DS #: 4635

APN: 138-07-602-002

PROJECT: GILMORE AND FORT APACHE (GILMORE CREEK) PROJECT IN CLARK COUNTY FOR CLV CONCURRENCE

SUBMITTAL: 1ST

SCANNED BY/DATE:

CHECKED BY/DATE:

CITY OF LAS VEGAS NEVADA

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: November 14, 2013
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: **Gilmore and Fort Apache (Gilmore Creek)** **(Project in Clark County for CLV Concurrence)**			**COPIES TO:** Thomason Consulting Engineers
Cross Streets:	SWC of Fort Apache Road & Gilmore Ave.			D.R. Horton
File Number:	F:\Depot\DSMemos\DS4635A.doc			Bart Anderson, P.E., DevCo
Parcel Number:	138-07-602-002			CCPW
Zoning Action:	ANX-51432			
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	10/31/2013	11/14/2013	See Comments Below	$400.00	338143: $400
			TOTAL FEES (LDDRS):	**$400.00**	**----**

REMARKS:

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

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

1. It is understood that the subject site is currently within the *Clark County* jurisdiction but is in the process to be annexed into the *City of Las Vegas*. The review and comments of this drainage study will base on the local criteria per the *City of Las Vegas* standards.
2. Provide existing contours on the grading plans in the next submittal so as to determine the extent of proposed cut and fill by the developments.
3. Revise the callout of the *City of Las Vegas* recorded construction drawing number for an existing storm drain from "107Y-4214-5F" to "**630.98**".
4. All drainage easements must be public drainage easements to be privately maintained (by the *Homeowners Association)* and common lots to be labeled on the grading plans and to be dedicated as such in the final map.
5. Revise all proposed drop inlets to Type "CM" or Neenah Pre-cast inlets. Contact Raul Cruz at 229-3224 for an AutoCAD detail to be included within the improvement plans if Type "CM" drop inlets are used.
6. Identify all existing drop inlets in *Gilmore Avenue* with type and size information and provide note to protect-in-place.

7. Revise Construction Notes #7 and #10 to install per *Uniform Standard Drawings* (USD) Nos. 421 A and 421B.

8. **Sheet D1**: Revise *Detail 9/D1* to provide a cap at the top of an existing and a proposed walls to prevent future maintenance burden.

9. **Sheet P2** and **Sheet P3**: Show the 100-year hydraulic grade line (HGL) on the plan & profile sheets in the next submittal.

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

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

END OF REMARKS
ays

T/R/S: T20S/R60E/07
AREA L-07

****
*** FAX TX REPORT ***
****

TRANSMISSION OK

JOB NO.	2546
DESTINATION ADDRESS	9326129
PSWD/SUBADDRESS	
DESTINATION ID	
ST. TIME	11/14 14:39
USAGE T	01'36
PGS.	2
RESULT	OK

CITY OF LAS VEGAS **INTER-OFFICE MEMORANDUM**	**DATE:** **November 14, 2013**
TO: **Land Development Services** Department of Building & Safety	**FROM:** Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
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2. Provide existing contours on the grading plans in the next submittal so as to determine the extent of proposed cut and fill by the developments.
3. Revise the callout of the *City of Las Vegas* recorded construction drawing number for an existing storm drain from "107Y-4214-5F" to "**630.98**".
4. All drainage easements must be public drainage easements to be privately maintained (by the

Rec'd: 10/31/13
DS 4635
L-07

TECHNICAL HYDROLOGY STUDY FOR GILMORE AND FORT APACHE (GILMORE CREEK)

TO BE ANNEXED TO THE CITY

$400 —

ANX-51432

CLARK COUNTY
TCE# 126-13002

Prepared for:
DR Horton
330 Carousel Parkway, Suite 140
Henderson, Nevada 89014

Prepared by:
TCE
3277 East Warm Springs Road, Suite 400
Las Vegas, Nevada 89120
(702) 932-6125
FAX (702) 932-6129

October 2013

T THOMASON
C CONSULTING
E ENGINEERS

TECHNICAL HYDROLOGY STUDY FOR GILMORE AND FORT APACHE (GILMORE CREEK)

CLARK COUNTY
TCE# 126-13002

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October 2013

THOMASON
CONSULTING
ENGINEERS

October 25, 2013

Denis Cederburg, P.E.
Clark County, Public Works
Community Development
500 S. Grand Central Pkwy
Las Vegas, Nevada 89155

Re: Technical Drainage Study for Gilmore and Fort Apache

Mr. Cederburg:

Herewith for your review is the Technical Hydrology Study for Gilmore Avenue and Fort Apache Road. The project is located southwest of the Gilmore/Fort Apache intersection. The project consists of 4.04 acres which are to be developed as a single family subdivision.

Should you have any questions or concerns, please do not hesitate to contact this office at 932-6125.

Sincerely,
Thomason Consulting Engineers

John B. McAvoy, P.E.
Project Engineer

THOMASON
CONSULTING
ENGINEERS

3277 East Warm Springs Road, Suite 400
Las Vegas, Nevada 89120

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Gilmore Avenue at Fort Apache DATE: October 24, 2013

Location of development: a) Descriptive (Cross Streets) North/South Fort Apache East/West Gilmore

b) Sect. 7 Twn. 20S Rng 60E

Name of Owner: DR Horton Assessors Parcel No.: 138-07-602-002

Telephone No.: (702) 635-3600 Facsimile No.: (702) 208-9460

Address: 330 Carousel Parkway, Suite 140

Henderson, Nevada 89014

Contact Person-Name: John B. McAvoy Telephone No: 702-932-6125

Email: jmcavoy@tce-lv.com

Firm: TCE

Address: 3277 East Warm Springs Road, Suite 400 Las Vegas, Nevada 89120

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At Site: 4± Being Developed/Disturbed 4±
2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? YES ☐ NO ☒
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? YES ☐ NO ☒
4. Proposed type of development (Residential, Commercial, Etc.)? Single Family Residential
5. Approximate upstream land area, which drains to the subject site? 0 acres
6. Has the site drainage been evaluated in the past? YES ☒ NO ☐ If yes, please documentation:
   Fire Station No. 45 by AZTEC Engineering DS2976A
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site:
   Fort Apache Road and Gilmore Avenue
8. Briefly describe your proposed schedule for the subject project: ASAP

PROFESSIONAL ENGINEER-STATE OF NEVADA
JOHN B. McAVOY
Exp: 12/31/13
CIVIL
No. 22439
10/30/13
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.

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

Local Entity File No.

Revision	Date

REFERENCE: **STANDARD FORM 1**

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Gilmore / Fort Apache	Map ID:
Firm Name: TCE	Engineer: John B. McAvoy
Address: 3277 East Warm Springs Road, Suite 400	
City: Las Vegas	State: NV Zip: 89120
Phone Number: 702-932-6125	Fax Number: 702-932-6129
Property Owner: DR Horton	
Address: 330 Carousel Parkway, Suite 140	
City: Henderson	State: NV Zip: 89014

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 property evaluate the intended land use.

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

I. GENERAL REQUIREMENTS

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

II. MAPS AND EXHIBITS

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

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS (Continued)

YES	NO	
☒	☐	Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.
☒	☐	On-site drainage basin maps for existing interim and future conditions showing the existing topography, basin boundaries, concentration points, and on-site and off-site flows in cfs.
☒	☐	Vicinity Map with local and major cross streets identified and a north arrow.

III. DRAINAGE PLAN

YES	NO	
☒	☐	Sheet size 24"x36" sealed by a registered engineer in the State of Nevada.
☒	☐	Minimum scale: 1"=60'.
☒	☐	Project name.
☒	☐	Vicinity Map with local and major cross streets
☒	☐	Revision box.
☒	☐	North arrow and bar scale.
☒	☐	Engineer's /consultant's address and phone number.
☒	☐	Elevation datum and benchmark.
☒	☐	Legend for symbols and abbreviations.
☒	☐	Cut/fill scarps, where applicable.
☒	☐	Street names, grades, widths.
☒	☐	Proposed future and existing spot grades for top of curbs and street crown at lot lines, grade breaks, and along curb returns on both sides of the street.
☒	☐	Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate.
☒	☐	Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.
☒	☐	Proposed typical street sections.

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

YES	NO	
N/A	☐	Streets with off-set crowns.
☒	☐	Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.
☒	☐	Property lines.
☒	☐	Right-of-way lines and widths, existing and proposed.
☒	☐	Existing improvements and their elevations.
☒	☐	Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm Peak flows at basin concentration points.
☒	☐	Concentration points and drainage flow direction with $Q_{100}$and V_{100} and D_{100} in streets.
☒	☐	Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
☒	☐	Location and cross-section of street capacity calculations.
N/A	☐	Cross-sectional detail for channels, including cutoff wall locations.
☒	☐	Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalks, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, materials, shape, and slope with plan and profile and HGL calculations.
☒	☐	Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
N/A	☐	Location and detail of existing, proposed, and future block wall openings. Minimum size is 16"X48". Wrought iron gate is required for flows > 10 cfs.
N/A	☐	Location and detail of floodwalls illustrating depth of flow, proposed grouting height, etc.
☒	☐	Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood walls with 8-inch concrete masonry unit.
☒	☐	Building and/or lot numbers.
☒	☐	Alignment of all existing, proposed, or future Regional Facilities. Adjacent to the site.
N/A	☐	Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information.

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

YES	NO	
N/A	☐	For areas in Zone A, AE,AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE.
☒	☐	Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from Q_{100} flows.
☒	☐	Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.
N/A	☐	Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required).

IV. HYDROLOGIC ANALYSIS

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

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

YES	NO	
N/A	☐	Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
☒	☐	Normal depth street flow calculations and cross-section diagrams for all interior and perimeter streets. Provide "dxv" 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.
☒	☐	A summary table of interior and exterior street capacity calculations showing the street name, Q_{100} flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
N/A	☐	Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
☒	☐	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.
☒	☐	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 requirements 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, which ever is greater.
N/A	☐	A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. • Field survey data. • Input and output information. • Plotted cross-sections based on survey with proper encroachments. • A map showing the location of 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.
☒	☐	Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
☒	☐	Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public right-of-way, including headwater pool inundation.
☒	☐	The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed
N/A	☐	Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:	STANDARD FORM 2

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Appendix A: Rainfall Data
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Appendix C: Existing Drainage Conditions Model
Appendix D: Proposed Drainage Conditions Model
Appendix E: Street Capacity Calculations
Appendix F: Referenced "Fire Station No. 45"

1 INTRODUCTION

1.1 Study Overview and Purpose

This study is intended to serve as a technical hydrology study for 4.04± acres of land that is going to be developed as a single family subdivision for Gilmore Avenue and Fort Apache Road.

1.2 Location

The Gilmore Avenue and Fort Apache Road site is located within the southeast corner (SE/4) northeast quarter (NE1/4) of Section 7, Township 20 South, Range 60 East, Mount Diablo Meridian, Clark County Nevada. The site is located at the southwest corner of the intersection of Gilmore Avenue and Fort Apache Road (see Figure 1, *Vicinity Map*).

1.3 Existing Site Description

The site is 4.04± acres of developed rural land in poor hydrologic condition. The general area slopes to the east. The site is surrounded by residential subdivisions.

1.4 CCRFCD Master Plan Information

The site is located on Figure F-19 of the *Flood Control Master Plan Update of the Las Vegas Valley* (MPU). The site is not adjacent to any Regional facilities (see Figure 2, *Flood Control Facilities*).

Figure H-19 of the MPU indicates that the site lies within hydrologic sub-basin LV14-C (see Figure 3, *Hydrologic Sub-Basins*).

1.5 FEMA Flood Plain Information

A review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Community-Panel Number 32003C2135 F, effective date November 16, 2011, indicates the site is located within a FEMA Zone 'X'. Zone 'X' is described by FEMA as an area outside of the 500-year floodplain (see Figure 4, *Flood Insurance Rate Map*).

1.6 Previous Drainage Studies

This site does not appear to be previously studied and is existing rural estates. We have referenced the "Fire Station No. 45," by AZTEC Engineering for flows in Gilmore Avenue and agree with the conclusions of the study except where noted, please see section 5.1. See reference in Appendix F.

2 METHODOLOGY

2.1 Compliance with Regulations

This study complies with the standards set forth within the Clark County Regional Flood Control District's (CCRFCD) *Hydrologic and Drainage Design Manual* and the Clark County drainage requirements.

2.2 Hydrologic Criteria

2.2.1 Rainfall Criteria

The site is located outside of the McCarran Airport Rainfall Area. The 10 and 100 year, 6 hour duration, rainfall amounts were obtained from Figures 503 and 506 of the CCRFCD Flood Control Manual. The adjusted precipitation values for the 10 and 100 year storms are 1.71 and 3.00 inches, respectively (see Appendix A).

The watershed encompasses less than 8-square miles, therefore a Storm Distribution Number three (SDN #3) was used for the HEC-1 model.

2.2.2 Runoff Computations

The U. S. Army Corps of Engineers HEC-1 flood hydrograph package was used to determine the peak runoff generated during the 100- and 10-year, 6-hour storm events. The HEC-1 computer model simulates the surface runoff response of a given watershed to rainfall. The HEC-1 program represents the watershed as an interconnected system of hydraulic components. Each component represents an aspect of the rainfall runoff process within a portion of the watershed. The smaller portion is referred to as a sub-basin. The computed hydrographs from each sub-basin are then combined at appropriate locations to obtain the final discharge hydrograph.

The SCS curve number method was used to determine the infiltration rates for the drainage basins. The soil groups for the existing project site were determined using the Natural Resources Conservation Service's *Web Soil Survey* (Appendix B). The site and off-site basins are located within hydrologic soil groups A. Curve numbers were selected from Table 602 of the CCRFCD Manual for each drainage basin and are summarized in Table 1, *Drainage Basin Parameters*. Curve number calculations are located in Appendix B.

Lag Time T_L is defined as the time measured from the centroid of effective rainfall to the peak of the outflow hydrograph. It is a measure of the watershed's response time, and is a coherent property to basin length, slope, roughness characteristics, and land use. The lag-times for this study were estimated by calculating the drainage basins' time of concentration, T_C. The time of concentration consists of two components; the initial overland flow time, t_i, and the gutter or channel flow time, t_t. The equation for the time of concentration is $T_C = t_i + t_t$. The equation for lag time is $T_L = 0.6T_C$. Lag times were calculated using Standard Form 4 of the CCRFCD Manual. Calculations are located in the appendices with the HEC-1 models.

Table 1. Drainage Basin Parameters

BASIN	AREA (acres)	BASIN DESCRIPTION	CN	LAG (hr)
EXISTING ON-SITE BASINS				
EXON1	4.22	Newly graded, existing residential	77	0.100
DEVELOPED ON-SITE BASINS				
DEON1	0.25	Residential Lots < 6000 sq ft	89	0.055
DEON2	0.84	Residential Lots < 6000 sq ft	89	0.061
DEON3	3.13	Residential Lots < 6000 sq ft	89	0.081
EXISTING OFF-SITE BASINS				
EXOF1	2.26	Impervious Right-of-Way	98	0.095
EXOF2	8.93	Residential Lots < 6000 sq ft	89	0.081

3 EXISTING DRAINAGE CONDITIONS

The existing site drainage condition is a developed rural residential lot that is to be demolished. Surface flows sheet flow to the east toward Fort Apache Road. Please see Figure 5, *Existing Basin Map.* A higher run-off coefficient was selected to be more reflective of the site's cleared condition.

3.1 Existing Offsite Drainage Description

Off-site flows impact the site at the north, and eastern sides of the property. These flows are contained within the improved right-of-way of Gilmore Avenue and Fort Apache Road. The reference study "Fire Station No. 45," by AZTEC Engineering has determined that the flow in Gilmore Avenue is 85 cfs and 208 cfs for the 10 and 100 year conditions, respectfully. The offsite development south of the site consists of single family residential developments of 4000 square foot lots, this development is basin EXOF2. Existing offsite basin EXOF1 consists of fully developed pavement in Fort Apache Road. These basins combine in Fort Apache Road.

3.2 Existing Onsite Drainage Description

There is one existing drainage basin; EXON1. Basin EXON1 combines with the offsite flows in the Fort Apache Road and Gilmore Avenue intersection.

The HEC-1 analysis and Standard Form 4 for the existing drainage conditions is located in Appendix C. Table 2 summarizes the runoff amounts.

Table 2. Existing Basin Runoff Amounts

Basin/Combination Point	Q10	Q100
EXON1	2	6
EXOF1	4	8
EXOF2	11	25
PT1	102	247

4 FUTURE DRAINAGE CONDITIONS

4.1 Interim Off-Site Drainage Conditions

The interim drainage model assumes developed on-site basins with the existing off-site drainage conditions. The off-site drainage basins are already developed residential lots and paved roadways. Off-site basins EXOF1 and EXOF2 drain to Fort Apache Road and flow toward the north to the low point in Gilmore Avenue. As the surrounding area is already developed; no changes in the flow pattern is anticipated after the site develops and no future model has been made.

4.2 Proposed On-Site Drainage Conditions

Developed on-site drainage basins are delineated on Figure 6, *Proposed Basin Map*. The site is divided into three (3) distinctive drainage basins that collect into interior streets. The southern most basin, DEON3, drains to the west half of Fort Apache Road from Elder Creek Avenue, while the cul-de-sac, DEON2, drains to Fort Apache through an easement. The northern basin, DEON1, drains out to Gilmore Avenue.

The HEC-1 analysis for the developed drainage conditions is located in Appendix D. Table 3 summarizes the runoff amounts

Table 3. Proposed Drainage Conditions

Basin/Combination Point	Q10	Q100
DEON1	<1	1
DEON2	1	3
DEON3	4	9
EXOF1	4	8
EXOF2	11	25
PT1	85	209
PT2	20	41
PT3	105	253

5 PROPOSED DRAINAGE FACILITIES

5.1 Street Capacities and Routing

Street hydraulic sections were evaluated for the Existing and Proposed conditions. One onsite section was computed using the maximum flow generated for the site. The exterior streets have been updated for each of the hydrologic conditions.

Flowmaster calculations are available in Appendix E. Tables 4 and 5 summarize the street capacities.

Table 4. Existing Street Capacities

Section	Q (cfs)	D (ft)	V (ft/s)	V x D
Section 1 - Gilmore 100yr	208	0.77	9.61	7.40
Section 1 - Gilmore 10yr	85	0.62	6.78	4.20
Section 2 - Fort Apache 100yr	39	0.66	2.60	1.72
Section 2 - Fort Apache 10yr	17	0.53	2.16	1.14

Table 5. Proposed Street Capacities

Section	Q (cfs)	D (ft)	V (ft/s)	V x D
Section 1 - Gilmore 100yr	211	0.77	9.66	7.44
Section 1 - Gilmore 10yr	86	0.62	6.80	4.22
Section 2 - Fort Apache 100yr	42	0.67	2.65	1.78
Section 2 - Fort Apache 10yr	19	0.55	2.20	1.21
Section 3 - Gilmore Creek 100yr	9	0.44	1.92	0.84
Section 4 - Easement 100yr	3	0.11	13.29	1.46

Existing improvements in Gilmore Avenue were put in place to obtain the dry lane in the sump condition. Based on review of the reference hydraulic calculations provided from "Fire Station No. 45," by AZTEC Engineering, it was concluded that the storm drain system in Gilmore Avenue and Fort Apache Road is undersized for the design storm of 85 cfs in the 10-year event. As such, the portions of the 10-year flow will by pass the existing F-type inlets and discharge to the intersection.

This 10-year by-pass flow will, in part, turn the corner in Fort Apache Road, combine with the flows tributary in the right-of-way and pond in a sump condition. Due to the pressured Fort Apache Road storm drain, it was not feasible to size an inlet that will collect enough flow to meet dry lane criteria. Further, there is no way to install a separate storm drain system to drain east in Gilmore Avenue as there isn't any way to day light that facility in a fully developed urban street.

It was concluded that a nuisance flow collector consisting of a Type C inlet with 18 inch storm drain lateral would be installed at the intersection corner to alleviate the ponding condition in the 10-year flow and low flows. No hydraulic calculations have been provided for this drop inlet, since it's a nuisance and low flow collector.

The Standard Form 6 is provided with revised loss calculations to show the pressurized hydraulic condition that is existing in the facility. The Standard Form 6 is based on a pipe full condition of 80 percent per the Clark County RFCD Design Manual. Please see Appendix E.

6 CONCLUSIONS

The following recommendations are provided to facilitate safety, both public and private, for the proposed residential development.

1. Elevate the finished floors to a minimum of twice the depth of flow up to 18 inches above the adjacent street flowline to prevent inundation by the 100-year, 6-hour storm event.

2. Construct all street and gutter improvements to allow proper conveyance of stormwater.

3. Construct a Type C drop inlet with 18 inch storm drain lateral for nuisance and low flow

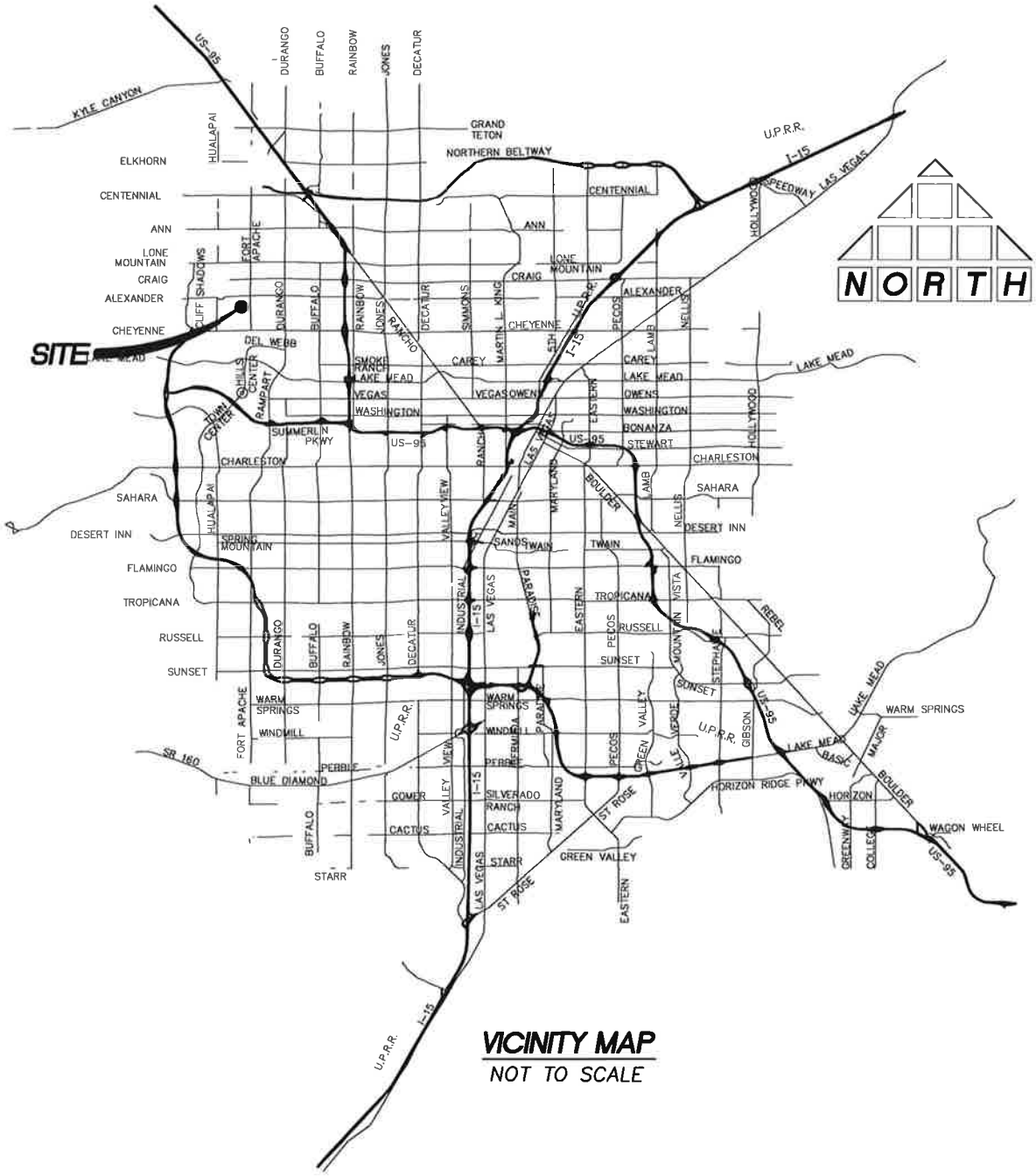
7 REFERENCES

1. *2008 CCRFCD Flood Control Master Plan*, Post, Buckley, Schuh, and Jernigan, Inc. and G.C. Wallace, 2008.

