RE1 — CROSS SECTION LOCATION

CENTENNIAL AND TEE PEE
LENNAR

REGINA/TEE PEE INTERSECTION
EXISTING CONDITIONS FLOW SPLIT

RCI Engineering
4325 DEAN MARTIN DRIVE, SUITE 300
LAS VEGAS, NV 89103
PH#702.453.0800 FAX#702.453.0801

O:\2014_LENNAR\2014-0088_Centennial and Tee Pee_DRAINAGE\Figures\ORIGINAL\EXHIBIT A.dwg mecd 7/09/14 10:15am

100-YEAR WEIR FLOW CALCS. REGINA/TEEPEE DEVELOPED CONDITION

FLOWLINE ELEV	2642
C =	3

$Q = CLH^{3/2}$

100 - Year Q (South Half)	123
WSE Depth	1.3

WEIR ELEVATION		WSE	Avg. H	Weir Length	Q
	2643	2643.3	0.3	60	29.6

Total Weir Flow	29.6
Ratio	0.24

Worksheet for SECT 100-YR REGENA AVENUE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.35000	%
Discharge	246.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	1.50
1+06.0	0.00
1+10.0	0.67
1+14.0	0.75
1+30.0	1.02
1+46.0	0.75
1+50.0	0.67
1+54.0	0.00
1+60.0	1.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 1.50)	(1+14.0, 0.75)	0.025
(1+14.0, 0.75)	(1+30.0, 1.02)	0.016
(1+30.0, 1.02)	(1+46.0, 0.75)	0.016
(1+46.0, 0.75)	(1+60.0, 1.50)	0.025

Results

Normal Depth		1.30	ft
Elevation Range	0.000 to 1.500 ft		
Flow Area		32.56	ft²
Wetted Perimeter		58.849	ft
Top Width		58.411	ft
Normal Depth		1.30	ft

Worksheet for SECT 100-YR REGENA AVENUE

Results

Critical Depth		1.57	ft
Critical Slope		0.00655	ft/ft
Velocity		7.56	ft/s
Velocity Head		0.89	ft
Specific Energy		2.19	ft
Froude Number		1.78	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.30	ft
Critical Depth	1.57	ft
Channel Slope	0.02350	ft/ft
Critical Slope	0.00655	ft/ft

Cross Section for SECT 100-YR REGENA AVENUE

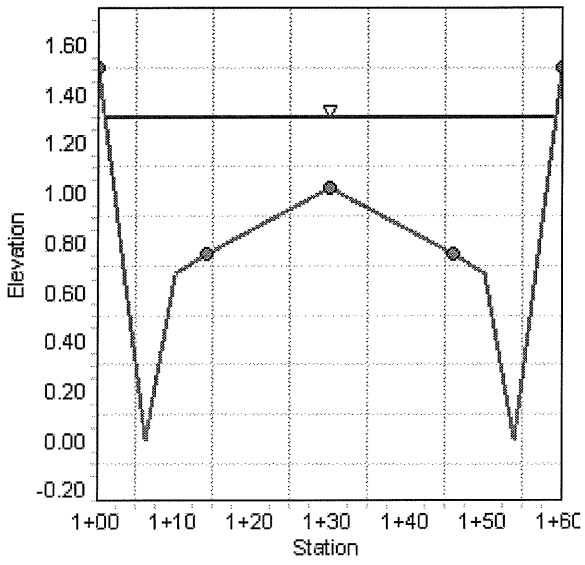
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.35000	%
Normal Depth	1.30	ft
Discharge	246.00	ft³/s

Cross Section Image



10-YEAR WEIR FLOW CALCS. REGINA/TEEPEE DEVELOPED CONDITION

FLOWLINE ELEV	2642
C =	3

$Q = CLH^{3/2}$

100 - Year Q (South Half)	77
WSE Depth	1.1

WEIR ELEVATION		WSE	Avg. H	Weir Length	Q
	2643	2643.1	0.1	60	5.7

Total Weir Flow	5.7
Ratio	0.07

Worksheet for SECT : 10-YR REGENA AVENUE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.35000	%
Discharge	153.00	ft^3/s

Section Definitions

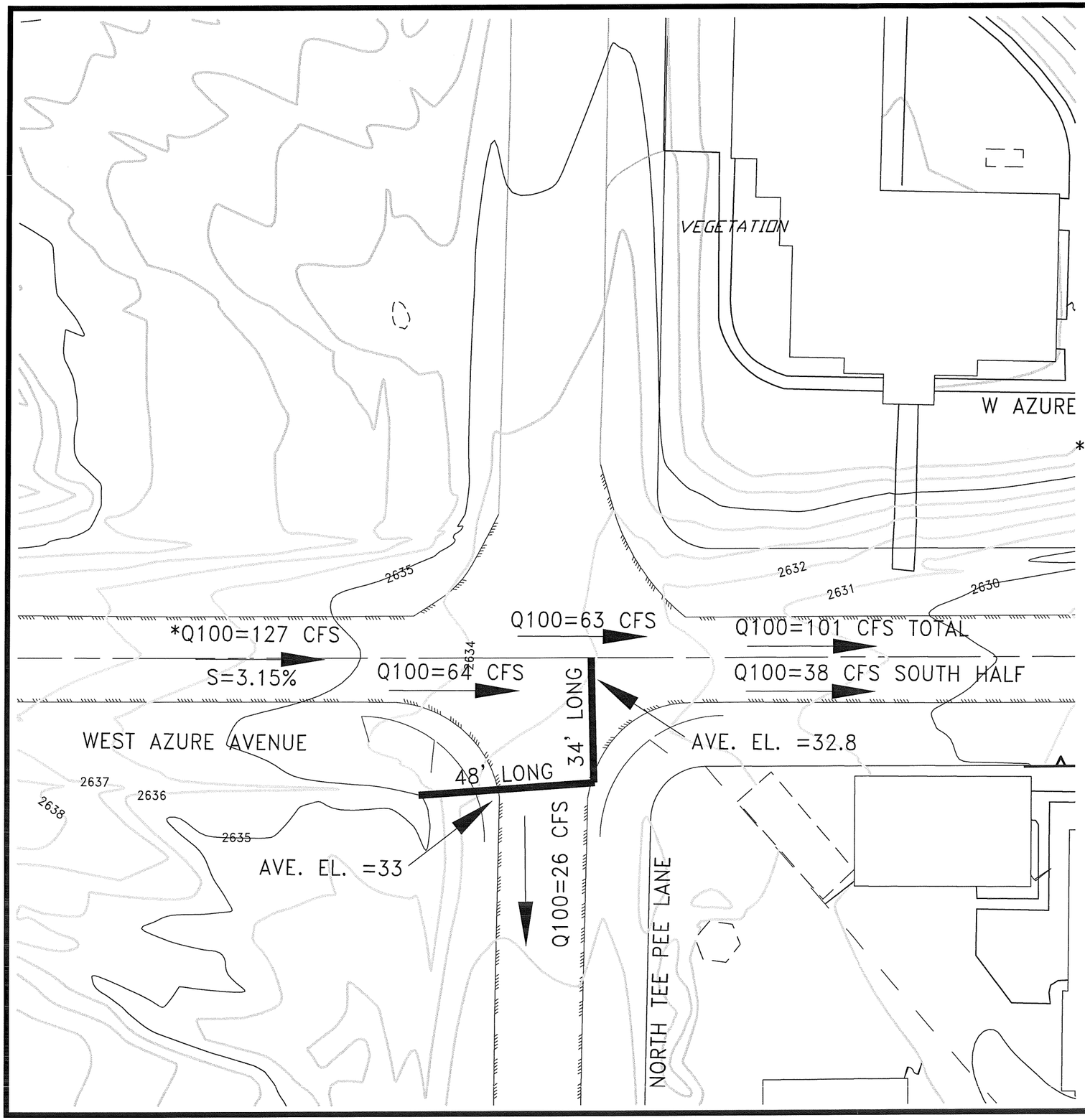
Station (ft)	Elevation (ft)
1+00.0	0.67
1+06.0	0.00
1+10.0	0.67
1+14.0	0.75
1+30.0	1.02
1+46.0	0.75
1+50.0	0.67
1+54.0	0.00
1+60.0	0.67

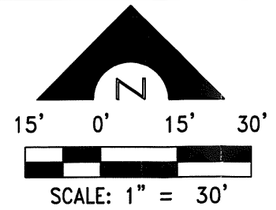
Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 0.67)	(1+14.0, 0.75)	0.025
(1+14.0, 0.75)	(1+30.0, 1.02)	0.016
(1+30.0, 1.02)	(1+46.0, 0.75)	0.016
(1+46.0, 0.75)	(1+60.0, 0.67)	0.025

Results

Normal Depth		1.09	ft
Elevation Range	0.000 to 1.020 ft		
Flow Area		24.68	ft^2
Wetted Perimeter		61.032	ft
Top Width		60.000	ft
Normal Depth		1.09	ft





*Q100=127 CFS →

*EXISTING 100-YR STORM FLOWS REFERENCED FROM CENTENNIAL TEEPEE STUDY BY CVL

WEST AZURE AVENUE STREET NAME

3.15% → STREET SLOPE/DIRECTION

WEIR SECTION LOCATION

CENTENNIAL AND TEE PEE
LENNAR

AZURE/TEE PEE INTERSECTION
EXISTING CONDITION FLOW SPLIT

RCI Engineering
4325 DEAN MARTIN DRIVE, SUITE 300
LAS VEGAS, NV 89103
PH#702.453.0800 FAX#702.453.0801

G:\2014_LENNAR\0038_Centennial and Tee Pee_DRAIN\FIGURES\ORIGINAL\EXHIBITA.dwg cread 4/09/14 10:29am

100-YEAR WEIR FLOW CALCS. AZURE AND TEE PEE 34' LONG WEIR

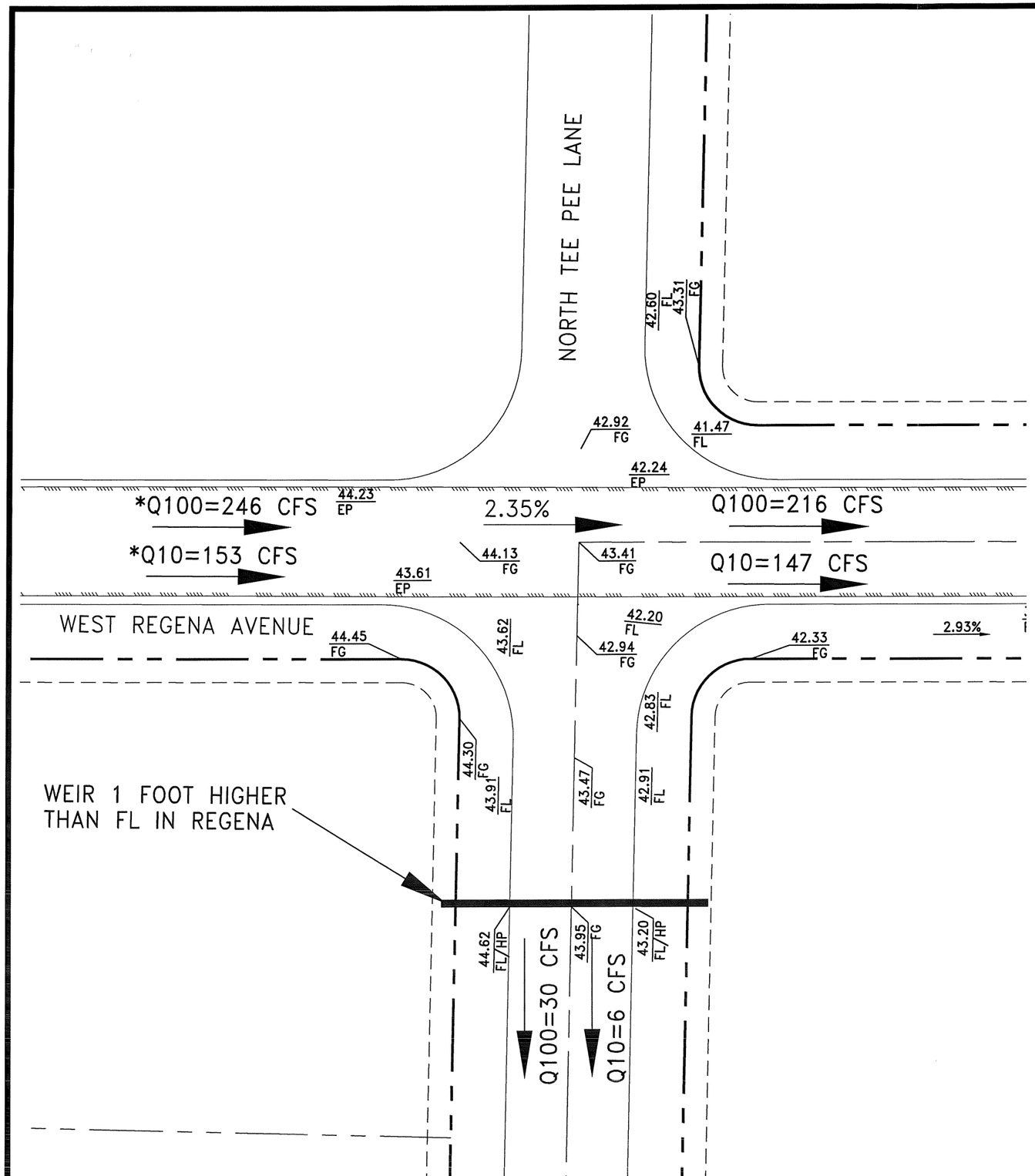
FLOWLINE ELEV	32.75
C =	3

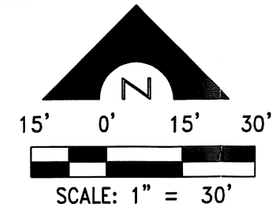
$Q = CLH^{3/2}$

100 - Year Q	64

WEIR ELEVATION		WSE	Avg. H	Weir Length	Q
	32.8	33.32	0.52	34	38.2

Total Weir Flow	38.2
Ratio	0.60





*Q100=246 CFS → DEVELOPED 100-YR AND 10-YEAR STORM FLOWS FROM CONCENTRATION POINT CP3 FROM FIGURE 5 REFERENCED FROM CENTENNIAL TEE PEE STUDY BY CVL

WEST REGENA AVENUE — STREET NAME

2.35% → STREET SLOPE/DIRECTION

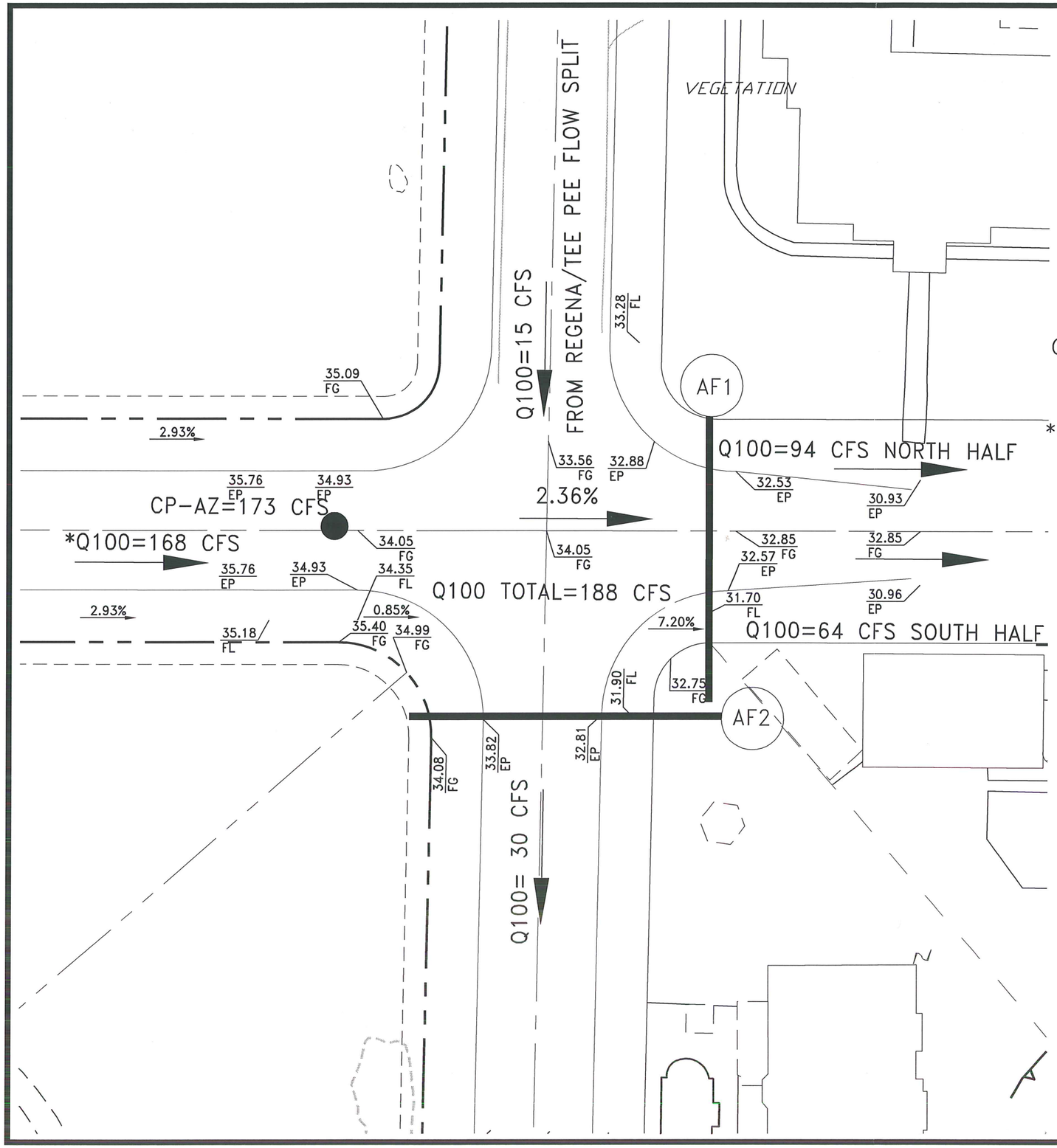
TE1 — CROSS SECTION LOCATION

CENTENNIAL AND TEE PEE
LENNAR

REGINA/TEE PEE INTERSECTION
DEVELOPED CONDITIONS FLOW SPLIT

RCI Engineering
4325 DEAN MARTIN DRIVE, SUITE 300
LAS VEGAS, NV 89103
PH#702.453.0800 FAX#702.453.0801

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CENTENNIAL AND TEE PEE
LENNAR

AZURE/TEE PEE INTERSECTION
DEVELOPED CONDITION FLOW SPLIT

RCI Engineering
4325 DEAN MARTIN DRIVE, SUITE 300
LAS VEGAS, NV 89103
PH#702.453.0800 FAX#702.453.0801

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Worksheet for SECT 10-YR REGENA AVENUE

Results

Critical Depth		1.27	ft
Critical Slope		0.00724	ft/ft
Velocity		6.20	ft/s
Velocity Head		0.60	ft
Specific Energy		1.69	ft
Froude Number		1.70	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.09	ft
Critical Depth	1.27	ft
Channel Slope	0.02350	ft/ft
Critical Slope	0.00724	ft/ft

Cross Section for SECT 10-YR REGENA AVENUE

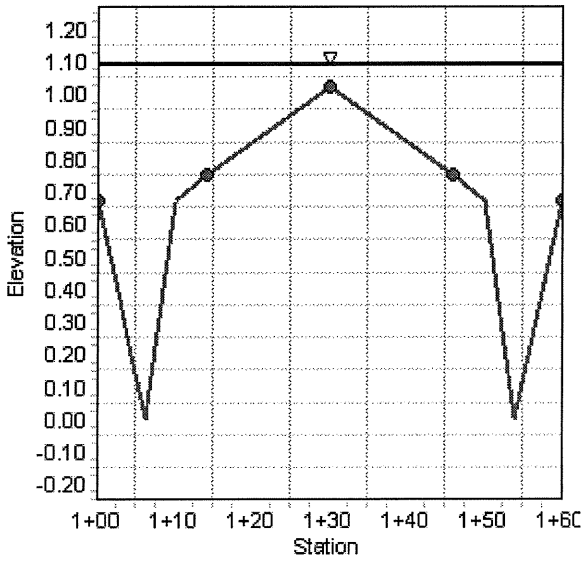
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.35000	%
Normal Depth	1.09	ft
Discharge	153.00	ft³/s

Cross Section Image



Worksheet for HALF AZURE FUTURE, FLOW SPLIT100-YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.36000	%
Discharge	64.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+30.0	33.06
1+46.5	32.50
1+54.0	31.70
1+60.0	32.60
1+60.0	36.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+30.0, 33.06)	(1+46.5, 32.50)	0.016
(1+46.5, 32.50)	(1+60.0, 32.60)	0.025
(1+60.0, 32.60)	(1+60.0, 36.00)	0.025

Results

Normal Depth		1.08	ft
Elevation Range	31.700 to 36.000 ft		
Flow Area		9.93	ft²
Wetted Perimeter		21.901	ft
Top Width		21.611	ft
Normal Depth		1.08	ft
Critical Depth		1.29	ft
Critical Slope		0.00799	ft/ft
Velocity		6.44	ft/s
Velocity Head		0.65	ft
Specific Energy		1.72	ft

Worksheet for HALF AZURE FUTURE, FLOW SPLIT100-YR

Results

Froude Number	1.68	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.08	ft
Critical Depth	1.29	ft
Channel Slope	0.02360	ft/ft
Critical Slope	0.00799	ft/ft

Cross Section for HALF AZURE FUTURE, FLOW SPLIT100-YR

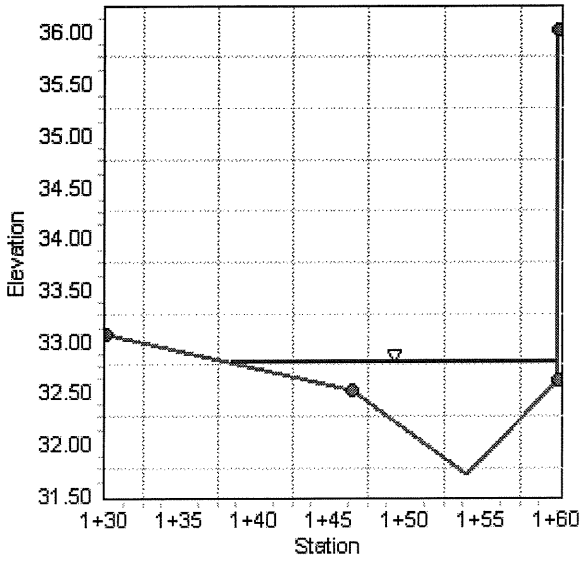
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.36000	%
Normal Depth	1.08	ft
Discharge	64.00	ft³/s

Cross Section Image



Worksheet for TEEPEE FUTURE, FLOW SPLIT100-YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.61000	%
Discharge	30.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	38.00
1+00.0	34.20
1+09.0	33.73
1+16.0	33.82
1+30.0	33.37
1+46.0	32.81
1+54.0	31.90
1+60.0	32.50
1+60.0	38.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 38.00)	(1+16.0, 33.82)	0.025
(1+16.0, 33.82)	(1+46.0, 32.81)	0.016
(1+46.0, 32.81)	(1+60.0, 32.50)	0.016
(1+60.0, 32.50)	(1+60.0, 38.00)	0.025

Results

Normal Depth		0.87	ft
Elevation Range	31.900 to 38.000 ft		
Flow Area		6.79	ft²
Wetted Perimeter		14.031	ft
Top Width		13.678	ft
Normal Depth		0.87	ft

Worksheet for TEEPEE FUTURE, FLOW SPLIT100-YR

Results

Critical Depth		0.91	ft
Critical Slope		0.00493	ft/ft
Velocity		4.42	ft/s
Velocity Head		0.30	ft
Specific Energy		1.18	ft
Froude Number		1.10	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.87	ft
Critical Depth	0.91	ft
Channel Slope	0.00610	ft/ft
Critical Slope	0.00493	ft/ft

Cross Section for TEEPEE FUTURE, FLOW SPLIT100-YR

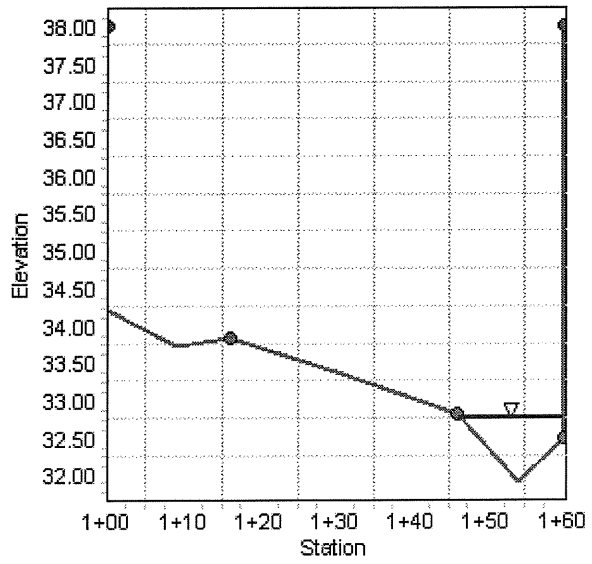
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.61000	%
Normal Depth	0.87	ft
Discharge	30.00	ft³/s

Cross Section Image



100-YEAR WEIR FLOW CALCS. AZURE AND TEE PEE 48' WEIR SOUTH

FLOWLINE ELEV	32.75
C =	3

$Q = CLH^{3/2}$

100 - Year Q	64

WEIR ELEVATION		WSE	Avg. H	Weir Length	Q
	33.0	33.32	0.32	48	26.1

Total Weir Flow	26.1
Ratio	0.41

EXIST STORM FLOWS

58 CFS FROM EXOF4 - 13 CFS SPILL OVER CROWN

Worksheet for SECT 1E 100-YR NORTH CENTENNIAL PARKWAY

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.70000	%
Discharge	45.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	1.50
1+06.0	0.00
1+10.0	0.67
1+14.0	0.75
1+30.0	1.02

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 1.50)	(1+14.0, 0.75)	0.025
(1+14.0, 0.75)	(1+30.0, 1.02)	0.016

Results

Normal Depth		1.02	ft
Elevation Range	0.000 to 1.500 ft		
Flow Area		8.12	ft²
Wetted Perimeter		28.045	ft
Top Width		27.861	ft
Normal Depth		1.02	ft
Critical Depth		1.16	ft
Critical Slope		0.00734	ft/ft
Velocity		5.54	ft/s
Velocity Head		0.48	ft
Specific Energy		1.49	ft
Froude Number		1.81	

Worksheet for SECT 1E 100-YR NORTH CENTENNIAL PARKWAY

Results

Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.02	ft
Critical Depth	1.16	ft
Channel Slope	0.02700	ft/ft
Critical Slope	0.00734	ft/ft

Cross Section for SECT 1E 100-YR NORTH CENTENNIAL PARKWAY

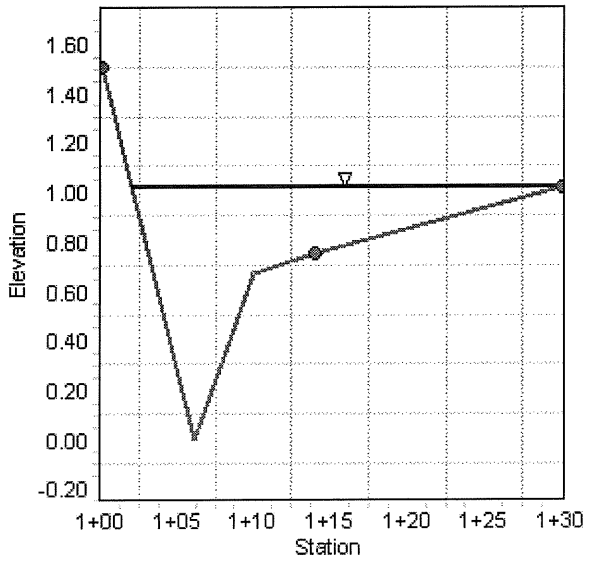
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.70000	%
Normal Depth	1.02	ft
Discharge	45.00	ft³/s

Cross Section Image



Worksheet for SECT 1F 100-YR NORTH HALF CENT PKWY FUTURE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.65000	%
Discharge	162.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	2.00
1+00.0	0.60
1+05.0	0.50
1+05.5	0.48
1+05.5	0.00
1+07.0	0.13
1+07.0	0.17
1+50.0	1.03

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 2.00)	(1+07.0, 0.13)	0.013
(1+07.0, 0.13)	(1+50.0, 1.03)	0.016

Results

Normal Depth		0.95	ft
Elevation Range	0.000 to 2.000 ft		
Flow Area		18.79	ft²
Wetted Perimeter		46.932	ft
Top Width		46.047	ft
Normal Depth		0.95	ft
Critical Depth		1.26	ft
Critical Slope		0.00399	ft/ft
Velocity		8.62	ft/s

Worksheet for SECT 1F 100-YR NORTH HALF CENT PKWY FUTURE

Results

Velocity Head		1.15	ft
Specific Energy		2.10	ft
Froude Number		2.38	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.95	ft
Critical Depth	1.26	ft
Channel Slope	0.02650	ft/ft
Critical Slope	0.00399	ft/ft

Cross Section for SECT 1F 100-YR NORTH HALF CENT PKWY FUTURE

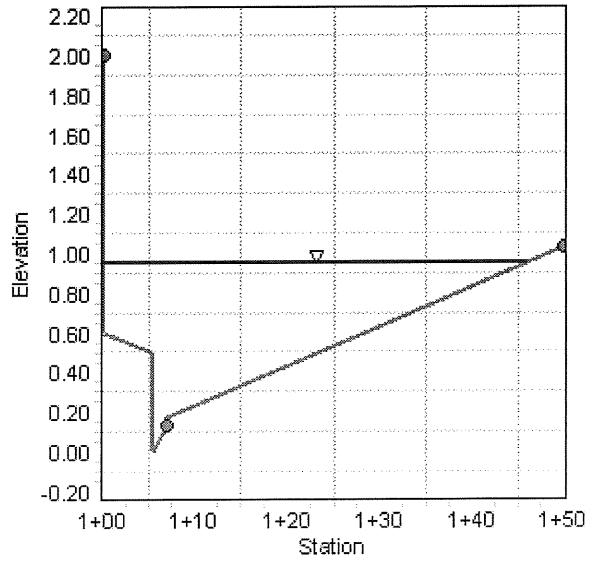
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.65000	%
Normal Depth	0.95	ft
Discharge	162.00	ft³/s

Cross Section Image



WEST SIDE

Worksheet for SECT 2E TEE PEE 100-YEAR INTERIM

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.25000	%
Discharge	24.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	0.67
1+06.0	0.00
1+10.0	0.67
1+14.0	0.75
1+30.0	1.02

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 0.67)	(1+14.0, 0.75)	0.025
(1+14.0, 0.75)	(1+30.0, 1.02)	0.016

Results

Normal Depth		0.88	ft
Elevation Range	0.000 to 1.020 ft		
Flow Area		6.63	ft²
Wetted Perimeter		22.001	ft
Top Width		21.696	ft
Normal Depth		0.88	ft
Critical Depth		0.92	ft
Critical Slope		0.00931	ft/ft
Velocity		3.62	ft/s
Velocity Head		0.20	ft
Specific Energy		1.08	ft
Froude Number		1.16	

Worksheet for SECT 2E TEE PEE 100-YEAR INTERIM

Results

Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.88	ft
Critical Depth	0.92	ft
Channel Slope	0.01250	ft/ft
Critical Slope	0.00931	ft/ft

Cross Section for SECT 2E TEE PEE 100-YEAR INTERIM

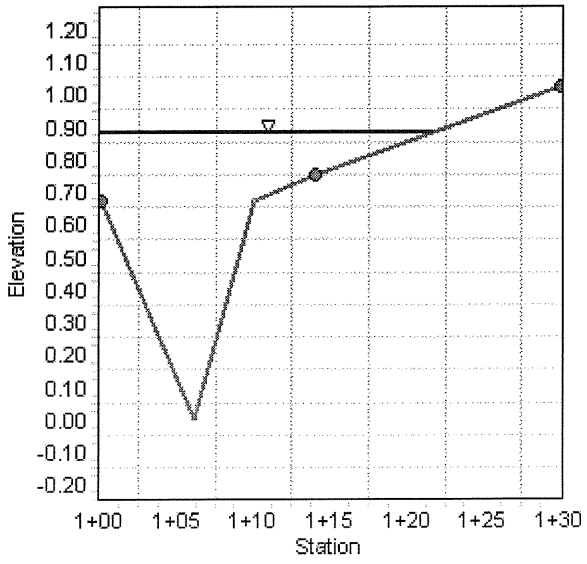
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.25000	%
Normal Depth	0.88	ft
Discharge	24.00	ft³/s

Cross Section Image



EAST SIDE

Worksheet for SECT 2E TEE PEE EAST 100-YEAR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.25000	%
Discharge	1.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	0.67
1+06.0	0.00
1+10.0	0.67
1+14.0	0.75
1+30.0	1.02

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 0.67)	(1+14.0, 0.75)	0.025
(1+14.0, 0.75)	(1+30.0, 1.02)	0.016

Results

Normal Depth		0.28	ft
Elevation Range	0.000 to 1.020 ft		
Flow Area		0.57	ft²
Wetted Perimeter		4.157	ft
Top Width		4.118	ft
Normal Depth		0.28	ft
Critical Depth		0.26	ft
Critical Slope		0.01828	ft/ft
Velocity		1.76	ft/s
Velocity Head		0.05	ft
Specific Energy		0.32	ft
Froude Number		0.84	

Worksheet for SECT 2E TEE PEE EAST 100-YEAR

Results

Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.26	ft
Channel Slope	0.01250	ft/ft
Critical Slope	0.01828	ft/ft

Cross Section for SECT 2E TEE PEE EAST 100-YEAR

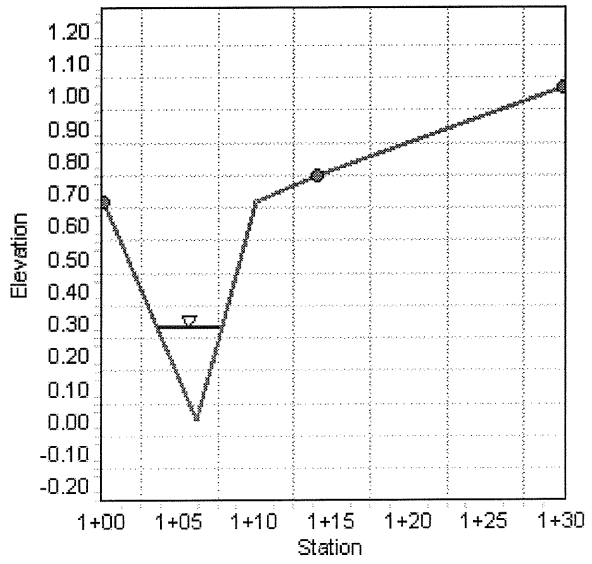
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.25000	%
Normal Depth	0.28	ft
Discharge	1.00	ft³/s

Cross Section Image



Worksheet for SECT 3F 100-YR REGENA AVENUE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.70000	%
Discharge	246.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	0.67
1+06.0	0.00
1+10.0	0.67
1+14.0	0.75
1+30.0	1.02
1+46.0	0.75
1+50.0	0.67
1+54.0	0.00
1+60.0	0.67

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 0.67)	(1+14.0, 0.75)	0.025
(1+14.0, 0.75)	(1+30.0, 1.02)	0.016
(1+30.0, 1.02)	(1+46.0, 0.75)	0.016
(1+46.0, 0.75)	(1+60.0, 0.67)	0.025

Results

Normal Depth		1.21	ft
Elevation Range	0.000 to 1.020 ft		
Flow Area		31.89	ft²
Wetted Perimeter		61.272	ft
Top Width		60.000	ft
Normal Depth		1.21	ft

Worksheet for SECT 3F 100-YR REGENA AVENUE

Results

Critical Depth		1.48	ft
Critical Slope		0.00685	ft/ft
Velocity		7.71	ft/s
Velocity Head		0.92	ft
Specific Energy		2.13	ft
Froude Number		1.87	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.21	ft
Critical Depth	1.48	ft
Channel Slope	0.02700	ft/ft
Critical Slope	0.00685	ft/ft

Cross Section for SECT 3F 100-YR REGENA AVENUE

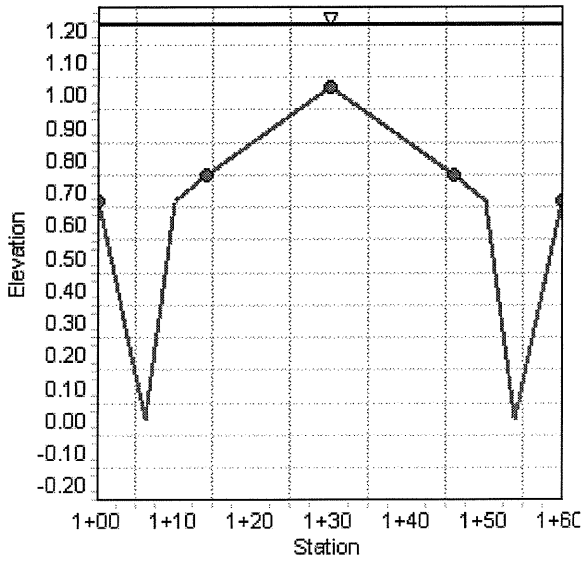
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.70000	%
Normal Depth	1.21	ft
Discharge	246.00	ft³/s

Cross Section Image



Worksheet for SECT 3F W/ CURB AND GUTTER

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.70000	%
Discharge	246.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	2.00
1+00.0	0.60
1+05.0	0.50
1+05.5	0.48
1+05.5	0.00
1+07.0	0.13
1+07.0	0.17
1+30.0	0.63
1+53.0	0.17
1+53.0	0.13
1+54.5	0.00
1+54.5	0.48
1+55.0	0.50
1+60.0	0.60
1+60.0	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 2.00)	(1+07.0, 0.17)	0.013
(1+07.0, 0.17)	(1+30.0, 0.63)	0.016
(1+30.0, 0.63)	(1+53.0, 0.17)	0.016
(1+53.0, 0.17)	(1+60.0, 2.00)	0.013

Worksheet for SECT 3F W/ CURB AND GUTTER

Results

Normal Depth		0.85	ft
Elevation Range	0.000 to 2.000 ft		
Flow Area		26.77	ft²
Wetted Perimeter		61.573	ft
Top Width		60.000	ft
Normal Depth		0.85	ft
Critical Depth		1.21	ft
Critical Slope		0.00383	ft/ft
Velocity		9.19	ft/s
Velocity Head		1.31	ft
Specific Energy		2.17	ft
Froude Number		2.43	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.85	ft
Critical Depth	1.21	ft
Channel Slope	0.02700	ft/ft
Critical Slope	0.00383	ft/ft

Cross Section for SECT 3F W/ CURB AND GUTTER

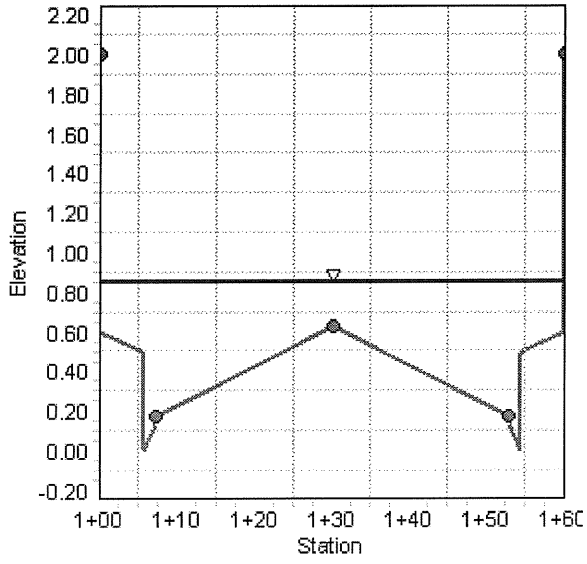
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.70000	%
Normal Depth	0.85	ft
Discharge	246.00	ft³/s

Cross Section Image



Worksheet for SECT 4F 100-YR REGENA AVENUE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.93000	%
Discharge	216.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	0.67
1+06.0	0.00
1+10.0	0.67
1+14.0	0.75
1+30.0	1.02
1+46.0	0.75
1+50.0	0.67
1+54.0	0.00
1+60.0	0.67

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 0.67)	(1+14.0, 0.75)	0.025
(1+14.0, 0.75)	(1+30.0, 1.02)	0.016
(1+30.0, 1.02)	(1+46.0, 0.75)	0.016
(1+46.0, 0.75)	(1+60.0, 0.67)	0.025

Results

Normal Depth		1.16	ft
Elevation Range	0.000 to 1.020 ft		
Flow Area		28.66	ft²
Wetted Perimeter		61.164	ft
Top Width		60.000	ft
Normal Depth		1.16	ft

Worksheet for SECT 4F 100-YR REGENA AVENUE

Results

Critical Depth		1.42	ft
Critical Slope		0.00695	ft/ft
Velocity		7.54	ft/s
Velocity Head		0.88	ft
Specific Energy		2.04	ft
Froude Number		1.92	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.16	ft
Critical Depth	1.42	ft
Channel Slope	0.02930	ft/ft
Critical Slope	0.00695	ft/ft

Cross Section for SECT 4F 100-YR REGENA AVENUE

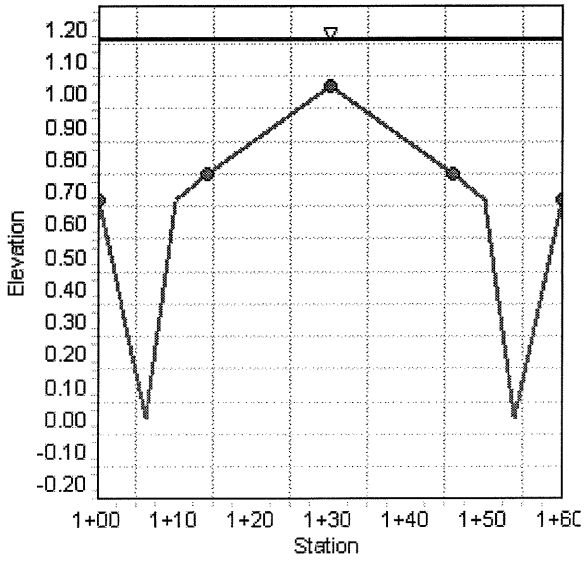
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.93000	%
Normal Depth	1.16	ft
Discharge	216.00	ft³/s

Cross Section Image



Worksheet for SECT 4F W/ CURB AND GUTTER

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.93000	%
Discharge	216.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	2.00
1+00.0	0.60
1+05.0	0.50
1+05.5	0.48
1+05.5	0.00
1+07.0	0.13
1+07.0	0.17
1+30.0	0.63
1+53.0	0.17
1+53.0	0.13
1+54.5	0.00
1+54.5	0.48
1+55.0	0.50
1+60.0	0.60
1+60.0	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 2.00)	(1+07.0, 0.17)	0.013
(1+07.0, 0.17)	(1+30.0, 0.63)	0.016
(1+30.0, 0.63)	(1+53.0, 0.17)	0.016
(1+53.0, 0.17)	(1+60.0, 2.00)	0.013

Worksheet for SECT 4F W/ CURB AND GUTTER

Results

Normal Depth		0.81	ft
Elevation Range	0.000 to 2.000 ft		
Flow Area		24.17	ft²
Wetted Perimeter		61.487	ft
Top Width		60.000	ft
Normal Depth		0.81	ft
Critical Depth		1.15	ft
Critical Slope		0.00393	ft/ft
Velocity		8.94	ft/s
Velocity Head		1.24	ft
Specific Energy		2.05	ft
Froude Number		2.48	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.81	ft
Critical Depth	1.15	ft
Channel Slope	0.02930	ft/ft
Critical Slope	0.00393	ft/ft

Cross Section for SECT 4F W/ CURB AND GUTTER

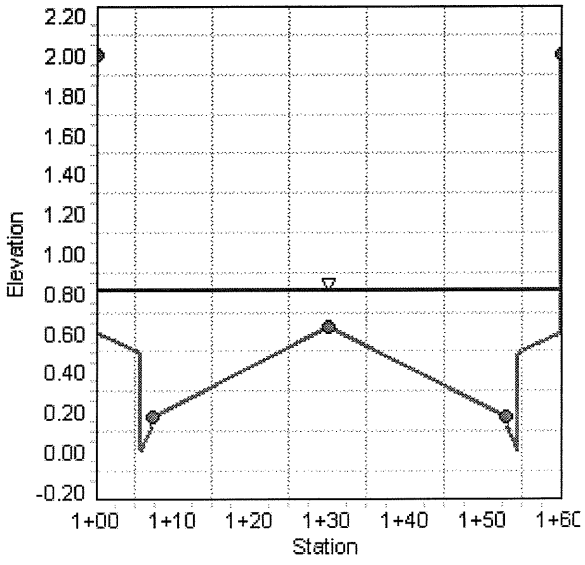
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.93000	%
Normal Depth	0.81	ft
Discharge	216.00	ft³/s

Cross Section Image



Worksheet for SECT 5F 100-YR TEE PEE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.81000	%
Discharge	30.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	0.67
1+06.0	0.00
1+10.0	0.67
1+14.0	0.75
1+30.0	1.02
1+46.0	0.75
1+50.0	0.67
1+54.0	0.00
1+60.0	0.67

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 0.67)	(1+14.0, 0.75)	0.025
(1+14.0, 0.75)	(1+30.0, 1.02)	0.016
(1+30.0, 1.02)	(1+46.0, 0.75)	0.016
(1+46.0, 0.75)	(1+60.0, 0.67)	0.025

Results

Normal Depth	0.65	ft
Elevation Range	0.000 to 1.020 ft	
Flow Area	6.38	ft²
Wetted Perimeter	19.702	ft
Top Width	19.521	ft
Normal Depth	0.65	ft

Worksheet for SECT 5F 100-YR TEE PEE

Results

Critical Depth		0.78	ft
Critical Slope		0.01383	ft/ft
Velocity		4.70	ft/s
Velocity Head		0.34	ft
Specific Energy		1.00	ft
Froude Number		1.45	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.65	ft
Critical Depth	0.78	ft
Channel Slope	0.02810	ft/ft
Critical Slope	0.01383	ft/ft

Cross Section for SECT 5F 100-YR TEE PEE

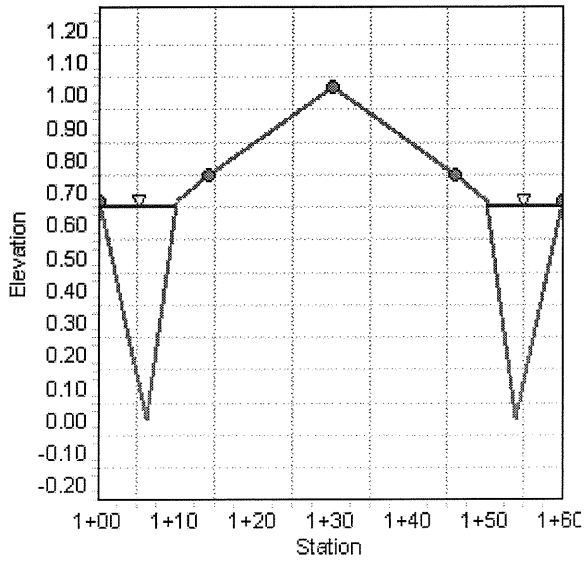
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.81000	%
Normal Depth	0.65	ft
Discharge	30.00	ft³/s

Cross Section Image



Worksheet for SECT 6F 100-YR AZURE DRIVE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.46000	%
Discharge	173.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	0.67
1+06.0	0.00
1+10.0	0.67
1+14.0	0.75
1+30.0	1.02
1+46.0	0.75
1+50.0	0.67
1+54.0	0.00
1+60.0	0.67

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 0.67)	(1+14.0, 0.75)	0.025
(1+14.0, 0.75)	(1+30.0, 1.02)	0.016
(1+30.0, 1.02)	(1+46.0, 0.75)	0.016
(1+46.0, 0.75)	(1+60.0, 0.67)	0.025

Results

Normal Depth	1.07	ft
Elevation Range	0.000 to 1.020 ft	
Flow Area	23.56	ft²
Wetted Perimeter	60.994	ft
Top Width	60.000	ft
Normal Depth	1.07	ft

Worksheet for SECT 6F 100-YR AZURE DRIVE

Results

Critical Depth		1.32	ft
Critical Slope		0.00696	ft/ft
Velocity		7.34	ft/s
Velocity Head		0.84	ft
Specific Energy		1.91	ft
Froude Number		2.07	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.07	ft
Critical Depth	1.32	ft
Channel Slope	0.03460	ft/ft
Critical Slope	0.00696	ft/ft

Cross Section for SECT 6F 100-YR AZURE DRIVE

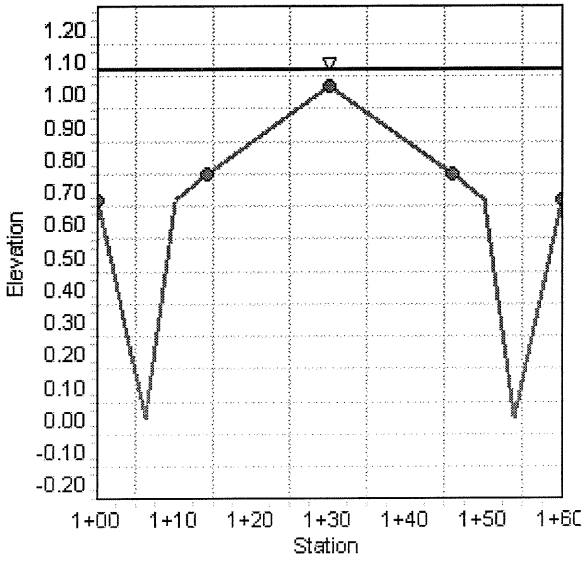
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.46000	%
Normal Depth	1.07	ft
Discharge	173.00	ft³/s

Cross Section Image



Worksheet for SECT 6F W/ CURB AND GUTTER

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.46000	%
Discharge	173.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	2.00
1+00.0	0.60
1+05.0	0.50
1+05.5	0.48
1+05.5	0.00
1+07.0	0.13
1+07.0	0.17
1+30.0	0.63
1+53.0	0.17
1+53.0	0.13
1+54.5	0.00
1+54.5	0.48
1+55.0	0.50
1+60.0	0.60
1+60.0	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 2.00)	(1+07.0, 0.17)	0.013
(1+07.0, 0.17)	(1+30.0, 0.63)	0.016
(1+30.0, 0.63)	(1+53.0, 0.17)	0.016
(1+53.0, 0.17)	(1+60.0, 2.00)	0.013

Worksheet for SECT 6F W/ CURB AND GUTTER

Results

Normal Depth		0.74	ft
Elevation Range	0.000 to 2.000 ft		
Flow Area		20.12	ft²
Wetted Perimeter		61.352	ft
Top Width		60.000	ft
Normal Depth		0.74	ft
Critical Depth		1.04	ft
Critical Slope		0.00412	ft/ft
Velocity		8.60	ft/s
Velocity Head		1.15	ft
Specific Energy		1.89	ft
Froude Number		2.62	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	1.04	ft
Channel Slope	0.03460	ft/ft
Critical Slope	0.00412	ft/ft

Cross Section for SECT 6F W/ CURB AND GUTTER

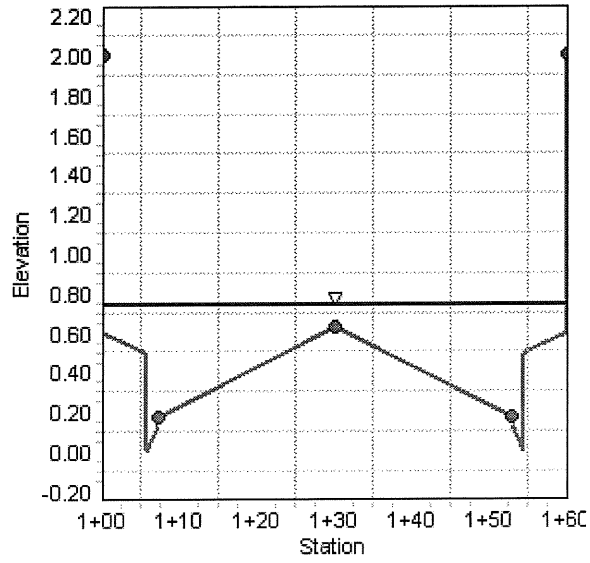
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.46000	%
Normal Depth	0.74	ft
Discharge	173.00	ft³/s

Cross Section Image



Worksheet for SECT 7F 100-YR TEE PEE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.22000	%
Discharge	30.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	0.67
1+06.0	0.00
1+10.0	0.67
1+14.0	0.75
1+30.0	1.02
1+46.0	0.75
1+50.0	0.67
1+54.0	0.00
1+60.0	0.67

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 0.67)	(1+14.0, 0.75)	0.025
(1+14.0, 0.75)	(1+30.0, 1.02)	0.016
(1+30.0, 1.02)	(1+46.0, 0.75)	0.016
(1+46.0, 0.75)	(1+60.0, 0.67)	0.025

Results

Normal Depth		0.78	ft
Elevation Range	0.000 to 1.020 ft		
Flow Area		9.54	ft²
Wetted Perimeter		32.067	ft
Top Width		31.657	ft
Normal Depth		0.78	ft

Worksheet for SECT 7F 100-YR TEE PEE

Results

Critical Depth		0.78	ft
Critical Slope		0.01197	ft/ft
Velocity		3.14	ft/s
Velocity Head		0.15	ft
Specific Energy		0.93	ft
Froude Number		1.01	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.78	ft
Critical Depth	0.78	ft
Channel Slope	0.01220	ft/ft
Critical Slope	0.01197	ft/ft

Cross Section for SECT 7F 100-YR TEE PEE

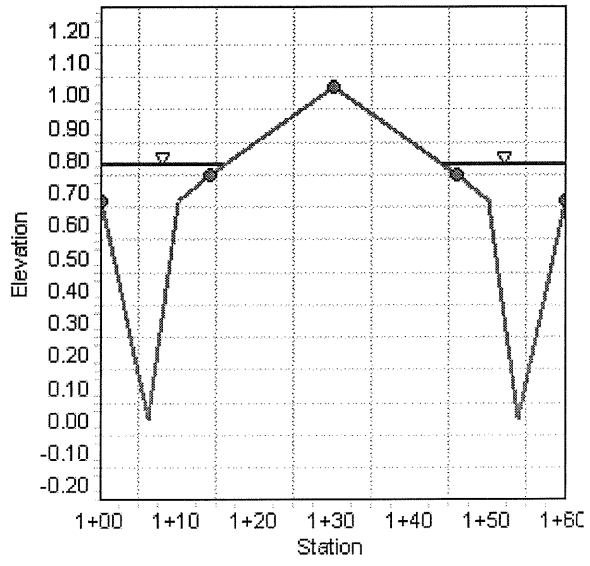
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.22000	%
Normal Depth	0.78	ft
Discharge	30.00	ft³/s

Cross Section Image



Worksheet for SECT 7F W/ CURB AND GUTTER

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.22000	%
Discharge	30.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	2.00
1+00.0	0.60
1+05.0	0.50
1+05.5	0.48
1+05.5	0.00
1+07.0	0.13
1+07.0	0.17
1+30.0	0.63
1+53.0	0.17
1+53.0	0.13
1+54.5	0.00
1+54.5	0.48
1+55.0	0.50
1+60.0	0.60
1+60.0	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 2.00)	(1+07.0, 0.17)	0.013
(1+07.0, 0.17)	(1+30.0, 0.63)	0.016
(1+30.0, 0.63)	(1+53.0, 0.17)	0.016
(1+53.0, 0.17)	(1+60.0, 2.00)	0.013

Worksheet for SECT 7F W/ CURB AND GUTTER

Results

Normal Depth		0.54	ft
Elevation Range	0.000 to 2.000 ft		
Flow Area		8.67	ft²
Wetted Perimeter		47.029	ft
Top Width		45.965	ft
Normal Depth		0.54	ft
Critical Depth		0.60	ft
Critical Slope		0.00600	ft/ft
Velocity		3.46	ft/s
Velocity Head		0.19	ft
Specific Energy		0.73	ft
Froude Number		1.40	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.54	ft
Critical Depth	0.60	ft
Channel Slope	0.01220	ft/ft
Critical Slope	0.00600	ft/ft

Cross Section for SECT 7F W/ CURB AND GUTTER

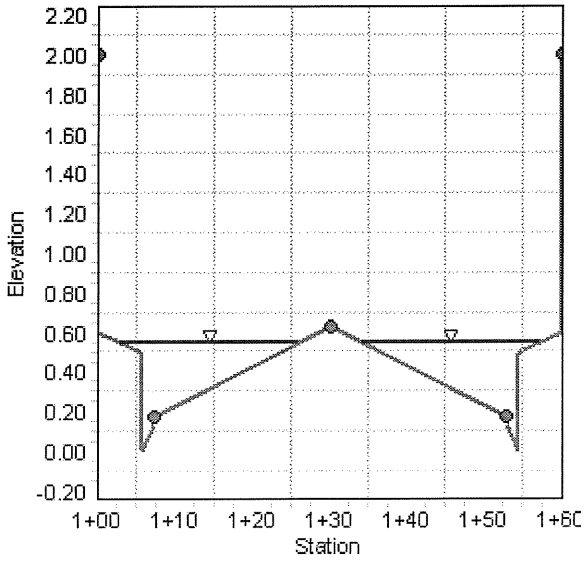
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.22000	%
Normal Depth	0.54	ft
Discharge	30.00	ft³/s

Cross Section Image



EXIST CALC FOR COMPARISON OF FLOW DEPTHS IN TEE PEE

Worksheet for SECT 7F 100-YR TEE PEE-EXIST

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.22000	%
Discharge	26.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	0.67
1+06.0	0.00
1+10.0	0.67
1+14.0	0.75
1+30.0	1.02
1+46.0	0.75
1+50.0	0.67
1+54.0	0.00
1+60.0	0.67

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 0.67)	(1+14.0, 0.75)	0.025
(1+14.0, 0.75)	(1+30.0, 1.02)	0.016
(1+30.0, 1.02)	(1+46.0, 0.75)	0.016
(1+46.0, 0.75)	(1+60.0, 0.67)	0.025

Results

Normal Depth	0.75	ft
Elevation Range	0.000 to 1.020 ft	
Flow Area	8.70	ft²
Wetted Perimeter	28.706	ft
Top Width	28.352	ft
Normal Depth	0.75	ft

Worksheet for SECT 7F 100-YR TEE PEE-EXIST

Results

Critical Depth		0.74	ft
Critical Slope		0.01346	ft/ft
Velocity		2.99	ft/s
Velocity Head		0.14	ft
Specific Energy		0.89	ft
Froude Number		0.95	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.75	ft
Critical Depth	0.74	ft
Channel Slope	0.01220	ft/ft
Critical Slope	0.01346	ft/ft

Cross Section for SECT 7F 100-YR TEE PEE-EXIST

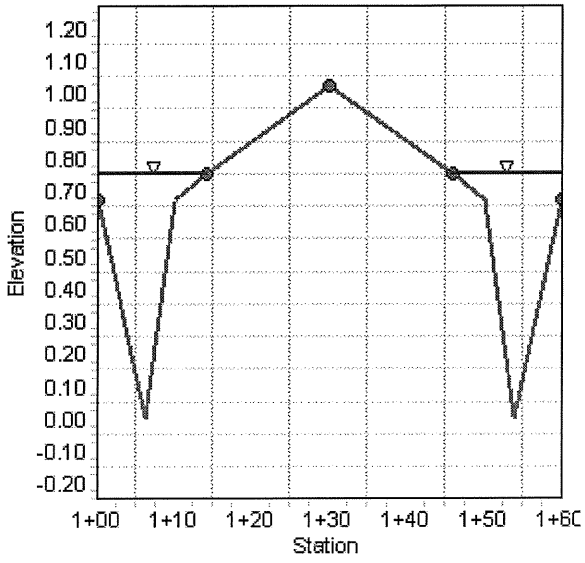
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.22000	%
Normal Depth	0.75	ft
Discharge	26.00	ft³/s

Cross Section Image



Worksheet for SECT 8F 100-YR BRIGHT ANGEL WAY

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.07000	%
Discharge	52.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	0.67
1+06.0	0.00
1+10.0	0.67
1+14.0	0.75
1+30.0	1.02
1+46.0	0.75
1+50.0	0.67
1+54.0	0.00
1+60.0	0.67

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 0.67)	(1+14.0, 0.75)	0.025
(1+14.0, 0.75)	(1+30.0, 1.02)	0.016
(1+30.0, 1.02)	(1+46.0, 0.75)	0.016
(1+46.0, 0.75)	(1+60.0, 0.67)	0.025

Results

Normal Depth	0.84	ft
Elevation Range	0.000 to 1.020 ft	
Flow Area	11.68	ft²
Wetted Perimeter	39.372	ft
Top Width	38.840	ft
Normal Depth	0.84	ft

Worksheet for SECT 8F 100-YR BRIGHT ANGEL WAY

Results

Critical Depth		0.94	ft
Critical Slope		0.00989	ft/ft
Velocity		4.45	ft/s
Velocity Head		0.31	ft
Specific Energy		1.15	ft
Froude Number		1.43	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.84	ft
Critical Depth	0.94	ft
Channel Slope	0.02070	ft/ft
Critical Slope	0.00989	ft/ft

Cross Section for SECT 8F 100-YR BRIGHT ANGEL WAY

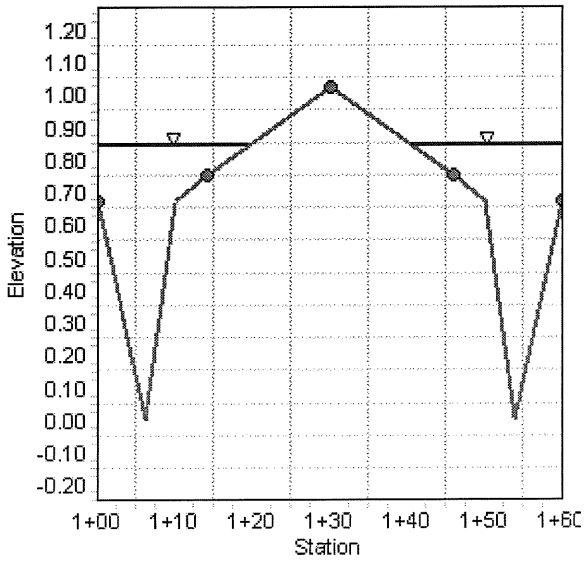
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.07000	%
Normal Depth	0.84	ft
Discharge	52.00	ft³/s

Cross Section Image



Worksheet for SECT 8F W/ CURB AND GUTTER

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.07000	%
Discharge	52.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	2.00
1+00.0	0.60
1+05.0	0.50
1+05.5	0.48
1+05.5	0.00
1+07.0	0.13
1+07.0	0.17
1+30.0	0.63
1+53.0	0.17
1+53.0	0.13
1+54.5	0.00
1+54.5	0.48
1+55.0	0.50
1+60.0	0.60
1+60.0	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 2.00)	(1+07.0, 0.17)	0.013
(1+07.0, 0.17)	(1+30.0, 0.63)	0.016
(1+30.0, 0.63)	(1+53.0, 0.17)	0.016
(1+53.0, 0.17)	(1+60.0, 2.00)	0.013

Worksheet for SECT 8F W/ CURB AND GUTTER

Results

Normal Depth		0.59	ft
Elevation Range	0.000 to 2.000 ft		
Flow Area		11.02	ft²
Wetted Perimeter		56.324	ft
Top Width		55.258	ft
Normal Depth		0.59	ft
Critical Depth		0.69	ft
Critical Slope		0.00531	ft/ft
Velocity		4.72	ft/s
Velocity Head		0.35	ft
Specific Energy		0.94	ft
Froude Number		1.86	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.59	ft
Critical Depth	0.69	ft
Channel Slope	0.02070	ft/ft
Critical Slope	0.00531	ft/ft

Cross Section for SECT 8F W/ CURB AND GUTTER

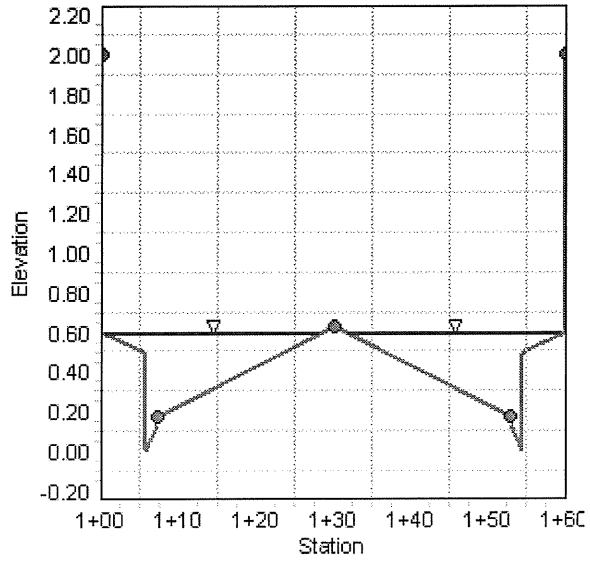
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.07000	%
Normal Depth	0.59	ft
Discharge	52.00	ft³/s

Cross Section Image



Worksheet for SECT 9F 100-YR REGENA AVENUE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.70000	%
Discharge	221.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	0.67
1+06.0	0.00
1+10.0	0.67
1+14.0	0.75
1+30.0	1.02
1+46.0	0.75
1+50.0	0.67
1+54.0	0.00
1+60.0	0.67

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 0.67)	(1+14.0, 0.75)	0.025
(1+14.0, 0.75)	(1+30.0, 1.02)	0.016
(1+30.0, 1.02)	(1+46.0, 0.75)	0.016
(1+46.0, 0.75)	(1+60.0, 0.67)	0.025

Results

Normal Depth		1.18	ft
Elevation Range	0.000 to 1.020 ft		
Flow Area		29.86	ft²
Wetted Perimeter		61.204	ft
Top Width		60.000	ft
Normal Depth		1.18	ft

Worksheet for SECT 9F 100-YR REGENA AVENUE

Results

Critical Depth		1.43	ft
Critical Slope		0.00695	ft/ft
Velocity		7.40	ft/s
Velocity Head		0.85	ft
Specific Energy		2.03	ft
Froude Number		1.85	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.18	ft
Critical Depth	1.43	ft
Channel Slope	0.02700	ft/ft
Critical Slope	0.00695	ft/ft

Cross Section for SECT 9F 100-YR REGENA AVENUE

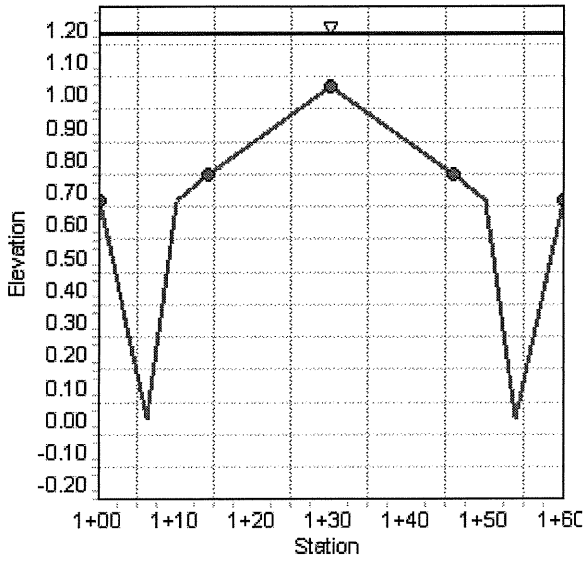
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.70000	%
Normal Depth	1.18	ft
Discharge	221.00	ft³/s

Cross Section Image



Worksheet for SECT 9F W/ CURB AND GUTTER

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.70000	%
Discharge	221.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	2.00
1+00.0	0.60
1+05.0	0.50
1+05.5	0.48
1+05.5	0.00
1+07.0	0.13
1+07.0	0.17
1+30.0	0.63
1+53.0	0.17
1+53.0	0.13
1+54.5	0.00
1+54.5	0.48
1+55.0	0.50
1+60.0	0.60
1+60.0	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 2.00)	(1+07.0, 0.17)	0.013
(1+07.0, 0.17)	(1+30.0, 0.63)	0.016
(1+30.0, 0.63)	(1+53.0, 0.17)	0.016
(1+53.0, 0.17)	(1+60.0, 2.00)	0.013

Worksheet for SECT 9F W/ CURB AND GUTTER

Results

Normal Depth		0.83	ft
Elevation Range	0.000 to 2.000 ft		
Flow Area		25.10	ft²
Wetted Perimeter		61.518	ft
Top Width		60.000	ft
Normal Depth		0.83	ft
Critical Depth		1.16	ft
Critical Slope		0.00392	ft/ft
Velocity		8.80	ft/s
Velocity Head		1.20	ft
Specific Energy		2.03	ft
Froude Number		2.40	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.83	ft
Critical Depth	1.16	ft
Channel Slope	0.02700	ft/ft
Critical Slope	0.00392	ft/ft

Cross Section for SECT 9F W/ CURB AND GUTTER

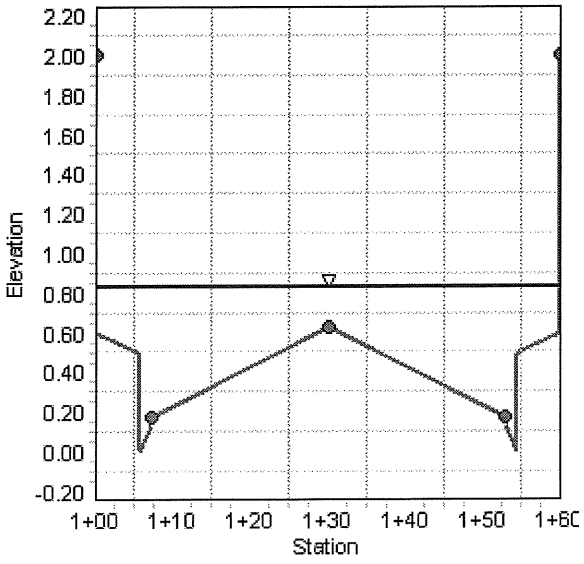
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.70000	%
Normal Depth	0.83	ft
Discharge	221.00	ft³/s

Cross Section Image



Worksheet for SECT 10 EGAN RANCH COURT FLATTEST

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.29000	%
Discharge	5.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	1.00
1+00.0	0.38
1+01.5	0.00
1+02.5	0.08
1+02.5	0.13
1+19.5	0.48
1+36.5	0.13
1+36.5	0.08
1+37.5	0.00
1+39.0	0.38
1+44.0	0.48
1+44.0	1.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 1.00)	(1+02.5, 0.13)	0.013
(1+02.5, 0.13)	(1+36.5, 0.13)	0.016
(1+36.5, 0.13)	(1+44.0, 1.00)	0.013

Results

Normal Depth	0.28	ft
Elevation Range	0.000 to 1.000 ft	
Flow Area	1.95	ft²
Wetted Perimeter	19.399	ft

Worksheet for SECT 10 EGAN RANCH COURT FLATTEST

Results

Top Width		19.236	ft
Normal Depth		0.28	ft
Critical Depth		0.31	ft
Critical Slope		0.00609	ft/ft
Velocity		2.57	ft/s
Velocity Head		0.10	ft
Specific Energy		0.38	ft
Froude Number		1.42	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.31	ft
Channel Slope	0.01290	ft/ft
Critical Slope	0.00609	ft/ft

Cross Section for SECT 10 EGAN RANCH COURT FLATTEST

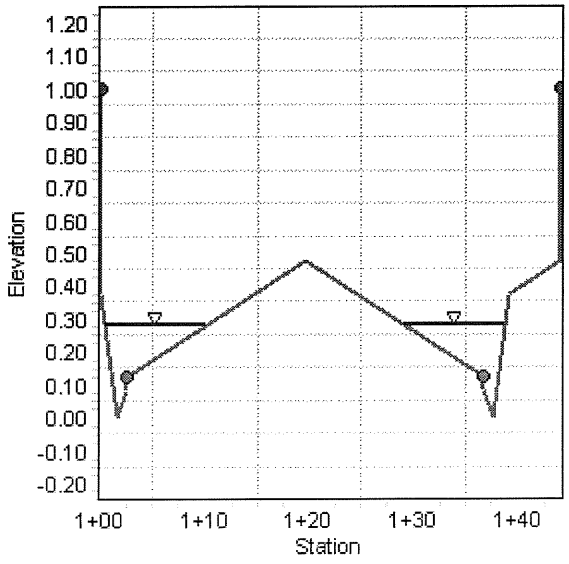
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.29000	%
Normal Depth	0.28	ft
Discharge	5.00	ft³/s

Cross Section Image



Worksheet for SECT 11 FLAXA RANCH COURT

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.52000	%
Discharge	18.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	1.00
1+00.0	0.38
1+01.5	0.00
1+02.5	0.08
1+02.5	0.13
1+19.5	0.48
1+36.5	0.13
1+36.5	0.08
1+37.5	0.00
1+39.0	0.38
1+44.0	0.48
1+44.0	1.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 1.00)	(1+02.5, 0.13)	0.013
(1+02.5, 0.13)	(1+36.5, 0.13)	0.016
(1+36.5, 0.13)	(1+44.0, 1.00)	0.013

Results

Normal Depth		0.40	ft
Elevation Range	0.000 to 1.000 ft		
Flow Area		4.99	ft²
Wetted Perimeter		32.926	ft

Worksheet for SECT 11 FLAXA RANCH COURT

Results

Top Width		32.714	ft
Normal Depth		0.40	ft
Critical Depth		0.47	ft
Critical Slope		0.00547	ft/ft
Velocity		3.61	ft/s
Velocity Head		0.20	ft
Specific Energy		0.60	ft
Froude Number		1.63	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.40	ft
Critical Depth	0.47	ft
Channel Slope	0.01520	ft/ft
Critical Slope	0.00547	ft/ft

Cross Section for SECT 11 FLAXA RANCH COURT

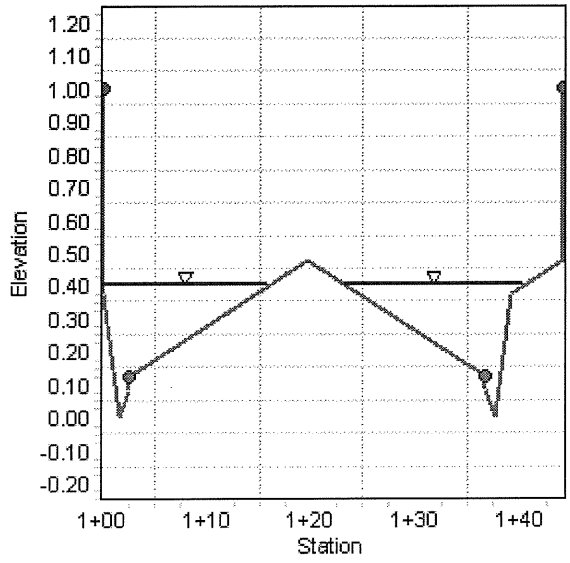
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.52000	%
Normal Depth	0.40	ft
Discharge	18.00	ft³/s

Cross Section Image



Worksheet for SECT 3F 10-YR REGENA AVENUE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.70000	%
Discharge	153.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	0.67
1+06.0	0.00
1+10.0	0.67
1+14.0	0.75
1+30.0	1.02
1+46.0	0.75
1+50.0	0.67
1+54.0	0.00
1+60.0	0.67

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 0.67)	(1+14.0, 0.75)	0.025
(1+14.0, 0.75)	(1+30.0, 1.02)	0.016
(1+30.0, 1.02)	(1+46.0, 0.75)	0.016
(1+46.0, 0.75)	(1+60.0, 0.67)	0.025

Results

Normal Depth		1.07	ft
Elevation Range	0.000 to 1.020 ft		
Flow Area		23.58	ft²
Wetted Perimeter		60.995	ft
Top Width		60.000	ft
Normal Depth		1.07	ft

Worksheet for SECT 3F 10-YR REGENA AVENUE

Results

Critical Depth		1.27	ft
Critical Slope		0.00714	ft/ft
Velocity		6.49	ft/s
Velocity Head		0.65	ft
Specific Energy		1.73	ft
Froude Number		1.83	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.07	ft
Critical Depth	1.27	ft
Channel Slope	0.02700	ft/ft
Critical Slope	0.00714	ft/ft

Cross Section for SECT 3F 10-YR REGENA AVENUE

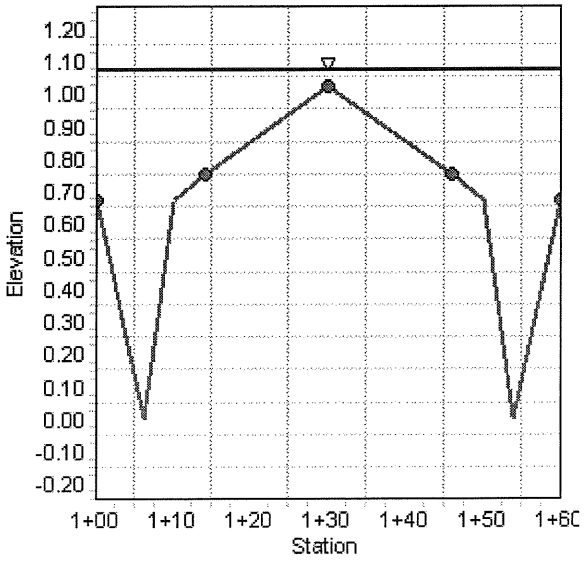
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.70000	%
Normal Depth	1.07	ft
Discharge	153.00	ft³/s

Cross Section Image



Worksheet for SECT 6F 10-YR AZURE DRIVE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.46000	%
Discharge	19.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	0.67
1+06.0	0.00
1+10.0	0.67
1+14.0	0.75
1+30.0	1.02
1+46.0	0.75
1+50.0	0.67
1+54.0	0.00
1+60.0	0.67

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 0.67)	(1+14.0, 0.75)	0.025
(1+14.0, 0.75)	(1+30.0, 1.02)	0.016
(1+30.0, 1.02)	(1+46.0, 0.75)	0.016
(1+46.0, 0.75)	(1+60.0, 0.67)	0.025

Results

Normal Depth	0.53	ft
Elevation Range	0.000 to 1.020 ft	
Flow Area	4.19	ft²
Wetted Perimeter	15.966	ft
Top Width	15.819	ft
Normal Depth	0.53	ft

Worksheet for SECT 6F 10-YR AZURE DRIVE

Results

Critical Depth		0.63	ft
Critical Slope		0.01354	ft/ft
Velocity		4.53	ft/s
Velocity Head		0.32	ft
Specific Energy		0.85	ft
Froude Number		1.55	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.03460	ft/ft
Critical Slope	0.01354	ft/ft

Cross Section for SECT 6F 10-YR AZURE DRIVE

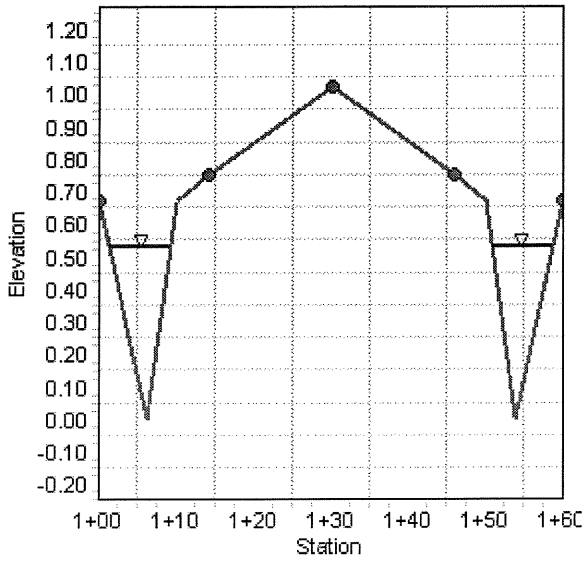
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.46000	%
Normal Depth	0.53	ft
Discharge	19.00	ft³/s

Cross Section Image



Worksheet for SECT 12 CONCRETE LINED EASEMENT

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.55000	%
Discharge	1.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+10.0	1.50
0+14.5	0.00
0+14.5	0.67

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+10.0, 1.50)	(0+14.5, 0.67)	0.015

Results

Normal Depth		0.53	ft
Elevation Range	0.000 to 1.500 ft		
Flow Area		0.41	ft²
Wetted Perimeter		2.185	ft
Top Width		1.575	ft
Normal Depth		0.53	ft
Critical Depth		0.49	ft
Critical Slope		0.00812	ft/ft
Velocity		2.42	ft/s
Velocity Head		0.09	ft
Specific Energy		0.62	ft
Froude Number		0.83	
Flow Type	Subcritical		

Worksheet for SECT 12 CONCRETE LINED EASEMENT

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.49	ft
Channel Slope	0.00550	ft/ft
Critical Slope	0.00812	ft/ft

Cross Section for SECT 12 CONCRETE LINED EASEMENT

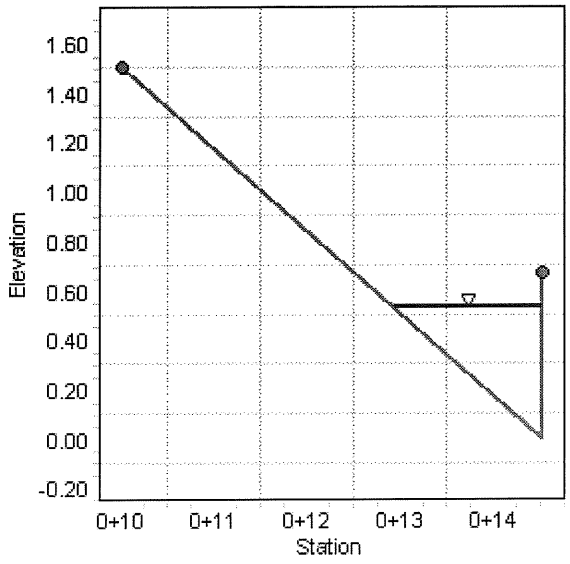
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.55000	%
Normal Depth	0.53	ft
Discharge	1.00	ft³/s

Cross Section Image



Worksheet for SECT 13 CONCRETE LINED EASEMENT

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.82000	%
Discharge	1.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+10.0	1.50
0+14.5	0.00
0+14.5	0.67

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+10.0, 1.50)	(0+14.5, 0.67)	0.015

Results

Normal Depth		0.42	ft
Elevation Range	0.000 to 1.500 ft		
Flow Area		0.26	ft²
Wetted Perimeter		1.746	ft
Top Width		1.258	ft
Normal Depth		0.42	ft
Critical Depth		0.49	ft
Critical Slope		0.00812	ft/ft
Velocity		3.79	ft/s
Velocity Head		0.22	ft
Specific Energy		0.64	ft
Froude Number		1.46	
Flow Type	Supercritical		

Worksheet for SECT 13 CONCRETE LINED EASEMENT

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.42	ft
Critical Depth	0.49	ft
Channel Slope	0.01820	ft/ft
Critical Slope	0.00812	ft/ft

Cross Section for SECT 13 CONCRETE LINED EASEMENT

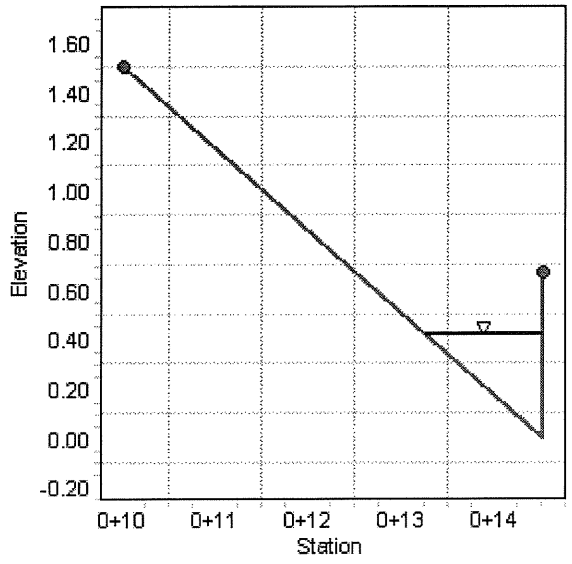
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.82000	%
Normal Depth	0.42	ft
Discharge	1.00	ft³/s

Cross Section Image



Worksheet for SECT 14 CONCRETE LINED EASEMENT

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50000	%
Discharge	1.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+10.0	0.50
0+10.0	0.05
0+12.5	0.00
0+15.0	0.05
0+15.0	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+10.0, 0.50)	(0+15.0, 0.50)	0.015

Results

Normal Depth		0.15	ft
Elevation Range	0.000 to 0.500 ft		
Flow Area		0.60	ft²
Wetted Perimeter		5.191	ft
Top Width		5.000	ft
Normal Depth		0.15	ft
Critical Depth		0.13	ft
Critical Slope		0.00720	ft/ft
Velocity		1.67	ft/s
Velocity Head		0.04	ft
Specific Energy		0.19	ft
Froude Number		0.85	
Flow Type	Subcritical		

Worksheet for SECT 14 CONCRETE LINED EASEMENT

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.15	ft
Critical Depth	0.13	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00720	ft/ft

Cross Section for SECT 14 CONCRETE LINED EASEMENT

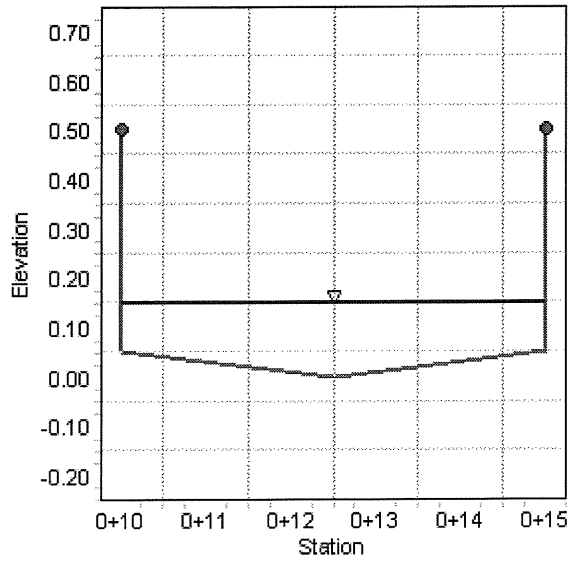
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50000	%
Normal Depth	0.15	ft
Discharge	1.00	ft³/s

Cross Section Image



Worksheet for SECT 15 CONCRETE LINED EASEMENT

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.00000	%
Discharge	13.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+10.0	0.50
0+10.0	0.10
0+15.0	0.00
0+20.0	0.10
0+20.0	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+10.0, 0.50)	(0+20.0, 0.50)	0.015

Results

Normal Depth		0.35	ft
Elevation Range	0.000 to 0.500 ft		
Flow Area		3.02	ft²
Wetted Perimeter		10.505	ft
Top Width		10.000	ft
Normal Depth		0.35	ft
Critical Depth		0.42	ft
Critical Slope		0.00495	ft/ft
Velocity		4.31	ft/s
Velocity Head		0.29	ft
Specific Energy		0.64	ft
Froude Number		1.38	
Flow Type	Supercritical		

Worksheet for SECT 15 CONCRETE LINED EASEMENT

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.35	ft
Critical Depth	0.42	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00495	ft/ft

Cross Section for SECT 15 CONCRETE LINED EASEMENT

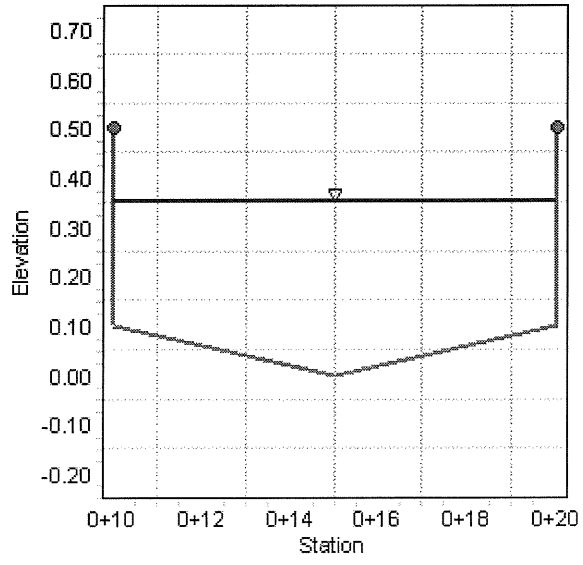
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.00000	%
Normal Depth	0.35	ft
Discharge	13.00	ft³/s

Cross Section Image



Block Wall Opening for Emergency Overflow-Lot 12

	WEIR		ORIFICE
Q100 =	2	Q100 =	2
L =	5.0	CLEAR AREA =	6.7
C =	3	C =	0.6
CLOGGING FACTOR	0.5	CLOGGING FACTOR	0.5
$H = (Q/CL)^{2/3}$	0.41	$H = (Q/CA)^2 / 64.4$	0.02

CONTROL = WEIR

Ponding Height = 0.41

Opening	Inches	Courses
Length =	60	3.75
Height =	16	2

CENTENNIAL AND TEE PEE

ZURN INLET MODEL Z1737

Q =	1.0 cfs	
A = (W)(D)	0.38 ft^2	
W=	10.0 in	0.8 ft
D=	5.5 in	0.5 ft
A'=	0.19 ft^2	50% CLOGGING

ORIFICE

$Q=CA'(2gH)^{0.5}$

C =	*0.65*
H =	1.01 ft

CONTROL = **ORIFICE**

PONDING DEPTH = 1.0 ft

APPENDIX C – REFERENCE MATERIALS

Zone Change (ZC-2019-05)

Tentative Map Notice of Final Action (TM-0165-13)

Waiver of Standards (WS-0600-13)

Technical Drainage Study for Centennial/Tee Pee, CVL Consultants, Inc., January 2007.