2. *Flood Insurance Rate Map, Community Panel Number32003C2910E Clark County, Nevada*, Federal Emergency Management Agency, effective August 13, 2003.

3. *CCRFCD Hydrologic Criteria and Drainage Design Manual*, WRC Engineering, 1990.

FIGURES



VICINITY MAP
NOT TO SCALE

DR HORTON
GILMORE CREEK

VICINITY MAP
FIGURE 1

THOMASON CONSULTING ENGINEERS
3277 E. WARM SPRINGS ROAD, SUITE 400
LAS VEGAS, NEVADA 89120
702-932-6125 FAX: 702-932-6129

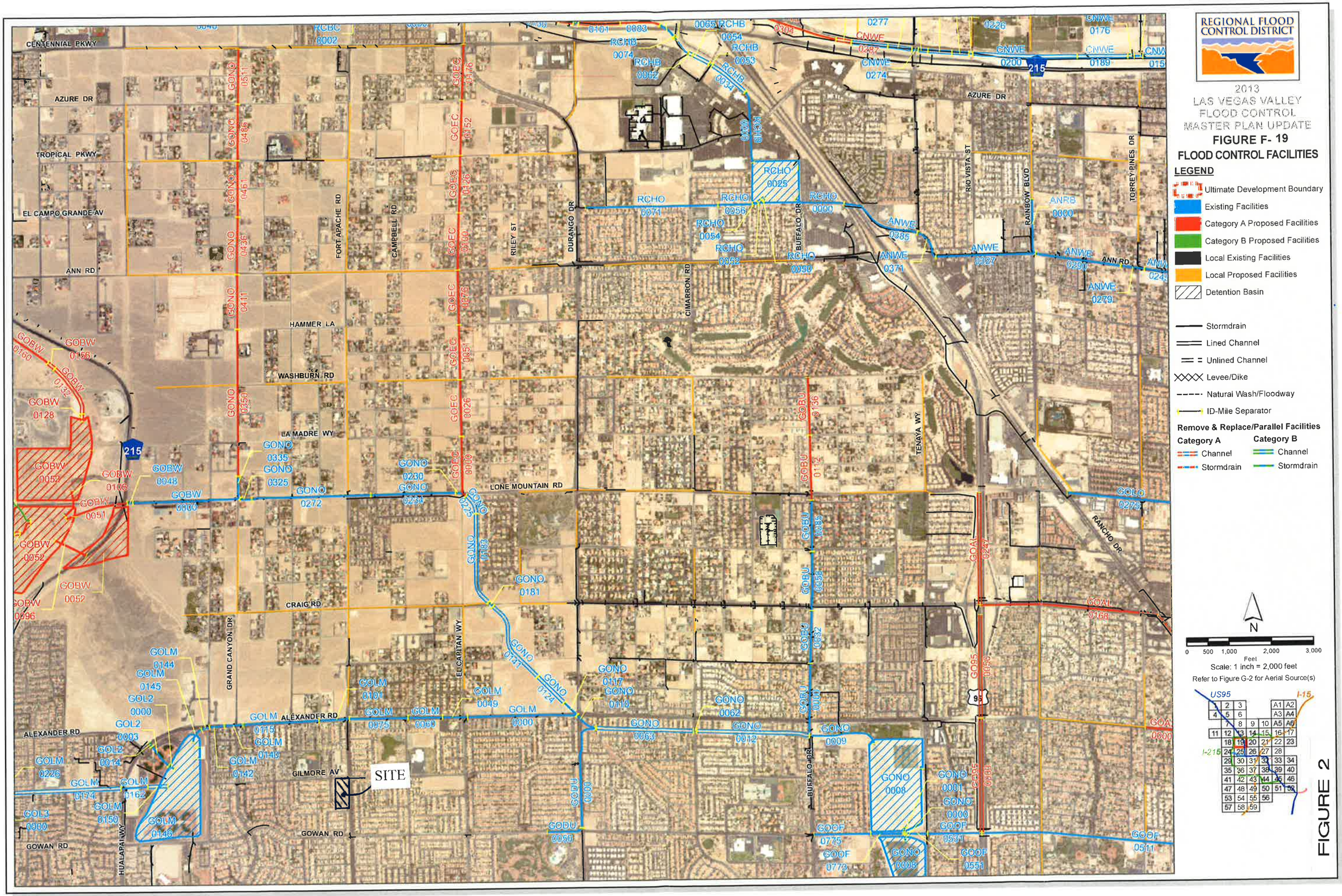

REGIONAL FLOOD CONTROL DISTRICT
2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE
FIGURE F- 19
FLOOD CONTROL FACILITIES
LEGEND
Ultimate Development Boundary
Existing Facilities
Category A Proposed Facilities
Category B Proposed Facilities
Local Existing Facilities
Local Proposed Facilities
Detention Basin
Stormdrain
Lined Channel
Unlined Channel
Levee/Dike
Natural Wash/Floodway
ID-Mile Separator
Remove & Replace/Parallel Facilities
Category A
Channel
Stormdrain
Category B
Channel
Stormdrain
N
0 500 1,000 2,000 3,000
Feet
Scale: 1 inch = 2,000 feet
Refer to Figure G-2 for Aerial Source(s)
US95
I-15
I-215
CENTENNIAL PKWY
AZURE DR
TROPICAL PKWY
EL CAMPO GRANDE AV
ANN RD
HAMMER LA
WASHBURN RD
LA MADRE WY
LONE MOUNTAIN RD
CRAIG RD
ALEXANDER RD
GILMORE AV
GOWAN RD
FORT APACHE RD
CAMPBELL RD
RILEY ST
DURANGO DR
CIMARRON RD
BUFFALO DR
RIO VISTA ST
RAINBOW BLVD
TORREY PINES DR
TENAYA WY
RANCHO DR
GRAND CANYON DR
EL CAPITAN WY
HUALAPAI WY
SITE

FIGURE 2

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
ANRB		ANN ROAD CHANNEL WEST - RAINBOW						
0000	E	10' X 7' RCB	1320	721	CNW2B5-C	WEST3	0.99	0.40
ANWE		ANN ROAD CHANNEL WEST						
0245	E	10' X 9' RCB	1721	993	CNW2D1-C	WEST3	6.84	0.80
0279	E	10' X 9' RCB	553	743	2CNW2B5C	WEST3	6.37	0.80
0290	E	8' X 8' RCB	2050	743	2CNW2B5C	WEST3	6.37	0.70
0327	E	6' X 6' RCB	2360	161	RCHODB	WEST3	5.38	0.87
0371	E	6' X 6' RCB	760	161	RCHODB	WEST3	5.38	0.34
0385	E	54" RCP	1950	161	RCHODB	WEST3	5.38	1.17
CNWE		CENTENNIAL PKWY CHANNEL WEST						
0150	E	Conc Chnl 40'W 9.5'D 0:1 SS	2279	4233	CNW3B3-C	WEST3	5.64	0.42
0173	E	3: 18' X 8' RCBC @ Torrey Pines	200	4233	CNW3B3-C	WEST3	5.64	0.42
0176	E	Conc Chnl 40'W 9'D 0:1 SS	150	4233	CNW3B3-C	WEST3	5.64	0.41
0189	E	Conc Chnl 36'W 10'D 0:1 SS	1200	4067	CNW2D4-C	WEST3	5.15	0.42
0200	E	Conc Chnl 36'W 9'D 0:1 SS	2470	4067	CNW2D4-C	WEST3	5.15	1.00
0226	E	2: 18' X 8.5' RCBC @ Rio Vista	100	4067	CNW2D4-C	WEST3	5.15	0.51
0241	E	Conc Chnl 36'W 9.5'D 0:1 SS	405	3951	CNW2D3-C	WEST3	4.65	0.51
0251	E	Conc Chnl 36'W 9'D 0:1 SS	575	3951	CNW2D3-C	WEST3	4.65	0.51
0271	E	Conc Chnl 32'W 10'D 0:1 SS	229	3951	CNW2D3-C	WEST3	4.65	0.51
0274	E	32' X 10' RCBC @ Tenaya	142	3951	CNW2D3-C	WEST3	4.65	0.51
0277	E	Conc Chnl 32'W 9'D 0:1 SS	579	3951	CNW2D3-C	WEST3	4.65	0.64
0287	E	Conc Chnl 13'W 10'D 2:1 SS	605	3593	CNW2B2-C	WEST3	3.84	1.19
0301	P2	Conc Chnl 32'W 10'D 0:1 SS	235	3593	CNW2B2-C	WEST3	3.84	1.19
0304	P2	32' X 10' RCB	3259	3593	CNW2B2-C	WEST3	3.84	1.79
GO95		GOWAN OUTFALL - U.S. 95 CHANNEL						
0000	P1	Conc Chnl 12'W 4'D 2:1 SS	2640	299	GD17BG-C	ALLGOW3	0.36	0.30
0050	P1	Conc Chnl 12'W 4'D 2:1 SS	2450	299	GD17BG-C	ALLGOW3	0.36	0.30
GOA2		GOWAN OUTFALL - ALEXANDER BRANCH						
0000	P1	8' X 5' RCB	2281	523	CPT41-C	ALLGOW3	0.61	0.90
GOAL		GOWAN OUTFALL - ALEXANDER ROAD FACILITIES						
0111	P1	10' X 8' RCB	3000	880	CPT2B2	ALLGOW3	2.28	0.83
0168	P1	10' X 8' RCB	4200	880	CPT2B2	ALLGOW3	2.28	0.50
0247	P1	Conc Chnl 12'W 5.5'D 2:1 SS	2640	757	CGD20BMC	ALLGOW3	1.98	0.30
GOBU		GOWAN NORTH - BUFFALO BRANCH						
0000	E	2: 12' X 6' RCB	1705	961	CGD14CBC	ALLGOW3	2.53	0.20
0032	E	2: 12' X 5' RCB	1248	850	CGD14AAC	ALLGOW3	2.30	0.25
0058	E	2: 11' X 4' RCB	1398	745	CGD17AAC	ALLGOW3	1.90	0.25
0085	E	11' X 5' RCB	1266	614	CGD17ABC	ALLGOW3	1.52	0.25
0112	P1	8' X 6' RCB	1535	484	CGD20ABC	ALLGOW3	1.15	0.54
0136	P1	7' X 6' RCB	1400	344	CGD20AAC	ALLGOW3	0.76	0.36
GOBW		GOWAN BELTWAY WEST						
0000	E	48" RCP	2527	116	LMBWDB	ALLGOW4	10.68	4.37
0048	E	72" RCP	131	116	LMBWDB	ALLGOW4	10.68	2.21
0051	P1	72" RCP Outlet	1508	116	LMBWDB	ALLGOW4	10.68	0.30
0052	P1	589 ac-ft Lone Mountain-Beltway Detention Basin		5140	CLMBW1	GW3SC	3.50	
0082	P1	51,400 cfs PMF Spillway		51400	CLMBW1	GW3SC	3.50	
0096	P1	8' X 8' RCB Connector Pipe Under Beltway	839	5140	CLMBW1	GW3SC	3.50	0.30
0097	P1	54" RCP	394	525	UVB1-2	ALLGOW3	0.34	8.09
0100	P1	Energy Dissipator	143	525	UVB1-2	ALLGOW3	0.34	50.00
0106	P1	8' X 8' RCB Connector Pipe Under Lone Mountain	697	5140	CLMBW1	GW3SC	3.50	0.30
0128	P1	Conc Chnl 20'W 10'D 0:1 SS	190	3429	CWRBW1	ALLGOW3	6.06	25.00
0132	P1	Conc Chnl 14'W 10'D 0:1 SS	1286	2869	CHLBW1-C	GW3SC	1.84	5.00
0156	P1	Conc Chnl 16'W 10'D 0:1 SS	221	2869	CHLBW1-C	GW3SC	1.84	1.05
0160	P1	16' X 8' RCB	1230	2869	CHLBW1-C	GW3SC	1.84	1.05
GOBX		GOWAN BOX CANYON						
0000	P1	66" RCP	794	753	LWBW1	ALLGOW3	0.48	9.45
GODU		GOWAN NORTH - DURANGO BRANCH						
0000	E	12' X 6' RCB	2629	1150	CLV14-C	ALLGOW3	1.40	0.91
0050	E	9' X 6' RCB	865	835	CLV20-C	ALLGOW3	0.97	1.50

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

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
GOOF		GOWAN OUTFALL FACILITIES						
0511	E	8' X 5' RCB	8390	699	CPT6B-C	GW3SC	1.08	0.50
0531	E	8' X 5' RCB	1300	558	GWNNDB	ALLGOW5	68.49	0.50
0551	E	72" RCP	524	558	GWNNDB	ALLGOW5	68.49	0.62
0773	E	60" RCP	803	286	LV30-C	ALLGOW3	0.42	1.40
0775	E	60" RCP	1300	286	LV30-C	ALLGOW3	0.42	1.00
RCHB		RANCHO ROAD SYSTEM - BELTWAY						
0000	E	2: 12' X 8.5' RCAP	1700	2631	CNW1C-W	WEST3	4.68	0.83
0034	E	Conc Chnl 21'W 8'D 0:1 SS	1000	2631	CNW1C-W	WEST3	4.68	1.19
0053	E	2: 12' X 8' RCBC @ South Ramp Connector	85	2304	CDW1C1	WEST3	4.31	1.40
0054	E	Conc Chnl 21'W 8'D 0:1 SS	432	2304	CDW1C1	WEST3	4.31	1.51
0062	E	Transition Structure	130	2304	CDW1C1	WEST3	4.31	1.51
0065	E	24' X 7' RCB	480	2304	CDW1C1	WEST3	4.31	0.30
0074	E	24' X 6' RCB	50	2226	CNWBC6-C	WEST3	4.17	0.30
0075	E	20' X 6' RCBC @ Beltway	428	2226	CNWBC6-C	WEST3	4.17	2.81
0083	P1	20' X 6' RCB	950	2226	CNWBC6-C	WEST3	4.17	2.49
0101	P1	Conc Chnl 20'W 7'D 0:1 SS	980	2226	CNWBC6-C	WEST3	4.17	2.38
0120	E	20' X 6' RCBC @ Grand Montecito	120	2226	CNWBC6-C	WEST3	4.17	1.00
0122	P1	Conc Chnl 16'-20'W 6'D 0:1 SS	350	2226	CNWBC6-C	WEST3	4.17	1.84
0130	P1	Conc Chnl 16'W 6'D 0:1 SS	1012	2226	CNWBC6-C	WEST3	4.17	2.67
RCHO		RANCHO ROAD SYSTEM						
0000	E	60" RCP with 38" Orifice Plate	1183	161	RCHODB	WEST3	5.38	0.74
0025	E	321 ac-ft Rancho Road Detention Basin		3115	RCHOIN	WEST3	5.38	
0027	E	18,000 cfs PMF Spillway		18000	RCHOIN	WEST3	5.38	
0050	E	Energy Dissipator	65	402	CNW1A4-C	WEST3	0.51	
0052	E	Conc Chnl 10'W 10'D 0:1 SS	115	402	CNW1A4-C	WEST3	0.51	11.73
0054	E	10' X 5' RCB	115	402	CNW1A4-C	WEST3	0.51	0.50
0056	E	10' X 5' RCB	835	402	CNW1A4-C	WEST3	0.51	0.47
0071	E	72" RCP	3128	402	CNW1A4-C	WEST3	0.51	1.80

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

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

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

REGIONAL FLOOD CONTROL DISTRICT

2013 LAS VEGAS VALLEY FLOOD CONTROL MASTER PLAN UPDATE

FACILITY INVENTORY
FIGURE F - 19

LEGEND

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

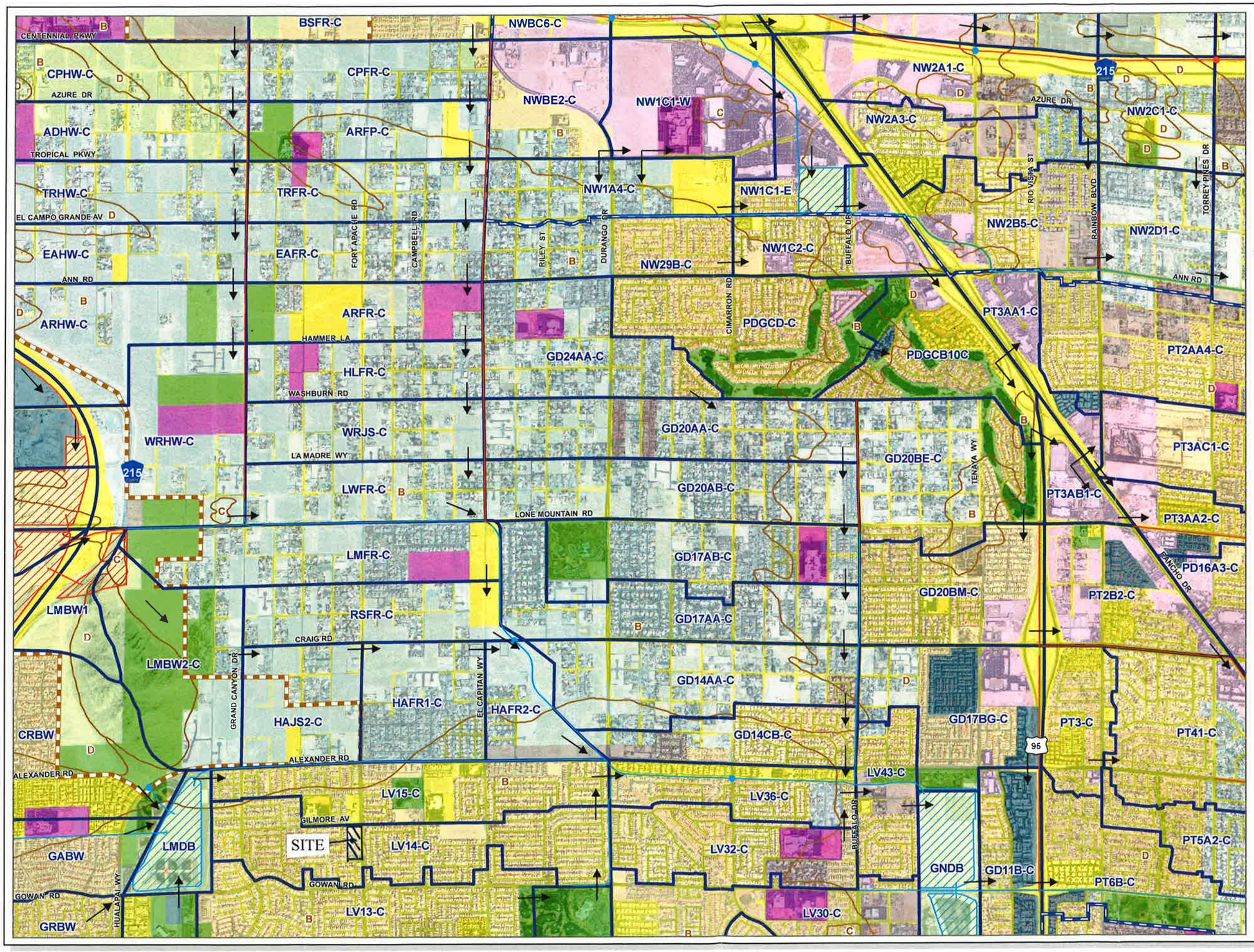
Existing Facility..... E
Proposed or Modified Facility..... P
Contingency Level
Category B..... P0
Master Plan..... P1
Preliminary Design..... P2
Design..... P3

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

Construction Features

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

FIGURE 2A



REGIONAL FLOOD CONTROL DISTRICT

2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE H-19
HYDROLOGIC SUMMARY

LEGEND

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

Flood Control Facilities

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

Type Hydrologic Soil Groups

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

Typical Land Use

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

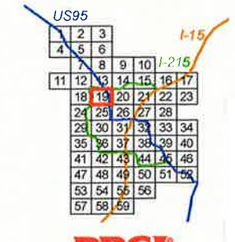
* Drought Ordinance Applied

N

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

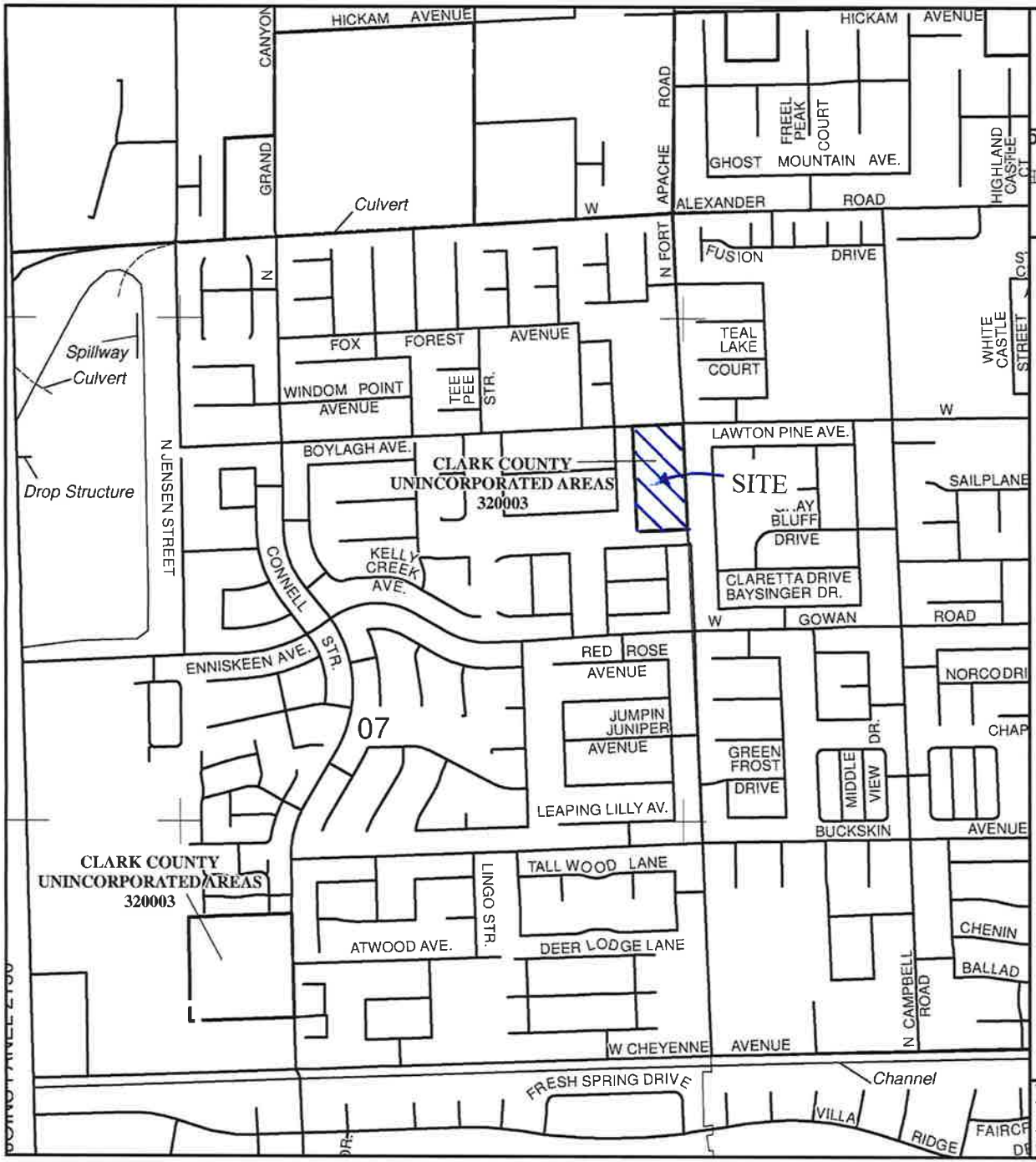
Scale: 1 inch = 2,000 feet

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



PBSJ
PB

FIGURE 3



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

METE

PANEL 2135F

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 2135 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY	320003	2135	F
LAS VEGAS, CITY OF	325276	2135	F

FIGURE 4

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 32003C2135F

MAP REVISED NOVEMBER 16, 2011

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

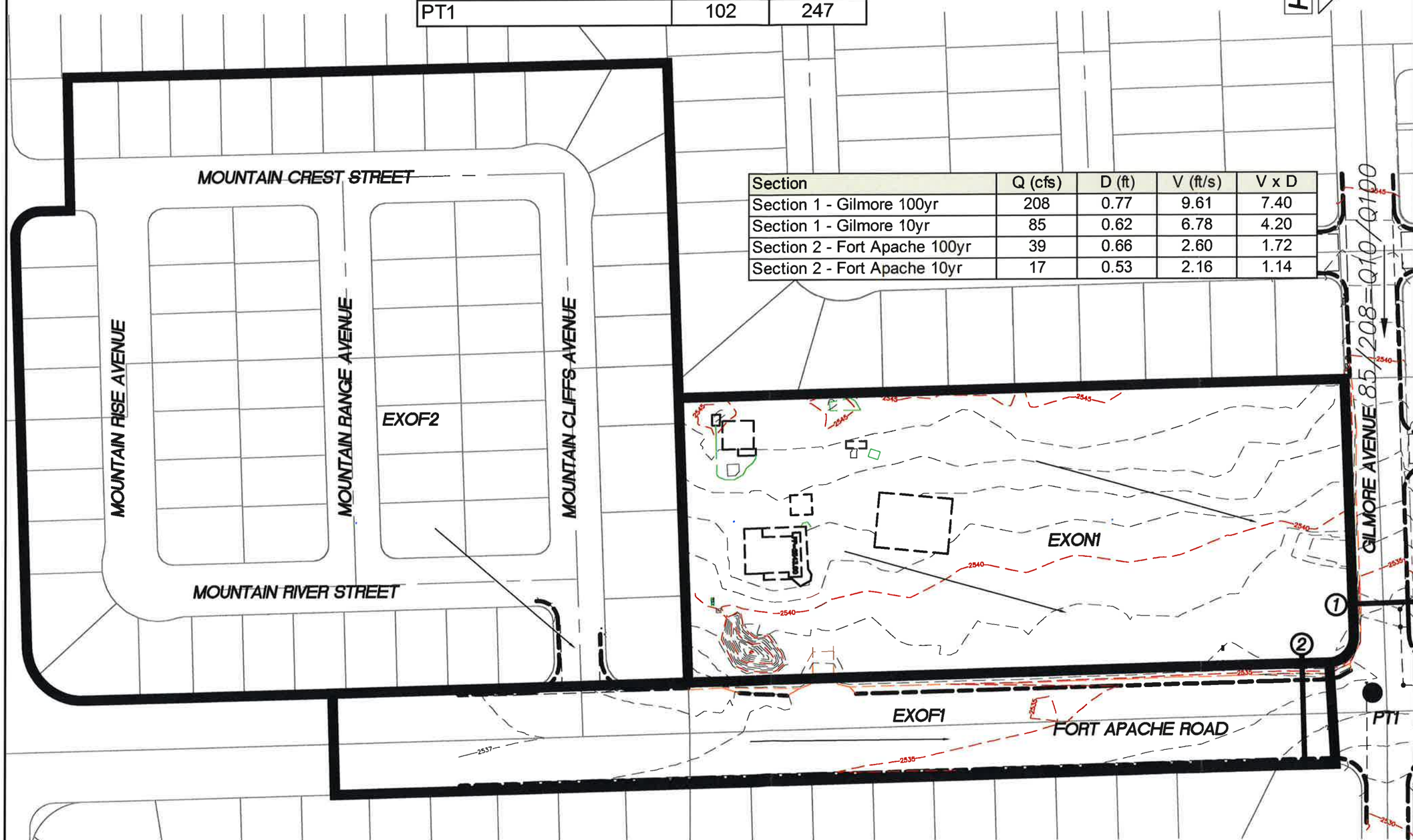
Basin/Combination Point	Q10	Q100
EXON1	2	6
EXOF1	4	8
EXOF2	11	25
PT1	102	247

100 0 50 100 200'

1" = 100'

NORTH

Section	Q (cfs)	D (ft)	V (ft/s)	V x D
Section 1 - Gilmore 100yr	208	0.77	9.61	7.40
Section 1 - Gilmore 10yr	85	0.62	6.78	4.20
Section 2 - Fort Apache 100yr	39	0.66	2.60	1.72
Section 2 - Fort Apache 10yr	17	0.53	2.16	1.14



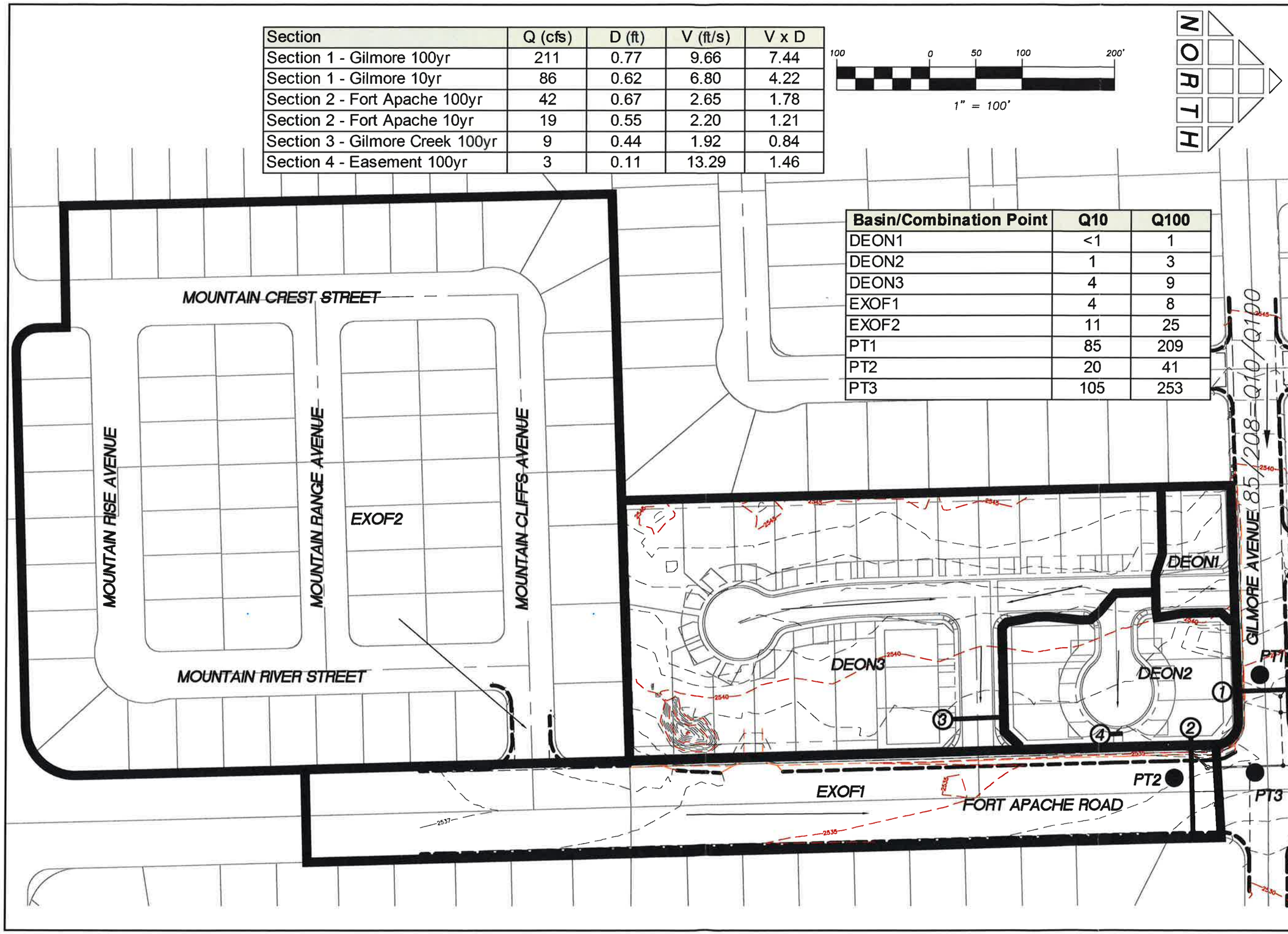
THOMASON CONSULTING ENGINEERS
3277 E. WARM SPRINGS ROAD, SUITE 400
LAS VEGAS, NEVADA 89120
702-932-6125 FAX: 702-932-6129

DR HORTON
GILMORE CREEK

EXISTING DRAINAGE CONDITIONS
FIGURE 5

1

Section	Q (cfs)	D (ft)	V (ft/s)	V x D
Section 1 - Gilmore 100yr	211	0.77	9.66	7.44
Section 1 - Gilmore 10yr	86	0.62	6.80	4.22
Section 2 - Fort Apache 100yr	42	0.67	2.65	1.78
Section 2 - Fort Apache 10yr	19	0.55	2.20	1.21
Section 3 - Gilmore Creek 100yr	9	0.44	1.92	0.84
Section 4 - Easement 100yr	3	0.11	13.29	1.46



Basin/Combination Point	Q10	Q100
DEON1	<1	1
DEON2	1	3
DEON3	4	9
EXOF1	4	8
EXOF2	11	25
PT1	85	209
PT2	20	41
PT3	105	253

T C E THOMASON CONSULTING ENGINEERS
3277 E. WARM SPRINGS ROAD, SUITE 400
LAS VEGAS, NEVADA 89120
702-932-6125 FAX: 702-932-6129

DR HORTON
GILMORE CREEK

DEVELOPED DRAINAGE CONDITIONS
FIGURE 6

1

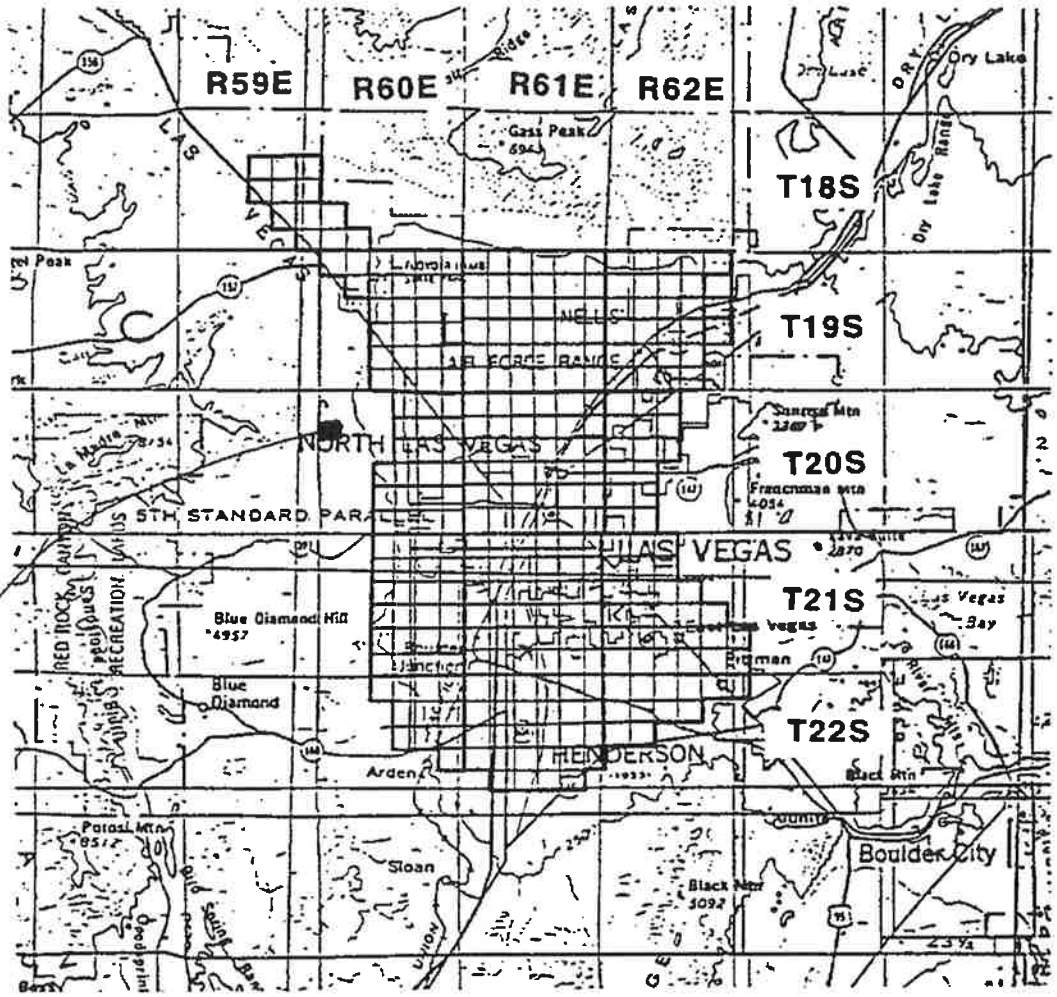
APPENDIX A

Rainfall Data

Referenced from Fire Station No. 45

T THOMASON
C CONSULTING
E ENGINEERS

McCARRAN AIRPORT RAINFALL AREA



TOWNSHIP	RANGE	SECTIONS	TOWNSHIP	RANGE	SECTIONS
18 South	59 East	13-15,22-26,36	20 South	62 East	4-9,16-20,29-32
18 South	60 East	30-32	21 South	60 East	1-4,9-16,21-28,33-36
19 South	60 East	1-6,8-16,21-28,33-36	21 South	61 East	ALL SECTIONS
19 South	61 East	ALL SECTIONS	21 South	62 East	4-9,15-23, 25-36
19 South	62 East	2-11,14-23,27-34	22 South	60 East	1-4,10-15,24
20 South	60 East	1-3,10-15,21-28,33-36	22 South	61 East	1-24,26-29
20 South	61 East	ALL SECTIONS	22 South	62 East	1-10,17-18

Notes:

1. Refer to Table 505 and Figure 516 Depth-Duration- Frequency values in the McCarran Airport Rainfall Area.
2. Refer to Table 506 and Figure 517 for Time-Intensity-Frequency values on the McCarran Airport Rainfall Area.

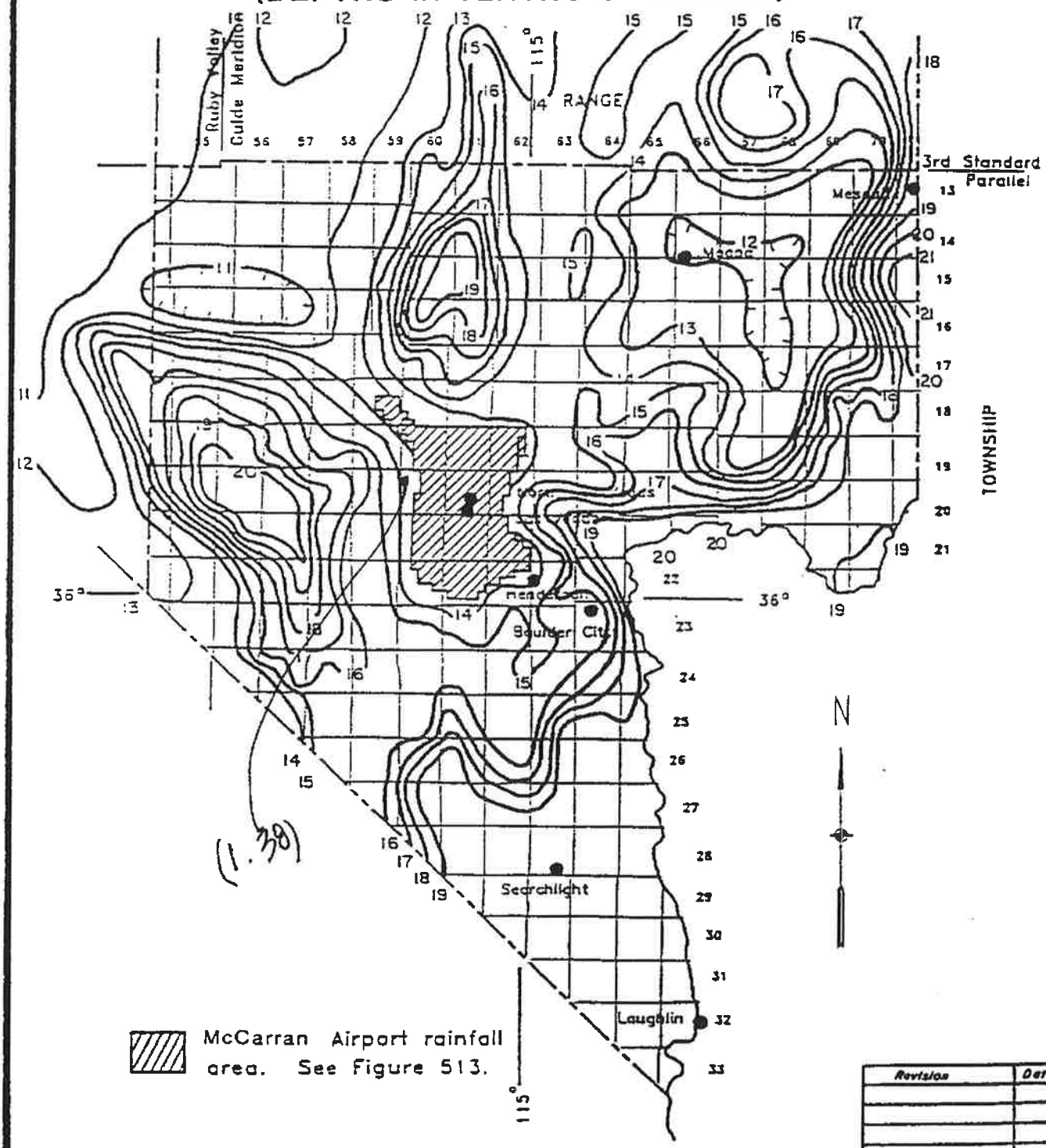
Revision	Date

WRC ENGINEERING

REFERENCE:
USACE, Los Angeles District, 1988

FIGURE 513

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



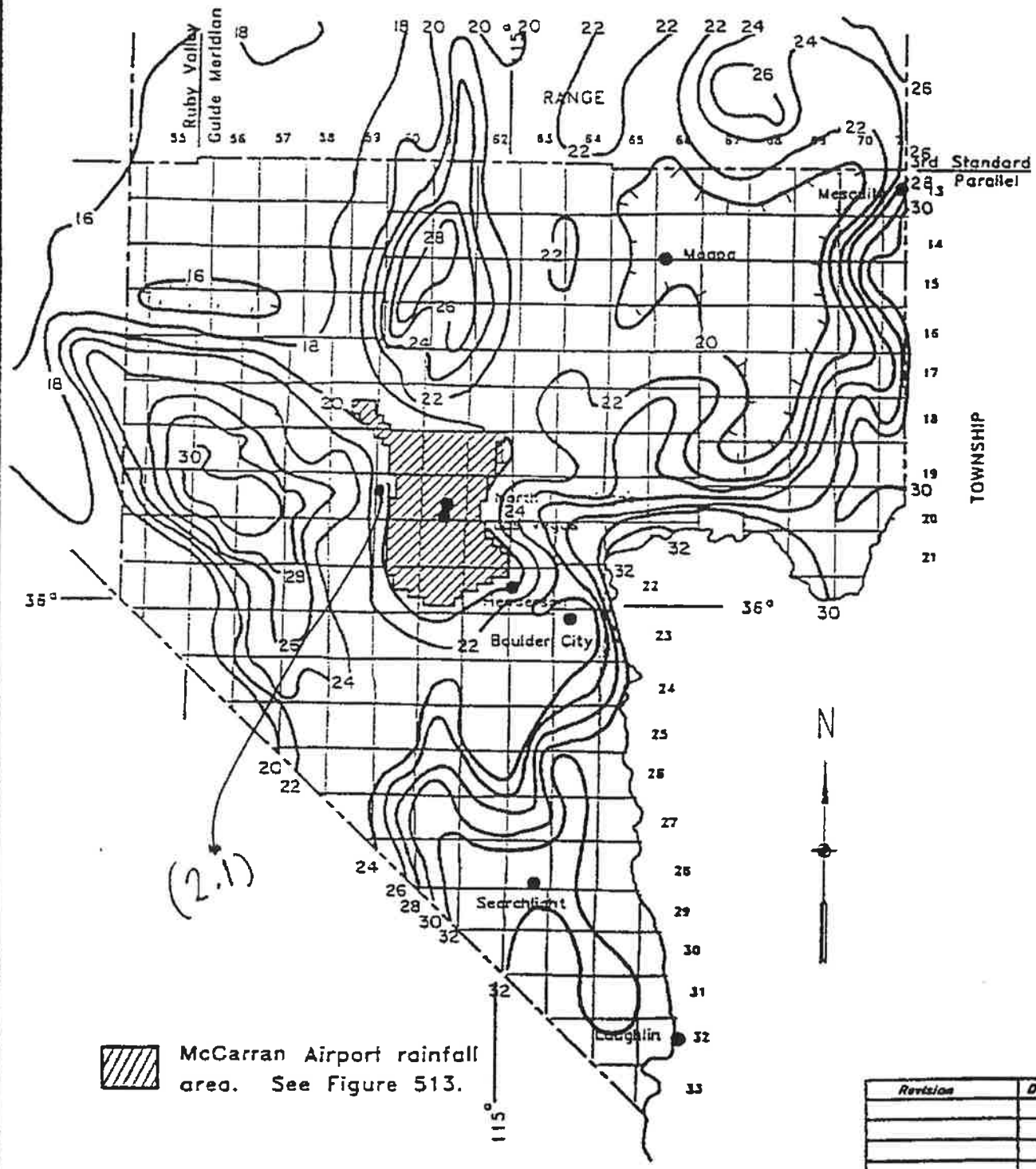
Revision	Date

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

PRECIPITATION ADJUSTMENT RATIOS

Recurrence Interval	Ratio to NOAA Atlas 2
2-year	1.00
5-year	1.16
10-year	1.24 x 1.38 = 1.711
25-year	1.33
50-year	1.39
100-year	1.43 x 2.1 = 3.00

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

APPENDIX B

Soil Information and Curve Number Calculations

THOMASON
CONSULTING
ENGINEERS

Hydrologic Soil Group—Las Vegas Valley Area, Nevada, Part of Clark County

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County
Survey Area Data: Version 8, Apr 6, 2012