Department of Comprehensive Planning
Land Use Planning

500 S Grand Central Pky • PO Box 551744 • Las Vegas NV 89155-1744
(702) 455-4314 • Fax (702) 455-3271
Barbara Ginoulias, Director

NOTICE OF FINAL ACTION

REVISED *6/29/06*
March 30, 2006

SCOTT ANDERSON
6280 S. VALLEY VIEW #200
LAS VEGAS, NV 89118

REFERENCE: ZC-2019-05

On the date indicated above, a Notice of Final Action was filed with the Clark County Clerk, Commission Division, pursuant to NRS 278.0235 and marking the commencement of the twenty-five (25) day limitation period specified therein.

The above referenced application was presented before the Clark County Board of County Commissioners at their regular meeting of **March 22, 2006** and was **APPROVED** subject to the conditions listed below and/or on the attached sheet. You will be required to comply with all conditions prior to the issuance of a building permit or a business license whichever occurs first.

Time limits to commence, complete or review this approval apply only to this specific application. A property may have several approved applications on it, each will have its own expiration date. It is the applicant's responsibility to keep each application current.

CONDITIONS:

Current Planning

1. **No resolution of intent and staff preparing an ordinance to adopt the zoning;**
2. **Minimum 18,000 square foot (gross) for the lots on 2.5 acres south of Regena Avenue (APN: 125-30-502-013);**
3. **Single story homes on Lots ~~15, 16, 17, 21 thru 25~~ *23 thru 26* per site plan on file with a minimum rear setback of 20 feet~~, to better integrate with adjacent, developed residences that have a minimum 30 foot rear setback~~;**
4. **All applicable standard conditions for this application type.**
5. **~~For~~ *The* two 5 acre parcels south of Regena Avenue (APN: 125-30-502-012 and APN: 125-30-601-007) will have a maximum of 9 lots *with 20,000 square foot minimum lot sizes,* ~~with~~ the proposed lot lines *along the west property line of APN 125-30-502-012 will* match~~ing~~ the lot lines of the adjacent subdivision to the west;**
6. **Maximum of 12 lots for the 5 acre parcel north of Regena Avenue (APN: 125-30-502-007);**

Civil Engineering

1. **Right-of-way dedication to include 60 feet for Azure Drive, 50 feet for Centennial Parkway, 30 to 60 feet for Tee Pee Lane, 30 to 60 feet for Regena Avenue, and 30 feet for Bright Angel Way;**
2. **If sidewalks are detached, dedicate right-of-way and grant easements in accordance with sidewalk requirements;**

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THOM REILLY, County Manager

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Barbara Ginoulias, Director

3. **If required by Regional Transportation Commission, dedicate and construct right-of-way for bus turnout and/or passenger loading/shelter area in accordance with Regional Transportation Commission standards;**
4. **Full off-sites on Centennial Parkway;**
5. **Drainage study and compliance;**
6. **Traffic study and compliance, project may qualify for an exception to the traffic analysis with Civil Engineering approval;**
7. **Coordinate drainage and traffic study with ZC 2016-05 and ZC-2018-05;**
8. **Driveway lengths to be a minimum of 20 feet in length;**
9. **Interior streets to have a minimum of 37 feet to back of curb;**
10. **Streets less than 150 feet in length to have a minimum of 24 feet of drivable surface width with a maximum of 2 lots and post "No Parking" signs on both sides of the street;**
11. **If applicable all vacations to be recordable prior to building permit issuance and or applicable map submittal.**
12. **Paving curb and gutter on Regena Avenue, Azure Drive, and Bright Angel Way;**
13. **Non-urban standards on Tee Pee Lane;**
14. **Safety lighting at the intersections.**

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THOM REILLY, County Manager

Tee Pee

Department of Comprehensive Planning
Land Use Planning

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(702) 455-4314 • Fax (702) 455-3271

Nancy A. Amundsen, Director • Marci D. Henson, Assistant Director

NOTICE OF FINAL ACTION

November 15, 2013

CHRIS THOMPSON
RCI ENGINEERING
3281 S. HIGHLAND DR #810
LAS VEGAS, NV 89109

REFERENCE: TM-0165-13

On the date indicated above, a Notice of Final Action was filed with the Clark County Clerk, Commission Division, pursuant to NRS 278.0235 and marking the commencement of the twenty-five (25) day limitation period specified therein.

The above referenced application was presented before the Clark County Board of County Commissioners at their regular meeting of **November 6, 2013** and was **APPROVED** subject to the conditions listed below and/or on the attached sheet. You will be required to comply with all conditions prior to the issuance of a building permit or a business license whichever occurs first.

Time limits to commence, complete or review this approval, apply only to this specific application. A property may have several approved applications on it with each having its own expiration date. **It is the applicant's responsibility to keep the application current, and also provide a current contact name, address, and phone number to this Department at the above address. This information must be submitted in writing with the application number referenced.**

CONDITIONS:

- **Subject to conditions of approval of ZC-2019-05;**
- **Match lot lines of Lots 21, 22, and 23;**
- **Single story homes per new site plan;**
- **Any common block wall (redundant wall) to be mitigated per Title 30 requirements;**
- **Landscaping along Regena Avenue to be 36 inch box trees, 30 feet apart including shrubs.**
- **Applicant is advised that any change in circumstances or regulations may be justification for the denial of an extension of time; and that a final map for all, or a portion, of the property included under this application must be recorded within 4 years or it will expire.**

Public Works – Development Review

- **Artificial grade (fill) can only be created if required by the drainage study;**
- **No curb/gutter along Regena Avenue, Azure Drive, and Bright Angel Way, only landscape curbs;**
- **Drainage study and compliance;**
- **Traffic study and compliance;**
- **Full off-site improvements;**

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DONALD G. BURNETTE, County Manager

Department of Comprehensive Planning
Land Use Planning

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Nancy A. Amundsen, Director • Marci D. Henson, Assistant Director

- **Right-of-way dedication to include 30 to 60 feet for Tee Pee Lane, 60 feet for Azure Drive, 30 to 60 feet for Regena Avenue, 50 feet for Centennial Parkway and all associated spandrels;**
- **Fire Department approval of the over-length cul-de-sac.**

Current Planning Division – Addressing

- **The 4 lot cul-de-sac shown as Zrinyi Ranch Court shall be a part of Regena Avenue.**

Fire Department

- **Dead-end streets/cul-de-sacs in excess of 500 feet must have an approved Fire Department turn-around provided.**

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DONALD G. BURNETTE, County Manager

TEE PEE

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Nancy A. Amundsen, Director • Marci D. Henson, Assistant Director

NOTICE OF FINAL ACTION

November 15, 2013

CHRIS THOMPSON
RCI ENGINEERING
3281 S. HIGHLAND DR #810
LAS VEGAS, NV 89109

REFERENCE: WS-0600-13

On the date indicated above, a Notice of Final Action was filed with the Clark County Clerk, Commission Division, pursuant to NRS 278.0235 and marking the commencement of the twenty-five (25) day limitation period specified therein.

The above referenced application was presented before the Clark County Board of County Commissioners at their regular meeting of **November 6, 2013** and was **APPROVED** subject to the conditions listed below and/or on the attached sheet. You will be required to comply with all conditions prior to the issuance of a building permit or a business license whichever occurs first.

Time limits to commence, complete or review this approval, apply only to this specific application. A property may have several approved applications on it with each having its own expiration date. **It is the applicant's responsibility to keep the application current, and also provide a current contact name, address, and phone number to this Department at the above address. This information must be submitted in writing with the application number referenced.**

CONDITIONS:

Current Planning

- **Subject to conditions of approval of ZC-2019-05;**
- **Match lot lines of Lots 21, 22, and 23;**
- **Single story homes per new site plan;**
- **Any common block wall (redundant wall) to be mitigated per Title 30 requirements;**
- **Landscaping along Regena Avenue to be 36 inch box trees, 30 feet apart including shrubs.**
- **Certificate of Occupancy and/or business license shall not be issued without final zoning inspection.**
- **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.**

Public Works – Development Review

- **Artificial grade (fill) can only be created if required by the drainage study;**
- **No curb/gutter along Regena Avenue, Azure Drive, and Bright Angel Way, only landscape curbs;**
- **Drainage study and compliance;**

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Department of Comprehensive Planning
Land Use Planning

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(702) 455-4314 • Fax (702) 455-3271

Nancy A. Amundsen, Director • Marci D. Henson, Assistant Director

- **Traffic study and compliance;**
- **Full off-site improvements;**
- **Right-of-way dedication to include 30 to 60 feet for Tee Pee Lane, 60 feet for Azure Drive, 30 to 60 feet for Regena Avenue, 50 feet for Centennial Parkway and all associated spandrels;**
- **Fire Department approval of the over length cul-de-sac.**

Fire Department

- **Applicant is advised that 32-foot wide street, Tee Pee Lane, is allowed because there are no curbs/gutters or sidewalks; and that off-street parking is expected (dirt both sides of street).**

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DONALD G. BURNETTE, County Manager

06-37189
11-30-06
ADD # 1
T-1 ICM

Addendum # 1
TECHNICAL DRAINAGE STUDY

FOR
CENTENNIAL/TEE PEE

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 09-12-0115001
NOVEMBER 28, 2006

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 23, 2007

LTR

06-37189

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/Tee Pee **(5346)**
Study Dated: August 16, 2006
Addendum Dated: November 28, 2006
Supplemental Dated: December 7, 2006
2nd Supplement Dated: January 11, 2007
Location: SEC of Centennial Parkway and Tee Pee Lane
S30, T19S, R60E
HTE# 06-37189

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 / Teepee," Sheets C-1, GP-1 thru GP-3, DT-1, DT-2, EX-1 and PP-1 thru PP-8 signed and sealed by Geoffrey G. Purse, P.E., on January 11, 2007;

2. The following drainage facilities shall be constructed:

   a. A 5-foot wide drainage easement to be privately maintained, located along the east side of lots 8 through 12, containing a 3-foot wide concrete valley gutter, as shown in section C/DT-1. The easement will have 48" x 16" block wall openings at all lot lines as shown in section AH/DT-2

   b. The above mentioned drainage easement conveys to a dry well (section AA/DT-2) at the southeast corner of lot 12, which outlets to Regena Avenue through a 2-foot wide sidewalk underdrain

   c. A 5-foot wide drainage easement to be privately maintained, located along the east and south sides of lot 14, containing a 3-foot wide concrete valley gutter and a 6" A-curb, as shown in section Q/DT-1, with a 48" x 16" block

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VIRGINIA VALENTINE, P.E., County Manager

wall opening at the boundary with lot 13, and conveying to a dry well (section AC/DT-2) at the south boundary of lot 14

d. A 5-foot wide drainage easement to be privately maintained, located along the west side of lot 14, containing a 3-foot wide concrete valley gutter, as shown in section L/DT-1, with a depressed curb at the entrance

e. A 5-foot wide drainage easement to be privately maintained, located along the south side of lot 15, containing a 3-foot wide concrete valley gutter, as shown in section M/DT-1, with 48" x 16" block wall openings (section AH/DT-2) at each end

f. A 5-foot wide drainage easement to be privately maintained, located along the east side of lots 18 through 21, containing a 3-foot wide concrete valley gutter, as shown in section P/DT-1, with 48" x 16" block wall openings at all lot lines as shown in section AH/DT-2

g. The above mentioned drainage easement 2f. conveys to a dry well (section AA/DT-2) at the southeast corner of lot 18, which outlets to Azure Drive through a 2-foot wide sidewalk underdrain

h. A 5-foot wide drainage easement to be privately maintained, located along the east side of lots 27 through 29, containing a 3-foot wide concrete valley gutter, as shown in section V/DT-1, with 48" x 16" block wall openings at all lot lines as shown in section AH/DT-2

i. The above mentioned drainage easement 2h. conveys to a dry well (section AA/DT-2) at the southeast corner of lot 27, which outlets to Bright Angel Way through a 2-foot wide sidewalk underdrain

j. A 20-foot wide to 15-foot wide concrete lined drainage easement to be privately maintained, located along the south of lot 33, with a 20-foot wide wrought iron gate at the entrance (section AE/DT-2), side walls solid grouted 3 courses (section AF/DT-2), and a depressed curb at the outlet

k. The perimeter block walls shall be solid grouted 3 courses along Centennial Parkway (sections A and B/DT-1), Teepee Lane (section D/DT-1 and N/DT-1), Regena Avenue (section J/DT-1, K/DT-1 and Z/DT-2), Azure Drive (sections S and T/DT-1), and along the west side of lots 32 through 35 (section U/DT-1)

l. An 8-foot wide concrete valley gutter at the following locations:

- Crossing Teepee Lane at Centennial Parkway
- Crossing Conlin Ct on the north side of Regena Avenue

- Crossing Conlin Ct on the south side of Regena Avenue
- Crossing Teepee Lane on the north side of Regena Avenue
- Crossing Teepee Lane on the south side of Regena Avenue
- Crossing Teepee Lane on the north side of Azure Drive
- Crossing Teepee Lane on the south side of Azure Drive
- Crossing Janna Falls Ct at Azure Drive
- Crossing Teepee Lane at Bright Angel Way
- Crossing Marva Jo Ct at Bright Angel Way

m. A 6-inch by 3-foot cutoff wall in Regina Avenue as shown in detail H/DT-1 and Z/DT-2

3. A bond estimate must be submitted to Clark County Civil Engineering Division for the above-mentioned storm water management facilities, except item 2(k);

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 plans;

6. The subject site is located within Zone X, as shown on FIRM Community Panel Number 32003C 1745E, 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. 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;

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

10. 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. The cross slopes for the valley gutter shown in Detail AG/DT-2 must be revised to correspond with the slope shown in AF/DT-2 (6.7%)

b. Section AF/DT-2 shows block wall on both sides of the easement between Lots 33 and 34. A wall opening must be provided for Lot 33 to drain into the easement or the lot drainage must be defined to the street

c. The manhole inlet must be show at the southeast corner of Lot 18

d. Construction Note 5 should be referenced at locations where Existing AC pavement is to be saw cut and matched

e. Construction Note 3 should be referenced at locations where 8-ft valley gutters are proposed

f. The Detail R/DT-1 should be revised to show solid grout similar to Detail S on this sheet

g. The match lines on Sheet PP-2 must be revised to reference Sheets PP-1 and PP-3

h. Show the cutoff wall in Regena Avenue on detail Z/DT-2

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

DEPARTMENT OF DEVELOPMENT SERVICES

BY: Glenn S. Hale

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

GH/rm

cc:
Development File

CVL CONSULTANTS, INC.
Land Planning
Land Surveying
Civil Engineering

November 28, 2006

Mr. Dave Betley, P.E.
Clark County Public Works
500 S. Grand Central Parkway
Las Vegas, NV 89115

RE: Addendum #1 to the
Technical Drainage Study for Centennial / Tee Pee
H T E # 06-37189
CVL Project No. 09-12-0115001

Mr. Betley:

CVL Consultants has received the review comment letter concerning the above-referenced project, dated September 6, 2006 by Clark County. A coordination meeting was held to discuss issues regarding this comment letter on September 20, 2006. Present at the meeting were: Barbara Brown of Momentum Engineers, Jeff Purse of CVL consultants, and Dave Betley of Clark County. In the meeting several issues were discussed and agreed upon as described in the responses to the review comments below.

1. It is required to provide street depth calculations for "Non-Urban Standard" perimeter streets utilizing a fully-developed street section including curb, gutter, and sidewalk. This is because future conditions may require full offsite improvements and the site needs to be flood protected to meet criteria. Provide the revised street flow calculations with the worst case flow and verify that the proposed flood protection (i.e. solid grouted block walls) meets criteria;

Street calculations are provided herein for interim conditions for both the non-urban and the urban (fully-improved) standard section (See revised Figure 4). Street calculations for future conditions are provided based on only the urban (fully-improved) standard street section (See Figure 6). Calculations are included in the appendix of this submittal. The revised street calculations meet CCRFCD Drainage Manual criteria and the site is adequately protected.

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;

The grading plans herein have been revised to comply with Clark County Code Title 30.

2. In the interim conditions analysis it is shown that the flow at the east end of Regena Avenue is 180/304 cfs (Q(10)/Q(100)) where the existing flow is 1 / 2 cfs. This is not considered an existing condition and the d x v criteria is not met. Provisions must be made to mitigate the impact of these flows on the downstream properties and to meet the criteria;

The hydrologic analyses have been revised and presented in this submittal (See Figures 3 through 6). Previously, curve numbers for existing conditions were selected from CCRFCD Drainage Manual Table 602, 4 of 4. However, for this submittal, all existing conditions curve numbers were revised to comply with Drainage Manual page 610. The result is that the existing conditions curve numbers were reduced in general, from CN=80 to CN=77 for Hydrologic Soils Group B soils, which applies to most of the existing basins studied. A future conditions hydrologic analysis was also prepared and presented in this submittal. For the future conditions analysis, curve numbers were based on the most conservative estimate for future development of the watershed, with no CCRFCD Regional Drainage Facilities implemented (a future Regional facility is planned for the Grand Canyon Drive alignment). The Clark County Development Services website was referenced to determine current zoning of the area. Much of the watershed south of Centennial Parkway is located within a neighborhood protection zone that guarantees no more than 2 residential units per acre. Areas north of Centennial Parkway are not within the protection area and will probably be developed as higher-density residential or even commercial.

For all of the hydrologic analyses presented in this submittal, including the revised existing and revised interim analyses, as well as the future conditions analysis, a flow split calculation is provided at the intersection of Regena Avenue and Tee Pee Lane. Under existing conditions, it is expected that most of the flow will be conveyed on the north side of the existing crown and it is assumed that only flow that overtops the crown of Regena Avenue splits to the south at Tee Pee Lane. Under interim and future conditions, the improvement of the street sections at that intersection is intended to match the existing flow split as much as possible. Valley gutters are recommended at this intersection in order to convey the majority of flow from west to east as under existing conditions. Flow that splits from Regena Avenue to the south on Tee Pee Lane overtops the lip of the valley gutter, and is calculated

* CN Values for Exist + Developed

as weir flow since the southward velocity is expected to be negligible.

For the revised existing conditions analysis refer to revised Figure 3. Drainage areas CHS1, CHS2, CHS3, EXOF51, and EXOF61 were added to the analysis at the upstream end, where previously, these basins were referenced from another study, producing unreasonably high runoff results. Addition of these areas results in a more accurate existing conditions analysis. Also, as discussed above, curve numbers were revised and a flow split was added at point CP3 at the intersection of Regena Avenue and Tee Pee Lane. These revisions also result in a more accurate existing conditions analysis, and still do not cause development of the site to increase peak runoff rates. Calculations are included in the appendix and results are shown on revised Figure 3.

For the revised interim conditions analysis, refer to revised Figure 4. Offsite basins are the same as shown on revised Figure 3. A flow split is calculated at the intersection of Regena Avenue and Tee Pee Lane that is very similar to that which occurs under existing conditions, having 60 cfs turn south on Tee Pee Lane in the 100-year storm event, while the remainder continues easterly on Regena Avenue. Interim conditions peak discharge rates at point CP4 (84/226) on revised Figure 4 can be compared to the sum of existing conditions peak discharge rates from CP12 and CP4 (20/74 + 98/153 = 118/227) on revised Figure 3. Although peak discharge rates are similar under existing and interim conditions, there is a difference as to where the flow is discharged from the developed site. Under existing conditions, the flow that splits to the south from Regena near Tee Pee Lane enters a natural wash and is carried to the east where it impacts the rear of several residential properties at point CP13 (Q(100)=64 cfs) on Figure 3. Under interim conditions, development of the site blocks the natural wash and only flow from onsite areas DON3 and DON4 is discharged at that point (Q(100)=2 cfs), actually improving the drainage conditions to these properties. Field investigation and examination of existing conditions contours downstream of the site and properties to the east indicates that flow passing through these residential lots under existing conditions enters Chieftain Street, where it is directed southerly into a sizable low point near Azure Drive, where it continues flowing easterly. A copy of the contour map is included in this submittal. Under interim conditions, about half of the flow running southerly on the west side of Tee Pee Lane from Regena Avenue will continue southerly, where it enters Azure Avenue and continues easterly. The remaining half of the flow in the east side of Tee Pee Lane will likely turn easterly, entering the natural channel along the north side of the house at the corner of Tee Pee Lane and Azure Drive. The amount of flow expected to run in this natural wash is about 31 cfs in the 100-year storm event. A normal depth calculation was performed as section G-G on Figure 4, in order to determine the impact on the property. It was determined that this flow has very little impact on the existing property, which has a finished floor elevation of more than 6.5 feet above the calculated normal depth of flow. This flow continues downstream about 400 feet to a point where it would have eventually run under

existing conditions, near the intersection of Chieftain and Azure. Additional street calculations (Section 13) were also performed downstream of the site on Azure Drive east of Tee Pee Lane, to determine any adverse impacts to the surrounding properties. Calculations were performed at this location in the case that all flow in Tee Pee Lane continues southerly, turning easterly on Azure Drive under interim conditions. It was determined that the 100-year depth of flow in Azure Drive has minimal impact on the properties on the north and south sides of Azure Drive just east of Tee Pee Lane. The finished floor elevation of the house north of Azure Drive exists at an elevation at least 6 feet above the crown of the street, while the finished floor of the house south of Azure Drive exists at an elevation at least 1.5 feet above the crown of the street, and these properties are adequately protected.

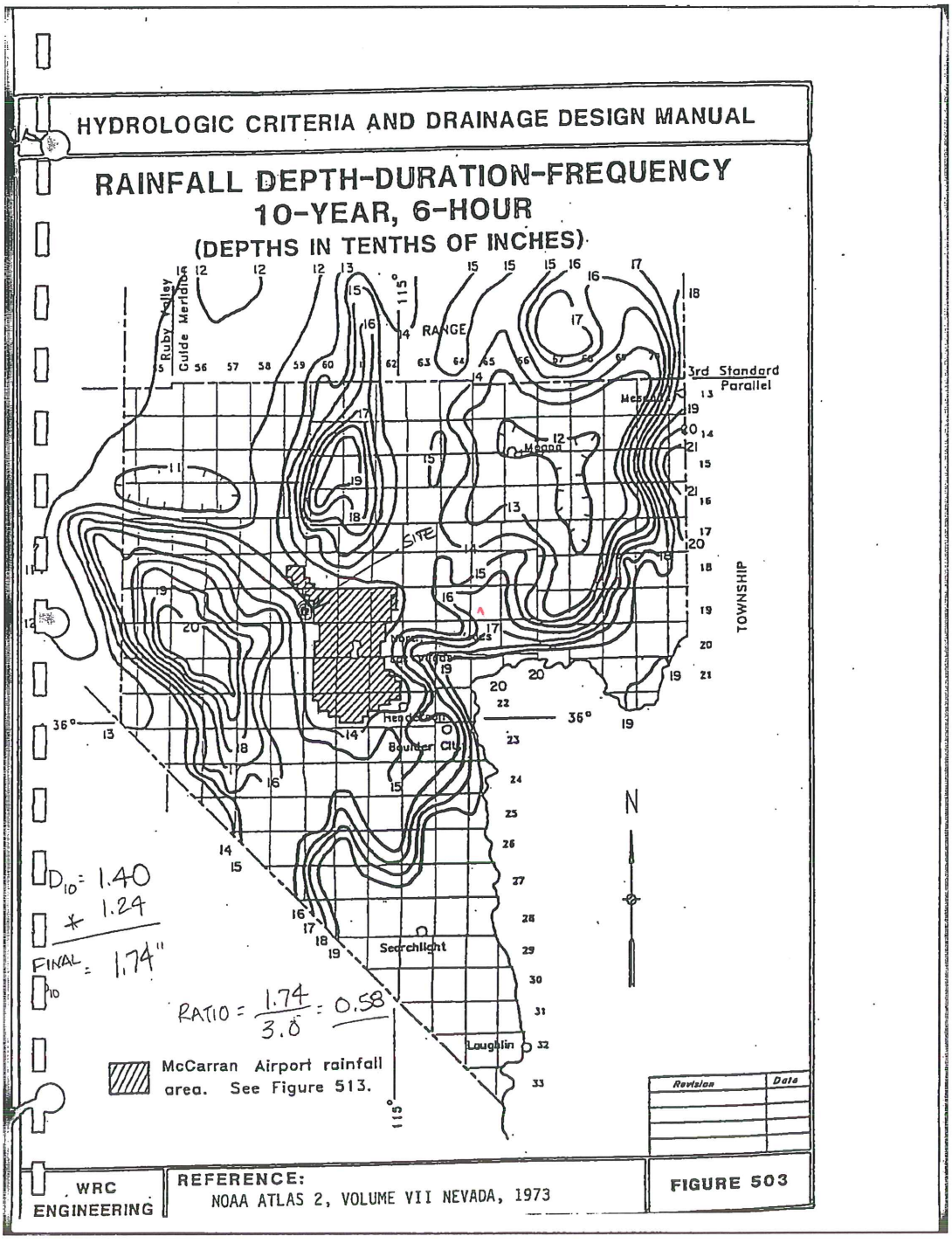
Under future conditions, refer to Figures 5 and 6. Offsite basins north of Centennial Parkway are assumed to be developed as high-density residential or commercial development, while areas south of Centennial Parkway are assumed to be developed as lower-density residential. The future conditions analysis applies curve numbers to the watershed that are higher than existing conditions curve numbers in some areas, while applying lower than existing conditions curve numbers in other areas. The result is that peak runoff flow rates for future conditions are different than existing and interim conditions at many of the concentration points. As a result, street calculations were included at all relevant locations to ensure that the worst-case scenario is presented. Note that a CCRFCD regional facility is planned for the Grand Canyon Drive alignment, extending from the south to Centennial Parkway, however is assumed to be non-existent for the purposes of this future conditions analysis. All streets were found to meet 10- and 100-year Drainage Manual Criteria, including Centennial Parkway at the northern boundary of the subject site. Calculations are included in the appendix and results are summarized on Figures 5 and 6.

3. The calculations for Section F-F use a slope of 0.031300. The slope on the plan for this section is 0.012. The details provided for this area (AF/DT-2 and AG/DT-2) do not indicate that the flows will be contained within the easement at the plan slope. The calculations and the drainage details must be revised to determine the actual depth of flow and to ensure that the flows are contained within the limits of the easement;

The details and flow calculations for section F-F have been revised herein; results are summarized on Figures 4 and 6.

4. The grading shown at the east end of Centennial Parkway near the northeast corner of Lot 7 on Sheet GP-1 shows a grade difference of approximately 4-feet between the proposed grade and the existing grade. Additional grading must be provided to provide a transition between the proposed and existing grades;

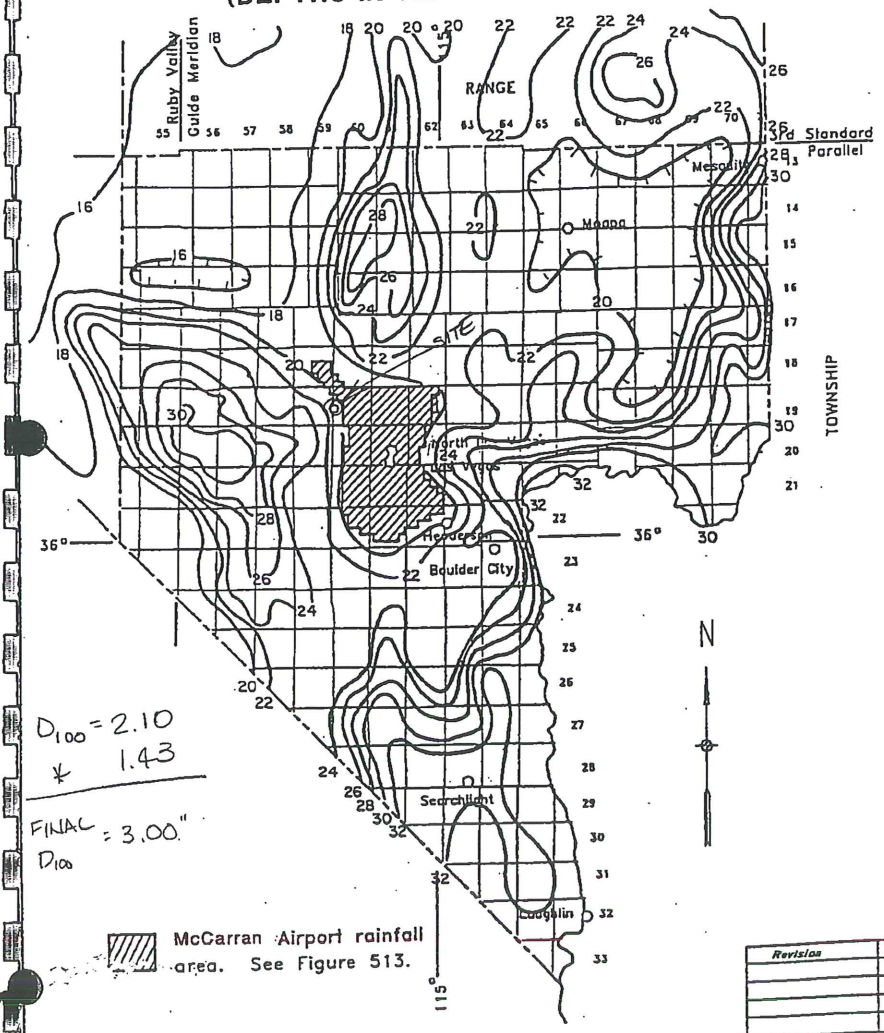
Original Study



Original Study

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

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



$D_{100} = 2.10$
$* \quad 1.43$
FINAL $D_{100} = 3.00"$

Revision	Date

WRC ENGINEERING

REFERENCE:
NOAA ATLAS 2, VOLUME VII NEVADA, 1973

FIGURE 506

* CN CALCULATIONS SHOWING SAME BASIN AREAS WITH CN VALUE REVISED FOR EXIST OR FUTURE

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL - STANDARD FORM 4

Momentum Engineers, Ltd.
6101 Kings Brook Ct.
Las Vegas NV 89149

PROJECT NO. : 06014 — PROJECT: Centennial Tee Pee
FILE : frm4 — CALCULATED BY: B Brown — DATE : 10/23/06

Sub-Basin Data					Initial/Overland Time (T_i)			Travel Time (T_t)					T_c	T_c Check (Urbanized Basins)		Final T_c	T_{lag}	Remarks
DESIG	CN	K	AREA (acres)	AREA (mi^2)	LENGTH (ft)	SLOPE (%)	T_i (min)	LENGTH (ft)	SLOPE (%)	V_1 (fps)	V_2 (fps)	T_t (min)	$T_c=T_i+T_t$ (min)	TOTAL (ft)	T_c (min)	T_c (min)	T_{lag} (hrs)	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
DEVELOPED CONDITION																		
CHS1	87	0.758	28.38	0.0443	350	1.0	11.5	845	3.3	3.7	5.6	3.3	14.8	1195	16.6	14.8	0.148	
CHS2	94	0.851	35.52	0.0555	400	1.0	9.0	1505	2.2	3.0	4.5	6.5	15.4	1905	20.6	15.4	0.154	
CHS3	74	0.587	8.62	0.0135	300	1.0	16.0	960	2.8	3.4	5.1	4.0	20.0	1260	17.0	17.0	0.170	
DCHS1	94	0.851	28.38	0.0443	350	1.0	8.4	845	3.3	3.7	5.6	3.3	11.7	1195	16.6	11.7	0.117	
CNT1	98	0.904	0.94	0.0015	43	2.0	1.8	360	2.7	3.3	N/A	1.8	3.6	403	12.2	3.6	0.050	
RG1	98	0.904	0.45	0.0007	23	2.0	1.3	300	2.7	3.3	N/A	1.5	2.9	323	11.8	2.9	0.050	
RG2	98	0.904	0.45	0.0007	23	2.0	1.3	300	2.7	3.3	N/A	1.5	2.9	323	11.8	2.9	0.050	
AZ1	98	0.904	0.46	0.0007	23	2.0	1.3	300	3.0	3.5	N/A	1.4	2.8	323	11.8	2.8	0.050	
BA1	98	0.904	0.46	0.0007	23	2.0	1.3	300	2.2	3.0	N/A	1.7	3.0	323	11.8	3.0	0.050	
TP1	98	0.904	0.83	0.0013	23	2.0	1.3	570	1.7	2.6	4.0	3.5	4.8	593	13.3	4.8	0.050	
TP2	98	0.904	0.90	0.0014	23	2.0	1.3	575	1.7	2.6	4.0	3.5	4.8	598	13.3	4.8	0.050	
TP3	98	0.904	0.89	0.0014	23	2.0	1.3	575	0.7	1.7	2.6	5.4	6.8	598	13.3	6.8	0.068	
TPE2	98	0.904	0.46	0.0007	23	2.0	1.3	220	1.7	2.6	N/A	1.4	2.7	243	11.4	2.7	0.050	
DOF10	70	0.534	15.06	0.0235	200	2.0	11.4	940	3.0	3.5	5.3	3.8	15.2	1140	16.3	15.2	0.152	
DOF11	70	0.534	9.47	0.0148	200	2.0	11.4	785	3.3	3.7	5.6	3.1	14.6	985	15.5	14.6	0.146	
DOF12	70	0.534	2.99	0.0047	200	2.0	11.4	690	3.3	3.7	5.6	2.8	14.3	890	14.9	14.3	0.143	
DOF14	92	0.824	13.98	0.0218	200	2.0	5.6	1280	3.4	3.7	5.6	4.5	10.1	1480	18.2	10.1	0.101	
DOF1	75	0.600	25.53	0.0399	200	2.0	10.1	2325	3.3	3.7	5.6	7.7	17.8	2525	24.0	17.8	0.178	
DOF2	92	0.824	15.73	0.0246	200	2.0	5.6	2520	3.5	3.8	5.7	8.1	13.7	2720	25.1	13.7	0.137	
DOF3	92	0.824	11.46	0.0179	560	2.8	8.3	1170	3.7	3.9	5.9	4.0	12.4	1730	19.6	12.4	0.124	
DOF4	92	0.824	45.42	0.0710	200	2.0	5.6	3155	3.6	3.8	5.8	9.8	15.4	3355	28.6	15.4	0.154	
DOF5	72	0.560	10.81	0.0169	460	2.3	15.8	990	2.8	3.4	5.1	4.1	19.8	1450	18.1	18.1	0.181	
DOF51	92	0.824	9.48	0.0148	450	3.3	7.1	781	1.4	2.4	3.6	4.8	11.8	1231	16.8	11.8	0.118	
DOF6	72	0.560	19.04	0.0298	200	2.0	10.9	2205	3.1	3.6	5.4	7.6	18.5	2405	23.4	18.5	0.185	
DOF61	92	0.824	8.26	0.0129	200	2.8	5.0	1170	2.9	3.4	5.2	4.6	9.5	1370	17.6	9.5	0.095	
DOF7	75	0.600	11.52	0.0180	200	2.0	10.1	1120	3.6	3.8	5.8	4.0	14.1	1320	17.3	14.1	0.141	
DOF8	72	0.560	24.44	0.0382	200	2.0	10.9	1780	2.8	3.4	5.1	6.6	17.5	1980	21.0	17.5	0.175	
DON1	75	0.600	2.99	0.0047	150	1.0	11.0	545	1.4	2.4	3.6	3.7	14.7	695	13.9	13.9	0.139	
DON2	75	0.600	0.93	0.0015	70	1.0	7.5	570	1.4	2.4	3.6	3.8	11.3	640	13.6	11.3	0.113	
DON3	75	0.600	1.59	0.0025	150	1.0	11.0	280	1.6	2.6	N/A	1.8	12.8	430	12.4	12.4	0.124	
DON4	75	0.600	0.31	0.0005	70	1.0	7.5	290	1.6	2.6	N/A	1.9	9.4	360	12.0	9.4	0.094	
DON5	75	0.600	1.14	0.0018	70	1.0	7.5	570	1.2	2.2	3.4	4.1	11.6	640	13.6	11.6	0.116	
DON6	75	0.600	2.98	0.0047	165	1.0	11.6	520	1.2	2.2	3.4	3.9	15.4	685	13.8	13.8	0.138	
DON7	75	0.600	3.18	0.0050	150	1.0	11.0	490	1.1	2.1	N/A	3.9	14.9	640	13.6	13.6	0.136	
DON8	75	0.600	0.93	0.0015	70	1.0	7.5	570	1.1	2.1	3.2	4.3	11.8	640	13.6	11.8	0.118	
EXOF5	73	0.574	10.81	0.0169	460	2.3	15.4	990	2.8	3.4	5.1	4.1	19.5	1450	18.1	18.1	0.181	
EXOF6	72	0.560	19.04	0.0298	200	2.0	10.9	2205	3.1	3.6	5.4	7.6	18.5	2405	23.4	18.5	0.185	
EXOF8	73	0.574	24.44	0.0382	200	2.0	10.6	1780	2.8	3.4	5.1	6.6	17.3	1980	21.0	17.3	0.173	
EXOF9	70	0.534	13.15	0.0205	300	2.0	14.0	880	3.1	3.6	5.4	3.5	17.5	1180	16.6	16.6	0.166	
EXOF10	72	0.560	15.06	0.0235	200	2.0	10.9	940	3.0	3.5	5.3	3.8	14.7	1140	16.3	14.7	0.147	
EXOF12	76	0.613	2.99	0.0047	200	2.0	9.8	710	3.1	3.6	5.4	3.0	12.8	910	15.1	12.8	0.128	
EXOF13	88	0.772	1.65	0.0026	60	1.0	4.6	555	2.2	3.0	4.5	3.0	7.6	615	13.4	7.6	0.076	
UNDEVELOPED CONDITION																		
EXOF1	77	0.626	25.53	0.0399	200	2.0	9.6	2325	3.3	2.7	5.3	8.8	18.4	N/A	N/A	18.4	0.184	
EXOF2	77	0.626	15.73	0.0246	200	2.0	9.6	2520	3.5	2.8	5.5	9.1	18.7	N/A	N/A	18.7	0.187	
EXOF3	77	0.626	11.46	0.0179	560	2.8	14.3	1170	3.7	2.8	5.7	4.9	19.2	N/A	N/A	19.2	0.192	
EXOF4	77	0.626	45.42	0.0710	200	2.0	9.6	3155	3.6	2.8	5.6	10.9	20.5	N/A	N/A	20.5	0.205	
EXOF51	81	0.679	9.48	0.0148	450	3.3	10.8	781	1.4	1.8	3.5	6.1	16.9	N/A	N/A	16.9	0.169	
EXOF61	77	0.626	8.26	0.0129	200	2.8	8.6	1170	2.9	2.5	5.0	5.5	14.1	N/A	N/A	14.1	0.141	
EXOF7	77	0.626	11.52	0.0180	200	2.0	9.6	1120	3.6	2.8	5.6	4.8	14.4	N/A	N/A	14.4	0.144	
EXOF11	75	0.600	9.47	0.0148	200	2.0	10.1	785	3.3	2.7	5.3	4.0	14.1	N/A	N/A	14.1	0.141	
EXOF12	76	0.613	2.99	0.0047	200	2.0	9.8	690	3.3	2.7	5.3	3.7	13.5	N/A	N/A	13.5	0.135	
EXOF14	77	0.626	13.98	0.0218	200	2.0	9.6	1280	3.4	2.7	5.4	5.5	15.0	N/A	N/A	15.0	0.150	
EXON1	77	0.626	4.43	0.0069	200	2.0	9.6	150	3.3	2.7	N/A	0.9	10.5	N/A	N/A	10.5	0.105	
EXON2	77	0.626	3.33	0.0052	200	2.0	9.6	500	3.2	2.6	N/A	3.1	12.7	N/A	N/A	12.7	0.127	
EXON3	77	0.626	0.92	0.0014	200	2.0	9.6	245	3.2	2.6	N/A	1.5	11.1	N/A	N/A	11.1	0.111	
EXON4	77	0.626	2.47	0.0039	200	2.0	9.6	310	3.2	2.6	N/A	2.0	11.5	N/A	N/A	11.5	0.115	
EXON5	77	0.626	3.85	0.0060	200	2.0	9.6	310	3.1	2.6	N/A	2.0	11.6	N/A	N/A	11.6	0.116	
EXON6	77	0.626	0.35	0.0005	200	2.0	9.6	110	3.1	2.6	N/A	0.7	10.3	N/A	N/A	10.3	0.103	

$T_i=(1.8(1.1-K)L^{1/2})/(S^{1/3})$ For the travel time (T_t) calculations,
$T_c=T_i+T_t$ V_1 applies to the first 500 feet of travel distance;
$K=0.0132(CN)-.39$ V_2 applies to the remaining travel distance.
$T_{lag}=0.6T_c$

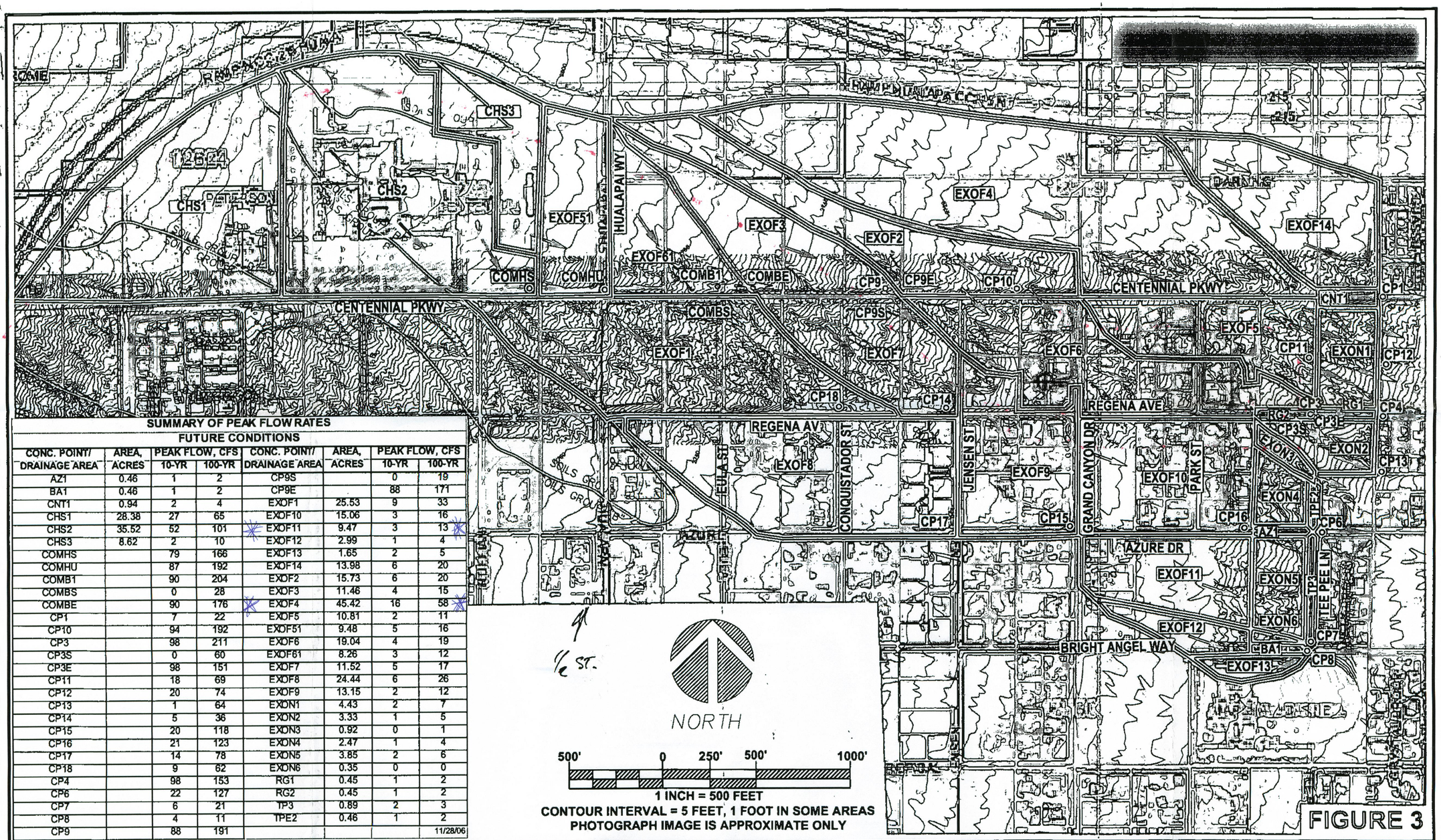
Travel Time Velocity Formulas

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

All basins over one square mile are calculated by the equation $T_{lag}=20Kn(L^{.8}_s/S^{.5})^{0.33}$

REFERENCE: CCRFCD HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

STANDARD FORM 4



SUMMARY OF PEAK FLOW RATES

FUTURE CONDITIONS

CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	PEAK FLOW, CFS 100-YR	CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	PEAK FLOW, CFS 100-YR
AZ1	0.46	1	2	CP9S		0	19
BA1	0.46	1	2	CP9E		88	171
CNT1	0.94	2	4	EXOF1	25.53	9	33
CHS1	28.38	27	65	EXOF10	15.06	3	16
CHS2	35.52	52	101	EXOF11	9.47	3	13
CHS3	8.62	2	10	EXOF12	2.99	1	4
COMHS		79	166	EXOF13	1.65	2	5
COMHU		87	192	EXOF14	13.98	6	20
COMB1		90	204	EXOF2	15.73	6	20
COMBS		0	28	EXOF3	11.46	4	15
COMBE		90	176	EXOF4	45.42	16	58
CP1		7	22	EXOF5	10.81	2	11
CP10		94	192	EXOF51	9.48	5	16
CP3		98	211	EXOF6	19.04	4	19
CP3S		0	60	EXOF61	8.26	3	12
CP3E		98	151	EXOF7	11.52	5	17
CP11		18	69	EXOF8	24.44	6	26
CP12		20	74	EXOF9	13.15	2	12
CP13		1	64	EXON1	4.43	2	7
CP14		5	36	EXON2	3.33	1	5
CP15		20	118	EXON3	0.92	0	1
CP16		21	123	EXON4	2.47	1	4
CP17		14	78	EXON5	3.85	2	6
CP18		9	62	EXON6	0.35	0	0
CP4		98	153	RG1	0.45	1	2
CP6		22	127	RG2	0.45	1	2
CP7		6	21	TP3	0.89	2	3
CP8		4	11	TPE2	0.46	1	2
CP9		88	191				11/28/06

1 INCH = 500 FEET

CONTOUR INTERVAL = 5 FEET, 1 FOOT IN SOME AREAS

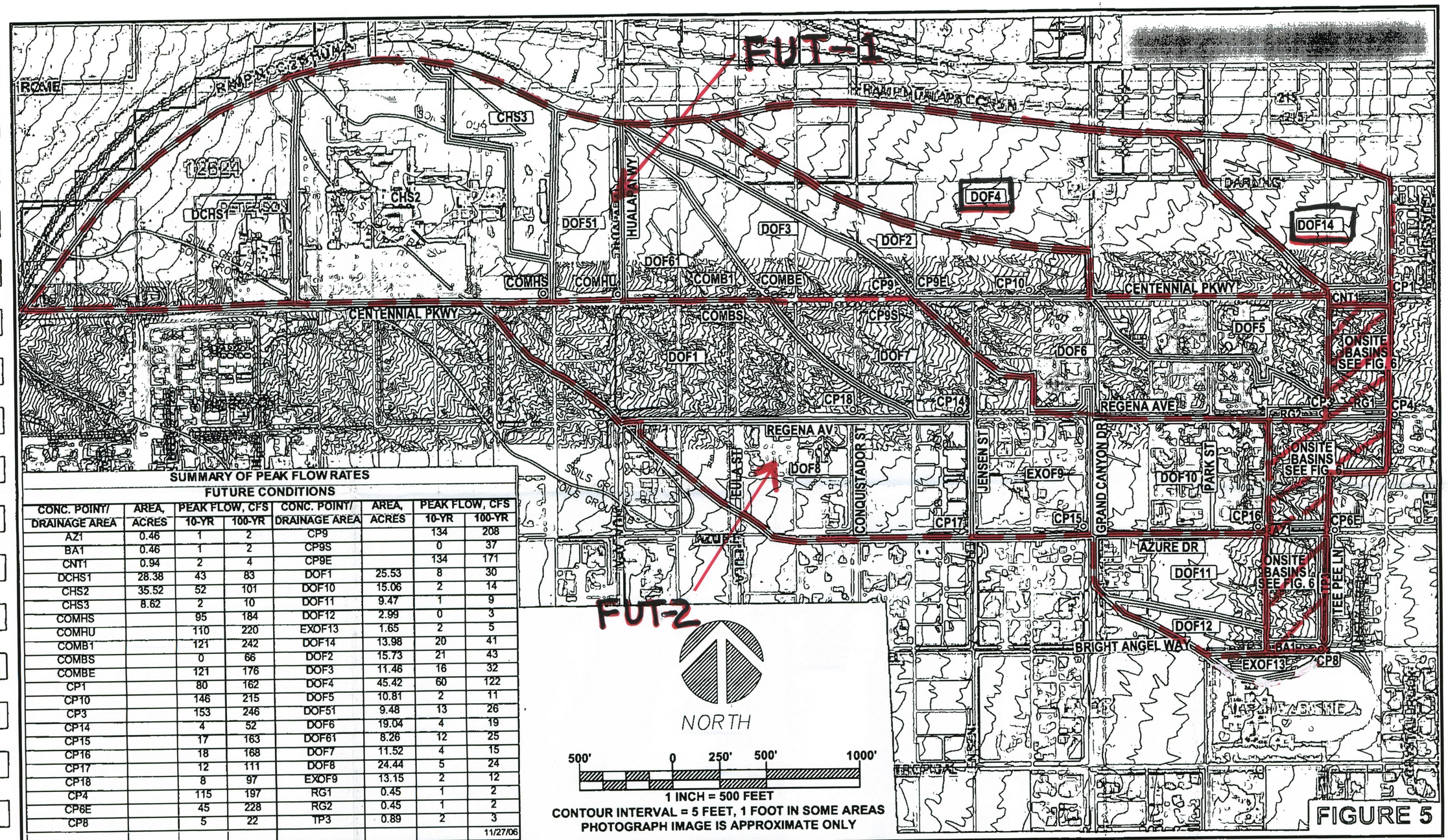
PHOTOGRAPH IMAGE IS APPROXIMATE ONLY

FIGURE 3

Centennial / Tee Pee Residential Development

EXISTING CONDITIONS DRAINAGE BASINS

CVL CONSULTANTS, INC.



SUMMARY OF PEAK FLOW RATES

FUTURE CONDITIONS

CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	PEAK FLOW, CFS 100-YR	CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	PEAK FLOW, CFS 100-YR
AZ1	0.46	1	2	CP9		134	208
BA1	0.46	1	2	CP9S		0	37
CNT1	0.94	2	4	CP9E		134	171
DCHS1	28.38	43	83	DOF1	25.53	8	30
CHS2	35.52	52	101	DOF10	15.06	2	14
CHS3	8.62	2	10	DOF11	9.47	1	9
COMHS		95	184	DOF12	2.99	0	3
COMHU		110	220	EXOF13	1.65	2	5
COMB1		121	242	DOF14	13.98	20	41
COMBS		0	66	DOF2	15.73	21	43
COMBE		121	176	DOF3	11.46	16	32
CP1		80	162	DOF4	45.42	60	122
CP10		146	215	DOF5	10.81	2	11
CP3		153	246	DOF51	9.48	13	26
CP14		4	52	DOF6	19.04	4	19
CP15		17	163	DOF61	8.26	12	25
CP16		18	168	DOF7	11.52	4	15
CP17		12	111	DOF8	24.44	5	24
CP18		8	97	EXOF9	13.15	2	12
CP4		115	197	RG1	0.45	1	2
CP6E		45	228	RG2	0.45	1	2
CP8		5	22	TP3	0.89	2	3

11/27/06

FIGURE 5

Centennial / Tee Pee Residential Development

FUTURE CONDITIONS DRAINAGE BASINS

CVL CONSULTANTS, INC.

STREET FLOW CALCULATIONS FUTURE CONDITIONS						
CROSS SECTION NO.	STREET WIDTH, FT	SLOPE %	Q_{10} / Q_{100} CFS	D_{10} / D_{100} FEET	V_{10} / V_{100} FPS	V_{10} * D_{10} / V_{100} * D_{100}
1	37	1.43	1 / 4	0.21 / 0.31	1.9 / 2.3	0.4 / 0.7
2	60	1.78	3 / 12	0.28 / 0.40	2.4 / 3.3	0.6 / 1.3
3	100	2.70	80 / 162	0.65 / 0.78	5.7 / 6.9	3.7 / 5.3
4	60	2.70	150 / 234	0.75 / 0.86	7.3 / 8.9	5.5 / 7.7
5	60	3.26	115 / 197	0.68 / 0.79	7.0 / 8.7	4.8 / 6.9
6	37	4.51	1 / 2	0.16 / 0.22	3.7 / 3.3	0.6 / 0.7
7	60	2.00	41 / 57	0.56 / 0.62	4.3 / 4.6	2.4 / 2.9
8	37	1.23	1 / 4	0.22 / 0.32	1.7 / 2.2	0.4 / 0.7
9	60	3.24	18 / 173	0.41 / 0.78	4.5 / 7.5	1.8 / 5.9
10	60	0.91	2 / 3	0.28 / 0.30	1.7 / 1.8	0.5 / 0.5
11	37	1.10	2 / 13	0.27 / 0.44	1.8 / 2.8	0.5 / 1.2
12	60	2.24	5 / 22	0.31 / 0.46	2.9 / 4.1	0.9 / 1.9
						27-Nov-06

2300' 0 100' 200' 400'

1 INCH = 200 FEET
CONTOUR INTERVAL = 1 FOOT

NORTH

EASEMENT FLOW CALCULATIONS FUTURE CONDITIONS							
LOCATION	WIDTH, FEET	SLOPE, PERCENT	Q_{100} CFS	D_{100} NORMAL FEET	VELOCITY, FEET PER SEC.	VELOCITY HEAD FEET	WEIR DEPTH FEET
A	5	1.62	1	0.31	3.5	0.19	-
B	5	1.41	1	0.32	3.3	0.17	-
C	5	0.81	2	0.46	3.2	0.16	-
D	5	0.70	2	0.47	3.0	0.14	-
E	5	1.56	1	0.31	3.4	0.19	-
F	15	1.19	9	0.18	3.4	0.18	0.34
							27-Nov-06

SUMMARY OF PEAK FLOW RATES FUTURE CONDITIONS			
CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	100-YR
AZ1	0.46	1	2
BA1	0.46	1	2
CNT1	0.94	2	4
CP1		80	162
CP16		18	168
CP2		3	12
CP3		153	246
CP3E		113	191
CP3S		40	55
CP4		115	197
CP5		2	13
CP6		18	173
CP6N		41	57
CP6E		45	228
CP8		5	22
CPR		150	234
DON1	2.99	1	4
DON2	0.93	0	1
DON3	1.59	1	2
DON4	0.31	0	0
DON5	1.14	0	2
DON6	2.98	1	4
DON7	3.18	1	4
DON8	0.93	0	1
DOF10	15.06	2	14
DOF11	9.47	1	9
DOF12	2.99	0	3
EXOF13	1.65	2	5
DOF14	13.98	20	41
DOF4	45.42	60	122
DOF5	10.81	2	11
DOF6	19.04	4	19
RG1	0.45	1	2
RG2	0.45	1	2
TP1	0.83	2	3
TP2	0.90	2	4
TP3	0.89	2	3
			11/27/06

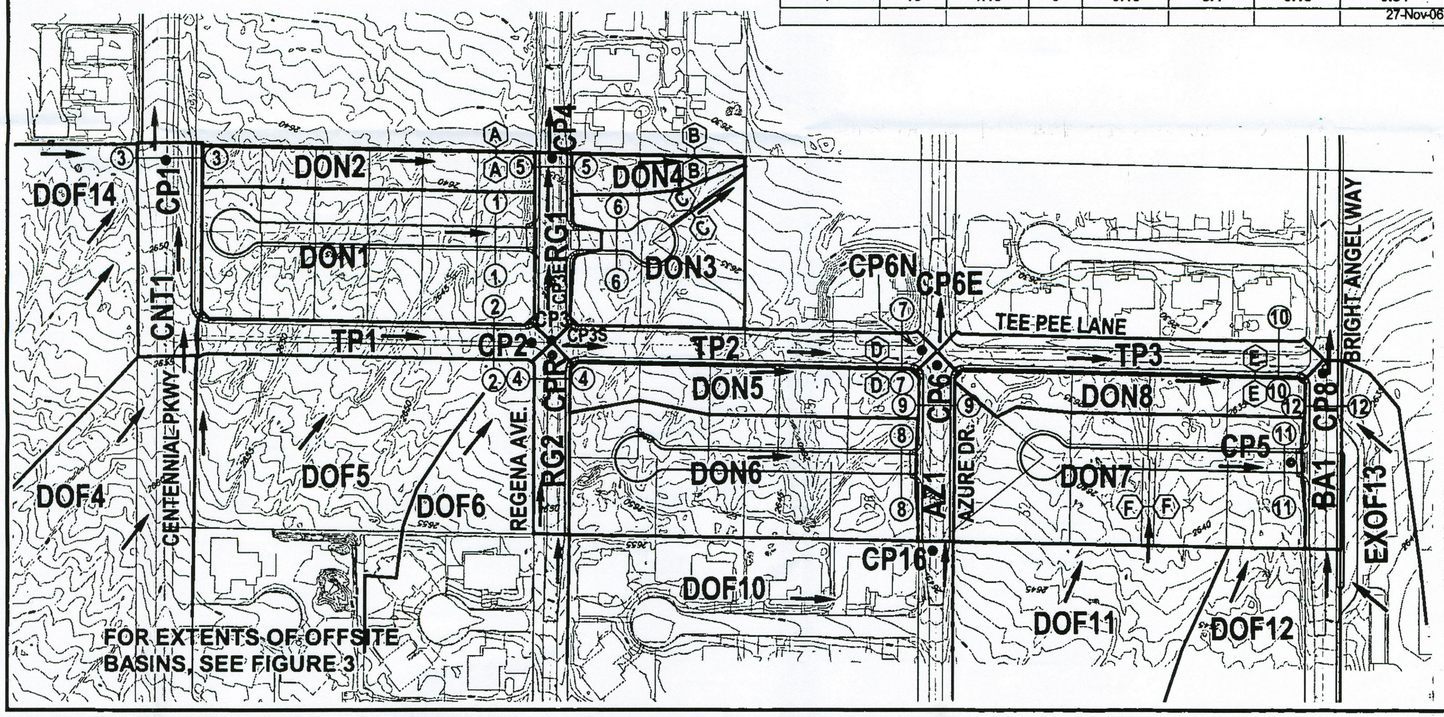


FIGURE 6

Centennial / Tee Pee Residential Development

FUTURE CONDITIONS DRAINAGE BASINS

CYL CONSULTANTS, INC.

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

Drainage Study Approval Letter

Date: December 23, 2014
Firm: RCI Engineering
Engineer: Rick J. Read, P.E.
Address: 4325 Dean Martin Drive, Suite 300, Las Vegas. NV 89103
Phone: (702) 453-0800
Fax: (702) 453-0801
E-mail: rread@rcinevada.com

Subject: Technical Drainage Study Update for Centennial and Tee Pee
Location: SEC of Centennial Parkway and Tee Pee Lane
APN: 125-30-502-007, -012, -013, 125-30-601-007
Sec, Township, Range: S30, T19S, R60E
Flood Zone & Panel: Zone X, 1745E, Revised September 27, 2002
Application Tracking #: 14-14210UP

HTE14-14210

Submittals	Date Received	Date Returned	Reviewer	Miscellaneous
Technical	04/10/2014	05/19/2014	AK	
Addendum 1	11/13/2014	12/12/2014	AK	
Supplement 1	12/16/2014	12/23/2014	AK	Phone and meeting

Concurrence Required: (Must be obtained prior to permit issuance)		Reason Concurrence is required
	City of Henderson	Adjacent to or Impacts Henderson
X	City of Las Vegas	Adjacent to or Impacts Las Vegas
	City of North Las Vegas	Adjacent to or Impacts North Las Vegas
	Nevada Department of Transportation	Adjacent to or Impacts NDOT Facility
	Union Pacific Rail Road	Adjacent to or Impacts a UPRR Facility
	US Army Corp of Engineers	Impacts a USACE Facility
	Clark County Regional Flood Control District	Regional Significance, Adjacent to or Impacts CCRFCD MPU Facility or in a SFHA

BOARD OF COUNTY COMMISSIONERS
STEVE SISOLAK, Chairman • LARRY BROWN, Vice Chairman
SUSAN BRAGER • TOM COLLINS • CHRIS GIUNCHIGLIANI • MARY BETH SCOW • LAWRENCE WEEKLY
DONALD G. BURNETTE, County Manager

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

This update is to revise the entire site. The previously approved Technical Drainage Study is: HTE# 06-37189.

The site shall be graded with respect to drainage as shown on "Centennial and Tee Pee Unit 1", sheets C-1, N-1, G-1-G-4, D-1-D-2, and P-1 through P-6 signed and sealed by Christopher R. Zrinyi P.E., on November 13, 2014 and "Centennial and Tee Pee Unit 2", sheets C-1, N-1, G-1-G-4, D-2, and P-1 through P-6 signed and sealed by Christopher R. Zrinyi, P.E., on November 13, 2014 and sheet D-1 signed and sealed by Christopher R. Zrinyi, P.E., on December 16, 2014.

Check appropriate conditions

	Retaining/screen wall combination may be in excess of current **Clark County Unified Development Code, Chapter 30.64.050.**
	A FEMA Elevation Certificate, completed by a licensed surveyor, must be submitted to and approved by CCPW Development Review Plan Check prior to the issuance of Certificates of Occupancy for those structures.
X	Mylars of the grading plan must be submitted to the CCPW Development Review Plan Check for approval signatures prior to map recordation (residential) or permit issuance (commercial).
X	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 CCPW Development Review front counter after drainage study approval and prior to offsite final review.
X	The grading plan will be reviewed by the Building Office Operations Division to ensure compliance with the ADA 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.
	The plans show work is proposed on another property. Notarized written permission must be obtained **prior to** plan approval**.** A grading permit must be obtained from Building Dept prior to grading.
X	Right-of-way dedication must be verified.
	Any previously approved drainage easements that are not being used must be vacated.
	Per *Regional Flood Control District policies and Procedures manual, Section VIII. D. 13. Uniform Regulations for the Control of Drainage*, the Engineer of Record shall provide As-Built plans or record drawings to the District after completion and final inspection of such privately installed flood control facilities that have regional flood control significance.
	Structural calculations are required. The structural calculations, plans, and details must be approved prior to "Offsite" submittal and prior to CCRFCD submittal, if applicable.
X	Plan revisions can be found on the red-lined plans and must be addressed.
X	Prepare drainage easement documents as shown on the grading plans.

Additional Conditions:

1. Address the redlined comments on the grading plans.

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.

By _____

W. Layne Weber, P.E., CFM
Principal Engineer
Clark County Public Works
Development Review

RCI Engineering

Letter of Transmittal

April 9, 2014

To: Flood Control Division
Clark County Public Works Dept.
500 South Grand Central Parkway
Las Vegas, Nevada 89155

From: Rick Read
Job# 3040.0038

RE: Technical Drainage Study Update For Centennial and Tee Pee (Formerly Centennial/Tee Pee HTE #06-37189)

Copies	Description
2	Technical Drainage Study and Improvement Plans
1	Check for $2000
1	Drainage Study Submittal Form

Comments:
Please call me at 453-0800 if you have any questions or need additional information.

Thank you,
Rick Read, P.E.

Received by: _____

Clark County Public Works Department

DEVELOPMENT REVIEW DIVISION

RECEIPT

(702) 455-4600

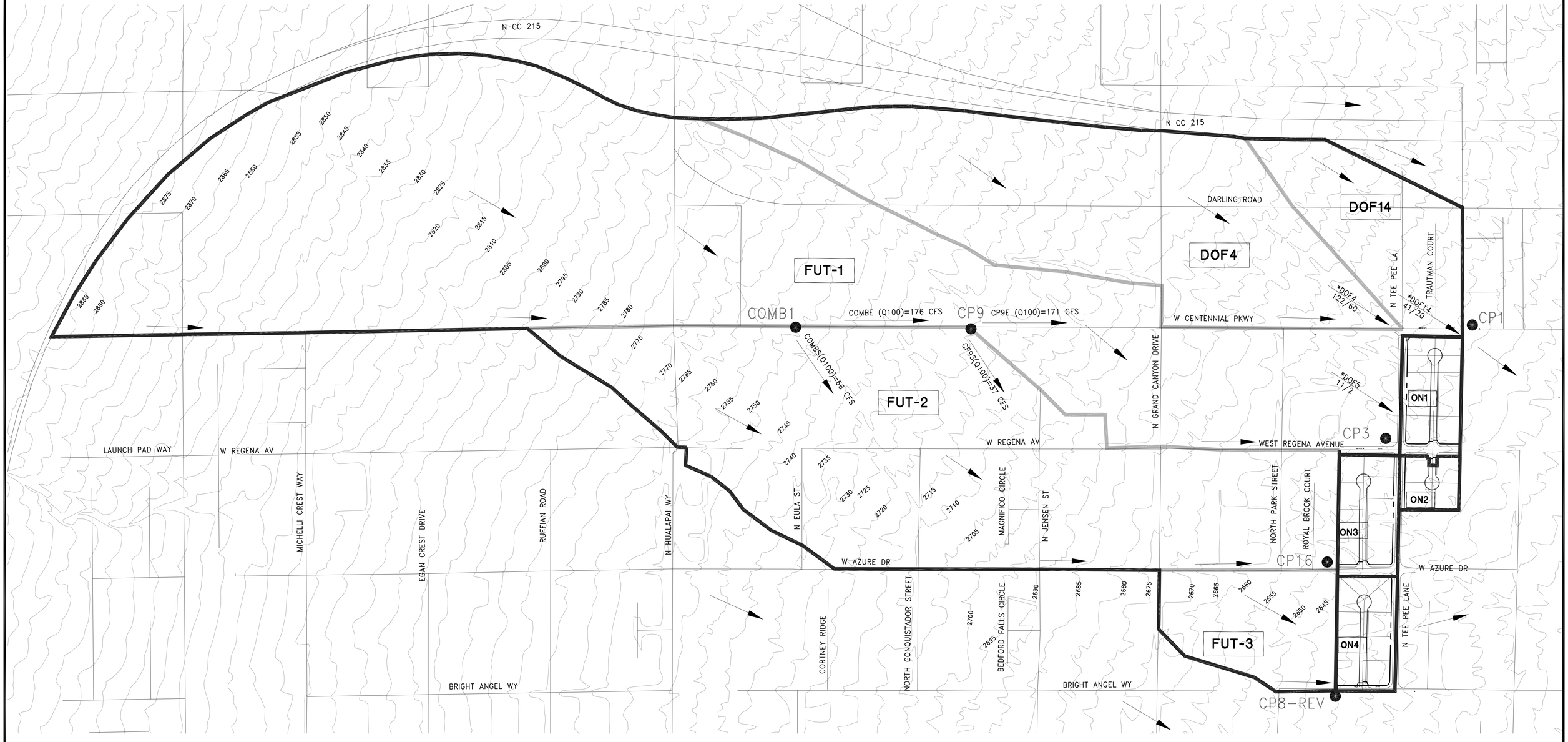
5 T T5 T@ T T T

DATE: 4/10/14 RECEIPT # 0000339876

ITEM DESCRIPTION	AMOUNT
*IMPACT ANALYSIS REV FEE	2000.00
TOTAL AMOUNT PAID	2000.00

PAYMENT TYPE: CHECK
CHECK NBR: 000493782
RECEIVED BY: SMITHG
REFERENCE: CENTENNIAL & TEE PEE DS
APPLICATION NBR: 14 00014210

BY: _____



FUT-1
DCHS1
CHS2
CHS3
DOF51
DOF61
DOF3
DOF2
DOF6
DOF5
RG2
TP1
CP3=246/153

FUT-2
DOF1
DOF8
DOF7
DOF9
DOF10
CP16= 168/18

FUT-3
DOF11
DOF12
CP8-REV=12/1

DOF4
122/60

DOF14
41/20

CP1
DOF4
DOF14
CNT-1
CP1=162/80

LEGEND

- FLOW DIRECTION
- DRAINAGE BASIN BOUNDARY LINE
- COMBINED BASIN LINE
- FUT-3 — COMBINED DRAINAGE SUBBASINS FROM ORIGINAL STUDY
- CP8 — PROPOSED CONCENTRATION POINT
- COMBE= 176 CFS — FLOW SPLIT LOCATION
- 20/6 — 100YR/10YR STORM FLOWS

N

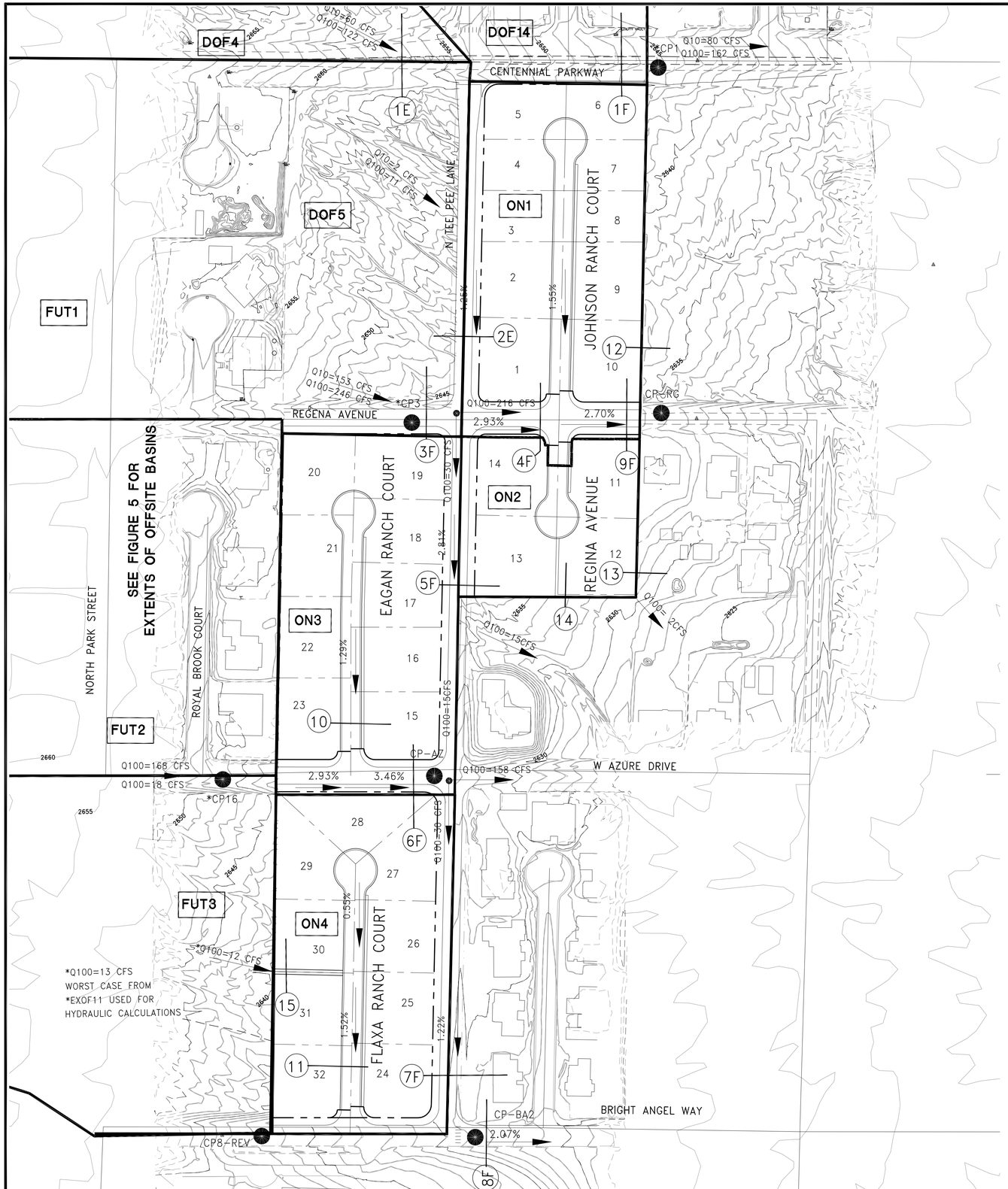
150' 0' 150' 300'

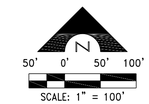
SCALE: 1" = 300'

CENTENNIAL AND TEE PEE
LENNAR

FIGURE 5
OFFSITE FLOW SUMMARY MAP

RCI Engineering
4325 DEAN MARTIN DRIVE, SUITE 300
LAS VEGAS, NV 89103
PH#702.453.0800 FAX#702.453.0801





LEGEND

- FLOW DIRECTION
- ULTIMATE DRAINAGE BASIN BOUNDARY LINE
- ON1 — ULTIMATE DRAINAGE SUBBASINS
- CP-AZ — PROPOSED CONCENTRATION POINT
- Q100=176 CFS — STORM FLOW AND DIRECTION
- 1F — CROSS SECTION LOCATION
- Q100=XX CFS / Q10=XX CFS → *CP8 — REFERENCED STORM FLOWS FROM ORIGINAL STUDY
- Q100=176 CFS / Q100=176 CFS — FLOW SPLIT FLOWS AND DIRECTION

100-YEAR OFFSITE ULTIMATE HYDRAULIC SECTIONS

Location	Slope (%)	Q_{100} (cfs)	D_{100} (ft)	V_{100} (ft/sec)	$D*V_{100}$
SECT 1E CENTENNIAL PKWY	2.70	45	1.02	5.54	N/A
SECT 1F CENTENNIAL PKWY	2.65	162	0.95	8.62	8.2
SECT 2E TEE PEE LANE WEST	1.25	24	0.88	3.62	N/A
SECT 2E TEE PEE LANE EAST	1.25	1	0.28	1.76	N/A
SECT 3F REGENA AVE	2.70	246	1.21	7.71	9.3
SECT 4F REGENA AVE	2.93	216	1.16	7.54	8.7
SECT 5F TEE PEE LANE	2.81	30	0.65	4.7	3.1
SECT 6F AZURE DRIVE	3.46	173	1.07	7.34	7.9
SECT 7F TEE PEE LANE	1.22	30	0.78	3.14	2.4
SECT 8F BRIGHT ANGEL WAY	2.07	52	0.84	4.45	3.7
SECT 9F REGENA AVENUE	2.70	221	1.18	7.4	8.7
SECT 10 EAGAN RANCH (FLATTEST)	1.29	5	0.28	2.57	0.7
SECT 11 FLAXA RANCH (STEEPEST)	1.52	18	0.40	3.61	1.4

10-YEAR OFFSITE ULTIMATE HYDRAULIC SECTIONS

Location	Slope (%)	Q_{10} (cfs)	D_{10} (ft)	V_{10} (ft/sec)	$D*V_{10}$
SECT 3F REGENA AVE	2.70	153	1.07	6.49	6.9
SECT 6F AZURE DRIVE	3.46	19	0.53	4.53	2.4

100-YEAR HYDRAULIC SECTIONS - CURB AND GUTTER

Location	Slope (%)	Q_{100} (cfs)	D_{100} (ft)	V_{100} (ft/sec)	$D*V_{100}$
SECT 3F REGENA AVENUE	2.70	246	0.85	9.19	7.8
SECT 4F REGENA AVENUE	2.93	216	0.81	8.94	7.2
SECT 6F AZURE DRIVE	3.46	173	0.74	8.60	6.4
SECT 7F TEE PEE LANE	1.22	30	0.54	3.46	1.9
SECTION 8F BRIGHT ANGEL WAY	2.07	52	0.59	4.72	2.8
SECTION 9F REGENA AVENUE	2.70	221	0.83	8.8	7.3

100-YEAR ONSITE CONCRETE DITCH HYDRAULIC SECTIONS

Location	Slope (%)	Q_{100} (cfs)	D_{100} (ft)	V_{100} (ft/sec)
SECTION 12	0.55	1	0.53	2.42
SECTION 13	1.82	1	0.42	3.79
SECTION 14	0.50	1	0.15	1.67
SECTION 15	1.00	13	0.35	4.31

ULTIMATE CONDITIONS HEC-1 SUMMARY

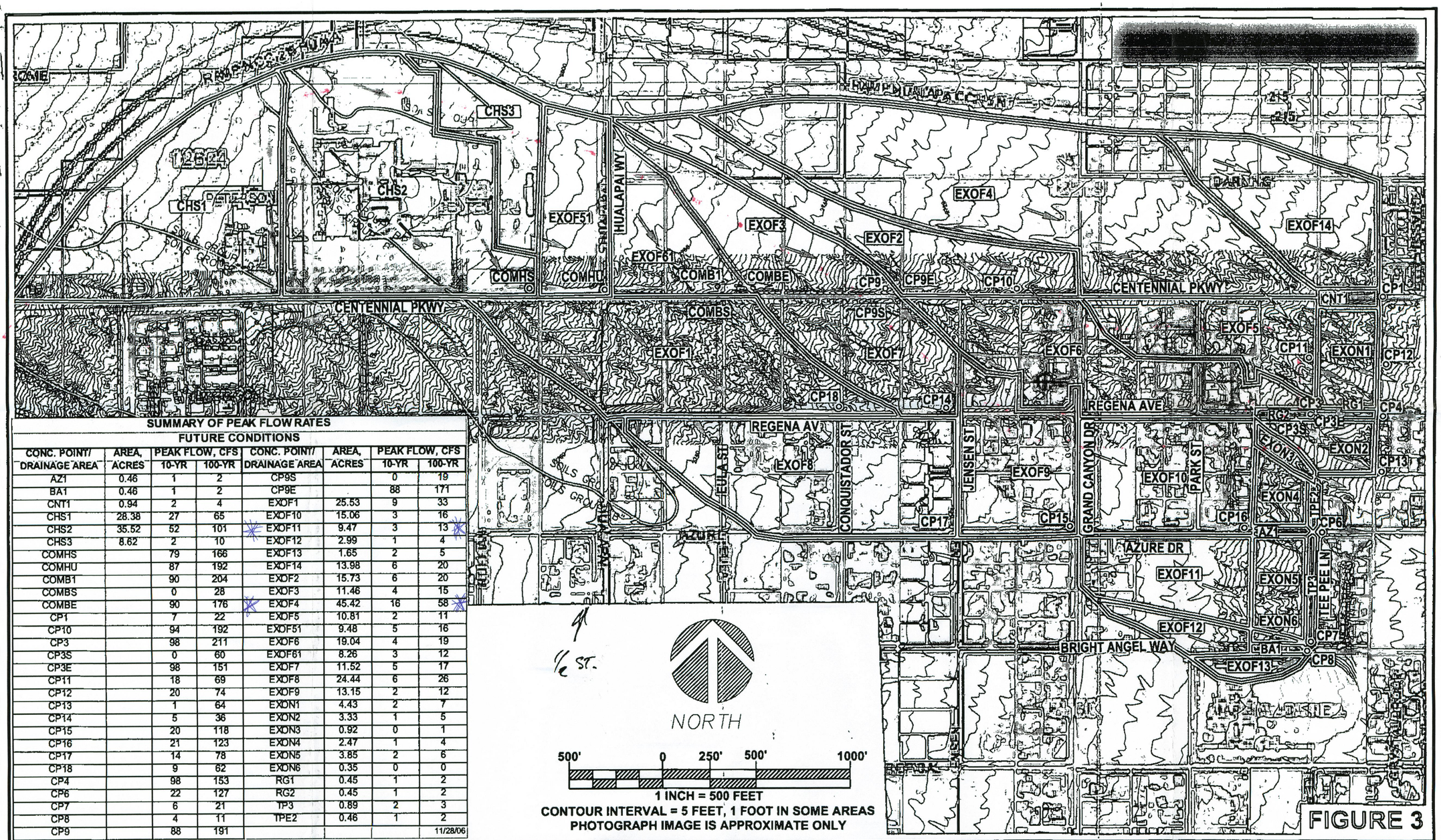
SUBBASIN OR CP	BASIN AREA (AC)	100 YR (cfs)	10 YR (cfs)
ON1	5.06	5	1
CP-RG	N/A	221	147
ON2	2.19	2	<1
ON3	5.1	5	1
CP-AZ	N/A	188	19
ON4	4.77	5	1
CP-BA2	N/A	52	4

CP-RG= ON1 + FLOW SPLIT REGENA EAST
CP-AZ= CP16 + ON3 + FLOW SPLIT REGENA SOUTH
CP-BA2= ON4 + CP8-REV + FLOW SPLIT AZURE SOUTH + EXOF13

CENTENNIAL AND TEE PEE
LENNAR

FIGURE 6
ULTIMATE CONDITION DRAINAGE MAP

RCI Engineering
4325 DEAN MARTIN DRIVE, SUITE 300
LAS VEGAS, NV 89103
PH#702.453.0800 FAX#702.453.0801



SUMMARY OF PEAK FLOW RATES

FUTURE CONDITIONS

CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	PEAK FLOW, CFS 100-YR	CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	PEAK FLOW, CFS 100-YR
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BA1	0.46	1	2	CP9E		88	171
CNT1	0.94	2	4	EXOF1	25.53	9	33
CHS1	28.38	27	65	EXOF10	15.06	3	16
CHS2	35.52	52	101	EXOF11	9.47	3	13
CHS3	8.62	2	10	EXOF12	2.99	1	4
COMHS		79	166	EXOF13	1.65	2	5
COMHU		87	192	EXOF14	13.98	6	20
COMB1		90	204	EXOF2	15.73	6	20
COMBS		0	28	EXOF3	11.46	4	15
COMBE		90	176	EXOF4	45.42	16	58
CP1		7	22	EXOF5	10.81	2	11
CP10		94	192	EXOF51	9.48	5	16
CP3		98	211	EXOF6	19.04	4	19
CP3S		0	60	EXOF61	8.26	3	12
CP3E		98	151	EXOF7	11.52	5	17
CP11		18	69	EXOF8	24.44	6	26
CP12		20	74	EXOF9	13.15	2	12
CP13		1	64	EXON1	4.43	2	7
CP14		5	36	EXON2	3.33	1	5
CP15		20	118	EXON3	0.92	0	1
CP16		21	123	EXON4	2.47	1	4
CP17		14	78	EXON5	3.85	2	6
CP18		9	62	EXON6	0.35	0	0
CP4		98	153	RG1	0.45	1	2
CP6		22	127	RG2	0.45	1	2
CP7		6	21	TP3	0.89	2	3
CP8		4	11	TPE2	0.46	1	2
CP9		88	191				11/28/06

1 INCH = 500 FEET

CONTOUR INTERVAL = 5 FEET, 1 FOOT IN SOME AREAS

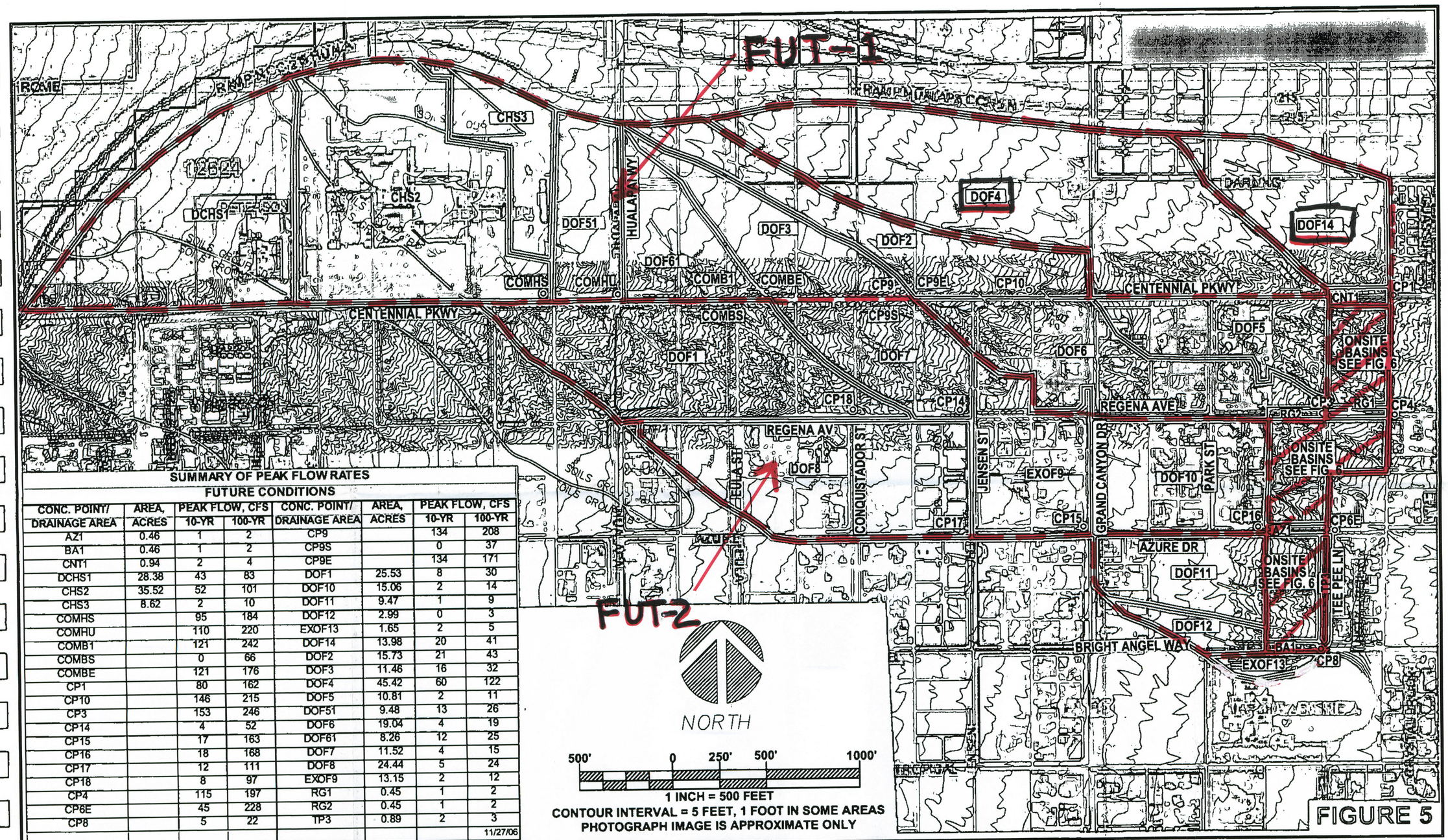
PHOTOGRAPH IMAGE IS APPROXIMATE ONLY

FIGURE 3

Centennial / Tee Pee Residential Development

EXISTING CONDITIONS DRAINAGE BASINS

CVL CONSULTANTS, INC.



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COMBS		0	66	DOF2	15.73	21	43
COMBE		121	176	DOF3	11.46	16	32
CP1		80	162	DOF4	45.42	60	122
CP10		146	215	DOF5	10.81	2	11
CP3		153	246	DOF51	9.48	13	26
CP14		4	52	DOF6	19.04	4	19
CP15		17	163	DOF61	8.26	12	25
CP16		18	168	DOF7	11.52	4	15
CP17		12	111	DOF8	24.44	5	24
CP18		8	97	EXOF9	13.15	2	12
CP4		115	197	RG1	0.45	1	2
CP6E		45	228	RG2	0.45	1	2
CP8		5	22	TP3	0.89	2	3

11/27/06

FIGURE 5

Centennial / Tee Pee Residential Development

FUTURE CONDITIONS DRAINAGE BASINS

CVL CONSULTANTS, INC.

STREET FLOW CALCULATIONS FUTURE CONDITIONS						
CROSS SECTION NO.	STREET WIDTH, FT	SLOPE %	Q_{10} / Q_{100} CFS	D_{10} / D_{100} FEET	V_{10} / V_{100} FPS	V_{10} * D_{10} / V_{100} * D_{100}
1	37	1.43	1 / 4	0.21 / 0.31	1.9 / 2.3	0.4 / 0.7
2	60	1.78	3 / 12	0.28 / 0.40	2.4 / 3.3	0.6 / 1.3
3	100	2.70	80 / 162	0.65 / 0.78	5.7 / 6.9	3.7 / 5.3
4	60	2.70	150 / 234	0.75 / 0.86	7.3 / 8.9	5.5 / 7.7
5	60	3.26	115 / 197	0.68 / 0.79	7.0 / 8.7	4.8 / 6.9
6	37	4.51	1 / 2	0.16 / 0.22	3.7 / 3.3	0.6 / 0.7
7	60	2.00	41 / 57	0.56 / 0.62	4.3 / 4.6	2.4 / 2.9
8	37	1.23	1 / 4	0.22 / 0.32	1.7 / 2.2	0.4 / 0.7
9	60	3.24	18 / 173	0.41 / 0.78	4.5 / 7.5	1.8 / 5.9
10	60	0.91	2 / 3	0.28 / 0.30	1.7 / 1.8	0.5 / 0.5
11	37	1.10	2 / 13	0.27 / 0.44	1.8 / 2.8	0.5 / 1.2
12	60	2.24	5 / 22	0.31 / 0.46	2.9 / 4.1	0.9 / 1.9
						27-Nov-06

2300' 0 100' 200' 400'

1 INCH = 200 FEET
CONTOUR INTERVAL = 1 FOOT

NORTH

EASEMENT FLOW CALCULATIONS FUTURE CONDITIONS							
LOCATION	WIDTH, FEET	SLOPE, PERCENT	Q_{100} CFS	D_{100} NORMAL FEET	VELOCITY, FEET PER SEC.	VELOCITY HEAD FEET	WEIR DEPTH FEET
A	5	1.62	1	0.31	3.5	0.19	-
B	5	1.41	1	0.32	3.3	0.17	-
C	5	0.81	2	0.46	3.2	0.16	-
D	5	0.70	2	0.47	3.0	0.14	-
E	5	1.56	1	0.31	3.4	0.19	-
F	15	1.19	9	0.18	3.4	0.18	0.34
							27-Nov-06

SUMMARY OF PEAK FLOW RATES FUTURE CONDITIONS			
CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	100-YR
AZ1	0.46	1	2
BA1	0.46	1	2
CNT1	0.94	2	4
CP1		80	162
CP16		18	168
CP2		3	12
CP3		153	246
CP3E		113	191
CP3S		40	55
CP4		115	197
CP5		2	13
CP6		18	173
CP6N		41	57
CP6E		45	228
CP8		5	22
CPR		150	234
DON1	2.99	1	4
DON2	0.93	0	1
DON3	1.59	1	2
DON4	0.31	0	0
DON5	1.14	0	2
DON6	2.98	1	4
DON7	3.18	1	4
DON8	0.93	0	1
DOF10	15.06	2	14
DOF11	9.47	1	9
DOF12	2.99	0	3
EXOF13	1.65	2	5
DOF14	13.98	20	41
DOF4	45.42	60	122
DOF5	10.81	2	11
DOF6	19.04	4	19
RG1	0.45	1	2
RG2	0.45	1	2
TP1	0.83	2	3
TP2	0.90	2	4
TP3	0.89	2	3
			11/27/06

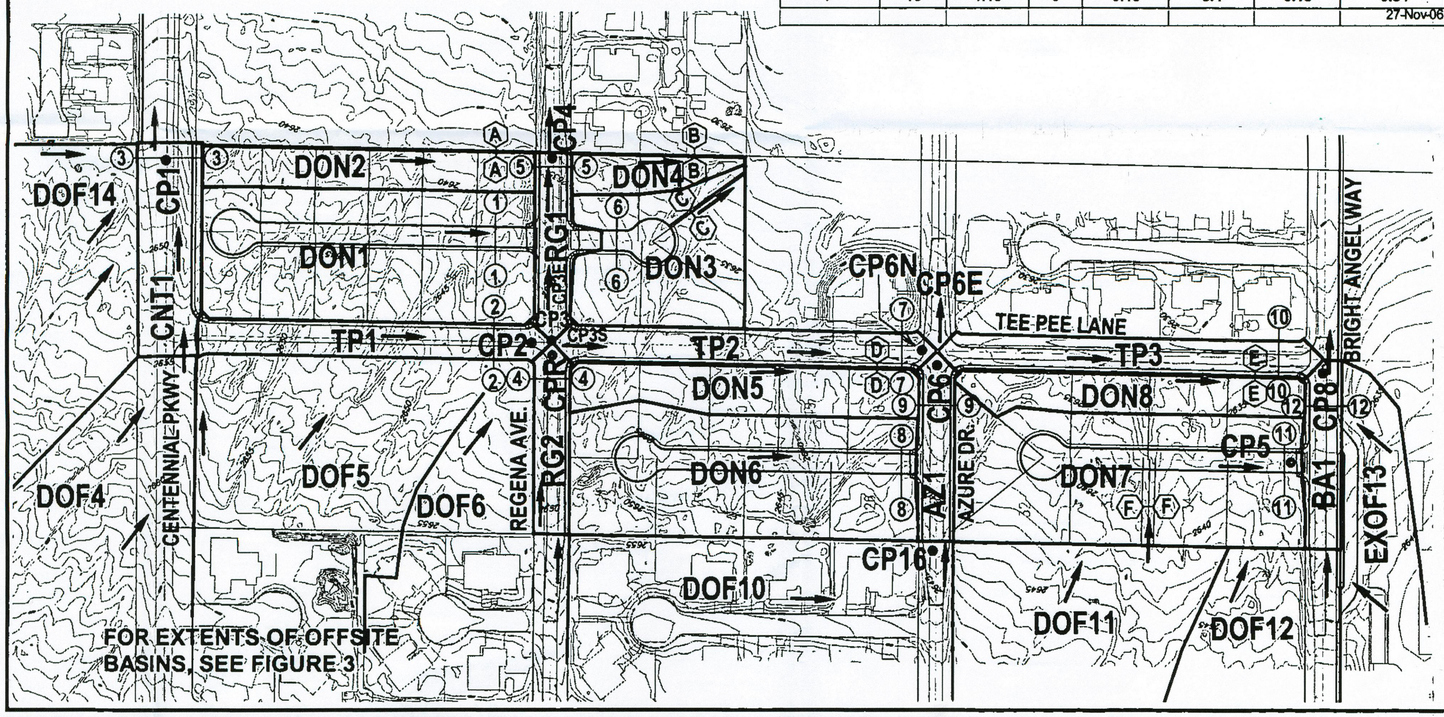


FIGURE 6

Centennial / Tee Pee Residential Development

FUTURE CONDITIONS DRAINAGE BASINS

CYL CONSULTANTS, INC.

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

Drainage Study Comment Letter

Date: May 19, 2014
Firm: RCI Engineering
Engineer: Rick J. Read, P.E.
Address: 4325 Dean Martin Drive, Suite 300, Las Vegas. NV 89103
Phone: (702) 453-0800
Fax: (702) 453-0801
E-mail: rread@rcinevada.com

Subject: Technical Drainage Study Update for Centennial and Tee Pee
Location: SEC of Centennial Parkway and Tee Pee Lane
APN: 125-30-502-007, -012, -013, 125-30-601-007
Sec, Township, Range: S30, T19S, R60E
Flood Zone & Panel: Zone X, 1745E, Revised September 27, 2002
Application Tracking #: 14-14210UP

HTE14-14210UP

Submittals	Date Received	Date Returned	Reviewer	Miscellaneous
Technical	04/10/2014	05/19/2014	AK	

Concurrence Required: (Must be obtained prior to permit issuance)		Reason Concurrence is required
	City of Henderson	Adjacent to or Impacts Henderson
X	City of Las Vegas	Adjacent to or Impacts Las Vegas
	City of North Las Vegas	Adjacent to or Impacts North Las Vegas
	Nevada Department of Transportation	Adjacent to or Impacts NDOT Facility
	Union Pacific Rail Road	Adjacent to or Impacts a UPRR Facility
	US Army Corp of Engineers	Impacts a USACE Facility
	Clark County Regional Flood Control District	Regional Significance, Adjacent to or Impacts CCRFCD MPU Facility or in a SFHA

BOARD OF COUNTY COMMISSIONERS
STEVE SISOLAK, Chairman • LARRY BROWN, Vice Chairman
SUSAN BRAGER • TOM COLLINS • CHRIS GIUNCHIGLIANI • MARY BETH SCOW • LAWRENCE WEEKLY
DONALD G. BURNETTE, County Manager

The following comments must be fully addressed and response provided with the next submittal. Incomplete responses may result in further review and time delays to the drainage study approval. Any revisions/modifications to the original site design must have supporting hydrologic and/or hydraulic calculations. CCPW Development Review will not be held responsible for project delays due to incomplete responses.

CCPW – Development Review Comments:

1. Revise analysis to clearly show the existing and developed condition analysis. Drainage basin map (showing offsite and onsite basins) need to be provided to show critical discharge points and hydraulic cross section locations. It is acceptable to use information from reference studies but the information should be pertinent to each individual condition i.e. existing or developed.

2. The approved Centennial Tee Pee study (HTE# 07-38840) indicated 2.20% longitudinal slope of Centennial Parkway adjacent to project site which matches the grading plan for the original study (HTE# 06-37189). Revise hydraulic analysis accordingly.

3. The HTE# 07-38840 study indicated a flow of 247/153 cfs (100/10-year) at the intersection of Regena and Tee Pee. Revise analysis accordingly. Also, the study indicated that existing Centennial Parkway has minimal capacity at Tee Pee and flow from the north will overtop the crown and impact the project site (Addendum 1 Comment 15). Provide additional details.

4. It appears that the interim condition was the worst case scenario as indicated in Figure 4 (CP3 flow 281/117 cfs, 100/10-year) of the original study. Provide additional details for not accounting for interim condition in the current analysis.

5. Based on the grading plan, the developed condition flow of 30 cfs from Regena Tee Pee flow split calculations will continue south to Azure Drive. Revise analysis and grading plan accordingly.

6. The slopes on Standard Form 4 need to match the grading plan.

7. The CN analysis for onsite basins need to account for paved/impervious area in the calculations. Revise analysis accordingly.

8. There is a mismatch between the ROW of Centennial Parkway as indicated in the report and grading plans. Provide clarity and revise calculations accordingly.

9. Revise street calculations as shown in Figure 6 to account for worst case scenario.

10. Drylane criteria is based on the worst case flow within the entire ROW limits. Provide Centennial Parkway calculations with the entire flow equaled about the CL and verify criteria of 19-ft drylane is met.

11. Provide HEC-1 model output from reference study.

12. Provide HTE# reference for all existing improvement on plans.

13. Per the Clark County Supplement to Uniform Standard Drawings and Specifications, (Chapter 1, 3.B.), longitudinal street slopes shall not exceed 6%. Please address and revise design as necessary.

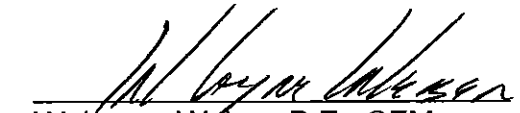
14. The project is proposing the pavement for offsite streets with no curb and gutter. The criteria for transverse flow overtopping the road is 10-yr flow depth of 1-ft or less and a DxV of 6 or less. The 100-yr flow depth of 1-ft or less with a DxV of 8 or less. Revise grading plan and analysis accordingly.

15. The finished floor elevation(s) of the proposed structure(s) need to meet the requirements of being set at a vertical distance above the gutter flowline of at least twice the depth of flow (measured at the high side of the building), up to a maximum of eighteen (18) inches above the 100-year water surface elevation in the street (per Section 304.4 of the *CCRFCD Manual*). Provide necessary calculations.

16. There are several comments on the redlined grading plans. Provide highlighter marks and responses on plans to show the issues are addressed.

The drainage/grading plans have been red-lined and require modifications prior to the next submittal. Failure to resubmit the red-lined grading plan will require an additional $400 re-review fee.

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.

By 

W. Layne Weber, P.E., CFM
Principal Engineer
Clark County Public Works
Development Review

ADDENDUM NO. 1 TO THE TECHNICAL DRAINAGE STUDY UPDATE FOR CENTENNIAL AND TEE PEE (FORMERLY CENTENNIAL/TEE PEE) (HTE#06-37189)

Prepared for:

Lennar Communities Nevada LLC
2490 Paseo Verde Parkway, Suite 120
Henderson, NV 89074
Phone: (702) 736-9100
Fax: (702) 736-9200

November 2014

PROJECT 3040.0038

RCI Engineering
4325 Dean Martin Drive, Suite 300 * Las Vegas, NV 89103
Tel: 702.453.0800 * Fax: 702.453.0801
www.rcicnevada.com

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: CENTENNIAL AND TEE PEE Date: November 2014

Location of Development: a) Descriptive (Cross Streets) North/South: Tee Pee Lane

East/West: Centennial Parkway

b) Section: 30 Township: 19 South Range: 60 East

c) APN : 125-30-502-007, 012, 013, 125-30-601-007

Name of Owner: Lennar Communities Nevada, LLC

Telephone No.: 702-739-9100 Fax No.: 702-736-9200 E-Mail Address:

Address: 2490 Paseo Verde Parkway, Suite 120, Henderson, NV 89074

Contact Person-Name: Rick J. Read, P.E. **Telephone No.:** 702-453-0800

*** E-Mail Address:** rread@rcinevada.com **Fax No.:** 702-453-0801

Firm: RCI Engineering

Address: 4325 Dean Martin Drive, Suite 300 Las Vegas, Nevada 89103

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: 17.5 acres Being Developed/Disturbed: 17.5 acres
2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ **Yes**** ☒ **No**
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☐ **Yes**** ☒ **No**
4. Proposed type of development (Residential, Commercial, Etc.): Residential
5. Approximate upstream land area which drains to the subject site: 330+/- acres
6. Has the site drainage been evaluated in the past? ☒ **YES** ☐ **NO** If yes, please identify documentation: Technical Drainage Study for Centennial/Tee Pee (HTE # 06- 37189)
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Regena Avenue, Azure Drive, Bright Angel Way
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 subject property. This form may provide sufficient information to serve as the Conceptual Drainage Study.

***New Required Field**

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

Revision	Date

Local Entity File No.

REFERENCE:

STANDARD FORM 1

Updated 05/01/2008

RCI Engineering

November 12, 2014

Clark County Public Works
Development Review
500 S. Grand Central Pkwy
Las Vegas, NV 89155

Subject: **Technical Drainage Study Update for Centennial & Tee Pee (HTE #14-14210 UP)**

The purpose of this letter is to address the comments from Clark County Department of Public Works (CCPW) dated May 19th, 2014 regarding the above referenced project. The comments are individually addressed as follows:

Please note that the Project has been broken into two phases. The first phase (Unit 1) will include Lots 1 through 10 on the east side of Tee Pee Lane between Centennial Parkway and Regena Avenue and Lots 11 through 14 on the south east corner of the Regena Avenue/Tee Pee Lane intersection. The second phase (Unit 2) will include Lots 15 through 32 on the west side of Tee Pee Lane between Regena Avenue and Bright Angel Way. Interim conditions for Unit 1 have been addressed in the Additional Responses section at the end of this letter.

Comment 1. Revise analysis to clearly show the existing and developed condition analysis. Drainage basin map (showing offsite and onsite basins) need to be provided to show critical discharge points and hydraulic cross section locations. It is acceptable to use information from reference studies but the information should be pertinent to each individual condition i.e. existing or developed.

Response: The worst case offsite storm flows tributary to the site are in some cases generated from offsite existing conditions basins and in some cases

generated in offsite developed conditions basins. The existing conditions analysis is shown on a copy of Figure 3 from the Original Study (HTE# 06-37189 included in the Appendix) and has not been revised for this update. A copy of the existing conditions HEC-1 model from the Original Study has been included in Appendix A.

The existing condition referenced storm flows and cross section locations for the normal depth calculations have been shown on Figure 7. In the Original Study, the offsite basin boundaries were not changed from existing to developed conditions. The only change between existing and developed conditions in the Original Study is that the CN values used for those basins were revised from existing to developed conditions. The following table is a summary of storm flows at Concentration Points referenced from the Original Study for existing and developed conditions. An asterisk is used in the table to identify the worst case 100-year storm flows that are tributary to the site.

TABLE 1
DEVELOPED/EXISTING COMPARISON
HEC-1 MODEL SUMMARY

Exist basin or CP	Existing 100 YR (cfs)	Developed basin or CP	Developed 100 YR (cfs)
BA1	2	BA1	*2
CP1	22	CP1	*162
CP3	211	CP3	*246
CP16	123	CP16	*168
CP8	11	CP8	*22
EXOF10	*16	DOF10	14
EXOF11	*13	DOF11	9
EXOF12	*4	DOF12	3
EXOF13	5	EXOF13	5
EXOF14	20	DOF14	*41
EXOF4	*58	DOF4	*122
EXOF5	11	DOF5	*11

Existing Conditions:

The existing conditions storm flows tributary to the site have been shown on Figure 7. There are two locations where the offsite existing conditions storm flows that are tributary to the site have been referenced. The first is at the downstream end of Subbasin EXOF4 at Cross Sections 1E and 20E west of the Tee Pee Lane/Centennial Parkway intersection. The 100-year storm flows under existing conditions west of the intersection will be 58 cfs during a 100-year storm event. At Cross Section 20E the 100-year storm flow from Subbasin EXOF4 will be contained in the north half of Centennial Parkway under existing conditions. At Cross Section 1E the capacity of the north half of Centennial Parkway is 42 cfs during a 100-year storm event. The 100-year storm flow of 42 cfs will continue east along the north half of Centennial Parkway and 16 cfs will spill out of the roadway and drain south in Tee Pee Lane. The flows that spill out of Centennial Parkway will be discussed in detail in the response to comment #2.

The second location where existing offsite storm flows are used in the normal depth calculation is at the southwest corner of the site where Subbasin EXOF11 generates more flows under existing conditions than under developed conditions. Existing conditions are the worst case storm flows tributary to the project from that basin, since a CN value of 75 was used for existing conditions and a CN value of 70 (20,000 sg. ft. Lots) was used for that area in the ultimate condition. The 13 cfs that drains to the site from Subbasin EXOF11 will drain to a low point in the subbasin and then east through a proposed 10-foot wide concrete lined easement, into Rockville Creek Court and then south to Bright Angel Way. The hydraulic calculation has not changed for that cross section and the easement cross section location and summary have been shown on Figure 6R.

Developed Conditions:

The offsite storm flows for developed conditions have also been referenced from the Original Study. Figure 5 (Future Conditions) from the Original Study has been included in Appendix C. Normal depth calculations and referenced storm flows for the developed condition have been shown on Figure 6R. Offsite storm flows that were used in the first submittal for this update have not been revised. Normal depth calculations have been revised based on different street cross sections or revised street slopes used in those calculations.

RCI, Lennar and Clark County have had several conversations and meetings concerning obtaining a D*V product of less than 8 for the nonurban street sections (See e-mail in Appendix). The final decision from Clark County is that as follows:

1. The nonurban major streets must be designed to meet a D*V equal to or less than 8.
2. Regena Avenue and Azure Drive will not include curb and gutter in accordance with the Tentative Map NOFA.
3. The landscape section adjacent to the street may be lined with riprap and dedicated as an easement for drainage.

Improvements and normal depth calculations have been revised to include the existing 33-foot patent easement on the north side of Regena Avenue (west of Tee Pee). The 6-foot landscape easements adjacent to the site will be used to convey flows adjacent to development in Regena Avenue and in Azure Drive. Riprap with a D50 of 6-inches and a thickness of 12-inches has been used for erosion protection within the landscape easements. A concrete cutoff wall will be constructed in Regina Avenue and in Azure Lane for erosion protection.

Cross section locations for the normal depth calculations for developed conditions have been shown on Figure 6R. Offsite storm flows used for the developed condition have not been revised from the first submittal of this update. As is shown in the summary table for the 100-year storm hydraulic calculations, the V*D product is equal to or less than 8. Velocities are greater than 5 fps in Regina Avenue and in Azure Drive under developed conditions, therefore a 3-foot deep cutoff wall is proposed for erosion protection adjacent to the pavement in the rural streets. Normal depth calculations of cross sections that have been revised have been included in Appendix B. Asterisks have been added to the Hydraulic Summary Tables on Figure 6R for the normal depth calculations that have been revised from the first submittal to this update.

The normal depth calculation for Cross Sections 1F in Centennial Parkway were revised to show that the 100-year storm flow and 10-year storm flow will meet Clark County criteria with the storm flows split evenly in both sides of the street.

Cross Sections 3F, 4F, and 9F were cut in Regena Avenue for the revised cross sections using a 6-foot landscape strip with riprap. The V*D product is equal to or less than 8 in all cases. The normal depth calculation for Cross Section 9F was also revised with 222 cfs instead of 221 cfs which is an additional 100-year storm flow of 1 cfs more that will be generated in Subbasin ON1 due to hydrologic revisions. The normal depth calculation for Cross Section 6F in Azure Drive was also revised using the riprap in the landscape easement and with 174 cfs instead of 173 cfs which is an additional 100-year storm flow of 1 cfs more that will be generated in Subbasin ON3 due to hydrologic revisions.

There will be a 100-year storm flow of 58 cfs at Cross Section 8F which is an increase of 7 cfs from the Original submittal. The combined 100-year storm flows at Cross Section 8F are from Subbasins EXOF11, EXOF12, and EXOF13 from Figure 3 from the Original Study plus the 100-year storm flows from ON4 plus the 30 cfs that will drain south in Tee Pee from the flow split at the Tee Pee Lane/Azure Drive intersection. As is shown in the normal depth calculation the velocity is not erosive. Therefore, no riprap is proposed in Bright Angel Way.

The calculations for Cross Sections 10 and 11 have also been revised for the interior streets due to the revised hydrologic model for the onsite drainage basins. The 100-year storm flows will drain at a depth of 0.41 feet deep at Cross Section 11 which will be the worst case storm flow depth in Unit 1 and in Unit 2. Finish floor elevations have been set 1.5 feet above the centerline of the interior streets at the high side of the lot for the Project. Therefore, all finish floor elevations meet the Manual criteria to be at least twice the depth of 100-year storm flow.

The calculation for Cross Section 12 has been revised to convey 1.5 cfs during a 100-year storm event from Lots 6 through 10 since the hydrologic model was revised. Approximately 25 percent of Subbasin ON1 drains to the easement (Q100=6cfs*.25=1.5 cfs). In addition the flattest slope of the easement has been revised to 0.57 percent. As is shown in Cross Section 12 the 100-year storm flows sill drain in the easement at a depth of 0.61 feet and a velocity of 2.71 fps. The remaining easements have not been revised. Please refer to the normal depth calculation for Cross Section 11 in Appendix B.

Comment 2. The approved Centennial Tee Pee study (HTE# 07-38840) indicated 2.20% longitudinal slope of Centennial Parkway adjacent to project site which matches the grading plan for the Original Study (HTE# 06-37189). Revise

hydraulic analysis accordingly.

Response: The slopes used in the normal depth calculations for Centennial Parkway west of Tee Pee Lane have been revised to 2.20 percent to match the grading plans for HTE# 07-38840. The existing conditions storm flows and cross sections have been included on Figure 7 and future conditions storm flows and cross sections have been added to Figure 6R. The capacity of Centennial Parkway with the north half of the road undeveloped will be 42 cfs during a 100-year storm event instead of 45 cfs from the previous submittal. This allows a 100-year storm flow of 16 cfs to spill over the crown of the road and drain south to the Tee Pee Lane/Regina Avenue intersection under existing conditions. Under future conditions it has been assumed that as Subbasin DOF4 develops the north half of Centennial Parkway will be developed as full half street improvements. A normal depth calculation for the north half of Centennial Parkway in the future condition (Cross Section 2F) at a slope of 2.20 percent shows that the entire 100-year storm flow of 122 cfs from Subbasin DOF4 will be contained in the north half of the street and will not spill over the crown and drain south in Tee Pee Lane during a 100-year storm event

Comment 3. The HTE# 07-38840 study indicated a flow of 247/153 cfs (100/10-year) at the intersection of Regena and Tee Pee. Revise analysis accordingly. Also, the study indicated that existing Centennial Parkway has minimal capacity at Tee Pee and flow from the north will overtop the crown and impact the project site (Addendum 1 Comment 15). Provide additional details.

Response: The HTE# 07-38840 study was not referenced for this update since that study referenced the same offsite basins as this update and then added their onsite basins peak to peak to their calculations. The drainage basins shown on Figure ADD1-2 from HTE# 07-38840 study shows that Subbasin TP1 was based on the entire width of Tee Pee Lane. The basin line for Subbasin ON1

for this study has been delineated to the centerline of Tee Pee Lane and so the Subbasins overlap which would account for the 1 cfs of 100-year storm flows difference between the Original Study and the 07-38840 Study.

Centennial Parkway does have a minimal capacity at Tee Pee Lane under existing conditions. Cross Section 1E discussed in Response #2 shows that 16 cfs will spill over the crown of road and drain south to the Regena Avenue/Tee Pee Lane intersection. The existing conditions storm flows as shown on Fig3 from the Original Study will be 211 cfs during a 100-year storm event at the intersection of Tee Pee and Regena. However, the worst case condition storm flows at the Regena Avenue/Tee Pee Lane intersection will be 246 cfs during a 100-year storm event under developed conditions (which assumes Centennial Parkway has been constructed). Therefore, developed conditions flow rates have been used for design purposes.

Comment 4. It appears that the interim condition was the worst case scenario as indicated in Figure 4 (CP3 flow 281/117 cfs, 100/10-year) of the original study. Provide additional details for not accounting for interim condition in the current analysis.

Response: The interim conditions storm flows were not referenced for the flows at the intersection because the interim condition model assumed that the entire 100-year storm flow from Subbasin EXOF4 would drain to the Tee Pee Lane/Regena Avenue intersection. As discussed in Response to Comment # 2 that is not the case. As was calculated in normal depth Cross Section 1E only 16 cfs will spill over the crown of Centennial Parkway from Subbasin EXOF4 during a 100-year storm event with 42 cfs continuing east past the site in the north half of Centennial Parkway. The existing conditions storm flows as shown on Fig3 from the Original Study will be 211 cfs during a 100-year storm event. The worst case storm flows at the Regena Avenue/Tee Pee Lane intersection will be 246 cfs during a 100-year storm event when the

upstream watershed tributary to the intersection are completely developed which is what was modeled with the original submittal for this update and shown on Fig5 from the Original Study.

Comment 5. Based on the grading plan, the developed condition flow of 30 cfs from Regena Tee Pee flow split calculations will continue south to Azure Drive. Revise analysis and grading plan accordingly.

Response: The analysis and grading plan have not been revised. The grading plan shows a 1-foot high hump which allows a portion of the 100-year storm flow in Regena Avenue to spill and drain south in Tee Pee Lane to match the drainage patterns that occur in the existing condition. There is an existing wash that drains southeast just south of Regena Avenue that was previously analyzed in the Original Study to convey 60 cfs from the flow split at the Regena Avenue/Tee Pee Lane intersection. Tee Pee Lane has been graded to allow the runoff in the east half of the road to spill out and drain east in the natural wash to match the existing condition. This flow drains southeast through the wash to Azure Drive east of Tee Pee Lane. Runoff in the west half of Tee Pee Lane will drain south to the Tee Pee Lane/Azure Drive intersection.

The homeowner on the northeast corner of the Tee Pee Lane/Azure Drive intersection has been contacted by Lennar Homes to determine if a wall could be constructed on that property outside of the eastern right-of-way to keep runoff from draining from Tee Pee Lane east onto the property. The homeowner informed Lennar Homes that a wall could not be constructed on the property. Please note that the residence was built as a part of the grading plan and drainage analysis for the Starrett and Fletcher Residence in 1998. A copy of the grading plan has been included in Appendix C. According to the grading and drainage plan there was a potential for a 100-year storm flow of approximately 600 cfs that would drain to the property. The finished floor

elevation of the house is set at 2638.53 which is elevated approximately 8 feet above the existing wash. Since the residence was elevated above the wash to be protected from the historical flows of 600 cfs the developed conditions storm flows from this project (Q100=15 cfs) will have no negative impact to that property.

Comment 6. The slopes on Standard Form 4 need to match the grading plan.

Response: The slopes were double checked and the Standard Form 4 have been adjusted to match the grading plan. The adjustments were minor and slopes slightly changed which did not change the overall average lag time for the basins. The overland/initial lag length and slope are based on the slope and length of the upstream lot or street section whichever applies. The travel length is based on the length when flow is channelized (ie in the curb line or adjacent ditch) and the slope is based on the average slope of that travel length from the downstream end of the initial length to the downstream end of the subbasin. Please note that Subbasin ON1 has been revised since the south half of Centennial Parkway has been widened by 5 feet.

Comment 7. The CN analysis for onsite basins need to account for paved/impervious area in the calculations. Revise analysis accordingly.

Response: The CN values for the onsite drainage basins have been revised to account for 10 percent of the basin as pavement in the adjacent perimeter streets. The onsite CN value used for developed conditions is now 72.8. Please see the revised CN calculations, Standard Form 4 Spreadsheet, and HEC-1 model in Appendix A.

Comment 8. There is a mismatch between the ROW of Centennial Parkway as indicated in the report and grading plans. Provide clarity and revise calculations accordingly.

Response: Centennial Parkway has been revised to add an additional 5 feet to the south half of street. Hydraulic calculations have been updated and included in the Appendix.

Comment 9. Revise street calculations as shown in Figure 6 to account for worst case scenario.

Response: In some cases the worst case storm flows are generated from offsite basins in the existing condition and is some cases they are generated after offsite basins and streets have been developed. The hydraulic calculations in the first update submittal were based on the worst case storm flows. For this response to comments, the worst case existing storm flows and the developed conditions storm flows have been broken into two separate exhibits and two separate discussions for clarity. The other change to the street cross sections is that the cross sections for some of the streets have been revised to use an additional 6-foot drainage easement adjacent to right-of-way and an additional 3 feet for the patent easement width.

Comment 10. Drylane criteria is based on the worst case flow within the entire ROW limits. Provide Centennial Parkway calculations with the entire flow equaled about the CL and verify criteria of 19-ft drylane is met.

Response: Under developed conditions, the 100-year storm flows tributary to Centennial Parkway from the north will not cross the centerline of the street. Therefore, the 10-year storm flows will not cross the centerline. Even though this is the case, 100-year and 10-year normal depth calculations have been developed with the flow split evenly in the street per Clark County criteria. Results of those calculations have been shown of Figure 6R and included in Appendix B. Centennial Parkway meets the D*V manual criteria for 100-year and a 10-year

storm events. A 19.5 foot dry lane is maintained in Centennial Parkway adjacent to the site during a 10-year storm event.

Comment 11. Provide HEC-1 model output from reference study.

Response: The HEC-1 model output for the existing and future conditions have been enclosed. Reference flows from the existing condition and the future condition have been marked up in those models. The interim conditions HEC-1 model was not referenced as discussed in Response To Comments # 4. Therefore the interim condition model was not copied for the Appendix.

Comment 12. Provide HTE# reference for all existing improvement on plans.

Response: HTE#'s have been shown on the plans.

Comment 13. Per the Clark County Supplement to Uniform Standard Drawings and Specifications, (Chapter 1, 3.B.), longitudinal street slopes shall not exceed 6%. Please address and revise design as necessary.

Response: The street slope has been revised.

Comment 14. The project is proposing the pavement for offsite streets with no curb and gutter. The criteria for transverse flow overtopping the road is 10-yr flow depth of 1-ft or less and a DxV of 6 or less. The 100-yr flow depth of 1-ft or less with a DxV of 8 or less. Revise grading plan and analysis accordingly.

Response: Please see response to comments #1. The street section have been revised for the criteria established at meetings between Lennar, RCI and Clark County.

Comment 15. The finished floor elevation(s) of the proposed structure(s) need to meet the

requirements of being set at a vertical distance above the gutter flowline of at least twice the depth of flow (measured at the high side of the building), up to a maximum of eighteen (18) inches above the 100-year water surface elevation in the street (per section 304.4 of the *CCRFCD Manual*). Provide necessary calculations.

Response: Section 4F was cut in Regena Avenue just east of Tee Pee Lane. The 100-year storm flows tributary to Regena Avenue at this location will be the future conditions storm flows of 216 cfs that continues east in Regena Avenue after the 100-year storm flows split at Tee Pee Lane. During a 100-year storm event the flow rate of 216 cfs will be conveyed at a depth of 1.07 feet with a velocity of 7.07 feet per second for a D*V product of 7.6. A hump has been provided in the entrance street for Lots 11-14 on the south side of Regina Avenue to a minimum elevation of 1.8 feet above the flowline. Therefore freeboard to an elevation of 0.7-feet above the 100-year storm event water surface elevation has been provided to keep runoff from draining onto the site. The finish floor elevation of Lot 14 is 2641.7 which is 0.7 feet above the top of curb and 1.5 feet above the centerline of Clearwater Creek Court, which meets Clark County criteria. The finish floor elevation of Lot 11 is 2640.7 which is 0.6 feet above the top of curb and 0.5 feet above the centerline of Clearwater Creek Court. Lot 11 does not meet Clark County criteria for the finish floor elevation to be 18-inches above the adjacent street centerline elevation. Since the high point of Clearwater Creek Court is in the middle of the lot there will be a negligible amount of 100-year runoff in the street. The finish floor elevation of Lot 11 is 1.2 feet (0.7 plus 0.5) above the 100-year water surface elevation of runoff in Regena Avenue. A waiver of the Clark County criteria for the finish floor elevation to be 18-inches above the adjacent street centerline elevation is requested for Lot 11.

Per Design Manual criteria, the onsite finish floor elevations shall be set at a vertical distance of twice the depth of flow in the gutter flow line up to a

maximum of 18-inches above the water surface elevation. Based on the street capacity calculations, the maximum depth of surface flow in the interior streets will be 0.41-feet and 1.08-feet in the adjacent streets for the 100-year storm event. To meet 2* depth of flow criteria the finish floor elevations should be set to a minimum of 0.8-feet above the flow line on the interior and 2.16-feet above the flow line along the perimeter. However, the more stringent criteria required by Clark County, is to set the finish floor elevation 18-inches above the adjacent street centerline elevation.

Comment 16. There are several comments on the redlined grading plans. Provide highlighter marks and responses on plans to show the issues are addressed.

Response: The plans have been revised per your markups. The property is bordered on the west by USA owned property that is under the jurisdiction of the BLM. Offsite permission to grade will not be allowed by the BLM. Therefore a flood wall will be constructed along the entire western boundary along the backside of Lots 29 through 32. Storm flows from the west will pond up along the wall and either spill west into the easement located between Lots 30 and 31 or spill to the south into the Bright Angel Way right-of-way. The flood wall will be elevated to a minimum of two feet above the adjacent grade to provide for flood protection.

Additional Response:

Lennar Homes has decided to phase the project into two units due to offsite sanitary sewer connections. Unit 1 will include Lots 1 through 10 on the east side of Tee Pee Lane between Centennial Parkway and Regena Avenue and Lots 11 through 14 on the south east corner of the Regena Avenue/Tee Pee Lane intersection. Unit 2 will include Lots 15 through 32 on the west side of Tee Pee Lane between Regena Avenue and Bright Angel Way. Figure 2 has been revised to include the Phase Line between Units 1 and 2. Figure 8 has been created to show the interim conditions in Unit 1 since unit 1 will be

developed prior to Unit 2. In the interim condition all of the offsite flows tributary to the site are assumed to match the referenced existing condition analysis from the Original Study. Please refer to Figure 3 from the Original Study which has been enclosed in Appendix C.

The onsite basins and flows are the same as presented in the developed condition analysis discussed in this response. Please refer to the developed conditions analysis discussed in this response. Two normal depth calculations have been performed for the interim condition based on revised normal depth calculations for the capacity of Centennial Parkway in the existing conditions and for the interim grading in Regena Avenue west of Tee Pee Lane.

In the interim condition there will be 27 cfs draining south in Tee Pee Lane during a 100-year storm event. The storm flows are equal to the 100-year storm flow of 11 cfs that will be generated by Subbasin EXOF5 (referenced from the Original Study) plus the 100-year storm flow of 16 cfs that will spill over the existing paving in Centennial Parkway. Please see Fig3 in Appendix C from the Original Study and Figure 7 for the existing offsite storm flows tributary to the site. The only hydraulic sections that have been performed for the interim condition analysis is Section I2 along Tee Pee Lane and Section I3 along Regena Avenue.

In the interim condition the 100-year storm flow of 27 cfs draining south in Tee Pee Lane will drain at a depth of 0.75-feet and a velocity of 3.1 fps, with a corresponding V*D product of 2.3. Regena Avenue west of Tee Pee Lane is being constructed with Unit 1. In the interim condition the 100-year storm flow of 211 cfs (existing flows) draining east in Regena Avenue will drain at a depth of 1.09-feet and a velocity of 7.3 fps, with a corresponding V*D product of 8. As was previously mentioned a concrete cutoff wall will be constructed along the edge of pavement in Regena Avenue as erosion protection.

The drainage easement along the rear of Lots 6 through 10 has also been revised. The lots will drain through two blocks turned on their side at the downstream end of each swale into the easement. Subbasin ON1 is approximately 5 acres and will generate 6 cfs during a 100-year storm event which equates to about 1.2 cfs per acre. Each lot is approximately one quarter of an acre and will generate 0.3 cfs of runoff during a 100-year storm event. The lot swale drains into the drainage easement at two locations at the rear of those lots. A conservative calculation assuming that there will be .25 cfs at each block wall opening has been conducted. As is shown in the calculation using a weir and an orifice equation, the depth of 100-year storm flow at the block wall openings will be 0.2 feet deep which includes a 50 percent clogging factor applied. Please refer to Detail 32 on Sheet D-2 and the calculations in Appendix B.

A pedestrian access gate will be constructed at the south end of the easement for maintenance personnel. The easement will be privately maintained by the HOA. Runoff from the site will drain into Regena Avenue as surface flow. The ZURN drain at the downstream end of the easement has been removed from the plans. All other easements in Unit 1 and Unit 2 have not been revised from the first update submittal.

Sincerely,

Rick J. Read
RCI Engineering

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

Drainage Study Comment Letter

Date: May 19, 2014
Firm: RCI Engineering
Engineer: Rick J. Read, P.E.
Address: 4325 Dean Martin Drive, Suite 300, Las Vegas. NV 89103
Phone: (702) 453-0800
Fax: (702) 453-0801
E-mail: rread@rcinevada.com

Subject: Technical Drainage Study Update for Centennial and Tee Pee
Location: SEC of Centennial Parkway and Tee Pee Lane
APN: 125-30-502-007, -012, -013, 125-30-601-007
Sec, Township, Range: S30, T19S, R60E
Flood Zone & Panel: Zone X, 1745E, Revised September 27, 2002
Application Tracking #: 14-14210UP

HTE14-14210UP

Submittals	Date Received	Date Returned	Reviewer	Miscellaneous
Technical	04/10/2014	05/19/2014	AK	

Concurrence Required: (Must be obtained prior to permit issuance)		Reason Concurrence is required
	City of Henderson	Adjacent to or Impacts Henderson
X	City of Las Vegas	Adjacent to or Impacts Las Vegas
	City of North Las Vegas	Adjacent to or Impacts North Las Vegas
	Nevada Department of Transportation	Adjacent to or Impacts NDOT Facility
	Union Pacific Rail Road	Adjacent to or Impacts a UPRR Facility
	US Army Corp of Engineers	Impacts a USACE Facility
	Clark County Regional Flood Control District	Regional Significance, Adjacent to or Impacts CCRFCD MPU Facility or in a SFHA

BOARD OF COUNTY COMMISSIONERS
STEVE SISOLAK, Chairman • LARRY BROWN, Vice Chairman
SUSAN BRAGER • TOM COLLINS • CHRIS GIUNCHIGLIANI • MARY BETH SCOW • LAWRENCE WEEKLY
DONALD G. BURNETTE, County Manager

The following comments must be fully addressed and response provided with the next submittal. Incomplete responses may result in further review and time delays to the drainage study approval. Any revisions/modifications to the original site design must have supporting hydrologic and/or hydraulic calculations. CCPW Development Review will not be held responsible for project delays due to incomplete responses.

CCPW – Development Review Comments:

1. Revise analysis to clearly show the existing and developed condition analysis. Drainage basin map (showing offsite and onsite basins) need to be provided to show critical discharge points and hydraulic cross section locations. It is acceptable to use information from reference studies but the information should be pertinent to each individual condition i.e. existing or developed.

2. The approved Centennial Tee Pee study (HTE# 07-38840) indicated 2.20% longitudinal slope of Centennial Parkway adjacent to project site which matches the grading plan for the original study (HTE# 06-37189). Revise hydraulic analysis accordingly.

3. The HTE# 07-38840 study indicated a flow of 247/153 cfs (100/10-year) at the intersection of Regena and Tee Pee. Revise analysis accordingly. Also, the study indicated that existing Centennial Parkway has minimal capacity at Tee Pee and flow from the north will overtop the crown and impact the project site (Addendum 1 Comment 15). Provide additional details.

4. It appears that the interim condition was the worst case scenario as indicated in Figure 4 (CP3 flow 281/117 cfs, 100/10-year) of the original study. Provide additional details for not accounting for interim condition in the current analysis.

5. Based on the grading plan, the developed condition flow of 30 cfs from Regena Tee Pee flow split calculations will continue south to Azure Drive. Revise analysis and grading plan accordingly.

6. The slopes on Standard Form 4 need to match the grading plan.

7. The CN analysis for onsite basins need to account for paved/impervious area in the calculations. Revise analysis accordingly.

8. There is a mismatch between the ROW of Centennial Parkway as indicated in the report and grading plans. Provide clarity and revise calculations accordingly.

9. Revise street calculations as shown in Figure 6 to account for worst case scenario.

10. Drylane criteria is based on the worst case flow within the entire ROW limits. Provide Centennial Parkway calculations with the entire flow equaled about the CL and verify criteria of 19-ft drylane is met.

11. Provide HEC-1 model output from reference study.

12. Provide HTE# reference for all existing improvement on plans.

13. Per the Clark County Supplement to Uniform Standard Drawings and Specifications, (Chapter 1, 3.B.), longitudinal street slopes shall not exceed 6%. Please address and revise design as necessary.

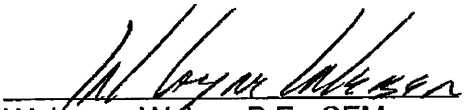
14. The project is proposing the pavement for offsite streets with no curb and gutter. The criteria for transverse flow overtopping the road is 10-yr flow depth of 1-ft or less and a DxV of 6 or less. The 100-yr flow depth of 1-ft or less with a DxV of 8 or less. Revise grading plan and analysis accordingly.

15. The finished floor elevation(s) of the proposed structure(s) need to meet the requirements of being set at a vertical distance above the gutter flowline of at least twice the depth of flow (measured at the high side of the building), up to a maximum of eighteen (18) inches above the 100-year water surface elevation in the street (per Section 304.4 of the *CCRFCD Manual*). Provide necessary calculations.

16. There are several comments on the redlined grading plans. Provide highlighter marks and responses on plans to show the issues are addressed.

The drainage/grading plans have been red-lined and require modifications prior to the next submittal. Failure to resubmit the red-lined grading plan will require an additional $400 re-review fee.

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.

By 

W. Layne Weber, P.E., CFM
Principal Engineer
Clark County Public Works
Development Review

Chris Zrinyi

From: Robert Thompson
Sent: Tuesday, August 19, 2014 7:20 AM
To: 'Chris Zrinyi'; Erik Denman; Layne Weber
Cc: Paulo E Chavez; Robert Flaxa; Rick Read
Subject: RE: Centennial and Tee Pee

agreed

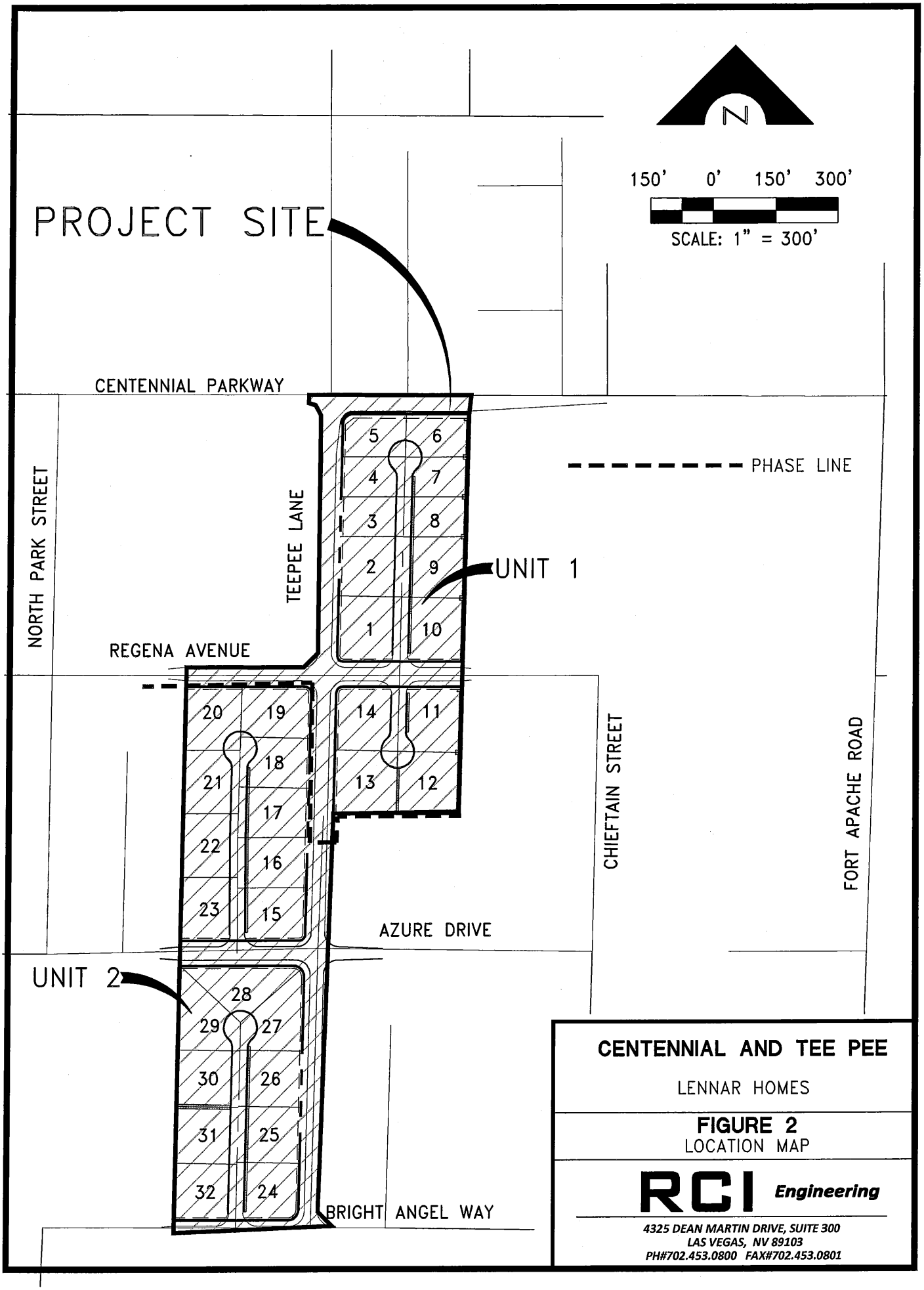
From: Chris Zrinyi [mailto:czrinyi@rcinevada.com]
Sent: Monday, August 18, 2014 7:25 PM
To: Robert Thompson; Erik Denman; Layne Weber
Cc: Paulo E Chavez; Robert Flaxa; Rick Read
Subject: Centennial and Tee Pee

Robert,
Below summarizes our meeting this morning on the Centennial and Tee Pee Project # 14-14210. Regena Avenue and Azure Drive will not be built with curb and gutter in accordance with the NOFA for the Tentative Map. The depth * velocity product must be less than 8 per RFCD criteria. To reduce the D*V to less than 8 the landscape section adjacent to the road improvements will be lined with riprap and dedicated as a drainage easement. The pavement section and the riprap section will include concrete cutoff walls running parallel to the improvements. Adjacent walls will be solid grouted accordingly. Preliminary street section calculations expanded to include the riprap showed D*V less than 8 with velocities in the 6.5 fps range.

CCPW maintenance may request a transverse cutoff wall installed at the upstream and downstream sections of the improvements. CCPW to let us know if they prefer the transverse cutoff wall or if it will hinder maintenance after a storm event. Please let us know if you need anything else and thank you for your time today.

Thank you,
Chris Zrinyi, P.E.

RCI Engineering
998-2104 (P)
453-0800 (O)
453-0801 (F)
756-6694 (C)



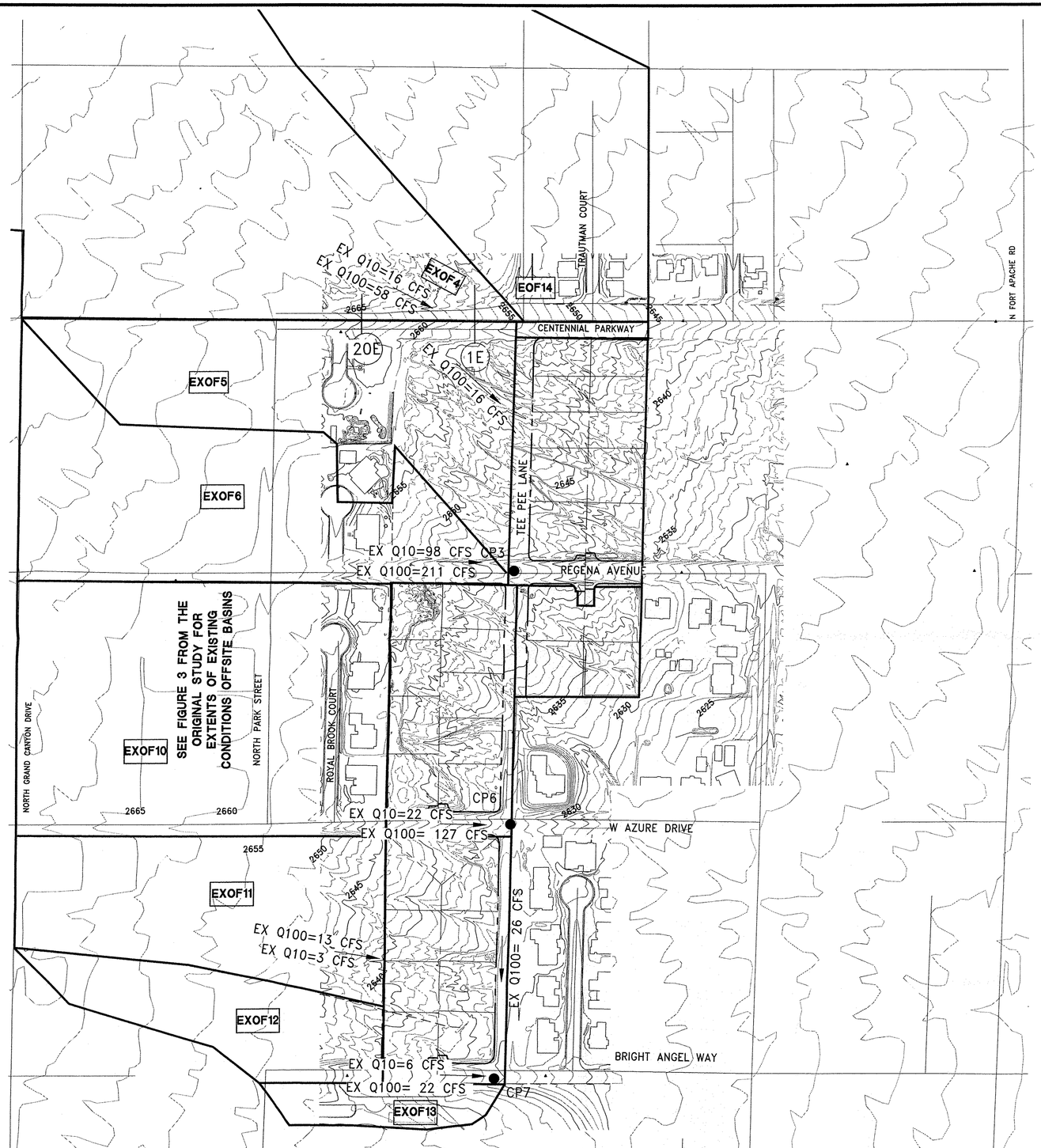
CENTENNIAL AND TEE PEE

LENNAR HOMES

FIGURE 2
LOCATION MAP

RCI Engineering
4325 DEAN MARTIN DRIVE, SUITE 300
LAS VEGAS, NV 89103
PH#702.453.0800 FAX#702.453.0801

O:\3040_LENR\0038_Centennial and Tee Pee_DRAIN\FIGURES\ADD_1\figure2R.dwg rread 10/24/14 11:09am



N

75' 0' 75' 150'

SCALE: 1" = 150'

LEGEND

EXOF4	EXISTING DRAINAGE SUBBASINS
	SUBBASIN BOUNDARY
CP3	REFERENCED EXIST CONDITION CONCENTRATION POINT
EX Q100=XX CFS EX Q10=XX CFS	REFERENCED EXISTING CONDITIONS STORM FLOWS SEE FIGURE 3 FROM ORIGINAL STUDY
1E	CROSS SECTION CALCULATIONS BASED ON EXISTING CONDITIONS STORM FLOWS SEE FIGURE 3 FROM ORIGINAL STUDY

100-YEAR
OFFSITE EXISTING HYDRAULIC SECTIONS

Location	Slope (%)	Q_{100} (cfs)	D_{100} (ft)	V_{100} (ft/sec)	D^*V_{100}
*SECT 1E CENTENNIAL PKWY	2.20	42	1.02	5.04	5.1
*SECT 20E CENTENNIAL PARKWAY	2.20	58	0.91	5.46	5.0

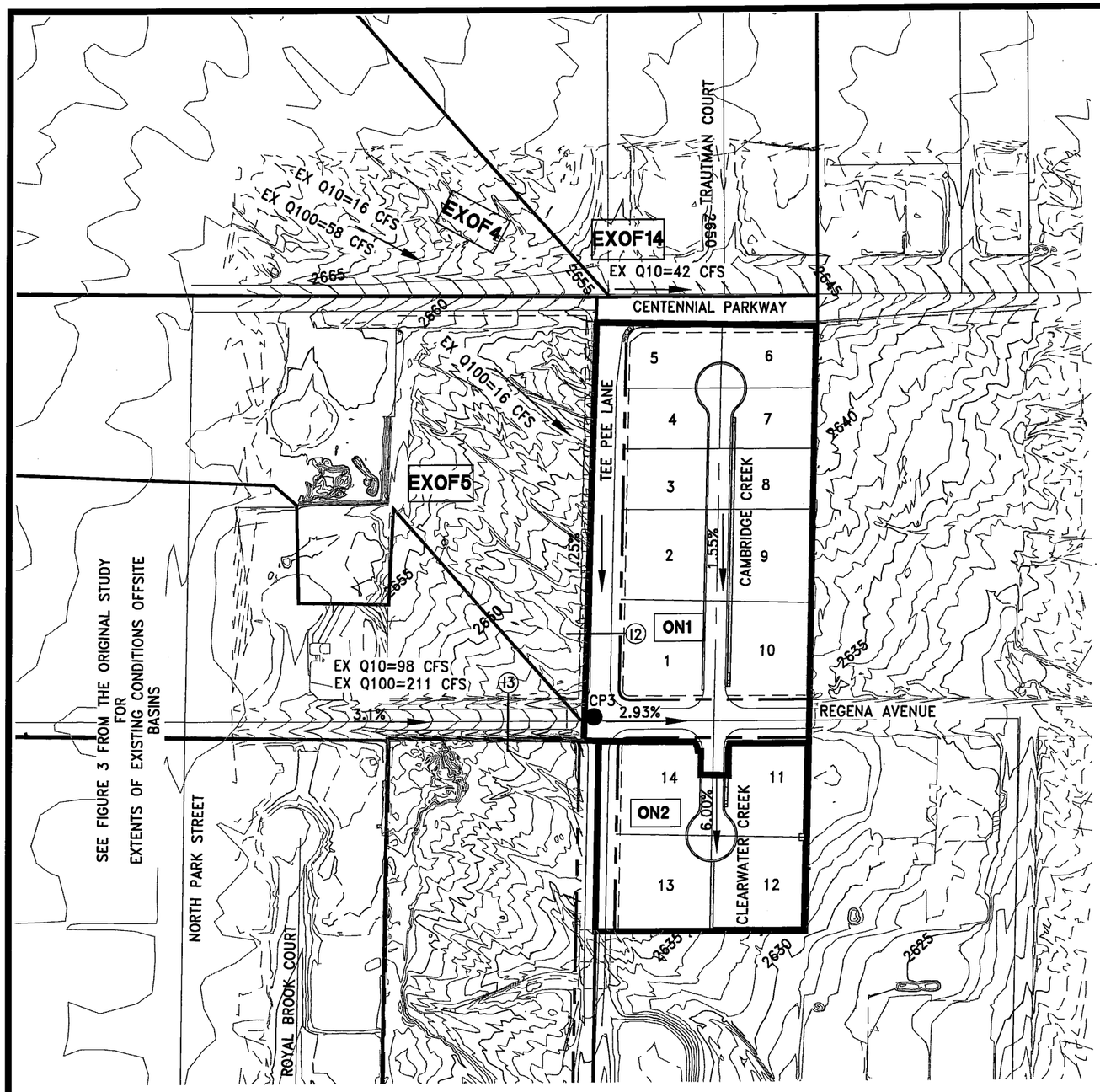
* CROSS SECTION CALCULATION FOR NORTH HALF OF CENTENNIAL PARKWAY CAPACITY

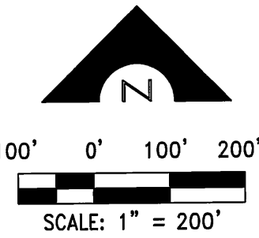
CENTENNIAL AND TEEPEE
LENNAR

FIGURE 7
EXISTING CONDITIONS CROSS SECTION MAP

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LEGEND

ON1	INTERIM BASIN (UNIT 1)
———	SUBBASIN BOUNDARY
● CP3	REFERENCED EXIST CONDITION CONCENTRATION POINT

INTERIM CONDITIONS
HEC-1 MODEL SUMMARY

SUBBASIN OR CP	BASIN AREA (AC)	100 YR (cfs)	10 YR (cfs)
ON1	5.32	6	1
ON2	2.19	3	1

100-YEAR
OFFSITE INTERIM HYDRAULIC SECTIONS

Location	Slope (%)	Q_{100} (cfs)	D_{100} (ft)	V_{100} (ft/sec)	$D*V_{100}$
*SECT I2 TEE PEE LANE	1.25	27	0.75	3.1	2.3
SECT I3 REGENA AVENUE	2.70	211	1.09	7.3	8.0

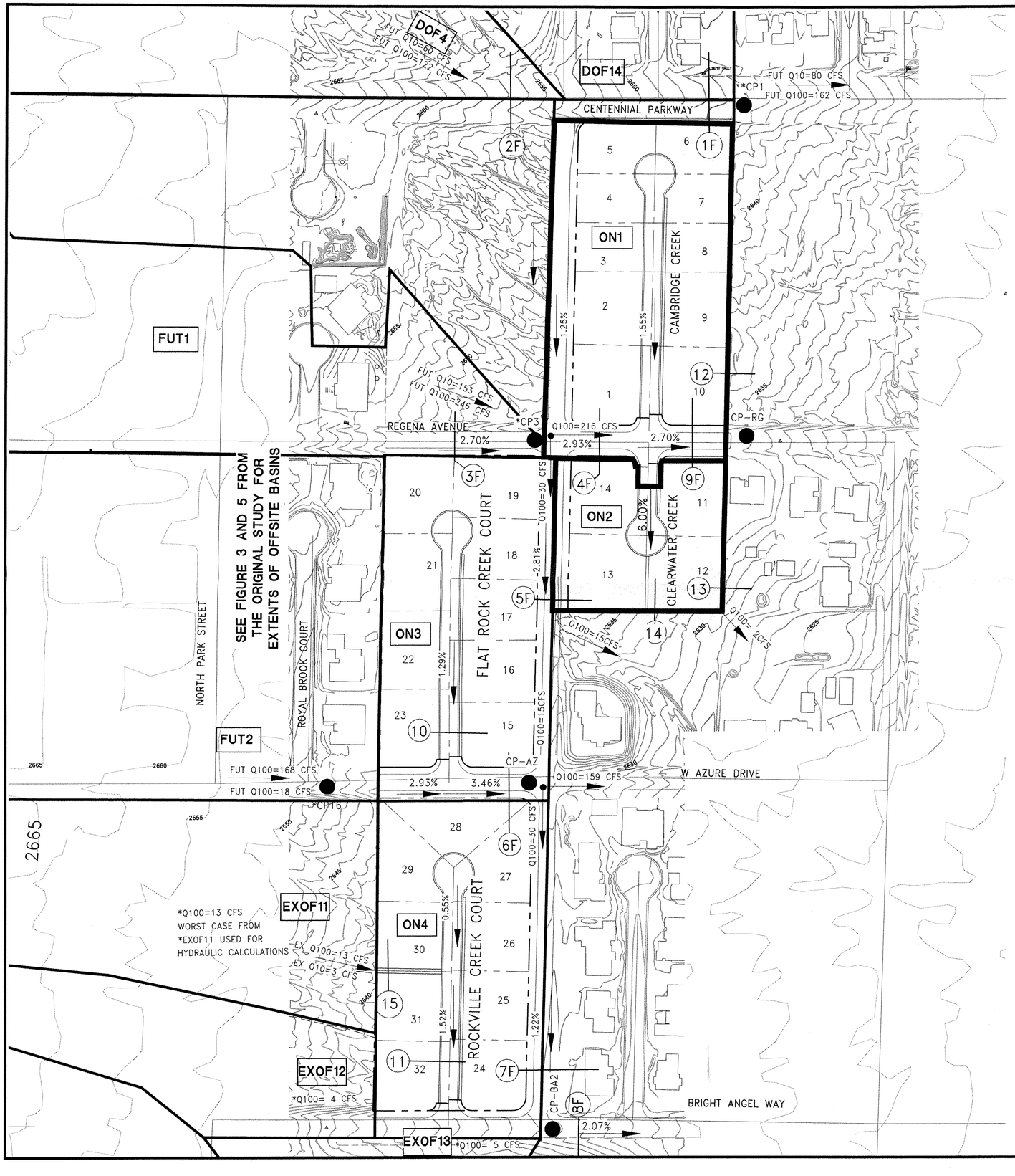
* 100-YEAR STORM FLOW IN TEE PEE LANE IS 11 CFS FROM SUBBASIN EXOF5 PLUS 16 CFS SPILL OVER CENTENNIAL PKWY CENTERLINE TO TOTAL 27 CFS

LENNAR
CENTENNIAL AND TEE PEE

FIGURE 8
INTERIM CONDITION (UNIT 1)

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PH#702.453.0800 FAX#702.453.0801

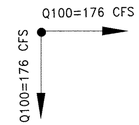
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LEGEND

- FLOW DIRECTION
- ULTIMATE DRAINAGE BASIN BOUNDARY LINE
- ON1 — ULTIMATE DRAINAGE SUBBASINS
- CP-AZ — PROPOSED CONCENTRATION POINT
- Q100=176 CFS — STORM FLOW AND DIRECTION
- *CP8 — REFERENCED STORM FLOWS FROM ORIGINAL STUDY



FLOW SPLIT FLOWS AND DIRECTION

100-YEAR
OFFSITE DEVELOPED HYDRAULIC SECTIONS

Location	Slope (%)	Q_{100} (cfs)	D_{100} (ft)	V_{100} (ft/sec)	$D*V_{100}$
*SECT 1F CENTENNIAL PKWY	2.65	162	0.77	7.11	5.5
*SECT 2F CENTENNIAL PKWY 1/2 STREET	2.20	122	0.89	7.45	N/A
*SECT 3F REGENA AVE	2.70	246	1.08	7.30	7.9
*SECT 4F REGENA AVE	2.93	216	1.07	7.07	7.6
SECT 5F TEE PEE LANE	2.81	30	0.65	4.70	3.1
*SECT 6F AZURE DRIVE	3.46	174	1.05	6.77	7.1
SECT 7F TEE PEE LANE	1.22	30	0.78	3.14	2.4
*SECT 8F BRIGHT ANGEL WAY	2.07	58	0.87	4.62	4.0
*SECT 9F REGENA AVENUE	2.70	222	1.05	7.59	8.0
*SECT 10 FLAT ROCK CREEK (FLATTEST)	1.29	6	0.29	2.85	0.8
*SECT 11 ROCKVILLE CREEK (STEEPEST)	1.52	19	0.41	3.62	1.5

10-YEAR
OFFSITE DEVELOPED HYDRAULIC SECTIONS

Location	Slope (%)	Q_{10} (cfs)	D_{10} (ft)	V_{10} (ft/sec)	$D*V_{10}$
*SECT 1F CENTENNIAL PARKWAY	2.65	80	0.64	5.80	3.7
*SECT 3F REGENA AVE	2.70	153	0.95	6.14	5.8
*SECT 6F AZURE DRIVE	3.46	19	0.53	4.54	2.4

100-YEAR
HYDRAULIC SECTIONS - CURB AND GUTTER

Location	Slope (%)	Q_{100} (cfs)	D_{100} (ft)	V_{100} (ft/sec)	$D*V_{100}$
SECT 3F REGENA AVENUE	2.70	246	0.85	9.19	7.8
SECT 4F REGENA AVENUE	2.93	216	0.81	8.94	7.2
SECT 6F AZURE DRIVE	3.46	174	0.74	8.62	6.4
SECT 7F TEE PEE LANE	1.22	30	0.54	3.46	1.9
SECTION 8F BRIGHT ANGEL WAY	2.07	52	0.59	4.72	2.8
SECTION 9F REGENA AVENUE	2.70	222	0.83	8.82	7.3

100-YEAR
ONSITE CONCRETE DITCH HYDRAULIC SECTIONS

Location	Slope (%)	Q_{100} (cfs)	D_{100} (ft)	V_{100} (ft/sec)
*SECTION 12	0.57	1.5	0.61	2.71
SECTION 13	1.82	1	0.42	3.79
SECTION 14	0.50	1	0.15	1.67
SECTION 15	1.00	13	0.35	4.31

* CALCULATIONS THAT HAVE BEEN REVISED

DEVELOPED CONDITIONS
HEC-1 SUMMARY

SUBBASIN OR CP	BASIN AREA (AC)	100 YR (cfs)	10 YR (cfs)
ON1	5.32	6	1
CP-RG	N/A	222	154
ON2	2.19	3	1
ON3	5.1	6	1
CP-AZ	N/A	189	19
ON4	4.92	6	1
CP-BA2	N/A	58	9

CP-RG= ON1 + FLOW SPLIT REGENA EAST
CP-AZ= CP16 + ON3 + FLOW SPLIT REGENA SOUTH
CP-BA2= ON4 + FLOW SPLIT AZURE SOUTH + EXOF13 + EXOF12 + EXOF11

CENTENNIAL AND TEE PEE
LENNAR

FIGURE 6R
DEVELOPED CONDITION DRAINAGE MAP

RCI Engineering
4325 DEAN MARTIN DRIVE, SUITE 300
LAS VEGAS, NV 89103
PH#702.453.0800 FAX#702.453.0801

APPENDIX A – HYDROLOGIC CALCS

Interim Conditions

- Curve Number Calculations
- Standard Form 4
- Interim Conditions HEC-1 Model

Developed Conditions

- Curve Number Calculations
- Standard Form 4
- Ultimate Conditions HEC-1 Model

CN CALCULATIONS - INTERIM CONDITIONS CENTENNIAL AND TEE PEE-REVISED

Basin	% SOIL TYPE	HYDRO	STREETS		CN - RNP/RURAL (20,000 SF)		WEIGHTED CN
ON1, ON2		A		98		54	0.0
	100	B	10	98	90	70	72.8
		C		98		80	0.0
		D		98		85	0.0
							72.8

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

RCI
ENGINEERING

CENTENNIAL AND TEE PEE
INTERIM ONSITE CONDITIONS

BY: RJR
DATE: 11/7/14

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check	Tlag	REMARKS
DESIG:	DEV./EX. (D or E)	CN	K	AREA Ac	AREA Mi^2	INITIAL LENGTH Feet	SLOPE %	Ti Min	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY FPS	V2 VELOCITY FPS	Tt Min	Min	Min	Tlag= 0.6Tc/60 Hours	
(1)			(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9a)	(9b)	(10)	(13)	(14)		
ON1	D	72.8	0.5710	5.32	0.0083	187	1.4	11.6	690	1.8	2.7	4.1	3.9	15.5	14.9	0.149	
ON2	D	72.8	0.5710	2.19	0.0034	232	2.1	11.4	315	1.7	2.6	4.0	2.0	13.4	13.0	0.130	

Tc = Ti + Tt Tlag = 0.6 Tc
Ti = 1.8 (1.1 - K) L^1/2 / S^1/3
K = 0.0132 (CN) - 0.39
Tc Check (Developed) = L/180+10

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
Existing V2 = 29.4*(S/100)^1/2
Minimum Tc (EX) = 10 Min per Section 602

Developed V1 = 20.2*(S/100)^1/2
Developed V2 = 30.6*(S/100)^1/2
Minimum Tc (DEV) = 5 Min per Section 602.1

REFERENCE :

STANDARD FORM 4

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN  1998               *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   26OCT14  TIME  06:53:12  *
*                                      *
****************************************
```

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

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

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

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

1 HEC-1 INPUT PAGE 1

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

                        *DIAGRAM
            1           ID     CENTENNIAL AND TEE PEE
            2           ID     CN VALUES BASED ON 10% BASIN STREETS
            3           ID     INTERIM DESIGN
            4           ID     DESIGN STORM = 100-YEAR 6-HOUR STORM
            5           ID     STORM DISTRIBUTION = SDN3
            6           ID
            7           IT       5       0       0     300
            8           IO       5       0       0
            9           IN       5       0       0
           10           JR    PREC    1.00    0.58
                        *

           11           KK     ON1
           12           KM    SUBBASIN ON1
           13           BA   .0083
           14           PB    3.00
           15           PC   0.000   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
           16           PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
           17           PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
           18           PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
           19           PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
           20           PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
           21           PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
           22           PC   0.998   0.999   1.000
           23           LS       0    72.8
           24           UD   0.149
                        *

           25           KK     ON2
           26           KM    SUBBASIN ON2
           27           BA   .0034
           28           LS       0    72.8
           29           UD   0.130
                        *
           30           ZZ
```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

    11         ON1
                 .
                 .
    25           .         ON2

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```


```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN  1998               *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   26OCT14  TIME  06:53:12  *
*                                      *
****************************************
```

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


CENTENNIAL AND TEE PEE
CN VALUES BASED ON 10% BASIN STREETS
INTERIM DESIGN

```
                          DESIGN STORM = 100-YEAR 6-HOUR STORM
                          STORM DISTRIBUTION = SDN3


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

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

                     COMPUTATION INTERVAL      .08 HOURS
                        TOTAL TIME BASE   24.92 HOURS

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

       JP          MULTI-PLAN OPTION
                        NPLAN           1  NUMBER OF PLANS

       JR          MULTI-RATIO OPTION
                       RATIOS OF PRECIPITATION
                      1.00       .58
1

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


                                                                          RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION      AREA     PLAN                        RATIO 1  RATIO 2
                                                                       1.00       .58

 HYDROGRAPH AT
+                    ON1        .01      1   FLOW                      6.        1.
                                             TIME                    3.58      3.67

 HYDROGRAPH AT
+                    ON2        .00      1   FLOW                      3.        1.
                                             TIME                    3.58      3.58


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

CN CALCULATIONS - DEVELOPED CONDITIONS CENTENNIAL AND TEE PEE-REVISED

			STREETS		CN - RNP/RURAL (20,000 SF)		
Basin	% SOIL TYPE	HYDRO					WEIGHTED CN
ON1, ON2, ON3, ON4		A		98		54	0.0
	100	B	10	98	90	70	72.8
		C		98		80	0.0
		D		98		85	0.0
							72.8

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

RCI ENGINEERING

CENTENNIAL AND TEE PEE
DEVELOPED ONSITE CONDITIONS FUTURE OFFSITE

BY: RJR
DATE: 10/27/14

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check	Tlag	REMARKS
DESIG:	DEV./EX. (D or E)	CN	K	AREA Ac	AREA Mi^2	INITIAL LENGTH Feet	SLOPE %	Ti Min	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY FPS	V2 VELOCITY FPS	Tt Min	Min	Min	Tlag= 0.6Tc/60 Hours	
(1)			(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9a)	(9b)	(10)	(13)	(14)		
ON1	D	72.8	0.5710	5.32	0.0083	187	1.4	11.6	690	1.8	2.7	4.1	3.9	15.5	14.9	0.149	
ON2	D	72.8	0.5710	2.19	0.0034	232	2.1	11.4	315	1.7	2.6	4.0	2.0	13.4	13.0	0.130	
ON3	D	72.8	0.5710	5.10	0.0080	218	1.1	13.8	750	1.6	2.6	3.9	4.3	18.1	15.4	0.154	
ON4	D	72.8	0.5710	4.92	0.0077	260	1.1	15.1	620	1.1	2.2	3.3	4.5	19.6	14.9	0.149	

Tc = Ti + Tt Tlag = 0.6 Tc

Ti = 1.8 (1.1 - K) L^1/2 / S^1/3

K = 0.0132 (CN) - 0.39

Tc Check (Developed) = L/180+10

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

Developed V1 = 20.2*(S/100)^1/2

Existing V2 = 29.4*(S/100)^1/2

Developed V2 = 30.6*(S/100)^1/2

Minimum Tc (EX) = 10 Min per Section 602

Minimum Tc (DEV) = 5 Min per Section 602.1

REFERENCE :

STANDARD FORM 4

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN  1998                *
*          VERSION 4.1                 *
*                                      *
*  RUN DATE  26OCT14  TIME  06:53:24   *
*                                      *
****************************************
```