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

Date(s) aerial images were photographed: May 7, 2011—Oct 17, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Las Vegas Valley Area, Nevada, Part of Clark County (NV788)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
190	Dalian very gravelly fine sandy loam, 2 to 4 percent slopes	A	8.2	4.4%
502	Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes	A	178.5	95.6%
Totals for Area of Interest			**186.8**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Basin	Total Area (acres)	Soil Type / Ground Cover	Acreage	% of Basin	CN	Soil Type / Ground Cover	Acreage	% of Basin	CN	Weighted CN
DEON1	0.25	COMM-A	0.25	100.00	89.00	IMPERVIOUS	0.00	0.00	98.00	89.0
DEON2	0.84	COMM-A	0.84	100.00	89.00	IMPERVIOUS	0.00	0.00	98.00	89.0
DEON3	3.13	COMM-A	3.13	100.00	89.00	IMPERVIOUS	0.00	0.00	98.00	89.0
EXOF1	2.26	Impervious	2.26	100.00	98.00	DES-D	0.00	0.00	88.00	98.0
EXOF2	8.93	COMM-A	8.93	100.00	89.00	DES-D	0.00	0.00	88.00	89.0
EXON1	4.22	NGA-A	4.22	100.00	77.00	NGA-A	0.00	0.00	77.00	77.0

COMM	Commercial and Residential for lots less than 6,000sqft
DES	Desert shrub - poor condition
IND	Industrial
NDL	Natural Desert Landscape
NGA	Newly Graded Areas
Open	Open Space (grass cover<50%) lawns, parks, golf courses etc.
10,000 sqft	10,000 SQFT lots or larger
10,000 sqft	10,000 SQFT lots or larger
14,000 sqft	14,000 SQFT lots or larger

APPENDIX C

Existing Drainage Conditions Model

T THOMASON
C CONSULTING
E ENGINEERS

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

TCE
Project No. : 126-13002

DEVELOPMENT : FT APACHE AND GILMORE

CALCULATED BY : GH

DATE: OCTOBER 2013

T THOMASON
C CONSULTING
E ENGINEERS

SUB-BASIN DATA					INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc CHECK URBANIZED BASINS		FINAL Tc	Min Tc	Tlag		REMARKS
DESIG: (1)	CN	K (2)	AREA (acres) (3)	AREA (mi^2) (4)	LENGTH (ft) (5)	SLOPE (%) (6)	Ti (min) (7)	LENGTH (ft) (8)	SLOPE (%) (9)	LAND COVER k	VELOCITY* (fps) (10)	Tt (min) (11)	Tc = Ti + Tt (min)	TOTAL LENGTH (ft) (12)	Tc = (L/180)+10 (min) (13)	(min) (14)	(min)	Tlag= 0.6Tc (min)	Tlag= 0.6Tc/60 (hour)	
DEON1	89.0	0.7848	0.25	0.0004	85	1.00	5.23	70	2.60	DEV	4.93	0.2	5.5	155.0	10.861	5.47	5.00	**3.28**	**0.055**	
DEON2	89.0	0.7848	0.84	0.0013	85	1.00	5.23	160	1.00	DEV	3.06	0.9	6.1	245.0	11.361	6.10	5.00	**3.66**	**0.061**	
DEON3	89.0	0.7848	3.13	0.0049	85	1.00	5.23	520	1.00	DEV	3.06	2.8	8.1	605.0	13.361	8.06	5.00	**4.84**	**0.081**	
EXOF1	98.0	0.9036	2.26	0.0035	50	2.00	1.98	980	0.50	DEV	2.16	7.5	9.5	1030.0	15.722	9.53	5.00	**5.72**	**0.095**	
EXOF2	89.0	0.7848	8.93	0.0140	80	1.00	5.07	938	2.03	DEV	4.36	3.6	8.7	1018.0	15.656	8.66	5.00	**5.20**	**0.087**	
EXON1	77.0	0.6264	4.22	0.0066	160	2.00	8.56	178	2.10	UNDEV	4.26	0.7	9.3	338.0	N/A	9.26	10.00	**0.10**	**0.100**	minimum Tc used

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

*** The velocity in column 9 was computed using the equation V = CS^.5**
C is a coefficient and S is the travel slope, as outlined in section 602.1 of the CCRFCD Manual.

***As recommended in the CCRFCD Manual, C = 30.6 under developed conditions and C = 29.4 under undeveloped conditions.**

REFERENCE :

STANDARD FORM 4

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   24OCT13  TIME  12:05:10  *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    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
 *** FREE ***
            1           ID    PREPARED FOR: DR HORTON
            2           ID    PROJECT NAME: FT APACHE AT GILMORE
            3           ID    PROJECT# 126-13002
            4           ID    EXISTING 10 DRAINAGE CONDITIONS
            5           ID    INPUT FILE = SF4.XLS
            6           ID
            7           ID    DESIGN STORM =  6-HOUR STORM
            8           ID    STORM DISTRIBUTION = SDN3
            9           ID
           10           IT       5       0     300
           11           IO       5       0
           12           IN       5       0
           13           JR    PREC       1
                        *

           14           KK   EXON1
           15           BA  0.0066
           16           BF       0
           17           PB    1.71
           18           PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
           19           PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
           20           PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
           21           PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
           22           PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
           23           PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
           24           PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
           25           PC   0.998   0.999   1.000
           26           LS       0    77.0
           27           UD   0.100
                        *

           28           KK    FS40
           29           KM  REFERENCED FLOW FROM FIRE STATION STUDY
           30           BA  0.0001
           31           BF      85
           32           LS       0     0.1
           33           UD   0.001
                        *

           34           KK   EXOF1
           35           BA  0.0035
           36           BF       0
           37           LS       0    98.0
           38           UD   0.095
                        *

           39           KK   EXOF2
           40           BF       0
           41           BA  0.0140
           42           LS       0    89.0
           43           UD   0.087
                        *
1                                          HEC-1 INPUT                                                    PAGE  2

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

           44           KK     PT1
           45           HC       4
                        *
           46           ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    14       EXON1
                 .
                 .
    28           .        FS40
                 .           .
                 .           .
    34           .           .       EXOF1
                 .           .           .
                 .           .           .
    39           .           .           .       EXOF2
```

```
                 .          .          .          .
                 .          .          .          .
    44         PT1..............................
 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN   1998              *
 *            VERSION 4.1               *
 *                                      *
 *  RUN DATE   24OCT13  TIME  12:05:10  *
 *                                      *
 ****************************************
```

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

```
                          PREPARED FOR: DR HORTON
                          PROJECT NAME: FT APACHE AT GILMORE
                          PROJECT# 126-13002
                          EXISTING 10 DRAINAGE CONDITIONS
                          INPUT FILE = SF4.XLS

                          DESIGN STORM =  6-HOUR STORM
                          STORM DISTRIBUTION = SDN3

   11 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        0300  STARTING TIME
                           NQ         101  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE      1    0  ENDING DATE
                       NDTIME        1120  ENDING TIME
                       ICENT          19  CENTURY MARK

                   COMPUTATION INTERVAL     .08 HOURS
                        TOTAL TIME BASE    8.33 HOURS

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

      JP          MULTI-PLAN OPTION
                        NPLAN           1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                     RATIOS OF PRECIPITATION
                    1.00
1

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

                                                          RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION     AREA    PLAN            RATIO 1
                                                        1.00

 HYDROGRAPH AT
+                 EXON1       .01     1   FLOW          2.
                                           TIME        3.58

 HYDROGRAPH AT
+                  FS40       .00     1   FLOW         85.
                                           TIME         .00

 HYDROGRAPH AT
+                 EXOF1       .00     1   FLOW          4.
                                           TIME        3.50

 HYDROGRAPH AT
+                 EXOF2       .01     1   FLOW         11.
                                           TIME        3.50

  4 COMBINED AT
+                   PT1       .02     1   FLOW        102.
                                           TIME        3.50


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

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   24OCT13  TIME  12:05:17  *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    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
 *** FREE ***
             1          ID    PREPARED FOR: DR HORTON
             2          ID    PROJECT NAME: FT APACHE AT GILMORE
             3          ID    PROJECT# 126-13002
             4          ID    EXISTING DRAINAGE CONDITIONS
             5          ID    INPUT FILE = SF4.XLS
             6          ID
             7          ID    DESIGN STORM =  6-HOUR STORM
             8          ID    STORM DISTRIBUTION = SDN3
             9          ID
            10          IT       5       0     300
            11          IO       5       0
            12          IN       5       0
            13          JR    PREC       1
                        *

            14          KK   EXON1
            15          BA  0.0066
            16          BF       0
            17          PB    3.00
            18          PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
            19          PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
            20          PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
            21          PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
            22          PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
            23          PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
            24          PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
            25          PC   0.998   0.999   1.000
            26          LS       0    77.0
            27          UD   0.100
                        *

            28          KK    FS40
            29          KM  REFERENCED FLOW FROM FIRE STATION STUDY
            30          BA  0.0001
            31          BF     208
            32          LS       0     0.1
            33          UD   0.001
                        *

            34          KK   EXOF1
            35          BA  0.0035
            36          BF       0
            37          LS       0    98.0
            38          UD   0.095
                        *

            39          KK   EXOF2
            40          BF       0
            41          BA  0.0140
            42          LS       0    89.0
            43          UD   0.087
                        *
1                                          HEC-1 INPUT                                                    PAGE  2

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


            44          KK     PT1
            45          HC       4
                        *
            46          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    14       EXON1
                 .
                 .
    28           .        FS40
                 .          .
                 .          .
    34           .          .       EXOF1
                 .          .          .
                 .          .          .
    39           .          .          .       EXOF2
```

```
                 .          .          .          .
                 .          .          .          .
   44         PT1.................................
 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN   1998              *
 *            VERSION 4.1               *
 *                                      *
 *  RUN DATE   24OCT13  TIME  12:05:17  *
 *                                      *
 ****************************************

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

                          PREPARED FOR: DR HORTON
                          PROJECT NAME: FT APACHE AT GILMORE
                          PROJECT# 126-13002
                          EXISTING DRAINAGE CONDITIONS
                          INPUT FILE = SF4.XLS

                          DESIGN STORM =  6-HOUR STORM
                          STORM DISTRIBUTION = SDN3

  11 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        0300  STARTING TIME
                          NQ         101  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      1    0  ENDING DATE
                      NDTIME        1120  ENDING TIME
                       ICENT          19  CENTURY MARK

                  COMPUTATION INTERVAL     .08 HOURS
                       TOTAL TIME BASE    8.33 HOURS

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

     JP          MULTI-PLAN OPTION
                      NPLAN           1  NUMBER OF PLANS

     JR          MULTI-RATIO OPTION
                    RATIOS OF PRECIPITATION
                   1.00
1

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

                                                                 RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION     AREA    PLAN                  RATIO 1
                                                                1.00

 HYDROGRAPH AT
+                 EXON1       .01     1   FLOW                  6.
                                           TIME                3.50

 HYDROGRAPH AT
+                  FS40       .00     1   FLOW                208.
                                           TIME                 .00

 HYDROGRAPH AT
+                 EXOF1       .00     1   FLOW                  8.
                                           TIME                3.50

 HYDROGRAPH AT
+                 EXOF2       .01     1   FLOW                 25.
                                           TIME                3.50

  4 COMBINED AT
+                   PT1       .02     1   FLOW                247.
                                           TIME                3.50


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

APPENDIX D

Proposed Drainage Conditions Model

T THOMASON
C CONSULTING
E ENGINEERS

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN   1998               *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   24OCT13  TIME  16:52:28  *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    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
 *** FREE ***
             1          ID    PREPARED FOR: DR HORTON
             2          ID    PROJECT NAME: FT APACHE AND GILMORE
             3          ID    PROJECT# 126-13002
             4          ID    PROPOSED DRAINAGE CONDITIONS
             5          ID    INPUT FILE = SF4.XLS
             6          ID
             7          ID    DESIGN STORM = 6-HOUR STORM
             8          ID    STORM DISTRIBUTION = SDN3
             9          ID
            10          IT       5       0     300
            11          IO       5       0
            12          IN       5       0
            13          JR    PREC   1.000
                        *

            14          KK   DEON1
            15          BA  0.0004
            16          BF  0.0000
            17          PB    1.71
            18          PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
            19          PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
            20          PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
            21          PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
            22          PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
            23          PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
            24          PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
            25          PC   0.998   0.999   1.000
            26          LS       0    89.0
            27          UD   0.055
                        *

            28          KK    FS40
            29          KM  REFERENCED FLOW FROM FIRE STATION STUDY
            30          BA  0.0001
            31          BF      85
            32          LS       0     0.1
            33          UD   0.001
                        *

            34          KK     PT1
            35          HC       2
                        *

            36          KK   DEON2
            37          BA  0.0013
            38          BF  0.0000
            39          LS       0    89.0
            40          UD   0.061
                        *
1                                          HEC-1 INPUT                                                    PAGE  2

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

            41          KK   DEON3
            42          BA  0.0049
            43          BF  0.0000
            44          LS       0    89.0
            45          UD   0.081
                        *

            46          KK   EXOF1
            47          BA  0.0035
            48          BF  0.0000
            49          LS       0    98.0
            50          UD   0.095
                        *

            51          KK   EXOF2
            52          BA  0.0140
            53          BF  0.0000
            54          LS       0    89.0
            55          UD   0.087
                        *

            56          KK     PT2
            57          HC       4
                        *
```

```
            58          KK      PT3
            59          HC        2
                        *
            60          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    14       DEON1
                 .
                 .
    28           .        FS40
                 .          .
                 .          .
    34         PT1..........
                 .
                 .
    36           .       DEON2
                 .          .
                 .          .
    41           .          .       DEON3
                 .          .          .
                 .          .          .
    46           .          .          .       EXOF1
                 .          .          .          .
                 .          .          .          .
    51           .          .          .          .       EXOF2
                 .          .          .          .          .
                 .          .          .          .          .
    56           .         PT2.........................................
                 .          .
                 .          .
    58         PT3..........
 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN   1998              *
 *            VERSION 4.1               *
 *                                      *
 *  RUN DATE   24OCT13  TIME  16:52:28  *
 *                                      *
 ****************************************
```

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

```
                          PREPARED FOR: DR HORTON
                          PROJECT NAME: FT APACHE AND GILMORE
                          PROJECT# 126-13002
                          PROPOSED DRAINAGE CONDITIONS
                          INPUT FILE = SF4.XLS

                          DESIGN STORM = 6-HOUR STORM
                          STORM DISTRIBUTION = SDN3

   11 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        0300  STARTING TIME
                           NQ         101  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE      1    0  ENDING DATE
                       NDTIME        1120  ENDING TIME
                        ICENT          19  CENTURY MARK

                  COMPUTATION INTERVAL     .08 HOURS
                       TOTAL TIME BASE    8.33 HOURS

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

      JP          MULTI-PLAN OPTION
                       NPLAN           1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                     RATIOS OF PRECIPITATION
                    1.00
1

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


                                                          RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION      AREA     PLAN            RATIO 1
                                                          1.00

 HYDROGRAPH AT
+                 DEON1        .00      1   FLOW           0.
                                             TIME         3.50

 HYDROGRAPH AT
+                  FS40        .00      1   FLOW          85.
                                             TIME          .00

  2 COMBINED AT
+                   PT1        .00      1   FLOW          85.
                                             TIME         3.50
```

```
 HYDROGRAPH AT
+                 DEON2       .00     1   FLOW          1.
                                           TIME        3.50

 HYDROGRAPH AT
+                 DEON3       .00     1   FLOW          4.
                                           TIME        3.50

 HYDROGRAPH AT
+                 EXOF1       .00     1   FLOW          4.
                                           TIME        3.50

 HYDROGRAPH AT
+                 EXOF2       .01     1   FLOW         11.
                                           TIME        3.50

  4 COMBINED AT
+                   PT2       .02     1   FLOW         20.
                                           TIME        3.50

  2 COMBINED AT
+                   PT3       .02     1   FLOW        105.
                                           TIME        3.50


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

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *             JUN   1998               *
 *           VERSION 4.1                *
 *                                      *
 *  RUN DATE   24OCT13  TIME  16:58:29  *
 *                                      *
 ****************************************
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```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

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

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

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

```
1                                          HEC-1 INPUT                                                    PAGE  1

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

                        *DIAGRAM
 *** FREE ***
             1          ID    PREPARED FOR: DR HORTON
             2          ID    PROJECT NAME: FT APACHE AND GILMORE
             3          ID    PROJECT# 126-13002
             4          ID    PROPOSED DRAINAGE CONDITIONS
             5          ID    INPUT FILE = SF4.XLS
             6          ID
             7          ID    DESIGN STORM = 6-HOUR STORM
             8          ID    STORM DISTRIBUTION = SDN3
             9          ID
            10          IT       5       0     300
            11          IO       5       0
            12          IN       5       0
            13          JR    PREC   1.000
                        *

            14          KK   DEON1
            15          BA  0.0004
            16          BF  0.0000
            17          PB    3.00
            18          PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
            19          PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
            20          PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
            21          PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
            22          PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
            23          PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
            24          PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
            25          PC   0.998   0.999   1.000
            26          LS       0    89.0
            27          UD   0.055
                        *

            28          KK    FS40
            29          KM  REFERENCED FLOW FROM FIRE STATION STUDY
            30          BA  0.0001
            31          BF     208
            32          LS       0     0.1
            33          UD   0.001
                        *

            34          KK     PT1
            35          HC       2
                        *

            36          KK   DEON2
            37          BA  0.0013
            38          BF  0.0000
            39          LS       0    89.0
            40          UD   0.061
                        *
1                                          HEC-1 INPUT                                                    PAGE  2

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

            41          KK   DEON3
            42          BA  0.0049
            43          BF  0.0000
            44          LS       0    89.0
            45          UD   0.081
                        *

            46          KK   EXOF1
            47          BA  0.0035
            48          BF  0.0000
            49          LS       0    98.0
            50          UD   0.095
                        *

            51          KK   EXOF2
            52          BA  0.0140
            53          BF  0.0000
            54          LS       0    89.0
            55          UD   0.087
                        *

            56          KK     PT2
            57          HC       4
                        *
```

```
            58          KK      PT3
            59          HC        2
                        *
            60          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    14       DEON1
                 .
                 .
    28           .        FS40
                 .          .
                 .          .
    34         PT1..........
                 .
                 .
    36           .       DEON2
                 .          .
                 .          .
    41           .          .       DEON3
                 .          .          .
                 .          .          .
    46           .          .          .       EXOF1
                 .          .          .          .
                 .          .          .          .
    51           .          .          .          .       EXOF2
                 .          .          .          .          .
                 .          .          .          .          .
    56           .         PT2.........................................
                 .          .
                 .          .
    58         PT3..........
 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN   1998              *
 *            VERSION 4.1               *
 *                                      *
 *  RUN DATE   24OCT13  TIME  16:58:29  *
 *                                      *
 ****************************************
```

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

```
                          PREPARED FOR: DR HORTON
                          PROJECT NAME: FT APACHE AND GILMORE
                          PROJECT# 126-13002
                          PROPOSED DRAINAGE CONDITIONS
                          INPUT FILE = SF4.XLS

                          DESIGN STORM = 6-HOUR STORM
                          STORM DISTRIBUTION = SDN3

  11 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       0300  STARTING TIME
                          NQ        101  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      1   0  ENDING DATE
                      NDTIME       1120  ENDING TIME
                       ICENT         19  CENTURY MARK

                 COMPUTATION INTERVAL     .08 HOURS
                      TOTAL TIME BASE    8.33 HOURS

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

     JP          MULTI-PLAN OPTION
                       NPLAN          1  NUMBER OF PLANS

     JR          MULTI-RATIO OPTION
                     RATIOS OF PRECIPITATION
                   1.00
1

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


                                                          RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION     AREA    PLAN            RATIO 1
                                                        1.00

 HYDROGRAPH AT
+                 DEON1       .00     1   FLOW          1.
                                           TIME        3.50

 HYDROGRAPH AT
+                  FS40       .00     1   FLOW        208.
                                           TIME         .00

  2 COMBINED AT
+                   PT1       .00     1   FLOW        209.
                                           TIME        3.50
```

```
 HYDROGRAPH AT
+                 DEON2        .00     1   FLOW          3.
                                           TIME        3.50

 HYDROGRAPH AT
+                 DEON3        .00     1   FLOW          9.
                                           TIME        3.50

 HYDROGRAPH AT
+                 EXOF1        .00     1   FLOW          8.
                                           TIME        3.50

 HYDROGRAPH AT
+                 EXOF2        .01     1   FLOW         25.
                                           TIME        3.50

   4 COMBINED AT
+                   PT2        .02     1   FLOW         44.
                                           TIME        3.50

   2 COMBINED AT
+                   PT3        .02     1   FLOW        253.
                                           TIME        3.50


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

APPENDIX E

Street Capacity Calculations

THOMASON
CONSULTING
ENGINEERS

Worksheet for Section 1 - Existing Gilmore 10yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.93000	%
Discharge	85.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+30.00	0.63
0+53.00	0.17
0+53.00	0.13
0+54.50	0.00
0+54.50	0.50
0+55.00	0.50
0+60.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+53.00, 0.17)	0.016
(0+53.00, 0.17)	(0+60.00, 0.60)	0.013

Options

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

Worksheet for Section 1 - Existing Gilmore 10yr

Results

Normal Depth		0.62	ft
Elevation Range	0.00 to 0.63 ft		
Flow Area		12.53	ft²
Wetted Perimeter		60.00	ft
Hydraulic Radius		0.21	ft
Top Width		58.86	ft
Normal Depth		0.62	ft
Critical Depth		0.81	ft
Critical Slope		0.00480	ft/ft
Velocity		6.78	ft/s
Velocity Head		0.72	ft
Specific Energy		1.33	ft
Froude Number		2.59	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.62	ft
Critical Depth	0.81	ft
Channel Slope	3.93000	%
Critical Slope	0.00480	ft/ft

Cross Section for Section 1 - Existing Gilmore 10yr

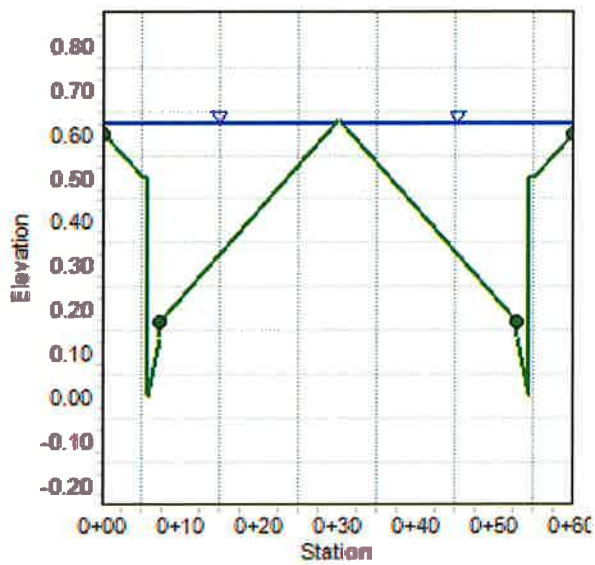
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.93000	%
Normal Depth	0.62	ft
Discharge	85.00	ft^3/s

Cross Section Image



Worksheet for Section 1 - Existing Gilmore 100yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.93000	%
Discharge	208.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+30.00	0.63
0+53.00	0.17
0+53.00	0.13
0+54.50	0.00
0+54.50	0.50
0+55.00	0.50
0+60.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+53.00, 0.17)	0.016
(0+53.00, 0.17)	(0+60.00, 0.60)	0.013

Options

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

Worksheet for Section 1 - Existing Gilmore 100yr

Results

Normal Depth		0.77	ft
Elevation Range	0.00 to 0.63 ft		
Flow Area		21.65	ft²
Wetted Perimeter		61.44	ft
Hydraulic Radius		0.35	ft
Top Width		60.00	ft
Normal Depth		0.77	ft
Critical Depth		1.13	ft
Critical Slope		0.00399	ft/ft
Velocity		9.61	ft/s
Velocity Head		1.43	ft
Specific Energy		2.20	ft
Froude Number		2.82	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.77	ft
Critical Depth	1.13	ft
Channel Slope	3.93000	%
Critical Slope	0.00399	ft/ft

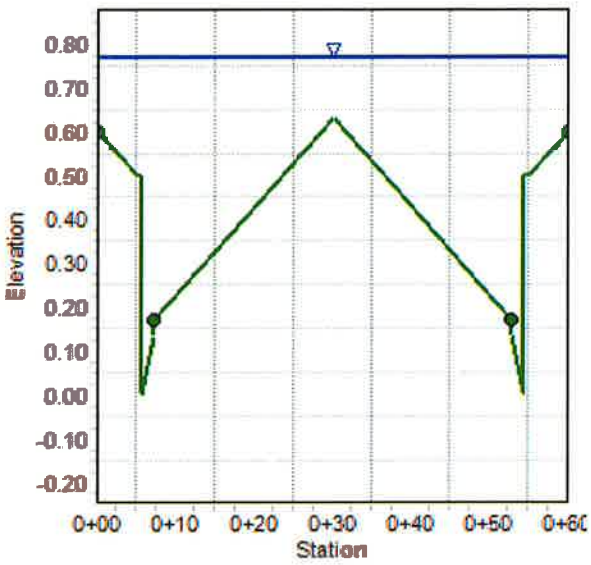
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.93000	%
Normal Depth	0.77	ft
Discharge	208.00	ft³/s

Cross Section Image



Worksheet for Section 2- Existing Fort Apache 10yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50000	%
Discharge	17.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+50.00	1.03
0+93.00	0.17
0+93.00	0.13
0+94.50	0.00
0+94.50	0.50
0+95.00	0.50
1+00.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+93.00, 0.17)	0.016
(0+93.00, 0.17)	(1+00.00, 0.60)	0.013

Options

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

Worksheet for Section 2- Existing Fort Apache 10yr

Results

Normal Depth		0.53	ft
Elevation Range	0.00 to 1.03 ft		
Flow Area		7.87	ft²
Wetted Perimeter		43.72	ft
Hydraulic Radius		0.18	ft
Top Width		42.62	ft
Normal Depth		0.53	ft
Critical Depth		0.51	ft
Critical Slope		0.00641	ft/ft
Velocity		2.16	ft/s
Velocity Head		0.07	ft
Specific Energy		0.60	ft
Froude Number		0.89	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.53	ft
Critical Depth	0.51	ft
Channel Slope	0.50000	%
Critical Slope	0.00641	ft/ft

Cross Section for Section 2- Existing Fort Apache 10yr

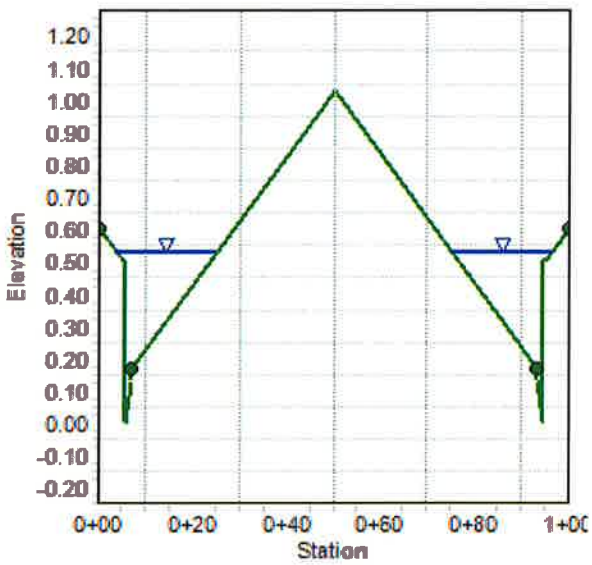
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50000	%
Normal Depth	0.53	ft
Discharge	17.00	ft^3/s

Cross Section Image



Worksheet for Section 2 - Existing Fort Apache 100yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50000	%
Discharge	39.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+50.00	1.03
0+93.00	0.17
0+93.00	0.13
0+94.50	0.00
0+94.50	0.50
0+95.00	0.50
1+00.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+93.00, 0.17)	0.016
(0+93.00, 0.17)	(1+00.00, 0.60)	0.013

Options

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

Worksheet for Section 2 - Existing Fort Apache 100yr

Results

Normal Depth		0.66	ft
Elevation Range	0.00 to 1.03 ft		
Flow Area		15.00	ft²
Wetted Perimeter		64.14	ft
Hydraulic Radius		0.23	ft
Top Width		62.92	ft
Normal Depth		0.66	ft
Critical Depth		0.65	ft
Critical Slope		0.00573	ft/ft
Velocity		2.60	ft/s
Velocity Head		0.11	ft
Specific Energy		0.76	ft
Froude Number		0.94	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.66	ft
Critical Depth	0.65	ft
Channel Slope	0.50000	%
Critical Slope	0.00573	ft/ft

Cross Section for Section 2 - Existing Fort Apache 100yr

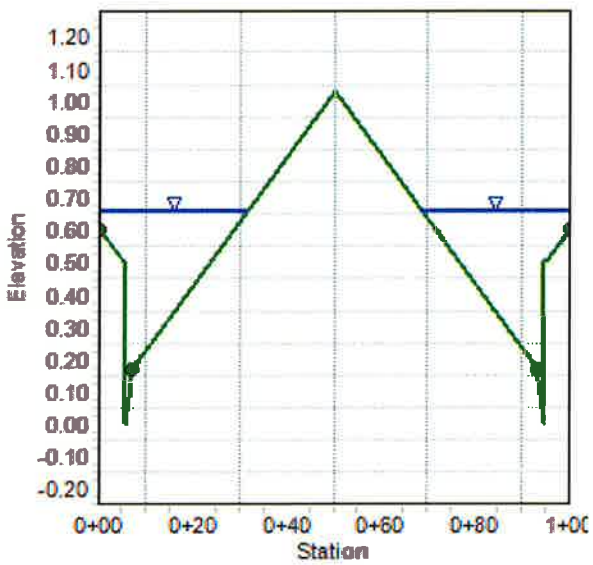
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50000	%
Normal Depth	0.66	ft
Discharge	39.00	ft^3/s

Cross Section Image



Worksheet for Section 1 - Gilmore 10yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.93000	%
Discharge	86.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+30.00	0.63
0+53.00	0.17
0+53.00	0.13
0+54.50	0.00
0+54.50	0.50
0+55.00	0.50
0+60.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+53.00, 0.17)	0.016
(0+53.00, 0.17)	(0+60.00, 0.60)	0.013

Options

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

Worksheet for Section 1 - Gilmore 10yr

Results

Normal Depth		0.62	ft
Elevation Range	0.00 to 0.63 ft		
Flow Area		12.65	ft²
Wetted Perimeter		60.21	ft
Hydraulic Radius		0.21	ft
Top Width		59.07	ft
Normal Depth		0.62	ft
Critical Depth		0.81	ft
Critical Slope		0.00479	ft/ft
Velocity		6.80	ft/s
Velocity Head		0.72	ft
Specific Energy		1.34	ft
Froude Number		2.59	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.62	ft
Critical Depth	0.81	ft
Channel Slope	3.93000	%
Critical Slope	0.00479	ft/ft

Cross Section for Section 1 - Gilmore 10yr

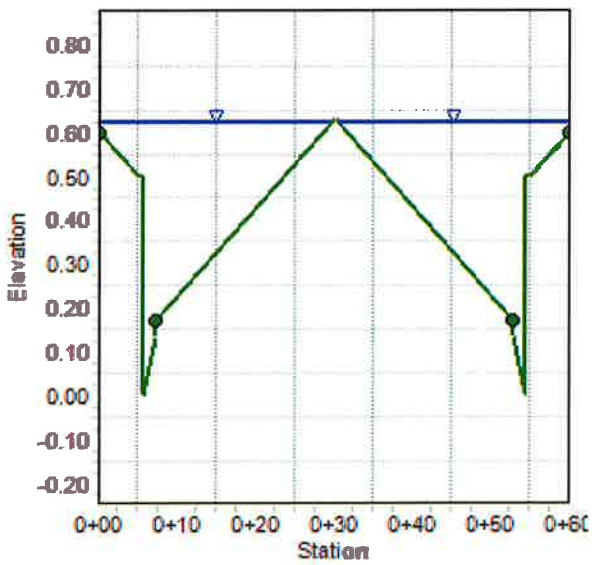
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.93000	%
Normal Depth	0.62	ft
Discharge	86.00	ft^3/s

Cross Section Image



Worksheet for Section 1 - Gilmore 100yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.93000	%
Discharge	211.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+30.00	0.63
0+53.00	0.17
0+53.00	0.13
0+54.50	0.00
0+54.50	0.50
0+55.00	0.50
0+60.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+53.00, 0.17)	0.016
(0+53.00, 0.17)	(0+60.00, 0.60)	0.013

Options

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

Worksheet for Section 1 - Gilmore 100yr

Results

Normal Depth		0.77	ft
Elevation Range	0.00 to 0.63 ft		
Flow Area		21.84	ft²
Wetted Perimeter		61.45	ft
Hydraulic Radius		0.36	ft
Top Width		60.00	ft
Normal Depth		0.77	ft
Critical Depth		1.14	ft
Critical Slope		0.00398	ft/ft
Velocity		9.66	ft/s
Velocity Head		1.45	ft
Specific Energy		2.22	ft
Froude Number		2.82	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.77	ft
Critical Depth	1.14	ft
Channel Slope	3.93000	%
Critical Slope	0.00398	ft/ft

Cross Section for Section 1 - Gilmore 100yr

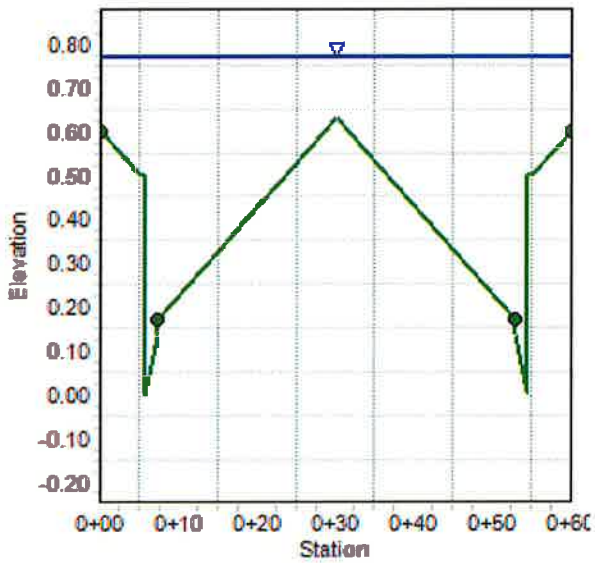
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.93000	%
Normal Depth	0.77	ft
Discharge	211.00	ft^3/s

Cross Section Image



Worksheet for Section 2 - Fort Apache 10yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50000	%
Discharge	19.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+50.00	1.03
0+93.00	0.17
0+93.00	0.13
0+94.50	0.00
0+94.50	0.50
0+95.00	0.50
1+00.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+93.00, 0.17)	0.016
(0+93.00, 0.17)	(1+00.00, 0.60)	0.013

Options

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

Worksheet for Section 2 - Fort Apache 10yr

Results

Normal Depth		0.55	ft
Elevation Range	0.00 to 1.03 ft		
Flow Area		8.65	ft²
Wetted Perimeter		47.25	ft
Hydraulic Radius		0.18	ft
Top Width		46.15	ft
Normal Depth		0.55	ft
Critical Depth		0.53	ft
Critical Slope		0.00631	ft/ft
Velocity		2.20	ft/s
Velocity Head		0.07	ft
Specific Energy		0.62	ft
Froude Number		0.89	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.55	ft
Critical Depth	0.53	ft
Channel Slope	0.50000	%
Critical Slope	0.00631	ft/ft

Cross Section for Section 2 - Fort Apache 10yr

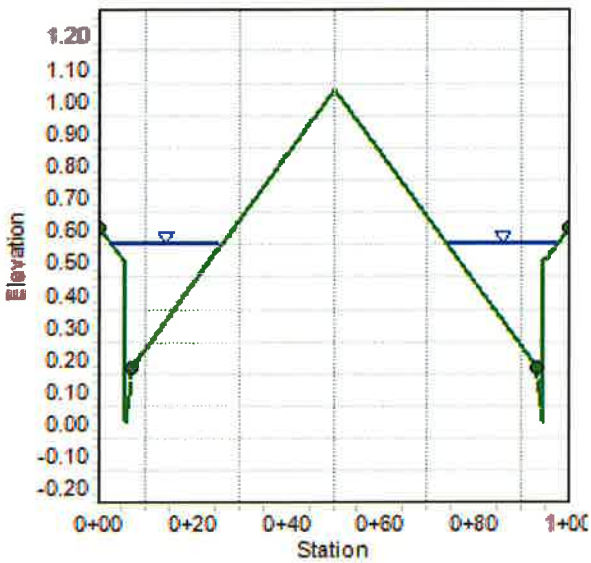
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50000	%
Normal Depth	0.55	ft
Discharge	19.00	ft³/s

Cross Section Image



Worksheet for Section 2 - Fort Apache 100yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50000	%
Discharge	42.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+50.00	1.03
0+93.00	0.17
0+93.00	0.13
0+94.50	0.00
0+94.50	0.50
0+95.00	0.50
1+00.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+93.00, 0.17)	0.016
(0+93.00, 0.17)	(1+00.00, 0.60)	0.013

Options

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

Worksheet for Section 2 - Fort Apache 100yr

Results

Normal Depth		0.67	ft
Elevation Range	0.00 to 1.03 ft		
Flow Area		15.83	ft²
Wetted Perimeter		65.47	ft
Hydraulic Radius		0.24	ft
Top Width		64.22	ft
Normal Depth		0.67	ft
Critical Depth		0.66	ft
Critical Slope		0.00568	ft/ft
Velocity		2.65	ft/s
Velocity Head		0.11	ft
Specific Energy		0.78	ft
Froude Number		0.94	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.67	ft
Critical Depth	0.66	ft
Channel Slope	0.50000	%
Critical Slope	0.00568	ft/ft

Cross Section for Section 2 - Fort Apache 100yr

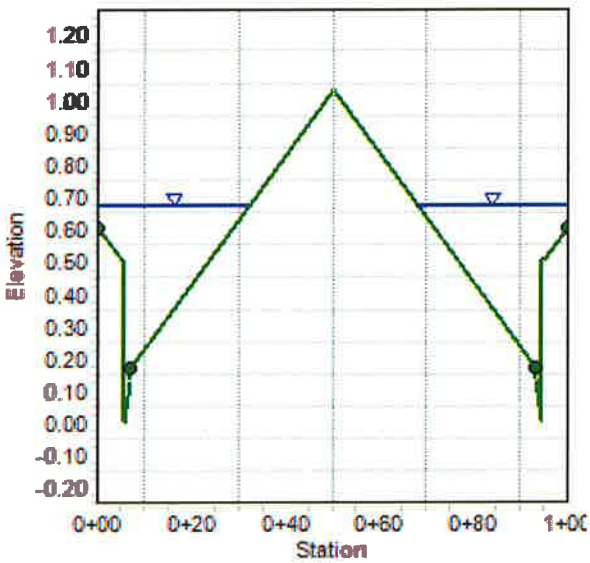
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50000	%
Normal Depth	0.67	ft
Discharge	42.00	ft^3/s

Cross Section Image



Worksheet for Section 3 - Gilmore Creek

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50000	%
Discharge	10.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+23.50	0.50
0+40.00	0.17
0+40.00	0.13
0+41.50	0.00
0+41.50	0.50
0+42.00	0.50
0+47.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.13)	0.013
(0+07.00, 0.13)	(0+40.00, 0.13)	0.016
(0+40.00, 0.13)	(0+47.00, 0.60)	0.013

Options

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

Worksheet for Section 3 - Elder Creek

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50000	%
Discharge	9.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+23.50	0.50
0+40.00	0.17
0+40.00	0.13
0+41.50	0.00
0+41.50	0.50
0+42.00	0.50
0+47.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.13)	0.013
(0+07.00, 0.13)	(0+40.00, 0.13)	0.016
(0+40.00, 0.13)	(0+47.00, 0.60)	0.013

Options

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

Worksheet for Section 3 - Elder Creek

Results

Normal Depth		0.44	ft
Elevation Range	0.00 to 0.60 ft		
Flow Area		4.70	ft²
Wetted Perimeter		30.73	ft
Hydraulic Radius		0.15	ft
Top Width		29.75	ft
Normal Depth		0.44	ft
Critical Depth		0.42	ft
Critical Slope		0.00705	ft/ft
Velocity		1.92	ft/s
Velocity Head		0.06	ft
Specific Energy		0.49	ft
Froude Number		0.85	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.44	ft
Critical Depth	0.42	ft
Channel Slope	0.50000	%
Critical Slope	0.00705	ft/ft

Cross Section for Section 3 - Elder Creek

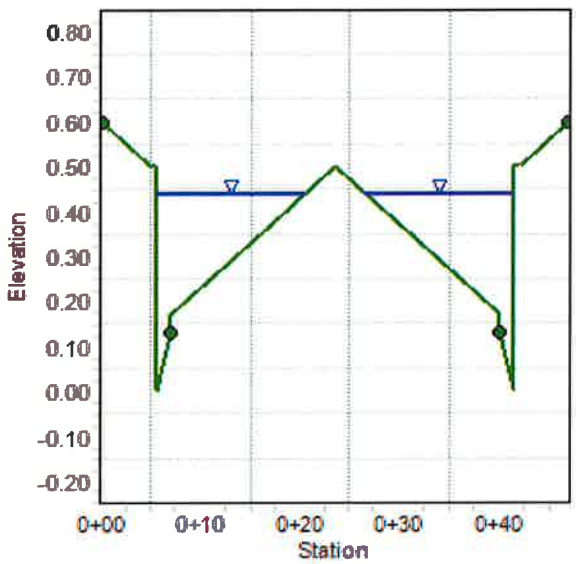
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50000	%
Normal Depth	0.44	ft
Discharge	9.00	ft³/s

Cross Section Image



Worksheet for Section 4 - Easeemnt 100yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	28.60000	%
Bottom Width	2.00	ft