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

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

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

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

1 HEC-1 INPUT PAGE 1

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

              *DIAGRAM
    1         ID     CENTENNIAL AND TEE PEE
    2         ID     CN VALUES BASED ON 10% BASIN STREETS
    3         ID     ULTIMATE DEVELOPED CONDITIONS
    4         ID     DESIGN STORM = 100-YEAR 6-HOUR STORM
    5         ID     STORM DISTRIBUTION = SDN3
    6         ID
    7         IT       5       0       0     300
    8         IO       5       0       0
    9         IN       5       0       0
   10         JR    PREC    1.00    0.58
              *

   11         KK     ON1
   12         KM    SUBBASIN ON1
   13         BA   .0083
   14         PB    3.00
   15         PC   0.000   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
   16         PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
   17         PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
   18         PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   19         PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   20         PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
   21         PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
   22         PC   0.998   0.999   1.000
   23         LS       0    72.8
   24         UD   0.149
              *

   25         KK     ON2
   26         KM    SUBBASIN ON2
   27         BA   .0034
   28         LS       0    72.8
   29         UD   0.130
              *

   30         KK     ON3
   31         KM    SUBBASIN ON3
   32         BA   .0080
   33         LS       0    72.8
   34         UD   0.154
              *

   35         KK     ON4
   36         KM    SUBBASIN ON4
   37         BA   .0077
   38         LS       0    72.8
   39         UD   0.149
              *
   40         ZZ
```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   11        ON1
               .
               .
   25          .        ON2
               .          .
               .          .
   30          .          .         ON3
               .          .           .
               .          .           .
```

```
   35          .          .          .         ON4

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *               JUN  1998               *
 *            VERSION 4.1                *
 *                                       *
 *  RUN DATE   26OCT14  TIME  06:53:24   *
 *                                       *
 *****************************************
```

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

CENTENNIAL AND TEE PEE
CN VALUES BASED ON 10% BASIN STREETS
ULTIMATE DEVELOPED CONDITIONS
DESIGN STORM = 100-YEAR 6-HOUR STORM
STORM DISTRIBUTION = SDN3

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

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

                   COMPUTATION INTERVAL     .08 HOURS
                       TOTAL TIME BASE   24.92 HOURS

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

      JP          MULTI-PLAN OPTION
                       NPLAN          1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                      RATIOS OF PRECIPITATION
                     1.00       .58
1

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


                                                                  RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION      AREA     PLAN                 RATIO 1  RATIO 2
                                                              1.00      .58

 HYDROGRAPH AT
+                   ON1        .01      1    FLOW             6.        1.
                                              TIME           3.58      3.67

 HYDROGRAPH AT
+                   ON2        .00      1    FLOW             3.        1.
                                              TIME           3.58      3.58

 HYDROGRAPH AT
+                   ON3        .01      1    FLOW             6.        1.
                                              TIME           3.58      3.67

 HYDROGRAPH AT
+                   ON4        .01      1    FLOW             6.        1.
                                              TIME           3.58      3.67


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

APPENDIX B – HYDRAULIC CALCS

100-Year Existing Cross Sections Calculations

100-Year Ultimate Cross Section Calculations

10-Year Ultimate Cross Sections Calculations

100-Year Interim Cross Section Calculation

100-Year Block Wall Opening Calculations at rear of Lots 6 Through 10

Worksheet for SECT 20E 100-YR NORTH CENTENNIAL PARKWAY

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.20000	%
Discharge	58.00	ft³/s

EXISTING FLOW RATE FROM EXOF4

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	1.00
1+06.0	0.00
1+18.0	0.68
1+34.0	1.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 1.00)	(1+18.0, 0.68)	0.025
(1+18.0, 0.68)	(1+34.0, 1.00)	0.016

Results

Normal Depth		0.91	ft
Elevation Range	0.000 to 1.000 ft		
Flow Area		10.62	ft²
Wetted Perimeter		29.004	ft
Top Width		28.907	ft
Normal Depth		0.91	ft
Critical Depth		1.05	ft
Critical Slope		0.00818	ft/ft
Velocity		5.46	ft/s
Velocity Head		0.46	ft
Specific Energy		1.37	ft
Froude Number		1.59	
Flow Type	Supercritical		

Worksheet for SECT 20E 100-YR NORTH CENTENNIAL PARKWAY

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.91	ft
Critical Depth	1.05	ft
Channel Slope	0.02200	ft/ft
Critical Slope	0.00818	ft/ft

Cross Section for SECT 20E 100-YR NORTH CENTENNIAL PARKWAY

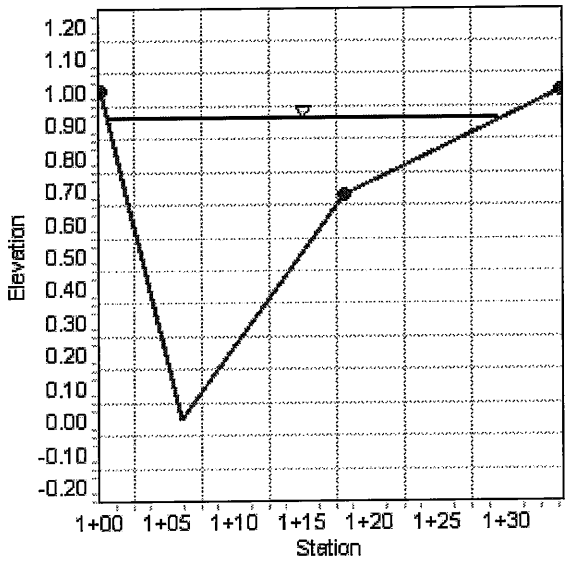
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.20000	%
Normal Depth	0.91	ft
Discharge	58.00	ft³/s

Cross Section Image



Worksheet for Revised SECT 1E 100-YR NORTH CENTENNIAL

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.20000	%
Discharge	42.00	ft³/s
Section Definitions		

EXISTING FLOW RATE MAX CAPACITY

Station (ft)	Elevation (ft)
1+00.0	1.50
1+06.0	0.00
1+10.0	0.67
1+14.0	0.75
1+30.0	1.02

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 1.50)	(1+14.0, 0.75)	0.025
(1+14.0, 0.75)	(1+30.0, 1.02)	0.016

Results

Normal Depth	1.02	ft
Elevation Range	0.000 to 1.500 ft	
Flow Area	8.33	ft²
Wetted Perimeter	28.283	ft
Top Width	28.095	ft
Normal Depth	1.02	ft
Critical Depth	1.14	ft
Critical Slope	0.00747	ft/ft
Velocity	5.04	ft/s
Velocity Head	0.40	ft
Specific Energy	1.42	ft
Froude Number	1.63	

Worksheet for Revised SECT 1E 100-YR NORTH CENTENNIAL

Results

Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.02	ft
Critical Depth	1.14	ft
Channel Slope	0.02200	ft/ft
Critical Slope	0.00747	ft/ft

Cross Section for Revised SECT 1E 100-YR NORTH CENTENNIAL

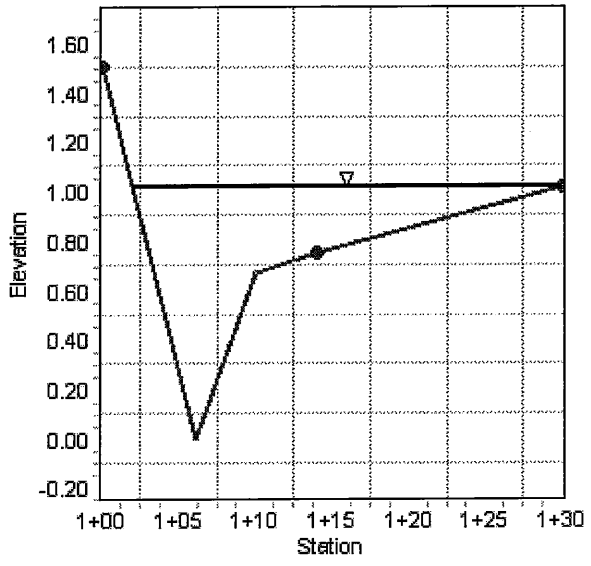
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.20000	%
Normal Depth	1.02	ft
Discharge	42.00	ft³/s

Cross Section Image



Worksheet for SECT 1F 100-YR CENT PKWY

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.65000	%
Discharge	162.00	ft³/s

DEVELOPED

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	2.00
1+00.0	0.60
1+05.0	0.50
1+05.5	0.48
1+05.5	0.00
1+07.0	0.13
1+07.0	0.17
1+50.0	1.03
1+93.0	0.17
1+93.0	0.13
1+94.5	0.00
1+94.5	0.48
1+95.0	0.50
2+00.0	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 2.00)	(1+07.0, 0.17)	0.013
(1+07.0, 0.17)	(1+93.0, 0.17)	0.016
(1+93.0, 0.17)	(2+00.0, 0.60)	0.013

Results

Normal Depth	0.77	ft
Elevation Range	0.000 to 2.000 ft	

Worksheet for SECT 1F 100-YR CENT PKWY FUTURE-new

Results

Flow Area		22.80	ft²
Wetted Perimeter		75.730	ft
Top Width		74.320	ft
Normal Depth		0.77	ft
Critical Depth		1.01	ft
Critical Slope		0.00459	ft/ft
Velocity		7.11	ft/s
Velocity Head		0.78	ft
Specific Energy		1.55	ft
Froude Number		2.26	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	1.01	ft
Channel Slope	0.02650	ft/ft
Critical Slope	0.00459	ft/ft

Cross Section for SECT 1F 100-YR CENT PKWY FUTURE-new

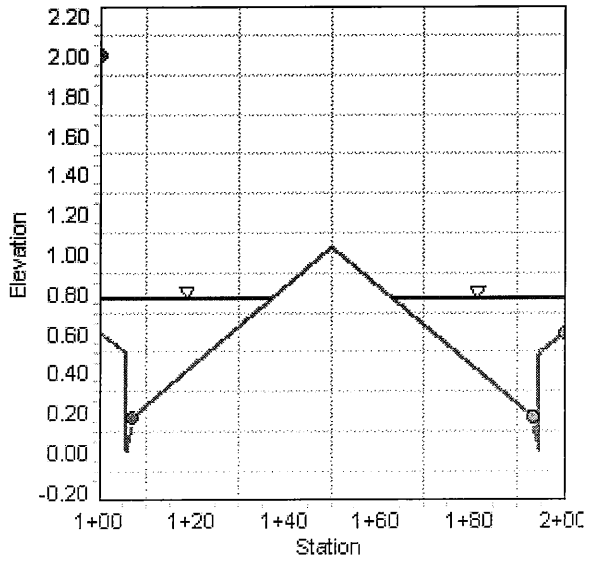
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.65000	%
Normal Depth	0.77	ft
Discharge	162.00	ft³/s

Cross Section Image



Worksheet for SECT 2F 100-YR CENT PKWY NORTH HALF

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.20000	%
Discharge	122.00	ft³/s

FUTURE CONDITIONS

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	2.00
1+00.0	0.60
1+05.0	0.50
1+05.5	0.48
1+05.5	0.00
1+07.0	0.13
1+07.0	0.17
1+50.0	1.03

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 2.00)	(1+07.0, 0.17)	0.013
(1+07.0, 0.17)	(1+50.0, 1.03)	0.016

Results

Normal Depth	0.89	ft
Elevation Range	0.000 to 2.000 ft	
Flow Area	16.38	ft²
Wetted Perimeter	44.178	ft
Top Width	43.348	ft
Normal Depth	0.89	ft
Critical Depth	1.14	ft
Critical Slope	0.00423	ft/ft
Velocity	7.45	ft/s

Worksheet for SECT 2F 100-YR CENT PKWY NORTH HALF

Results

Velocity Head		0.86	ft
Specific Energy		1.76	ft
Froude Number		2.14	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.89	ft
Critical Depth	1.14	ft
Channel Slope	0.02200	ft/ft
Critical Slope	0.00423	ft/ft

Cross Section for SECT 2F 100-YR CENT PKWY NORTH HALF

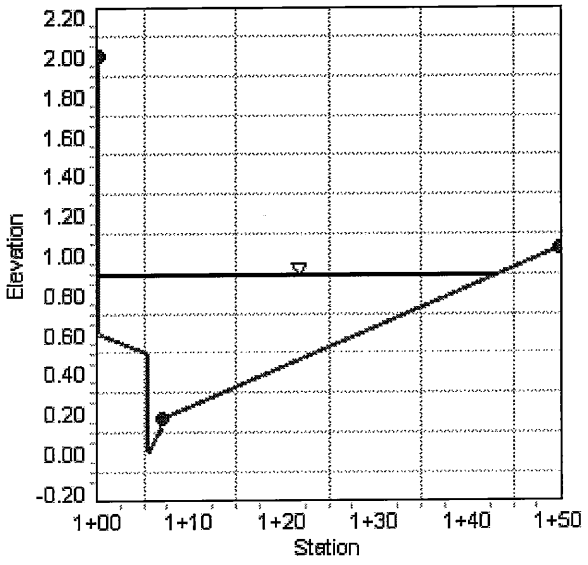
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.20000	%
Normal Depth	0.89	ft
Discharge	122.00	ft³/s

Cross Section Image



Worksheet for SECT 3F 100-YR REGENA AVENUE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.70000	%
Discharge	246.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+97.0	49.00
1+06.0	47.67
1+10.0	48.17
1+14.0	48.25
1+30.0	48.57
1+46.0	48.25
1+50.0	48.17
1+54.0	47.67
1+60.0	48.10
1+66.0	48.53
1+66.0	50.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+97.0, 49.00)	(1+14.0, 48.25)	0.025
(1+14.0, 48.25)	(1+30.0, 48.57)	0.016
(1+30.0, 48.57)	(1+46.0, 48.25)	0.016
(1+46.0, 48.25)	(1+60.0, 48.10)	0.025
(1+60.0, 48.10)	(1+66.0, 50.00)	0.033

Results

Normal Depth	1.08	ft
Elevation Range	47.670 to 50.000 ft	
Flow Area	33.69	ft²

Worksheet for SECT 3F 100-YR REGENA AVENUE

Results

Wetted Perimeter		67.721	ft
Top Width		67.319	ft
Normal Depth		1.08	ft
Critical Depth		1.33	ft
Critical Slope		0.00722	ft/ft
Velocity		7.30	ft/s
Velocity Head		0.83	ft
Specific Energy		1.91	ft
Froude Number		1.82	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.08	ft
Critical Depth	1.33	ft
Channel Slope	0.02700	ft/ft
Critical Slope	0.00722	ft/ft

Cross Section for SECT 3F 100-YR REGENA AVENUE

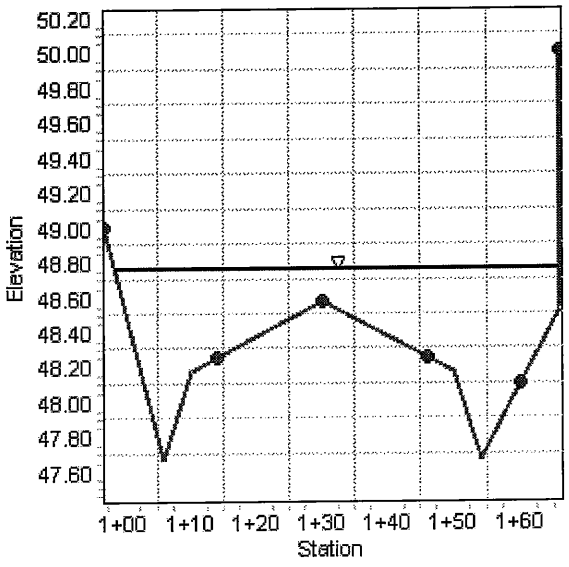
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.70000	%
Normal Depth	1.08	ft
Discharge	246.00	ft³/s

Cross Section Image



D*V

1.08 * 7.3 = 7.9

OK

Worksheet for SECT 4F 100-YR REGENA AVENUE new

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.93000	%
Discharge	216.00	ft³/s

Section Definitions

FLOW DRAINING EAST AFTER FLOW SPLIT

Station (ft)	Elevation (ft)
0+94.0	42.50
0+94.0	41.62
1+00.0	41.50
1+06.0	40.74
1+10.0	41.23
1+14.0	41.31
1+30.0	41.63
1+46.0	41.31
1+50.0	41.23
1+54.0	40.70
1+60.0	41.50
1+66.0	41.62
1+66.0	42.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+94.0, 42.50)	(0+94.0, 41.62)	0.025
(0+94.0, 41.62)	(1+00.0, 41.50)	0.033
(1+00.0, 41.50)	(1+14.0, 41.31)	0.025
(1+14.0, 41.31)	(1+30.0, 41.63)	0.016
(1+30.0, 41.63)	(1+46.0, 41.31)	0.016
(1+46.0, 41.31)	(1+60.0, 41.50)	0.025
(1+60.0, 41.50)	(1+66.0, 41.62)	0.033
(1+66.0, 41.62)	(1+66.0, 42.50)	0.025

Worksheet for SECT 4F 100-YR REGENA AVENUE new

Results

Normal Depth		1.07	ft
Elevation Range	40.700 to 42.500 ft		
Flow Area		30.54	ft²
Wetted Perimeter		72.480	ft
Top Width		72.000	ft
Normal Depth		1.07	ft
Critical Depth		1.30	ft
Critical Slope		0.00697	ft/ft
Velocity		7.07	ft/s
Velocity Head		0.78	ft
Specific Energy		1.85	ft
Froude Number		1.91	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.07	ft
Critical Depth	1.30	ft
Channel Slope	0.02930	ft/ft
Critical Slope	0.00697	ft/ft

Cross Section for SECT 4F 100-YR REGENA AVENUE new

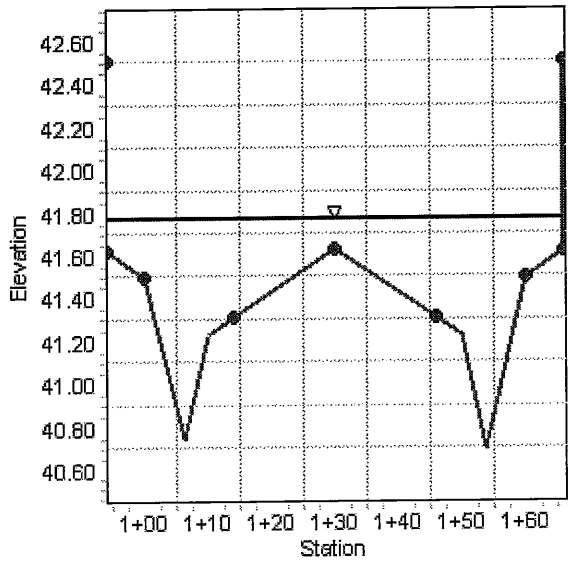
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.93000	%
Normal Depth	1.07	ft
Discharge	216.00	ft³/s

Cross Section Image



Worksheet for SECT 6F 100-YR AZURE DRIVE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.46000	%
Discharge	174.00	ft³/s ← CP16 + 6CFS FROM ON 3
Section Definitions		

Station (ft)	Elevation (ft)
0+94.0	0.79
1+00.0	0.67
1+06.0	0.00
1+10.0	0.67
1+14.0	0.75
1+30.0	1.07
1+46.0	0.75
1+50.0	0.67
1+54.0	0.00
1+60.0	0.67
1+66.0	0.79

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+94.0, 0.79)	(1+00.0, 0.67)	0.033
(1+00.0, 0.67)	(1+14.0, 0.75)	0.025
(1+14.0, 0.75)	(1+30.0, 1.07)	0.016
(1+30.0, 1.07)	(1+46.0, 0.75)	0.016
(1+46.0, 0.75)	(1+60.0, 0.67)	0.025
(1+60.0, 0.67)	(1+66.0, 0.79)	0.033

Results

Normal Depth		1.05 ft
Elevation Range	0.000 to 1.070 ft	

Worksheet for SECT 6F 100-YR AZURE DRIVE

Results

Flow Area		25.69	ft²
Wetted Perimeter		71.193	ft
Top Width		70.468	ft
Normal Depth		1.05	ft
Critical Depth		1.26	ft
Critical Slope		0.00769	ft/ft
Velocity		6.77	ft/s
Velocity Head		0.71	ft
Specific Energy		1.77	ft
Froude Number		1.98	
Flow Type	Supercritical		

V*D

1.05 x 6.77 = 7.1

7.1 < 8

OK

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.05	ft
Critical Depth	1.26	ft
Channel Slope	0.03460	ft/ft
Critical Slope	0.00769	ft/ft

Cross Section for SECT 6F 100-YR AZURE DRIVE

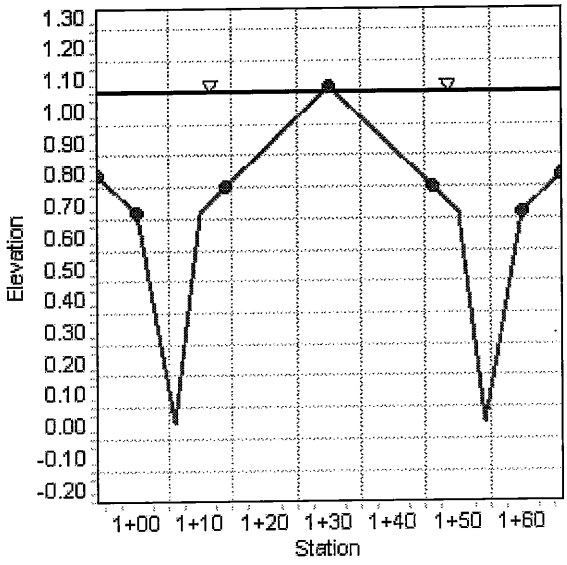
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.46000	%
Normal Depth	1.05	ft
Discharge	174.00	ft³/s

Cross Section Image



Worksheet for SECT 8F 100-YR BRIGHT ANGEL WAY

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.07000	%
Discharge	58.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	0.67
1+06.0	0.00
1+10.0	0.67
1+14.0	0.75
1+30.0	1.07
1+46.0	0.75
1+50.0	0.67
1+54.0	0.00
1+60.0	0.67

EXOF11= 13
EXOF12= 4
EXOF13= 5
EXOF14= 6
T/A FLOW SPLIT = 30%
58CFS

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(1+00.0, 0.67)	(1+14.0, 0.75)	0.025
(1+14.0, 0.75)	(1+30.0, 1.07)	0.016
(1+30.0, 1.07)	(1+46.0, 0.75)	0.016
(1+46.0, 0.75)	(1+60.0, 0.67)	0.025

Results

Normal Depth	0.87	ft
Elevation Range	0.000 to 1.070 ft	
Flow Area	12.57	ft²
Wetted Perimeter	40.248	ft
Top Width	39.665	ft
Normal Depth	0.87	ft

Worksheet for SECT 8F 100-YR BRIGHT ANGEL WAY

Results

Critical Depth		0.97	ft
Critical Slope		0.00964	ft/ft
Velocity		4.62	ft/s
Velocity Head		0.33	ft
Specific Energy		1.20	ft
Froude Number		1.45	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.87	ft
Critical Depth	0.97	ft
Channel Slope	0.02070	ft/ft
Critical Slope	0.00964	ft/ft

Cross Section for SECT 8F 100-YR BRIGHT ANGEL WAY

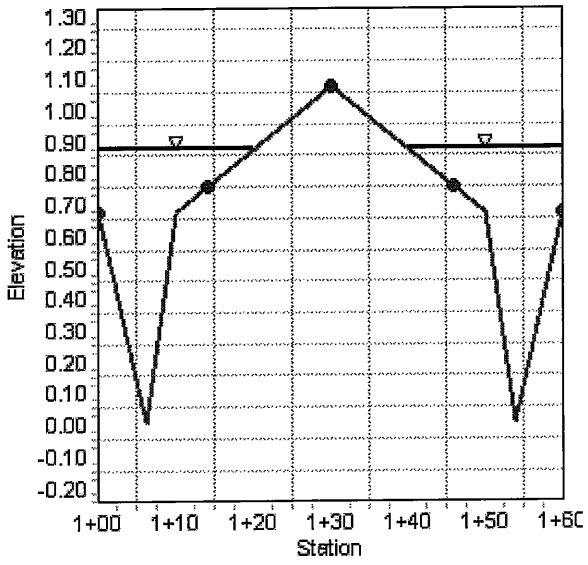
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.07000	%
Normal Depth	0.87	ft
Discharge	58.00	ft³/s

Cross Section Image



Worksheet for SECT 9F 100-YR REGENA AVENUE new

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.93000	%
Discharge	222.00	ft³/s
Section Definitions		

216 CFS (FLOWSPLIT) + 6 CFS (ONI)

Station (ft)	Elevation (ft)
0+94.0	38.00
0+94.0	37.87
1+00.0	35.87
1+06.0	35.11
1+10.0	35.60
1+14.0	35.68
1+30.0	36.00
1+46.0	35.68
1+50.0	35.60
1+54.0	35.11
1+60.0	35.87
1+66.0	37.87
1+66.0	38.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+94.0, 38.00)	(0+94.0, 37.87)	0.025
(0+94.0, 37.87)	(1+00.0, 35.87)	0.033
(1+00.0, 35.87)	(1+14.0, 35.68)	0.025
(1+14.0, 35.68)	(1+30.0, 36.00)	0.016
(1+30.0, 36.00)	(1+46.0, 35.68)	0.016
(1+46.0, 35.68)	(1+60.0, 35.87)	0.025
(1+60.0, 35.87)	(1+66.0, 37.87)	0.033
(1+66.0, 37.87)	(1+66.0, 38.00)	0.025

Worksheet for SECT 9F 100-YR REGENA AVENUE new

Results

Normal Depth		1.05	ft
Elevation Range	35.110 to 38.000 ft		
Flow Area		29.23	ft²
Wetted Perimeter		62.008	ft
Top Width		61.750	ft
Normal Depth		1.05	ft
Critical Depth		1.32	ft
Critical Slope		0.00673	ft/ft
Velocity		7.59	ft/s
Velocity Head		0.90	ft
Specific Energy		1.95	ft
Froude Number		1.95	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.05	ft
Critical Depth	1.32	ft
Channel Slope	0.02930	ft/ft
Critical Slope	0.00673	ft/ft

Cross Section for SECT 9F 100-YR REGENA AVENUE new

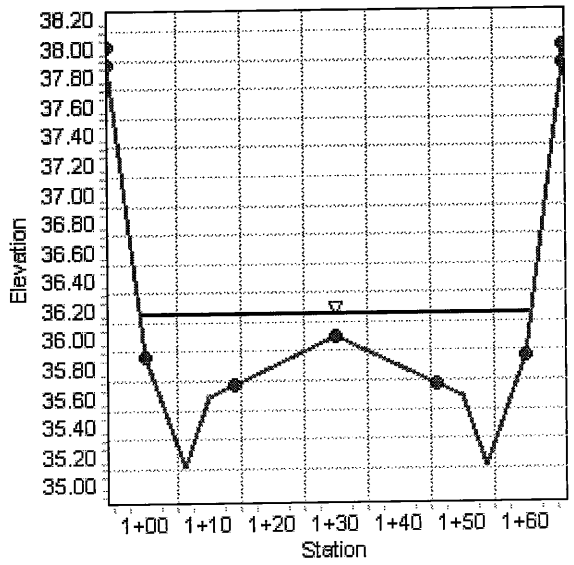
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.93000	%
Normal Depth	1.05	ft
Discharge	222.00	ft³/s

Cross Section Image



Worksheet for SECT 10 FLAT ROCK CREEK FLATTEST

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.29000	%
Discharge	6.00	ft³/s

ON 3 = 6 CFS

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	1.00
1+00.0	0.38
1+01.5	0.00
1+02.5	0.08
1+02.5	0.13
1+19.5	0.48
1+36.5	0.13
1+36.5	0.08
1+37.5	0.00
1+39.0	0.38
1+44.0	0.48
1+44.0	1.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 1.00)	(1+02.5, 0.13)	0.013
(1+02.5, 0.13)	(1+36.5, 0.13)	0.016
(1+36.5, 0.13)	(1+44.0, 1.00)	0.013

Results

Normal Depth	0.29	ft
Elevation Range	0.000 to 1.000 ft	
Flow Area	2.10	ft²
Wetted Perimeter	20.236	ft

Worksheet for SECT 10 FLAT ROCK CREEK FLATTEST

Results

Top Width		20.072	ft
Normal Depth		0.29	ft
Critical Depth		0.33	ft
Critical Slope		0.00507	ft/ft
Velocity		2.85	ft/s
Velocity Head		0.13	ft
Specific Energy		0.41	ft
Froude Number		1.55	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.33	ft
Channel Slope	0.01290	ft/ft
Critical Slope	0.00507	ft/ft

Cross Section for SECT 10 FLAT ROCK CREEK FLATTEST

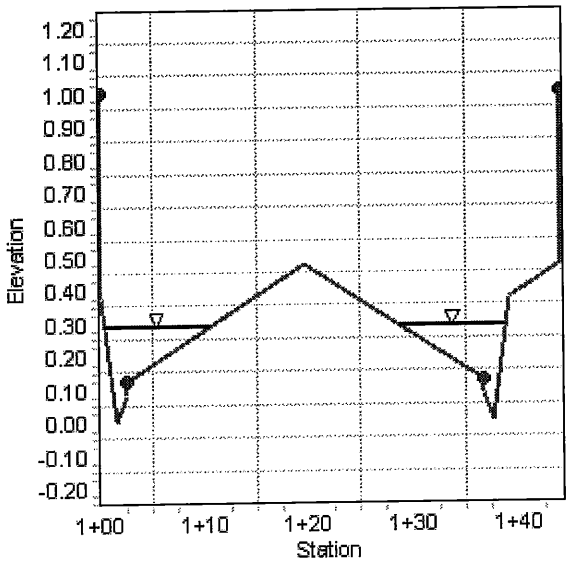
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.29000	%
Normal Depth	0.29	ft
Discharge	6.00	ft³/s

Cross Section Image



Worksheet for SECT 11 ROCKVILLE CREEK COURT

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.52000	%
Discharge	19.00	ft³/s

EXOF11 + ON4
V3 + 6

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	1.00
1+00.0	0.38
1+01.5	0.00
1+02.5	0.08
1+02.5	0.13
1+19.5	0.48
1+36.5	0.13
1+36.5	0.08
1+37.5	0.00
1+39.0	0.38
1+44.0	0.48
1+44.0	1.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 1.00)	(1+02.5, 0.13)	0.013
(1+02.5, 0.13)	(1+36.5, 0.13)	0.016
(1+36.5, 0.13)	(1+44.0, 1.00)	0.013

Results

Normal Depth	0.41	ft
Elevation Range	0.000 to 1.000 ft	
Flow Area	5.24	ft²
Wetted Perimeter	34.060	ft

Worksheet for SECT 11 ROCKVILLE CREEK COURT

Results

Top Width		33.839	ft
Normal Depth		0.41	ft
Critical Depth		0.47	ft
Critical Slope		0.00548	ft/ft
Velocity		3.62	ft/s
Velocity Head		0.20	ft
Specific Energy		0.61	ft
Froude Number		1.62	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.47	ft
Channel Slope	0.01520	ft/ft
Critical Slope	0.00548	ft/ft

Cross Section for SECT 11 ROCKVILLE CREEK COURT

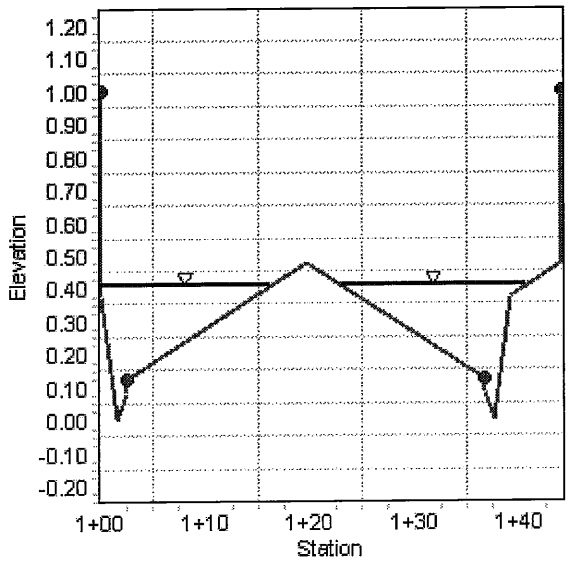
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.52000	%
Normal Depth	0.41	ft
Discharge	19.00	ft³/s

Cross Section Image



Worksheet for SECT 1F 10-YR CENT PKWY FUTURE-new

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.65000	%
Discharge	80.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	2.00
1+00.0	0.60
1+05.0	0.50
1+05.5	0.48
1+05.5	0.00
1+07.0	0.13
1+07.0	0.17
1+50.0	1.03
1+93.0	0.17
1+93.0	0.13
1+94.5	0.00
1+94.5	0.48
1+95.0	0.50
2+00.0	0.60
2+00.0	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 2.00)	(1+07.0, 0.17)	0.013
(1+07.0, 0.17)	(1+93.0, 0.17)	0.016
(1+93.0, 0.17)	(2+00.0, 2.00)	0.013

Results

Normal Depth	0.64	ft

Worksheet for SECT 1F 10-YR CENT PKWY FUTURE-new

Results

Elevation Range	0.000 to 2.000 ft		
Flow Area		13.80	ft²
Wetted Perimeter		62.159	ft
Top Width		61.018	ft
Normal Depth		0.64	ft
Critical Depth		0.80	ft
Critical Slope		0.00510	ft/ft
Velocity		5.80	ft/s
Velocity Head		0.52	ft
Specific Energy		1.16	ft
Froude Number		2.15	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.64	ft
Critical Depth	0.80	ft
Channel Slope	0.02650	ft/ft
Critical Slope	0.00510	ft/ft

Cross Section for SECT 1F 10-YR CENT PKWY FUTURE-new

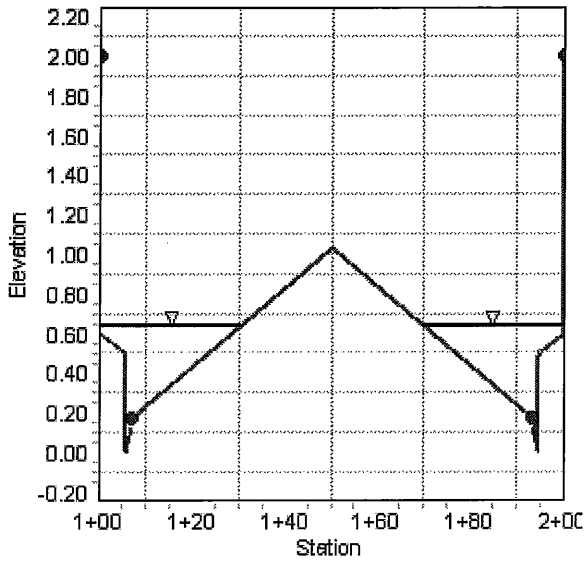
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.65000	%
Normal Depth	0.64	ft
Discharge	80.00	ft³/s

Cross Section Image



$\frac{1.03 - .64}{.02} = 19.5$

Dry Lane OK

Worksheet for SECT 3F 10-YR REGENA AVENUE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.70000	%
Discharge	153.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+97.0	49.00
1+06.0	47.67
1+10.0	48.17
1+14.0	48.25
1+30.0	48.57
1+46.0	48.25
1+50.0	48.17
1+54.0	47.67
1+60.0	48.10
1+66.0	48.53
1+66.0	50.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+97.0, 49.00)	(1+14.0, 48.25)	0.025
(1+14.0, 48.25)	(1+30.0, 48.57)	0.016
(1+30.0, 48.57)	(1+46.0, 48.25)	0.016
(1+46.0, 48.25)	(1+60.0, 48.10)	0.025
(1+60.0, 48.10)	(1+66.0, 50.00)	0.033

Results

Normal Depth	0.95	ft
Elevation Range	47.670 to 50.000 ft	
Flow Area	24.91	ft²

Worksheet for SECT 3F 10-YR REGENA AVENUE

Results

Wetted Perimeter		66.691	ft
Top Width		66.430	ft
Normal Depth		0.95	ft
Critical Depth		1.13	ft
Critical Slope		0.00766	ft/ft
Velocity		6.14	ft/s
Velocity Head		0.59	ft
Specific Energy		1.54	ft
Froude Number		1.77	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.95	ft
Critical Depth	1.13	ft
Channel Slope	0.02700	ft/ft
Critical Slope	0.00766	ft/ft

Cross Section for SECT 3F 10-YR REGENA AVENUE

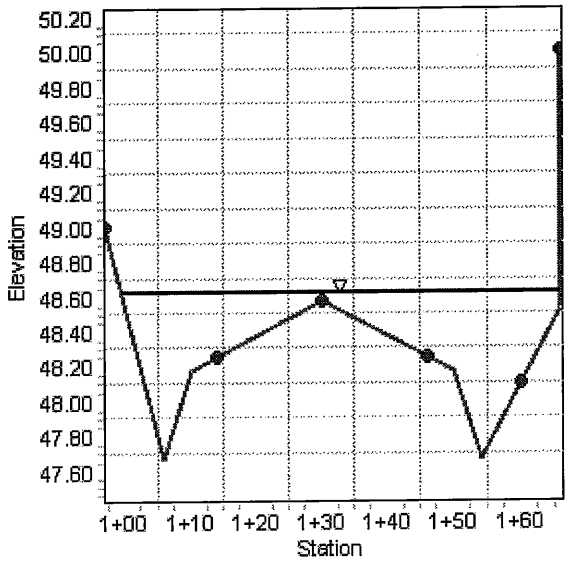
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.70000	%
Normal Depth	0.95	ft
Discharge	153.00	ft³/s

Cross Section Image



0.95 X 6.14
=5.83
OK

Worksheet for SECT 6F 10-YR AZURE DRIVE-NEW

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.46000	%
Discharge	19.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	0.67
1+06.0	0.00
1+10.0	0.67
1+14.0	0.75
1+30.0	1.07
1+46.0	0.75
1+50.0	0.67
1+54.0	0.00
1+60.0	0.67

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 0.67)	(1+14.0, 0.75)	0.025
(1+14.0, 0.75)	(1+30.0, 1.07)	0.016
(1+30.0, 1.07)	(1+46.0, 0.75)	0.016
(1+46.0, 0.75)	(1+60.0, 0.67)	0.025

Results

Normal Depth	0.53	ft
Elevation Range	0.000 to 1.070 ft	
Flow Area	4.19	ft²
Wetted Perimeter	15.961	ft
Top Width	15.814	ft
Normal Depth	0.53	ft

Worksheet for SECT 6F 10-YR AZURE DRIVE-NEW

Results

Critical Depth		0.63	ft
Critical Slope		0.01354	ft/ft
Velocity		4.54	ft/s
Velocity Head		0.32	ft
Specific Energy		0.85	ft
Froude Number		1.55	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.03460	ft/ft
Critical Slope	0.01354	ft/ft

Cross Section for SECT 6F 10-YR AZURE DRIVE-NEW

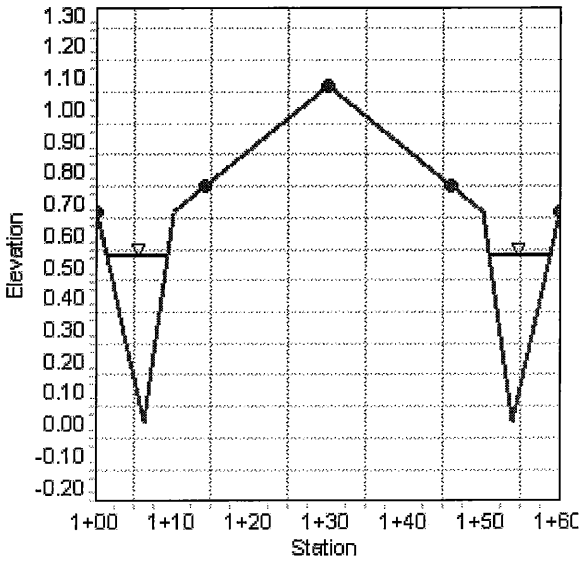
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.46000	%
Normal Depth	0.53	ft
Discharge	19.00	ft³/s

Cross Section Image



Worksheet for SECT I2 100-YR TEE PEE INTERIM

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.25000	%
Discharge	27.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00.0	2.06
1+03.0	2.00
1+09.0	0.00
1+13.0	0.50
1+17.0	0.58
1+33.0	0.90
1+49.0	0.58
1+53.0	0.50
1+57.0	0.00
1+63.0	2.00
1+69.0	2.12

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 2.06)	(1+17.0, 0.58)	0.025
(1+17.0, 0.58)	(1+33.0, 0.90)	0.016
(1+33.0, 0.90)	(1+49.0, 0.58)	0.016
(1+49.0, 0.58)	(1+69.0, 2.12)	0.025

Results

Normal Depth	0.75	ft
Elevation Range	0.000 to 2.120 ft	
Flow Area	8.71	ft²
Wetted Perimeter	37.531	ft

Worksheet for SECT I2 100-YR TEE PEE INTERIM

Results

Top Width		37.221	ft
Normal Depth		0.75	ft
Critical Depth		0.77	ft
Critical Slope		0.00969	ft/ft
Velocity		3.10	ft/s
Velocity Head		0.15	ft
Specific Energy		0.90	ft
Froude Number		1.13	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.75	ft
Critical Depth	0.77	ft
Channel Slope	0.01250	ft/ft
Critical Slope	0.00969	ft/ft

Cross Section for SECT I2 100-YR TEE PEE INTERIM

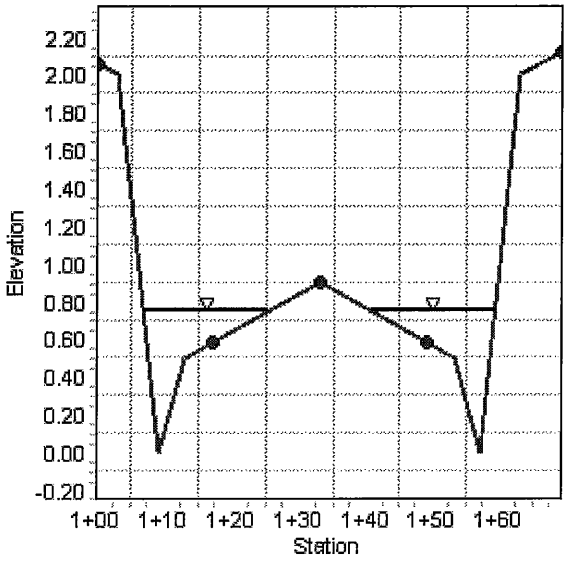
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.25000	%
Normal Depth	0.75	ft
Discharge	27.00	ft³/s

Cross Section Image



Worksheet for SECT I3 100-YR REGINA INTERIM

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.70000	%
Discharge	211.00	ft³/s

211 CFS = EXIST COND

Section Definitions

INTERIM SECTION

Station (ft)	Elevation (ft)
1+00.0	50.00
1+09.0	48.56
1+13.0	49.06
1+17.0	49.14
1+33.0	49.46
1+49.0	49.14
1+53.0	49.06
1+57.0	48.56
1+63.0	49.80

1.09 * 7.3 = 8.0

OK

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+00.0, 50.00)	(1+17.0, 49.14)	0.025
(1+17.0, 49.14)	(1+49.0, 49.14)	0.016
(1+49.0, 49.14)	(1+63.0, 49.80)	0.025

Results

Normal Depth	1.09	ft
Elevation Range	48.560 to 50.000 ft	
Flow Area	28.89	ft²
Wetted Perimeter	60.351	ft
Top Width	60.083	ft
Normal Depth	1.09	ft
Critical Depth	1.34	ft

Worksheet for SECT I3 100-YR REGINA INTERIM

Results

Critical Slope		0.00690	ft/ft
Velocity		7.30	ft/s
Velocity Head		0.83	ft
Specific Energy		1.92	ft
Froude Number		1.86	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.09	ft
Critical Depth	1.34	ft
Channel Slope	0.02700	ft/ft
Critical Slope	0.00690	ft/ft

Cross Section for SECT I3 100-YR REGINA INTERIM

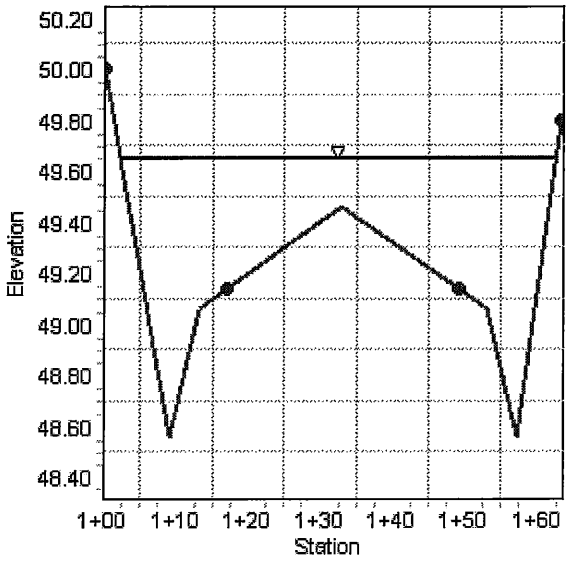
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.70000	%
Normal Depth	1.09	ft
Discharge	211.00	ft^3/s

Cross Section Image



Worksheet for SECT 12 CONCRETE LINED EASEMENT

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.57000	%
Discharge	1.50	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+10.0	1.50
0+14.5	0.00
0+14.5	0.67

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+10.0, 1.50)	(0+14.5, 0.67)	0.015

Results

Normal Depth		0.61	ft
Elevation Range	0.000 to 1.500 ft		
Flow Area		0.55	ft²
Wetted Perimeter		2.527	ft
Top Width		1.821	ft
Normal Depth		0.61	ft
Critical Depth		0.57	ft
Critical Slope		0.00769	ft/ft
Velocity		2.71	ft/s
Velocity Head		0.11	ft
Specific Energy		0.72	ft
Froude Number		0.87	
Flow Type	Subcritical		

Worksheet for SECT 12 CONCRETE LINED EASEMENT

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.61	ft
Critical Depth	0.57	ft
Channel Slope	0.00570	ft/ft
Critical Slope	0.00769	ft/ft

Cross Section for SECT 12 CONCRETE LINED EASEMENT

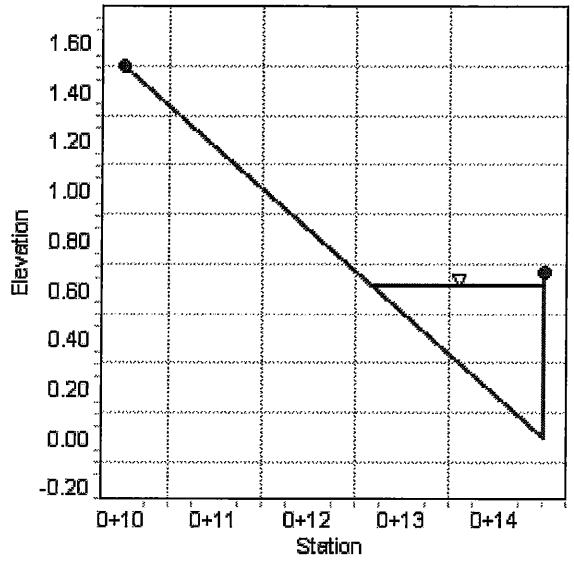
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.57000	%
Normal Depth	0.61	ft
Discharge	1.50	ft³/s

Cross Section Image



RCI Engineering
4325 Dean Martin Drive, Suite 300, Las Vegas, NV 89103
PH#702.453.0800 FAX#702.453.0801

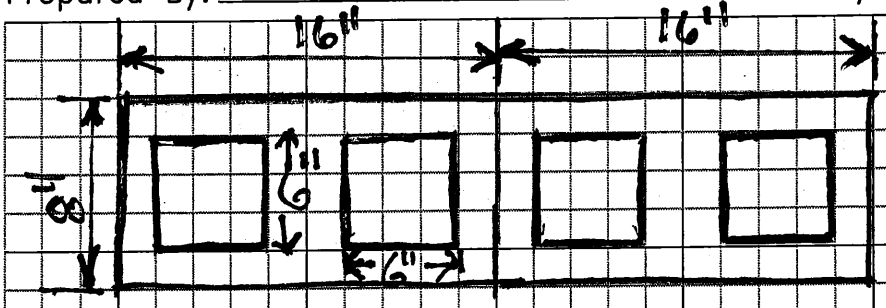
Sheet: 1 of 1

Date: 11/11/14

Project: CENTENNIAL AND TEE PEE Project No.:

Subject: WALL OPENING CALCS

Prepared By: Checked By:



4 OPENINGS $6" \times 6" = .25ft^2$ $= 1ft^2$

FOR 50% CLOGGING USE 1 BLOCK

$0.5ft^2$

L = 2'

Block Wall Opening for Lots 6-10

	WEIR		ORIFICE
Q100 =	0.25	Q100 =	0.25
L =	2.0	CLEAR AREA =	1.0
C =	3	C =	0.6
CLOGGING FACTOR	0.5	CLOGGING FACTOR	0.5

Opening	Inches	Courses
Length =	24	1.5
Height =	6	0.75

$H = (Q/CL)^{2/3}$	0.19	$H = (Q/CA)^2 / 64.4$	0.01

CONTROL = WEIR

Ponding Height = 0.19

APPENDIX C – REFERENCE MATERIALS

Technical Drainage Study for Centennial/Tee Pee, CVL Consultants, Inc., January 2007.

Hydrology Study For Centennial/Tee Pee, CivilTec Engineering, September 2007

Starrett and Fletcher Residence Grading Plan 1998

06-37189
1-16-07
SUPP #~
T-1 RIM
SUPP

Supplement #2
TECHNICAL DRAINAGE STUDY

FOR
CENTENNIAL/TEE PEE

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 09-12-0115001
JANUARY 11, 2007

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 23, 2007

LTR

06-37189

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/Tee Pee **(5346)**
Study Dated: August 16, 2006
Addendum Dated: November 28, 2006
Supplemental Dated: December 7, 2006
2nd Supplement Dated: January 11, 2007
Location: SEC of Centennial Parkway and Tee Pee Lane
S30, T19S, R60E
HTE# 06-37189

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 / Teepee," Sheets C-1, GP-1 thru GP-3, DT-1, DT-2, EX-1 and PP-1 thru PP-8 signed and sealed by Geoffrey G. Purse, P.E., on January 11, 2007;

2. The following drainage facilities shall be constructed:

   a. A 5-foot wide drainage easement to be privately maintained, located along the east side of lots 8 through 12, containing a 3-foot wide concrete valley gutter, as shown in section C/DT-1. The easement will have 48" x 16" block wall openings at all lot lines as shown in section AH/DT-2

   b. The above mentioned drainage easement conveys to a dry well (section AA/DT-2) at the southeast corner of lot 12, which outlets to Regena Avenue through a 2-foot wide sidewalk underdrain

   c. A 5-foot wide drainage easement to be privately maintained, located along the east and south sides of lot 14, containing a 3-foot wide concrete valley gutter and a 6" A-curb, as shown in section Q/DT-1, with a 48" x 16" block

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

wall opening at the boundary with lot 13, and conveying to a dry well (section AC/DT-2) at the south boundary of lot 14

d. A 5-foot wide drainage easement to be privately maintained, located along the west side of lot 14, containing a 3-foot wide concrete valley gutter, as shown in section L/DT-1, with a depressed curb at the entrance

e. A 5-foot wide drainage easement to be privately maintained, located along the south side of lot 15, containing a 3-foot wide concrete valley gutter, as shown in section M/DT-1, with 48" x 16" block wall openings (section AH/DT-2) at each end

f. A 5-foot wide drainage easement to be privately maintained, located along the east side of lots 18 through 21, containing a 3-foot wide concrete valley gutter, as shown in section P/DT-1, with 48" x 16" block wall openings at all lot lines as shown in section AH/DT-2

g. The above mentioned drainage easement 2f. conveys to a dry well (section AA/DT-2) at the southeast corner of lot 18, which outlets to Azure Drive through a 2-foot wide sidewalk underdrain

h. A 5-foot wide drainage easement to be privately maintained, located along the east side of lots 27 through 29, containing a 3-foot wide concrete valley gutter, as shown in section V/DT-1, with 48" x 16" block wall openings at all lot lines as shown in section AH/DT-2

i. The above mentioned drainage easement 2h. conveys to a dry well (section AA/DT-2) at the southeast corner of lot 27, which outlets to Bright Angel Way through a 2-foot wide sidewalk underdrain

j. A 20-foot wide to 15-foot wide concrete lined drainage easement to be privately maintained, located along the south of lot 33, with a 20-foot wide wrought iron gate at the entrance (section AE/DT-2), side walls solid grouted 3 courses (section AF/DT-2), and a depressed curb at the outlet

k. The perimeter block walls shall be solid grouted 3 courses along Centennial Parkway (sections A and B/DT-1), Teepee Lane (section D/DT-1 and N/DT-1), Regena Avenue (section J/DT-1, K/DT-1 and Z/DT-2), Azure Drive (sections S and T/DT-1), and along the west side of lots 32 through 35 (section U/DT-1)

l. An 8-foot wide concrete valley gutter at the following locations:

- Crossing Teepee Lane at Centennial Parkway
- Crossing Conlin Ct on the north side of Regena Avenue

- Crossing Conlin Ct on the south side of Regena Avenue
- Crossing Teepee Lane on the north side of Regena Avenue
- Crossing Teepee Lane on the south side of Regena Avenue
- Crossing Teepee Lane on the north side of Azure Drive
- Crossing Teepee Lane on the south side of Azure Drive
- Crossing Janna Falls Ct at Azure Drive
- Crossing Teepee Lane at Bright Angel Way
- Crossing Marva Jo Ct at Bright Angel Way

m. A 6-inch by 3-foot cutoff wall in Regina Avenue as shown in detail H/DT-1 and Z/DT-2

3. A bond estimate must be submitted to Clark County Civil Engineering Division for the above-mentioned storm water management facilities, except item 2(k);

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 plans;

6. The subject site is located within Zone X, as shown on FIRM Community Panel Number 32003C 1745E, 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. 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;

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

10. 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. The cross slopes for the valley gutter shown in Detail AG/DT-2 must be revised to correspond with the slope shown in AF/DT-2 (6.7%)

b. Section AF/DT-2 shows block wall on both sides of the easement between Lots 33 and 34. A wall opening must be provided for Lot 33 to drain into the easement or the lot drainage must be defined to the street

c. The manhole inlet must be show at the southeast corner of Lot 18

d. Construction Note 5 should be referenced at locations where Existing AC pavement is to be saw cut and matched

e. Construction Note 3 should be referenced at locations where 8-ft valley gutters are proposed

f. The Detail R/DT-1 should be revised to show solid grout similar to Detail S on this sheet

g. The match lines on Sheet PP-2 must be revised to reference Sheets PP-1 and PP-3

h. Show the cutoff wall in Regena Avenue on detail Z/DT-2

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

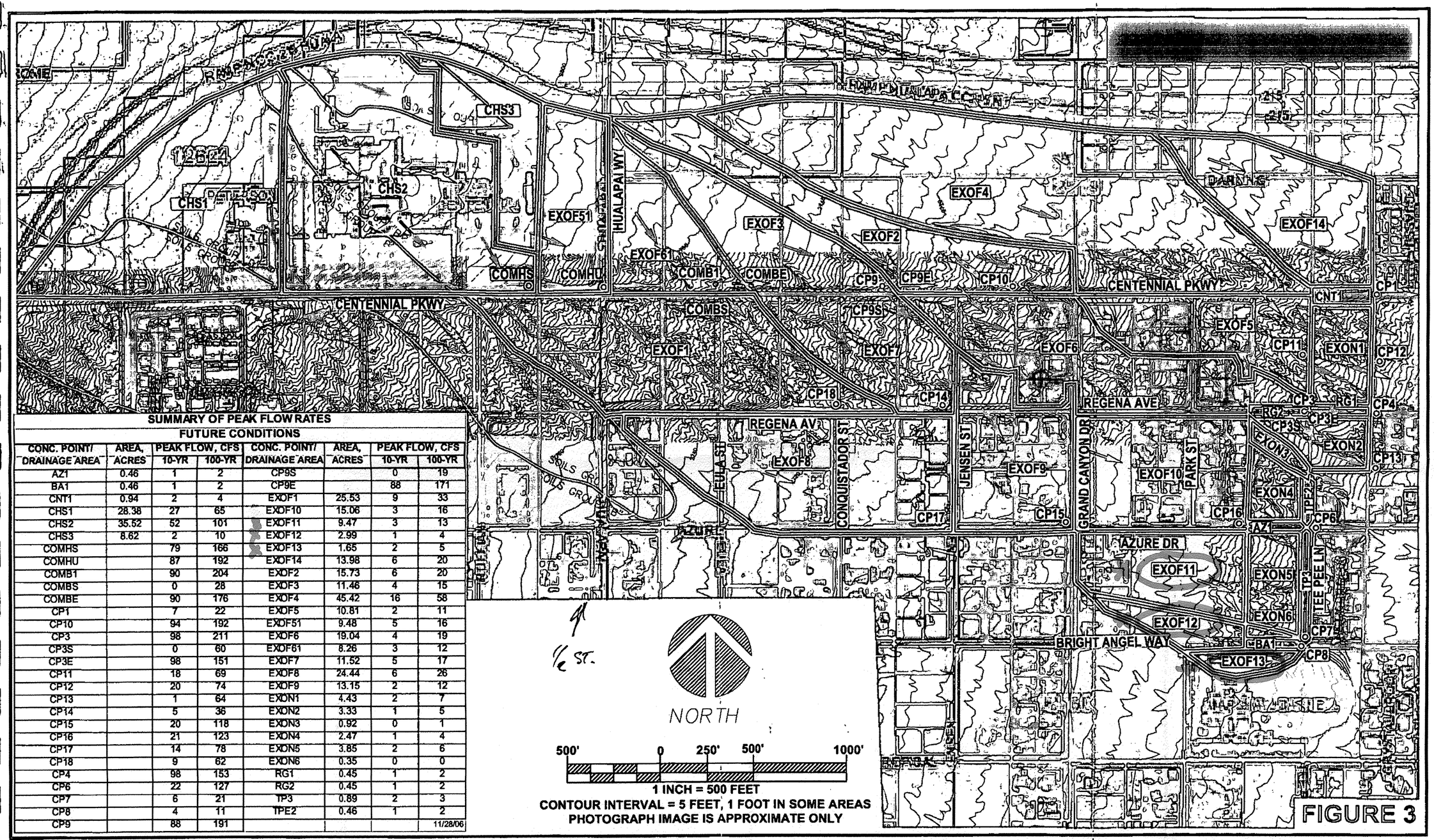
DEPARTMENT OF DEVELOPMENT SERVICES

BY: Glenn S. Hale

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

GH/rm

cc:
Development File



SUMMARY OF PEAK FLOW RATES
FUTURE CONDITIONS

CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	PEAK FLOW, CFS 100-YR	CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	PEAK FLOW, CFS 100-YR
AZ1	0.46	1	2	CP9S		0	19
BA1	0.46	1	2	CP9E		88	171
CNT1	0.94	2	4	EXOF1	25.53	9	33
CHS1	28.38	27	65	EXOF10	15.06	3	16
CHS2	35.52	52	101	EXOF11	9.47	3	13
CHS3	8.62	2	10	EXOF12	2.99	1	4
COMHS		79	166	EXOF13	1.65	2	5
COMHU		87	192	EXOF14	13.98	6	20
COMB1		90	204	EXOF2	15.73	6	20
COMBS		0	28	EXOF3	11.46	4	15
COMBE		90	176	EXOF4	45.42	16	58
CP1		7	22	EXOF5	10.81	2	11
CP10		94	192	EXOF51	9.48	5	16
CP3		98	211	EXOF6	19.04	4	19
CP3S		0	60	EXOF61	8.26	3	12
CP3E		98	151	EXOF7	11.52	5	17
CP11		18	69	EXOF8	24.44	6	26
CP12		20	74	EXOF9	13.15	2	12
CP13		1	64	EXON1	4.43	2	7
CP14		5	36	EXON2	3.33	1	5
CP15		20	118	EXON3	0.92	0	1
CP16		21	123	EXON4	2.47	1	4
CP17		14	78	EXON5	3.85	2	6
CP18		9	62	EXON6	0.35	0	0
CP4		98	153	RG1	0.45	1	2
CP6		22	127	RG2	0.45	1	2
CP7		6	21	TP3	0.89	2	3
CP8		4	11	TPE2	0.46	1	2
CP9		88	191				11/28/06

1 INCH = 500 FEET
CONTOUR INTERVAL = 5 FEET, 1 FOOT IN SOME AREAS
PHOTOGRAPH IMAGE IS APPROXIMATE ONLY

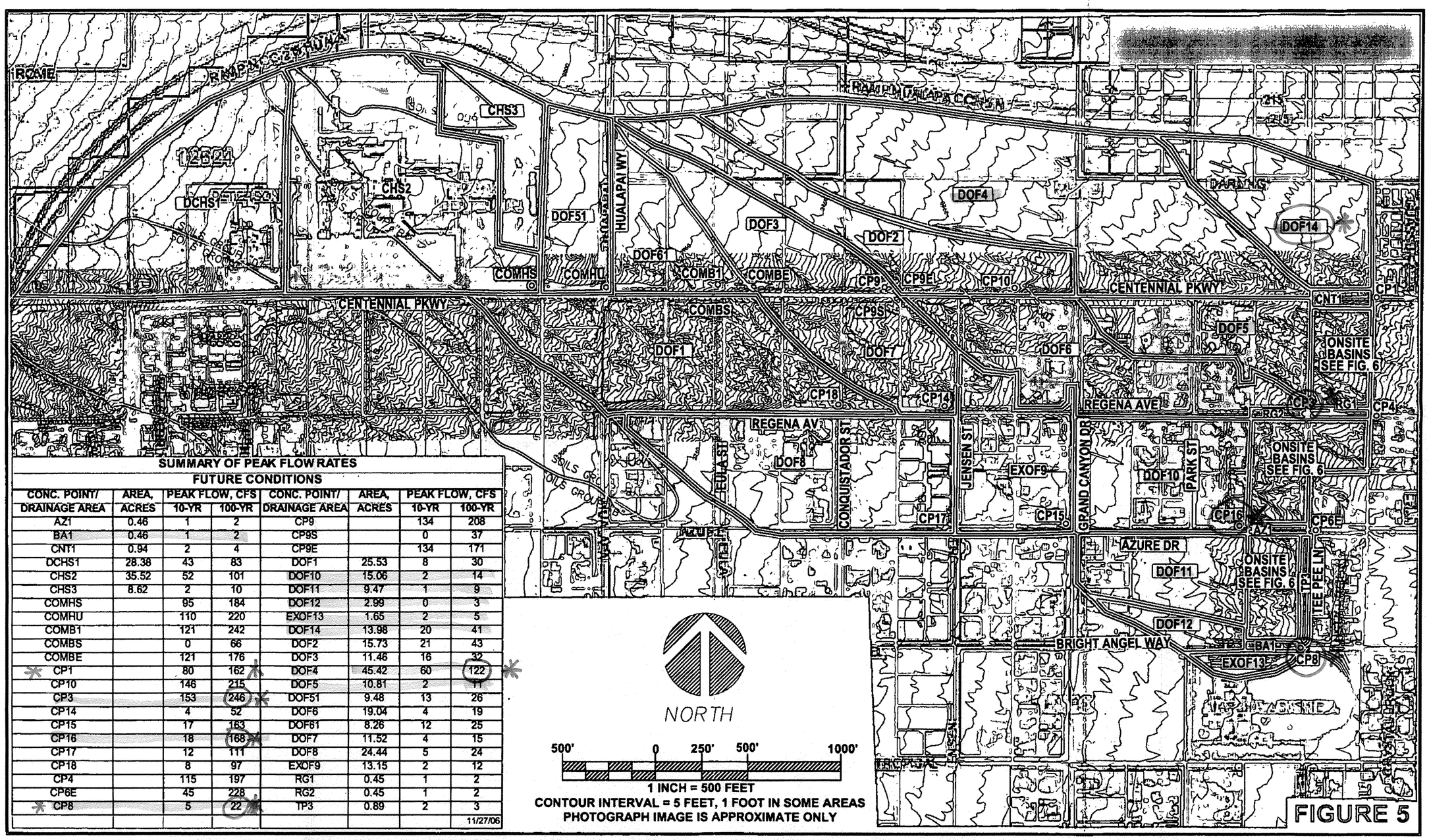
FIGURE 3

Centennial / Tee Pee Residential Development

EXISTING CONDITIONS DRAINAGE BASINS

CVL CONSULTANTS, INC.

* WORST CASE STORM FLOWS



SUMMARY OF PEAK FLOW RATES

FUTURE CONDITIONS

CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	PEAK FLOW, CFS 100-YR	CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	PEAK FLOW, CFS 100-YR
AZ1	0.46	1	2	CP9		134	208
BA1	0.46	1	2	CP9S		0	37
CNT1	0.94	2	4	CP9E		134	171
DCHS1	28.38	43	83	DOF1	25.53	8	30
CHS2	35.52	52	101	DOF10	15.06	2	14
CHS3	8.62	2	10	DOF11	9.47	1	9
COMHS		95	184	DOF12	2.99	0	3
COMHU		110	220	EXOF13	1.65	2	5
COMB1		121	242	DOF14	13.98	20	41
COMBS		0	66	DOF2	15.73	21	43
COMBE		121	176	DOF3	11.46	16	32
* CP1		80	162 *	DOF4	45.42	60	122 *
CP10		146	215	DOF5	10.81	2	11
CP3		153	246 *	DOF51	9.48	13	26
CP14		4	52	DOF6	19.04	4	19
CP15		17	163	DOF61	8.26	12	25
CP16		18	168 *	DOF7	11.52	4	15
CP17		12	111	DOF8	24.44	5	24
CP18		8	97	EXOF9	13.15	2	12
CP4		115	197	RG1	0.45	1	2
CP6E		45	228	RG2	0.45	1	2
* CP8		5	22 *	TP3	0.89	2	3
							11/27/06

FIGURE 5

Centennial / Tee Pee Residential Development

FUTURE CONDITIONS DRAINAGE BASINS

CONSULTANTS, INC.

* WORST CASE STORM FLOWS

FUTURE MODEL

```
1**********. .*****************************
*                                          *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)      *
*             JUN  1998                    *
*           VERSION 4.1                    *
*                                          *
*  RUN DATE   27NOV06  TIME  20:10:08      *
*                                          *
********************************************
```


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


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

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

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

1 HEC-1 INPUT PAGE 1

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
          *DIAGRAM
    1     ID
    2     ID    FUTURE CONDITIONS MODEL
    3     ID    TECHNICAL DRAINAGE STUDY FOR CENTENNIAL TEE PEE
    4     ID    MOMENTUM ENGINEERS - - B BROWN
    5     ID
    6     ID
    7     ID    6-HOUR STORM DISTRIBUTION #3
    8     ID    10- AND 100-YEAR STORM EVENTS
    9     ID
   10     ID    NO RAINFALL REDUCTION FOR DEPTH-AREA
   11     ID
   12     ID
   13     ID
   14     IT       5       0       0     300
   15     IO       5       0       0
   16     IN       5       0       0
   17     JR    PREC    0.58       1

   18     KK   DCH61
   19     BA   .0443
   20     PB    3.00
   21     KM              SDN #3
   22     PC   0.000   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
   23     PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
   24     PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
   25     PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   26     PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   27     PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
   28     PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
   29     PC   0.998   0.999   1.000
```

FUTURE

```
     _J        LS      0      94
     31        UD   0.117
               *

     32        KK    CB82
     33        BA   .0555
     34        LS      0      94
     35        UD   0.154
               *

     36        KK    COMH8
     37        HC        2
               *

     38        KK    CH83
     39        BA   .0135
     40        LS      0      74
     41        UD   0.170
               *
```



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

     42        KK   DOF51
     43        BA   .0148
     44        LS      0      92
     45        UD   0.118
               *

     46        KK   COMHU
     47        HC        3
               *

     48        KK   DOF61
     49        BA   .0129
     50        LS      0      92
     51        UD   0.095
               *

     52        KK   COMB1
     53        HC        2
               *

     54        KK   COMBE
     55        KM         DIVERTED FLOW (COMB8) CROSSES THE CROWN & FLOWS SOUTHERLY,
     56        KM         REMAINDER FLOWS EASTWARD IN CENTENNIAL
     57        DT   COMB8
     58        DI        0     176     208
     59        DQ        0       0      32
               *

     60        KK   RCP9E
     61        KM         ROUTE COMBE TO CP9
     62        RK      800  .0280    .020       0    TRAP     50       0
               *

     63        KK    DOF3
     64        BA   .0179
     65        LS      0      92
     66        UD   0.124
               *

     67        KK     CP9
     68        RC        2
               *

     69        KK   CP9E
     70        KM         DIVERTED FLOW (CP98) FLOWS SOUTHERLY ACROSS CENTENNIAL CROWN
```

```
                KM          REMAINDER FLOWS EASTWARD IN CENTENNIAL
                KM          BASED ON CAPACITY CALC OF CENTENNIAL CROWN AT CPy = 171 CFS
                DI    CP9S
                DI      0     171     172     300
                DQ      0       0       1     128
                *
1                                          HEC-1 INPUT                                          PAGE  3

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

                KK   RCP9E
                KM   '          ROUTE CP9E TO CP10
                RK    990   .0310    .020       0    TRAP     50       0
                *
                KK    DOF2
                BA   .0246
                LS      0      92
                UD   0.137
                *
                KK    CP10
                HC       2
                *
                KK    DOF6
                BA   .0298
                LS      0      72
                UD   0.185
                *
                KK     RG2
                BA   .0007
                LS      0      98
                UD   0.050
                *
                KK     CPR
                HC       3
                *
                KK    DOF5
                BA   .0169
                LS      0      72
                UD   0.161
                *
                KK     YP1
                BA   .0013
                LS      0      98
                UD   0.050
                *
                KK     CP2
                HC       2
                *
                KK     CP3
                HC       2
                *
1                                          HEC-1 INPUT                                          PAGE  4

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

                KK    CP3E
                KM          DIVERTED FLOW (CP3S) FLOWS SOUTHERLY INTO THE FEE LANE
                KM          REMAINDER FLOWS EASTWARD IN REGENA
```

```
110        KM          BASED ON WEIR FLOW SPLIT CALCULATIONS
111        DT    CP36
112        DI       0     153     246
113        DQ       0      40      55
           *

114        KK    DCN1
115        BA   .0047
116        LS       0      75
117        UD   0.139
           *

118        KK    DCN2
119        BA   .0015
120        LS       0      75
121        UD   0.113
           *

122        KK     RG1
123        BA   .0007
124        LS       0      98
125        UD   0.050
           *

126        KK     CP4
127        HC       4
           *

128        KK   COMBS
129        KM          RECALL FLOW CROSSING CENTENNIAL
130        DR   COMBS
           *

131        KK    DOF1
132        BA   .0399
133        LS       0      75
134        UD   0.178
           *

135        KK    CP18
136        HC       2
           *

137        KK   RCP18
138        KM          ROUTE CP18 TO CP17
139        RK     990   .0320    .020       0    TRAP      50       0
           *
```



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

140        KK    DOF8
141        BA   .0382
142        LS       0      72
143        UD   0.175
           *

144        KK    CP17
145        HC       2
           *

146        KK   RCP17
147        KM          ROUTE CP17 TO CP15
148        RK     660   .0320    .020       0    TRAP      50       0
           *

149        KK    CP98
150        KM          RECALL FLOW CROSSING CENTENNIAL
```

```
                DR   CP98
                *
152             KK   DOF7
153             BA  .0180
154             LS     0      75
155             UD  0.141
                *
156             KK   CP14
157             HC      2
                *
158             KK   RCP14
159             KM           ROUTE CP14 TO CP15
160             RK    1000  .0320    .020       0    TRAP     50       0
                *
161             KK   KKOF9
162             BA  .0205
163             LS      0      70
164             UD  0.166
                *
165             KK    CP15
166             HC       3
                *
167             KK   RCP15
168             KM           ROUTE CP15 TO CP16
169             RK     990  .0310    .020       0    TRAP     50       0
                *
1                                        HEC-1 INPUT                                                    PAGE  6

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

170             KK   DOF10
171             BA   .0235
172             LS      0      70
173             UD   0.152
                *
174             KK    CP16
175             HC       2
                *
176             KK    DON6
177             BA   .0047
178             LS      0      75
179             UD   0.138
                *
180             KK    DON5
181             BA   .0018
182             LS      0      75
183             UD   0.116
                *
184             KK     AZ1
185             BA   .0007
186             LS      0      98
187             UD   0.050
                *
188             KK     CP6
189             HC       4
                *
```

```
190          KK    CP38
191          KM          RECALL FLOW SPLITTING 8 FROM REGENA
192          DR    CP38
             *

193          KK     TD2
194          BA   .0014
195          LS       0      98
196          UD   0.050
             *

197          KK    CP6N
198          EC       2
             *

199          KK    CP6E
200          EC       2
             *
```



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

201          KK   DOF11
202          BA   .0148
203          LS       0      70
204          UD   0.146
             *

205          KK    DON7
206          BA   .0050
207          LS       0      75
208          UD   0.136
             *

209          KK     CP5
210          EC       2
             *

211          KK   DOF12
212          BA   .0047
213          LS       0      70
214          UD   0.143
             *

215          KK  EXDF13
216          BA   .0026
217          LS       0      88
218          UD   0.076
             *

219          KK    DON8
220          BA   .0015
221          LS       0      75
222          UD   0.118
             *

223          KK     BA1
224          BA   .0007
225          LS       0      98
226          UD   0.050
             *

227          KK     CP8
228          EC       5
             *

229          KK   DUMMY
230          KM          DUMMY CONCENTRATION POINT FOR ERROR CONTROL ONLY
```

```
                HC      3
                *
1                                        HEC-1 INPUT                                        PAGE  8

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

  232           KK    DOF4
  233           BA   .0710
  234           LS      0       92
  235           UD   0.154
                *

  236           KK   DOF14
  237           BA   .0218
  238           LS      0       92
  239           UD   0.101
                *

  240           KK    CNT1
  241           BA   .0015
  242           LS      0       98
  243           UD   0.050
                *

  244           KK     CP1
  245           HC       3
                *

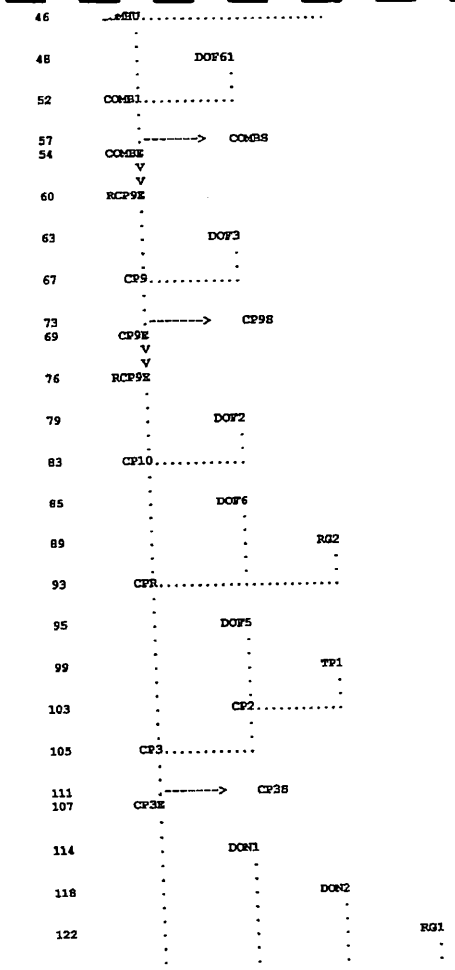
  246           KK     TP3
  247           BA   .0014
  248           LS      0       98
  249           UD   0.068
                *

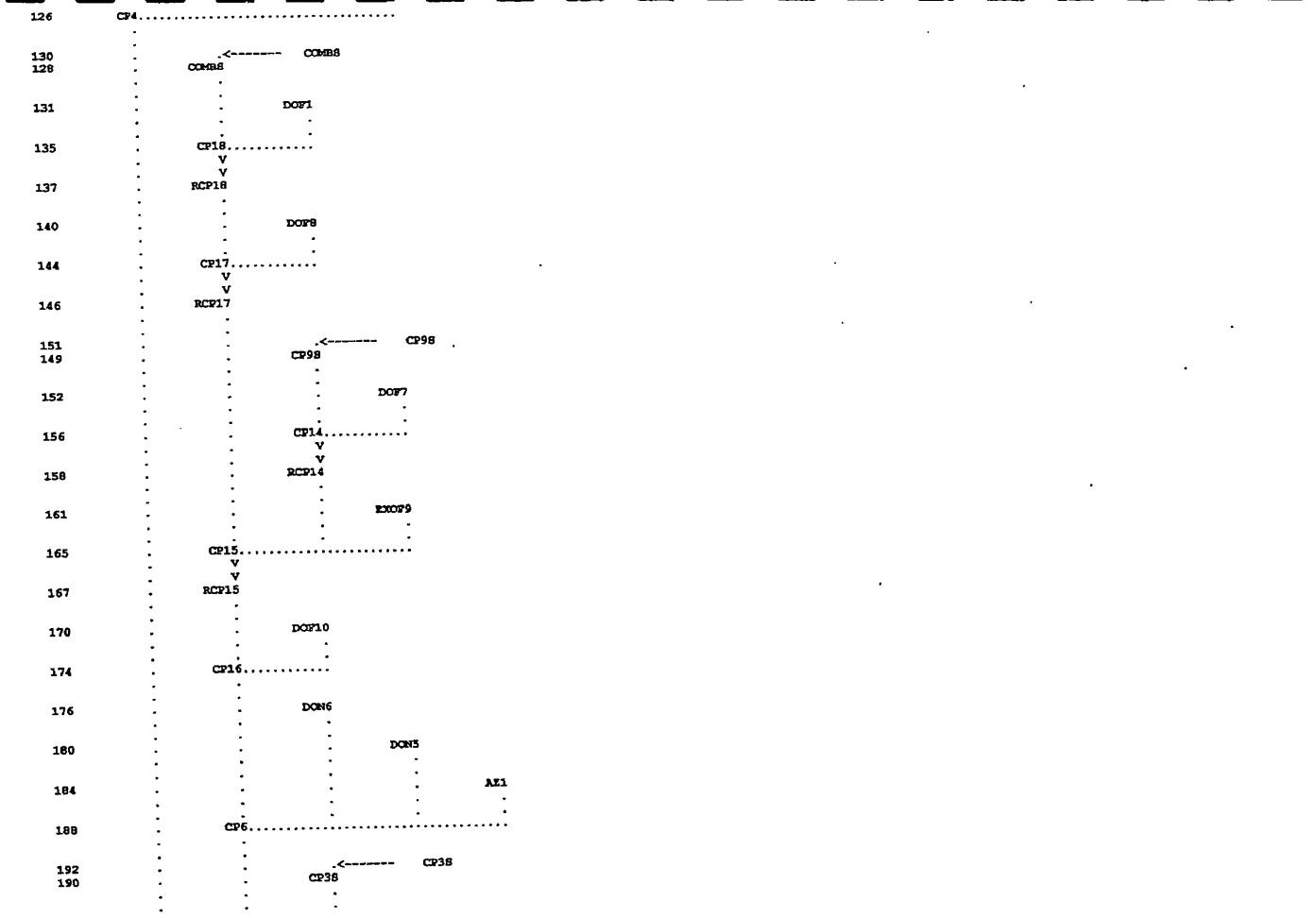
  250           KK    DON3
  251           BA   .0025
  252           LS      0       75
  253           UD   0.124
                *

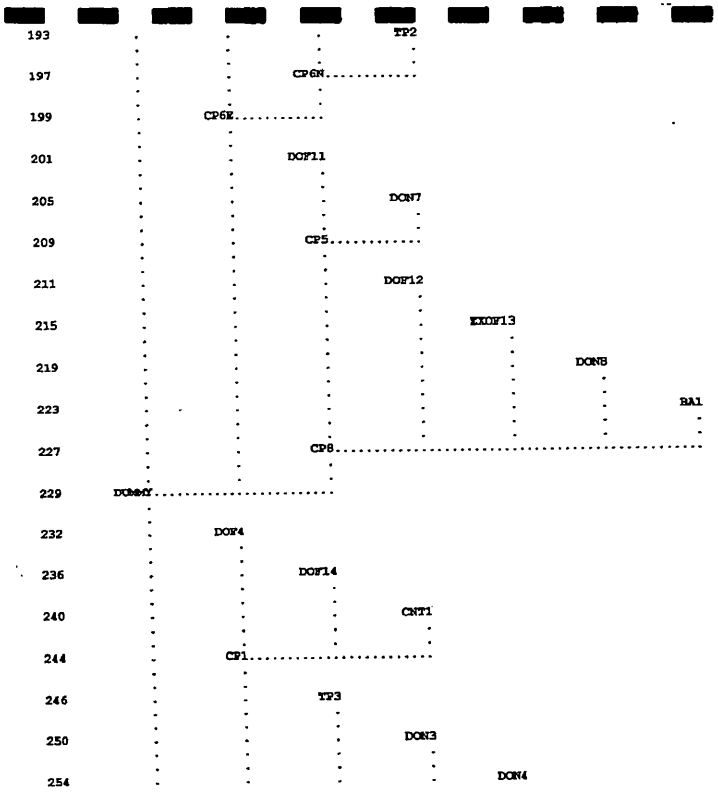
  254           KK    DON4
  255           BA   .0005
  256           LS      0       75
  257           UD   0.094
                *
  258           ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT
 LINE      (V) ROUTING           (--->) DIVERSION OR PUMP FLOW
                                   .
  NO.      (.) CONNECTOR         (<---) RETURN OF DIVERTED OR PUMPED FLOW

   18       DCH81
                .
                .
   32           .          CH82
                .            .
                .            .
   36       COMH8.............
                .
                .
   38           .          CH83
                .            .
                .            .
   42           .            .        DOF51
                .            .          .
                .            .          .
```


46
48
52
57
54
60
63
67
73
69
76
79
83
85
89
93
95
99
103
105
111
107
114
118
122
DOF61
COMB1
COMBS
COMBE
RCP9E
DOF3
CP9
CP9S
CP9E
RCP9E
DOF2
CP10
DOF6
RG2
CPR
DOF5
TP1
CP2
CP3
CP3S
CP3E
DON1
DON2
RG1


126
CP4
130
128
COMB8
131
DOF1
135
CP18
137
RCP18
140
DOF8
144
CP17
146
RCP17
151
149
CP9S
152
DOF7
156
CP14
158
RCP14
161
EXOF9
165
CP15
167
RCP15
170
DOF10
174
CP16
176
DON6
180
DON5
184
AE1
188
CP6
192
190
CP3S