Discharge	3.00	ft^3/s

Results

Normal Depth	0.11	ft
Flow Area	0.23	ft^2
Wetted Perimeter	2.23	ft
Hydraulic Radius	0.10	ft
Top Width	2.00	ft
Critical Depth	0.41	ft
Critical Slope	0.00524	ft/ft
Velocity	13.29	ft/s
Velocity Head	2.75	ft
Specific Energy	2.86	ft
Froude Number	6.98	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.11	ft
Critical Depth	0.41	ft
Channel Slope	28.60000	%
Critical Slope	0.00524	ft/ft

Cross Section for Section 4 - Easeemnt 100yr

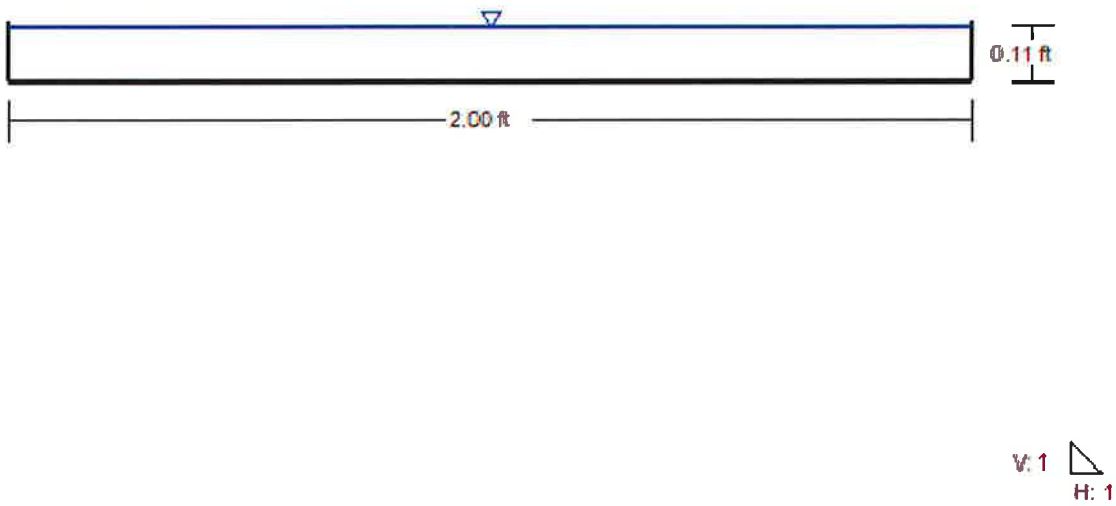
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	28.60000	%
Normal Depth	0.11	ft
Bottom Width	2.00	ft
Discharge	3.00	ft^3/s

Cross Section Image



CONDUIT DATA									FLOW DATA								ENERGY LOSS DATA									ENERGY AND HYDRAULIC DATA				COMMENTS		
																														BEGIN HGL =	22.35	EGL = 21.64
STATION						INVERTS											PIPE	TRANSITIONS						TOTAL	NEXT U/S PIPE		THIS PIPE				
		SIZE	(inches)	TYPE	TYPE	D/S	U/S	LENGTH	A *	R *	Φ	Q	V	$H_V = V^2/2g$	S_F	AVE. S_F	Hf	HJxn	Hmanhole		Hbend		H_T	LOSS	D/S EGL	D/S HGL	U/S EGL	U/S HGL	%FULL	PRESS.	OTHER
FROM	TO	d/diam	w	conduit	n value	ELEV	ELEV	(FT)	(FT^2)	(FT)		(CFS)	(FPS)	(FT)	(FT/FT)	(FT/FT)	(FT)	(FT)	K_m	(FT)	K_b	(FT)	(FT)	(FT)	ELEV.	ELEV.	ELEV.	ELEV.	TEST	FLOW ?	
0	375	48		circ	0.013	17.64	21.02	375	12.57	1	0.00492	85	6.8	0.71	0.0035	0.0035	1.31		0.03	0.02	0.00	0.00	0.73	2.04	26.23	25.02	**23.68**	**22.97**	48.74	NO	
375	750	42		circ	0.013	21.52	23.39	375	9.621	0.875	0.00492	85	8.8	1.21	0.0071	0.0053	1.99		0.03	0.03	0.00	0.00	0.03	2.02	28.10	26.89	**28.26**	**27.04**	104.37	YES	
750	1145	42		circ	0.013	23.39	25.37	395	9.621	0.875	0.00492	85	8.8	1.21	0.0071	0.0071	2.82		0.03	0.03	0.00	0.00	0.03	2.85	30.08	28.87	**31.10**	**29.89**	129.12	YES	
1145	1315.6	42		circ	0.013	25.37	26.22	170.6	9.621	0.875	0.00492	85	8.8	1.21	0.0071	0.0071	1.22		0.03	0.03	0.00	0.00	0.03	1.25	30.93	29.72	**32.35**	**31.14**	140.45	YES	
1315.6	1359.26	42		circ	0.013	26.22	26.44	43.66	9.621	0.875	0.00492	85	8.8	1.21	0.0071	0.0071	0.31		1.01	1.22	0.00	0.00	1.22	1.54	31.69	29.44	**33.88**	**32.67**	178.03	YES	
1359.26	1415.26	36		circ	0.013	26.44	27.85	56	7.069	0.75	0.00492	85	12.0	2.25	0.0162	0.0117	0.65	4.08	0.00	0.00	0.00	0.00	4.08	4.73	31.41	30.85	**38.61**	**36.37**	283.88	YES	
1415.26	1437.26	36		circ	0.013	27.85	28.2	22	7.069	0.75	0.00492	42.5	6.0	0.56	0.0041	0.0101	0.22	0.50	0.00	0.00	0.00	0.00	0.50	0.72	30.91	30.20	**39.34**	**38.78**	352.51	YES	
1437.26	1445.64	24		circ	0.013	28.2	29.37	8.38	3.142	0.5	0.00492	21.25	6.8	0.71	0.0088	0.0064	0.05		0.00	0.00	0.00	0.00	0.00	0.05	#REF!	#REF!	**39.39**	**38.68**	465.50	YES	

* = SEE EXCEL SHEET PARAMETERS - copy & paste

$\Phi = 2g(n^2)/2.21$

$S_F = \Theta H_v / R^{1.33}$

APPENDIX F

Referenced Fire Station No. 45

THOMASON
CONSULTING
ENGINEERS

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: December 10, 2001
TO: **Land Development Services** Department of Public Works				FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Technical Drainage Study for:			**COPIES TO:**
Fire Station No. 45				Sam Tolman, CLV Architectural Services
Cross Streets:	NWC Fort Apache Rd. & Gilmore Ave.			AZTEC Engineering
FILE NO.	F:\Depot\DSMEMOS\DS2976C.doc			Cheri Edleman, P.E. DEVCO
Parcel Number:	138-07-501-014			CCPW
Zoning Action:				
FEMA Flood Zone	YES	No	X	
Proposed Storm Drain	YES	No	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES
1st Submittal	9/11/2001	9/25/2001	Not Acceptable	N/C
2nd Submittal	9/26/2001	9/27/2001	Accepted	N/C
3rd Submittal	11/27/2001	12/10/2001	See Comments Below	N/C
			TOTAL FEES (LDDRS):	**N/C**

REMARKS:

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

X	is acceptable in concept subject to conformance to all City standards and the following conditions.
	must be resubmitted or supplemented including the following:
	must have Clark County Regional Flood Control District concurrence

The following comments are repeated until they are complete:

1. *All improvement proposed in the unincorporated Clark County right of way must be permitted by the County Public Works Department. The engineer is directed to contact CCPW for their permitting requirements.*

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 Amendment and accepted by the CLV 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
B&H/ays

T/R/S: **T20S/R60E/07**
AREA L-07

1.4 SOILS INFORMATION

The proposed development is located within the soil type identified as 502 (see Figure 3). As shown in the Soil Survey of Las Vegas Valley Area, Nevada by the Soil Conservation Service, soil type 502 is characterized as "Canutio". Soil type 502 is classified with hydrologic group B, which is designated as "moderately low runoff".

1.5 MASTER PLAN IMPROVEMENTS

The project site is not adjacent to any *existing* or *proposed* Clark County Regional Flood Control District (CCRFCD) Facilities as shown on Sheet F-9 of the February 1997 CCRFCD Master Plan Update of the Las Vegas Valley.

1.6 PREVIOUS DRAINAGE STUDIES

The City of Las Vegas prepared a Neighborhood Drainage Study for the Cheyenne/Jensen/Alexander/Buffalo Area in December 1995. The following two scenarios were modeled:

Scenario 1 – Developed conditions with existing facilities
Scenario 2 – Developed conditions with developed facilities (i.e., storm drain network)

The following table indicates the 10-year and 100-year flows along Gilmore Avenue at Fort Apache Road for each scenario.

TABLE 1 – GILMORE AVENUE FLOWS FROM CLV NEIGHBORHOOD DRAINAGE STUDY

SCENARIO	10-YEAR FLOW (CFS)	100-YEAR FLOW (CFS)
1	85	208
2	0	119

The Neighborhood Drainage Study proposed the installation of a 36-inch RCP along Fort Apache Road beginning at Gilmore Avenue and extending northward to a future Alexander Road storm drain system. These drainage improvements were designed to collect the 10-year flow.

Pertinent information is included in Appendix B.

3.0 HYDROLOGIC ANALYSIS

3.1 HYDROLOGIC METHODOLOGY AND CRITERIA

Drainage improvements shall be designed to meet the requirements of the CCRFCD Hydrologic Criteria and Drainage Design Manual. The following drainage criteria have been used for this project.

3.1.1 Precipitation

According to Figure 513 of the CCRFCD *Hydrologic Criteria and Drainage Design Manual*, the project site does not lie within the McCarran Airport rainfall area. Hence, a specific time-intensity-frequency curve was derived. The curve was used to determine the rainfall intensity utilized with the Modified Rational Method. The precipitation analysis was based on a 6-hour and 24-hour duration with the estimates for the 10-year and 100-year frequency storm events. The rainfall depth-duration-frequency values were obtained from Figures 501 through 512 from the CCRFCD Manual. The adjustment factors for the 10-year and 100-year frequency depths were 1.24 and 1.43, respectively. The resulting adjusted 1-hour rainfall depths were 1.24 and 2.29 inches for the 10-year and 100-year storms, respectively.

The Modified Rational Method was used to calculate the existing and developed flows for the on-site and off-site basins. See Appendix A for supporting calculations.

3.1.2 Street Flow

Fort Apache Road has a 100-foot right-of-way width along the project site and has an offset crown approximately 29 feet west of the street centerline. Street improvements will include extension of pavement to the west half of Fort Apache Road and construction of sidewalk, curb and gutter, and streetlighting. A high point exists along Fort Apache Road approximately 275 feet north of Gilmore Avenue.

Gilmore Avenue has a 60-foot right-of-way width along the project site. Street improvements will include extension of pavement to the north and south halves of Gilmore Avenue and construction of sidewalk, curb and gutter, and streetlighting along the north side.

The street flow data for Fort Apache Road and Gilmore Avenue is summarized in Table 2 for the developed 10-year and 100-year frequency storms assuming Scenario 1 conditions (worst case scenario) for Gilmore Avenue. Flow Master by Haestad Methods was used to calculate flow depths in the street and Appendix A includes the cross sections and supporting calculations.

TABLE 2 – DEVELOPED STREET FLOW DATA; CALCULATION OF V x D

Street Name	Frequency Storm	Q (cfs)	Depth (ft)	Velocity (fps)	* V x D
Fort Apache Road (Section 1 @ High Point)	10-year	0.7	0.22	1.74	0.38
Fort Apache Road (Section 1 @ High Point)	100-year	1.8	0.28	2.15	0.60
Fort Apache Road (Section 2 @ PT1)	10-year	3.3	0.34	2.48	0.84
Fort Apache Road (Section 2 @ PT1)	100-year	7.6	0.43	3.04	1.31
Gilmore Avenue (Section 3 @ PT2)	10-year	85	0.67	5.50	3.69
Gilmore Avenue (Section 3 @ PT2)	100-year	208	0.85	7.85	6.67

Under current criteria, VxD should be less than 6 and less than 8 for the 10-year and 100-year frequency storms, respectively.

3.2 HYDROLOGIC RESULTS

The parameters used to characterize the existing basins are shown in Table 3. Supporting calculations are shown in Appendix A.

TABLE 3 – BASIN PARAMETERS, EXISTING CONDITIONS

Basin/Point	Area (ac)	Tc (min)	Q_{10} (cfs)	Q_{100} (cfs)
EX1A	1.18	16.59	0.4	1.5
EX1B	2.59	21.55	0.8	2.9
TOTAL ON-SITE FLOW			**1.2**	**4.4**
OFF1	1.4	13.06	1.6	3.2
PT1	(EX1A + OFF1)		2.0	4.7
PT2	(EX1B)		0.8	2.9

Table 4 summarizes the developed conditions for the on-site basins. The calculations for these values are shown in Appendix A.

TABLE 4 – BASIN PARAMETERS, DEVELOPED CONDITIONS

Basin	Area (ac)	Tc (min)	Q_{10} (cfs)	Q_{100} (cfs)
ON1	0.87	5.00	0.6	1.9
ON2	0.71	12.06	0.7	1.8
ON3	0.84	5.78	1.0	2.3
ON4	0.38	5.29	0.4	1.3
TOTAL ON-SITE FLOW			**2.7**	**7.3**
OFF2	0.20	5.00	0.4	0.7
OFF3	0.17	5.00	0.3	0.6
PT1	(ON1 + ON2 + OFF1 + OFF2)		3.3	7.6
PT2	(GILMORE FLOWS)		85	208

4.0 PROPOSED DRAINAGE FACILITIES

4.1 OFF-SITE DRAINAGE FACILITIES

Off-site Basin OFF2 consists of Fort Apache Road from the existing high point to the north property line. This basin is 0.20 acres in size and generates 10-year and 100-year developed flows of 0.4 cfs and 0.7 cfs, respectively. These flows will travel northward to Alexander Road. Basin OFF3 consists of Fort Apache Road from the existing high point to Gilmore Avenue. This basin is 0.17 acres in size and generates 10-year and 100-year developed flows of 0.3 cfs and 0.6 cfs, respectively. The flows from Basin OFF3 will travel southward to Gilmore Avenue and enter the proposed 18-foot Type "F" drop inlet

4.1.1 Drop Inlet

Based on the 10-year flow of 85 cfs *(Scenario 1)* for Gilmore Avenue from the Neighborhood Drainage Study, an 18-foot Type "F" drop inlet is proposed on the north and south side of Gilmore Avenue to intercept the entire 10-year flow. These drop inlets will be placed in a sump condition to collect the flows from Fort Apache Road; however, the ponding depth is minimal due to flat grades in the intersection. Therefore, the drop inlets were designed based on a continuous grade to intercept the entire 10-year flow and prevent any flow from bypassing the drop inlets and reaching the intersection.

4.1.2 Storm Drain System

The flows intercepted by the proposed 18-foot Type "F" drop inlets along Gilmore Avenue will combine into a proposed 42-inch RCP via two proposed 30-inch RCP laterals. The headwater depth for the 30-inch laterals is 4.5 feet based on the inlet control condition. The 42-inch RCP along Gilmore Avenue will tie into a proposed 42-inch RCP along Fort Apache Road where it will tie into a future system at Alexander Road. This project will only construct the storm drain to the north property line. Approximately 750 feet of future storm drain will need to be constructed from our project site to Alexander Road.

The hydraulic grade line is 12 inches or more below the finished grade in all locations of the storm drain system (see Standard Form 6 in Appendix A). Table 5 summarizes the pipe hydraulics for the storm drain system.

TABLE 5 – PIPE HYDRAULICS SUMMARY

Segment No.	Q_{10} (cfs)	Pipe Size (in)	Slope (%)	U/S HGL (ft)	Finished Grade (ft)
3	85	42	0.5	28.01	35.68
4	85	42	0.5	30.77	33.95
5	85	42	1.62	32.24	33.54
6	42.5	30	5.0	32.37	33.39

4.1.3 Interim Condition

In the interim condition, a drop inlet will be installed approximately 62 feet south of the north property line to act as a bubbler until the remaining 750 feet of future storm drain is installed from the north property line to Alexander Road. Using the orifice equation, the drop inlet has been sized as a 24-foot Modified Type "C" (see Appendix A for supporting calculations).

4.2 ON-SITE DRAINAGE FACILITIES

Developed on-site basins are shown on Figure 6. See Appendix A for supporting calculations.

On-site grading is set to shed flows away from the building. The drainage around the building is proposed as surface flow with the use of curb and gutters and concrete swales.

Flows from Basins ON1 and ON2 will be directed to Fort Apache Road and combine with the flows from Basins OFF1 and OFF2 at PT1. Total combined developed flows at PT1 are 3.3 cfs and 7.6 cfs for the 10-year and 100-year, respectively. These flows will travel northward to Alexander Road due to the existing high point located at the driveway.

For Basin ON3, all flows will be directed to Gilmore Avenue and enter the proposed 18-foot Type "F" drop inlet. Majority of flows will be directed via a proposed 2-foot concrete rectangular channel to be constructed within the landscape area.

Basin ON4 is set to shed flows to Fort Apache Road and travel southward to Gilmore Avenue. Flows from this basin will combine with the flows from Basin OFF3 and enter the proposed 18-foot Type "F" drop inlet at PT2. Total combined developed flows at PT2 are 85 cfs and 208 cfs for the 10-year and 100-year frequency storm.

4.2.1 Erosion Protection

For the 100-year frequency storm, Gilmore Avenue resulted in a velocity of 7.85 fps and a flow depth of 0.85 feet from the flowline. Based on these calculations, the flows along Gilmore Avenue appear to be above the back of sidewalk at a depth of approximately 0.25 feet. Decorative rock sized at 8 inches (16-inch thick) will be placed in the landscape area along Gilmore Avenue to provide erosion protection (see calculations in Appendix A).

4.3 DRIVEWAY ELEVATIONS

The two driveways along Fort Apache Road have continuous slopes toward the street. The 100-year inundation limit for both driveways has been identified on the Grading Plan as "PWL" (ponding water limit). The PWL line indicates that the off-site flows do not back up into the site and are safely kept away from the proposed building.

The driveway along Gilmore Avenue has been bermed 6 inches above the 100-year flow depth in the street in order to keep those flows from entering the project site. Table 6 depicts a summary of the minimum driveway elevation for Gilmore Avenue.

TABLE 6 – MINIMUM DRIVEWAY ELEVATION

Driveway	Flowline Elevation	100-Year Flow (cfs)	100-Year Flow Depth (ft)	Minimum Flowline Elevation At Driveway
Gilmore Avenue	2538.25	208	0.85	2539.60

4.4 FINISHED FLOOR ELEVATIONS

The entire site is graded to shed flows away from the proposed building and direct the flows onto the adjacent street. Therefore, no sections were required next to the building pad to identify the interior flows. Adequate protection will be provided by maintaining the on-site finished floor elevation as follows:

- Finished Floor Elevation should be set at a vertical distance above the gutter flowline of at least twice the depth of flow in the gutter flowline up to a maximum of 18 inches above the water surface elevation in the street

Since the driveway along Gilmore Avenue is bermed 6 inches above the 100-year flow depth, the finished floor elevation is calculated based on the flow depth of Fort Apache Road and is summarized in Table 7. The resultant finished floor elevation is presented on Figure 6 and summarized in Table 8.

TABLE 7 – CALCULATION OF FINISHED FLOOR ELEVATION BASED ON 100-YEAR FLOW DEPTH IN FORT APACHE ROAD

Building Pad	Flowline Elevation	100-Year Flow Depth @ High Point	Twice 100-Year Flow Depth	Minimum Finished Floor Elevation
One	2535.57	0.28	0.56	2536.13

TABLE 8 – SUMMARY OF FINISHED FLOOR ELEVATION

Building Pad	Minimum Finished Floor Elevation	Proposed Finished Floor Elevation
One	2536.13	2538.30

5.0 SUMMARY

1. The project site consists of a 5-acre fire station site. Based on the peak flows developed and the on-site analysis, the hydraulic calculations, and the on-site surface conveyance facilities, this project conforms to the drainage criteria set forth in the CCRFCD *Hydrologic Criteria and Drainage Design Manual*.

2. The project site is located within a FEMA designated Zone X, and is not within a designated floodplain.

3. The site is not adjacent to any existing or proposed CCRFCD Master Plan Facilities.

4. The on-site flows are conveyed through the site utilizing curb and gutter and concrete swales.

5. The on-site finished floor elevation was set above the minimum requirement of twice the depth of flow in the gutter flowline up to a maximum of 18 inches above the water surface elevation in the street.

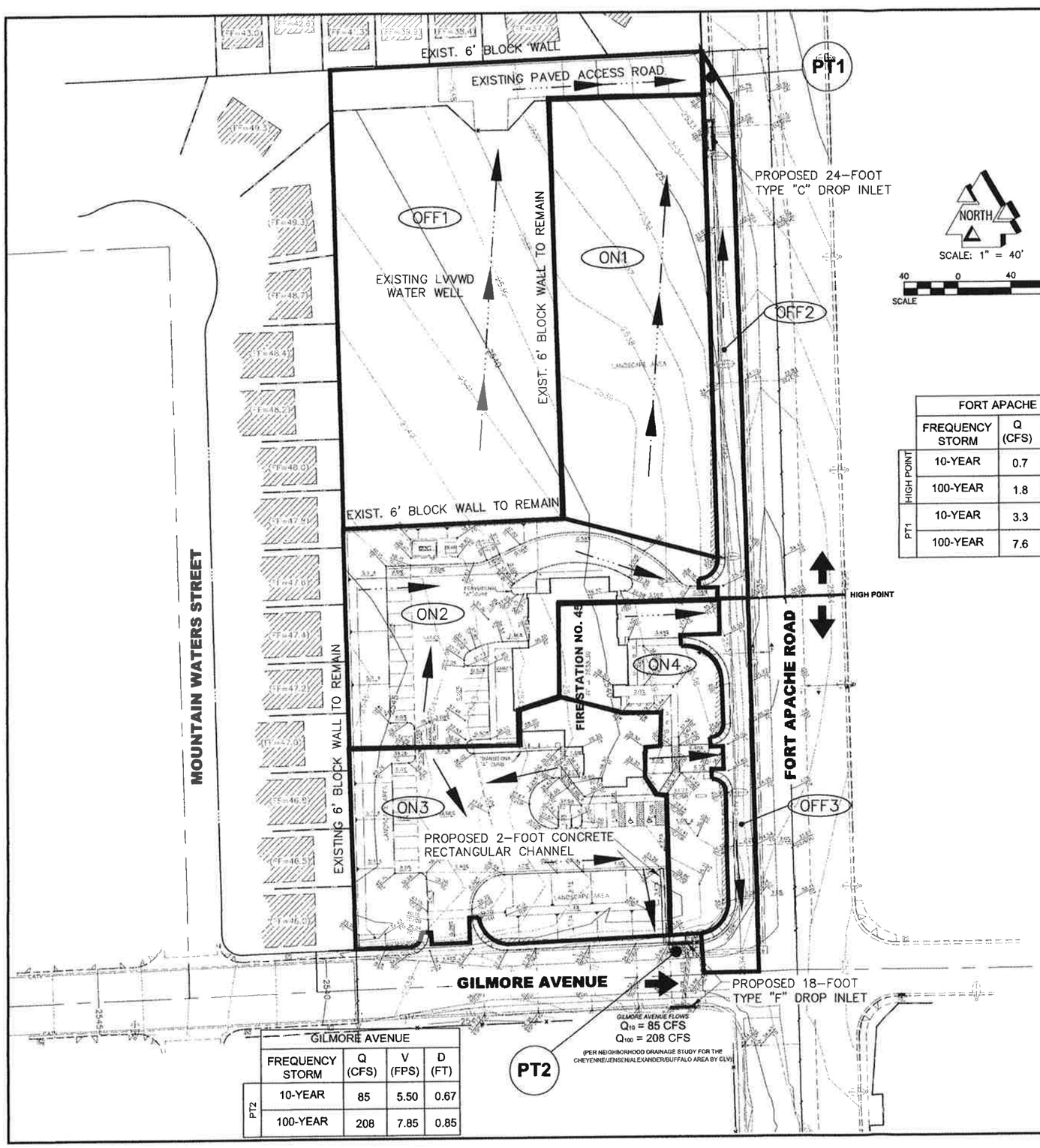
6. The development of this site will not significantly increase the downstream flow conditions and no adverse conditions resulting from this development are anticipated.

Prepared by:

Rosa A. Cortez, E.I.

Reviewed by:

Allen E. Pavelka, P.E.



FORT APACHE ROAD				
	FREQUENCY STORM	Q (CFS)	V (FPS)	D (FT)
HIGH POINT	10-YEAR	0.7	1.74	0.22
HIGH POINT	100-YEAR	1.8	2.15	0.28
PT1	10-YEAR	3.3	2.48	0.34
PT1	100-YEAR	7.6	3.04	0.43

GILMORE AVENUE				
	FREQUENCY STORM	Q (CFS)	V (FPS)	D (FT)
PT2	10-YEAR	85	5.50	0.67
PT2	100-YEAR	208	7.85	0.85

LEGEND

BASIN IDENTIFICATION	ON1
CONCENTRATION POINT	PT1
FLOW DIRECTION	
BASIN BOUNDARY	

BASIN / POINT	AREA (AC)	Q_{10} (CFS)	Q_{100} (CFS)
ON1	0.87	0.6	1.9
ON2	0.71	0.7	1.8
ON3	0.84	1.0	2.3
ON4	0.38	0.4	1.3
OFF2	0.20	0.4	0.7
OFF3	0.17	0.3	0.6
PT1	----	3.3	7.6
PT2	----	85	208

This grading plan is a part of drainage study
2976
01 9/11/01
9/28/01 Page 8 Of 10

REV	DESCRIPTION	BY	DATE	APPR	DATE

PROJ NO: AZ01003
DESIGN: RAC
DATE: 09/06/01
SCALE: AS SHOWN
FILE: FIGURE6

STAMP DATE:

AZTEC ENGINEERING
3320 N Buffalo Dr. # 106, Las Vegas, NV 89129
Tel (702) 396-3426 Fax(702) 396-3758
Email: aztec@aztecengcom

CITY OF LAS VEGAS
FIRE STATION NO. 45

DEVELOPED CONDITIONS
DRAINAGE BASIN PLAN

SHEET
FIG_6
1 OF 1 SHEETS
CLV DRAWING NO.

F:\AZ01003\dwg\Drainage\Figure6.dwg, 09/07/01 09:10:19 AM, Rosa Cortez

AZTEC ENGINEERING

AZ01003

November 27, 2001

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3320 N. Buffalo Drive
Suite 106
Las Vegas, NV 89129

Tel: 702-396-3426
Fax: 702-396-3758

aztec@azteceng.com
www.azteceng.com

Albert Sung
City of Las Vegas
Department of Public Works
Engineering and Planning Division
Flood Control Section
731 South Fourth Street
Las Vegas, Nevada 89101

RE: **TECHNICAL DRAINAGE STUDY – SUPPLEMENTAL INFORMATION**
for City of Las Vegas – Fire Station No. 45

This letter has been prepared to address Flood Control comments shown on the Civil Improvement Plans. Standard Form 6 has been revised to incorporate changes regarding the proposed Storm Drain System along Gilmore Avenue and Fort Apache Road.

At the City of Las Vegas' request, the proposed 18-foot Type "F" drop inlets along Gilmore Avenue have been changed to two 9-foot Type "F" drop inlets on both the north and south sides of Gilmore Avenue. Additional laterals have been proposed which were sized using Manning's Equation and Inlet Control (see Figure 1005).

Table 5 has been revised to show the new segments that are included in Standard Form 6.

TABLE 5 – PIPE HYDRAULICS SUMMARY

Segment No.	Q_{10} (cfs)	Pipe Size (in)	Slope (%)	U/S HGL (ft)	Finished Grade (ft)
3	85	42	0.5	28.05	35.68
4	85	42	0.5	29.30	34.19
5	85	42	0.5	29.72	33.95
6	85	36	1.62	29.94	33.54
7	42.5	36	1.62	32.35	33.86
8	21.25	24	2.0	32.25	33.67

Please incorporate this revision into the approved Technical Drainage Study. If you have any questions or require additional information, please feel free to contact me at 396-3426.

Sincerely,

AZTEC ENGINEERING

Prepared By:

Rosa A. Cortez, E.I.

Reviewed By:

Allen E. Pavelka, P.E.

PROFESSIONAL ENGINEER-STATE OF NEVADA
ALLEN E. PAVELKA
CIVIL
No. 09029

11-27-01

STORM SEWER HYDRAULIC CALCULATIONS

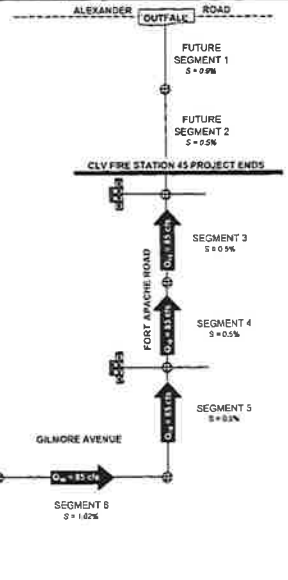
CONDUIT DATA: STATION FROM	STATION TO	SIZE (FT)	TYPE	INVERTS D/S ELEV	INVERTS U/S ELEV	LENGTH	FLOW DATA: A (FT^2)	ϕ	Q (CFS)	V (FPS)	H_v (FT)	S_f (FT/FT)	AVE. S_f (FT/FT)	ENERGY LOSS DATA: PIPE S_f	PIPE H_f (FT)	TRANSITIONS S_f	H_f (FT)	K_f	H_f (FT)	K_m	H_m (FT)	K_c	H_c (FT)	K_e	H_e (FT)	K_b	H_b (FT)	K	H_i (FT)	K_o	H_o (FT)	TOTAL (FT)	ENERGY AND HYDRAULIC DATA: PIPE U/S EGL ELEV	PIPE U/S HGL ELEV	TRANSITION U/S EGL ELEV	TRANSITION U/S HGL ELEV	FINISHED SURFACE ELEV.	COMMENTS: PRESS. FLOW? PIPE	PRESS. FLOW? TRAN	OTHER
Enter Starting EGL and HGL here →																																		22.35	21.54	←				
FUTURE SEGMENT 1		4.00	RCP	17.54	21.02	375	12.57	0.00492	85	6.76	0.71	0.0035	0.0035	0.0035	1.312					0.025	0.018									1.000	0.710	0.728	23.67	22.96	24.39	23.68	27.29	NO	NO	
FUTURE SEGMENT 2		3.50	RCP	21.52	23.39	375	9.62	0.00492	65	6.83	1.21	0.0071	0.0053	0.0053	1.993					0.025	0.030											0.030	26.39	25.17	25.42	25.20	31.96	NO	NO	
SEGMENT 3		3.50	RCP	23.39	25.37	395	9.62	0.00492	85	8.83	1.21	0.0071	0.0071	0.0071	2.816					0.025	0.030											0.030	28.23	28.02	28.28	28.05	35.68	NO	NO	
SEGMENT 4		3.50	RCP	25.37	28.22	170.6	9.62	0.00492	85	8.83	1.21	0.0071	0.0071	0.0071	1.216					0.025	0.030											0.030	30.48	29.27	30.51	29.30	34.19	YES	YES	
SEGMENT 5		3.50	RCP	28.22	28.44	43.66	9.62	0.00492	85	8.83	1.21	0.0071	0.0071	0.0071	0.311					1.010	1.224											1.224	30.82	29.61	30.93	29.72	33.95	YES	YES	
SEGMENT 6		3.00	RCP	26.84	27.85	56	7.07	0.00492	85	12.03	2.25	0.0162	0.0117	0.0117	0.654	0.48	1.987	0.280	2.088													4.075	31.59	28.34	32.18	29.94	33.54	NO	NO	2 Laterals (49°, 61°)
SEGMENT 7		3.00	RCP	27.85	28.20	22	7.07	0.00492	42.5	6.01	0.56	0.0041	0.0101	0.0101	0.223			0.083	0.502													0.502	32.41	31.85	32.91	32.35	33.86	YES	YES	Junction at 140°
SEGMENT 8		2.00	RCP	29.20	29.37	8.38	3.14	0.00492	21.25	6.76	0.71	0.0068	0.0064	0.0064	0.054																	0.000	32.96	32.25	32.96	32.25	33.67	YES	YES	

$$S_f = \frac{\phi H_v}{R^{1.33}} \qquad \phi = \frac{2g(n^2)}{2.21}$$

Revision	Date

WRC ENGINEERING INC. | REFERENCE: | STANDARD FORM 6

Note: Segments 1 and 2 will not be constructed with the CLV Fire Station 45 project. These are future storm drain improvements that were used in this calculation to obtain an approximate starting HGL for Segment 3.

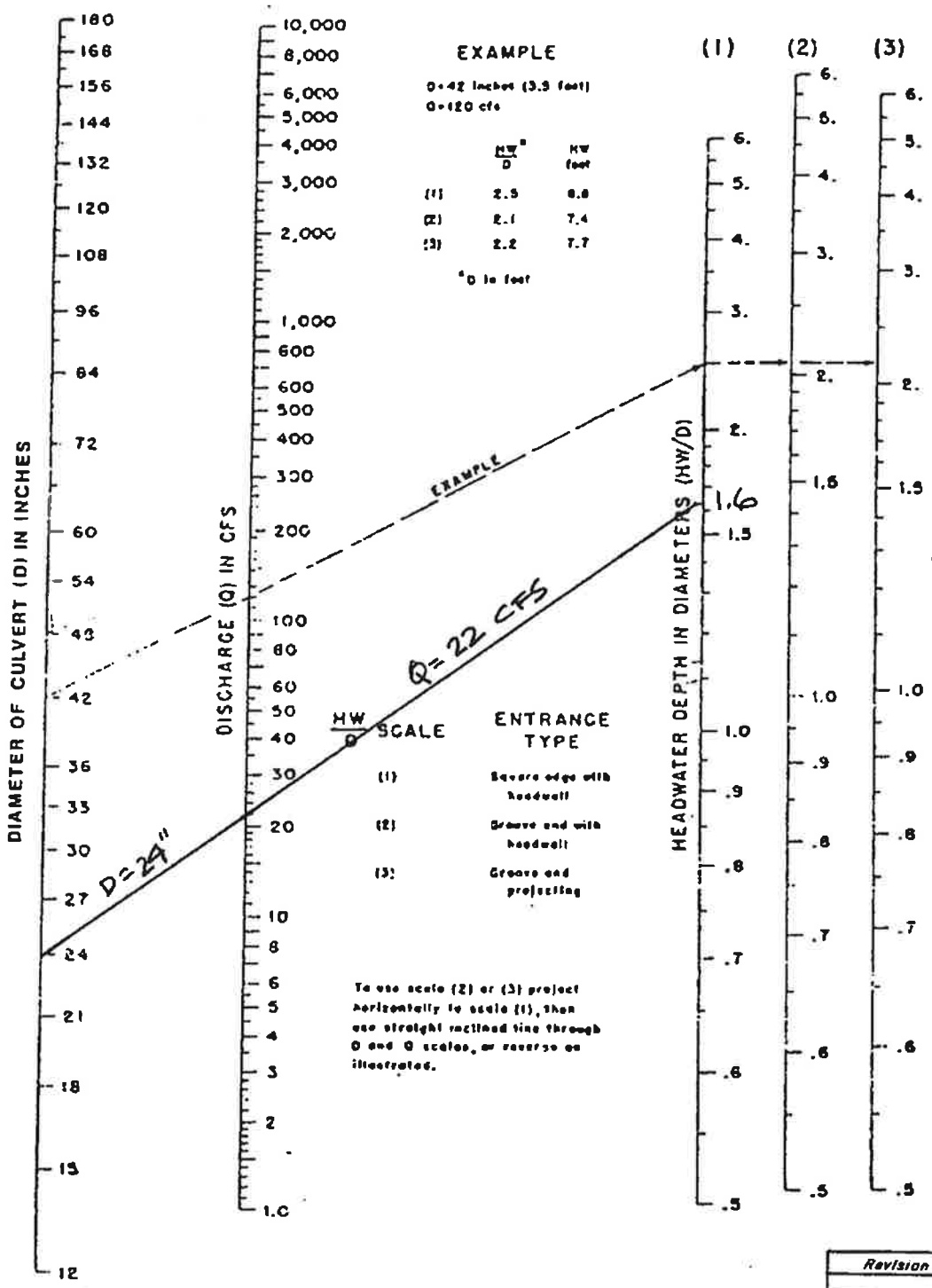


REVISED 48" RCP OUTFALL

ALONG GILMORE AVENUE: LATERALS CONNECTING 9-FOOT DIs

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH – INLET CONTROL RCP



$\frac{H_W}{D} = 1.6$

$H_W = 3.2'$

Revision	Date

WRC ENGINEERING

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

FIGURE 1005

STORM SEWER HYDRAULIC CALCULATIONS

CONDUIT DATA: STATION FROM	STATION TO	SIZE (FT)	TYPE	INVERTS D/S ELEV	INVERTS U/S ELEV	LENGTH	FLOW DATA: A (FT^2)	ϕ	Q (CFS)	V (FPS)	H_v (FT)	S_f (FT/FT)	AVE. S_f (FT/FT)	ENERGY LOSS DATA: PIPE S_f	PIPE H_f (FT)	TRANSITIONS S_f	H_f (FT)	K_f	H_f (FT)	K_m	H_m (FT)	K_c	H_c (FT)	K_e	H_e (FT)	K_b	H_b (FT)	K_i	H_i (FT)	K_o	H_o (FT)	TOTAL (FT)	ENERGY AND HYDRAULIC DATA: PIPE U/S EGL ELEV	PIPE U/S HGL ELEV	TRANSITION U/S EGL ELEV	TRANSITION U/S HGL ELEV	COMMENTS: FINISHED SURFACE ELEV.	PRESS. FLOW? PIPE	PRESS. FLOW? TRAN	OTHER
																																Enter Starting EGL and HGL here →				22.35	21.64	←		
FUTURE SEGMENT 1		4.00	RCP	17.64	21.02	375	12.57	0.00492	85	6.76	0.71	0.0035	0.0035	0.0035	1.312					0.025	0.016									1.000	0.710	0.728	23.67	22.95	24.39	23.68	27.29	NO	NO	
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$$S_f = \frac{\phi H_v}{R^{1.33}} \qquad \phi = \frac{2g(n^2)}{2.21}$$

Revision	Date

WRC ENGINEERING INC. | REFERENCE: | STANDARD FORM 6

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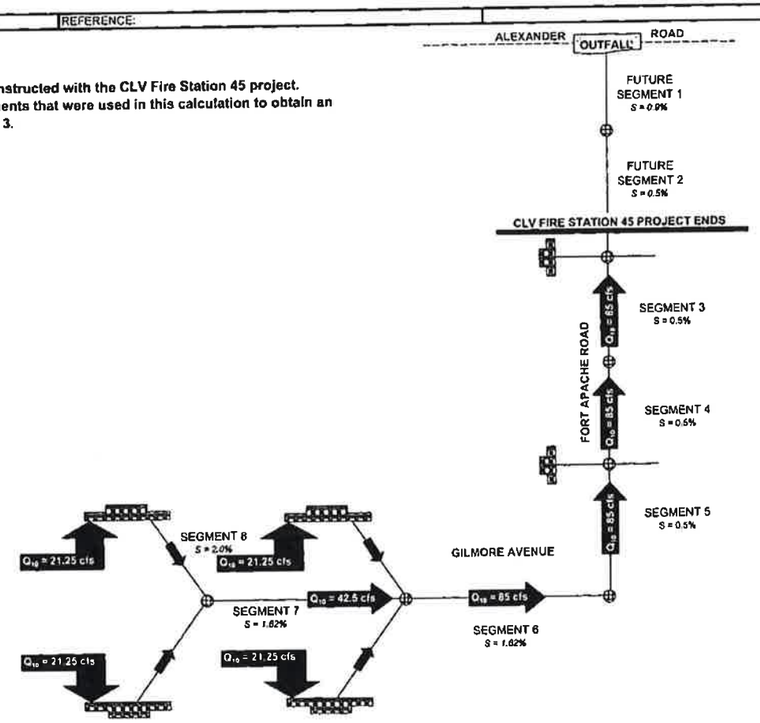
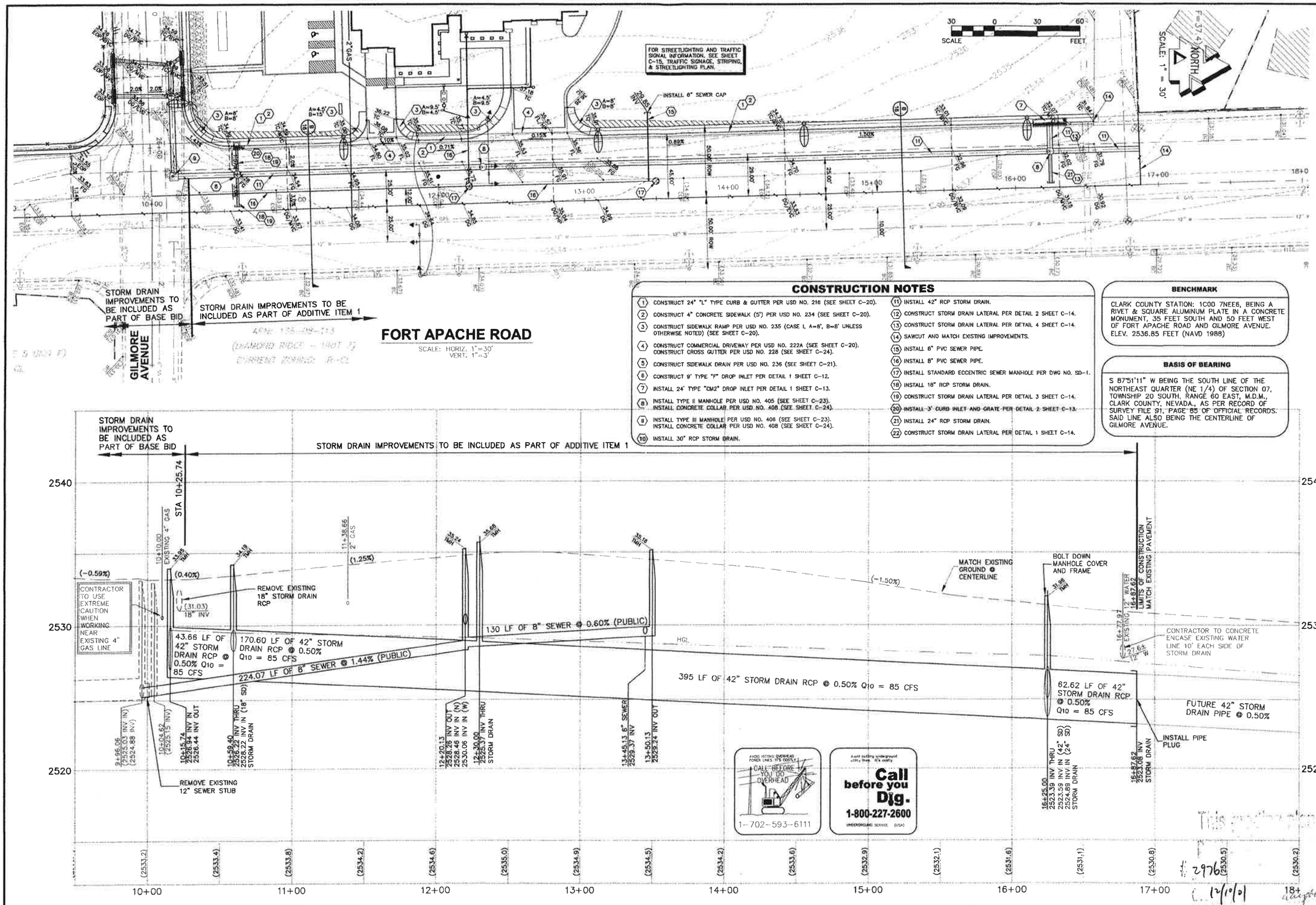


REVISED 48" RCP OUTFALL



CONSTRUCTION NOTES

1. CONSTRUCT 24" "L" TYPE CURB & GUTTER PER USD NO. 216 (SEE SHEET C-20).
2. CONSTRUCT 4" CONCRETE SIDEWALK (5') PER USD NO. 234 (SEE SHEET C-20).
3. CONSTRUCT SIDEWALK RAMP PER USD NO. 235 (CASE I, A=8', B=8' UNLESS OTHERWISE NOTED) (SEE SHEET C-20).
4. CONSTRUCT COMMERCIAL DRIVEWAY PER USD NO. 222A (SEE SHEET C-20). CONSTRUCT CROSS GUTTER PER USD NO. 228 (SEE SHEET C-24).
5. CONSTRUCT SIDEWALK DRAIN PER USD NO. 236 (SEE SHEET C-21).
6. CONSTRUCT 9' TYPE "F" DROP INLET PER DETAIL 1 SHEET C-12.
7. INSTALL 24' TYPE "CM2" DROP INLET PER DETAIL 1 SHEET C-13.
8. INSTALL TYPE II MANHOLE PER USD NO. 405 (SEE SHEET C-23). INSTALL CONCRETE COLLAR PER USD NO. 408 (SEE SHEET C-24).
9. INSTALL TYPE III MANHOLE PER USD NO. 406 (SEE SHEET C-23). INSTALL CONCRETE COLLAR PER USD NO. 408 (SEE SHEET C-24).
10. INSTALL 30" RCP STORM DRAIN.
11. INSTALL 42" RCP STORM DRAIN.
12. CONSTRUCT STORM DRAIN LATERAL PER DETAIL 2 SHEET C-14.
13. CONSTRUCT STORM DRAIN LATERAL PER DETAIL 4 SHEET C-14.
14. SAWCUT AND MATCH EXISTING IMPROVEMENTS.
15. INSTALL 6" PVC SEWER PIPE.
16. INSTALL 8" PVC SEWER PIPE.
17. INSTALL STANDARD ECCENTRIC SEWER MANHOLE PER DWG NO. SD-1.
18. INSTALL 18" RCP STORM DRAIN.
19. CONSTRUCT STORM DRAIN LATERAL PER DETAIL 3 SHEET C-14.
20. ~~INSTALL 3' CURB INLET AND GRATE PER DETAIL 2 SHEET C-13.~~
21. INSTALL 24" RCP STORM DRAIN.
22. CONSTRUCT STORM DRAIN LATERAL PER DETAIL 1 SHEET C-14.

BENCHMARK

CLARK COUNTY STATION: 1C00 7NEE6, BEING A RIVET & SQUARE ALUMINUM PLATE IN A CONCRETE MONUMENT, 35 FEET SOUTH AND 50 FEET WEST OF FORT APACHE ROAD AND GILMORE AVENUE. ELEV. 2536.85 FEET (NAVD 1988)

BASIS OF BEARING

S 87°51'11" W BEING THE SOUTH LINE OF THE NORTHEAST QUARTER (NE 1/4) OF SECTION 07, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA., AS PER RECORD OF SURVEY FILE 91, PAGE 85 OF OFFICIAL RECORDS. SAID LINE ALSO BEING THE CENTERLINE OF GILMORE AVENUE.

PROJ NO:	AZ01003
DESIGN:	LG/RAC
DATE:	12/04/01
SCALE:	AS SHOWN
FILE:	FS45_1C

PROFESSIONAL ENGINEER-STATE OF NEVADA ALLEN D. PAVELKA No. 9029

STAMP DATE: 12-A-01

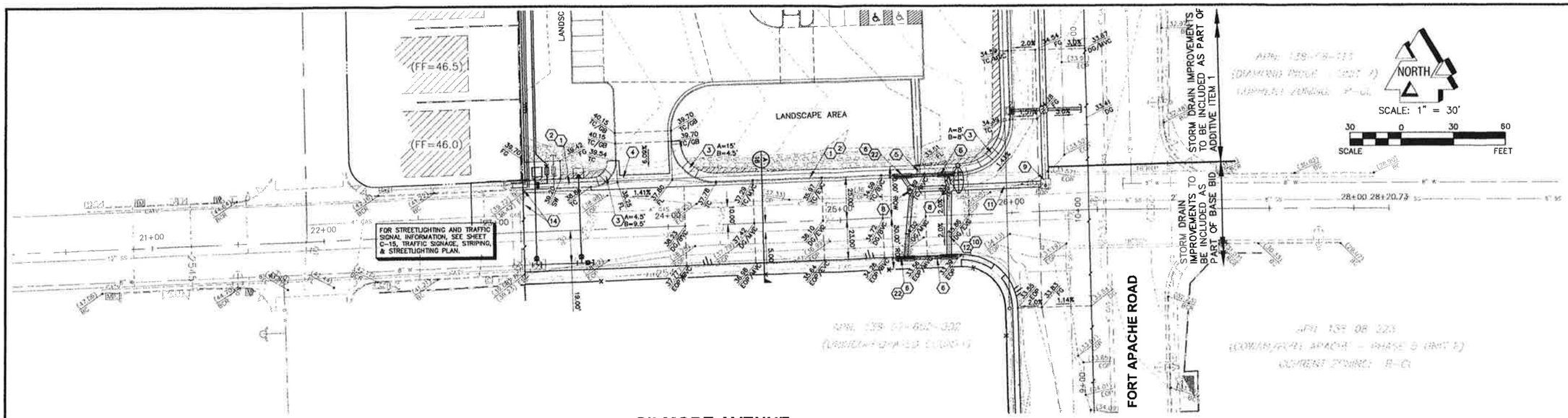
AZTEC ENGINEERING
3320 N Buffalo Dr. # 106, Las Vegas, NV 89129
Tel (702) 396-3426 Fax(702) 396-3758
Email: aztec@aztecengr.com

CITY OF LAS VEGAS
FIRE STATION NO. 45
PLAN & PROFILE
FORT APACHE ROAD

SHEET
C-10
10 OF 26 SHEETS

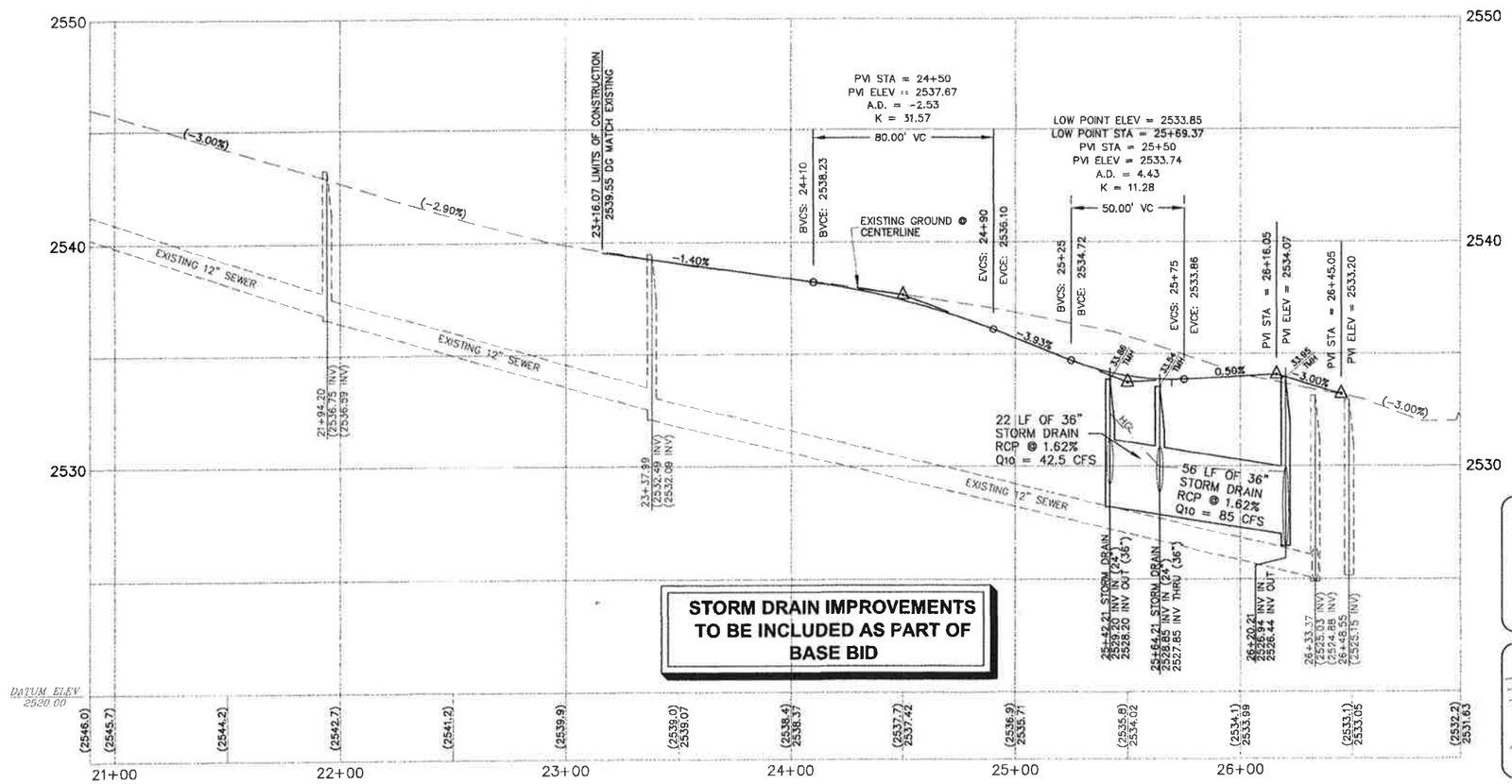
CLV DRAWING NO.
630.98

12/10/01



GILMORE AVENUE

SCALE: HORIZ. 1"=30'
VERT. 1"=3'



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22. CONSTRUCT STORM DRAIN LATERAL PER DETAIL 1 SHEET C-14.

Avoid cutting underground utility lines. It's costly.
Call before you Dig.
1-800-227-2600
UNDERGROUND SERVICE (USA)

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
CALL BEFORE YOU DO OVERHEAD
1-702-593-6111

BENCHMARK

CLARK COUNTY STATION: 1C00 7NEE6, BEING A RIVET & SQUARE ALUMINUM PLATE IN A CONCRETE MONUMENT, 35 FEET SOUTH AND 50 FEET WEST OF FORT APACHE ROAD AND GILMORE AVENUE.
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12/10/01

PROJ NO:	AZ01003
DESIGN:	LG/RAC
DATE:	12/04/01
SCALE:	AS SHOWN
FILE:	FS45_11

PROFESSIONAL ENGINEER - STATE OF NEVADA
ALLEN D. PRYOR
No. 9079
STAMP DATE: 12-04-01

AZTEC ENGINEERING
3320 N Buffalo Dr. # 106, Las Vegas, NV 89129