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1**************************************
*                                    *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1) *
*            JUN  1998               *
*          VERSION 4.1               *
*                                    *
* RUN DATE  27NOV06  TIME  20:10:08  *
*                                    *
**************************************
```

```
**************************************
*                                    *
*  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 CENTENNIAL TEE PEE
MOMENTUM ENGINEERS - - B BROWN

6-HOUR STORM DISTRIBUTION #3
10- AND 100-YEAR STORM EVENTS

NO RAINFALL REDUCTION FOR DEPTH-AREA

15 IO OUTPUT CONTROL VARIABLES

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

IT HYDROGRAPH TIME DATA

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

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

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

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
.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 .58	RATIO 2 1.00
HYDROGRAPH AT	DCHS1	.04	1	FLOW	43.	83.
+				TIME	3.58	3.50
HYDROGRAPH AT	CHS2	.06	1	FLOW	52.	101.
+				TIME	3.58	3.58
2 COMBINED AT	COMHS	.10	1	FLOW	95.	184.
+						

				TIME	3.58	3.58
HYDROGRAPH AT +	CHS3	.01	1	FLOW TIME	2. 3.67	10. 3.58
HYDROGRAPH AT +	DOF51	.01	1	FLOW TIME	13. 3.58	26. 3.58
3 COMBINED AT +	COMBU	.13	1	FLOW TIME	110. 3.58	220. 3.58
HYDROGRAPH AT +	DOF61	.01	1	FLOW TIME	12. 3.50	25. 3.50
2 COMBINED AT +	COMB1	.14	1	FLOW TIME	121. 3.58	242. 3.58
DIVERSION TO +	COMBS	.14	1	FLOW TIME	0. .00	66. 3.58
HYDROGRAPH AT +	COMBE	.14	1	FLOW TIME	121. 3.58	176. 3.42
ROUTED TO +	RCP9E	.14	1	FLOW TIME	118. 3.58	176. 3.50
HYDROGRAPH AT +	DOF3	.02	1	FLOW TIME	16. 3.58	32. 3.58
2 COMBINED AT +	CP9	.16	1	FLOW TIME	134. 3.58	208. 3.58
DIVERSION TO +	CP9S	.16	1	FLOW TIME	0. .00	37. 3.58
HYDROGRAPH AT +	CP9E	.16	1	FLOW TIME	134. 3.58	171. 3.58
ROUTED TO +	RCP9E	.16	1	FLOW TIME	126. 3.67	171. 3.58
HYDROGRAPH AT +	DOF2	.02	1	FLOW TIME	21. 3.58	43. 3.58
2 COMBINED AT +	CP10	.18	1	FLOW TIME	146. 3.58	215. 3.58
HYDROGRAPH AT +	DOF6	.03	1	FLOW TIME	4. 3.75	19. 3.67
HYDROGRAPH AT +	RG2	.00	1	FLOW TIME	1. 3.50	2. 3.50

+ 3 COMBINED AT	CPR	.21	1	FLOW	150.	234.
				TIME	3.58	3.58
+ HYDROGRAPH AT	DOP5	.02	1	FLOW	2.	11.
				TIME	3.67	3.67
+ HYDROGRAPH AT	TP1	.00	1	FLOW	2.	3.
				TIME	3.50	3.50
+ 2 COMBINED AT	CP2	.02	1	FLOW	3.	12.
				TIME	3.67	3.58
+ 2 COMBINED AT	CP3	.23	1	FLOW	153.	246.
				TIME	3.58	3.58
+ DIVERSION TO	CP3S	.23	1	FLOW	40.	55.
				TIME	3.58	3.58
+ HYDROGRAPH AT	CP3E	.23	1	FLOW	113.	191.
				TIME	3.58	3.58
+ HYDROGRAPH AT	DON1	.00	1	FLOW	1.	4.
				TIME	3.58	3.58
+ HYDROGRAPH AT	DON2	.00	1	FLOW	0.	1.
				TIME	3.58	3.58
+ HYDROGRAPH AT	RG1	.00	1	FLOW	1.	2.
				TIME	3.50	3.50
+ 4 COMBINED AT	CP4	.24	1	FLOW	115.	197.
				TIME	3.58	3.58
+ HYDROGRAPH AT	COMB8	.00	1	FLOW	0.	66.
				TIME	.00	3.58
+ HYDROGRAPH AT	DOF1	.04	1	FLOW	8.	30.
				TIME	3.67	3.58
+ 2 COMBINED AT	CP18	.04	1	FLOW	8.	97.
				TIME	3.67	3.58
+ ROUTED TO	RCP18	.04	1	FLOW	7.	87.
				TIME	3.83	3.58
+ HYDROGRAPH AT	DOF8	.04	1	FLOW	5.	24.
				TIME	3.67	3.58
+ 2 COMBINED AT	CP17	.08	1	FLOW	12.	111.
				TIME	3.75	3.58

ROUTED TO						
+	RCP17	.08	1	FLOW	12.	103.
				TIME	3.83	3.67
HYDROGRAPH AT						
+	CP98	.00	1	FLOW	0.	37.
				TIME	.00	3.58
HYDROGRAPH AT						
+	DOF7	.02	1	FLOW	4.	15.
				TIME	3.58	3.58
2 COMBINED AT						
+	CP14	.02	1	FLOW	4.	52.
				TIME	3.58	3.58
ROUTED TO						
+	RCP14	.02	1	FLOW	4.	49.
				TIME	3.83	3.67
HYDROGRAPH AT						
+	EXOF9	.02	1	FLOW	2.	12.
				TIME	3.75	3.58
3 COMBINED AT						
+	CP15	.12	1	FLOW	17.	163.
				TIME	3.83	3.67
ROUTED TO						
+	RCP15	.12	1	FLOW	16.	155.
				TIME	3.92	3.67
HYDROGRAPH AT						
+	DOF10	.02	1	FLOW	2.	14.
				TIME	3.67	3.58
2 COMBINED AT						
+	CP16	.14	1	FLOW	18.	168.
				TIME	3.92	3.67
HYDROGRAPH AT						
+	DON6	.00	1	FLOW	1.	4.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	DON5	.00	1	FLOW	0.	2.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	AE1	.00	1	FLOW	1.	2.
				TIME	3.50	3.50
4 COMBINED AT						
+	CP6	.15	1	FLOW	18.	173.
				TIME	3.92	3.67
HYDROGRAPH AT						
+	CP38	.00	1	FLOW	40.	55.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	TP2	.00	1	FLOW	2.	4.
				TIME	3.50	3.50
2 COMBINED AT						
+	CP6N	.00	1	FLOW	41.	57.
				TIME	3.58	3.50
2 COMBINED AT						

+	CP6E	.15	1	FLOW	45.	228.
				TIME	3.58	3.67
HYDROGRAPH AT						
+	DOF11	.01	1	FLOW	1.	9.
				TIME	3.67	3.58
HYDROGRAPH AT						
+	DON7	.00	1	FLOW	1.	4.
				TIME	3.58	3.58
2 COMBINED AT						
+	CP5	.02	1	FLOW	2.	13.
				TIME	3.67	3.58
HYDROGRAPH AT						
+	DOF12	.00	1	FLOW	0.	3.
				TIME	3.67	3.58
HYDROGRAPH AT						
+	EXDF13	.00	1	FLOW	2.	5.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	DON8	.00	1	FLOW	0.	1.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	BA1	.00	1	FLOW	1.	2.
				TIME	3.50	3.50
5 COMBINED AT						
+	CP8	.03	1	FLOW	5.	22.
				TIME	3.58	3.58
3 COMBINED AT						
+	DUMMY	.42	1	FLOW	165.	435.
				TIME	3.58	3.67
HYDROGRAPH AT						
+	DOF4	.07	1	FLOW	60.	122.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	DOF14	.02	1	FLOW	20.	41.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	CNT1	.00	1	FLOW	2.	4.
				TIME	3.50	3.50
3 COMBINED AT						
+	CP1	.09	1	FLOW	80.	162.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	TP3	.00	1	FLOW	2.	3.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	DON3	.00	1	FLOW	1.	2.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	DON4	.00	1	FLOW	0.	0.
				TIME	3.58	3.50

1

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

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	IN. POLATED TO COMPUTATION PEAK	INTERVAL TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .58									
RCP9E	MANE	1.20	119.75	216.78	1.04	5.00	118.23	215.00	1.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7806E+01 EXCESS= .0000E+00 OUTFLOW= .7839E+01 BASIN STORAGE= .7039E-04 PERCENT ERROR= -.4

FOR PLAN = 1 RATIO= 1.00									
RCP9E	MANE	.99	176.00	207.40	2.05	5.00	176.00	210.00	2.05

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1541E+02 EXCESS= .0000E+00 OUTFLOW= .1544E+02 BASIN STORAGE= .6924E-04 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .58									
RCP9E	MANE	1.25	133.27	217.38	1.04	5.00	126.22	220.00	1.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8792E+01 EXCESS= .0000E+00 OUTFLOW= .8825E+01 BASIN STORAGE= .2488E-03 PERCENT ERROR= -.4

FOR PLAN = 1 RATIO= 1.00									
RCP9E	MANE	1.17	171.28	216.08	1.98	5.00	171.28	215.00	1.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1675E+02 EXCESS= .0000E+00 OUTFLOW= .1678E+02 BASIN STORAGE= .2460E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .58									
RCP18	MANE	3.90	7.39	226.95	.27	5.00	7.24	230.00	.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5563E+00 EXCESS= .0000E+00 OUTFLOW= .5752E+00 BASIN STORAGE= .1174E-03 PERCENT ERROR= -3.4

FOR PLAN = 1 RATIO= 1.00									
RCP18	MANE	1.48	93.45	217.34	1.41	5.00	86.75	215.00	1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2987E+01 EXCESS= .0000E+00 OUTFLOW= .2995E+01 BASIN STORAGE= .1018E-03 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .58									
RCP17	MANE	2.25	11.76	229.50	.23	5.00	11.72	230.00	.23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9614E+00 EXCESS= .0000E+00 OUTFLOW= .9629E+00 BASIN STORAGE= .1693E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= 1.00									
RCP17	MANE	.85	110.51	216.90	1.10	5.00	102.64	220.00	1.11

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4588E+01 EXCESS= .0000E+00 OUTFLOW= .4596E+01 BASIN STORAGE= .1712E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .58									
RCP14	MANE	3.15	3.67	227.58	.27	5.00	3.59	230.00	.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2510E+00 EXCESS= .0000E+00 OUTFLOW= .2636E+00 BASIN STORAGE= .1150E-03 PERCENT ERROR= -5.1

FOR PLAN = 1 RATIO= 1.00

RCP14	MANE	1.82	51.15	218.91	1.78	5.00	49.14	220.00	1.77

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1686E+01 EXCESS= .0000E+00 OUTFLOW= .1707E+01 BASIN STORAGE= .1007E-03 PERCENT ERROR= -1.3

FOR PLAN = 1 RATIO= .58

RCP15	MANE	2.78	16.46	237.77	.22	5.00	16.14	235.00	.23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1388E+01 EXCESS= .0000E+00 OUTFLOW= .1394E+01 BASIN STORAGE= .4341E-03 PERCENT ERROR= -.5

FOR PLAN = 1 RATIO= 1.00

RCP15	MANE	1.12	160.69	221.59	1.14	5.00	154.61	220.00	1.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7083E+01 EXCESS= .0000E+00 OUTFLOW= .7092E+01 BASIN STORAGE= .4882E-03 PERCENT ERROR= -.1

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

EXIST CONDITIONS

```
1*****************************************
*                                       *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *
*            JUN  1998                  *
*          VERSION 4.1                  *
*                                       *
* RUN DATE   27NOV06  TIME  11:09:51    *
*                                       *
*****************************************
```

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

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

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

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

1 HEC-1 INPUT PAGE 1

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
              *DIAGRAM
    1         ID
    2         ID   EXISTING CONDITIONS MODEL
    3         ID   TECHNICAL DRAINAGE STUDY FOR CENTENNIAL TEE PEE
    4         ID   MOMENTUM ENGINEERS - - B BROWN
    5         ID
    6         ID
    7         ID   6-HOUR STORM DISTRIBUTION #3
    8         ID   10- AND 100-YEAR STORM EVENTS
    9         ID
   10         ID   NO RAINFALL REDUCTION FOR DEPTH-AREA
   11         ID
   12         ID
   13         ID
   14         IT     5       0       0     300
   15         IO     5       0       0
   16         IN     5       0       0
   17         JR   PREC    0.58       1

   18         KK   CH81
   19         BA  .0443
   20         PB  3.00
   21         KM            SDN #3
   22         PC  0.000   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
   23         PC  0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
   24         PC  0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
   25         PC  0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   26         PC  0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   27         PC  0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
   28         PC  0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
   29         PC  0.998   0.999   1.000
```

EXISTING

```
   30          LS       0      87
   31          UD   0.148
               *

   32          KK    CHS2
   33          BA   .0555
   34          LS       0      94
   35          UD   0.154
               *

   36          KK   COMHS
   37          HC       2
               *

   38          KK    CHS3
   39          BA   .0135
   40          LS       0      74
   41          UD   0.170
               *
1                                        HEC-1 INPUT                                        PAGE  2

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

   42          KK  EXOF51
   43          BA   .0148
   44          LS       0      81
   45          UD   0.169
               *

   46          KK   COMHU
   47          HC       3
               *

   48          KK  EXOF61
   49          BA   .0129
   50          LS       0      77
   51          UD   0.141
               *

   52          KK   COMB1
   53          HC       2
               *

   54          KK   COMBE
   55          KM         DIVERTED FLOW (COMBS) CROSSES THE CROWN & FLOWS SOUTHERLY,
   56          KM         REMAINDER FLOWS EASTWARD IN CENTENNIAL
   57          DT   COMBS
   58          DI       0     176     208
   59          DQ       0       0      32
               *

   60          KK   RCP9E
   61          KM           ROUTE COMBE TO CP9
   62          RK     800  .0280    .020       0    TRAP     50       0
               *

   63          KK   EXOF3
   64          BA   .0179
   65          LS       0      77
   66          UD   0.192
               *

   67          KK     CP9
   68          HC       2
               *

   69          KK    CP9E
   70          KM         DIVERTED FLOW (CP9S) FLOWS SOUTHERLY ACROSS CENTENNIAL CROWN
```

```
                KM          REMAINDER FLOWS EASTWARD IN CENTENNIAL
                KM          BASED ON CAPACITY CALC OF CENTENNIAL CROWN AT CP9 = 171 CFS
                DT    CP9S
                DI       0     171     172     300
                DQ       0       0       1     128
                *
1                                          HEC-1 INPUT                                          PAGE  3

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

                KK   RCP9E
                KM          ROUTE CP9E TO CP10
                RK     990  .0310    .020       0    TRAP     50       0
                *

                KK   EXOF2
                BA   .0246
                LS       0      77
                UD   0.187
                *

                KK    CP10
                HC       2
                *

                KK   EXOF6
                BA   .0298
                LS       0      72
                UD   0.185
                *

                KK     RG2
                BA   .0007
                LS       0      98
                UD   0.050
                *

                KK     CP3
                HC       3
                *

                KK    CP3E
                KM          DIVERTED FLOW (CP3S) FLOWS SOUTHERLY ACROSS REGENA ST
                KM          REMAINDER FLOWS EASTWARD IN REGENA
                KM          BASED ON CAPACITY CALC OF REGENA ST AT CP9 = 151 CFS
                DT    CP3S
                DI       0     151     152     300
                DQ       0       0       1     149
                *

                KK     RG1
                BA   .0007
                LS       0      98
                UD   0.050
                *

                KK     CP4
                HC       2
                *
1                                          HEC-1 INPUT                                          PAGE  4

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

                KK    CP3S
                KM          RECALL FLOW CROSSING REGENA
                DR    CP3S
                *
```

```
111          KK   EXON2
112          BA   .0052
113          LS      0      77
114          UD   0.127
             *

115          KK    CP13
116          HC       2
             *

117          KK   COMBS
118          KM          RECALL FLOW CROSSING CENTENNIAL
119          DR   COMBS
             *

120          KK   EXOF1
121          BA   .0399
122          LS      0      77
123          UD   0.184
             *

124          KK    CP18
125          HC       2
             *

126          KK   RCP18
127          KM          ROUTE CP18 TO CP17
128          RK     990  .0320    .020       0    TRAP     50       0
             *

129          KK   EXOF8
130          BA   .0382
131          LS      0      73
132          UD   0.173
             *

133          KK    CP17
134          HC       2
             *

135          KK   RCP17
136          KM          ROUTE CP17 TO CP15
137          RK     660  .0320    .020       0    TRAP     50       0
             *
1                                        HEC-1 INPUT                                        PAGE  5
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

138          KK    CP9S
139          KM          RECALL FLOW CROSSING CENTENNIAL
140          DR    CP9S
             *

141          KK   EXOF7
142          BA   .0180
143          LS      0      77
144          UD   0.144
             *

145          KK    CP14
146          HC       2
             *

147          KK   RCP14
148          KM          ROUTE CP14 TO CP15
149          RK    1000  .0320    .020       0    TRAP     50       0
             *
```

```
  150          KK   EXOF9
  151          BA   .0205
  152          LS      0      70
  153          UD   0.166
               *

  154          KK    CP15
  155          HC       3
               *

  156          KK   RCP15
  157          KM            ROUTE CP15 TO CP16
  158          RK     990   .0310    .020       0    TRAP     50       0
               *

  159          KK  EXOF10
  160          BA   .0235
  161          LS       0      72
  162          UD   0.147
               *

  163          KK    CP16
  164          HC       2
               *

  165          KK   EXON4
  166          BA   .0039
  167          LS       0      77
  168          UD   0.115
               *
1                                        HEC-1 INPUT                                        PAGE   6

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

  169          KK    TPE2
  170          BA   .0007
  171          LS       0      98
  172          UD   0.050
               *

  173          KK     AZ1
  174          BA   .0007
  175          LS       0      98
  176          UD   0.050
               *

  177          KK     CP6
  178          HC       4
               *

  179          KK   EXOF4
  180          BA   .0710
  181          LS       0      77
  182          UD   0.205
               *

  183          KK   EXOF5
  184          BA   .0169
  185          LS       0      73
  186          UD   0.181
               *

  187          KK    CP11
  188          HC       2
               *

  189          KK   EXON1
```

```
190          BA   .0069
191          LS      0      77
192          UD   0.105
             *

193          KK    CP12
194          HC       2
             *

195          KK   EXOF12
196          BA   .0047
197          LS      0      76
198          UD   0.128
             *

199          KK   EXON6
200          BA   .0005
201          LS      0      77
202          UD   0.103
             *
```



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

203          KK   EXOF13
204          BA   .0026
205          LS      0      88
206          UD   0.076
             *

207          KK     BA1
208          BA   .0007
209          LS      0      98
210          UD   0.050
             *

211          KK     CP8
212          HC       4
             *

213          KK   EXOF11
214          BA   .0148
215          LS      0      75
216          UD   0.141
             *

217          KK   EXON5
218          BA   .0060
219          LS      0      77
220          UD   0.116
             *

221          KK     TP3
222          BA   .0014
223          LS      0      98
224          UD   0.068
             *

225          KK     CP7
226          HC       3
             *

227          KK   DUMMY
228          KM          DUMMY CONCENTRATION POINT FOR ERROR CONTROL ONLY
229          KC       5
             *

230          KK   EXOF14
```

```
          231          BA   .0218
          232          LS      0      77
          233          UD   0.150
                       *
1                                                  HEC-1 INPUT                                                PAGE  8

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

          234          KK    CNT1
          235          BA   .0015
          236          LS      0      9B
          237          UD   0.050
                       *

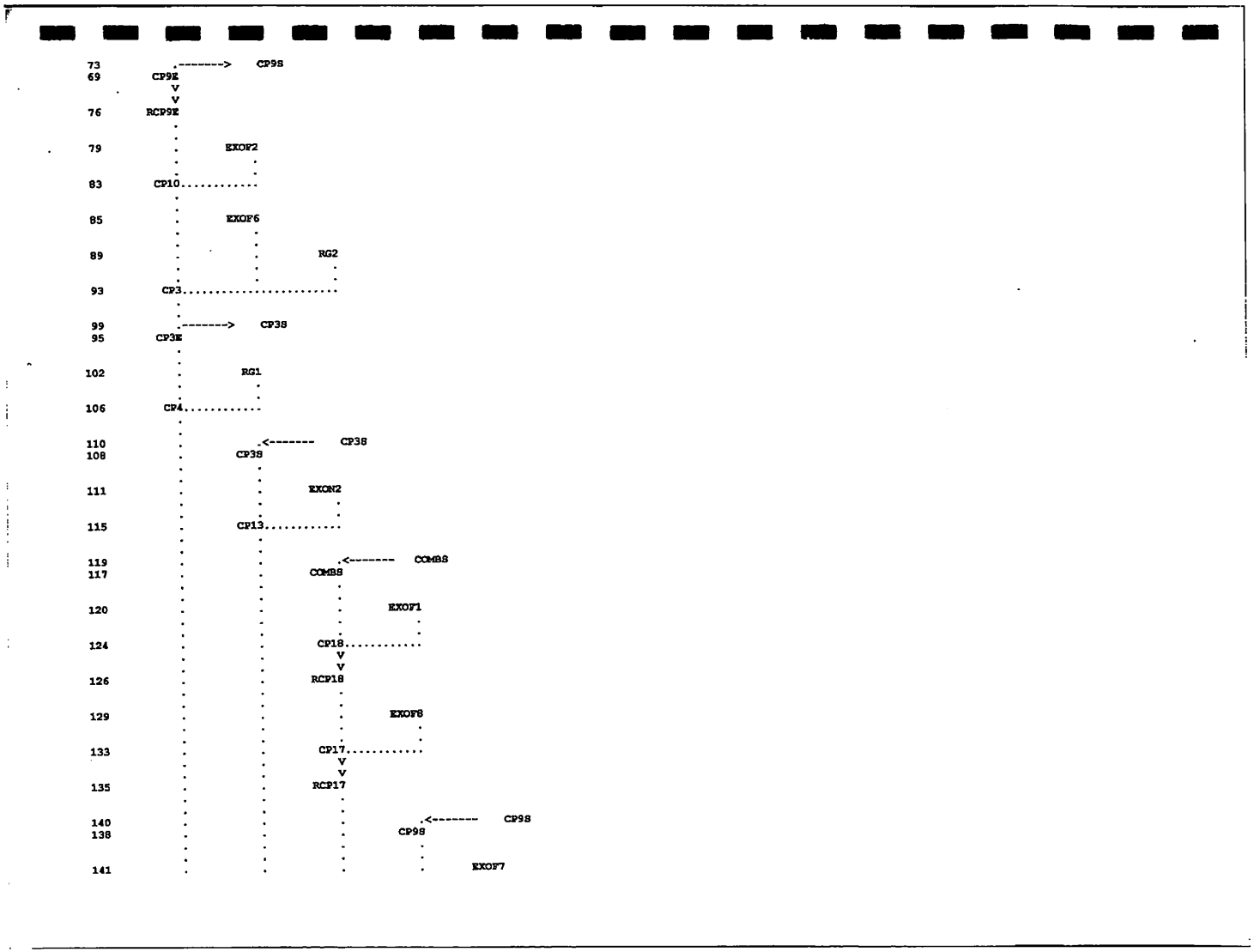
          238          KK     CP1
          239          HC       2
                       *

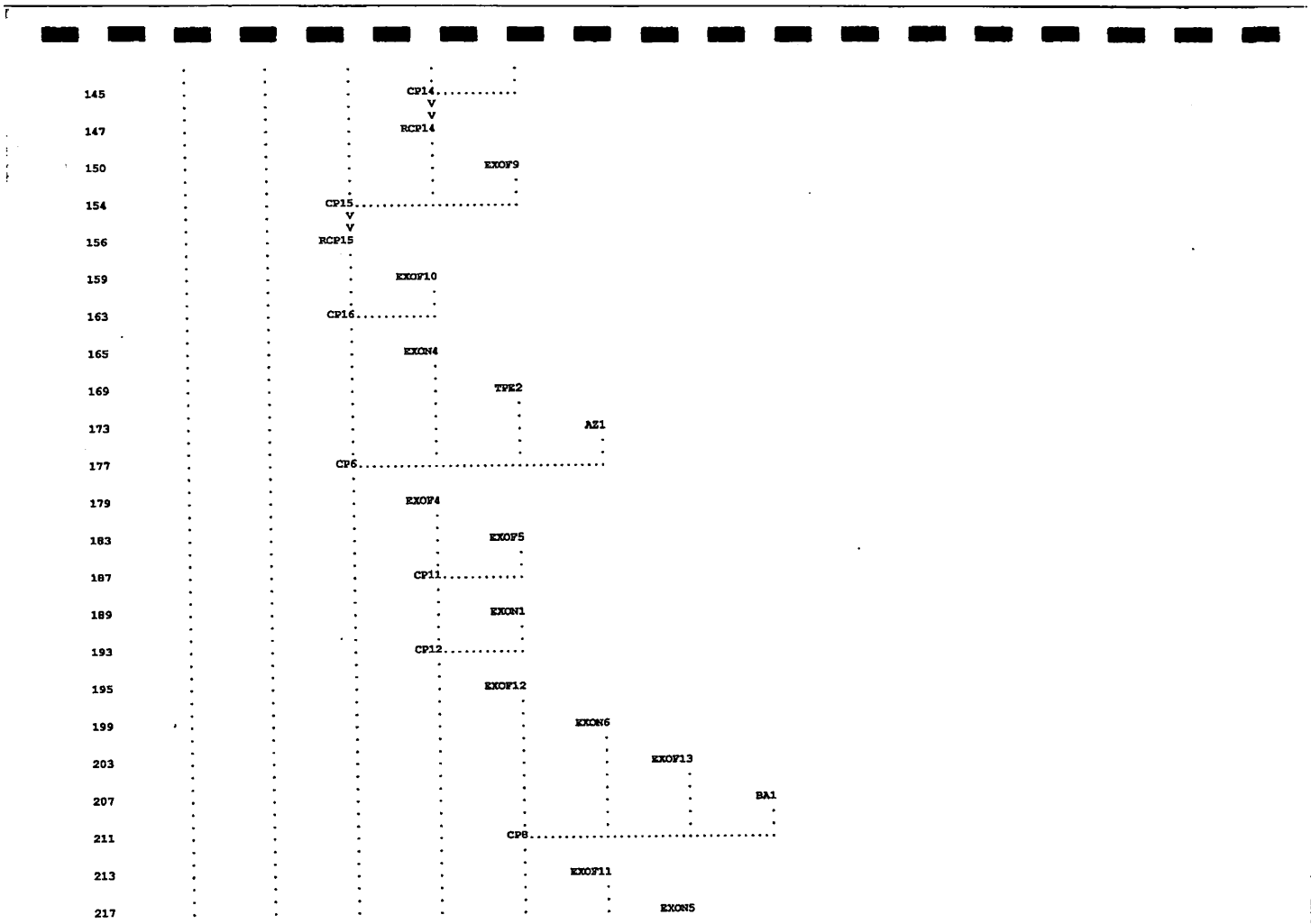
          240          KK   EXCN3
          241          BA   .0014
          242          LS      0      77
          243          UD   0.111
                       *
          244          ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK

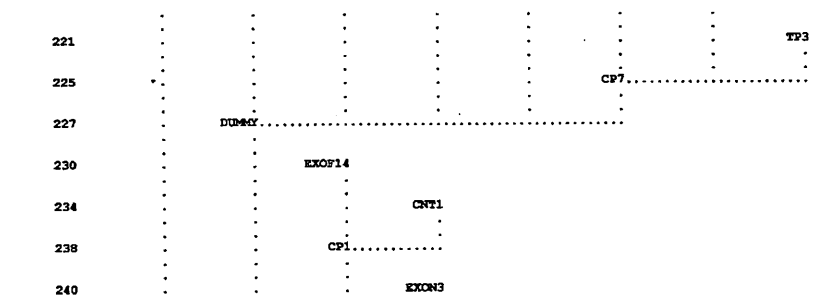
 INPUT
 LINE      (V) ROUTING           (--->) DIVERSION OR PUMP FLOW

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

   18        CHS1
             .
             .
   32        .         CHS2
             .           .
             .           .
   36        COMBS.............
             .
             .
   38        .         CHS3
             .           .
             .           .
   42        .           .       EXOF51
             .           .           .
             .           .           .
   46        COMBU.........................
             .
             .
   48        .       EXOF61
             .           .
             .           .
   52        COMB1.............
             .
             .
   57        .-------->   COMBS
   54        COMBE
             V
             V
   60        RCP9E
             .
             .
   63        .         EXOF3
             .           .
             .           .
   67        CP9.............
             .
             .
```


73
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111
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117
120
124
126
129
133
135
140
138
141
CP9S
CP9E
RCP9E
EXOF2
CP10
EXOF6
RG2
CP3
CP3S
CP3E
RG1
CP4
CP3S
CP3S
EXON2
CP13
COMBS
COMBS
EXOF1
CP18
RCP18
EXOF8
CP17
RCP17
CP9S
CP9S
EXOF7


145
CP14
147
RCP14
150
EXOF9
154
CP15
156
RCP15
159
EXOF10
163
CP16
165
EXON4
169
TPE2
173
AZ1
177
CP6
179
EXOF4
183
EXOF5
187
CP11
189
EXON1
193
CP12
195
EXOF12
199
EXON6
203
EXOF13
207
BA1
211
CP8
213
EXOF11
217
EXON5



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN  1998                *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   27NOV06  TIME  11:09:51   *
*                                       *
*****************************************
```

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

EXISTING CONDITIONS MODEL
TECHNICAL DRAINAGE STUDY FOR CENTENNIAL TEE PRE
MOMENTUM ENGINEERS - - B BROWN

6-HOUR STORM DISTRIBUTION #3
10- AND 100-YEAR STORM EVENTS

NO RAINFALL REDUCTION FOR DEPTH-AREA

15 IO	OUTPUT CONTROL VARIABLES			
	IPRNT		5	PRINT CONTROL
	IPLOT		0	PLOT CONTROL
	QSCAL		0.	HYDROGRAPH PLOT SCALE
IT	HYDROGRAPH TIME DATA			
	NMIN		5	MINUTES IN COMPUTATION INTERVAL
	IDATE	1	0	STARTING DATE
	ITIME		0000	STARTING TIME
	NQ		300	NUMBER OF HYDROGRAPH ORDINATES
	NDDATE	2	0	ENDING DATE
	NDTIME		0055	ENDING TIME
	ICENT		19	CENTURY MARK
	COMPUTATION INTERVAL		.08	HOURS
	TOTAL TIME BASE		24.92	HOURS

ENGLISH UNITS

[redacted]

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 .58	RATIO 2 1.00
HYDROGRAPH AT						
+	CHS1	.04	1	FLOW	27.	65.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	CHS2	.06	1	FLOW	52.	101.
				TIME	3.58	3.58
2 COMBINED AT						
+	COMBS	.10	1	FLOW	79.	166.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	CHS3	.01	1	FLOW	2.	10.
				TIME	3.67	3.58
HYDROGRAPH AT						
+	EXOF51	.01	1	FLOW	5.	16.
				TIME	3.58	3.58
3 COMBINED AT						
+	COMHU	.13	1	FLOW	87.	192.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	EXOF61	.01	1	FLOW	3.	12.
				TIME	3.58	3.58
2 COMBINED AT						
+	COMB1	.14	1	FLOW	90.	204.
				TIME	3.58	3.58
DIVERSION TO						
+	COMBS	.14	1	FLOW	0.	28.
				TIME	.00	3.58
HYDROGRAPH AT						
+	COMBE	.14	1	FLOW	90.	176.
				TIME	3.58	3.50
ROUTED TO						
+	RCP9E	.14	1	FLOW	84.	176.
				TIME	3.67	3.58

HYDROGRAPH AT						
+	EXOF3	.02	1	FLOW	4.	15.
				TIME	3.67	3.67
2 COMBINED AT						
+	CP9	.16	1	FLOW	88.	191.
				TIME	3.67	3.58
DIVERSION TO						
+	CP9S	.16	1	FLOW	0.	19.
				TIME	.00	3.58
HYDROGRAPH AT						
+	CP9E	.16	1	FLOW	88.	171.
				TIME	3.67	3.58
ROUTED TO						
+	RCP9E	.16	1	FLOW	88.	171.
				TIME	3.67	3.67
HYDROGRAPH AT						
+	EXOF2	.02	1	FLOW	6.	20.
				TIME	3.67	3.67
2 COMBINED AT						
+	CP10	.18	1	FLOW	94.	192.
				TIME	3.67	3.67
HYDROGRAPH AT						
+	EXOF6	.03	1	FLOW	4.	19.
				TIME	3.75	3.67
HYDROGRAPH AT						
+	RG2	.00	1	FLOW	1.	2.
				TIME	3.50	3.50
3 COMBINED AT						
+	CP3	.21	1	FLOW	98.	211.
				TIME	3.67	3.67
DIVERSION TO						
+	CP3S	.21	1	FLOW	0.	60.
				TIME	.00	3.67
HYDROGRAPH AT						
+	CP3E	.21	1	FLOW	98.	151.
				TIME	3.67	3.50
HYDROGRAPH AT						
+	RG1	.00	1	FLOW	1.	2.
				TIME	3.50	3.50
2 COMBINED AT						
+	CP4	.21	1	FLOW	98.	153.
				TIME	3.67	3.50
HYDROGRAPH AT						
+	CP3S	.00	1	FLOW	0.	60.
				TIME	.00	3.67
HYDROGRAPH AT						
+	EXON2	.01	1	FLOW	1.	5.
				TIME	3.58	3.58
2 COMBINED AT						
+	CP13	.01	1	FLOW	1.	64.
				TIME	3.58	3.58
HYDROGRAPH AT						

+	COMB8	.00	1	FLOW TIME	0. .00	28. 3.58
HYDROGRAPH AT +	EXOF1	.04	1	FLOW TIME	9. 3.67	33. 3.58
2 COMBINED AT +	CP18	.04	1	FLOW TIME	9. 3.67	62. 3.58
ROUTED TO +	RCP18	.04	1	FLOW TIME	9. 3.83	53. 3.67
HYDROGRAPH AT +	EXOF8	.04	1	FLOW TIME	6. 3.67	26. 3.58
2 COMBINED AT +	CP17	.08	1	FLOW TIME	14. 3.75	78. 3.67
ROUTED TO +	RCP17	.08	1	FLOW TIME	14. 3.83	71. 3.67
HYDROGRAPH AT +	CP9S	.00	1	FLOW TIME	0. .00	19. 3.58
HYDROGRAPH AT +	EXOF7	.02	1	FLOW TIME	5. 3.58	17. 3.58
2 COMBINED AT +	CP14	.02	1	FLOW TIME	5. 3.58	36. 3.58
ROUTED TO +	RCP14	.02	1	FLOW TIME	4. 3.83	35. 3.67
HYDROGRAPH AT +	EXOF9	.02	1	FLOW TIME	2. 3.75	12. 3.58
3 COMBINED AT +	CP15	.12	1	FLOW TIME	20. 3.83	118. 3.67
ROUTED TO +	RCP15	.12	1	FLOW TIME	19. 3.92	111. 3.75
HYDROGRAPH AT +	EXOF10	.02	1	FLOW TIME	3. 3.67	16. 3.58
2 COMBINED AT +	CP16	.14	1	FLOW TIME	21. 3.92	123. 3.75
HYDROGRAPH AT +	EXON4	.00	1	FLOW TIME	1. 3.58	4. 3.58
HYDROGRAPH AT +	TPE2	.00	1	FLOW	1.	2.

				TIME	3.50	3.50
+ HYDROGRAPH AT	AE1	.00	1	FLOW	1.	2.
				TIME	3.50	3.50
+ 4 COMBINED AT	CP6	.15	1	FLOW	22.	127.
				TIME	3.92	3.75
+ HYDROGRAPH AT	EXOF4	.07	1	FLOW	16.	58.
				TIME	3.67	3.67
+ HYDROGRAPH AT	EXOF5	.02	1	FLOW	2.	11.
				TIME	3.67	3.67
+ 2 COMBINED AT	CP11	.09	1	FLOW	18.	69.
				TIME	3.67	3.67
+ HYDROGRAPH AT	EXON1	.01	1	FLOW	2.	7.
				TIME	3.58	3.58
+ 2 COMBINED AT	CP12	.09	1	FLOW	20.	74.
				TIME	3.67	3.67
+ HYDROGRAPH AT	EXOF12	.00	1	FLOW	1.	4.
				TIME	3.58	3.58
+ HYDROGRAPH AT	EXON6	.00	1	FLOW	0.	0.
				TIME	3.58	3.58
+ HYDROGRAPH AT	EXOF13	.00	1	FLOW	2.	5.
				TIME	3.50	3.50
+ HYDROGRAPH AT	BA1	.00	1	FLOW	1.	2.
				TIME	3.50	3.50
+ 4 COMBINED AT	CP8	.01	1	FLOW	4.	11.
				TIME	3.50	3.50
+ HYDROGRAPH AT	EXOF11	.01	1	FLOW	3.	13.
				TIME	3.58	3.58
+ HYDROGRAPH AT	EXON5	.01	1	FLOW	2.	6.
				TIME	3.58	3.58
+ HYDROGRAPH AT	TP3	.00	1	FLOW	2.	3.
				TIME	3.50	3.50
+ 3 COMBINED AT	CP7	.02	1	FLOW	6.	21.
				TIME	3.58	3.58
+ 5 COMBINED AT	DUMMY	.28	1	FLOW	39.	274.
				TIME	3.92	3.67

HYDROGRAPH AT
+ EXOF14 .02 1 FLOW 6. 20.
TIME 3.58 3.58

HYDROGRAPH AT
+ CNT1 .00 1 FLOW 2. 4.
TIME 3.50 3.50

2 COMBINED AT
+ CP1 .02 1 FLOW 7. 22.
TIME 3.58 3.58

HYDROGRAPH AT
+ EXON3 .00 1 FLOW 0. 1.
TIME 3.58 3.58

1

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

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .58									
	RCP9E MANE	1.33	88.84	217.96	.78	5.00	84.29	220.00	.78
CONTINUITY SUMMARY (AC-FT) - INFLOW= .5831E+01 EXCESS= .0000E+00 OUTFLOW= .5852E+01 BASIN STORAGE= .6853E-04 PERCENT ERROR= -.4									
FOR PLAN = 1 RATIO= 1.00									
	RCP9E MANE	.92	176.00	212.13	1.77	5.00	176.00	215.00	1.77
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1327E+02 EXCESS= .0000E+00 OUTFLOW= .1330E+02 BASIN STORAGE= .7861E-04 PERCENT ERROR= -.2									
FOR PLAN = 1 RATIO= .58									
	RCP9E MANE	1.41	88.16	221.53	.73	5.00	87.85	220.00	.73
CONTINUITY SUMMARY (AC-FT) - INFLOW= .6146E+01 EXCESS= .0000E+00 OUTFLOW= .6165E+01 BASIN STORAGE= .2493E-03 PERCENT ERROR= -.3									
FOR PLAN = 1 RATIO= 1.00									
	RCP9E MANE	1.23	171.15	217.73	1.66	5.00	171.14	220.00	1.66
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1405E+02 EXCESS= .0000E+00 OUTFLOW= .1409E+02 BASIN STORAGE= .2482E-03 PERCENT ERROR= -.3									
FOR PLAN = 1 RATIO= .58									
	RCP18 MANE	3.44	9.29	226.23	.32	5.00	8.90	230.00	.32
CONTINUITY SUMMARY (AC-FT) - INFLOW= .6727E+00 EXCESS= .0000E+00 OUTFLOW= .6793E+00 BASIN STORAGE= .1072E-03 PERCENT ERROR= -1.0									
FOR PLAN = 1 RATIO= 1.00									
	RCP18 MANE	1.61	57.82	217.86	1.18	5.00	52.67	220.00	1.17
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2497E+01 EXCESS= .0000E+00 OUTFLOW= .2507E+01 BASIN STORAGE= .1216E-03 PERCENT ERROR= -.4									
FOR PLAN = 1 RATIO= .58									

[redacted]

```
             RCP17  MANE          2.04     13.95    229.21       .27       5.00     13.88    230.00        .27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1112E+01 EXCESS= .0000E+00 OUTFLOW= .1113E+01 BASIN STORAGE= .1563E-03 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO= 1.00
             RCP17  MANE          1.00     76.58    221.53      1.02       5.00     71.24    220.00       1.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4243E+01 EXCESS= .0000E+00 OUTFLOW= .4244E+01 BASIN STORAGE= .1575E-03 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .58
             RCP14  MANE          3.43      4.49    228.56       .32       5.00      4.35    230.00        .32

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3035E+00 EXCESS= .0000E+00 OUTFLOW= .3085E+00 BASIN STORAGE= .1143E-03 PERCENT ERROR=  -1.7

          FOR PLAN = 1  RATIO= 1.00
             RCP14  MANE          2.01     35.03    221.69      1.36       5.00     34.92    220.00       1.36

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1293E+01 EXCESS= .0000E+00 OUTFLOW= .1305E+01 BASIN STORAGE= .1023E-03 PERCENT ERROR=   -.9

          FOR PLAN = 1  RATIO=  .58
             RCP15  MANE          2.68     19.74    235.75       .26       5.00     19.21    235.00        .26

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1589E+01 EXCESS= .0000E+00 OUTFLOW= .1595E+01 BASIN STORAGE= .5180E-03 PERCENT ERROR=   -.4

          FOR PLAN = 1  RATIO= 1.00
             RCP15  MANE          1.34    115.61    223.30      1.02       5.00    111.30    225.00       1.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6332E+01 EXCESS= .0000E+00 OUTFLOW= .6328E+01 BASIN STORAGE= .4522E-03 PERCENT ERROR=    .1


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

07-38440
09/10/07

TO: WILLDAN & ASSOC. FOR REVIEW
FROM: CLARK COUNTY DEV. SERVICES
ORIGINAL ✓ ADDENDUM # 6
BY DEC DATE 9/10/07

TDS

HYDROLOGY STUDY

For

Centennial/ Tee Pee

PROFESSIONAL ENGINEER STATE OF NEVADA
CAMERON G. HILLSTEAD
Exp. 6-30-09
CIVIL
No. 9899
9.10.07

Submitted To:

Clark County
500 Grand Central Parkway
Las Vegas, Nevada 89155

Prepared For:

Threshold Capital LLC
3430 Bunkerhill Dr. #A
N. Las Vegas, Nevada 89032-6011

September-2007

APN
125-30-502-006

07-38440 LTR

Department of Development Services

500 S Grand Central Pky 1st Fl • Box 551799 • Las Vegas NV 89155-1799
(702) 455-4600 • Fax (702) 388-2550
Ronald L. Lynn, Director/Building Official

Dean Friedli, Assistant Director, Administrative Division
Greg Franklin, Assistant Director, Building Division
Robert Thompson, Assistant Director, Civil Engineering Division

Drainage Study Approval Letter

Date: September 16, 2008
Firm: Civiltec, Inc.
Engineer: Russell Sillitoe, P.E.
Address: 70 E. Horizon Ridge Parkway, Suite 190, Henderson, NV 89002
Phone: (702) 458-0099
Fax: (702) 456-5393
E-mail:

Subject: Tech Drainage Study for Centennial / Tee Pee
Location: Centennial Parkway and Tee Pee Lane
APN: 125-30-502-006
Sec, Township, Range: Sec 30, T19S, R60E
Flood Zone & Panel: Zone X, 1745, Revised September 27,2002
Application Tracking #: 07-38440

HTE07-38440CDD

Submittals	Date Received	Date Returned	Clark Co. Reviewer	WILLDAN Reviewer	Misc.
Technical	9/10/2007	9/21/2007	JAKE	JPN	
Addendum #1	4/22/2008			SFH	
Supplemental	4/30/2008	5/7/2007	JAKE	SFH	
Addendum #2	9/2/2008		JAKE	N/A	
Supplemental	9/8/2008	9/16/2008	JAKE	N/A	

Concurrence Required: (Must be obtained prior to permit issuance)		Reason Concurrence is required
	City of Henderson	Adjacent to or Impacts Henderson
X	City of Las Vegas	Adjacent to or Impacts Las Vegas
	City of North Las Vegas	Adjacent to or Impacts North Las Vegas
	Nevada Department of Transportation	Impacts NDOT Facility
	Clark County Public Works	Adjacent to or Impacts a CCPW Facility
	US Army Corp of Engineers	Impacts a USACOE Facility
	Clark County Regional Flood Control District	Adjacent to or Impacts CCRFCD MPU Facility or in a SFHA

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

07-38440

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

The site shall be graded with respect to drainage as shown on "Centennial and Tee Pee", grading plan sheet GP-1, signed and sealed by Russell R. Sillitoe, P.E., on September 8, 2008.

Check appropriate conditions

X	Retaining/screen wall combination may be in excess of current **Clark County Unified Development Code, Chapter 30.64.050.**
	A FEMA Elevation Certificate, completed by a licensed surveyor, must be submitted to and approved by Clark County Civil Engineering Division Plan Check prior to the issuance of Certificates of Occupancy for those structures.
X	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) or permit issuance (commercial).
	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.
	The grading plan will be reviewed by the Building Office Operations Division to ensure compliance with the ADA 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.
X	The plans show work is proposed outside of the project boundary. Notarized written permission must be obtained **prior to grading plan approval.**
X	Right-of-way dedication must be verified.
	Any previously approved drainage easements that are not being used must be vacated.
	Per *Regional Flood Control District policies and Procedures manual, Section VIII. D. 13. Uniform Regulations for the Control of Drainage*, the Engineer of Record shall provide As-Built plans or record drawings to the District after completion and final inspection of such privately installed flood control facilities that have regional flood control significance.
	Structural calculations are required. The structural calculations, plans, and details must be approved prior to "Offsite" submittal.
X	Plan revisions can be found on the red-lined plans and must be addressed.

Clark County Additional Conditions:

1. Please adjust grads adjacent to lots 7 and 8 in order to eliminate street (Running Pinto) ponding.

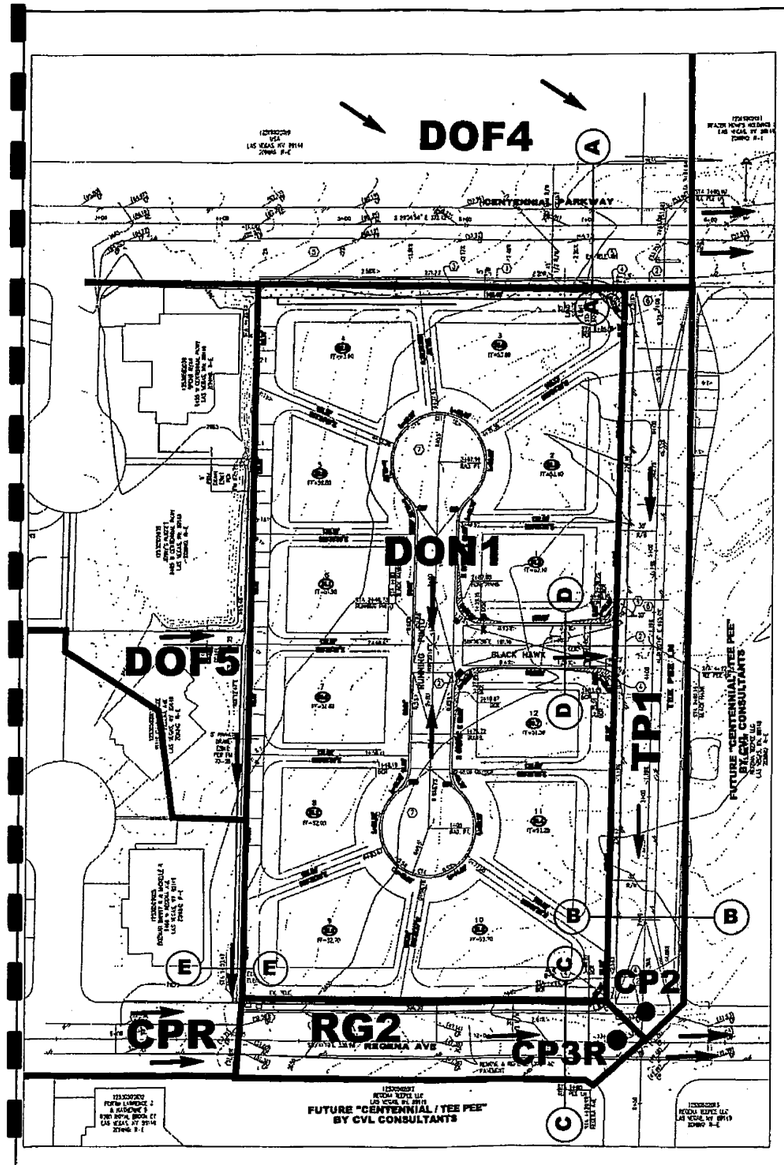
07-38440

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;

By _____

Jacob Mizrahi, P.E.
Senior Civil Engineer
Department of Development Services
Civil Engineering Division

cc: Threshold Capital, LLC
Development File
Willdan



SUMMARY OF PEAK FLOW RATES FUTURE CONDITIONS				
CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	 100-YR	 NOTES
CP2		3	9	3
CP3R		153	247	6
CPR		150	234	5
DON1	4.00	1	6	1
DOF4	45.42	60	122	2
DOF5	10.81	2	11	4
RG2	0.46	1	2	2
TP1	0.83	2	3	2
				8/5/2008

NOTES:
1. HEC-1 Calculations in this package
2. Referenced from "Technical Drainage Study for Centennial / Tee Pee", by CVL Consultants, 2007. H T E #06-37189.
3. Direct summary of peaks CP2 = DON1 + TP1
4. The design of the drainage easement is based on the entire peak flow rate from DOF5, even though this area also includes the subject site in the reference material.
5. Referenced from the drainage study listed above. The point CPR is taken from the HEC-1 output and consists of the hydrograph summary in Regena Avenue just upstream of Tee Pee Lane, without inclusion of hydrographs DOF5, and RG2.
6. Peak flows are added from the hydrographs: CP3R=CPR+DOF5+RG2.

STREET FLOW CALCULATIONS FUTURE CONDITIONS							
CROSS SECTION NO.	STREET NAME	STREET WIDTH, FT	SLOPE %	Q_{10} / Q_{100} CFS	D_{10} / D_{100} FEET	V_{10} / V_{100} FPS	V_{10} * D_{10} / V_{100} * D_{100}
A	Centennial	100	2.20	60 / 122	0.62 / 0.74	4.8 / 5.9	3.0 / 4.4
B (MIN SLOPE)	Tee Pee	60	1.19	3 / 9	0.29 / 0.39	2.1 / 2.6	0.6 / 1.0
B (MAX SLOPE)	Tee Pee	60	4.22	3 / 9	0.25 / 0.33	3.4 / 4.3	0.9 / 1.4
C	Regena	60	2.61	153 / 247	0.76 / 0.88	7.3 / 8.9	5.5 / 7.8
D	Black Hawk	37	1.04	1/6	0.22 / 0.36	1.6 / 2.3	0.4 / 0.8
							5-Aug-08

EASEMENT FLOW CALCULATIONS FUTURE CONDITIONS							
LOCATION	WIDTH, FEET	SLOPE, PERCENT	Q_{100} CFS	D_{100} NORMAL FEET	VELOCITY, FEET PER SEC.	VELOCITY HEAD FEET	WEIR DEPTH FEET
E	5	1.95	11	0.36	6.00	0.57	0.80
							5-Aug-08

200' 100' 50' 0 100'
1 INCH = 100 FEET

FIGURE ADD2-2

Technical Drainage Study for Centennial Tee Pee

FUTURE CONDITIONS ONSITE DRAINAGE BASIN MAP

Civiltec ENGINEERS • SURVEYORS • PLANNERS

hydrology. Pertinent portions of that study have been copied, annotated and included in the appendix of this submittal package.

It is noted that even though the drainage study was approved, the adjacent CVL project titled "Centennial / Tee Pee" was not bonded and is not currently complete, nor is it under construction.

Existing Conditions

Referring to the reference material Figure 3, the subject site is located within drainage basin EXOF5 where concentration point CP11 is located. Centennial Parkway exists partially-improved with a pavement section and graded swales on each side. There are some culvert crossings, located near points COMB1 and CP9. Flow splits occur at these points, which were calculated in the referenced material. At these points, a portion of the runoff flow is contained in the graded swale along the north side of the pavement and is conveyed easterly toward the subject site.

Runoff flow from basin EXOF2 combines with flow continuing eastward from point CP9 at point CP10. At point CP10, runoff flow enters basin EXOF6 where the flow combines at point CP3, in Regena Avenue at the Tee ~~Pee Lane~~ intersection.

Runoff flow from offsite area EXOF4 is not contained within the Centennial Parkway alignment, but crosses onto the subject site, combining with flow from offsite area EXOF5 at point CP11. *

Interim Conditions

Under interim conditions, the subject site becomes developed and the offsite basins remain in existing condition as shown on Figure 3 of the reference material. Interim conditions hydrology for the subject site is shown on Figure ADD1-1 of this submittal.

Onsite flow is discharged from the site to the east into Tee Pee lane under interim and future conditions. A simple HEC-1 model was created to model onsite basin DON1. Rainfall depths and curve numbers were referenced from the CVL Centennial / Tee Pee drainage study. Calculations are included in the appendix and results are shown on Figures ADD1-1 and ADD-2 of this submittal.

The peak flow rates in Tee Pee Lane (point CP2) at the subject site under interim conditions are calculated by addition of peak flow rate from onsite basin DON1 and street area basin TP1. A high point is designed in Tee Pee Lane that prevents flow from entering Tee Pee Lane from Centennial

* No calculation was provided to back This up.

Parkway. The high point is set at an elevation at least 6 inches above the calculated 100-year depth of flow in Centennial Parkway.

Because the site will have a boundary wall along Centennial Parkway, all runoff flow from basin EXOF4 will be contained in the street section along the northern boundary wall. The peak flow rate in Centennial Parkway at the subject site under interim conditions is flow from basin EXOF4.

For interim conditions, the subject site is impacted on the western boundary by flow exiting the adjacent residential area. The peak flow rate impacting the western boundary of the site will be directed southerly for discharge into Regena Avenue by way of a 5-foot wide drainage easement. The peak flow impacting the western boundary of the subject site is best estimated by peak flow from reference material basin EXOF5. Even though basin EXOF5 includes the majority of the subject site, the more conservative higher flow rate is acceptable for design purposes.

For Regena Avenue bordering the subject site on the south, runoff combines at point CP3R at the corner of Regena Avenue and Tee Pee Lane. Runoff flow (from EXOF5) from the drainage easement combines with runoff flow from upstream. The flow from upstream consists of runoff from basin EXOF6 and EXOF2, and flow overtopping Centennial Parkway at CP10. The upstream peak flow rates at point CPR were taken from the referenced HEC-1 output, and flow from street area (RG2) is also added in for a sum total at point CP3R. *

Street and easement flow normal depth calculations were performed, including flow running in half-street sections and non-urban street sections. Results are summarized on Figure ADD1-1. All streets were found to meet CCRFCD Drainage Manual Criteria.

Future Conditions

Under future conditions, the subject site becomes developed and the offsite basins also become developed as shown on Figure 5 of the reference material. Basins north of Centennial Parkway are expected to develop with higher runoff land usage than basins south of Centennial Parkway. Although a CCRFCD regional collection facility is planned for the Grand Canyon Drive alignment in the future, the facility is not included in the analysis for the most conservative results at the subject site. Future conditions hydrology for the subject site is shown on Figure ADD1-2 of this submittal.

Onsite flow is discharged from the site to the east into Tee Pee Lane under interim and future conditions. A simple HEC-1 model was created to model onsite basin DON1. Rainfall depths and curve numbers were referenced from the CVL Centennial / Tee Pee drainage study.

* PEAK FLOW = 246 CFS
ADDED RG2 DIRECTLY TO
HEC-1 FOR 247 CFS

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL - STANDARD FORM 4

Momentum Engineers, Ltd.
6101 Kings Brook Ct.
Las Vegas NV 89149

PROJECT NO. : 06014 | **PROJECT: Centennial Tee Pee**

FILE : frm4 | **CALCULATED BY: B Brown** | **DATE : 10/23/06**

Sub-Basin Data					Initial/Overland Time (T_i)			Travel Time (T_t)					T_c	T_c Check (Urbanized Basins)		Final T_c	T_{lag}	Remarks
DESIG	CN	K	AREA (acres)	AREA (mi^2)	LENGTH (ft)	SLOPE (%)	T_i (min)	LENGTH (ft)	SLOPE (%)	V_1 (fps)	V_2 (fps)	T_t (min)	$T_c=T_i+T_t$ (min)	TOTAL (ft)	T_c (min)	T_c (min)	T_{lag} (hrs)	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
DEVELOPED CONDITION																		
CHS1	87	0.758	28.38	0.0443	350	1.0	11.5	845	3.3	3.7	5.6	3.3	14.8	1195	16.6	14.8	0.148	
CHS2	94	0.851	35.52	0.0555	400	1.0	9.0	1505	2.2	3.0	4.5	6.5	15.4	1905	20.6	15.4	0.154	
CHS3	74	0.587	8.62	0.0135	300	1.0	16.0	960	2.8	3.4	5.1	4.0	20.0	1260	17.0	17.0	0.170	
DCHS1	94	0.851	28.38	0.0443	350	1.0	8.4	845	3.3	3.7	5.6	3.3	11.7	1195	16.6	11.7	0.117	
CNT1	98	0.904	0.94	0.0015	43	2.0	1.8	360	2.7	3.3	N/A	1.8	3.6	403	12.2	3.6	0.050	
RG1	98	0.904	0.45	0.0007	23	2.0	1.3	300	2.7	3.3	N/A	1.5	2.9	323	11.8	2.9	0.050	
RG2	98	0.904	0.45	0.0007	23	2.0	1.3	300	2.7	3.3	N/A	1.5	2.9	323	11.8	2.9	0.050	
AZ1	98	0.904	0.46	0.0007	23	2.0	1.3	300	3.0	3.5	N/A	1.4	2.8	323	11.8	2.8	0.050	
BA1	98	0.904	0.46	0.0007	23	2.0	1.3	300	2.2	3.0	N/A	1.7	3.0	323	11.8	3.0	0.050	
TP1	98	0.904	0.83	0.0013	23	2.0	1.3	570	1.7	2.6	4.0	3.5	4.8	593	13.3	4.8	0.050	
TP2	98	0.904	0.90	0.0014	23	2.0	1.3	575	1.7	2.6	4.0	3.5	4.8	598	13.3	4.8	0.050	
TP3	98	0.904	0.89	0.0014	23	2.0	1.3	575	0.7	1.7	2.6	5.4	6.8	598	13.3	6.8	0.068	
TPE2	98	0.904	0.46	0.0007	23	2.0	1.3	220	1.7	2.6	N/A	1.4	2.7	243	11.4	2.7	0.050	
DOF10	70	0.534	15.06	0.0235	200	2.0	11.4	940	3.0	3.5	5.3	3.8	15.2	1140	16.3	15.2	0.152	
DOF11	70	0.534	9.47	0.0148	200	2.0	11.4	785	3.3	3.7	5.6	3.1	14.6	985	15.5	14.6	0.146	
DOF12	70	0.534	2.99	0.0047	200	2.0	11.4	690	3.3	3.7	5.6	2.8	14.3	890	14.9	14.3	0.143	
DOF14	92	0.824	13.98	0.0218	200	2.0	5.6	1280	3.4	3.7	5.6	4.5	10.1	1480	18.2	10.1	0.101	
DOF1	75	0.600	25.53	0.0399	200	2.0	10.1	2325	3.3	3.7	5.6	7.7	17.8	2525	24.0	17.8	0.178	
DOF2	92	0.824	15.73	0.0246	200	2.0	5.6	2520	3.5	3.8	5.7	8.1	13.7	2720	25.1	13.7	0.137	
DOF3	92	0.824	11.46	0.0179	560	2.8	8.3	1170	3.7	3.9	5.9	4.0	12.4	1730	19.6	12.4	0.124	
DOF4	92	0.824	45.42	0.0710	200	2.0	5.6	3155	3.6	3.8	5.8	9.8	15.4	3355	28.6	15.4	0.154	
DOF5	72	0.560	10.81	0.0169	460	2.3	15.8	990	2.8	3.4	5.1	4.1	19.8	1450	18.1	18.1	0.181	
DOF51	92	0.824	9.48	0.0148	450	3.3	7.1	781	1.4	2.4	3.6	4.8	11.8	1231	16.8	11.8	0.118	
DOF6	72	0.560	19.04	0.0298	200	2.0	10.9	2205	3.1	3.6	5.4	7.6	18.5	2405	23.4	18.5	0.185	
DOF61	92	0.824	8.26	0.0129	200	2.8	5.0	1170	2.9	3.4	5.2	4.6	9.5	1370	17.6	9.5	0.095	
DOF7	75	0.600	11.52	0.0180	200	2.0	10.1	1120	3.6	3.8	5.8	4.0	14.1	1320	17.3	14.1	0.141	
DOF8	72	0.560	24.44	0.0382	200	2.0	10.9	1780	2.8	3.4	5.1	6.6	17.5	1980	21.0	17.5	0.175	
DON1	75	0.600	2.99	0.0047	150	1.0	11.0	545	1.4	2.4	3.6	3.7	14.7	695	13.9	13.9	0.139	
DON2	75	0.600	0.93	0.0015	70	1.0	7.5	570	1.4	2.4	3.6	3.8	11.3	640	13.6	11.3	0.113	
DON3	75	0.600	1.59	0.0025	150	1.0	11.0	280	1.6	2.6	N/A	1.8	12.8	430	12.4	12.4	0.124	
DON4	75	0.600	0.31	0.0005	70	1.0	7.5	290	1.6	2.6	N/A	1.9	9.4	360	12.0	9.4	0.094	
DON5	75	0.600	1.14	0.0018	70	1.0	7.5	570	1.2	2.2	3.4	4.1	11.6	640	13.6	11.6	0.116	
DON6	75	0.600	2.98	0.0047	165	1.0	11.6	520	1.2	2.2	3.4	3.9	15.4	685	13.8	13.8	0.138	
DON7	75	0.600	3.18	0.0050	150	1.0	11.0	490	1.1	2.1	N/A	3.9	14.9	640	13.6	13.6	0.136	
DON8	75	0.600	0.93	0.0015	70	1.0	7.5	570	1.1	2.1	3.2	4.3	11.8	640	13.6	11.8	0.118	
EXOF5	73	0.574	10.81	0.0169	460	2.3	15.4	990	2.8	3.4	5.1	4.1	19.5	1450	18.1	18.1	0.181	
EXOF6	72	0.560	19.04	0.0298	200	2.0	10.9	2205	3.1	3.6	5.4	7.6	18.5	2405	23.4	18.5	0.185	
EXOF8	73	0.574	24.44	0.0382	200	2.0	10.6	1780	2.8	3.4	5.1	6.6	17.3	1980	21.0	17.3	0.173	
EXOF9	70	0.534	13.15	0.0205	300	2.0	14.0	880	3.1	3.6	5.4	3.5	17.5	1180	16.6	16.6	0.166	
EXOF10	72	0.560	15.06	0.0235	200	2.0	10.9	940	3.0	3.5	5.3	3.8	14.7	1140	16.3	14.7	0.147	
EXOF12	76	0.613	2.99	0.0047	200	2.0	9.8	710	3.1	3.6	5.4	3.0	12.8	910	15.1	12.8	0.128	
EXOF13	88	0.772	1.65	0.0026	60	1.0	4.6	555	2.2	3.0	4.5	3.0	7.6	615	13.4	7.6	0.076	
UNDEVELOPED CONDITION																		
EXOF1	77	0.626	25.53	0.0399	200	2.0	9.6	2325	3.3	2.7	5.3	8.8	18.4	N/A	N/A	18.4	0.184	
EXOF2	77	0.626	15.73	0.0246	200	2.0	9.6	2520	3.5	2.8	5.5	9.1	18.7	N/A	N/A	18.7	0.187	
EXOF3	77	0.626	11.46	0.0179	560	2.8	14.3	1170	3.7	2.8	5.7	4.9	19.2	N/A	N/A	19.2	0.192	
EXOF4	77	0.626	45.42	0.0710	200	2.0	9.6	3155	3.6	2.8	5.6	10.9	20.5	N/A	N/A	20.5	0.205	
EXOF51	81	0.679	9.48	0.0148	450	3.3	10.8	781	1.4	1.8	3.5	6.1	16.9	N/A	N/A	16.9	0.169	
EXOF61	77	0.626	8.26	0.0129	200	2.8	8.6	1170	2.9	2.5	5.0	5.5	14.1	N/A	N/A	14.1	0.141	
EXOF7	77	0.626	11.52	0.0180	200	2.0	9.6	1120	3.6	2.8	5.6	4.8	14.4	N/A	N/A	14.4	0.144	
EXOF11	75	0.600	9.47	0.0148	200	2.0	10.1	785	3.3	2.7	5.3	4.0	14.1	N/A	N/A	14.1	0.141	
EXOF12	76	0.613	2.99	0.0047	200	2.0	9.8	690	3.3	2.7	5.3	3.7	13.5	N/A	N/A	13.5	0.135	
EXOF14	77	0.626	13.98	0.0218	200	2.0	9.6	1280	3.4	2.7	5.4	5.5	15.0	N/A	N/A	15.0	0.150	
EXON1	77	0.626	4.43	0.0069	200	2.0	9.6	150	3.3	2.7	N/A	0.9	10.5	N/A	N/A	10.5	0.105	
EXON2	77	0.626	3.33	0.0052	200	2.0	9.6	500	3.2	2.6	N/A	3.1	12.7	N/A	N/A	12.7	0.127	
EXON3	77	0.626	0.92	0.0014	200	2.0	9.6	245	3.2	2.6	N/A	1.5	11.1	N/A	N/A	11.1	0.111	
EXON4	77	0.626	2.47	0.0039	200	2.0	9.6	310	3.2	2.6	N/A	2.0	11.5	N/A	N/A	11.5	0.115	
EXON5	77	0.626	3.85	0.0060	200	2.0	9.6	310	3.1	2.6	N/A	2.0	11.6	N/A	N/A	11.6	0.116	
EXON6	77	0.626	0.35	0.0005	200	2.0	9.6	110	3.1	2.6	N/A	0.7	10.3	N/A	N/A	10.3	0.103	

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

$T_c=T_i+T_t$

$K=0.0132(CN)-.39$

$T_{lag}=0.6T_c$

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

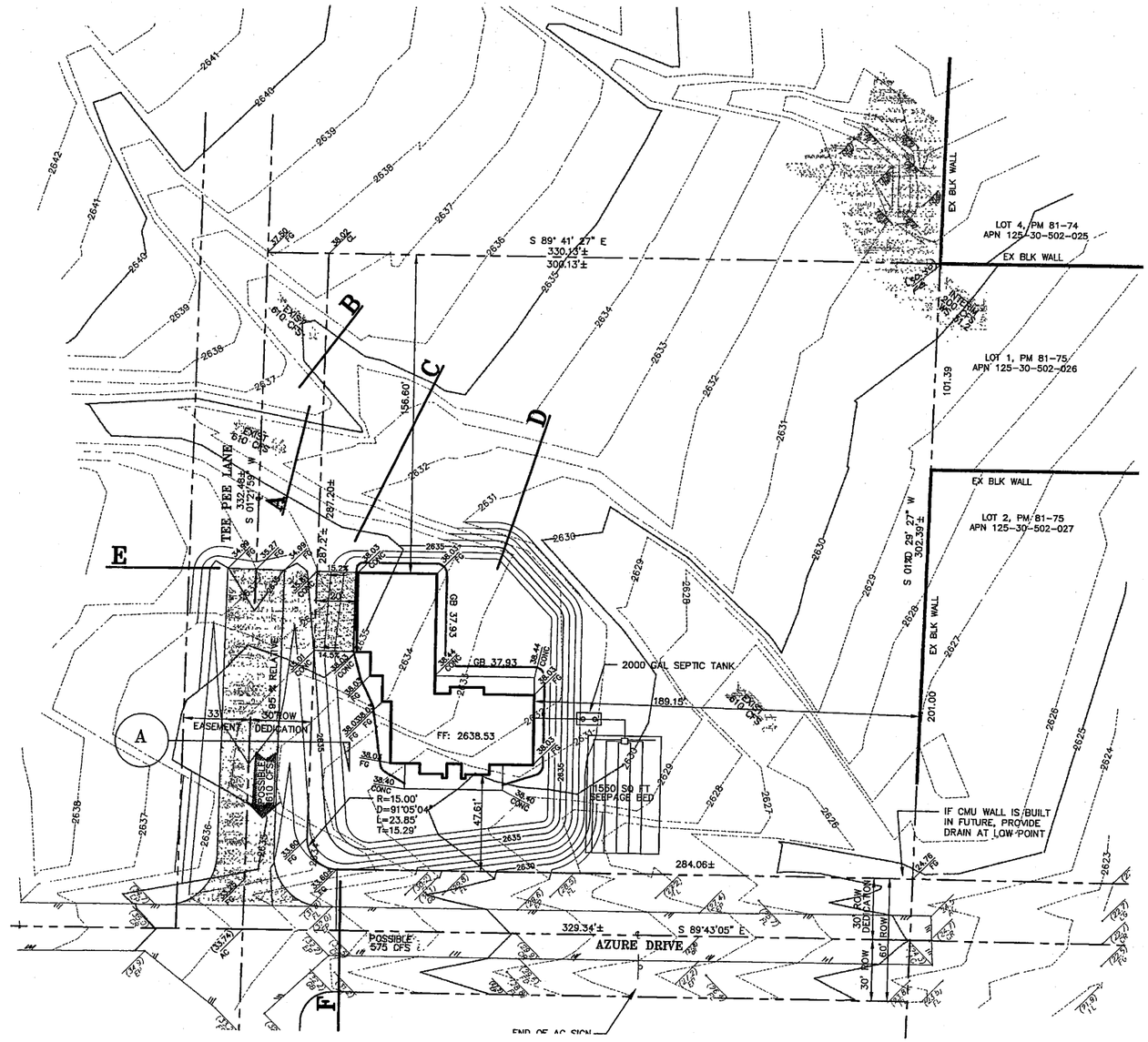
Travel Time Velocity Formulas

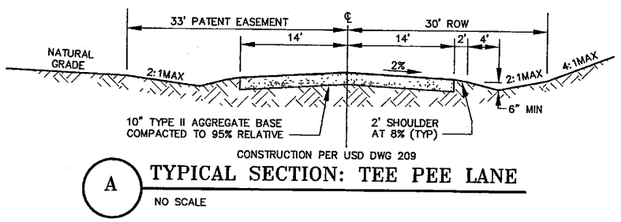
Existing	Developed
$V_1 = 14.8*(S/100)^{1/2}$	$V_1 = 20.2*(S/100)^{1/2}$
$V_2 = 29.4*(S/100)^{1/2}$	$V_2 = 30.6*(S/100)^{1/2}$

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

REFERENCE: CCRFCD HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

STANDARD FORM 4





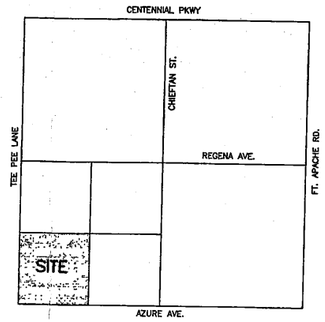
A TYPICAL SECTION: TEE PEE LANE
NO SCALE

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

NORTH

(99) EXIST CONTOUR
99 PROPOSED CONTOUR
GRADE BREAK
FL FLOW LINE
EDGE OF PAVEMENT
PROPERTY LINE
CENTER LINE
FG FINISH GRADE
CONC CONCRETE
TW TOP OF WALL

LEGEND



VICINITY MAP NTS

CONSTRUCTION RESTRICTION

NO CMU, BLOCK, OR CONCRETE WALLS SHALL BE BUILT ON THE SITE UNTILL THE CONSTRUCTION OF SUCH WALLS HAS BEEN SPECIFICALLY APPROVED IN AN APPROVED DRAINAGE STUDY UPDATE. THE UPDATE WILL DEMONSTRATE THAT THE FLOWS SHOWN ON THE PLAN IMPACTING THE SITE HAVE BEEN REDIRECTED UPSTREAM AWAY FROM THE SITE, OR PROVIDES CALCULATIONS AND DETAILS FOR WALL OPENINGS CAPABLE OF PASSING THE 100-YEAR EVENT FLOW.

LEGAL DESCRIPTION

SOUTHWEST QUARTER (SW1/4) OF THE SOUTHWEST QUARTER (SW1/4) OF THE NORTHEAST QUARTER (NE1/4) OF THE NORTHEAST QUARTER (NE1/4) OF SECTION 30, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M. D. M. EXCEPT THEREFROM THE WESTERLY 30 FEET AND THE SOUTHERLY 30 FEET TOGETHER WITH A SPANDREL IN THE SOUTHWEST CORNER THEREOF, BOUNDAED ON THE SOUTH BY THE NORTH LINE OF THE SOUTH 30 FEET, ON THE WEST BY THE EAST LINE OF THE WEST 30 FEET, AND ON THE NORTHEAST BY THE ARC OF A CURVE CONCAVE NORTHEASTELY, HAVING A RADIUS OF 15 FEET AND BEING TANGENT TO THE NORTH LINE OF SAID SOUTH 30 FEET AND TO THE EAST LINE OF SAID WEST 30 FEET.

BENCHMARK

BASIS OF ELEVATION C.C.B.M. 1-C90-30N6 BEING A RIVET AND SQUARE ALUMINUM PLATE IN A 4 FOOT BY 4 FOOT CONCRETE ELECTRICAL PAD (#YY-756) 330 FEET EAST OF AZURE DRIVE, EAST SIDE OF GRAND CANYON DRIVE.

ELEVATION = 813.688 METERS (2669.57 FEET0 PER NAVD 88 DATUM

FLOOD ZONE X

PER FIRM MAP 32003C1745 D, EFFECTIVE AUG 16, 1995

APN: 125-30-502-014

HEALTH PERMIT NO.

SK 932-0664-00

ZONE R-E

EARTH WORK:

CUT: 350 CU YDS
FILL: 3400 CU YDS
IMPORT: 3050 CU YDS

OWNER:

DAWN STARRETT AND DAVID FLETCHER
2104 E. WALNUT AVENUE
LAS VEGAS, NV., 89101
702-366-0856

CLARK COUNTY
DEPARTMENT OF PUBLIC WORKS

Acceptance of plans for filing
By JL NARCISO PER EBT 11-9-98
Acceptance of these plans for filing shall not be construed to be a permit for or an approval of any violation of any of the provisions of the state or county laws and / or specifications. Clark County shall be held free from damages which may result from the construction of the improvements from the engineering design depicted herein.

NOTE: Power poles and / or other existing facilities not in proper location based on proposed improvements shown hereon will be re-located at no expense to Clark County

HTE 99-23476

98-11-09-01

REVISIONS			
REV NO	DATE	DESCRIPTION	

STARRETT & FLETCHER RESIDENCE
GRADING PLAN

SECTION 30 TOWNSHIP 19 S RANGE 60 E

CELLA BARR ASSOCIATES
Engineering Planning Surveying Landscape Architecture Hydrology
1771 E. Flamingo Road #103-B Las Vegas, Nevada 89119
(702) 893-7779 Offices in Arizona, California and Nevada

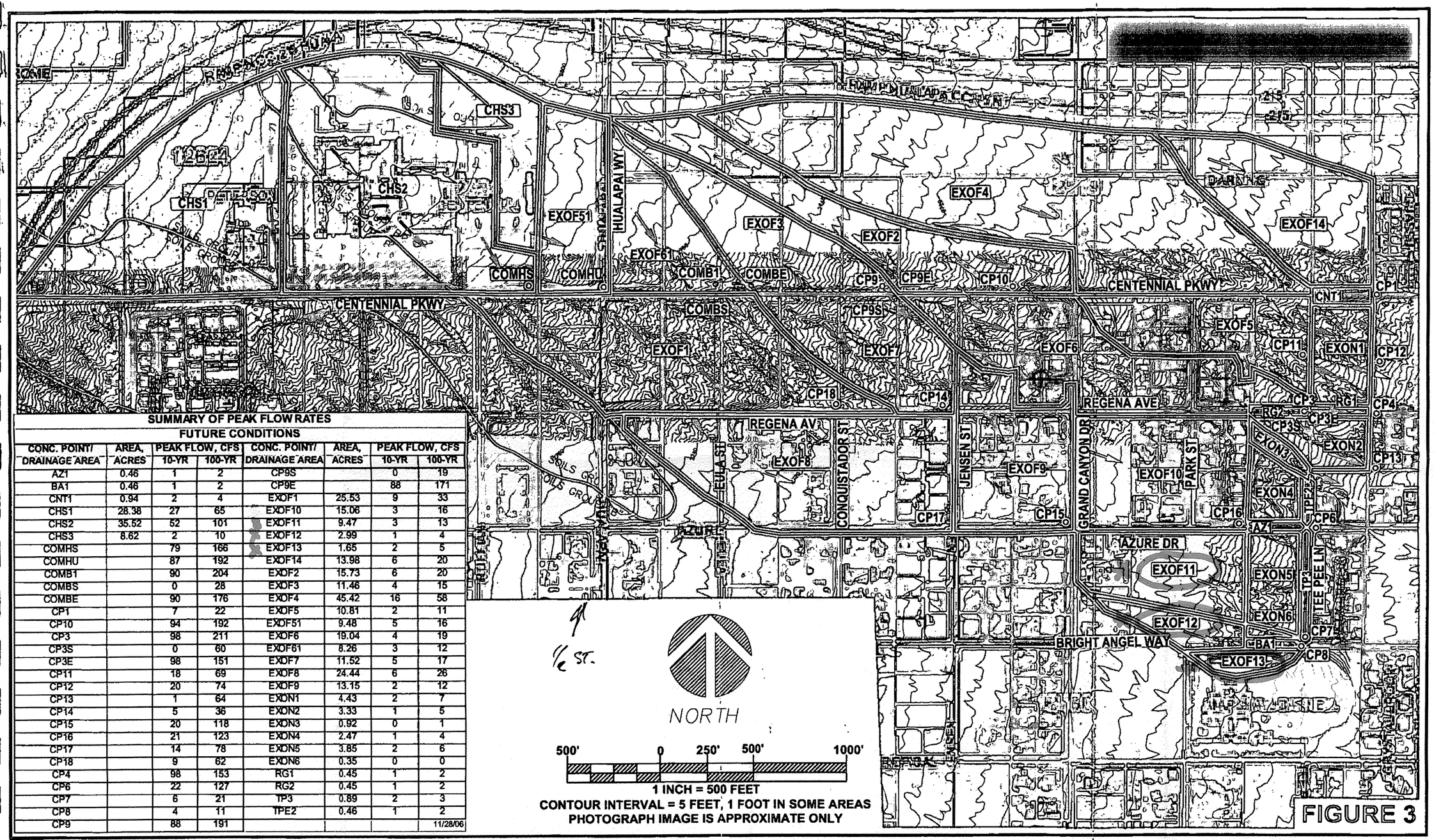
SEAL:
REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA
GUY F. RUDDY
No 12845
11/24/98

DESIGNED BY:	CBS
DRAWN BY:	CBS
CHECKED BY:	GFR
JOB NO.:	880000.00
ISSUE DATE:	

SHEET NUMBER
C-1
1 OF 1

CLOSED 12-14-98

DWG NAME: SITE/GRADING PWBM NAME: SHT XREF DWGS:
V:\880214\0214.dwg Fri Sep 25 07:53:41 1998 JOE HANCOCK
880214.00



SUMMARY OF PEAK FLOW RATES
FUTURE CONDITIONS

CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	PEAK FLOW, CFS 100-YR	CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	PEAK FLOW, CFS 100-YR
AZ1	0.46	1	2	CP9S		0	19
BA1	0.46	1	2	CP9E		88	171
CNT1	0.94	2	4	EXOF1	25.53	9	33
CHS1	28.38	27	65	EXOF10	15.06	3	16
CHS2	35.52	52	101	EXOF11	9.47	3	13
CHS3	8.62	2	10	EXOF12	2.99	1	4
COMHS		79	166	EXOF13	1.65	2	5
COMHU		87	192	EXOF14	13.98	6	20
COMB1		90	204	EXOF2	15.73	6	20
COMBS		0	28	EXOF3	11.46	4	15
COMBE		90	176	EXOF4	45.42	16	58
CP1		7	22	EXOF5	10.81	2	11
CP10		94	192	EXOF51	9.48	5	16
CP3		98	211	EXOF6	19.04	4	19
CP3S		0	60	EXOF61	8.26	3	12
CP3E		98	151	EXOF7	11.52	5	17
CP11		18	69	EXOF8	24.44	6	26
CP12		20	74	EXOF9	13.15	2	12
CP13		1	64	EXON1	4.43	2	7
CP14		5	36	EXON2	3.33	1	5
CP15		20	118	EXON3	0.92	0	1
CP16		21	123	EXON4	2.47	1	4
CP17		14	78	EXON5	3.85	2	6
CP18		9	62	EXON6	0.35	0	0
CP4		98	153	RG1	0.45	1	2
CP6		22	127	RG2	0.45	1	2
CP7		6	21	TP3	0.89	2	3
CP8		4	11	TPE2	0.46	1	2
CP9		88	191				11/28/06

1 INCH = 500 FEET
CONTOUR INTERVAL = 5 FEET, 1 FOOT IN SOME AREAS
PHOTOGRAPH IMAGE IS APPROXIMATE ONLY

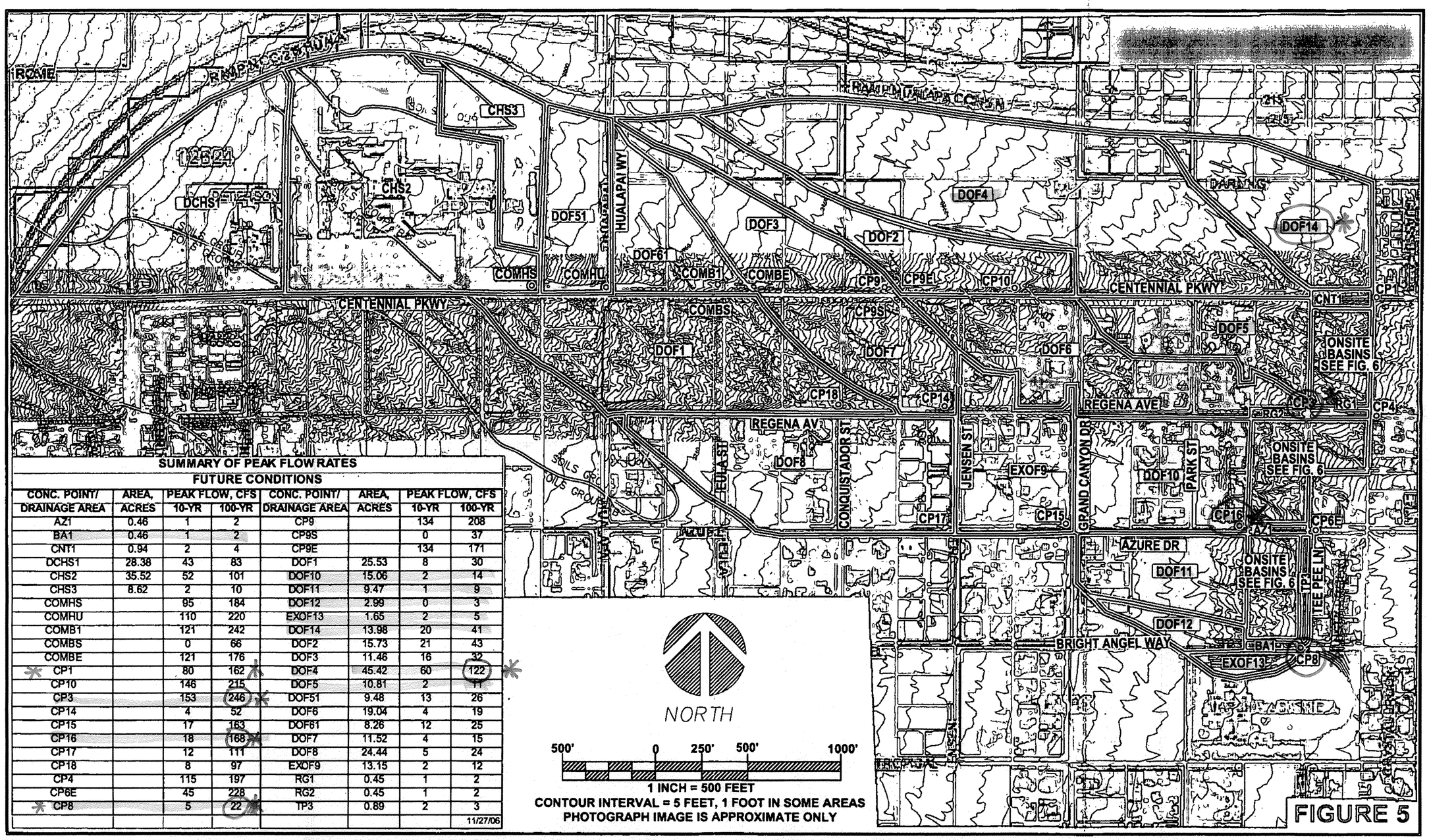
FIGURE 3

Centennial / Tee Pee Residential Development

EXISTING CONDITIONS DRAINAGE BASINS

CVL CONSULTANTS, INC.

* WORST CASE STORM FLOWS



SUMMARY OF PEAK FLOW RATES

FUTURE CONDITIONS

CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	PEAK FLOW, CFS 100-YR	CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	PEAK FLOW, CFS 100-YR
AZ1	0.46	1	2	CP9		134	208
BA1	0.46	1	2	CP9S		0	37
CNT1	0.94	2	4	CP9E		134	171
DCHS1	28.38	43	83	DOF1	25.53	8	30
CHS2	35.52	52	101	DOF10	15.06	2	14
CHS3	8.62	2	10	DOF11	9.47	1	9
COMHS		95	184	DOF12	2.99	0	3
COMHU		110	220	EXOF13	1.65	2	5
COMB1		121	242	DOF14	13.98	20	41
COMBS		0	66	DOF2	15.73	21	43
COMBE		121	176	DOF3	11.46	16	32
* CP1		80	162 *	DOF4	45.42	60	122 *
CP10		146	215	DOF5	10.81	2	11
CP3		153	246 *	DOF51	9.48	13	26
CP14		4	52	DOF6	19.04	4	19
CP15		17	163	DOF61	8.26	12	25
CP16		18	168 *	DOF7	11.52	4	15
CP17		12	111	DOF8	24.44	5	24
CP18		8	97	EXOF9	13.15	2	12
CP4		115	197	RG1	0.45	1	2
CP6E		45	228	RG2	0.45	1	2
* CP8		5	22 *	TP3	0.89	2	3
							11/27/06

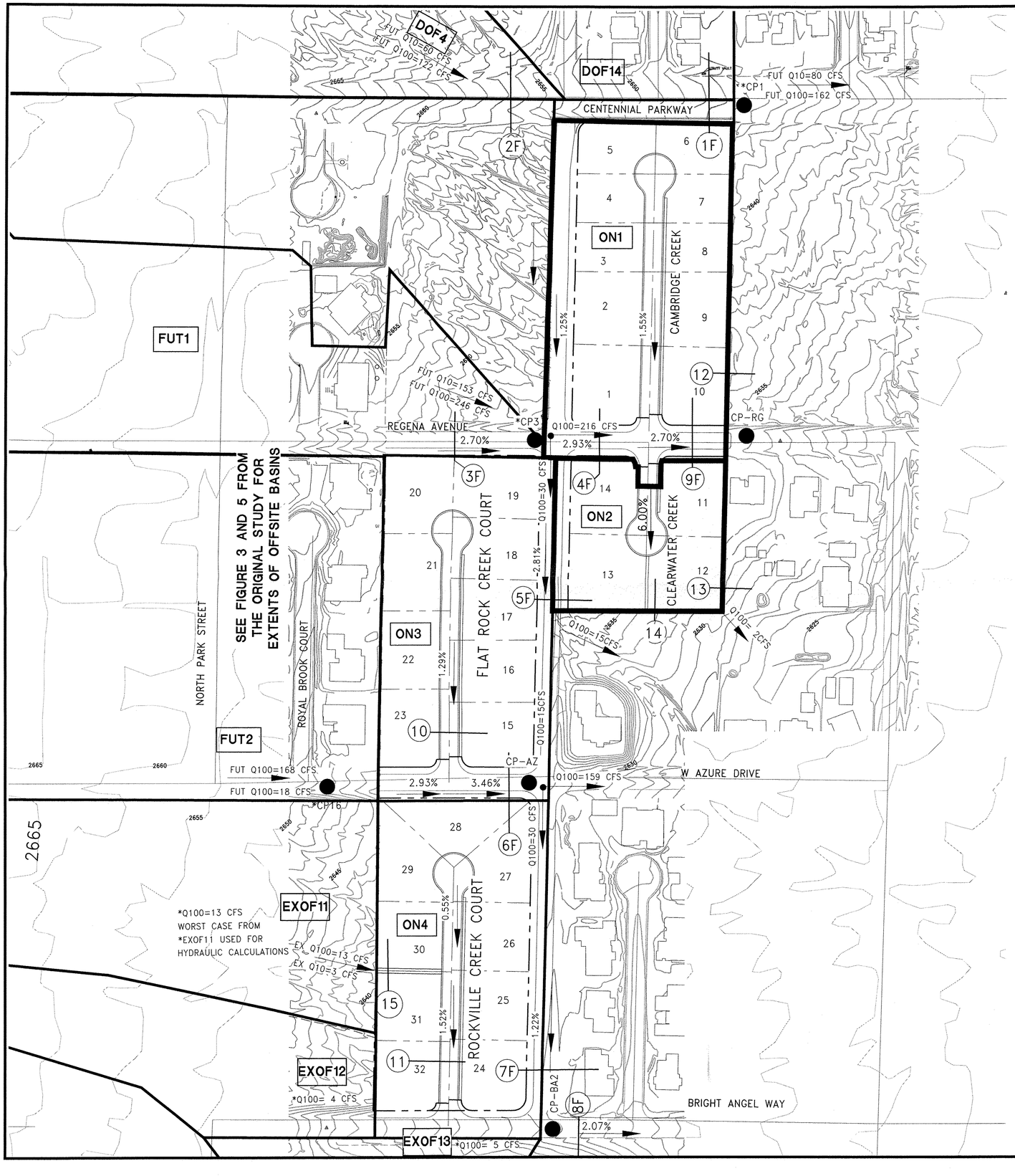
FIGURE 5

Centennial / Tee Pee Residential Development

FUTURE CONDITIONS DRAINAGE BASINS

CONSULTANTS, INC.

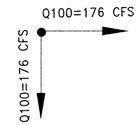
* WORST CASE STORM FLOWS





LEGEND

- FLOW DIRECTION
- ULTIMATE DRAINAGE BASIN BOUNDARY LINE
- ON1 — ULTIMATE DRAINAGE SUBBASINS
- CP-AZ — PROPOSED CONCENTRATION POINT
- Q100=176 CFS — STORM FLOW AND DIRECTION
- *CP8 — REFERENCED STORM FLOWS FROM ORIGINAL STUDY



FLOW SPLIT FLOWS AND DIRECTION

100-YEAR
OFFSITE DEVELOPED HYDRAULIC SECTIONS

Location	Slope (%)	Q_{100} (cfs)	D_{100} (ft)	V_{100} (ft/sec)	$D*V_{100}$
*SECT 1F CENTENNIAL PKWY	2.65	162	0.77	7.11	5.5
*SECT 2F CENTENNIAL PKWY 1/2 STREET	2.20	122	0.89	7.45	N/A
*SECT 3F REGENA AVE	2.70	246	1.08	7.30	7.9
*SECT 4F REGENA AVE	2.93	216	1.07	7.07	7.6
SECT 5F TEE PEE LANE	2.81	30	0.65	4.70	3.1
*SECT 6F AZURE DRIVE	3.46	174	1.05	6.77	7.1
SECT 7F TEE PEE LANE	1.22	30	0.78	3.14	2.4
*SECT 8F BRIGHT ANGEL WAY	2.07	58	0.87	4.62	4.0
*SECT 9F REGENA AVENUE	2.70	222	1.05	7.59	8.0
*SECT 10 FLAT ROCK CREEK (FLATTEST)	1.29	6	0.29	2.85	0.8
*SECT 11 ROCKVILLE CREEK (STEEPEST)	1.52	19	0.41	3.62	1.5

10-YEAR
OFFSITE DEVELOPED HYDRAULIC SECTIONS

Location	Slope (%)	Q_{10} (cfs)	D_{10} (ft)	V_{10} (ft/sec)	$D*V_{10}$
*SECT 1F CENTENNIAL PARKWAY	2.65	80	0.64	5.80	3.7
*SECT 3F REGENA AVE	2.70	153	0.95	6.14	5.8
*SECT 6F AZURE DRIVE	3.46	19	0.53	4.54	2.4

100-YEAR
HYDRAULIC SECTIONS - CURB AND GUTTER

Location	Slope (%)	Q_{100} (cfs)	D_{100} (ft)	V_{100} (ft/sec)	$D*V_{100}$
SECT 3F REGENA AVENUE	2.70	246	0.85	9.19	7.8
SECT 4F REGENA AVENUE	2.93	216	0.81	8.94	7.2
SECT 6F AZURE DRIVE	3.46	174	0.74	8.62	6.4
SECT 7F TEE PEE LANE	1.22	30	0.54	3.46	1.9
SECTION 8F BRIGHT ANGEL WAY	2.07	52	0.59	4.72	2.8
SECTION 9F REGENA AVENUE	2.70	222	0.83	8.82	7.3

100-YEAR
ONSITE CONCRETE DITCH HYDRAULIC SECTIONS

Location	Slope (%)	Q_{100} (cfs)	D_{100} (ft)	V_{100} (ft/sec)
*SECTION 12	0.57	1.5	0.61	2.71
SECTION 13	1.82	1	0.42	3.79
SECTION 14	0.50	1	0.15	1.67
SECTION 15	1.00	13	0.35	4.31

* CALCULATIONS THAT HAVE BEEN REVISED

DEVELOPED CONDITIONS
HEC-1 SUMMARY

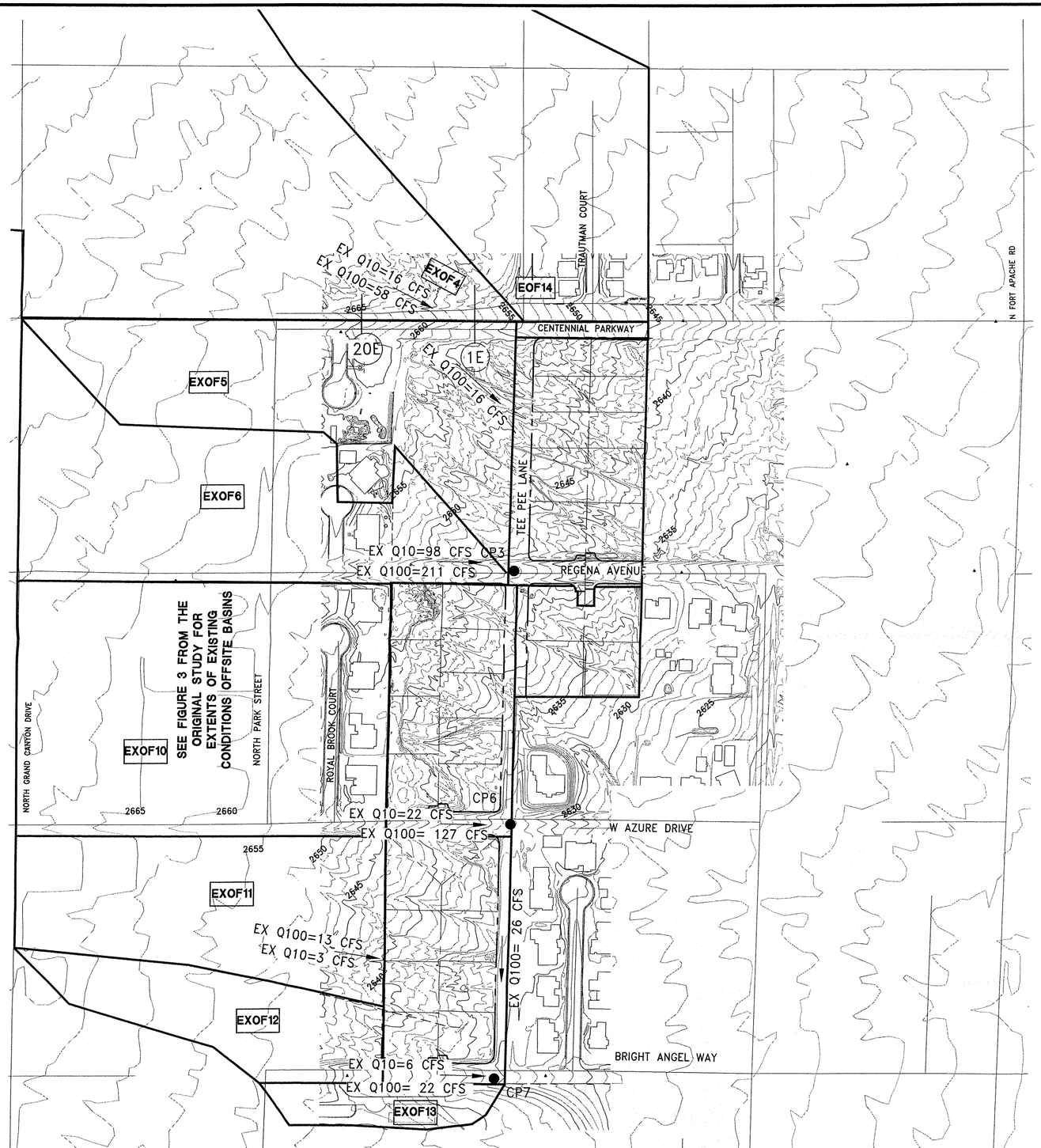
SUBBASIN OR CP	BASIN AREA (AC)	100 YR (cfs)	10 YR (cfs)
ON1	5.32	6	1
CP-RG	N/A	222	154
ON2	2.19	3	1
ON3	5.1	6	1
CP-AZ	N/A	189	19
ON4	4.92	6	1
CP-BA2	N/A	58	9

CP-RG= ON1 + FLOW SPLIT REGENA EAST
CP-AZ= CP16 + ON3 + FLOW SPLIT REGENA SOUTH
CP-BA2= ON4 + FLOW SPLIT AZURE SOUTH + EXOF13 + EXOF12 + EXOF11

CENTENNIAL AND TEE PEE
LENNAR

FIGURE 6R
DEVELOPED CONDITION DRAINAGE MAP

RCI Engineering
4325 DEAN MARTIN DRIVE, SUITE 300
LAS VEGAS, NV 89103
PH#702.453.0800 FAX#702.453.0801



N

75' 0' 75' 150'

SCALE: 1" = 150'

LEGEND

EXOF4	EXISTING DRAINAGE SUBBASINS
	SUBBASIN BOUNDARY
CP3	REFERENCED EXIST CONDITION CONCENTRATION POINT
EX Q100=XX CFS EX Q10=XX CFS	REFERENCED EXISTING CONDITIONS STORM FLOWS SEE FIGURE 3 FROM ORIGINAL STUDY
1E	CROSS SECTION CALCULATIONS BASED ON EXISTING CONDITIONS STORM FLOWS SEE FIGURE 3 FROM ORIGINAL STUDY

100-YEAR
OFFSITE EXISTING HYDRAULIC SECTIONS

Location	Slope (%)	Q_{100} (cfs)	D_{100} (ft)	V_{100} (ft/sec)	D^*V_{100}
*SECT 1E CENTENNIAL PKWY	2.20	42	1.02	5.04	5.1
*SECT 20E CENTENNIAL PARKWAY	2.20	58	0.91	5.46	5.0

* CROSS SECTION CALCULATION FOR NORTH HALF OF CENTENNIAL PARKWAY CAPACITY

CENTENNIAL AND TEEPEE
LENNAR

FIGURE 7
EXISTING CONDITIONS CROSS SECTION MAP

RCI Engineering
4325 DEAN MARTIN DRIVE, SUITE 300
LAS VEGAS, NV 89103
PH#702.453.0800 FAX#702.453.0801

S:\Civil\...\Centennial and Tee Pee_EXHIBITS.dwg, Layout1, 11/21/17 3:03pm

IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 1
A SINGLE FAMILY RESIDENTIAL SUBDIVISION
BY LENNAR®

APN 125-30-502-007, 125-30-502-013
CLARK COUNTY, NEVADA
7.58+/- ACRES

LEGAL DESCRIPTION

PARCEL 13:

THE NORTHWEST QUARTER (NW ¼) OF THE SOUTHWEST QUARTER (SW ¼) OF THE NORTHEAST QUARTER (NE ¼) OF THE NORTHEAST QUARTER (NE ¼) OF SECTION 30, TOWNSHIP 19 SOUTH, RANGE 60 EAST. M.D.M.

PARCEL 15:

THE WEST HALF (W ½) OF THE NORTHWEST QUARTER (NW ¼) OF THE NORTHEAST QUARTER (NE ¼) OF THE NORTHEAST QUARTER (NE ¼) OF SECTION 30, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M.

BENCHMARK

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

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

BASIS OF BEARINGS

SOUTH 89°47'00" EAST BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 30, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY RECORDER'S OFFICE IN FILE 89, PAGE 3 OF SURVEYS.

OWNER:

GREYSTONE NEVADA LLC
2490 PASEO VERDE PARKWAY SUITE 120 HENDERSON, NV 89074
PHONE: (702) 736-9100 FAX:(702) 736-9200

DEVELOPER:

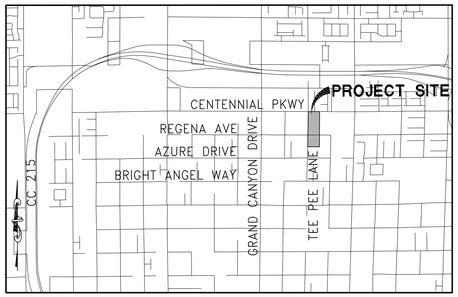
LENNAR®
2490 PASEO VERDE PARKWAY SUITE 120 HENDERSON, NV 89074
PHONE: (702) 736-9100 FAX: (702) 736-9200

DESIGN ENGINEER:

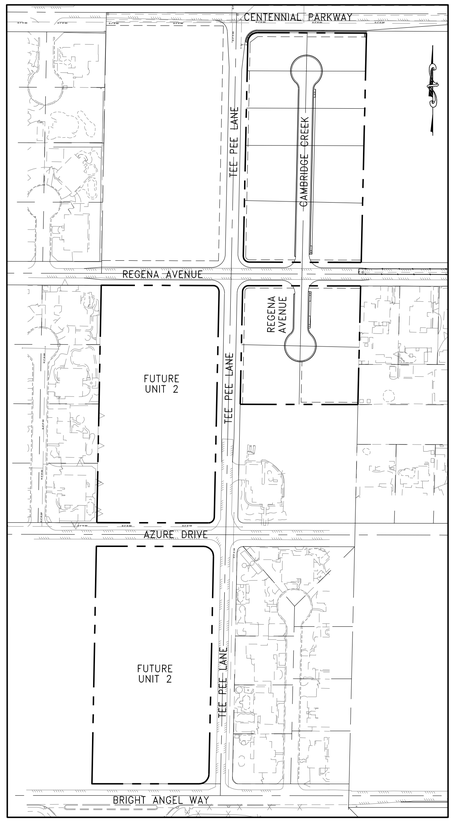
RCI *Engineering*
4325 Dean Martin Road, Suite 300 - Las Vegas, NV 89103
PH#702.453.0800 FAX#702.453.0801

SHEET INDEX

SHT No.	DWG ID	DRAWING DESCRIPTION
1	C-1	COVER SHEET
2	N-1	GENERAL NOTES, LEGEND AND ABBREVIATIONS
3	G-1	GRADING PLAN (SHEET 1 OF 3)
4	G-2	GRADING PLAN (SHEET 2 OF 3)
5	G-3	GRADING PLAN (SHEET 3 OF 3)
6	G-4	GRADING PLAN (SHEET 4 OF 4)
7	D-1	GRADING DETAILS (SHEET 1 OF 2)
8	D-2	GRADING DETAILS (SHEET 2 OF 2)
9	MU-1	MASTER UTILITY
10	U-1	UTILITY PLAN (SHEET 1 OF 3)
11	U-2	UTILITY PLAN (SHEET 2 OF 3)
12	U-3	UTILITY PLAN (SHEET 3 OF 3)
13	P-1	PLAN AND PROFILE – REGENA AVE
14	P-2	PLAN AND PROFILE – REGENA AVE STA: 9+55.83 TO 16+83.71
15	P-3	PLAN AND PROFILE – CENTENNIAL PKWY 22+76.24 TO 30+05.00
16	P-4	PLAN AND PROFILE – TEE PEE LANE STA: 19+08.37 TO 23+81.27
17	P-5	PLAN AND PROFILE – TEE PEE LANE STA: 23+81.27 TO 29+95.52
18	P-6	PLAN AND PROFILE – CAMBRIDGE CREEK CT
19	S-1	STREETLIGHT, SIGNAGE AND STRIPING PLAN (SHEET 1 OF 3)
20	S-2	STREETLIGHT, SIGNAGE AND STRIPING PLAN (SHEET 2 OF 3)
21	S-3	STREETLIGHT, SIGNAGE AND STRIPING PLAN (SHEET 3 OF 3)



VICINITY MAP
NOT TO SCALE



SITE PLAN
NOT TO SCALE

APPROVED BY:

NV ENERGY

NV ENERGY COMPANY — DATE

NV ENERGY COMPANY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NV ENERGY COMPANY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.

CENTRAL TELEPHONE COMPANY, d/b/a CENTURYLINK

CENTRAL TELEPHONE COMPANY, d/b/a CENTURYLINK

THE CENTRAL TELEPHONE COMPANY, D/B/A CENTURYLINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

SOUTHWEST GAS

SOUTHWEST GAS CORPORATION — DATE

COX COMMUNICATIONS LAS VEGAS INC.

COX COMMUNICATIONS, LAS VEGAS INC. — DATE

CITY OF LAS VEGAS - SEWER ONLY

DAVID BOWERS, P.E. #16736, P.T.O.E. — DATE
CITY ENGINEER

APPROVAL OF THESE PLANS IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHTS-OF-WAY AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE THE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS, EXCEPT THOSE SPECIFICALLY LISTED UNDER DEVIATIONS FROM STANDARD. THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN DEVIATIONS FROM STANDARDS IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS CLARK COUNTY AREA NEVADA.

CLARK COUNTY FIRE DEPARTMENT

CLARK COUNTY FIRE DEPARTMENT — DATE

LAS VEGAS VALLEY WATER DISTRICT APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT # _____ DATE: _____
(SHEETS C-1, N-1, MU-1, U-1 THRU U-3, P-1, P-2, P-4 THRU P-6)

NOTE: A PRE-DEVELOPMENT MEETING WITH THE DEPARTMENT OF PUBLIC WORKS DEVELOPMENT REVIEW DIVISION, OFF-SITE INSPECTOR IS REQUIRED. PLEASE CONTACT THE INSPECTOR AT 702-455-4610

DISCLAIMER NOTE:

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

Avoid overhead power line contact. It's costly.
Call before you Overhead
1-702-227-2929
Nevada Power Environment and Safety Services Department

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811
OR
1-800-227-2600
CLARK COUNTY TRAFFIC OPERATIONS
1-702-455-6000



Call before you UnderGround
1-702-455-6000
CLARK COUNTY TRAFFIC OPERATIONS
AND
1-702-432-5300
LAS VEGAS AREA COMPUTERIZED TRAFFIC SYSTEM

FOR REVIEW ONLY

REV	DESCRIPTION	BY	APPD	DATE

DATE: December 30, 2014
HORIZ. SCALE: N/A
VERT. SCALE: N/A
DRAWN BY: MJD/dlb
DESIGNED BY: AW
CHECKED BY: CZ
APPROVED BY: CZ
PROJECT #: 3040.0038

LENNAR®
2490 PASEO VERDE PARKWAY SUITE 120 HENDERSON, NV 89074
PHONE: (702) 736-9100 FAX: (702) 736-9200

RCI Engineering
4325 Dean Martin Road, Suite 300, Las Vegas, NV 89103
PH#702.453.0800 FAX#702.453.0801

IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 1
A SINGLE FAMILY RESIDENTIAL SUBDIVISION
COVER SHEET
CLARK COUNTY NEVADA

CHRISTOPHER R. ZRINYI
Exp. 6/30/2016
CIVIL
No. 13976
PROFESSIONAL ENGINEER — STATE OF NEVADA

DRAWING
C-1
SHT 1 OF 21
HTE NUMBER

G:\3040_LENR\0038_Centennial and Tee Pee_CIVIL_IPS\UNIT 1\3001_C01.dwg crivera 12/30/14 9:54am

GENERAL NOTES

1. ALL QUANTITIES SHOWN HEREIN ARE APPROXIMATE AND USED FOR PERMIT AND BOND PURPOSES ONLY. THEY SHALL NOT BE USED IN ANY WAY FOR BIDDING OR CONSTRUCTION. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO CONDUCT QUANTITY TAKE-OFFS FOR BIDDING AND CONSTRUCTION PURPOSES.
2. A GEOTECHNICAL INVESTIGATION WAS PERFORMED FOR THE PROJECT BY AMERICAN SOILS ENGINEERING, LLC DATED DECEMBER 30,2013, PROJECT NO.1691-GEO. THE CONTRACTOR SHALL ATTENTIVELY EXAMINE THE SITE IN SUCH A MANNER THAT HE CAN CONFIRM EXISTING SURFACE CONDITIONS WITH THOSE PRESENTED IN THE GEOTECHNICAL REPORT. HE SHALL SATISFY HIMSELF THAT THE QUALITY AND QUANTITY OF EXPOSED MATERIALS AND SUBSURFACE SOIL OR ROCK DEPOSITS HAVE BEEN SATISFACTORILY REPRESENTED BY THE GEOTECHNICAL ENGINEER'S REPORT AND CIVIL ENGINEER'S DRAWINGS. ANY DISCREPANCY THAT MAY BE OF PRIOR KNOWLEDGE TO THE CONTRACTOR THAT IS REVEALED THROUGH HIS INVESTIGATIONS SHALL BE MADE AVAILABLE TO THE OWNER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO REVIEW THE GEOTECHNICAL REPORT PRIOR TO CONSTRUCTION. RESULTS OF THE GEOTECHNICAL INVESTIGATION ALONG WITH THEIR RECOMMENDATIONS SHALL BECOME PART OF THE SPECIFICATIONS BUT DO NOT CONSTITUTE A GUARANTEE OF THE SUBSURFACE CONDITIONS IN ANY WAY.
3. THE CONTRACTOR SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; AND THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY, AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY, AND HOLD THE OWNER AND ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR ENGINEER.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXCAVATION AND SHORING PROCEDURES AND CONFORM TO THE LATEST O.S.H.A. REQUIREMENTS.
5. THE CONTRACTOR SHALL MAINTAIN AN ON-GOING DUST CONTROL PROGRAM, INCLUDING WATERING OF OPEN AREAS, IN ORDER TO CONFORM WITH THE LATEST STATE AND COUNTY AIR POLLUTION REGULATIONS. THE CONTRACTOR SHALL HAVE A DUST CONTROL PLAN APPROVED BY THE CLARK COUNTY DISTRICT HEALTH DEPARTMENT AIR POLLUTION CONTROL DIVISION PRIOR TO COMMENCEMENT OF ANY WORK.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DAILY REMOVAL OF ALL CONSTRUCTION MATERIALS SPILLED ON PAVED STREETS, ONSITE AND OFFSITE.
7. THE CONTRACTOR SHALL PURSUE THE WORK IN A CONTINUOUS AND DILIGENT MANNER, CONFORMING TO ALL THE PERTINENT SAFETY REGULATIONS, TO INSURE A TIMELY COMPLETION OF THE PROJECT.
8. THE CONTRACTOR SHALL NOTIFY ALL ENTITIES INVOLVED (PUBLIC AND PRIVATE) 48 HOURS PRIOR TO BEGINNING CONSTRUCTION, AND 48 HOURS PRIOR NOTICE FOR ALL SURVEYING AND INSPECTIONS DURING CONSTRUCTION.
9. ALL AREAS DISTURBED AND LEFT UNDEVELOPED FOR A PERIOD OF MORE THAN 30 DAYS SHALL BE STABILIZED BY THE APPLICATION OF AN APPROVED DUST PALLIATIVE AT THE COST OF THE CONTRACTOR AND PER THE APPROVED STORM WATER POLLUTION PREVENTION PLAN.
10. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND FEES REQUIRED FOR CONSTRUCTION.
11. ALL EXISTING UTILITY LOCATIONS, SIZES, AND DESCRIPTIONS AS SHOWN ON THESE DRAWINGS ARE FROM SURFACE OBSERVATIONS USED IN CONJUNCTION WITH AVAILABLE RECORDS, REFERENCE MAPS, DRAWINGS, AND VERBAL STATEMENTS SUPPLIED BY UTILITY COMPANIES, AND MAY NOT BE WHOLLY ACCURATE OR RELIABLE. THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES WHICH MAY BE AFFECTED BY THE WORK TO OBTAIN ASSISTANCE IN THE LOCATION OF EXISTING MAINS AND SERVICE CONNECTIONS. THE CONTRACTOR SHALL ALSO CALL U.S.A. (1-800-227-2600) PRIOR TO BEGINNING WORK.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION SIGNING, BARRICADES AND TRAFFIC DELINEATION TO CONFORM TO THE STATE OF NEVADA, DEPARTMENT OF TRANSPORTATION, "NEVADA WORK ZONE TRAFFIC CONTROL MANUAL".
13. THE WORK IN THIS CONTRACT INCLUDES ALL ONSITE AND OFFSITE WORK SHOWN ON THESE DRAWINGS, DESCRIBED IN THE SPECIFICATIONS, OR REASONABLY IMPLIED.
14. THE CONTRACTOR SHALL AT ALL TIMES DURING CONSTRUCTION, PROTECT FROM DAMAGE EXISTING IMPROVEMENTS ON AND AROUND THE SITE, INCLUDING, BUT NOT LIMITED TO, PAVEMENT, CURB & GUTTER, SIDEWALK, LANDSCAPING, SIGNAGE, STORM & SANITARY SEWERS, AND ALL UTILITIES. THE CONTRACTOR SHALL ASSUME SOLE RESPONSIBILITY FOR THE REPAIR OF ANY IMPROVEMENTS (EXISTING OR PROPOSED) DAMAGED THROUGHOUT THE COURSE OF CONSTRUCTION.
15. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN AT ALL TIMES EMERGENCY ACCESS TO THE PROJECT SITE TO THE SATISFACTION OF THE LOCAL FIRE DEPARTMENT.
16. THE CONTRACTOR SHALL, UPON COMPLETION OF THE PROJECT, PREPARE AND SUBMIT TO THE OWNER RECORD DRAWINGS INDICATING BY DIMENSION AND DESCRIPTION ANY FACILITY CONSTRUCTED CONTRARY TO THAT SHOWN ON THESE PLANS.
17. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF ALL MATERIALS TO BE USED ON THE SITE TO INCLUDE, BUT NOT BE LIMITED TO, A.C. AND P.C.C. MIX DESIGN, AGGREGATE BASE QUALIFICATIONS, PRECAST CONCRETE, CAST IRON GRATES AND COVERS, PIPING, FENCING, AND SIGNS TO THE PROJECT ENGINEER FOR APPROVAL PRIOR TO THE MANUFACTURING OF OR USE OF SUCH ITEMS.
18. INSPECTION REQUIREMENTS SHALL BE IN ACCORDANCE WITH COUNTY STANDARDS OR THE STANDARD SPECIFICATIONS, WHICH EVER IS THE MORE STRINGENT.
19. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.

CITY OF LAS VEGAS GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST ISSUE; THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST REVISED EDITION; THE "SUMMERLIN IMPROVEMENT STANDARDS" FOR WORK IN THE SUMMERLIN AREA; AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY; THE UNIFORM BUILDING CODE; AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".
2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CLV PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY TO THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE PLANS. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCE'S WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.
3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER AND OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS, ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.
5. TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK, CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. MIX DESIGNS TO BE APPROVED BY THE CITY, PRIOR TO THE USE ON THE PROJECT.
6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.
7. EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTRUDED-TYPE CURB.
8. AC PAVEMENT TO BE ONE-HALF INCH (½") ABOVE LIP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS AND CROSS GUTTERS.
9. CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.
10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.
11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF THE TRANSITIONS TO BE AS SHOWN ON PLANS.
12. ALL GRADING WORK SHALL CONFORM TO THE SOILS REPORT AS PREPARED BY NOVA GEOTECHNICAL PROJECT. E-12-044, DATED MAY, 25 2012 APPROVED BY THE CITY ENGINEER, AND AS SHOWN ON THESE PLANS.
13. EXACT LOCATION OF ALL SAWCUT LINES MAY BE ADJUSTED OR DETERMINED IN THE FIELD BY A CITY OF LAS VEGAS ENGINEER IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES RELOCATIONS.
14. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS, ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH N.R.S. STATUTE NO. 625.380 & CITY OF LAS VEGAS TITLE 18, APPENDIX D.
15. UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC., SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APRONS, FLOWLINES, AND CROSS GUTTERS UNLESS WRITTEN APPROVAL IS GRANTED BY THE UTILITY COMPANY AND THE CITY ENGINEER. WALL NOTES:
16. ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVIL PLANS FOR THE PURPOSE OF REVIEWING GRADING RELATIONSHIPS; FLOOD CONTROL AND SIGHT DISTANCE AT INTERSECTIONS. NEW WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE BUILDING DEPARTMENT.
17. ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHT OF WAY.
18. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, ANDSEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.
19. MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF NDOT OR THE CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.
20. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC, THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO OFFSITE INSPECTION AND TESTING CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.
21. SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S) SHALL BE PROVIDED TO THE OFFSITE INSPECTION AND TESTING SECTION PRIOR TO PROJECT ACCEPTANCE. THE MAP(S) SHALL INCLUDE THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, AND THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXITS THE PUBLIC RIGHT-OF-WAY. THE LOCATIONS SHALL BE DESCRIBED BY STATE PLANE COORDINATES WHICH SHALL BE BASED ON THE "NEVADA COORDINATE SYSTEM OF 1983, EAST ZONE" AS DEFINED BY THE NEVADA REVISED STATUTES CHAPTER 327, AND TIED TO THE CITY OF LAS VEGAS VERTICAL CONTROL BENCHMARK NETWORK. COORDINATES MUST BE CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CERTAINTIES OF +/- 0.1 METER (+/- 0.3 FEET). A SEPARATE ELECTRONIC COMMA DELIMITED FILE FOR THE SANITARY SEWER AND STORM DRAIN COORDINATES SHALL ALSO ACCOMPANY THE SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S).
22. SANITARY SEWER SERVICE LATERALS REQUIRE THE INSTALLATION OF A MARKER BALL AT THE CONNECTION OF THE SEWER SERVICE LATERAL TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERAL EXITS THE PUBLIC RIGHT-OF-WAY. STORM DRAIN LATERALS REQUIRE THE INSTALLATION OF A MARKER BALL AT THE CONNECTION OF THE STORM DRAIN LATERAL TO THE STORM DRAIN MAIN AND WHERE THE STORM DRAIN LATERAL EXITS THE PUBLIC RIGHT-OF-WAY OR WHERE THE STORM DRAIN LATERAL CONNECTS TO A DROP INLET. THE MARKER BALL SHALL BE 3M 4" MARKER BALL 1404-XR OR APPROVED EQUAL.
23. CCTV VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST ADDITION.
24. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

CLARK COUNTY TRAFFIC NOTES

1. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ONTO THE PORTIONS OF THE ROAD(S) BEING IMPROVED HEREUNDER, REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER OFF-SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.
2. 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 GROUND MOUNTED STOP SIGNS AT ALL NEW STREET ENCROACHMENTS INTO EXISTING COUNTY STREETS IMMEDIATELY AFTER FIRST GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN SAID SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.
3. ALL CONSTRUCTION SIGNING, BARRICADING AND PAVEMENT MARKINGS SHALL CONFORM TO THE NEVADA WORK ZONE TRAFFIC CONTROL HANDBOOK – 1986 AND TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, CURRENT EDITION.
4. 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 COUNTY TRAFFIC MANAGER.
5. THE DEVELOPER SHALL BE RESPONSIBLE TO PROVIDE AND INSTALL ALL PERMANENT SIGNS SHOWN ON THE PLANS. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CLARK COUNTY AREA STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGNPOSTS SHALL BE INSTALLED IN ACCORDANCE WITH CLARK COUNTY AREA STANDARDS. ALL SIGNS SHALL USE CLASS VI SHEETING.
6. IF A PROPOSED STREET LIGHT STANDARD IS FIELD LOCATED TO WITHIN FIVE (5) FEET OF ANY SIGN, SHOWN HEREON TO BE MOUNTED ON A SIGN POST, CHANGE SIGN MOUNTING TO ONE ON THE STREETLIGHT STANDARD.
7. PRIOR TO CONSTRUCTION, THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE CURRENT PLANNING DIVISION OF THE DEPARTMENT OF COMPREHENSIVE PLANNING.
8. ALL TRAFFIC SIGNAL POLE ASSEMBLIES, STEEL PEDESTAL FOR CABINETS AND STREET LIGHT POLES SHALL BE GALVANIZED PER ASTM A.123.
9. ALL STREET LIGHTING INSTALLATIONS EXCEPT NOTED ON THE STREET LIGHTING PLANS SHALL CONFORM TO THE UNIFORM STANDARD DRAWINGS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, LATEST EDITION OF EACH.
10. THE FOLLOWING CLARK COUNTY UNDERGROUND FACILITIES MAY BE LOCATED IN YOUR PROJECT AREA: STREET LIGHTING, TRAFFIC SIGNALS, AND FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T.) INTERCONNECT CABLE. YOU MUST CONTACT CLARK COUNTY TRAFFIC MANAGEMENT DIVISION, OPERATIONS UNIT AT 455-6000 FOR LOCATIONS AT LEAST 48 HOURS PRIOR TO WORKING IN THE AREA. CLARK COUNTY IS NOT A MEMBER OF "CALL BEFORE YOU DIG" (UNDERGROUND SERVICE ALERT), AND A CALL TO THAT ORGANIZATION DOES NOT RELIEVE YOU OF LIABILITY FOR CLARK COUNTY FACILITIES.
11. F.A.S.T. INTERCONNECT CABLE POLICY IS IN EFFECT. INTERCONNECT CABLE MUST BE MAINTAINED AT ALL TIMES. DEVELOPER/CONTRACTOR SHALL PROVIDE TEMPORARY OVERHEAD INTERCONNECT CABLE WHILE PERMANENT CABLE IS BEING RELOCATED. TEMPORARY AERIAL INSTALLATION MUST BE ACCEPTABLE TO THE COUNTY TRAFFIC MANAGER AND TO F.A.S.T. ANY DAMAGE TO THIS CABLE IS DEEMED IN EMERGENCY BY F.A.S.T., CITY OF LAS VEGAS, CLARK COUNTY AND NDOT AND MUST BE REPAIRED IMMEDIATELY TO F.A.S.T. ACCEPTANCE. $2,500 PER DAY DAMAGES MAY BE ASSESSED AFTER 24 HOURS HAS ELAPSED FROM TIME OF BREAK OR DAMAGE.
12. ALL NEW OR REPLACEMENT TRAFFIC SIGNAL LOOPS SHALL BE INSTALLED USING CABLE-IN-DUCT WIRING, SHALL HAVE INDEPENDENT LEAD-IN WIRES FOR EACH LOOP FROM THE CONTROLLER TO THE PULL-BOX, AND EACH LEAD-IN SHALL BE INDIVIDUALLY TAGGED.
13. TRAFFIC SIGNAL PEDESTRIAN HEADS SHALL BE THE L.E.D. TYPE.
14. ELECTRICAL POWER SERVICE POINT LOCATION(S) FOR STREET LIGHTING AND TRAFFIC SIGNALS MUST BE INDICATED ON THE PLANS. IF CONNECTING TO AN EXISTING CIRCUIT, INDICATE LOCATION OF EXISTING SERVICE POINT FOR EACH CIRCUIT.
15. WHEN STREETLIGHTS ARE TO BE CONNECTED TO AN EXISTING CIRCUIT, THE ENGINEER MUST CERTIFY THAT THE EXISTING CIRCUIT IS CAPABLE OF HANDLING THE ADDITIONAL CIRCUIT LOAD.
16. CLARK COUNTY RESERVES THE RIGHT TO REJECT STREET LIGHT AND TRAFFIC SIGNAL POLES AND ASSEMBLIES WHICH HAVE A "STRIPED" APPEARANCE.
17. TWO WEEKS PRIOR TO BEGINNING OF CONSTRUCTION, MODIFICATION OR RELOCATION OF ANY TRAFFIC SIGNAL SYSTEM, WRITTEN NOTICE SHALL BE SUBMITTED TO THE CLARK COUNTY TRAFFIC MANAGEMENT DIVISION OF THE DATE THAT WORK WILL BEGIN.
18. THREE (3) NORMAL WORKING DAYS PRIOR TO TURN-ON OR COMPLETION OF MODIFICATION(S) TO A TRAFFIC SIGNAL SYSTEM, WRITTEN NOTICE SHALL BE SUBMITTED TO THE CLARK COUNTY TRAFFIC MANAGEMENT DIVISION THAT WORK IS BEING COMPLETED AND THE PROPOSED DATE OF COMPLETION.

CITY OF LAS VEGAS SEWER NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, AS AMENDED. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.
2. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS, ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEER.
3. CHISEL "S" OR "G" IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.
4. POLYVINYL (PVC) SEWER PIPE SHALL MEET ASTM D-3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND BACKFILL OF TYPE II AGGREGATE BASE.
5. ALL MANHOLES PAVED IN STREETS EIGHTY (80') FOOT R/W AND LARGER SHALL HAVE CONCRETE COLLARS. STREETS LESS THAN EIGHTY (80') FOOT R/W WILL REQUIRE RETROFIT IF PAVING DOES NOT CONFORM TO CITY STANDARDS AT THE MANHOLE.
6. TEE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCH (12") DIAMETER. CONNECTIONS TO FIFTEEN INCH (15") OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE "Y" S SHALL BE USED ON LINES TWELVE INCHES (12") OR ABOVE.
7. WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVVWD STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A WATER MAIN OR THE SEWER IS LESS THAN EIGHTEEN INCH (18") UNDER A WATER MAIN.
8. ALL CONTRACTORS INSTALLING SEWER MAINS THAT WILL BE UNDER THE JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS "A" CONTRACTORS.
9. THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN ONE TENTH (0.1) OF A FOOT FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. MAINS FOUND TO EXCEED THIS TOLERANCE WILL HAVE TO BE REPAIRED OR REMOVED OR REPLACED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.
10. INSTALLATION OF CURVED SEWER REQUIRES THE USE OF C-900 PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.
11. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.

DEPARTMENT OF PUBLIC WORKS NOTES

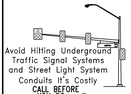
1. INSPECTIONS ARE REQUIRED. CALL 24 HOURS IN ADVANCE, 455-4610. YOUR PERMIT, APPROVED PLANS, AND BARRICADE PLANS FOR THIS WORK MUST BE ON THE JOB SITE AT ALL TIMES.
2. EXACT LOCATION OF ALL SAW-CUT LINES SHALL BE DETERMINED IN THE FIELD BY A CLARK COUNTY INSPECTOR.
3. CURB AND GUTTER WITH A GRADE OF LESS THAT 4/10 OF ONE PERCENT SHALL BE CONSTRUCTED BY SLIP FORMING. EACH JOINT SHALL BE CHECKED FOR GRADE PRIOR TO CONSTRUCTION AND WATER TESTED AS SOON AS POSSIBLE AFTER CONSTRUCTION.
4. FINAL ASPHALTIC CONCRETE (AC) PAVEMENT SURFACES SHALL BE ONE-HALF (1/2") INCH ABOVE THE LIP OF THE GUTTER (INCLUDING OPEN GRADE).
5. ALL OFF-SITE IMPROVEMENT CONSTRUCTION SHALL CONFORM TO THE UNIFORM STANDARD SPECIFICATIONS AND STANDARD DRAWINGS CLARK COUNTY AREA NEVADA AND CLARK COUNTY SUPPLEMENT TO UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS, LATEST REVISION.
6. PRIVATE STREETS CURB & GUTTER AND VALLEY GUTTERS REFLECTED ON THESE PLANS ARE TO BE INSPECTED BY A CLARK COUNTY INSPECTOR.
7. WHEEL CHAIR RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS SHALL BE DETERMINED IN THE FIELD BY A CLARK COUNTY INSPECTOR.
8. PROPER SIGNS, BARRIERS, BARRICADES AND LIGHTS SHALL BE PLACED AND MAINTAINED IN ACCORDANCE WITH THE LATEST "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" TRAFFIC, SCHOOL, OR STREET SIGNS OF ANY KIND ARE NOT TO BE MOVED FOR ANY REASON WITHOUT FIRST COORDINATING WITH THE DEPARTMENT OF PUBLIC WORKS INSPECTOR @ 455.4613.
9. THIS PLAN DOES NOT AUTHORIZE CLOSURE OF ANY ROAD OR STREET.
10. NO OPEN TRENCH SHALL BE ALLOWED ACROSS ANY STREET OR WITHIN TEN (10) FEET OF ANY TRAVEL-WAY, EXCEPT WHEN WORK IS IN ACTUAL PROGRESS. AREAS COVERED BY ACCEPTABLE STEEL PLATE ARE NOT TO BE CONSTRUED AS A TRENCH. NO OPEN TRENCH IS PERMITTED IN EXCESS OF 500 FEET OR LENGTH NECESSARY TO ACCOMMODATE PIPE INSTALLATION IN A SINGLE DAY, WHICH EVER IS GREATER. ALL TRENCH CROSSINGS AND BACKFILL SHALL MEET THE STANDARD SPECIFICATION UNLESS OTHERWISE STATED.
11. A TEMPORARY PATCH IS TO BE IN PLACE AT THE END OF EACH WORK DAY WHERE THE BACKFILL IN THE TRENCH HAS BEEN COMPLETED AND PRIOR TO OPENING THE WORK AREA BACK TO TRAFFIC AND IS TO BE MAINTAINED BY THE PERMITEE. A PERMANENT PATCH IS TO BE IN PLACE WITHIN THIRTY (30) DAYS AFTER THE INSTALLATION OF THE TEMPORARY PATCH.
12. COMPACTION TESTS ARE REQUIRED.

CLARK COUNTY FIRE DEPARTMENT NOTES

A. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE CLARK COUNTY FIRE CODE AS AMENDED, AND THE 2007 EDITION OF NATIONAL FIRE PROTECTION ASSOCIATION PAMPHLET #24.
B. FIRE HYDRANTS AND WATER SUPPLIES FOR FIRE PROTECTION SHALL BE AND MADE SERVICABLE PRIOR TO AND DURING THE TIME OF CONSTRUCTION IN ACCORDANCE WITH SECTION 1412 OF THE CLARK COUNTY FIRE CODE, AS AMENDED.
C. IF DURING CONSTRUCTION IT BECOMES NECESSARY TO CLOSE ANY CONTROL VALVE OR PLACE A HYDRANT OUT OF SERVICE, APPROVAL SHALL BE OBTAINED FOR THE FIRE DEPARTMENT PRIOR TO PLACING THE HYDRANT OUT OF SERVICE
D. PAINTING OF CURBS AND/OR STRIPING OF ASPHALT AREAS AND PROTECTION OF HYDRANTS FROM PHYSICAL INJURY SHALL BE PER FIRE HYDRANT INSTALLATION SPECIFICATIONS OF THE FIRE PREVENTION DIVISION.
E. NO FIRE HYDRANT SHALL BE LOCATED WITHIN 25 FEET OF ANY STRUCTURE, OR 6 FEET OF A DRIVEWAY, POWER POLE, LIGHT STANDARD, OR ANY OTHER OBSTRUCTION. FOR WALL, FENCE AND PLANTER LOCATIONS, A PERIMETER AROUND THE HYDRANT MEASURING A MINIMUM OF 3 FEET FROM ITS EXTERIOR SHALL BE MAINTAINED CLEAR OF ALL OBSTRUCTIONS AT ALL TIMES.
F. FIRE APPARATUS ACCESS ROADS SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF FIRE APPARATUS, WITH A MINIMUM VEHICLE LOAD OF 18,000 POUNDS PER AXLE, AND SHALL BE SURFACED AND PAVED SO AS TO PROVIDE ALL WEATHER DRIVING CAPABILITIES.
EXCEPTION: TEMPORARY ACCESS ROADS SERVING ONLY BUILDINGS UNDER CONSTRUCTION SHALL NOT BE REQUIRED TO BE PAVED, BUT SHALL COMPLY WITH ALL OTHER REQUIREMENTS OF SECTION 503.2.3 OF THE CLARK COUNTY FIRE CODE.
G. PRIOR TO ACCEPTANCE OF ANY FIRE SERVICE MAIN, A SATISFACTORY HYDROSTATIC TEST WITH PIPING JOINTS UNCOVERED MUST BE CONDUCTED. APPROVED PLANS, AN INSTALLATION PERMIT AND A CONTRACTOR'S MATERIALS AND TEST CERTIFICATE MUST BE PROVIDED AT TIME OF INSPECTION. SCHEDULE INSPECTION AT WWW.CLARKCOUNTYNV.GOV/DEPTS/FIRE.
H. FIRE HYDRANTS SHALL BE LOCATED 4' TO 7' FROM BACK OF CURB AND A MINIMUM OF 6 FEET AWAY F

DISCLAIMER NOTE:

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



Avoid overhead power line contact. It's costly.
Call before you Overhead
1-702-227-2929
Nevada Power Environment and Safety Services Department

Avoid cutting underground utility lines. It's costly.
Call before you Dig
811
1-800-227-2600
CLARK COUNTY TRAFFIC OPERATIONS
1-702-455-6000

CONSTRUCTION NOTES

1. CONSTRUCT AC PAVEMENT PER DETAILS 1 THRU 5 ON SHEET D-1
2. CONSTRUCT 30" ROLL CURB PER CCAUSD # 217.S1
3. CONSTRUCT 24" "L" CURB AND GUTTER PER CCAUSD # 216
4. CONSTRUCT 5' SIDEWALK PER CCAUSD # 234 (5-INCH THICK WHEN CONTIGUOUS TO ROLL CURB)
5. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD # 235 (CASE 1)
6. CONSTRUCT WALL OPENING PER DETAIL 26 SHEET D-2
7. CONSTRUCT WALL OPENING PER DETAIL 23 & 31 SHEET D-2
8. SAW CUT AND MATCH EXISTING PAVEMENT. FINAL LIMITS TO BE FIELD DETERMINED BY INSPECTOR
9. CONSTRUCT DEPRESSED CURB PER DETAIL 30 ON SHEET D-2
10. CONSTRUCT 5' WIDE ACCESS GATE
11. CONSTRUCT CUT OFF WALL PER DETAIL 3 AND 5 ON SHEET D-1
12. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD # 235 (CASE 3)

SURVEY MONUMENT NOTE

OWNER RESPONSIBLE TO PROVIDE SURVEY MONUMENTATION AS REQUIRED BY CLARK COUNTY PUBLIC WORKS AND CLARK COUNTY UNIFORM STANDARD DRAWING NUMBER 243. OWNER IS ALSO RESPONSIBLE TO REPLACE ALL SURVEY MONUMENTATION DAMAGED, DESTROYED, OR OBSCURED DURING CONSTRUCTION.

BUILDING PERMIT NOTE

ALL STRUCTURES SHOWN OR INDICATED ON THIS SUBMITTAL WITHIN THE PROPERTY REQUIRE A BUILDING PERMIT APPLICATION AND SUBMITTAL THIS INCLUDES BUILDINGS, ABOVE GROUND TANKS, SIGNS, RETAINING WALLS, FENCES, TRASH ENCLOSURES, SHADE STRUCTURES, STAIRWAYS, RAMPS, LIGHT POLES, LIGHT BOLLARDS, ETC. THIS DOES NOT INCLUDE ANY FLOOD CONTROL STRUCTURE SUCH AS PIPES, CULVERTS, ARCH CULVERTS, HEADWALLS, ETC. THIS DOES NOT INCLUDE ANY WORK WITHIN A PUBLIC STREET RIGHT-OF-WAY. THIS DOES NOT INCLUDE PRIVATE STREETS. THE REVIEW OF CIVIL IMPROVEMENT AND/OR GRADING PLANS DOES NOT INCLUDE ANY REVIEW OF ANY STRUCTURE THAT REQUIRES A BUILDING PERMIT APPLICATION."

BENCHMARK

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

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

BASIS OF BEARINGS

SOUTH 89°47'00" EAST BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 30, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY RECORDER'S OFFICE IN FILE 89, PAGE 3 OF SURVEYS.

SIGHT VISIBILITY ZONE

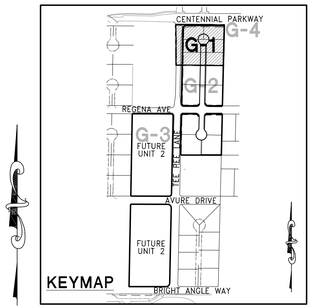
NO WALLS, FENCES, SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT, OTHER THAN TRAFFIC CONTROL DEVICES, FIRE HYDRANTS, TREES, AND STREET LIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT, MEASURED FROM TOP OF CURB, OR WHERE NO CURB EXISTS, A HEIGHT OF 27 INCHES MEASURED FROM THE TOP OF ADJACENT ASPHALT, GRAVEL OR PAVEMENT STREET SURFACE. THIS RESTRICTION EXTENDS ALONG THE SIGHT VISIBILITY LINE THROUGH LANDSCAPED MEDIANS.

FLOOD ZONE NOTE

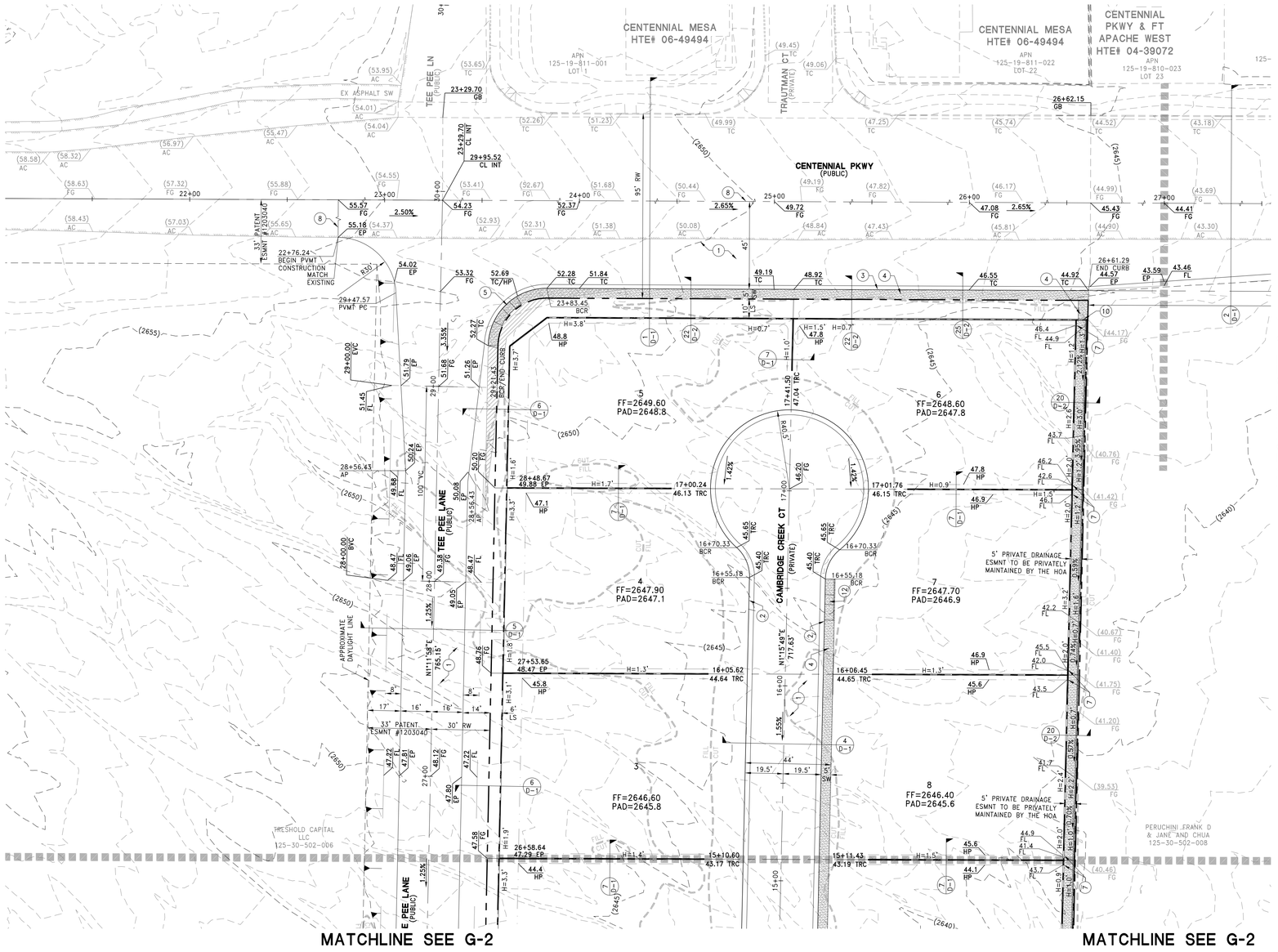
ACCORDING TO THE FEMA FLOOD INSURANCE RATE MAP (FIRM) COMMUNITY PANEL MAP NUMBER 32003C1745E DATED SEPTEMBER 27, 2002, THE SITE IS LOCATED IN A ZONE "X". ZONE "X" AREAS ARE DEFINED AS AREAS DETERMINDED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOOD PLAIN.

ENGINEERS NOTES

1. CONTRACTOR IS RESPONSIBLE FOR DUST AND EROSION CONTROL DURING CONSTRUCTION.
2. SEE DETAIL SHEET FOR ON-SITE PAVEMENT SECTIONS. CONTRACTOR TO VERIFY WITH SOILS REPORT.
3. SEE FINAL MAP FOR EXACT PROPERTY LINE DIMENSIONS.
4. ENGINEER TO BE NOTIFIED OF ANY DISCREPANCIES IMMEDIATELY.
5. THESE PLANS SHALL NOT, IN PART OR IN WHOLE, BE USED FOR CONSTRUCTION UNTIL APPROVED AND SIGNED BY THE GOVERNING AGENCIES.
6. ALL GRADING SHALL CONFORM TO SOILS REPORT RECOMMENDATIONS.
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   PROJECT NO. 1691-GEO
   DATED: DECEMBER 30,2013
9. CUT/FILL ESTIMATES
   EXISTING TO FINISH GRADE ELEVATIONS
   NET CUT: 9,242 CY
   NET FILL: 16,950 CY
10. SEE DETAIL 27 AND 28 SHEET D-2 FOR TYPICAL LOT DRAINAGE
11. FOR STORMWATER RUNOFF MANAGEMENT NOTES REFER TO SHEET N-1
12. FOR ALL PROPOSED SPOT GRADE ELEVATIONS ADD 2600 FEET FOR ELEVATION REFERENCE TO SEA LEVEL.



30' 15' 0' 30' 60'
SCALE: 1" = 30'



CLARK COUNTY DEPARTMENT OF PUBLIC WORKS DEVELOPMENT REVIEW

ACCEPTANCE OF PLANS FOR FILING BY

BY _____

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CHRISTOPHER R. ZRINYI, PE NO. 13976 — DATE

FOR REVIEW ONLY

REV	DESCRIPTION	BY	APP'D	DATE

DATE: December 30, 2014
HORIZ. SCALE: 1"=30'
VERT. SCALE: N/A
DRAWN BY: BD
DESIGNED BY: AW
CHECKED BY: CZ
APPROVED BY: CZ
PROJECT #: 3040.0038

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IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 1
A SINGLE FAMILY RESIDENTIAL SUBDIVISION
GRADING PLAN (SHEET 1 OF 3)

CLARK COUNTY NEVADA

PROFESSIONAL ENGINEER STATE OF NEVADA
CHRISTOPHER R. ZRINYI
Exp. 6/30/2016
CIVIL
No. 13976

DRAWING
G-1
SHT 3 OF 21
HTE NUMBER

O:\3040_LENR\0038_Centennial and Tee Pee_CIVIL_PS\UNIT 1\3003_C01.dwg crivero 12/30/14 11:14am

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LAS VEGAS AREA COMPUTERIZED TRAFFIC SYSTEM

SURVEY MONUMENT NOTE

OWNER RESPONSIBLE TO PROVIDE SURVEY MONUMENTATION AS REQUIRED BY CLARK COUNTY PUBLIC WORKS AND CLARK COUNTY UNIFORM STANDARD DRAWING NUMBER 243. OWNER IS ALSO RESPONSIBLE TO REPLACE ALL SURVEY MONUMENTATION DAMAGED, DESTROYED, OR OBSCURED DURING CONSTRUCTION.

CONSTRUCTION NOTES

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2. CONSTRUCT 30" ROLL CURB PER CCAUSD # 217.S1
3. CONSTRUCT 24" "L" CURB AND GUTTER PER CCAUSD # 216
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6. CONSTRUCT WALL OPENING PER DETAIL 26 SHEET D-2
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BENCHMARK

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

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

BASIS OF BEARINGS

SOUTH 89°47'00" EAST BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 30, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY RECORDER'S OFFICE IN FILE 89, PAGE 3 OF SURVEYS.

SIGHT VISIBILITY ZONE

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ENGINEERS NOTES

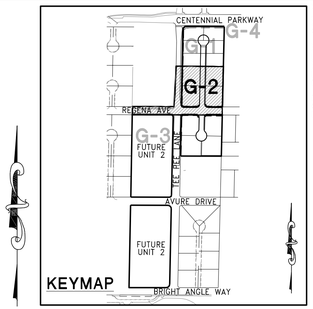
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CLARK COUNTY DEPARTMENT OF PUBLIC WORKS DEVELOPMENT REVIEW

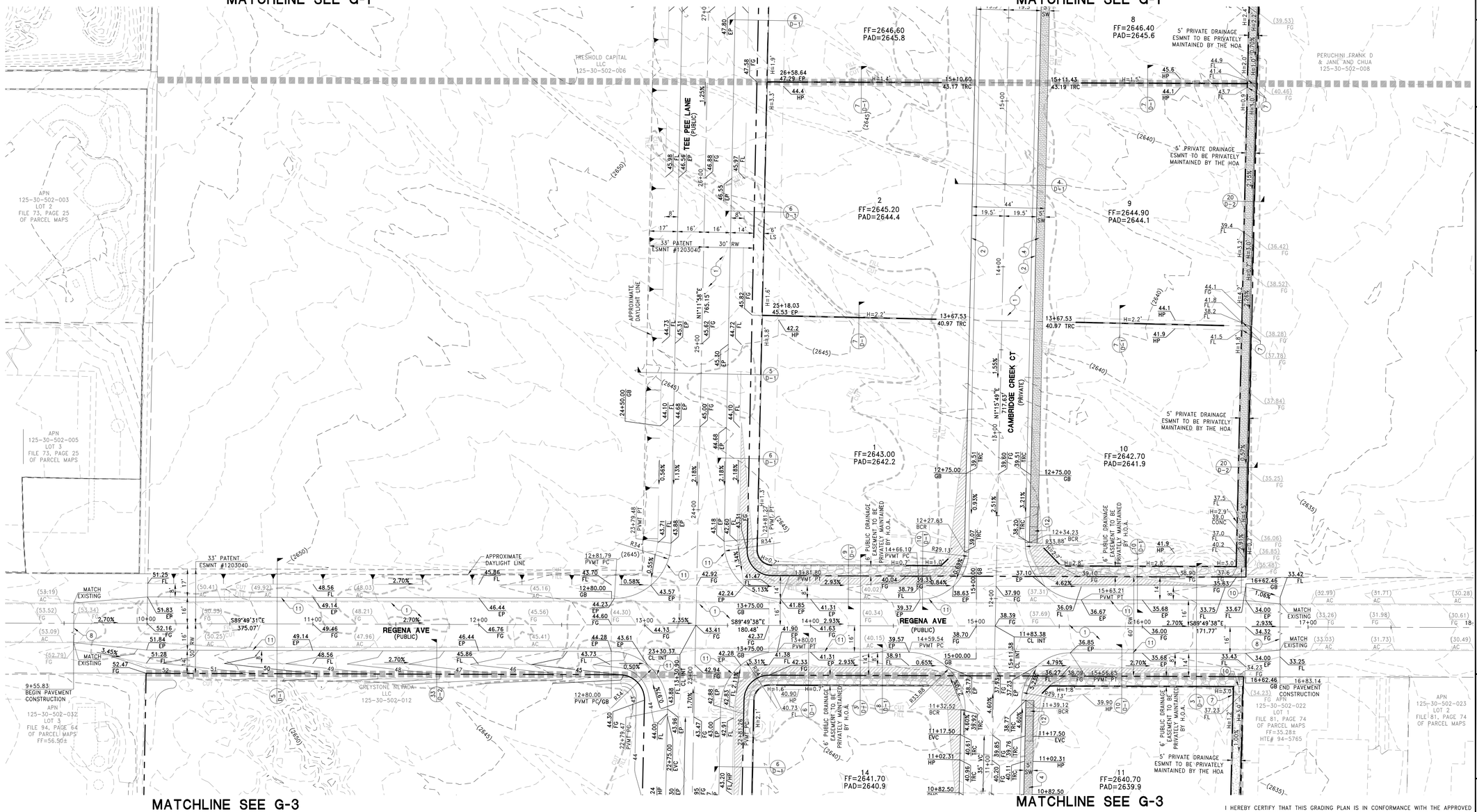
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CHRISTOPHER R. ZRINYI, PE NO. 13976 — DATE

FOR REVIEW ONLY

REV	DESCRIPTION	BY	APP'D	DATE

DATE: December 30, 2014
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VERT. SCALE: N/A
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IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 1
A SINGLE FAMILY RESIDENTIAL SUBDIVISION
GRADING PLAN (SHEET 2 OF 3)

CLARK COUNTY — NEVADA

PROFESSIONAL ENGINEER — STATE OF NEVADA — CHRISTOPHER R. ZRINYI — Exp. 6/30/2016 — CIVIL — No. 13976

DRAWING
G-2
SHT 4 OF 21
HTE NUMBER

G:\3040_LENR\0038_Centennial and Tee Pee_CIVIL_PPS\UNIT 1\3003_G01.dwg crivera 12/30/14 11:14am

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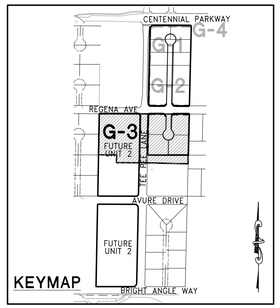
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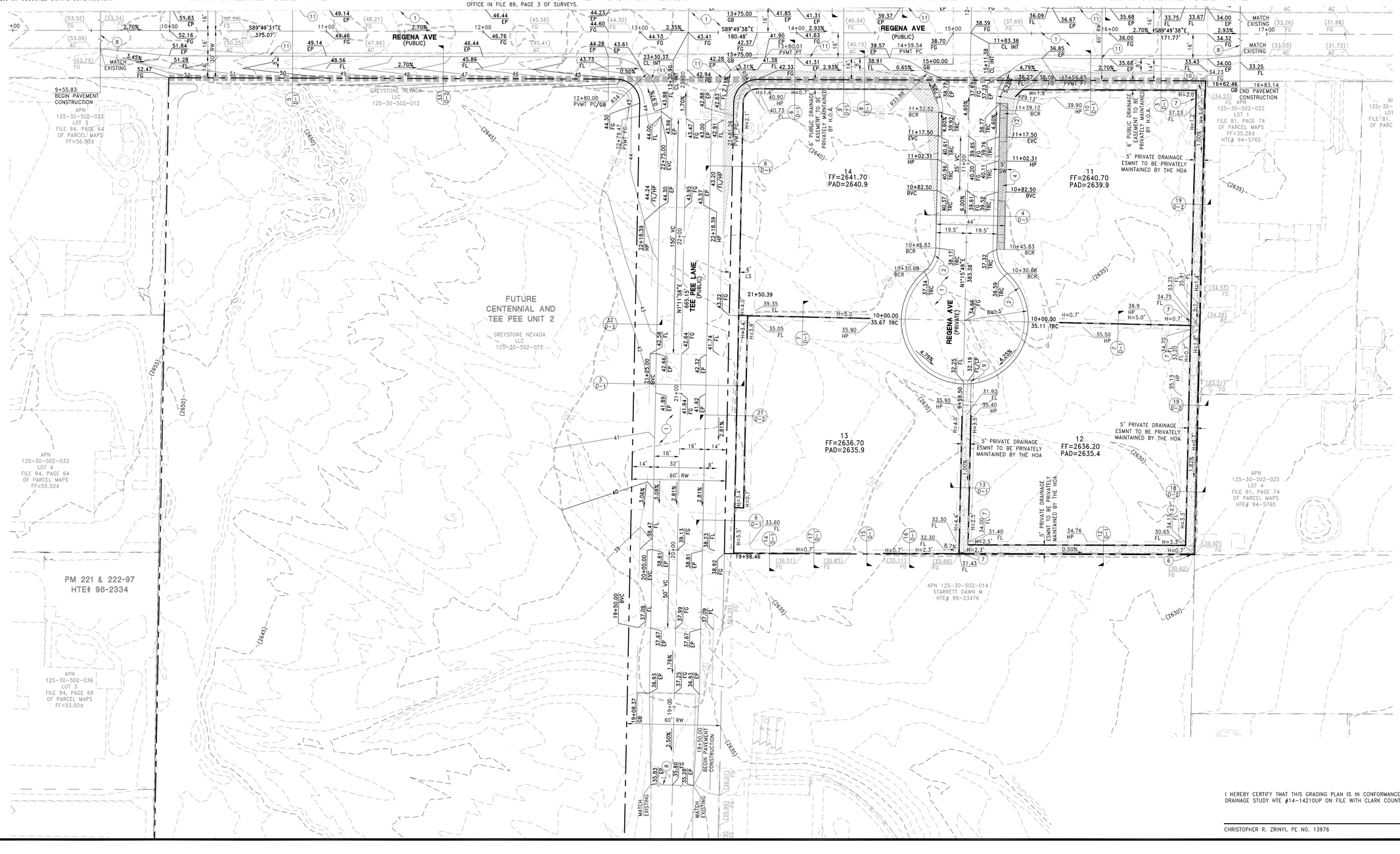


SURVEY MONUMENT NOTE

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MATCHLINE SEE G-2

MATCHLINE SEE G-2



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CHRISTOPHER R. ZRINYI, PE NO. 13976 — DATE

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(SHEET 3 OF 3)

CLARK COUNTY NEVADA

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DRAWING
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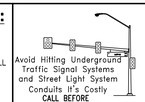
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SOUTH 89°47'00" EAST BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 30, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY RECORDER'S OFFICE IN FILE 89, PAGE 3 OF SURVEYS.

SIGHT VISIBILITY ZONE

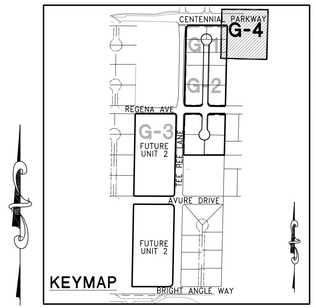
NO WALLS, FENCES, SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT, OTHER THAN TRAFFIC CONTROL DEVICES, FIRE HYDRANTS, TREES, AND STREET LIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT, MEASURED FROM TOP OF CURB, OR WHERE NO CURB EXISTS, A HEIGHT OF 27 INCHES MEASURED FROM THE TOP OF ADJACENT ASPHALT, GRAVEL OR PAVEMENT STREET SURFACE. THIS RESTRICTION EXTENDS ALONG THE SIGHT VISIBILITY LINE THROUGH LANDSCAPED MEDIANS.

FLOOD ZONE NOTE

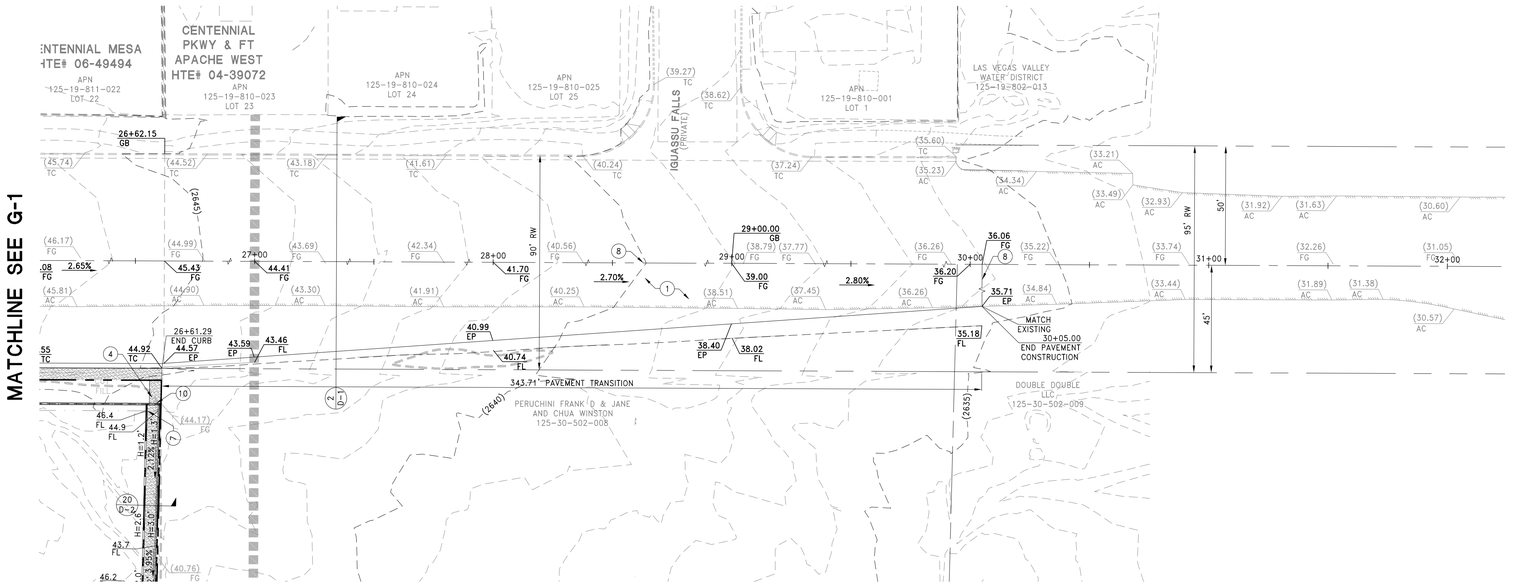
ACCORDING TO THE FEMA FLOOD INSURANCE RATE MAP (FIRM) COMMUNITY PANEL MAP NUMBER 32003C1745E DATED SEPTEMBER 27, 2002, THE SITE IS LOCATED IN A ZONE "X". ZONE "X" AREAS ARE DEFINED AS AREAS DETERMINDED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOOD PLAIN.

ENGINEERS NOTES

1. CONTRACTOR IS RESPONSIBLE FOR DUST AND EROSION CONTROL DURING CONSTRUCTION.
2. SEE DETAIL SHEET FOR ON-SITE PAVEMENT SECTIONS. CONTRACTOR TO VERIFY WITH SOILS REPORT.
3. SEE FINAL MAP FOR EXACT PROPERTY LINE DIMENSIONS.
4. ENGINEER TO BE NOTIFIED OF ANY DISCREPANCIES IMMEDIATELY.
5. THESE PLANS SHALL NOT, IN PART OR IN WHOLE, BE USED FOR CONSTRUCTION UNTIL APPROVED AND SIGNED BY THE GOVERNING AGENCIES.
6. ALL GRADING SHALL CONFORM TO SOILS REPORT RECOMMENDATIONS.
7. DURING CONSTRUCTION, SURVEYORS AND CONTRACTORS MUST VERIFY THAT ALL STREETS AND LOTS HAVE POSITIVE DRAINAGE. SAME MUST UTILIZE AT LEAST THREE GRADES ON VERTICAL TANGENTS TO VERIFY SLOPES.
8. SOIL REPORT NOTE:
   GRADING SHALL BE IN ACCORDANCE WITH SOILS REPORT PREPARED BY:
   ENGINEER: AMERICAN SOILS ENGINEERING, LLC
   PROJECT NO. 1691-GEO
   DATED: DECEMBER 30,2013
9. CUT/FILL ESTIMATES
   EXISTING TO FINISH GRADE ELEVATIONS
   NET CUT: 9,242 CY
   NET FILL: 16,950 CY
10. SEE DETAIL 27 AND 28 SHEET D-2 FOR TYPICAL LOT DRAINAGE
11. FOR STORMWATER RUNOFF MANAGEMENT NOTES REFER TO SHEET N-1
12. FOR ALL PROPOSED SPOT GRADE ELEVATIONS ADD 2600 FEET FOR ELEVATION REFERENCE TO SEA LEVEL.



30' 15' 0' 30' 60'
SCALE: 1" = 30'



CLARK COUNTY DEPARTMENT OF PUBLIC WORKS DEVELOPMENT REVIEW

ACCEPTANCE OF PLANS FOR FILING BY

BY _____

ACCEPTANCE OF THESE PLANS FOR FILING SHALL NOT BE CONSTRUED TO BE A PERMIT FOR OR AN APPROVAL OF ANY VIOLATION OF ANY OF THE PROVISIONS OF THE STATE OR COUNTY LAWS AND/OR SPECIFICATIONS. CLARK COUNTY SHALL BE HELD FREE FROM DAMAGES WHICH MAY RESULT FROM CONSTRUCTION OF THE IMPROVEMENTS FROM THE ENGINEERING DESIGN DEPICTED HEREIN.
NOTE: POWER POLES AND/OR OTHER EXISTING FACILITIES NOT IN THEIR PROPER LOCATION BASED ON PROPOSED IMPROVEMENTS SHOWN HEREON WILL BE RELOCATED AT NO EXPENSE TO CLARK COUNTY.

I HEREBY CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY HTE #14-14210UP ON FILE WITH CLARK COUNTY FOR THIS PROJECT.

CHRISTOPHER R. ZRINYI, PE NO. 13976 — DATE

FOR REVIEW ONLY

REV	DESCRIPTION	BY	APP'D	DATE

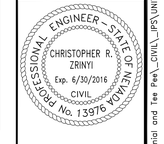
DATE: December 30, 2014
HORIZ. SCALE: 1"=30'
VERT. SCALE: N/A
DRAWN BY: BD
DESIGNED BY: AW
CHECKED BY: CZ
APPROVED BY: CZ
PROJECT #: 3040.0038

LENNAR®
2490 PASEO VERDE PARKWAY SUITE 120 HENDERSON, NV 89074
PHONE: (702) 736-9100 FAX: (702) 736-9200

RCI Engineering
4325 Dean Martin Road, Suite 300, Las Vegas, NV 89103
PH#702.453.0800 FAX#702.453.0801

IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 1
A SINGLE FAMILY RESIDENTIAL SUBDIVISION
GRADING PLAN
(SHEET 4 OF 4)

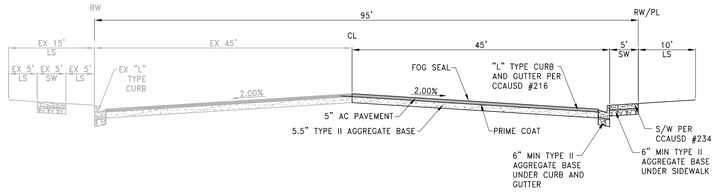
CLARK COUNTY NEVADA



DRAWING
G-4
SHT 6 OF 21
HTE NUMBER

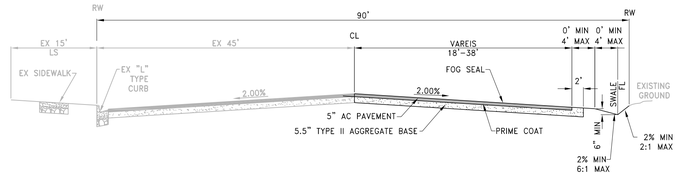
G:\3040_LENR\0038_Centennial and Tee Pee_CIVIL_IPS\UNIT 1\3003_G01.dwg crivera 12/30/14 11:15am

NOTE: ALL AGGREGATE BASES SHALL BE COMPACTED PER THE GEOTECHNICAL REPORT HTE#XX-XXXXX. PRELIMINARY PAVEMENT SECTIONS SHALL BE VERIFIED WITH THE FINAL PAVEMENT SECTION RECOMMENDATION REPORT PRIOR TO CONSTRUCTION. IF FINAL PAVEMENT SECTIONS ARE DIFFERENT A REVISION TO THE IMPROVEMENT PLANS WILL BE REQUIRED.



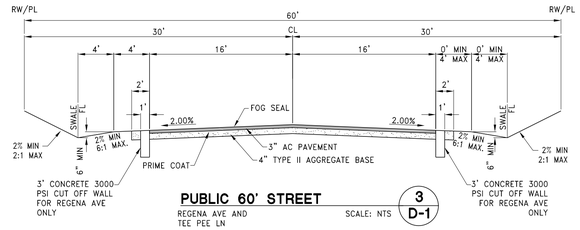
95' PUBLIC R/W STREET — 1 / D-1
CENTENNIAL PARKWAY — SCALE: NTS

NOTE: ALL AGGREGATE BASES SHALL BE COMPACTED PER THE GEOTECHNICAL REPORT HTE#XX-XXXXX. PRELIMINARY PAVEMENT SECTIONS SHALL BE VERIFIED WITH THE FINAL PAVEMENT SECTION RECOMMENDATION REPORT PRIOR TO CONSTRUCTION. IF FINAL PAVEMENT SECTIONS ARE DIFFERENT A REVISION TO THE IMPROVEMENT PLANS WILL BE REQUIRED.



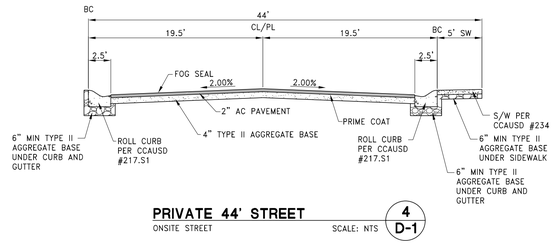
90' PUBLIC R/W STREET — 2 / D-1
CENTENNIAL PARKWAY — SCALE: NTS

NOTE: ALL AGGREGATE BASES SHALL BE COMPACTED PER THE GEOTECHNICAL REPORT HTE#XX-XXXXX. PRELIMINARY PAVEMENT SECTIONS SHALL BE VERIFIED WITH THE FINAL PAVEMENT SECTION RECOMMENDATION REPORT PRIOR TO CONSTRUCTION. IF FINAL PAVEMENT SECTIONS ARE DIFFERENT A REVISION TO THE IMPROVEMENT PLANS WILL BE REQUIRED.



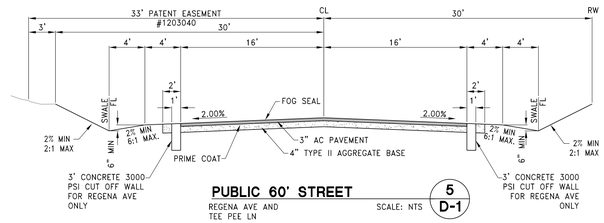
PUBLIC 60' STREET — 3 / D-1
REGENA AVE AND TEE PEE LN — SCALE: NTS

NOTE: ALL AGGREGATE BASES SHALL BE COMPACTED PER THE GEOTECHNICAL REPORT HTE#XX-XXXXX. PRELIMINARY PAVEMENT SECTIONS SHALL BE VERIFIED WITH THE FINAL PAVEMENT SECTION RECOMMENDATION REPORT PRIOR TO CONSTRUCTION. IF FINAL PAVEMENT SECTIONS ARE DIFFERENT A REVISION TO THE IMPROVEMENT PLANS WILL BE REQUIRED.

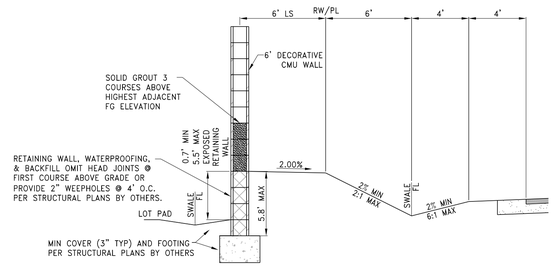


PRIVATE 44' STREET — 4 / D-1
ONSITE STREET — SCALE: NTS

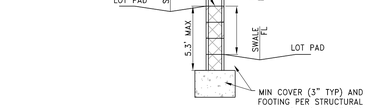
NOTE: ALL AGGREGATE BASES SHALL BE COMPACTED PER THE GEOTECHNICAL REPORT HTE#XX-XXXXX. PRELIMINARY PAVEMENT SECTIONS SHALL BE VERIFIED WITH THE FINAL PAVEMENT SECTION RECOMMENDATION REPORT PRIOR TO CONSTRUCTION. IF FINAL PAVEMENT SECTIONS ARE DIFFERENT A REVISION TO THE IMPROVEMENT PLANS WILL BE REQUIRED.



PUBLIC 60' STREET — 5 / D-1
REGENA AVE AND TEE PEE LN — SCALE: NTS



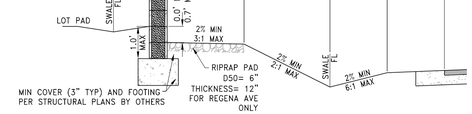
PERIMETER WALL — 6 / D-1
RETAINING — SCALE: NTS



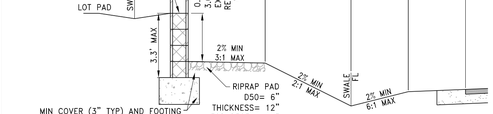
SIDE YARD TO SIDE YARD — 7 / D-1
RETAINING — SCALE: NTS



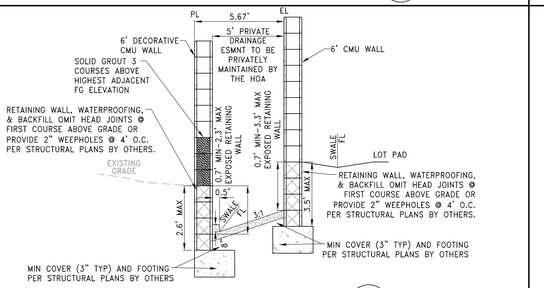
PERIMETER WALL — 8 / D-1
NO RETAINING — SCALE: NTS



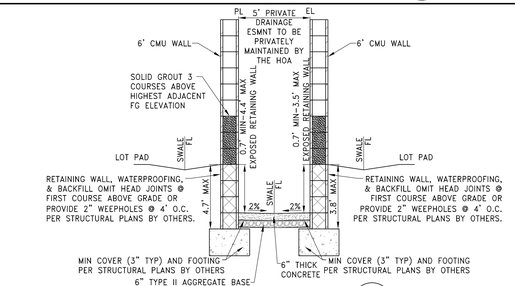
PERIMETER WALL — 9 / D-1
NO RETAINING — SCALE: NTS



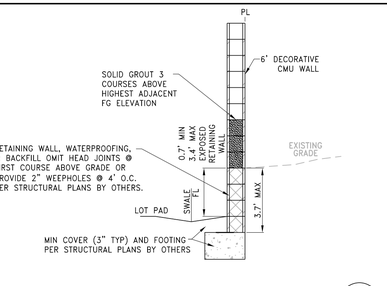
PERIMETER WALL — 10 / D-1
RETAINING — SCALE: NTS



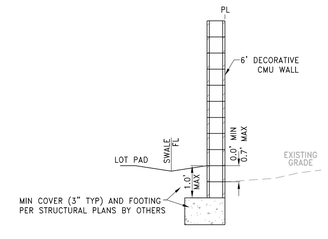
SIDE YARD TO SIDE YARD — 12 / D-1
RETAINING — SCALE: NTS



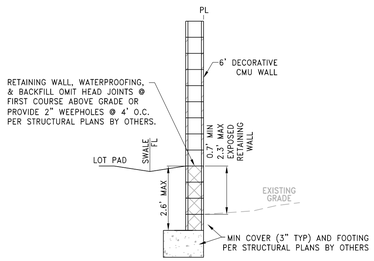
SIDE YARD TO SIDE YARD — 13 / D-1
RETAINING — SCALE: NTS



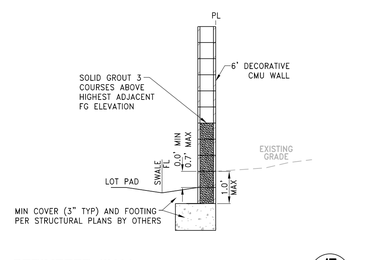
PERIMETER WALL — 14 / D-1
RETAINING — SCALE: NTS



PERIMETER WALL — 15 / D-1
NO RETAINING — SCALE: NTS



PERIMETER WALL — 16 / D-1
RETAINING — SCALE: NTS



PERIMETER WALL — 17 / D-1
NO RETAINING — SCALE: NTS

GEOTECHNICAL NOTE:

A GEOLOGIST OR GEOTECHNICAL ENGINEER SHALL BE ON SITE DURING EXCAVATION AND MASS GRADING OPERATIONS TO EXAMINE THE SOIL CHARACTERISTICS AND GEOLOGICAL CONDITIONS ENCOUNTERED, AND TO PROVIDE PROFESSIONAL ADVICE TO THE OWNER IN THE EVENT THAT UNANTICIPATED SOIL PROBLEMS ARISE AND/OR SUBSURFACE SITE CONDITIONS ARE FOUND TO BE SIGNIFICANTLY DIFFERENT THAN DEFINED BY PRE EXPLORATION AND TESTING.

WALL & SCARP NOTE:

1. CONTRACTOR TO CONSTRUCT ALL SCARP AND MAINTAIN PROPER COVER OVER AND FROM ALL WALL FOOTINGS PER THE SOILS REPORT REFERRED TO ON THE GRADING PLANS, REPORT ANY PROBLEMS IN DOING SO TO THE DEVELOPER AND THE ENGINEER IMMEDIATELY.
2. SCARP LESS THAN 1' VERTICAL NOT SHOWN ON PLANS.
3. ALL WALL ALIGNMENTS SHALL FOLLOW SIGHT VISIBILITY ZONE ALIGNMENT AND REMAIN OUTSIDE OF SIGHT VISIBILITY ZONE.

FOR REVIEW ONLY

REV	DESCRIPTION	BY	APPD	DATE

DATE: December 30, 2014
HORIZ. SCALE: N/A
VERT. SCALE: N/A
DRAWN BY: CR
DESIGNED BY: AW
CHECKED BY: CRZ
APPROVED BY: CRZ
PROJECT #: 3040.0038

LENNAR®
2490 PASEO VERDE PARKWAY SUITE 120 HENDERSON, NV 89074
PHONE: (702) 736-9100 FAX: (702) 736-9200

RCI Engineering
4325 Dean Martin Road, Suite 300, Las Vegas, NV 89103
PH#702.453.0800 FAX#702.453.0801

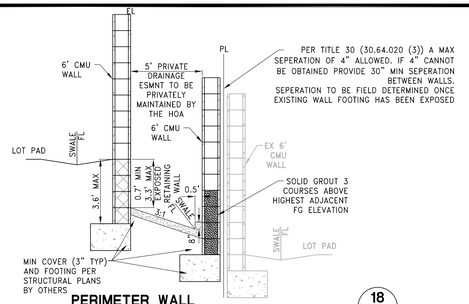
IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 1
A SINGLE FAMILY RESIDENTIAL SUBDIVISION
GRADING DETAILS (SHEET 1 OF 2)

CLARK COUNTY — NEVADA

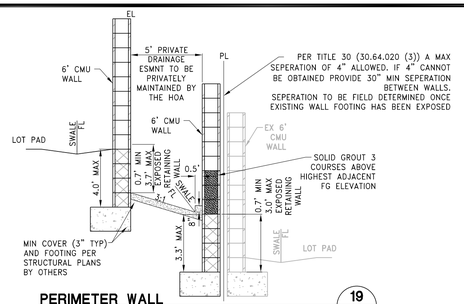
PROFESSIONAL ENGINEER — STATE OF NEVADA
CHRISTOPHER R. ZRINYI
No. 13976
Exp. 6/30/2016
CIVIL

DRAWING
D-1
SHT 7 OF 21
HTE NUMBER

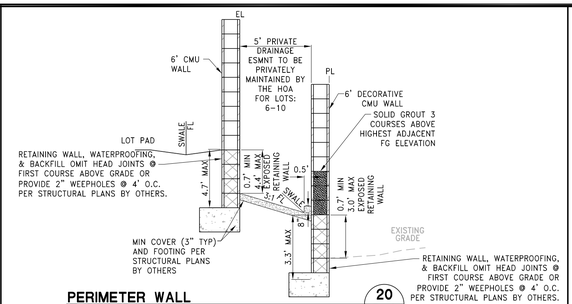
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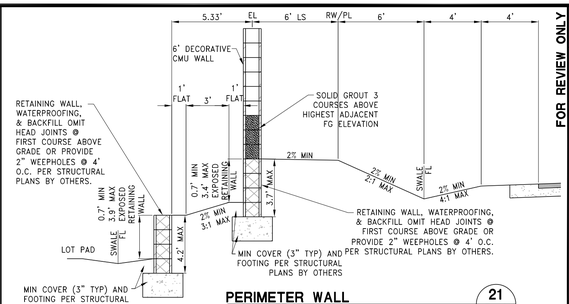
PERIMETER WALL 18 D-2
RETAINING SCALE: NTS



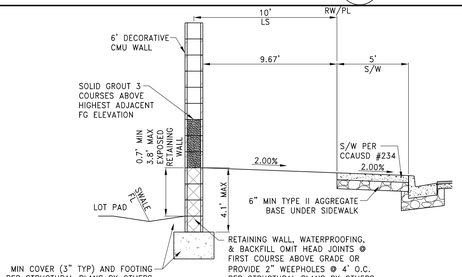
PERIMETER WALL 19 D-2
RETAINING SCALE: NTS



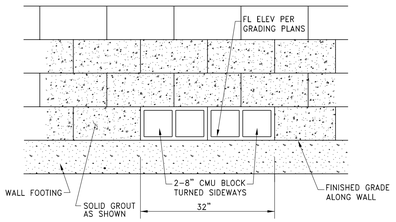
PERIMETER WALL 20 D-2
RETAINING SCALE: NTS



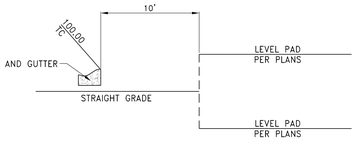
PERIMETER WALL 21 D-2
RETAINING SCALE: NTS



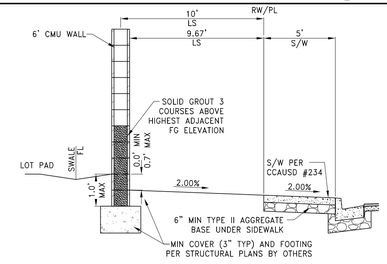
REAR/SIDE YARD TO COMMON ELEMENT 22 D-2
RETAINING SCALE: NTS



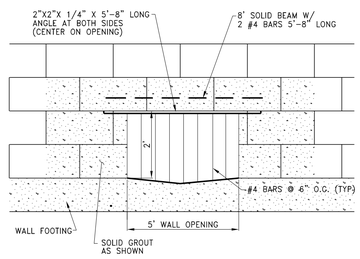
BLOCK WALL OPENING 23 D-2
SCALE: NTS



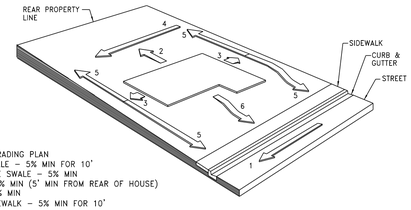
TYPICAL CORNER LOT ROUGH GRADE FOR CUT/FILL 24 D-2
ONSITE STREET SCALE: NTS



REAR/SIDE YARD TO COMMON ELEMENT 25 D-2
NO RETAINING SCALE: NTS

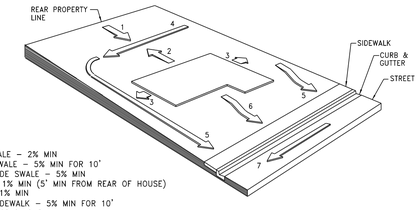


BLOCK WALL OPENING 26 D-2
SCALE: NTS



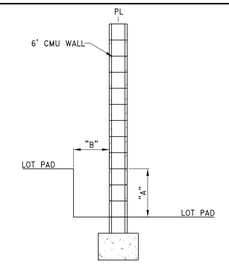
1. SLOPE OF STREET – PER GRADING PLAN
2. SLOPE FROM HOUSE TO SWALE – 5% MIN FOR 10'
3. SLOPE FROM HOUSE TO SIDE SWALE – 5% MIN
4. SLOPE OF REAR SWALE – 1% MIN (5' MIN FROM REAR OF HOUSE)
5. SLOPE OF SIDE SWALE – 1% MIN
6. SLOPE FROM HOUSE TO SIDEWALK – 5% MIN FOR 10'

TYPE B LOT DRAINAGE DETAIL 27 D-2
SCALE: NTS



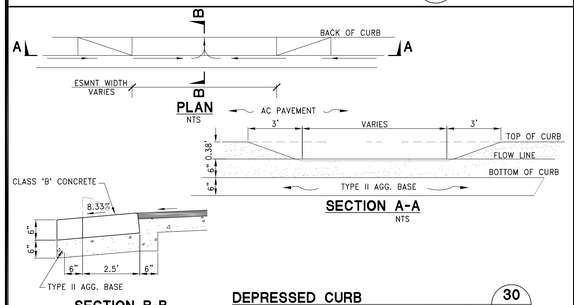
1. SLOPE FROM REAR TO SWALE – 2% MIN
2. SLOPE FROM HOUSE TO SWALE – 5% MIN FOR 10'
3. SLOPE FROM HOUSE TO SIDE SWALE – 5% MIN
4. SLOPE OF REAR SWALE – 1% MIN (5' MIN FROM REAR OF HOUSE)
5. SLOPE OF SIDE SWALE – 1% MIN
6. SLOPE FROM HOUSE TO SIDEWALK – 5% MIN FOR 10'
7. SLOPE OF STREET – PER GRADING PLAN

TYPICAL LOT DRAINAGE DETAIL 28 D-2
SCALE: NTS

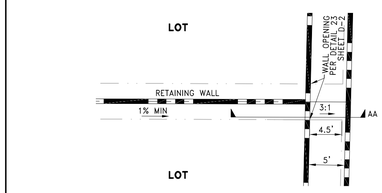


RET WALL HEIGHT	CUT BACK TO PAD
"A"	"B"
1.5'–2.5'	2.0'
3.0'–3.5'	2.5'
4.0'–5.0'	3.0'
5.0'–6.0'	3.5'

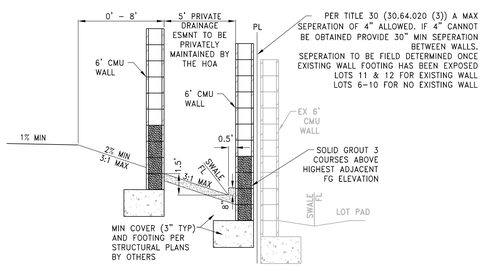
RETAINING WALL ROUGH GRADE CUT BACK SECTION 29 D-2
SCALE: NTS



DEPRESSED CURB 30 D-2
SCALE: NTS

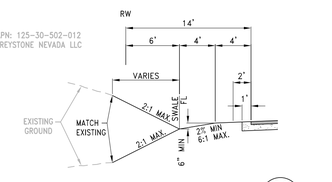


PLAN VIEW

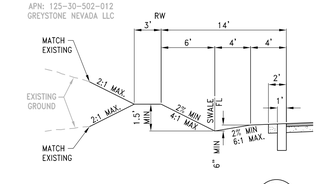


SECTION AA

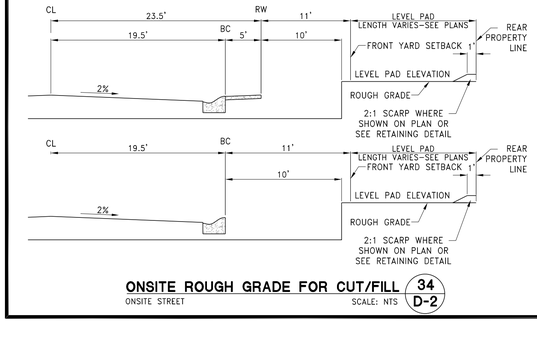
REAR YARD DRAINAGE DETAIL 31 D-2
SCALE: NTS



DITCH DETAIL 32 D-2
TEE PEE LN SCALE: NTS



BERM DETAIL 33 D-2
REGENA AVE SCALE: NTS



ONSITE ROUGH GRADE FOR CUT/FILL 34 D-2
ONSITE STREET SCALE: NTS

GEOTECHNICAL NOTE:

A GEOLOGIST OR GEOTECHNICAL ENGINEER SHALL BE ON SITE DURING EXCAVATION AND MASS GRADING OPERATIONS TO EXAMINE THE SOIL CHARACTERISTICS AND GEOLOGICAL CONDITIONS ENCOUNTERED, AND TO PROVIDE PROFESSIONAL ADVICE TO THE OWNER IN THE EVENT THAT UNANTICIPATED SOIL PROBLEMS ARISE AND/OR SUBSURFACE SITE CONDITIONS ARE FOUND TO BE SIGNIFICANTLY DIFFERENT THAN DEFINED BY PRE EXPLORATION AND TESTING.

WALL & SCARP NOTE:

1. CONTRACTOR TO CONSTRUCT ALL SCARP AND MAINTAIN PROPER COVER OVER AND FROM ALL WALL FOOTINGS PER THE SOILS REPORT REFERRED TO ON THE GRADING PLANS, REPORT ANY PROBLEMS IN DOING SO TO THE DEVELOPER AND THE ENGINEER IMMEDIATELY.
2. SCARP LESS THAN 1' VERTICAL NOT SHOWN ON PLANS.
3. ALL WALL ALIGNMENTS SHALL FOLLOW SIGHT VISIBILITY ZONE ALIGNMENT AND REMAIN OUTSIDE OF SIGHT VISIBILITY ZONE.

FOR REVIEW ONLY

REV	DESCRIPTION	BY	APPD	DATE

DATE: December 30, 2014
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VERT. SCALE: N/A
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DESIGNED BY: AW
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IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 1
A SINGLE FAMILY RESIDENTIAL SUBDIVISION

GRADING DETAILS (SHEET 2 OF 2)

CLARK COUNTY NEVADA

CHRISTOPHER R. ZRINYI Exp. 6/30/2016 CIVIL No. 13976 — PROFESSIONAL ENGINEER — STATE OF NEVADA

DRAWING D-2
SHT 8 OF 21
HTE NUMBER

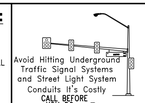
O:\3040_LENR\0038_Centennial and Tee Pee_CIVIL_PS\UNIT 1\3004_001.dwg crivera 12/30/14 9:35am

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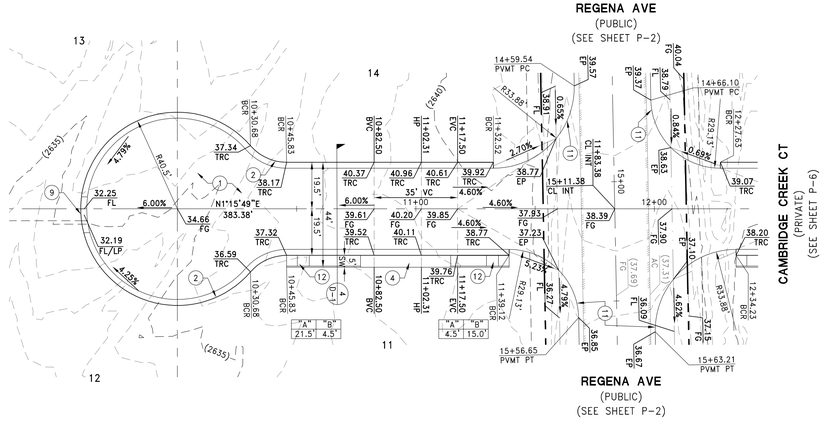
BENCHMARK

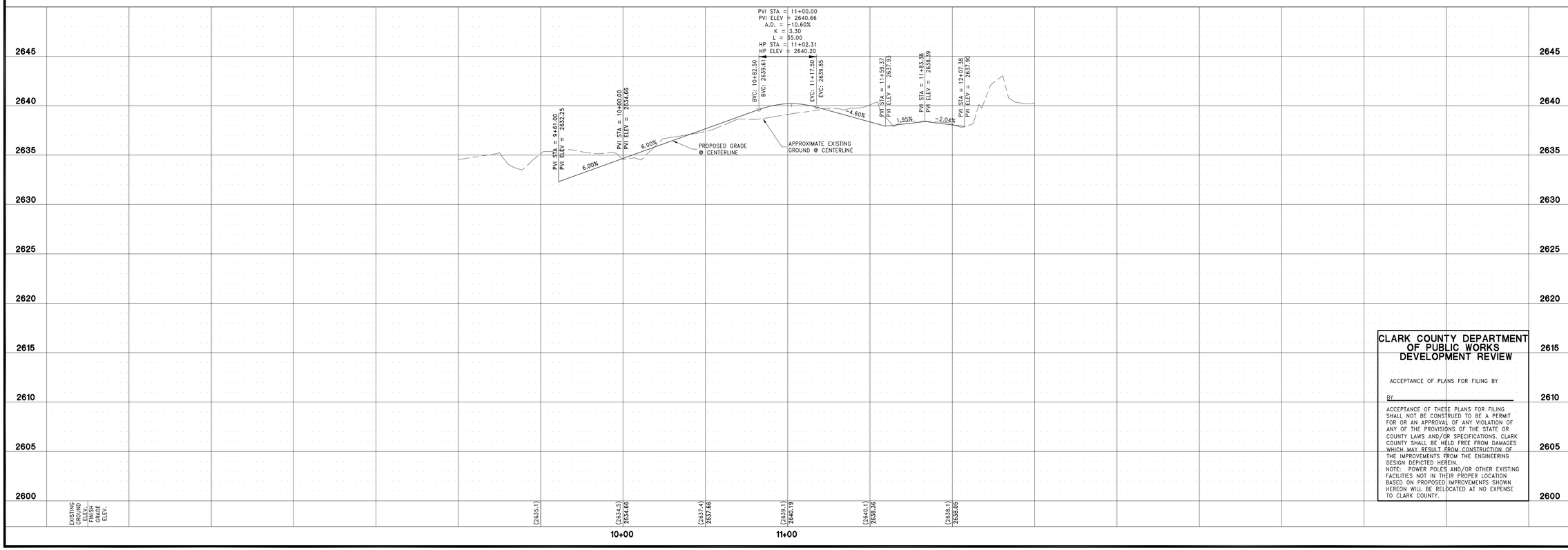
CITY OF LAS VEGAS BENCHMARK 6LV99 24SES
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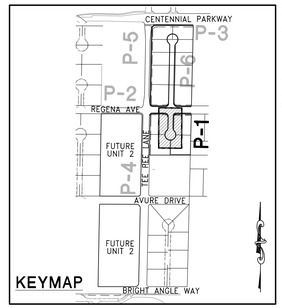
ELEVATION=844.924 METERS (NAVD'88)
ELEVATION=2772.06 US SURVEY FEET (NAVD'88)

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30' 15' 0' 30' 60'
HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 5'

CLARK COUNTY DEPARTMENT OF PUBLIC WORKS DEVELOPMENT REVIEW

ACCEPTANCE OF PLANS FOR FILING BY

BY _____

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IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 1
A SINGLE FAMILY RESIDENTIAL SUBDIVISION
PLAN AND PROFILE
REGENA AVENUE

CLARK COUNTY NEVADA

PROFESSIONAL ENGINEER — STATE OF NEVADA
CHRISTOPHER R. ZRINYI
Exp. 6/30/2016
CIVIL
No. 13976

DRAWING
P-1
SHT 13 OF 21
HTE NUMBER

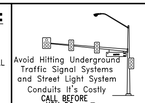
O:\3040_LENR\0038_Centennial and Tee Pee_CIVIL_IPS\UNIT 1\3007_P01.dwg crivera 12/30/14 11:41am

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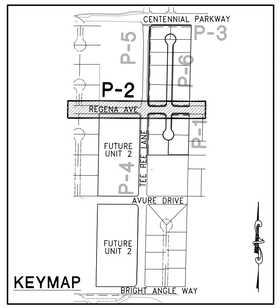
BENCHMARK

CITY OF LAS VEGAS BENCHMARK 6LV99 24SES
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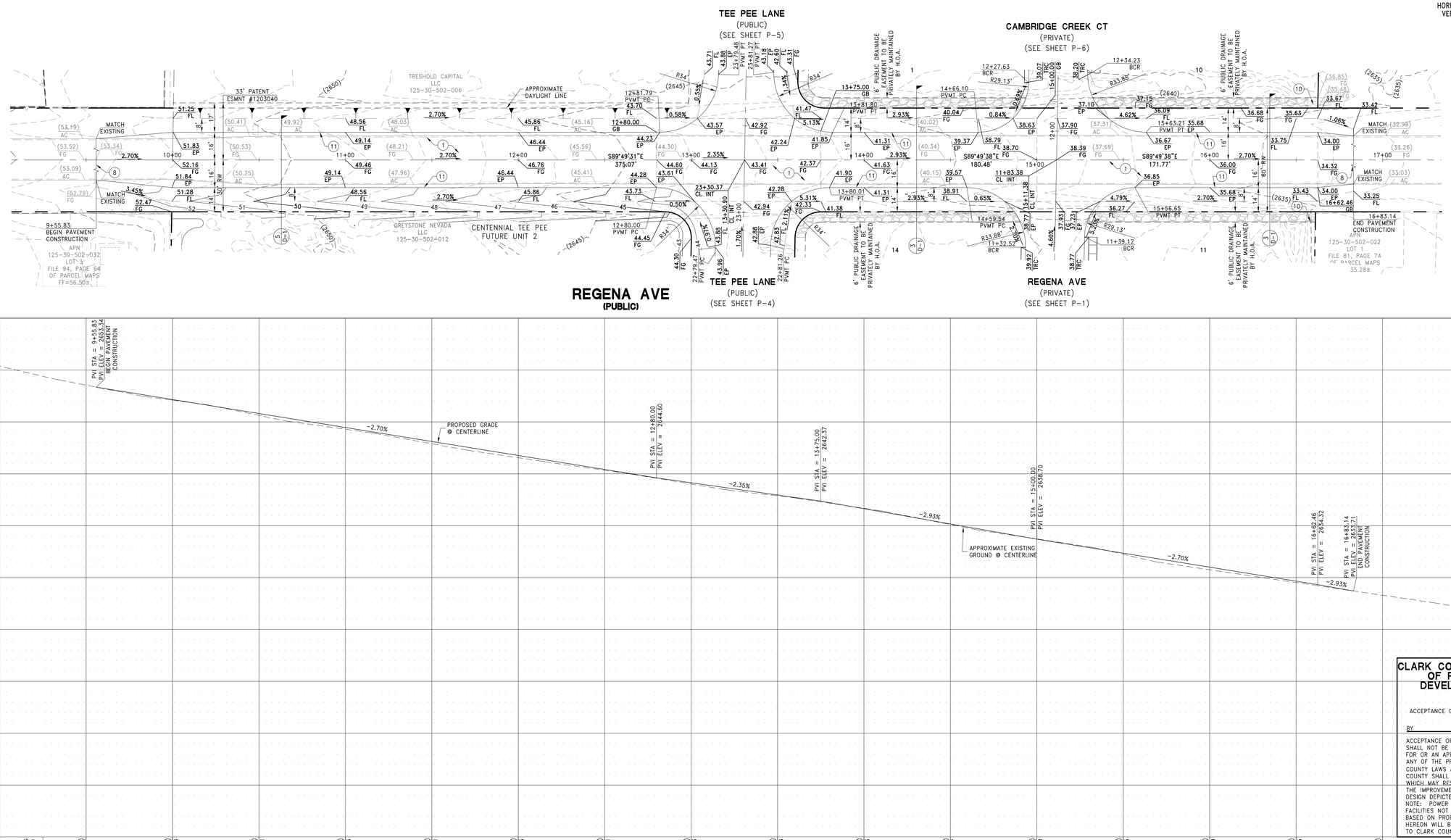
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PROJECT #: 3040.0038

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IMPROVEMENT PLANS FOR
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PLAN AND PROFILE
REGENA AVE STA: 9+55.83 TO 16+83.71
CLARK COUNTY NEVADA

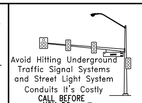
PROFESSIONAL ENGINEER - STATE OF NEVADA
CHRISTOPHER R. ZRINYI
Exp. 6/30/2016
CIVIL
No. 13976

DRAWING
P-2
SHT 14 OF 21
HTE NUMBER

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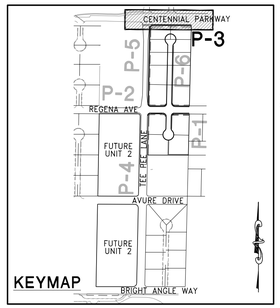
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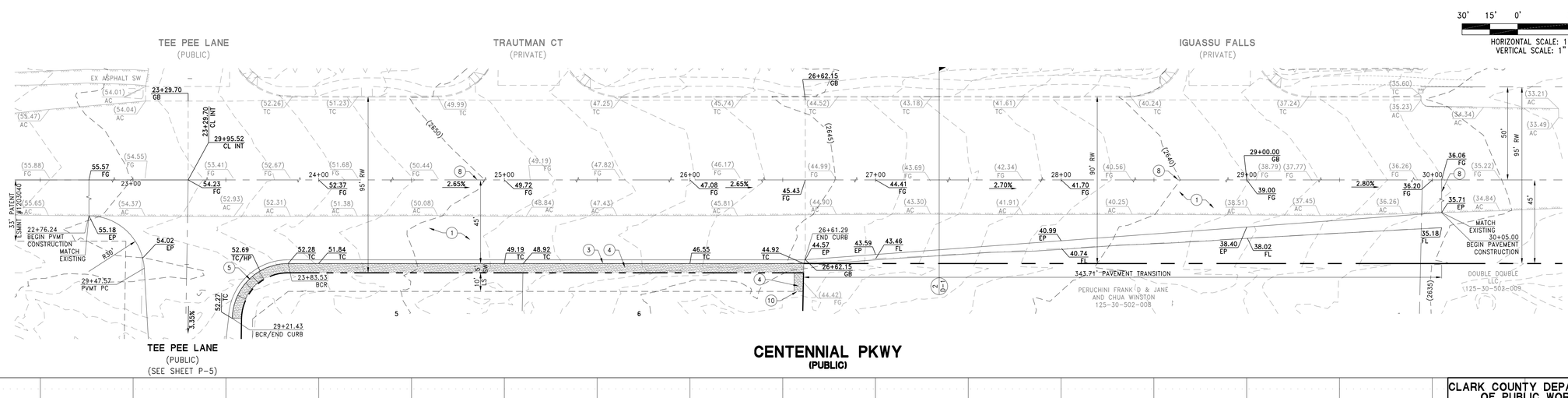
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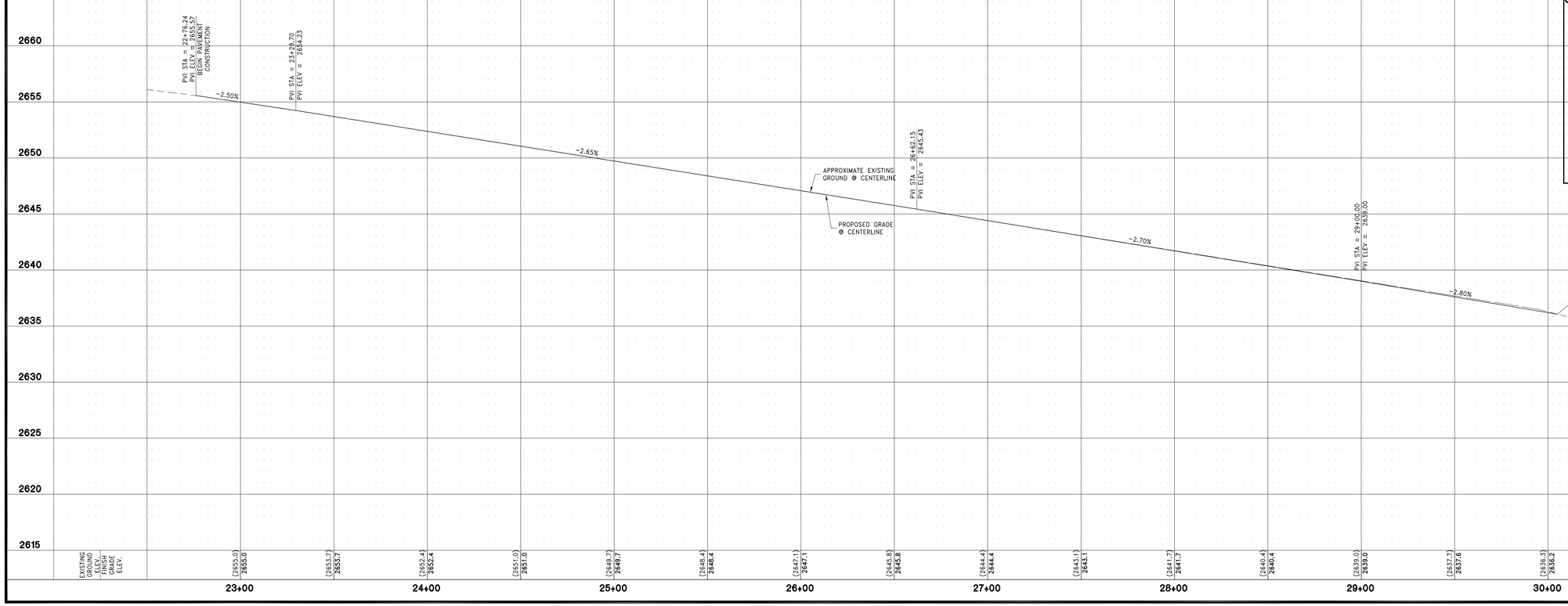
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CENTENNIAL PKWY 22+76.24 TO 30+05.00
CLARK COUNTY NEVADA

PROFESSIONAL ENGINEER STATE OF NEVADA
CHRISTOPHER R. ZRINYI
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CIVIL
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DRAWING
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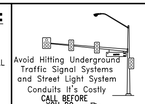
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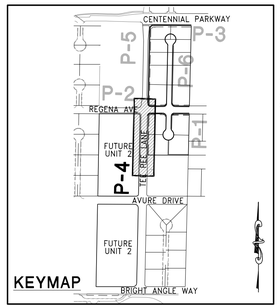
BENCHMARK

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

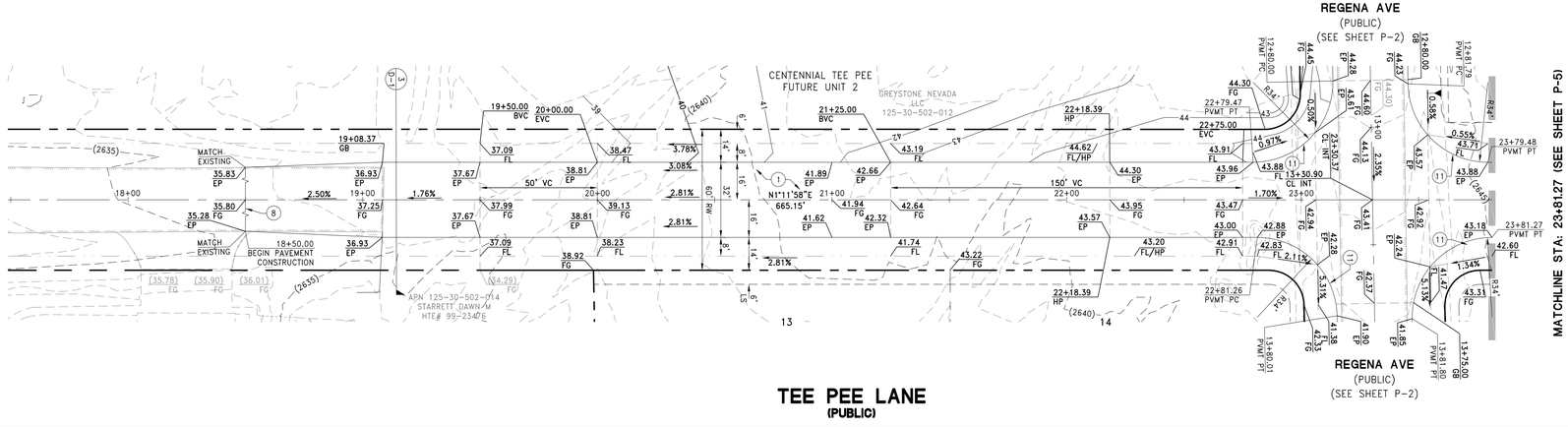
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ELEVATION=2772.06 US SURVEY FEET (NAVD'88)

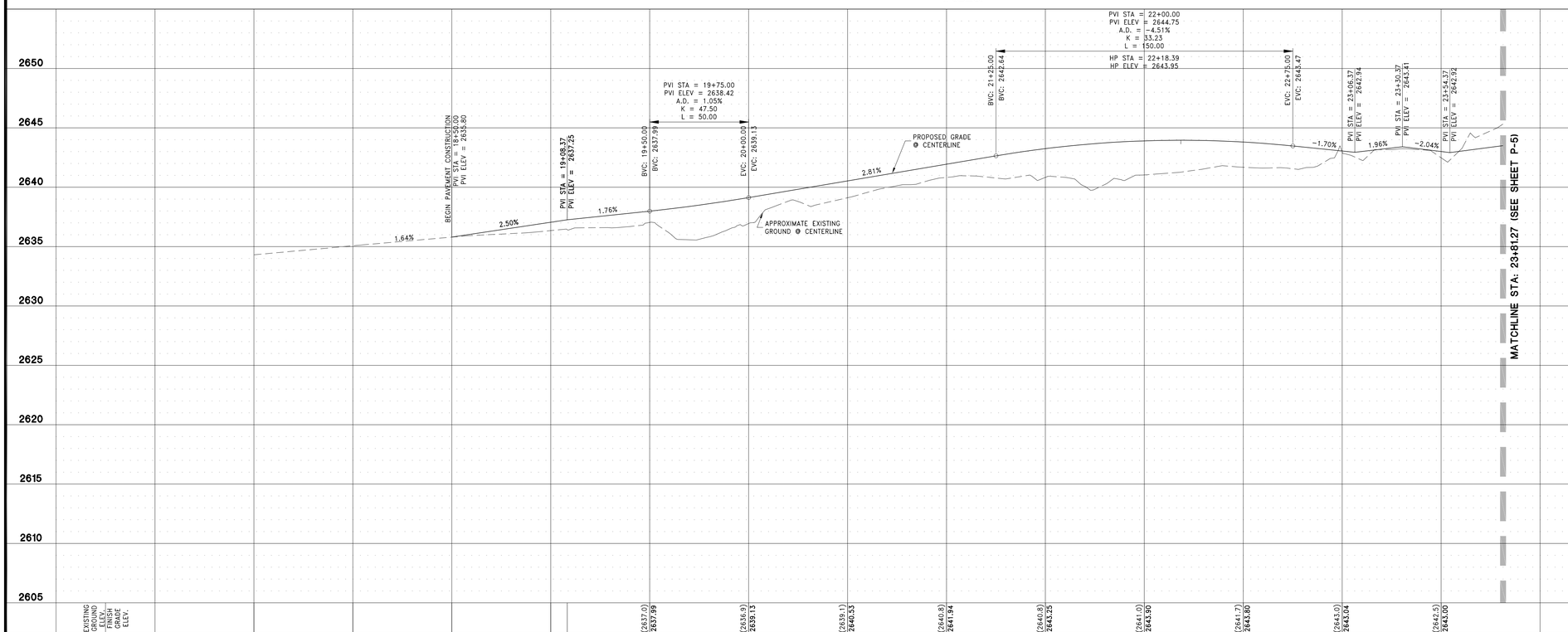
BASIS OF BEARINGS

SOUTH 89°47'00" EAST BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 30, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY RECORDER'S OFFICE IN FILE 89, PAGE 3 OF SURVEYS.



30' 15' 0' 30' 60'
HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 5'





CLARK COUNTY DEPARTMENT OF PUBLIC WORKS DEVELOPMENT REVIEW

ACCEPTANCE OF PLANS FOR FILING BY

BY _____

ACCEPTANCE OF THESE PLANS FOR FILING SHALL NOT BE CONSTRUED TO BE A PERMIT FOR OR AN APPROVAL OF ANY VIOLATION OF ANY OF THE PROVISIONS OF THE STATE OR COUNTY LAWS AND/OR SPECIFICATIONS. CLARK COUNTY SHALL BE HELD FREE FROM DAMAGES WHICH MAY RESULT FROM CONSTRUCTION OF THE IMPROVEMENTS FROM THE ENGINEERING DESIGN DEPICTED HEREIN.
NOTE: POWER POLES AND/OR OTHER EXISTING FACILITIES NOT IN THEIR PROPER LOCATION BASED ON PROPOSED IMPROVEMENTS SHOWN HEREON WILL BE RELOCATED AT NO EXPENSE TO CLARK COUNTY.

FOR REVIEW ONLY

REV	DESCRIPTION	BY	APP'D	DATE

DATE: December 30, 2014
HORIZ. SCALE: 1"=30'
VERT. SCALE: 1"=5'
DRAWN BY: CR
DESIGNED BY: AW
CHECKED BY: CRZ
APPROVED BY: CRZ
PROJECT #: 3040.0038

LENNAR®
2490 PASEO VERDE PARKWAY SUITE 120 HENDERSON, NV 89074
PHONE: (702) 736-9100 FAX: (702) 736-9200

RCI Engineering
4325 Dean Martin Road, Suite 300, Las Vegas, NV 89103
PH#702.453.0800 FAX#702.453.0801

IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 1
A SINGLE FAMILY RESIDENTIAL SUBDIVISION
PLAN AND PROFILE
TEE PEE LANE STA: 19+08.37 TO 23+81.27
CLARK COUNTY NEVADA

PROFESSIONAL ENGINEER - STATE OF NEVADA
CHRISTOPHER R. ZRINYI
Exp. 6/30/2016
CIVIL
No. 13976

DRAWING
P-4
SHT 16 OF 21
HTE NUMBER

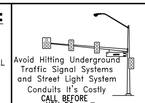
G:\3040_LENR\0038_Centennial and Tee Pee_CIVIL_IPS\UNIT 1\3007_P04.dwg crivera 12/30/14 11:43am

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Avoid overhead power line contact. It's costly.
Call before you Overhead
1-702-227-2929
Nevada Power
Environment and Safety
Services Department

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call
811
OR
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CLARK COUNTY TRAFFIC OPERATIONS
1-702-455-6000



Call before you UnderGround
1-702-455-6000
CLARK COUNTY TRAFFIC OPERATIONS
AND
1-702-432-5300
LAS VEGAS AREA COMPUTERIZED TRAFFIC SYSTEM

CONSTRUCTION NOTES

1. CONSTRUCT AC PAVEMENT PER DETAILS 1 THRU 5 ON SHEET D-1
2. CONSTRUCT 30" ROLL CURB PER CCAUSD # 217.S1
3. CONSTRUCT 24" 'L' CURB AND GUTTER PER CCAUSD # 216
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7. CONSTRUCT WALL OPENING PER DETAIL 23 & 31 SHEET D-2
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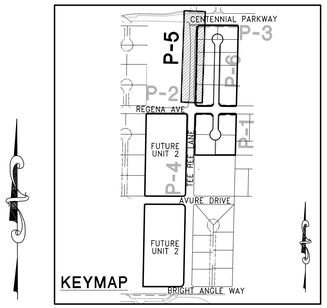
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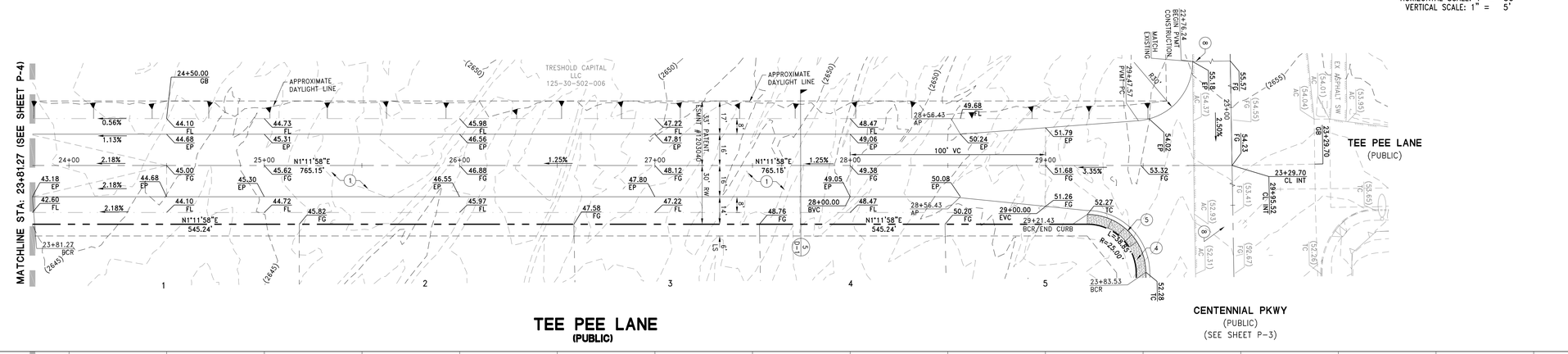
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BASIS OF BEARINGS

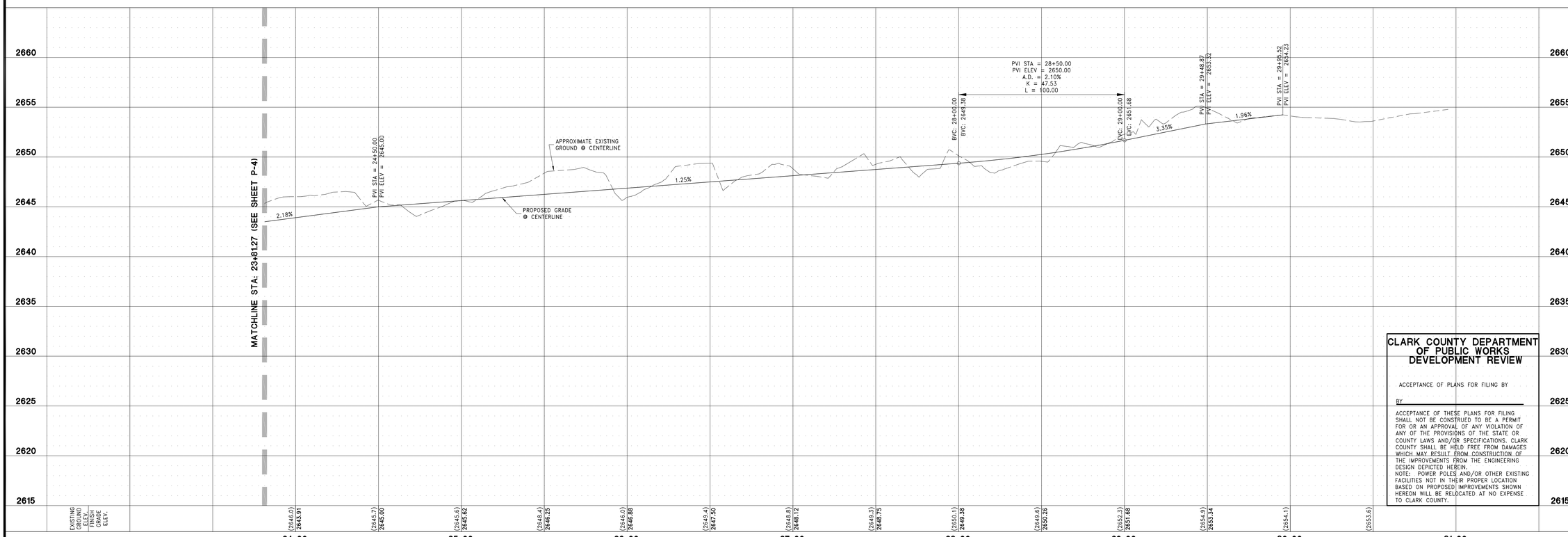
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30' 15' 0' 30' 60'
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TEE PEE LANE
(PUBLIC)



CLARK COUNTY DEPARTMENT OF PUBLIC WORKS DEVELOPMENT REVIEW

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BY _____

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APPROVED BY: CRZ
PROJECT #: 3040.0038

LENNAR®
2490 PASEO VERDE PARKWAY SUITE 120 HENDERSON, NV 89074
PHONE: (702) 736-9100 FAX: (702) 736-9200

RCI Engineering
4325 Dean Martin Road, Suite 300, Las Vegas, NV 89103
PH#702.453.0600 FAX#702.453.0801

IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 1
A SINGLE FAMILY RESIDENTIAL SUBDIVISION
PLAN AND PROFILE
TEE PEE LANE STA: 23+81.27 TO 29+95.52
NEVADA

CLARK COUNTY

PROFESSIONAL ENGINEER - STATE OF NEVADA
CHRISTOPHER P. ZRINYI
Exp. 6/30/2016
CIVIL
No. 13976

DRAWING
P-5
SHT 17 OF 21
HTE NUMBER

G:\3040_LENR\0038_Centennial and Tee Pee_CIVIL_IPS\UNIT 1\3007_P05.dwg crivera 12/30/14 11:34am

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Avoid Hitting Underground Traffic Signal Systems and Street Light Systems Conduits It's Costly
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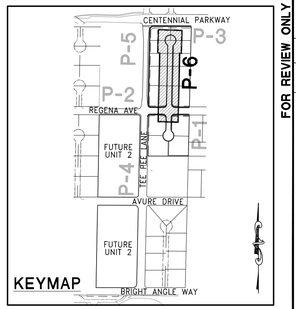
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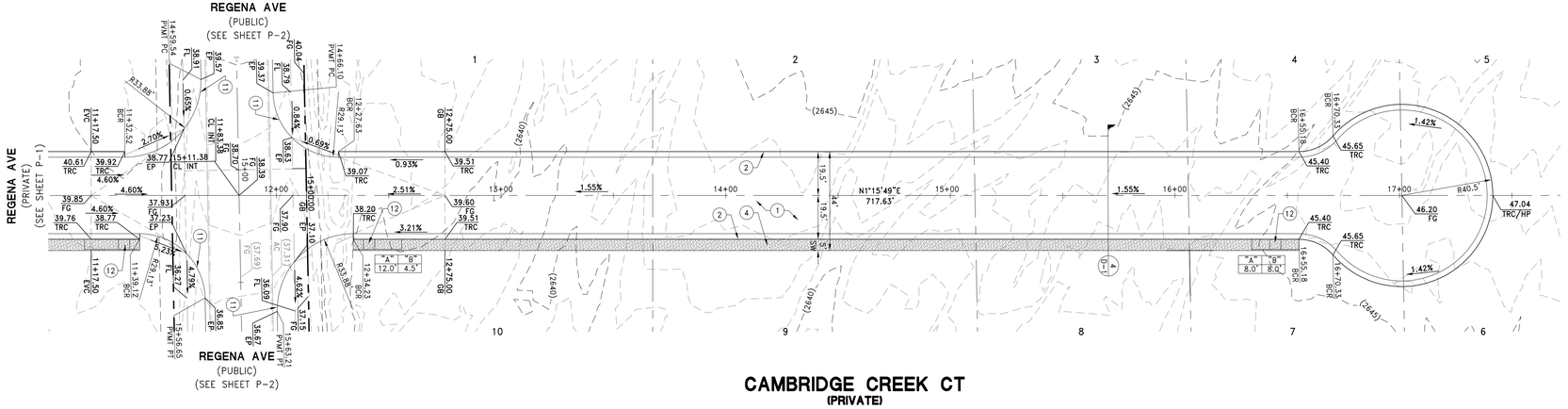
BASIS OF BEARINGS

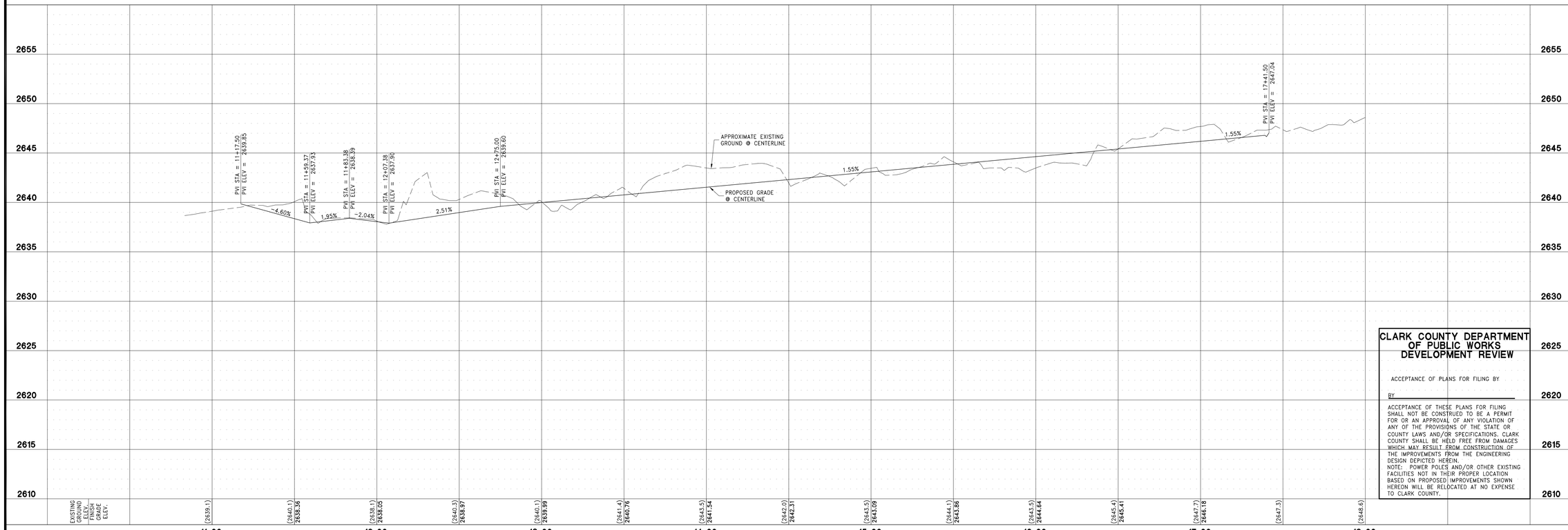
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CLARK COUNTY DEPARTMENT OF PUBLIC WORKS DEVELOPMENT REVIEW

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FOR REVIEW ONLY

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DESIGNED BY: AW
CHECKED BY: CRZ
APPROVED BY: CRZ
PROJECT #: 3040.0038

LENNAR®
2490 PASEO VERDE PARKWAY SUITE 120 HENDERSON, NV 89074
PHONE: (702) 736-9100 FAX: (702) 736-9200

RCI Engineering
4325 Dean Martin Road, Suite 300, Las Vegas, NV 89103
PH#702.453.0800 FAX#702.453.0801

IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 1
A SINGLE FAMILY RESIDENTIAL SUBDIVISION
PLAN AND PROFILE
CAMBRIDGE CREEK CT

CLARK COUNTY NEVADA

PROFESSIONAL ENGINEER - STATE OF NEVADA
CHRISTOPHER R. ZRINYI
Exp. 6/30/2016
CIVIL
No. 13976

DRAWING
P-6
SHT 18 OF 21
HTE NUMBER

D:\3040_LENR\0038_Centennial and Tee Pee_CIVIL_IPS\UNIT 1\3007_P06.dwg crivera 12/30/14 11:35am

IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 2
A SINGLE FAMILY RESIDENTIAL SUBDIVISION
BY LENNAR®

APN 125-30-601-007,
125-30-502-012
CLARK COUNTY, NEVADA
8.31+/- ACRES

LEGAL DESCRIPTION

PARCEL 12:

THE EAST HALF (E ½) OF THE SOUTHEAST QUARTER (SE ¼) OF THE NORTHWEST QUARTER (NW ¼) OF THE NORTHEAST QUARTER (NE ¼) OF SECTION 30, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M.

PARCEL 14:

THE EAST HALF (E ½) OF THE NORTHEAST QUARTER (NE ¼) OF THE SOUTHWEST QUARTER (SW ¼) OF THE NORTHEAST QUARTER (NE ¼)OF SECTION 30, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M.

EXCEPTING THEREFROM THAT PORTION CONVEYED TO THE COUNTY OF CLARK BY DEED RECORDED FEBRUARY 22, 2001 IN BOOK 20010222 AS INSTRUMENT NO. 00732, OF OFFICIAL RECORDS, CLARK COUNTY NEVADA.

BENCHMARK

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

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

BASIS OF BEARINGS

SOUTH 89°47'00" EAST BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 30, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY RECORDER'S OFFICE IN FILE 89, PAGE 3 OF SURVEYS.

OWNER:

GREYSTONE NEVADA LLC
2490 PASEO VERDE PARKWAY SUITE 120 HENDERSON, NV 89074
PHONE: (702) 736-9100 FAX:(702) 736-9200

DEVELOPER:

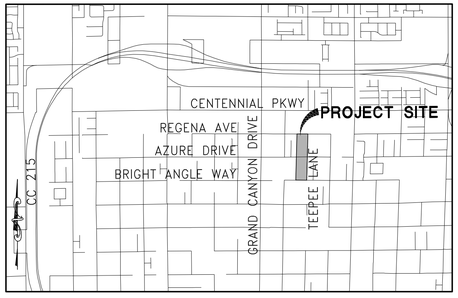
LENNAR®
2490 PASEO VERDE PARKWAY SUITE 120 HENDERSON, NV 89074
PHONE: (702) 736-9100 FAX: (702) 736-9200

DESIGN ENGINEER:

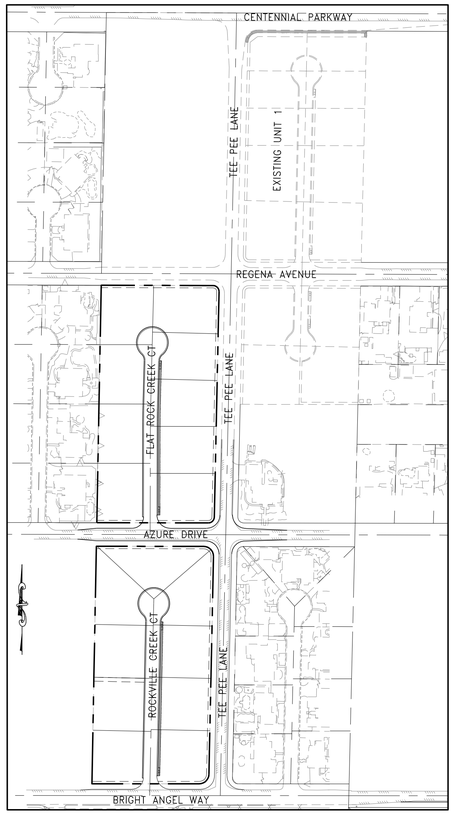
RCI *Engineering*
4325 Dean Martin Road, Suite 300 - Las Vegas, NV 89103
PH#702.453.0800 FAX#702.453.0801

SHEET INDEX

SHT No.	DWG ID	DRAWING DESCRIPTION
1	C-1	COVER SHEET
2	N-1	GENERAL NOTES, LEGEND AND ABBREVIATIONS
3	G-1	GRADING PLAN (SHEET 1 OF 4)
4	G-2	GRADING PLAN (SHEET 2 OF 4)
5	G-3	GRADING PLAN (SHEET 3 OF 4)
6	G-4	GRADING PLAN (SHEET 4 OF 4)
7	D-1	GRADING DETAILS (SHEET 1 OF 2)
8	D-2	GRADING DETAILS (SHEET 2 OF 2)
9	MU-1	MASTER UTILITY PLAN
10	U-1	UTILITY PLAN (SHEET 1 OF 4)
11	U-2	UTILITY PLAN (SHEET 2 OF 4)
12	U-3	UTILITY PLAN (SHEET 3 OF 4)
13	U-4	UTILITY PLAN (SHEET 4 OF 4)
14	P-1	PLAN AND PROFILE – BRIGHT ANGEL WAY STA: 13+00.00 – 18+00.00
15	P-2	PLAN AND PROFILE – AZURE DRIVE STA: 13+00.00 – 18+00.00
16	P-3	PLAN AND PROFILE – TEE PEE LANE STA: 10+00.00 – 17+14.27
17	P-4	PLAN AND PROFILE – TEE PEE LANE STA: 17+14.27 – 19+08.37
18	P-5	PLAN AND PROFILE – ROCKVILLE CREEK CT STA: 10+00.00 – 15+00.00
19	P-6	PLAN AND PROFILE – FLAT ROCK CREEK CT STA: 10+00.00 – 15+00.00
20	S-1	STREETLIGHT, SIGNAGE AND STRIPING PLAN (SHEET 1 OF 4)
21	S-2	STREETLIGHT, SIGNAGE AND STRIPING PLAN (SHEET 2 OF 4)
22	S-3	STREETLIGHT, SIGNAGE AND STRIPING PLAN (SHEET 3 OF 4)
23	S-4	STREETLIGHT, SIGNAGE AND STRIPING PLAN (SHEET 4 OF 4)



VICINITY MAP
NOT TO SCALE



SITE PLAN
NOT TO SCALE

APPROVED BY:

NV ENERGY

NV ENERGY COMPANY DATE

NV ENERGY COMPANY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NV ENERGY COMPANY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.

CENTRAL TELEPHONE COMPANY, d/b/a CENTURYLINK

CENTRAL TELEPHONE COMPANY, d/b/a CENTURYLINK

THE CENTRAL TELEPHONE COMPANY, D/B/A CENTURYLINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

SOUTHWEST GAS

SOUTHWEST GAS CORPORATION DATE

COX COMMUNICATIONS LAS VEGAS INC.

COX COMMUNICATIONS, LAS VEGAS INC. DATE

CITY OF LAS VEGAS - SEWER ONLY

DAVID BOWERS, P.E. #16736, P.T.O.E. DATE
CITY ENGINEER

APPROVAL OF THESE PLANS IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHTS-OF-WAY AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE THE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS, EXCEPT THOSE SPECIFICALLY LISTED UNDER DEVIATIONS FROM STANDARD. THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN DEVIATIONS FROM STANDARDS IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS CLARK COUNTY AREA NEVADA.

CLARK COUNTY FIRE DEPARTMENT

CLARK COUNTY FIRE DEPARTMENT DATE

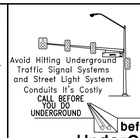
LAS VEGAS VALLEY WATER DISTRICT APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT # DATE:
(SHEETS C-1, N-1, MU-1, U-1 THRU U-4 & P-1 THRU P-6.)

NOTE: A PRE-DEVELOPMENT MEETING WITH THE DEPARTMENT OF PUBLIC WORKS DEVELOPMENT REVIEW DIVISION; OFF-SITE INSPECTOR IS REQUIRED. PLEASE CONTACT THE INSPECTOR AT 702-455-4610

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FOR REVIEW ONLY

REV	DESCRIPTION	BY	APPD	DATE

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IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 2
A SINGLE FAMILY RESIDENTIAL SUBDIVISION
COVER SHEET
CLARK COUNTY NEVADA

CHRISTOPHER R. ZRINYI
Exp. 6/30/2016
CIVIL
No. 13976
PROFESSIONAL ENGINEER – STATE OF NEVADA

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GENERAL NOTES

1. ALL QUANTITIES SHOWN HEREIN ARE APPROXIMATE AND USED FOR PERMIT AND BOND PURPOSES ONLY. THEY SHALL NOT BE USED IN ANY WAY FOR BIDDING OR CONSTRUCTION. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO CONDUCT QUANTITY TAKE-OFFS FOR BIDDING AND CONSTRUCTION PURPOSES.
2. A GEOTECHNICAL INVESTIGATION WAS PERFORMED FOR THE PROJECT BY AMERICAN SOILS ENGINEERING, LLC DATED DECEMBER 30,2013, PROJECT NO.1691-GEO. THE CONTRACTOR SHALL ATTENTIVELY EXAMINE THE SITE IN SUCH A MANNER THAT HE CAN CONFIRM EXISTING SURFACE CONDITIONS WITH THOSE PRESENTED IN THE GEOTECHNICAL REPORT. HE SHALL SATISFY HIMSELF THAT THE QUALITY AND QUANTITY OF EXPOSED MATERIALS AND SUBSURFACE SOIL OR ROCK DEPOSITS HAVE BEEN SATISFACTORILY REPRESENTED BY THE GEOTECHNICAL ENGINEER'S REPORT AND CIVIL ENGINEER'S DRAWINGS. ANY DISCREPANCY THAT MAY BE OF PRIOR KNOWLEDGE TO THE CONTRACTOR THAT IS REVEALED THROUGH HIS INVESTIGATIONS SHALL BE MADE AVAILABLE TO THE OWNER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO REVIEW THE GEOTECHNICAL REPORT PRIOR TO CONSTRUCTION. RESULTS OF THE GEOTECHNICAL INVESTIGATION ALONG WITH THEIR RECOMMENDATIONS SHALL BECOME PART OF THE SPECIFICATIONS BUT DO NOT CONSTITUTE A GUARANTEE OF THE SUBSURFACE CONDITIONS IN ANY WAY.
3. THE CONTRACTOR SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; AND THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY, AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY, AND HOLD THE OWNER AND ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR ENGINEER.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXCAVATION AND SHORING PROCEDURES AND CONFORM TO THE LATEST O.S.H.A. REQUIREMENTS.
5. THE CONTRACTOR SHALL MAINTAIN AN ON-GOING DUST CONTROL PROGRAM, INCLUDING WATERING OF OPEN AREAS, IN ORDER TO CONFORM WITH THE LATEST STATE AND COUNTY AIR POLLUTION REGULATIONS. THE CONTRACTOR SHALL HAVE A DUST CONTROL PLAN APPROVED BY THE CLARK COUNTY DISTRICT HEALTH DEPARTMENT AIR POLLUTION CONTROL DIVISION PRIOR TO COMMENCEMENT OF ANY WORK.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DAILY REMOVAL OF ALL CONSTRUCTION MATERIALS SPILLED ON PAVED STREETS, ONSITE AND OFFSITE.
7. THE CONTRACTOR SHALL PURSUE THE WORK IN A CONTINUOUS AND DILIGENT MANNER, CONFORMING TO ALL THE PERTINENT SAFETY REGULATIONS, TO INSURE A TIMELY COMPLETION OF THE PROJECT.
8. THE CONTRACTOR SHALL NOTIFY ALL ENTITIES INVOLVED (PUBLIC AND PRIVATE) 48 HOURS PRIOR TO BEGINNING CONSTRUCTION, AND 48 HOURS PRIOR NOTICE FOR ALL SURVEYING AND INSPECTIONS DURING CONSTRUCTION.
9. ALL AREAS DISTURBED AND LEFT UNDEVELOPED FOR A PERIOD OF MORE THAN 30 DAYS SHALL BE STABILIZED BY THE APPLICATION OF AN APPROVED DUST PALLIATIVE AT THE COST OF THE CONTRACTOR AND PER THE APPROVED STORM WATER POLLUTION PREVENTION PLAN.
10. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND FEES REQUIRED FOR CONSTRUCTION.
11. ALL EXISTING UTILITY LOCATIONS, SIZES, AND DESCRIPTIONS AS SHOWN ON THESE DRAWINGS ARE FROM SURFACE OBSERVATIONS USED IN CONJUNCTION WITH AVAILABLE RECORDS, REFERENCE MAPS, DRAWINGS, AND VERBAL STATEMENTS SUPPLIED BY UTILITY COMPANIES, AND MAY NOT BE WHOLLY ACCURATE OR RELIABLE. THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES WHICH MAY BE AFFECTED BY THE WORK TO OBTAIN ASSISTANCE IN THE LOCATION OF EXISTING MAINS AND SERVICE CONNECTIONS. THE CONTRACTOR SHALL ALSO CALL U.S.A. (1-800-227-2600) PRIOR TO BEGINNING WORK.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION SIGNING, BARRICADES AND TRAFFIC DELINEATION TO CONFORM TO THE STATE OF NEVADA, DEPARTMENT OF TRANSPORTATION, "NEVADA WORK ZONE TRAFFIC CONTROL MANUAL".
13. THE WORK IN THIS CONTRACT INCLUDES ALL ONSITE AND OFFSITE WORK SHOWN ON THESE DRAWINGS, DESCRIBED IN THE SPECIFICATIONS, OR REASONABLY IMPLIED.
14. THE CONTRACTOR SHALL AT ALL TIMES DURING CONSTRUCTION, PROTECT FROM DAMAGE EXISTING IMPROVEMENTS ON AND AROUND THE SITE, INCLUDING, BUT NOT LIMITED TO, PAVEMENT, CURB & GUTTER, SIDEWALK, LANDSCAPING, SIGNAGE, STORM & SANITARY SEWERS, AND ALL UTILITIES. THE CONTRACTOR SHALL ASSUME SOLE RESPONSIBILITY FOR THE REPAIR OF ANY IMPROVEMENTS (EXISTING OR PROPOSED) DAMAGED THROUGHOUT THE COURSE OF CONSTRUCTION.
15. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN AT ALL TIMES EMERGENCY ACCESS TO THE PROJECT SITE TO THE SATISFACTION OF THE LOCAL FIRE DEPARTMENT.
16. THE CONTRACTOR SHALL, UPON COMPLETION OF THE PROJECT, PREPARE AND SUBMIT TO THE OWNER RECORD DRAWINGS INDICATING BY DIMENSION AND DESCRIPTION ANY FACILITY CONSTRUCTED CONTRARY TO THAT SHOWN ON THESE PLANS.
17. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF ALL MATERIALS TO BE USED ON THE SITE TO INCLUDE, BUT NOT BE LIMITED TO, A.C. AND P.C.C. MIX DESIGN, AGGREGATE BASE QUALIFICATIONS, PRECAST CONCRETE, CAST IRON GRATES AND COVERS, PIPING, FENCING, AND SIGNS TO THE PROJECT ENGINEER FOR APPROVAL PRIOR TO THE MANUFACTURING OF OR USE OF SUCH ITEMS.
18. INSPECTION REQUIREMENTS SHALL BE IN ACCORDANCE WITH COUNTY STANDARDS OR THE STANDARD SPECIFICATIONS, WHICH EVER IS THE MORE STRINGENT.
19. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.

CITY OF LAS VEGAS GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST ISSUE; THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST REVISED EDITION; THE "SUMMERLIN IMPROVEMENT STANDARDS" FOR WORK IN THE SUMMERLIN AREA; AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY; THE UNIFORM BUILDING CODE; AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".
2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CLV PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE PLANS. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCE'S WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.
3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER AND OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS, ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.
5. TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK, CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. MIX DESIGNS TO BE APPROVED BY THE CITY, PRIOR TO THE USE ON THE PROJECT.
6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.
7. EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTRUDED-TYPE CURB.
8. AC PAVEMENT TO BE ONE-HALF INCH (½") ABOVE LIP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS AND CROSS GUTTERS.
9. CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.
10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.
11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF THE TRANSITIONS TO BE AS SHOWN ON PLANS.
12. ALL GRADING WORK SHALL CONFORM TO THE SOILS REPORT AS PREPARED BY NOVA GEOTECHNICAL PROJECT. C-12-044, DATED MAY, 25 2012 APPROVED BY THE CITY ENGINEER, AND AS SHOWN ON THESE PLANS.
13. EXACT LOCATION OF ALL SAWCUT LINES MAY BE ADJUSTED OR DETERMINED IN THE FIELD BY A CITY OF LAS VEGAS ENGINEER IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES RELOCATIONS.
14. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH N.R.S. STATUTE NO. 625.380 & CITY OF LAS VEGAS TITLE 18, APPENDIX D.
15. UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC., SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APRONS, FLOWLINES, AND CROSS GUTTERS UNLESS WRITTEN APPROVAL IS GRANTED BY THE UTILITY COMPANY AND THE CITY ENGINEER. WALL NOTES:
16. ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVIL PLANS FOR THE PURPOSE OF REVIEWING GRADING RELATIONSHIPS; FLOOD CONTROL AND SIGHT DISTANCE AT INTERSECTIONS. NEW WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE BUILDING DEPARTMENT.
17. ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHT OF WAY.
18. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, ANDSEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.
19. MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF NDOT OR THE CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.
20. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC., THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO OFFSITE INSPECTION AND TESTING CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.
21. SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S) SHALL BE PROVIDED TO THE OFFSITE INSPECTION AND TESTING SECTION PRIOR TO PROJECT ACCEPTANCE. THE MAP(S) SHALL INCLUDE THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, AND THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXITS THE PUBLIC RIGHT-OF-WAY. THE LOCATION SHALL BE DESCRIBED BY STATE PLANE COORDINATES WHICH SHALL BE BASED ON THE "NEVADA COORDINATE SYSTEM OF 1983, EAST ZONE" AS DEFINED BY THE NEVADA REVISED STATUTES CHAPTER 327 AND TIED TO THE CITY OF LAS VEGAS VERTICAL CONTROL BENCHMARK NETWORK. COORDINATES MUST BE CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CERTAINTIES OF +/- 0.1 METER (+/- 0.3 FEET). A SEPARATE ELECTRONIC COMMA DELIMITED FILE FOR THE SANITARY SEWER AND STORM DRAIN COORDINATES SHALL ALSO ACCOMPANY THE SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S).
22. SANITARY SEWER SERVICE LATERALS REQUIRE THE INSTALLATION OF A MARKER BALL AT THE CONNECTION OF THE SEWER SERVICE LATERAL TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERAL EXITS THE PUBLIC RIGHT-OF-WAY. STORM DRAIN LATERALS REQUIRE THE INSTALLATION OF A MARKER BALL AT THE CONNECTION OF THE STORM DRAIN LATERAL TO THE STORM DRAIN MAIN AND WHERE THE STORM DRAIN LATERAL EXITS THE PUBLIC RIGHT-OF-WAY OR WHERE THE STORM DRAIN LATERAL CONNECTS TO A DROP INLET. THE MARKER BALL SHALL BE 3M 4" MARKER BALL 1404-XR OR APPROVED EQUAL.
23. CCTV VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST ADDITION.
24. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

CLARK COUNTY TRAFFIC NOTES

1. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ONTO THE PORTIONS OF THE ROAD(S) BEING IMPROVED HEREUNDER, REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER OFF-SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.
2. 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 GROUND MOUNTED STOP SIGNS AT ALL NEW STREET ENCROACHMENTS INTO EXISTING COUNTY STREETS IMMEDIATELY AFTER FIRST GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN SAID SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.
3. ALL CONSTRUCTION SIGNING, BARRICADING AND PAVEMENT MARKINGS SHALL CONFORM TO THE NEVADA WORK ZONE TRAFFIC CONTROL HANDBOOK – 1986 AND TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, CURRENT EDITION.
4. 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 COUNTY TRAFFIC MANAGER.
5. THE DEVELOPER SHALL BE RESPONSIBLE TO PROVIDE AND INSTALL ALL PERMANENT SIGNS SHOWN ON THE PLANS. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CLARK COUNTY AREA STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGNPOSTS SHALL BE INSTALLED IN ACCORDANCE WITH CLARK COUNTY AREA STANDARDS. ALL SIGNS SHALL USE CLASS VI SHEETING.
6. IF A PROPOSED STREET LIGHT STANDARD IS FIELD LOCATED TO WITHIN FIVE (5) FEET OF ANY SIGN, SHOWN HEREON TO BE MOUNTED ON A SIGN POST, CHANGE SIGN MOUNTING TO ONE ON THE STREETLIGHT STANDARD.
7. PRIOR TO CONSTRUCTION, THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE CURRENT PLANNING DIVISION OF THE DEPARTMENT OF COMPREHENSIVE PLANNING.
8. ALL TRAFFIC SIGNAL POLE ASSEMBLIES, STEEL PEDESTAL FOR CABINETS AND STREET LIGHT POLES SHALL BE GALVANIZED PER ASTM A.123.
9. ALL STREET LIGHTING INSTALLATIONS EXCEPT NOTED ON THE STREET LIGHTING PLANS SHALL CONFORM TO THE UNIFORM STANDARD DRAWINGS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, LATEST EDITION OF EACH.
10. THE FOLLOWING CLARK COUNTY UNDERGROUND FACILITIES MAY BE LOCATED IN YOUR PROJECT AREA: STREET LIGHTING, TRAFFIC SIGNALS, AND FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T.) INTERCONNECT CABLE. YOU MUST CONTACT CLARK COUNTY TRAFFIC MANAGEMENT DIVISION, OPERATIONS UNIT AT 455-6000 FOR LOCATIONS AT LEAST 48 HOURS PRIOR TO WORKING IN THE AREA. CLARK COUNTY IS NOT A MEMBER OF "CALL BEFORE YOU DIG" (UNDERGROUND SERVICE ALERT), AND A CALL TO THAT ORGANIZATION DOES NOT RELIEVE YOU OF LIABILITY FOR CLARK COUNTY FACILITIES.
11. F.A.S.T. INTERCONNECT CABLE POLICY IS IN EFFECT. INTERCONNECT CABLE MUST BE MAINTAINED AT ALL TIMES. DEVELOPER/CONTRACTOR SHALL PROVIDE TEMPORARY OVERHEAD INTERCONNECT CABLE WHILE PERMANENT CABLE IS BEING RELOCATED. TEMPORARY AERIAL INSTALLATION MUST BE ACCEPTABLE TO THE COUNTY TRAFFIC MANAGER AND TO F.A.S.T. ANY DAMAGE TO THIS CABLE IS DEEMED IN EMERGENCY BY F.A.S.T., CITY OF LAS VEGAS, CLARK COUNTY AND NDOT AND MUST BE REPAIRED IMMEDIATELY TO F.A.S.T. ACCEPTANCE. $2,500 PER DAY DAMAGES MAY BE ASSESSED AFTER 24 HOURS HAS ELAPSED FROM TIME OF BREAK OR DAMAGE.
12. ALL NEW OR REPLACEMENT TRAFFIC SIGNAL LOOPS SHALL BE INSTALLED USING CABLE-IN-DUCT WIRING, SHALL HAVE INDEPENDENT LEAD-IN WIRES FOR EACH LOOP FROM THE CONTROLLER TO THE PULL-BOX, AND EACH LEAD-IN SHALL BE INDIVIDUALLY TAGGED.
13. TRAFFIC SIGNAL PEDESTRIAN HEADS SHALL BE THE L.E.D. TYPE.
14. ELECTRICAL POWER SERVICE POINT LOCATION(S) FOR STREET LIGHTING AND TRAFFIC SIGNALS MUST BE INDICATED ON THE PLANS. IF CONNECTING TO AN EXISTING CIRCUIT, INDICATE LOCATION OF EXISTING SERVICE POINT FOR EACH CIRCUIT.
15. WHEN STREETLIGHTS ARE TO BE CONNECTED TO AN EXISTING CIRCUIT, THE ENGINEER MUST CERTIFY THAT THE EXISTING CIRCUIT IS CAPABLE OF HANDLING THE ADDITIONAL CIRCUIT LOAD.
16. CLARK COUNTY RESERVES THE RIGHT TO REJECT STREET LIGHT AND TRAFFIC SIGNAL POLES AND ASSEMBLIES WHICH HAVE A "STRIPED" APPEARANCE.
17. TWO WEEKS PRIOR TO BEGINNING OF CONSTRUCTION, MODIFICATION OR RELOCATION OF ANY TRAFFIC SIGNAL SYSTEM, WRITTEN NOTICE SHALL BE SUBMITTED TO THE CLARK COUNTY TRAFFIC MANAGEMENT DIVISION OF THE DATE THAT WORK WILL BEGIN.
18. THREE (3) NORMAL WORKING DAYS PRIOR TO TURN-ON OR COMPLETION OF MODIFICATION(S) TO A TRAFFIC SIGNAL SYSTEM, WRITTEN NOTICE SHALL BE SUBMITTED TO THE CLARK COUNTY TRAFFIC MANAGEMENT DIVISION THAT WORK IS BEING COMPLETED AND THE PROPOSED DATE OF COMPLETION.

CITY OF LAS VEGAS SEWER NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, AS AMENDED. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.
2. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS, ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEER.
3. CHISEL "S" OR "G" IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.
4. POLYVINYL (PVC) SEWER PIPE SHALL MEET ASTM D-3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND BACKFILL OF TYPE II AGGREGATE BASE.
5. ALL MANHOLES PAVED IN STREETS EIGHTY (80') FOOT R/W AND LARGER SHALL HAVE CONCRETE COLLARS. STREETS LESS THAN EIGHTY (80') FOOT R/W WILL REQUIRE RETROFIT IF PAVING DOES NOT CONFORM TO CITY STANDARDS AT THE MANHOLE.
6. TEE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCH (12") DIAMETER. CONNECTIONS TO FIFTEEN INCH (15") OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE "Y" S SHALL BE USED ON LINES TWELVE INCHES (12") OR ABOVE.
7. WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVVWD STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A WATER MAIN OR THE SEWER IS LESS THAN EIGHTEEN INCH (18") UNDER A WATER MAIN.
8. ALL CONTRACTORS INSTALLING SEWER MAINS THAT WILL BE UNDER THE JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS "A" CONTRACTORS.
9. THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN ONE TENTH (0.1) OF A FOOT FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. SEWER MAINS FOUND TO EXCEED THIS TOLERANCE WILL HAVE TO BE REPAIRED OR REMOVED OR REPLACED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.
10. INSTALLATION OF CURVED SEWER REQUIRES THE USE OF C-900 PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.
11. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.

DEPARTMENT OF PUBLIC WORKS NOTES

1. INSPECTIONS ARE REQUIRED. CALL 24 HOURS IN ADVANCE. 455-4610. YOUR PERMIT, APPROVED PLANS, AND BARRICADE PLANS FOR THIS WORK MUST BE ON THE JOB SITE AT ALL TIMES.
2. EXACT LOCATION OF ALL SAW-CUT LINES SHALL BE DETERMINED IN THE FIELD BY A CLARK COUNTY INSPECTOR.
3. CURB AND GUTTER WITH A GRADE OF LESS THAN 4/10 OF ONE PERCENT SHALL BE CONSTRUCTED BY FORMING. EACH JOINT SHALL BE CHECKED FOR GRADE PRIOR TO CONSTRUCTION AND WATER TESTED AS SOON AS POSSIBLE AFTER CONSTRUCTION.
4. FINAL ASPHALTIC CONCRETE (AC) PAVEMENT SURFACES SHALL BE ONE-HALF (1/2") INCH ABOVE THE LIP OF THE GUTTER (INCLUDING OPEN GRADE).
5. ALL OFF-SITE IMPROVEMENT CONSTRUCTION SHALL CONFORM TO THE UNIFORM STANDARD SPECIFICATIONS AND STANDARD DRAWINGS CLARK COUNTY AREA NEVADA AND CLARK COUNTY SUPPLEMENT TO UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS, LATEST REVISION.
6. PRIVATE STREETS CURB & GUTTER AND VALLEY GUTTERS REFLECTED ON THESE PLANS ARE TO BE INSPECTED BY A CLARK COUNTY INSPECTOR.
7. WHEEL CHAIR RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS SHALL BE DETERMINED IN THE FIELD BY A CLARK COUNTY INSPECTOR.
8. PROPER SIGNS, BARRIERS, BARRICADES AND LIGHTS SHALL BE PLACED AND MAINTAINED IN ACCORDANCE WITH THE LATEST "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" TRAFFIC, SCHOOL, OR STREET SIGNS OF ANY KIND ARE NOT TO BE MOVED FOR ANY REASON WITHOUT FIRST COORDINATING WITH THE DEPARTMENT OF PUBLIC WORKS INSPECTOR @ 455.4613.
9. THIS PLAN DOES NOT AUTHORIZE CLOSURE OF ANY ROAD OR STREET.
10. NO OPEN TRENCH SHALL BE ALLOWED ACROSS ANY STREET OR WITHIN TEN (10) FEET OF ANY TRAVEL-WAY, EXCEPT WHEN WORK IS IN ACTUAL PROGRESS. AREAS COVERED BY ACCEPTABLE STEEL PLATE ARE NOT TO BE CONSTRUED AS A TRENCH. NO OPEN TRENCH IS PERMITTED IN EXCESS OF 500 FEET OR LENGTH NECESSARY TO ACCOMMODATE PIPE INSTALLATION IN A SINGLE DAY, WHICH EVER IS GREATER. ALL TRENCH CROSSINGS AND BACKFILL SHALL MEET THE STANDARD SPECIFICATION UNLESS OTHERWISE STATED.
11. A TEMPORARY PATCH IS TO BE IN PLACE AT THE END OF EACH WORK DAY WHERE THE BACKFILL IN THE TRENCH HAS BEEN COMPLETED AND PRIOR TO OPENING THE WORK AREA BACK TO TRAFFIC AND IS TO BE MAINTAINED BY THE PERMITEE. A PERMANENT PATCH IS TO BE IN PLACE WITHIN THIRTY (30) DAYS AFTER THE INSTALLATION OF THE TEMPORARY PATCH.
12. COMPACTION TESTS ARE REQUIRED.

CLARK COUNTY FIRE DEPARTMENT NOTES

A. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE CLARK COUNTY FIRE CODE AS AMENDED, AND THE 2007 EDITION OF NATIONAL FIRE PROTECTION ASSOCIATION PAMPHLET #24.
B. FIRE HYDRANTS AND WATER SUPPLIES FOR FIRE PROTECTION SHALL BE AND MADE SERVICABLE PRIOR TO AND DURING THE TIME OF CONSTRUCTION IN ACCORDANCE WITH SECTION 1412 OF THE CLARK COUNTY FIRE CODE, AS AMENDED.
C. IF DURING CONSTRUCTION IT BECOMES NECESSARY TO CLOSE ANY CONTROL VALVE OR PLACE A HYDRANT OUT OF SERVICE, APPROVAL SHALL BE OBTAINED FOR THE FIRE DEPARTMENT PRIOR TO PLACING THE HYDRANT OUT OF SERVICE
D. PAINTING OF CURBS AND/OR STRIPING OF ASPHALT AREAS AND PROTECTION OF HYDRANTS FROM PHYSICAL INJURY SHALL BE PER FIRE HYDRANT INSTALLATION SPECIFICATIONS OF THE FIRE PREVENTION DIVISION.
E. NO FIRE HYDRANT SHALL BE LOCATED WITHIN 25 FEET OF ANY STRUCTURE, OR 6 FEET OF A DRIVEWAY, POWER POLE, LIGHT STANDARD, OR ANY OTHER OBSTRUCTION. FOR WALL, FENCE AND PLANTER LOCATIONS, A PERIMETER AROUND THE HYDRANT MEASURING A MINIMUM OF 3 FEET FROM ITS EXTERIOR SHALL BE MAINTAINED CLEAR OF ALL OBSTRUCTIONS AT ALL TIMES.
F. FIRE APPARATUS ACCESS ROADS SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF FIRE APPARATUS, WITH A MINIMUM VEHICLE LOAD OF 18,000 POUNDS PER AXLE, AND SHALL BE SURFACED AND PAVED SO AS TO PROVIDE ALL WEATHER DRIVING CAPABILITIES.
EXCEPTION: TEMPORARY ACCESS ROADS SERVING ONLY BUILDINGS UNDER CONSTRUCTION SHALL NOT BE REQUIRED TO BE PAVED, BUT SHALL COMPLY WITH ALL OTHER REQUIREMENTS OF SECTION 503.2.3 OF THE CLARK COUNTY FIRE CODE.
G. PRIOR TO ACCEPTANCE OF ANY FIRE SERVICE MAIN, A SATISFACTORY HYDROSTATIC TEST WITH PIPING JOINTS UNCOVERED MUST BE CONDUCTED. APPROVED PLANS, AN INSTALLATION PERMIT AND A CONTRACTOR'S MATERIALS AND TEST CERTIFICATE MUST BE PROVIDED AT TIME OF INSPECTION. SCHEDULE INSPECTION AT WWW.CLARKCOUNTYNV.GOV/DEPTS/FIRE.
H. FIRE HYDRANTS SHALL BE LOCATED 4' TO 7' FROM BACK OF CURB AND A MINIMUM OF 6 FEET AWAY FRO

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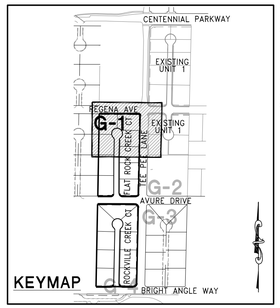
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30' 15' 0' 30' 60'
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ELEVATION=844.924 METERS (NAVD'88)
ELEVATION=2772.06 US SURVEY FEET (NAVD'88)

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CLARK COUNTY DEPARTMENT OF PUBLIC WORKS DEVELOPMENT REVIEW

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CHRISTOPHER R. ZRINYI, PE NO. 13976 — DATE

FOR REVIEW ONLY

REV	DESCRIPTION	BY	APPD	DATE

DATE: December 30, 2014
HORIZ. SCALE: 1"=30'
VERT. SCALE: N/A
DRAWN BY: BD
DESIGNED BY: AW
CHECKED BY: CZ
APPROVED BY: CZ
PROJECT #: 3040.0038

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IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 2
A SINGLE FAMILY RESIDENTIAL SUBDIVISION
GRADING PLAN
(SHEET 1 OF 4)

CLARK COUNTY NEVADA

PROFESSIONAL ENGINEER — STATE OF NEVADA — CHRISTOPHER R. ZRINYI — Exp. 6/30/2016 — CIVIL — No. 13976

DRAWING
G-1
SHT 3 OF 23
HTE NUMBER

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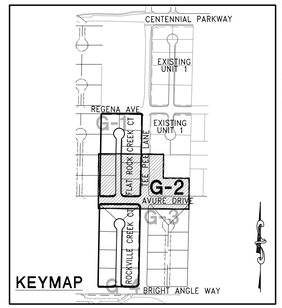
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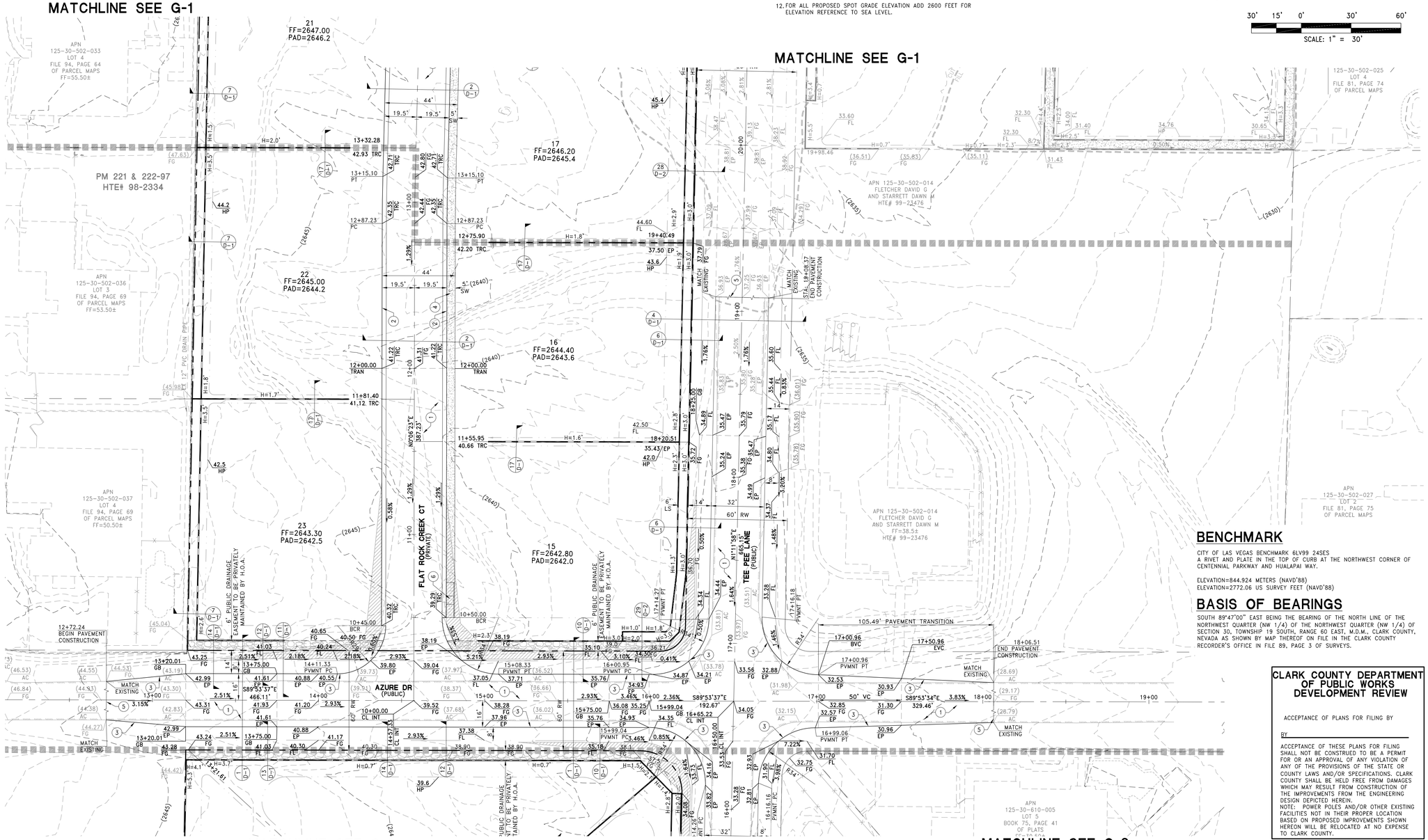
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CHRISTOPHER R. ZRINYI, PE NO. 13976 DATE

FOR REVIEW ONLY

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DRAWN BY: BD
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PROJECT #: 3040.0038

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(SHEET 2 OF 4)

CLARK COUNTY NEVADA

PROFESSIONAL ENGINEER — STATE OF NEVADA — CHRISTOPHER R. ZRINYI — Exp. 6/30/2016 — CIVIL — No. 13976

DRAWING
G-2
SHT 4 OF 23
HTE NUMBER

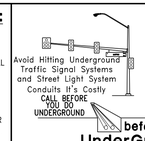
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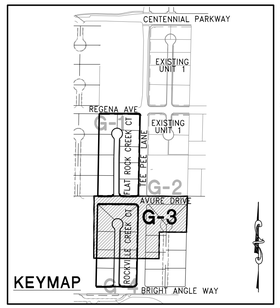
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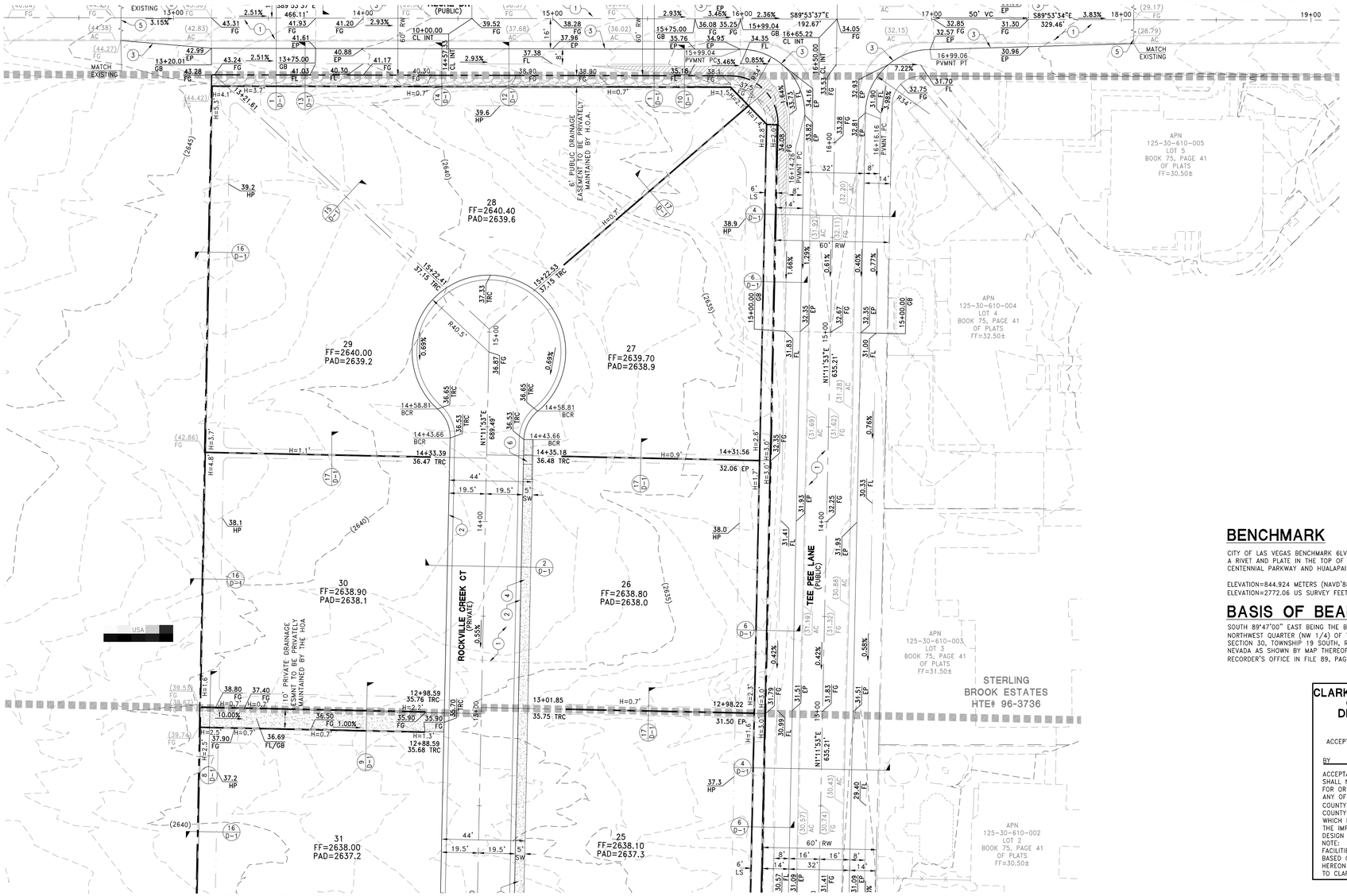
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SOUTH 89°47'00" EAST BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 30, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY RECORDER'S OFFICE IN FILE 89, PAGE 3 OF SURVEYS.

CLARK COUNTY DEPARTMENT OF PUBLIC WORKS DEVELOPMENT REVIEW

ACCEPTANCE OF PLANS FOR FILING BY

BY _____

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NOTE: POWER POLES AND/OR OTHER EXISTING FACILITIES NOT IN THEIR PROPER LOCATION BASED ON PROPOSED IMPROVEMENTS SHOWN HEREON WILL BE RELOCATED AT NO EXPENSE TO CLARK COUNTY.

I HEREBY CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY HTE #14-14210UP ON FILE WITH CLARK COUNTY FOR THIS PROJECT.

CHRISTOPHER R. ZRINYI, PE NO. 13976 DATE

FOR REVIEW ONLY

REV	DESCRIPTION	BY	APP'D	DATE

DATE: December 30, 2014
HORIZ. SCALE: 1"=30'
VERT. SCALE: N/A
DRAWN BY: BD
DESIGNED BY: AW
CHECKED BY: CZ
APPROVED BY: CZ
PROJECT #: 3040.0038

LENNAR®
2490 PASEO VERDE PARKWAY SUITE 120 HENDERSON, NV 89074
PHONE: (702) 736-9100 FAX: (702) 736-9200

RCI Engineering
4325 Dean Martin Road, Suite 300, Las Vegas, NV 89103
PH#702.453.0800 FAX#702.453.0801

IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 2
A SINGLE FAMILY RESIDENTIAL SUBDIVISION
GRADING PLAN (SHEET 3 OF 4)

CLARK COUNTY NEVADA

CHRISTOPHER R. ZRINYI — Exp. 6/30/2016 — CIVIL — No. 13976 — PROFESSIONAL ENGINEER — STATE OF NEVADA

DRAWING
G-3
SHT 5 OF 23
HTE NUMBER

D:\3040_LENR\0038_Centennial and Tee Pee_CIVIL_PS\UNIT 2\3003_G01.dwg crivera 12/30/14 11:22am

DISCLAIMER NOTE:

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

Avoid overhead power line contact. It's costly.
Call before you Overhead
1-702-227-2929
Nevada Power Environment and Safety Services Department

Call before you Dig
Avoid cutting underground utility lines. It's costly.
811
1-800-227-2600
CLARK COUNTY TRAFFIC OPERATIONS
1-702-455-6000

Avoid Hitting Underground Traffic Signal Systems and Street Light System
Conduits It's Costly
CALL BEFORE YOU DIG UNDERGROUND
Call before you UnderGround
1-702-455-6000
CLARK COUNTY TRAFFIC OPERATIONS
AND
1-702-432-5300
LAS VEGAS AREA COMPUTERIZED TRAFFIC SYSTEM

CONSTRUCTION NOTES

1. CONSTRUCT AC PAVEMENT PER DETAILS 1 THRU 5 ON SHEET D-1
2. CONSTRUCT 30" ROLL CURB PER CCAUSD # 217.S1
3. CONSTRUCT CONCRETE CUT OFF WALL PER DETAIL 1 ON SHEET D-1
4. CONSTRUCT 5' SIDEWALK PER CCAUSD # 234 (5-INCH THICK WHEN CONTIGUOUS TO ROLL CURB)
5. SAW CUT AND MATCH EXISTING PAVEMENT. FINAL LIMITS TO BE FIELD DETERMINED BY INSPECTOR
6. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVOLENT PER CCAUSD #235 (CASE 3)
7. EXISTING CONCRETE CUT OFF WALL

BUILDING PERMIT NOTE

ALL STRUCTURES SHOWN OR INDICATED ON THIS SUBMITTAL WITHIN THE PROPERTY REQUIRE A BUILDING PERMIT APPLICATION AND SUBMITTAL THIS INCLUDES BUILDINGS, ABOVE GROUND TANKS, SIGNS, RETAINING WALLS, FENCES, TRASH ENCLOSURES, SHADE STRUCTURES, STAIRWAYS, RAMPS, LIGHT POLES, LIGHT BOLLARDS, ETC. THIS DOES NOT INCLUDE ANY FLOOD CONTROL STRUCTURE SUCH AS PIPES, CULVERTS, ARCH CULVERTS, HEADWALLS, ETC. THIS DOES NOT INCLUDE ANY WORK WITHIN A PUBLIC STREET RIGHT-OF-WAY. THIS DOES NOT INCLUDE PRIVATE STREETS. THE REVIEW OF CIVIL IMPROVEMENT AND/OR GRADING PLANS DOES NOT INCLUDE ANY REVIEW OF ANY STRUCTURE THAT REQUIRES A BUILDING PERMIT APPLICATION."

SURVEY MONUMENT NOTE

OWNER RESPONSIBLE TO PROVIDE SURVEY MONUMENTATION AS REQUIRED BY CLARK COUNTY PUBLIC WORKS AND CLARK COUNTY UNIFORM STANDARD DRAWING NUMBER 243. OWNER IS ALSO RESPONSIBLE TO REPLACE ALL SURVEY MONUMENTATION DAMAGED, DESTROYED, OR OBSCURED DURING CONSTRUCTION.

SIGHT VISIBILITY ZONE

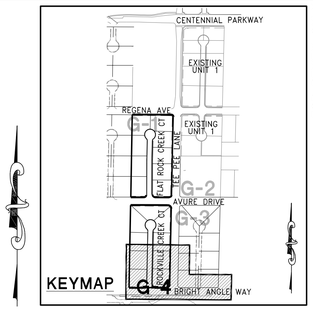
NO WALLS, FENCES, SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT, OTHER THAN TRAFFIC CONTROL DEVICES, FIRE HYDRANTS, TREES, AND STREET LIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT, MEASURED FROM TOP OF CURB, OR WHERE NO CURB EXISTS, A HEIGHT OF 27 INCHES MEASURED FROM THE TOP OF ADJACENT ASPHALT, GRAVEL OR PAVEMENT STREET SURFACE. THIS RESTRICTION EXTENDS ALONG THE SIGHT VISIBILITY LINE THROUGH LANDSCAPED MEDIANS.

FLOOD ZONE NOTE

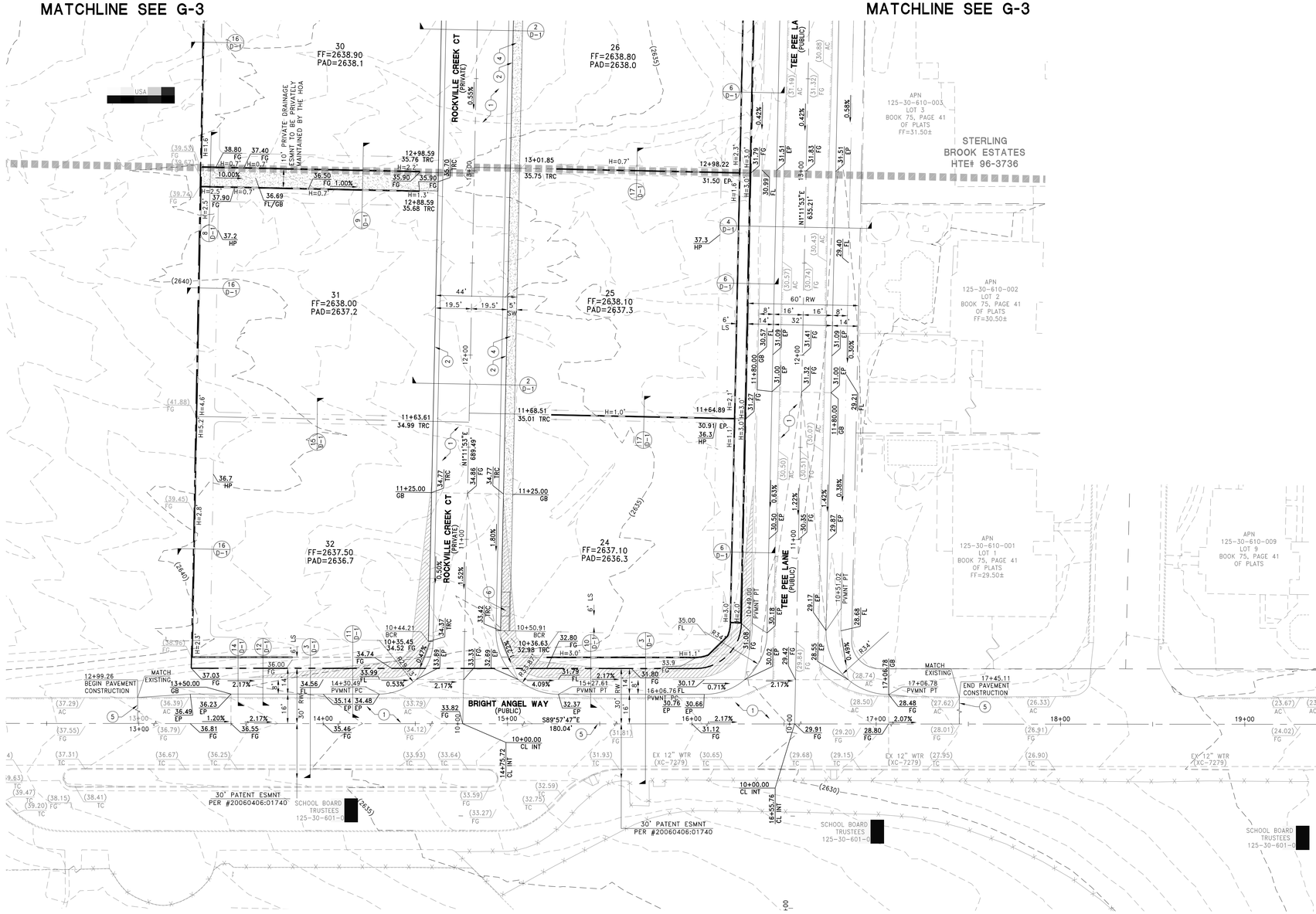
ACCORDING TO THE FEMA FLOOD INSURANCE RATE MAP (FIRM) COMMUNITY PANEL MAP NUMBER 32003C1745E DATED SEPTEMBER 27, 2002, THE SITE IS LOCATED IN A ZONE "X". ZONE "X" AREAS ARE DEFINED AS AREAS DETERMINDED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOOD PLAIN.

ENGINEERS NOTES

1. CONTRACTOR IS RESPONSIBLE FOR DUST AND EROSION CONTROL DURING CONSTRUCTION.
2. SEE DETAIL SHEET FOR ON-SITE PAVEMENT SECTIONS. CONTRACTOR TO VERIFY WITH SOILS REPORT.
3. SEE FINAL MAP FOR EXACT PROPERTY LINE DIMENSIONS.
4. ENGINEER TO BE NOTIFIED OF ANY DISCREPANCIES IMMEDIATELY.
5. THESE PLANS SHALL NOT, IN PART OR IN WHOLE, BE USED FOR CONSTRUCTION UNTIL APPROVED AND SIGNED BY THE GOVERNING AGENCIES.
6. ALL GRADING SHALL CONFORM TO SOILS REPORT RECOMMENDATIONS.
7. DURING CONSTRUCTION, SURVEYORS AND CONTRACTORS MUST VERIFY THAT ALL STREETS AND LOTS HAVE POSITIVE DRAINAGE. SAME MUST UTILIZE AT LEAST THREE GRADES ON VERTICAL TANGENTS TO VERIFY SLOPES.
8. SOIL REPORT NOTE:
   GRADING SHALL BE IN ACCORDANCE WITH SOILS REPORT PREPARED BY:
   ENGINEER: AMERICAN SOILS ENGINEERING, LLC
   PROJECT NO. 1691-GEO
   DATED: DECEMBER 30,2013
9. CUT/FILL ESTIMATES
   EXISTING TO FINISH GRADE ELEVATIONS
   NET CUT: 19,130 CY
   NET FILL: 21,794 CY
10. SEE DETAIL 21 & 22 ON SHEET D-2 FOR TYPICAL LOT DRAINAGE
11. FOR STORMWATER RUNOFF MANAGEMENT NOTES REFER TO SHEET N-1
12. FOR ALL PROPOSED SPOT GRADE ELEVATION ADD 2600 FEET FOR ELEVATION REFERENCE TO SEA LEVEL.



30' 15' 0' 30' 60'
SCALE: 1" = 30'



BENCHMARK

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

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

BASIS OF BEARINGS

SOUTH 89°47'00" EAST BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 30, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY RECORDER'S OFFICE IN FILE 89, PAGE 3 OF SURVEYS.

CLARK COUNTY DEPARTMENT OF PUBLIC WORKS DEVELOPMENT REVIEW

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CHRISTOPHER R. ZRINYI, PE NO. 13976 DATE

FOR REVIEW ONLY

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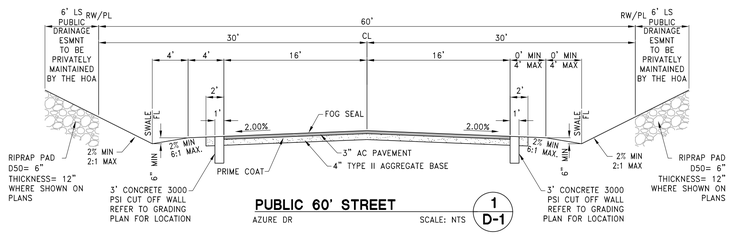
IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 2
A SINGLE FAMILY RESIDENTIAL SUBDIVISION
GRADING PLAN (SHEET 4 OF 4)
CLARK COUNTY NEVADA

PROFESSIONAL ENGINEER — STATE OF NEVADA
CHRISTOPHER R. ZRINYI
Exp. 6/30/2016
CIVIL
No. 13976

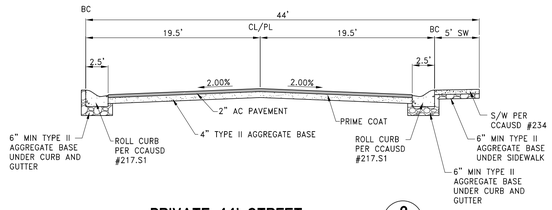
DRAWING
G-4
SHT 6 OF 23
HTE NUMBER

D:\3040_LENR\0038_Centennial and Tee Pee_CIVIL_IPS\UNIT 2\S003_G01.dwg crivera 12/30/14 11:24am

NOTE: ALL AGGREGATE BASES SHALL BE COMPACTED PER THE GEOTECHNICAL REPORT HTE#XX-XXXXX. PRELIMINARY PAVEMENT SECTIONS SHALL BE VERIFIED WITH THE FINAL PAVEMENT SECTION RECOMMENDATION REPORT PRIOR TO CONSTRUCTION. IF FINAL PAVEMENT SECTIONS ARE DIFFERENT A REVISION TO THE IMPROVEMENT PLANS WILL BE REQUIRED.

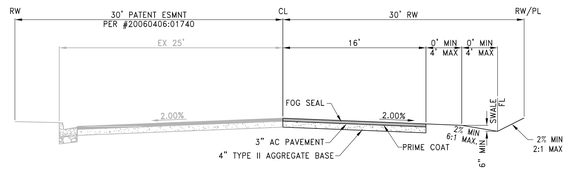


PUBLIC 60' STREET — AZURE DR — SCALE: NTS — 1 / D-1



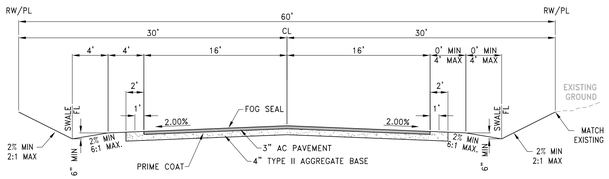
PRIVATE 44' STREET — ONSITE STREET — SCALE: NTS — 2 / D-1

NOTE: ALL AGGREGATE BASES SHALL BE COMPACTED PER THE GEOTECHNICAL REPORT HTE#XX-XXXXX. PRELIMINARY PAVEMENT SECTIONS SHALL BE VERIFIED WITH THE FINAL PAVEMENT SECTION RECOMMENDATION REPORT PRIOR TO CONSTRUCTION. IF FINAL PAVEMENT SECTIONS ARE DIFFERENT A REVISION TO THE IMPROVEMENT PLANS WILL BE REQUIRED.

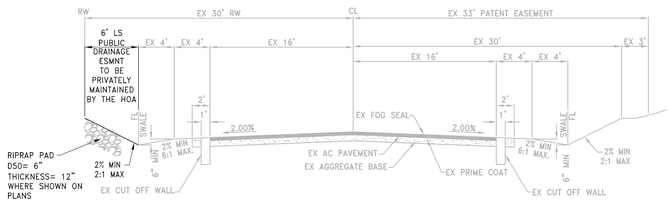


PUBLIC 60' STREET — BRIGHT ANGEL WAY — SCALE: NTS — 3 / D-1

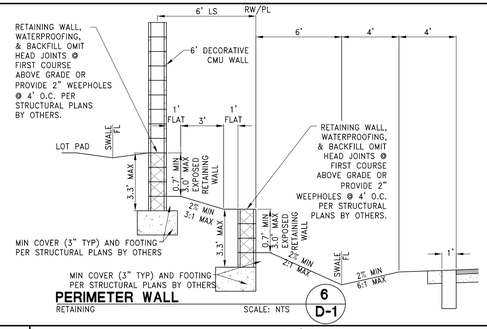
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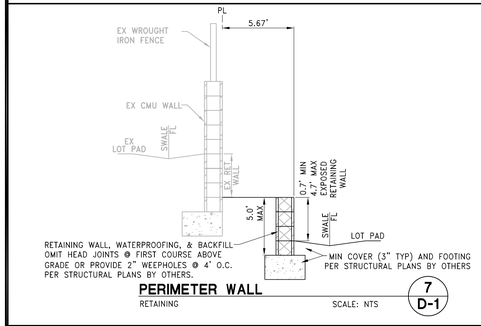
PUBLIC 60' STREET — TEE PEE LN — SCALE: NTS — 4 / D-1



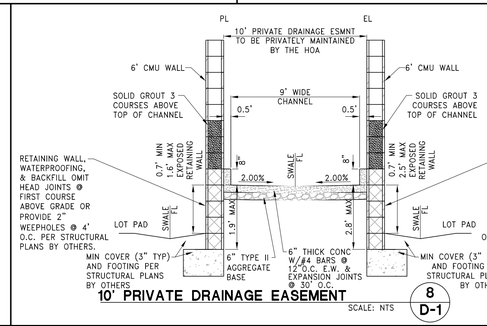
EXISTING PUBLIC 60' STREET — REGENA AVE — SCALE: NTS — 5 / D-1



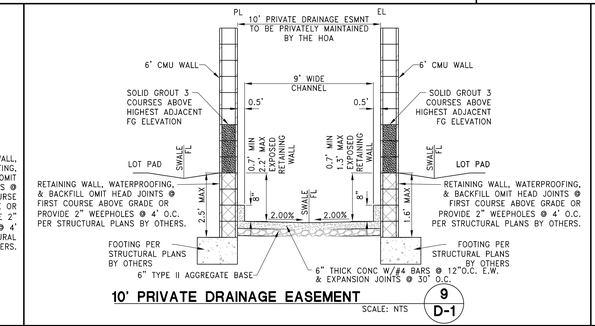
PERIMETER WALL — RETAINING — SCALE: NTS — 6 / D-1



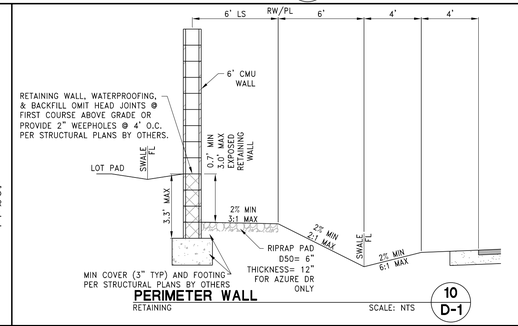
PERIMETER WALL — RETAINING — SCALE: NTS — 7 / D-1



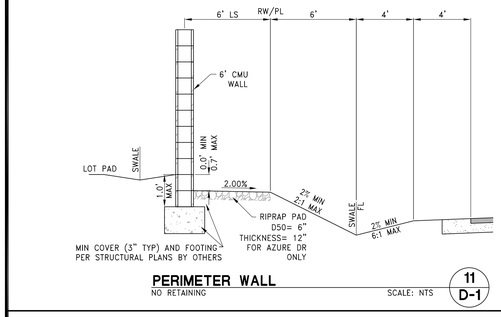
10' PRIVATE DRAINAGE EASEMENT — SCALE: NTS — 8 / D-1



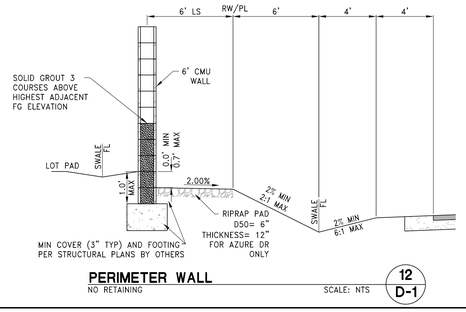
10' PRIVATE DRAINAGE EASEMENT — SCALE: NTS — 9 / D-1



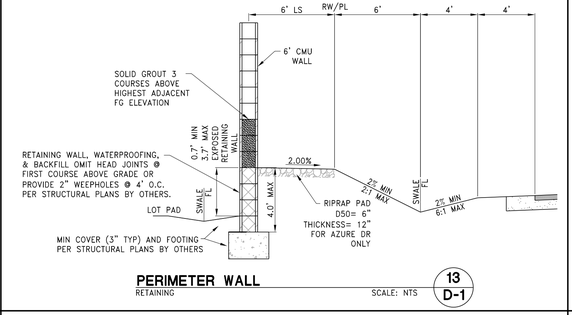
PERIMETER WALL — RETAINING — SCALE: NTS — 10 / D-1



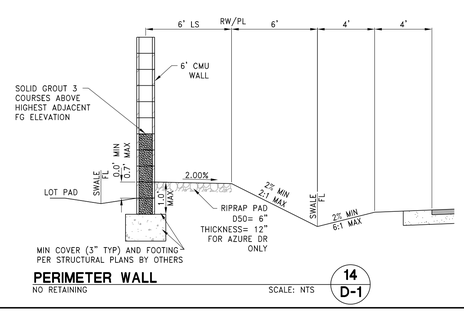
PERIMETER WALL — NO RETAINING — SCALE: NTS — 11 / D-1



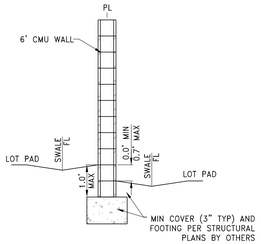
PERIMETER WALL — NO RETAINING — SCALE: NTS — 12 / D-1



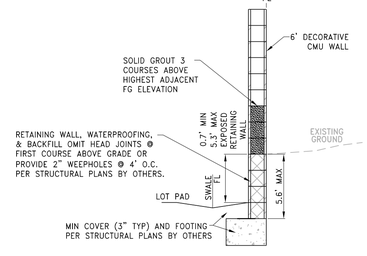
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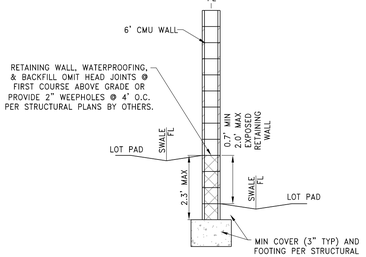
PERIMETER WALL — NO RETAINING — SCALE: NTS — 14 / D-1



SIDE YARD TO SIDE YARD — NO RETAINING — SCALE: NTS — 15 / D-1



PERIMETER WALL — RETAINING — SCALE: NTS — 16 / D-1



SIDE YARD TO SIDE YARD — RETAINING — SCALE: NTS — 17 / D-1

GEOTECHNICAL NOTE:

A GEOLOGIST OR GEOTECHNICAL ENGINEER SHALL BE ON SITE DURING EXCAVATION AND MASS GRADING OPERATIONS TO EXAMINE THE SOIL CHARACTERISTICS AND GEOLOGICAL CONDITIONS ENCOUNTERED, AND TO PROVIDE PROFESSIONAL ADVICE TO THE OWNER IN THE EVENT THAT UNANTICIPATED SOIL PROBLEMS ARISE AND/OR SUBSURFACE SITE CONDITIONS ARE FOUND TO BE SIGNIFICANTLY DIFFERENT THAN DEFINED BY PRE EXPLORATION AND TESTING.

WALL & SCARP NOTE:

1. CONTRACTOR TO CONSTRUCT ALL SCARP AND MAINTAIN PROPER COVER OVER AND FROM ALL WALL FOOTINGS PER THE SOILS REPORT REFERRED TO ON THE GRADING PLANS, REPORT ANY PROBLEMS IN DOING SO TO THE DEVELOPER AND THE ENGINEER IMMEDIATELY.
2. SCARP LESS THAN 1' VERTICAL NOT SHOWN ON PLANS.
3. ALL WALL ALIGNMENTS SHALL FOLLOW SIGHT VISIBILITY ZONE ALIGNMENT AND REMAIN OUTSIDE OF SIGHT VISIBILITY ZONE.

FOR REVIEW ONLY

REV	DESCRIPTION	BY	APP'D	DATE

DATE: December 30, 2014
HORIZ. SCALE: N/A
VERT. SCALE: N/A
DRAWN BY: CR
DESIGNED BY: AW
CHECKED BY: CRZ
APPROVED BY: CRZ
PROJECT #: 3040.0038

LENNAR®
2490 PASEO VERDE PARKWAY SUITE 120 HENDERSON, NV 89074
PHONE: (702) 736-9100 FAX: (702) 736-9200

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4325 Dean Martin Road, Suite 300, Las Vegas, NV 89103
PH#702.453.0800 FAX#702.453.0801

IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 2
A SINGLE FAMILY RESIDENTIAL SUBDIVISION

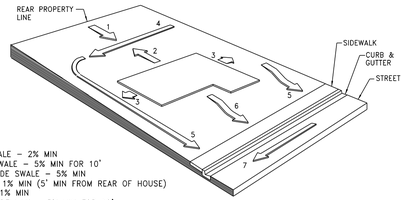
GRADING DETAILS (SHEET 1 OF 2)

CLARK COUNTY NEVADA

O:\3040_LENR\0038_Centennial and Tee Pee_CIVIL_PS\UNIT 2\3004_001.dwg crivera 12/30/14 11:24am

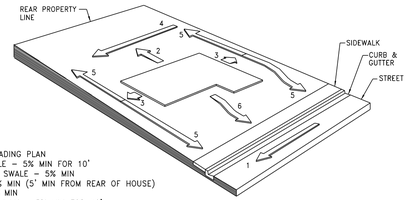
PROFESSIONAL ENGINEER — STATE OF NEVADA
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Exp. 6/30/2016
CIVIL
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DRAWING
D-1
SHT 7 OF 23
HTE NUMBER



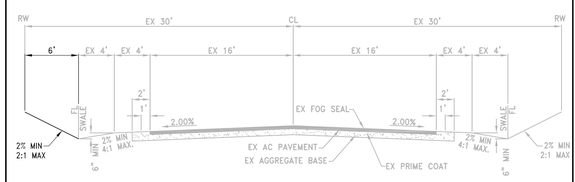
1. SLOPE FROM REAR TO SWALE – 2% MIN
2. SLOPE FROM HOUSE TO SWALE – 5% MIN FOR 10'
3. SLOPE FROM HOUSE TO SIDE SWALE – 5% MIN
4. SLOPE OF REAR SWALE – 1% MIN (5' MIN FROM REAR OF HOUSE)
5. SLOPE OF SIDE SWALE – 1% MIN
6. SLOPE FROM HOUSE TO SIDEWALK – 5% MIN FOR 10'
7. SLOPE OF STREET – PER GRADING PLAN

TYPICAL LOT DRAINAGE DETAIL (21) D-2
SCALE: NTS

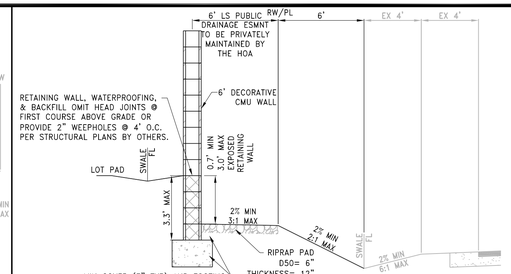


1. SLOPE OF STREET – PER GRADING PLAN
2. SLOPE FROM HOUSE TO SWALE – 5% MIN FOR 10'
3. SLOPE FROM HOUSE TO SIDE SWALE – 5% MIN
4. SLOPE OF REAR SWALE – 1% MIN (5' MIN FROM REAR OF HOUSE)
5. SLOPE OF SIDE SWALE – 1% MIN
6. SLOPE FROM HOUSE TO SIDEWALK – 5% MIN FOR 10'

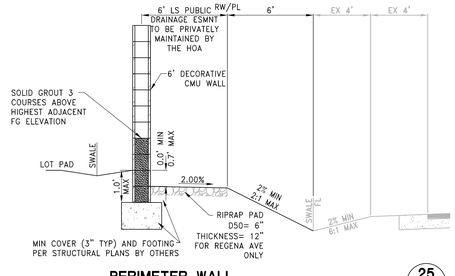
TYPE B LOT DRAINAGE DETAIL (22) D-2
SCALE: NTS



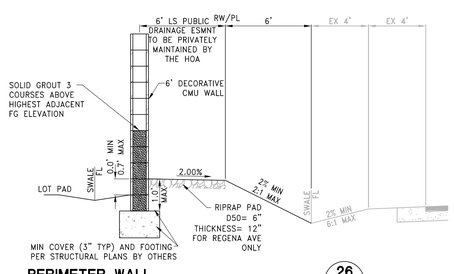
EXISTING PUBLIC 60' STREET
TEE PEE LN
SCALE: NTS (23) D-2



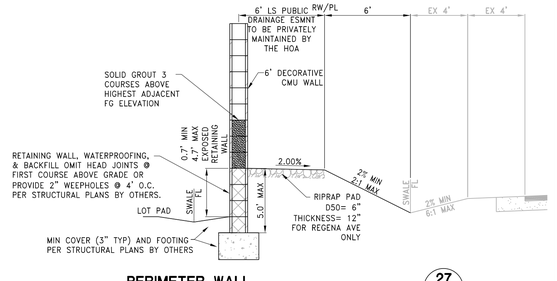
PERIMETER WALL
RETAINING
SCALE: NTS (24) D-2



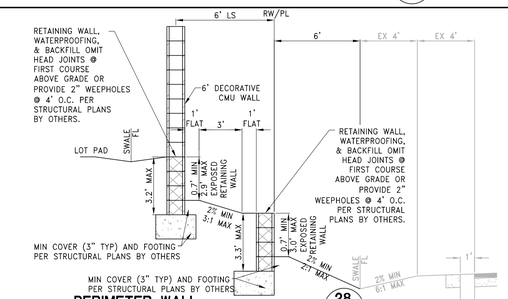
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NO RETAINING
SCALE: NTS (25) D-2



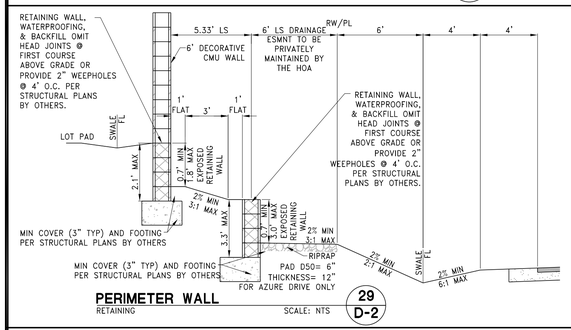
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NO RETAINING
SCALE: NTS (26) D-2



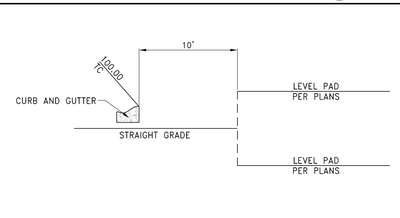
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RETAINING
SCALE: NTS (27) D-2



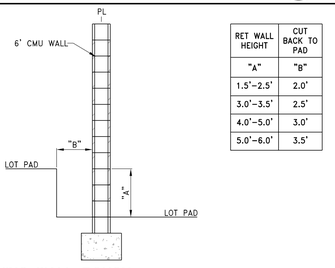
PERIMETER WALL
RETAINING
SCALE: NTS (28) D-2



PERIMETER WALL
RETAINING
SCALE: NTS (29) D-2

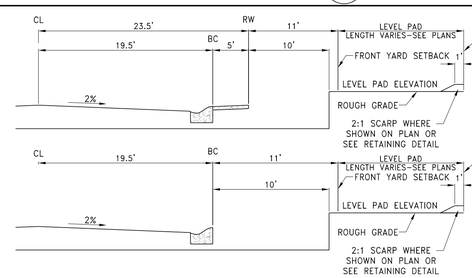


TYPICAL CORNER LOT ROUGH GRADE FOR CUT/FILL
ONSITE STREET
SCALE: NTS (30) D-2



RET WALL HEIGHT	CUT BACK TO PAD
"A"	"B"
1.5'–2.5'	2.0'
3.0'–3.5'	2.5'
4.0'–5.0'	3.0'
5.0'–6.0'	3.5'

RETAINING WALL ROUGH GRADE CUT BACK SECTION
SCALE: NTS (31) D-2



ONSITE ROUGH GRADE FOR CUT/FILL
ONSITE STREET
SCALE: NTS (32) D-2

GEOTECHNICAL NOTE:

A GEOLOGIST OR GEOTECHNICAL ENGINEER SHALL BE ON SITE DURING EXCAVATION AND MASS GRADING OPERATIONS TO EXAMINE THE SOIL CHARACTERISTICS AND GEOLOGICAL CONDITIONS ENCOUNTERED, AND TO PROVIDE PROFESSIONAL ADVICE TO THE OWNER IN THE EVENT THAT UNANTICIPATED SOIL PROBLEMS ARISE AND/OR SUBSURFACE SITE CONDITIONS ARE FOUND TO BE SIGNIFICANTLY DIFFERENT THAN DEFINED BY PRE EXPLORATION AND TESTING.

WALL & SCARP NOTE:

1. CONTRACTOR TO CONSTRUCT ALL SCARP AND MAINTAIN PROPER COVER OVER AND FROM ALL WALL FOOTINGS PER THE SOILS REPORT REFERRED TO ON THE GRADING PLANS, REPORT ANY PROBLEMS IN DOING SO TO THE DEVELOPER AND THE ENGINEER IMMEDIATELY.
2. SCARP LESS THAN 1' VERTICAL NOT SHOWN ON PLANS.
3. ALL WALL ALIGNMENTS SHALL FOLLOW SIGHT VISIBILITY ZONE ALIGNMENT AND REMAIN OUTSIDE OF SIGHT VISIBILITY ZONE.

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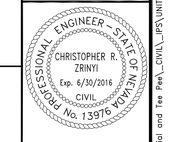
REV	DESCRIPTION	BY	APPD	DATE

DATE: December 30, 2014
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VERT. SCALE: N/A
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IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 2
A SINGLE FAMILY RESIDENTIAL SUBDIVISION
GRADING DETAILS (SHEET 2 OF 2)
CLARK COUNTY NEVADA



DRAWING
D-2
SHT 8 OF 23
HTE NUMBER

O:\3040_LENR\0038_Centennial and Tee Pee_CIVIL_IPS\UNIT 2\3004_D01.dwg crivera 12/30/14 11:24am

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AND
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LAS VEGAS AREA COMPUTERIZED TRAFFIC SYSTEM

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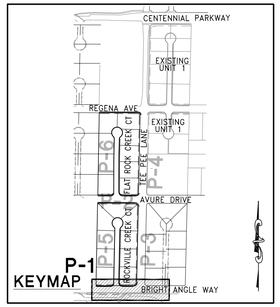
BENCHMARK

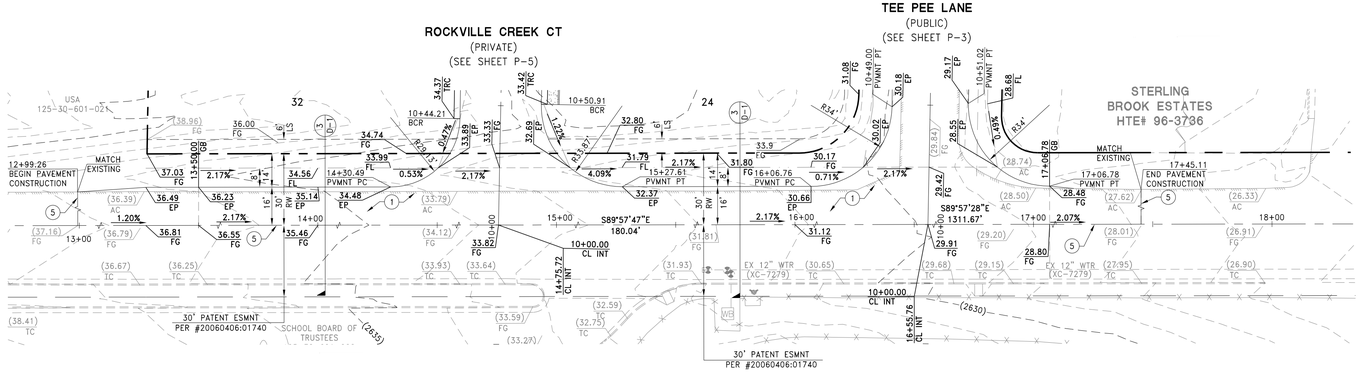
CITY OF LAS VEGAS BENCHMARK 6LV99 24SES
A RIVET AND PLATE IN THE TOP OF CURB AT THE NORTHWEST CORNER OF CENTENNIAL PARKWAY AND HUALAPAI WAY.

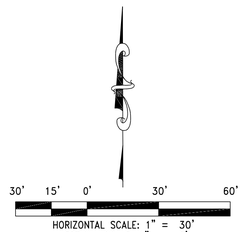
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ELEVATION=2772.06 US SURVEY FEET (NAVD'88)

BASIS OF BEARINGS

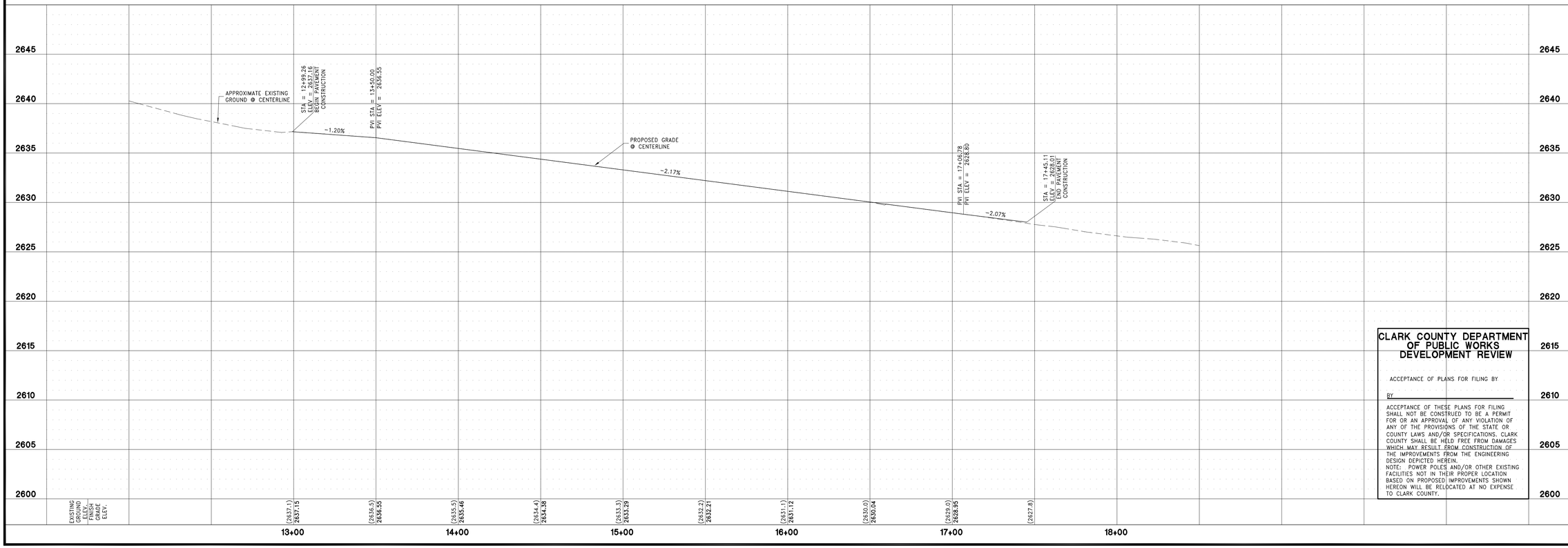
SOUTH 89°47'00" EAST BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 30, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY RECORDER'S OFFICE IN FILE 89, PAGE 3 OF SURVEYS.







BRIGHT ANGEL WAY
(PUBLIC)



CLARK COUNTY DEPARTMENT OF PUBLIC WORKS DEVELOPMENT REVIEW

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FOR REVIEW ONLY

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VERT. SCALE: 1"=5'
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DESIGNED BY: AW
CHECKED BY: CRZ
APPROVED BY: CRZ
PROJECT #: 3040.0038

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IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 2
A SINGLE FAMILY RESIDENTIAL SUBDIVISION
PLAN AND PROFILE
BRIGHT ANGEL WAY STA: 13+00.00 - 18+00.00
CLARK COUNTY NEVADA

PROFESSIONAL ENGINEER - STATE OF NEVADA
CHRISTOPHER R. ZRINYI
Exp. 6/30/2016
CIVIL
No. 13976

DRAWING
P-1
SHT 14 OF 23
HTE NUMBER

O:\3040_LENR\0038_Centennial and Tee Pee_CIVIL_IPS\UNIT 2\S007_P01.dwg crivera 12/30/14 11:25am

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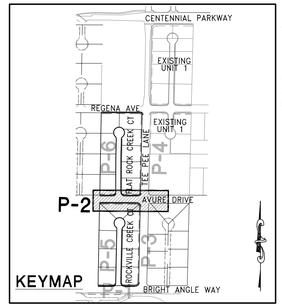
BENCHMARK

CITY OF LAS VEGAS BENCHMARK 6LV99 24SES
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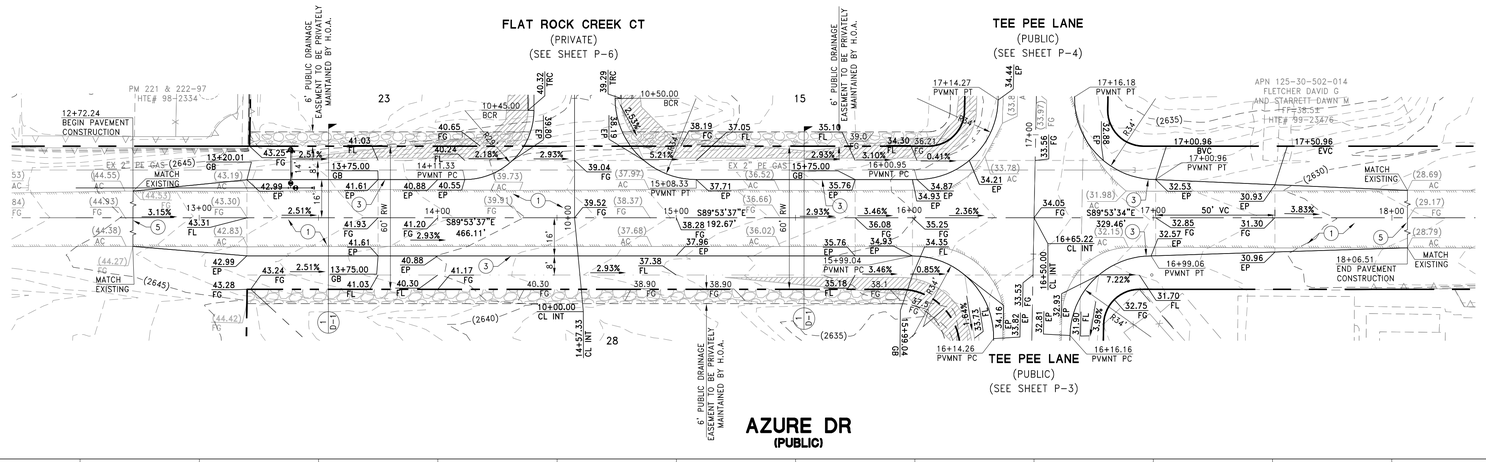
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ELEVATION=2772.06 US SURVEY FEET (NAVD'88)

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30' 15' 0' 30' 60'
HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 5'



CLARK COUNTY DEPARTMENT OF PUBLIC WORKS DEVELOPMENT REVIEW

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PLAN AND PROFILE
AZURE DRIVE STA: 13+00.00 - 18+00.00
CLARK COUNTY NEVADA

PROFESSIONAL ENGINEER - STATE OF NEVADA
CHRISTOPHER R. ZRINYI
Exp. 6/30/2016
CIVIL
No. 13976

DRAWING
P-2
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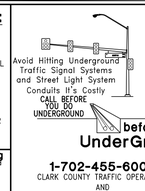
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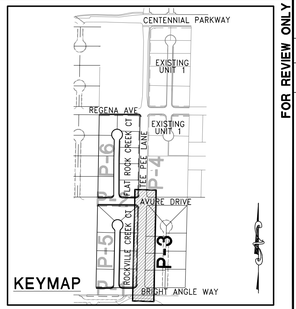
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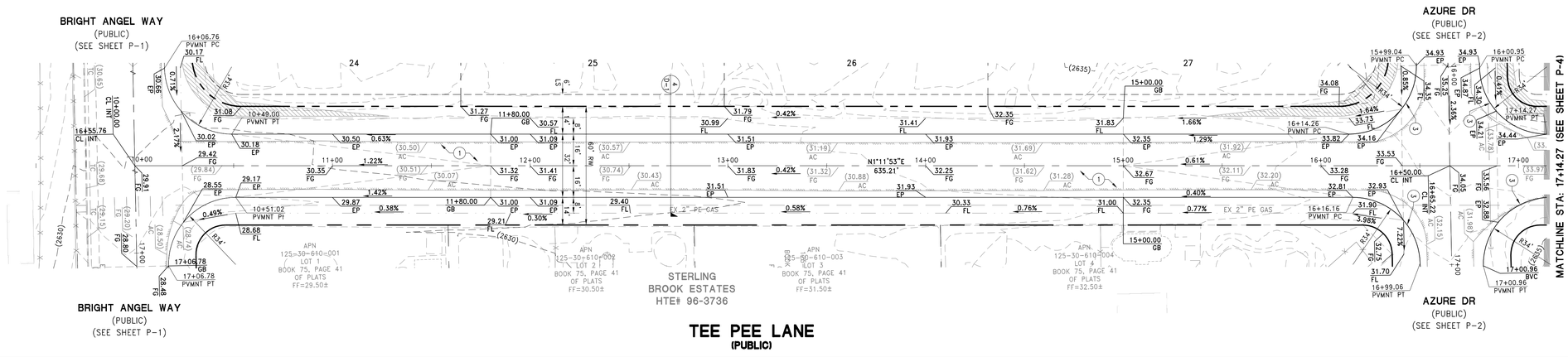
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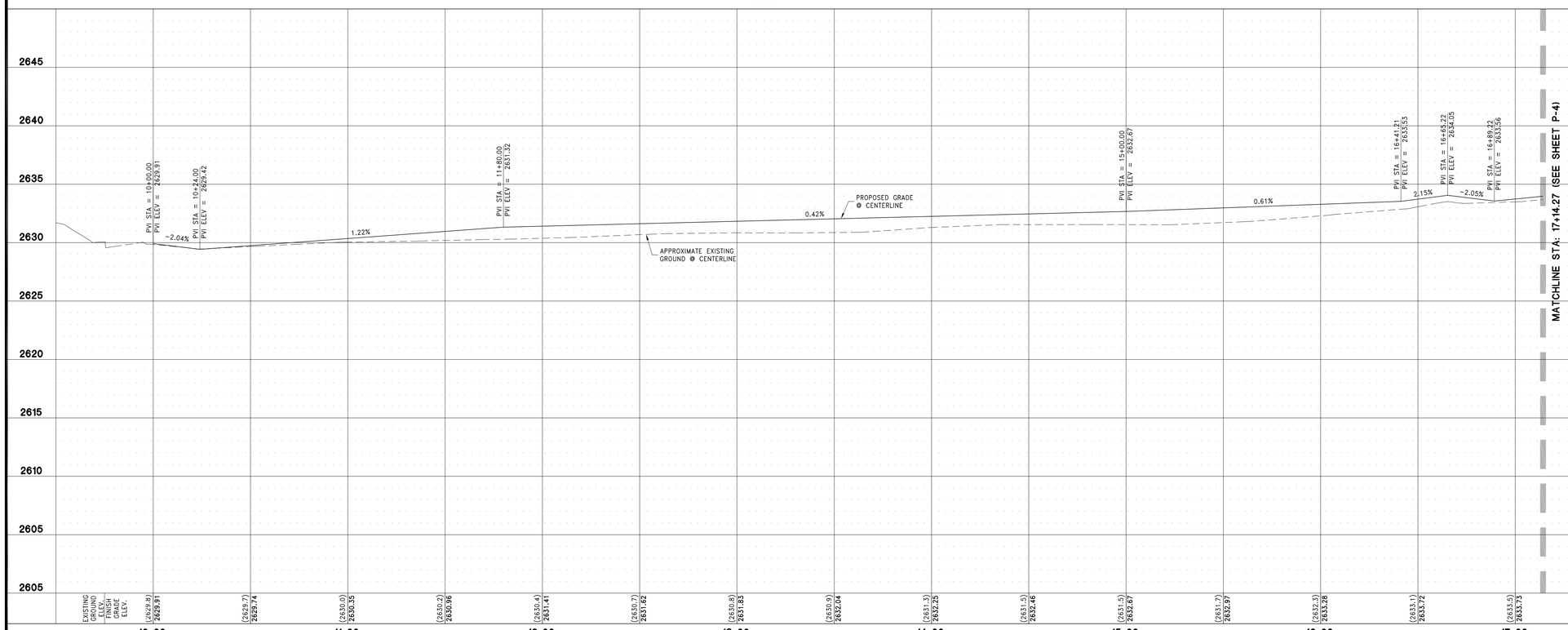
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CLARK COUNTY NEVADA

PROFESSIONAL ENGINEER - STATE OF NEVADA
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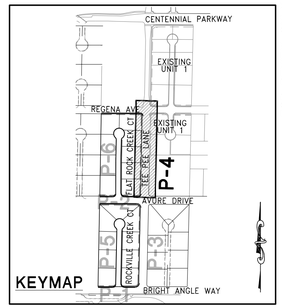
BENCHMARK

CITY OF LAS VEGAS BENCHMARK 6LV99 24SES
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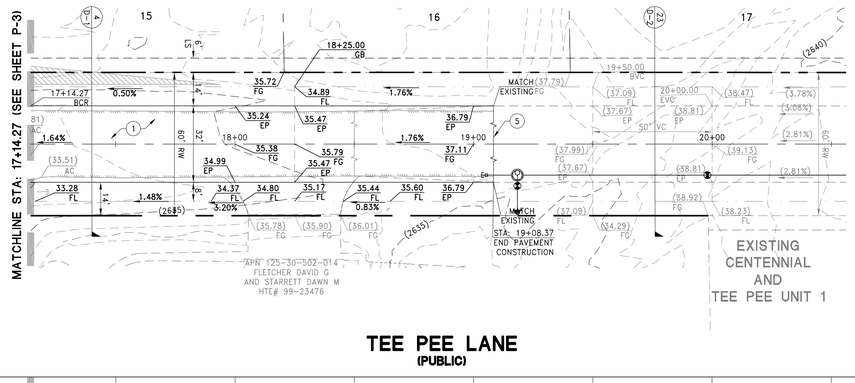
ELEVATION=844.924 METERS (NAVD'88)
ELEVATION=2772.06 US SURVEY FEET (NAVD'88)

BASIS OF BEARINGS

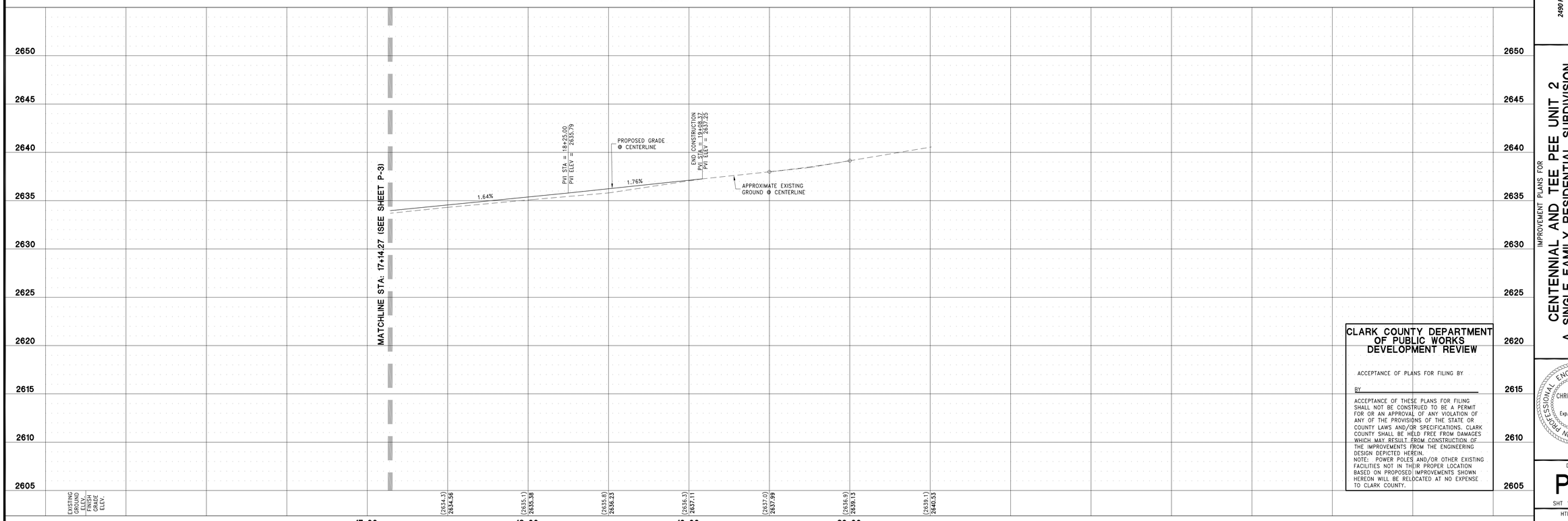
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30' 15' 0' 30' 60'
HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 5'



TEE PEE LANE
(PUBLIC)



CLARK COUNTY DEPARTMENT OF PUBLIC WORKS DEVELOPMENT REVIEW

ACCEPTANCE OF PLANS FOR FILING BY

BY _____

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FOR REVIEW ONLY

REV	DESCRIPTION	BY	APP'D	DATE

DATE: December 30, 2014
HORIZ. SCALE: 1"=30'
VERT. SCALE: 1"=5'
DRAWN BY: CR
DESIGNED BY: AW
CHECKED BY: CRZ
APPROVED BY: CRZ
PROJECT #: 3040.0038

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RCI Engineering
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PH#702.453.0800 FAX#702.453.0801

IMPROVEMENT PLANS FOR
CENTENNIAL AND TEE PEE UNIT 2
A SINGLE FAMILY RESIDENTIAL SUBDIVISION
PLAN AND PROFILE
TEE PEE LANE STA: 17+14.27 - 19+08.37
CLARK COUNTY NEVADA

PROFESSIONAL ENGINEER STATE OF NEVADA
CHRISTOPHER R. ZRINYI
Exp. 6/30/2016
CIVIL
No. 13976

DRAWING
P-4
SHT 17 OF 23
HTE NUMBER

D:\3040_LENR\0038_Centennial and Tee Pee_CIVIL_PS\UNIT 2\3007_P04.dwg crivera 12/30/14 11:27am

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CLARK COUNTY TRAFFIC OPERATIONS AND
1-702-432-5300
LAS VEGAS AREA COMPUTERIZED TRAFFIC SYSTEM

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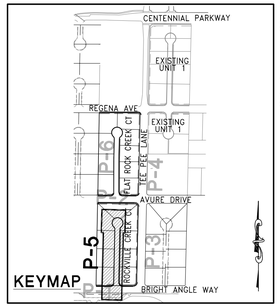
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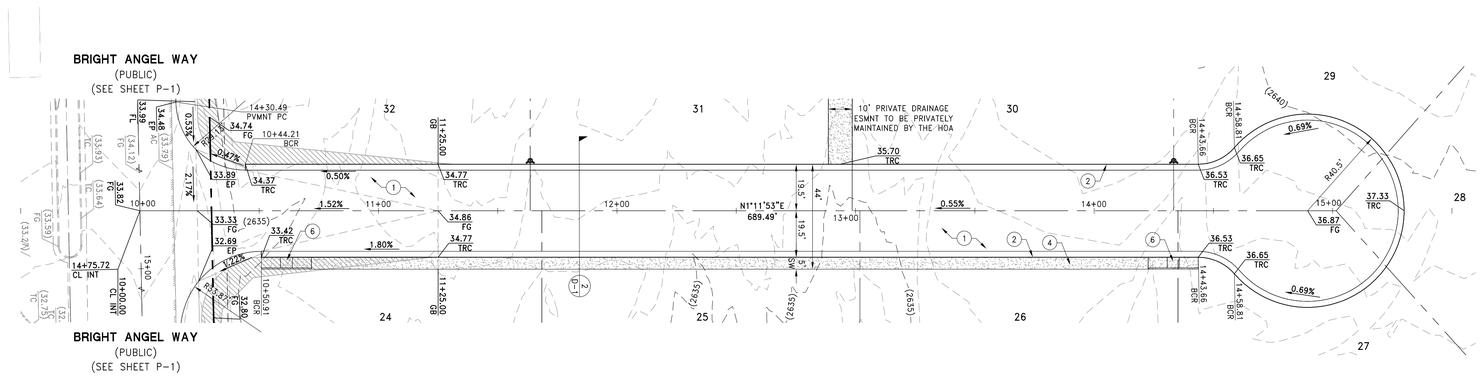
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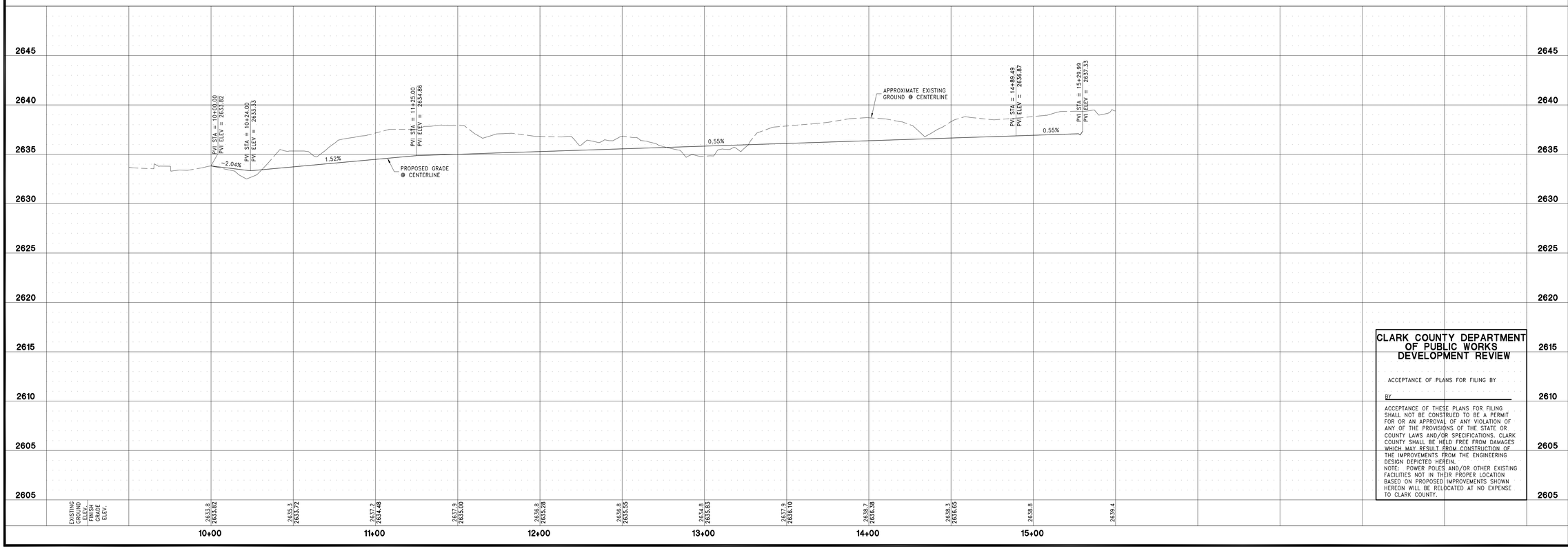
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ROCKVILLE CREEK CT
(PRIVATE)



CLARK COUNTY DEPARTMENT OF PUBLIC WORKS DEVELOPMENT REVIEW

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PLAN AND PROFILE
ROCKVILLE CREEK CT STA: 10+00.00 - 15+00.00
CLARK COUNTY NEVADA

PROFESSIONAL ENGINEER STATE OF NEVADA
CHRISTOPHER R. ZRINYI
Exp. 6/30/2016
CIVIL
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DRAWING
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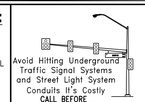
G:\3040_LENR\0038_Centennial and Tee Pee_CIVIL_IPS\UNIT 2\S007_P05.dwg crivera 12/30/14 11:27am

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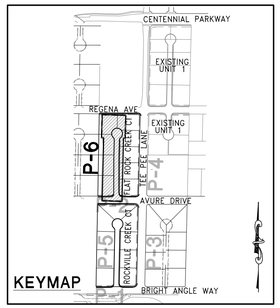
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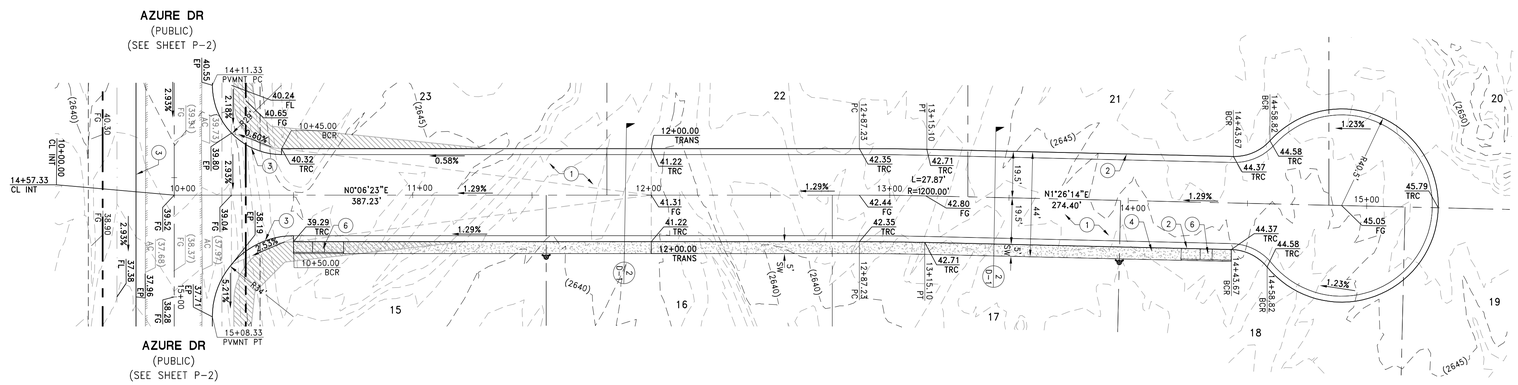
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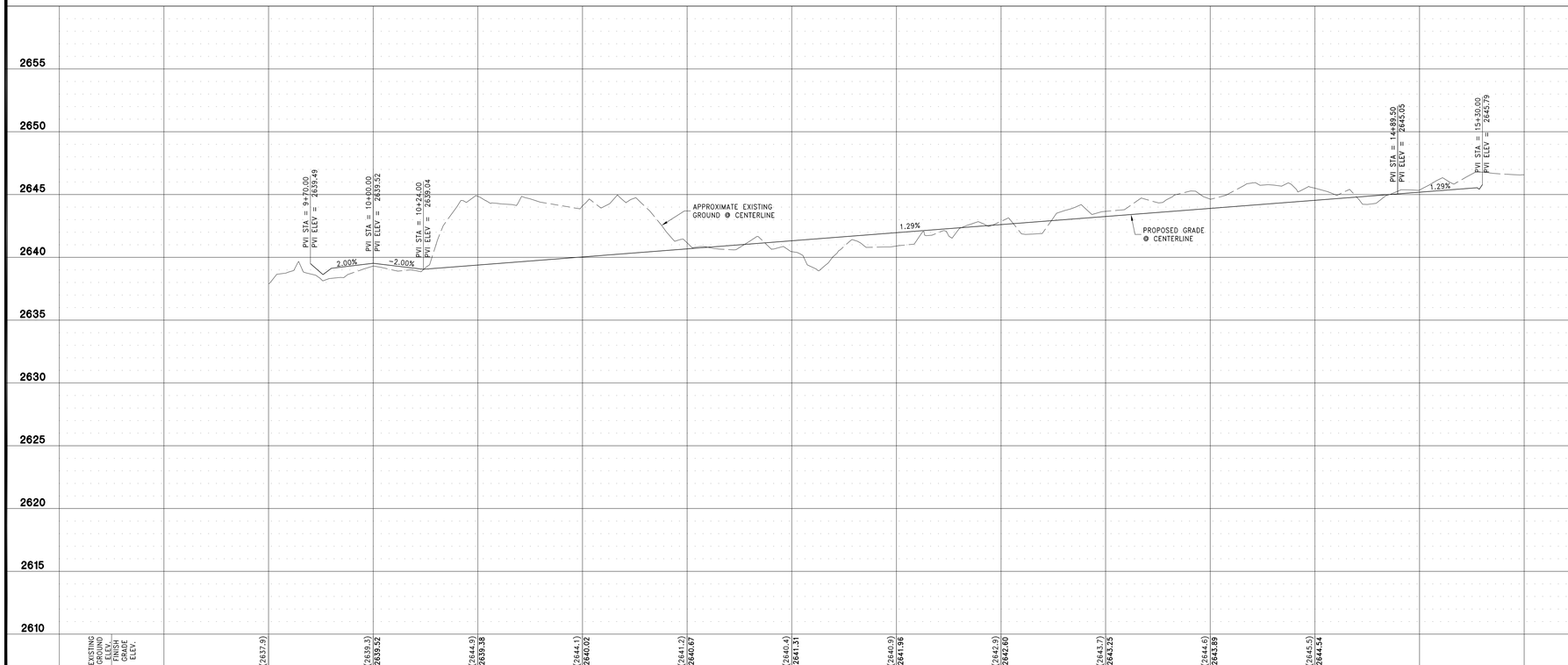
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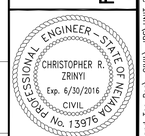
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