Tel (702) 396-3426 Fax(702) 396-3798
Email: aztec@aztecengr.com

CITY OF LAS VEGAS
FIRE STATION NO. 45
PLAN & PROFILE
GILMORE AVENUE

SHEET
C-11
11 OF 26 SHEETS

CLV DRAWING NO.
630.9

GILMORE CREEK
IMPROVEMENT PLANS

ASSESSOR'S PARCEL NUMBERS

138-07-602-002
4.04 ACRES

CLARK COUNTY
STATE OF NEVADA

DEVELOPER

D.R. HORTON

330 CAROUSEL PARKWAY,
HENDERSON NV 89014
PHONE: (702) 672-1939
FAX: (702) 208-9460
CONTACT: MARK JONES

OWNER

JILL ANN THACKER DUCHARME

3735 N. FORT APACHE ROAD
LAS VEGAS, NEVADA 89129
PHONE: (702) 810-9592
CONTACT: JILL ANN THACKER DUCHARME

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

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

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL SYSTEMS AND STREET LIGHT SYSTEMS CONDUITS IT'S COSTLY
Call before you UnderGround
1-702-455-7511
1-702-432-5300
FREEWAY TRAFFIC SIGNAL SYSTEMS & INTERSECTION

COX COMMUNICATIONS LAS VEGAS, INC. DATE

CENTRAL TELEPHONE COMPANY DATE
D.B.A. CENTURYLINK
"THE AFFIXED CENTURYLINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

SOUTHWEST GAS CORPORATION DATE

NV ENERGY DATE
NV ENERGY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NV ENERGY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSIONS RULES AND REGULATIONS.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER

DATE _____ PROJECT NO. _____

LVVWD APPROVED FIRE FLOW 1,500 GPM AT 20 PSI RESIDUAL

CLARK COUNTY FIRE DEPARTMENT APPROVAL

BY _____ DATE _____

APPROVAL OF THESE PLANS 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.
FIRE FLOW 1,500 GPM AT 20 PSI RESIDUAL

CHARLES KAJKOWSKI, P.E. #4784 DATE
CLV City Engineer
APPROVAL OF THESE PLANS IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHTS-OF-WAY AND/OR DEDICATED EASEMENTS. THE APPROVAL DOES NOT AUTHORIZE THE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDSAND/OR SPECIFICATIONS EXCEPT THOSE SPECIFICALLY LISTED UNDER "DEVIATIONS FROM STANDARDS". THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN "DEVIATIONS FROM STANDARDS" IN FAVOR OF THE UNIFORM STANDARDS DRAWINGS AND SPECIFICATIONS CLARK COUNTY AREA NEVADA.

PRE-DEVELOPMENT MEETING WITH DEPARTMENT OF DEVELOPMENT SERVICES, CIVIL ENGINEERING DIVISION, OFF-SITE INSPECTOR REQUIRED. CONTACT CIVIL ENGINEERING INSPECTOR AT 455-4610.

REV.	DATE	BY	REVISION

DRAWN BY: DLG
DESIGNED BY: DLG
CHECKED BY:
SCALE: N/A
N/A
COMMENTS ADDRESSED BY:
PROJECT NO. 126.13002

T:\Projects\126\13-002 Ft Ap - Gilmore\126i3002-COVER.dwg 10/29/2013 5:26:16 PM PDT

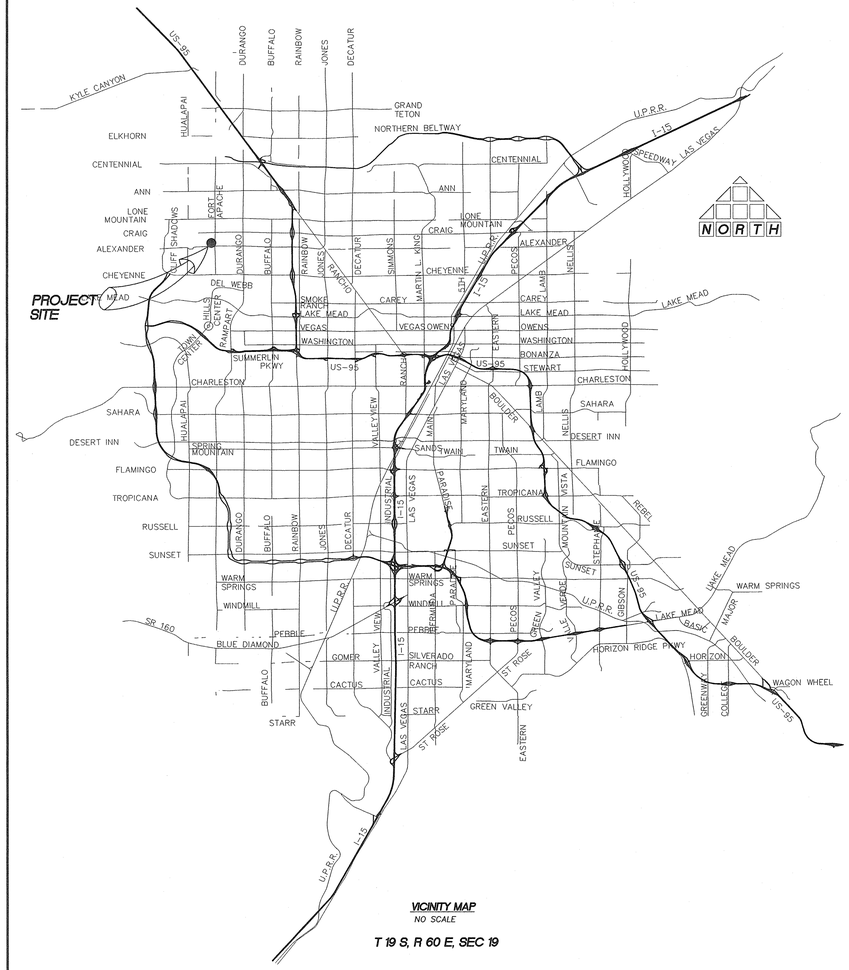
THOMASON CONSULTING ENGINEERS
3277 E. WARM SPRINGS ROAD, SUITE 400
LAS VEGAS, NEVADA 89120
702-932-6125 FAX: 702-932-6129

D.R. HORTON
330 CAROUSEL PARKWAY, HENDERSON NV 89014
PH: (702) 672-1939 FAX:(702) 208-9460

GILMORE CREEK
COVER SHEET

REGISTERED PROFESSIONAL ENGINEER
GARY S. KAZIO
CIVIL
No. 11903
STATE OF NEVADA
GARY S.KAZIO, P.E.
R.P.E. NO. 14970
EXP. 6-30-15
10-30-13

SHEET C1
1 OF
DRAWING NO.
HTE#



VICINITY MAP
NO SCALE

T 19 S, R 60 E, SEC 19

STREET IMPROVEMENT QUANTITIES

	PUBLIC	PRIVATE
"L" TYPE CURB AND GUTTER PER CCASD 216	2,552 LF	---
8' CROSS GUTTER	1,952 SF	---
4" THICK CONCRETE SIDEWALK.	12,760 SF	---
SIDEWALK RAMP	9 EA	---
SIDEWALK UNDERDRAIN	2 EA	---
2" ASPHALT CONCRETE	3,611 SY	---
3" ASPHALT CONCRETE	59 SY	---
5" ASPHALT CONCRETE	174 SY	---
EXISTING ASPHALT CONCRETE REMOVAL	238 SY	---
TYPE II AGGREGATE BASE	CY	---
CONCRETE DRAINAGE EASEMENT	100 SF	---
18" RCP STORM PIPE (CLASS III)	110 LF	---
TYPE "C" DROP INLET	1 EA	---
48" STORM MANHOLE	1 EA	---
100 WATT STREETLIGHTS	9 EA	---
150 WATT STREETLIGHTS	1 EA	---
250 WATT STREETLIGHTS	5 EA	---
2" STREETLIGHT CONDUIT W (2) # 4 AND (1) # 8 THW COPPER CONDUCTOR	LF	---
3" F.A.S.T CONDUIT W/ # 8 BARE OR GREEN CONTRACTORS CCUSS 623G03.0	LF	---
3 1/2 PULL BOX WITH NON CONDUCTIVE LID	EA	---
P-30 PULLBOX W/ ""FIBEROPTIC" INSCRIBED ON NON CONDUCTIVE LID PER CCUSS 6236.03.01 (500' MAX. SPACING)	EA	---
STREET SIGNS	EA	---
PAVEMENT STRIPING/MARKERSSTREET SIGNS	LF	---

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5	G2	GRADING PLAN 2
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7	U2	UTILITY PLAN 2
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13	T1	TRAFFIC CONTROL PLAN 1
14	T2	TRAFFIC CONTROL PLAN 2
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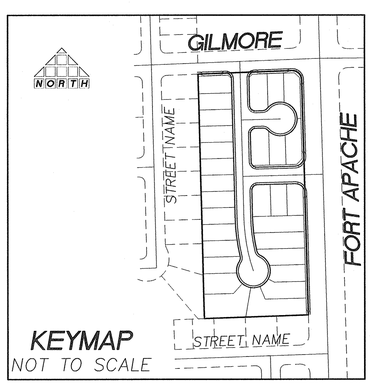

KEYMAP
NOT TO SCALE

NOTE TO CONTRACTOR :

THE QUANTITIES SHOWN ARE FOR PERMITTING PURPOSE AND IS INTENDED TO ILLUSTRATE THE SCOPE OF WORK. THE CONTRACTOR SHALL BE RESPONSABLE FOR VERIFYING THE EXACT QUANTITIES INVOLVED FOR BIDDING AND CONSTRUCTION OF PROJECT.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER

DATE _____ PROJECT NO. _____

LVVWD APPROVED FIRE FLOW 1,500 GPM AT 20 PSI RESIDUAL

CLARK COUNTY FIRE DEPARTMENT APPROVAL

BY _____ DATE _____

APPROVAL OF THESE PLANS 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.
FIRE FLOW 1,750 GPM AT 20 PSI RESIDUAL

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

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

AVOID DIGGING UNDERGROUND TRAFFIC SIGNAL SYSTEMS AND STREET LIGHT SYSTEMS CONDUITS IT'S COSTLY
Call before you UnderGround
1-702-455-7511
OR
1-702-432-5300
FIBER OPTIC SIGNAL SYSTEM

REV	DATE	BY	REVISION

10/29/2013 5:26:16 PM PDT
T:\Projects\126\13-002 FT Ap - Gilmore\126130G2-COVER.dwg

DRAWN BY: DJG
DESIGNED BY: DJG
CHECKED BY:
COMMENTS ADDRESSED BY:
SCALE: N/A
N/A

PROJECT NO.
126.13002

THOMASON CONSULTING ENGINEERS
3277 E. WARM SPRINGS ROAD, SUITE 400
LAS VEGAS, NEVADA 89120
702-932-6125 FAX: 702-932-6129

D.R. HORTON
330 CAROUSEL PARKWAY, HENDERSON NV 89014
PH: (702) 672-1939 FAX:(702) 208-9460

GILMORE CREEK
VICINITY MAP AND QUANTITIES

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA
GARY S. KAZIO
CIVIL
No. 11997

GARY S. KAZIO, P.E.
R.P.E. NO. 14970
EXP. 6-30-15
10-30-13

SHEET C2
2 OF

DRAWING NO.
HTE#

CLARK COUNTY GENERAL NOTES

1. THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THESE DRAWINGS. THE CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THESE DRAWINGS.
2. ALL GRADES ARE REFERENCED TO THE TOP OF THE CONSTRUCTION GRADE STAKES OR NAILS AND THIS RULE SHALL BE OBSERVED: THREE CONSECUTIVE CONSTRUCTION GRADE STAKES OR NAILS CORRESPONDING TO THREE CONSECUTIVE POINTS SHOWN ON THE APPROVED PLANS AS A STRAIGHT GRADE SHALL BE USED IN COMMON AND ANY VARIATION SHALL BE REPORTED IN WRITING TO THOMASON CONSULTING ENGINEERS BEFORE WORK PROCEEDS. CONTRACTORS DOING OTHERWISE SHALL PROCEED AT THEIR TOTAL RISK AND RESPONSIBILITY.
3. THE QUANTITY ESTIMATES SHOWN HEREON ARE APPROXIMATE AND NO ONE IS TO RELY UPON THEM FOR PAY QUANTITIES. EACH AND EVERY CONTRACTOR SHALL HAVE A SET OF APPROVED PLANS AND SPECIFICATIONS ON THE JOB SITE AT ALL TIMES AND SHALL RELY UPON THEM TO A HIGHER DEGREE THAN THE CONSTRUCTION STAKES IN PROSECUTING THE WORK.
4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS; ANY ALTERATIONS SHALL HAVE THE PRIOR APPROVAL OF THE COUNTY ENGINEER.
5. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS FOR PROPER DRAINAGE; EXTENT OF TRANSITIONS SHALL BE AS SHOWN OR AS DETERMINED BY THE COUNTY ENGINEER OR INSPECTOR.
6. ALL CURB AND GUTTER GRADES ARE FIGURED ON CENTERLINE STATIONING UNLESS OTHERWISE SHOWN.
7. ALL POWER POLES TO BE RELOCATED AT NO EXPENSE TO CLARK COUNTY.
8. ALL WORK WITHIN THE RIGHT-OF-WAY OUTSIDE THE PROJECT BOUNDARIES REQUIRED A SEPARATE ENCROACHMENT PERMIT ISSUED BY THE CLARK COUNTY DEPARTMENT OF DEVELOPMENT SERVICES. TRENCH AND PAVEMENT REPLACEMENT CONDITIONS WILL BE AS PER PERMIT.

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 AND DURING THE TIME OF CONSTRUCTION IN ACCORDANCE WITH THE 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 FROM 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 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 PROVIDED 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 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 FROM TURNS.

I. BLUE REFLECTIVE MARKERS MUST BE INSTALLED BEFORE FINAL HYDRANT ACCEPTANCE CAN BE ATTAINED (SECTION C107 OF THE CLARK COUNTY FIRE CODE, AS AMENDED)

J. HYDRANTS THAT ARE PROPOSED FOR INSTALLATION IN PUBLIC WATER SYSTEMS SHALL BE IN ACCORDANCE WITH APPROVED FIRE HYDRANTS AS ALLOWED BY THE WATER PURVEYOR. HYDRANTS PROPOSED FOR INSTALLATION ON PRIVATE WATER SYSTEMS SHALL BE IN ACCORDANCE WITH APPROVED FIRE HYDRANTS AS ALLOWED BY THE FIRE DEPARTMENT.

REVISED 07/18/2012

GRADING NOTES

1. THOMASON CONSULTING ENGINEER SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES IN THE PLANS OR CONDITIONS IN THE FIELD.
2. ALL WORK TO BE PERFORMED OUTSIDE OF THE PROJECT BOUNDARY AND ON PRIVATE PROPERTY SHALL NOT BE PERFORMED UNTIL WRITTEN PERMISSION AND EASEMENT HAVE BEEN OBTAINED FROM THE OFFSITE OWNER AND GIVEN TO CLARK COUNTY.
3. FOR AREAS THAT ARE FLATTER THAN 2:1 SLOPE, OR LESS THAN 1' ELEVATION DIFFERENCE, SCARPS ARE NOT SHOWN ON PLAN FOR CLARITY PURPOSES.
4. ALL SLOPE AREAS SHALL HAVE A MINIMUM ONE FOOT SHOULDER NEXT TO WALL PRIOR TO STARTING SLOPE.
5. PAD SECTION SHOWN ON PLANS IS FOR REFERENCE ONLY. FOR ACTUAL SECTION, REFER TO GEOTECHNICAL REPORT FOR SOILS ENGINEERS' RECOMMENDATION.
6. ALL SIDEWALK INSTALLATIONS SHALL CONFORM TO ADA REQUIREMENTS.
7. RETAINING WALL ELEVATIONS ARE SHOWN FOR CONVENIENCE ONLY. CONTRACTOR MUST VERIFY EXACT TOP OF FOOTINGS, STEPFOOTINGS, AND TOP OF RETAINING WALLS TO MATCH FIELD CONDITIONS, PRIOR TO COMMENCEMENT OF WORK.

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

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AVOID HITTING UNDERGROUND TRAFFIC SIGNAL SYSTEMS AND STREET LIGHT SYSTEMS CONDUITS IT'S COSTLY
Call before you UnderGround
1-702-455-7511
1-702-432-5300

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.

REVISED 04/15/10

CLARK COUNTY DEPARTMENT OF PUBLIC WORKS

CIVIL ENGINEERING DIVISION 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 STANDARDS SPECIFICATIONS AND STANDARD DRAWINGS CLARK COUNTY AREA NEVADA AND CLARK COUNTY SUPPLEMENT TO UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS, LATEST REVISION
6. PRIVATE STREETS, CURBS & 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 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 DEVELOPMENT SERVICES, CIVIL ENGINEERING DIVISION INSPECTOR @ 455-4610.
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') 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 OTHER WISE 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.

BENCHMARK

CITY OF LAS VEGAS BENCH MARK NO. 6LV008NWW6 BEING A RIVET AND PLATE IN TOP OF CURB, SOUTHEAST CORNER OF FORT APACHE AND GILMORE .

ELEVATION: 2532.23 FEET OR 771.826 METERS, NAVD 88

FLOOD ZONE

THIS SITE IS LOCATED WITHIN FLOOD ZONE X, WHICH IS SPECIFIED AS "AREAS TO BE DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE OF FLOODPLAIN" FIRM MAP NUMBER 32003C2135 F LOMR DATED NOVEMBER 16, 2011.

BASIS OF BEARING

NORTH 87°51'05" EAST, BEING THE CENTERLINE OF GILMORE AVENUE AND BEING THE NORTH LINE OF THE SOUTH HALF (S 1/2) OF THE NORTHEAST QUARTER (NE 1/4) OF SECTION 7, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA, AS SHOWN IN BOOK 77, PAGE 90 OF PLATS IN THE RECORDER'S OFFICE OF CLARK COUNTY, NEVADA.

CLARK COUNTY TRAFFIC NOTES

1. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HERON 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 SIGN POSTS 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 FIRE (5) FEET OF ANY SIGN SHOWN HEREON TO BE MOUNTED ON A SIGN POST, THEN 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 PEDESTALS FOR CABINETS, AND STREET LIGHT POLES SHALL BE GALVANIZED PER ASTM A.123.
9. ALL STREET LIGHTING INSTALLATIONS EXCEPT AS NOTED ON THE STREET LIGHTING PLANS SHALL CONFORM TO THE UNIFORM STANDARD DRAWINGS AND THE UNIFORM STANDARDS 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 AN 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 INSTALLD 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 STREET LIGHTS 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, WRITTTEN NOTICE SHALL BE SUBMITTED TO THE CLARK COUNTY TRAFFIC MANAGEMENT DIVISION THAT WORK IS BEING COMPLETED AND AND THE PROPOSED DATE OF COMPLETION.

ABBREVIATIONS

AC	ASPHALTIC CONCRETE
ACP	ASBESTOS CEMENT PIPE
ADJ	ADJUST
BC	BEGINNING OF CURB OR BACK OF CURB
BCR	BEGINNING OF CURB RETURN OR BACK OF CURVE RADIUS
BDRY	BOUNDARY
BEG	BEGIN
BM	BENCHMARK
BSW	BACK OF SIDEWALK
BVC	BEGINNING OF VERTICAL CURVE
C & G	CURB AND GUTTER
CF	CURB FACE
CIP	CAST IRON PIPE
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CO	CLEAN OUT-SEWER
CONC	CONCRETE
CONST	CONSTRUCT
DC	DEPRESSED CURB
DI	DROP INLET
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DMH	DROP MANHOLE
EC	END OF CURVE
ECR	END OF CURB RETURN
EL	ELEVATION
EP	EDGE OF PAVEMENT
EVC	END OF VERTICAL CURVE
EX	EXISTING
F.A.S.T.	FREEWAY ARTERIAL SYSTEM OF TRANSPORTATION
FC	FACE OF CURB
FF	FINISHED FLOOR
FG	FINISH GRADE
FH	FIRE HYDRANT
FL	FLOW LINE
G	GAS
GB	GRADE BREAK
GFF	GARAGE FINISHED FLOOR
HGT	HIGH OR HEIGHT
HOR	HORIZONTAL
HP	HIGH POINT
ID	INSIDE DIAMETER
INT	INTERSECTION
INV	INVERT
LAT	LATERAL
LF	LINEAL FEET
LT	LEFT
LP	LOW POINT
MAX	MAXIMUM
MH	MANHOLE
MIN	MINIMUM
MVC	MIDDLE OF VERTICAL CURVE
NO	NUMBER
OC	ON CENTER
OD	OUTSIDE DIAMETER
P	POWERLINE
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVE
PG	PAD GRADE
PHP	PLASTIC HIGH PRESSURE
PI	POINT OF INTERSECTION
PL	PROPERTY LINE
PP	POWER POLE
PRC	POINT OF REVERSED CURVE
PROP	PROPOSED
PT	POINT OF TANGENT
PVC	POLY VINYL CHLORIDE PIPE
PVI	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT
Q	RATE OF FLOW
RCP	REINFORCED CONCRETE PIPE
RT	RIGHT
R/W, ROW	RIGHT-OF-WAY
SS	SANITARY SEWER
SD	STORM DRAIN
SHP	STEEL HIGH PRESSURE
SHT	SHEET
SNWA	SOUTHERN NEVADA WATER AUTHORITY
SP MH	SPECIAL MANHOLE
STA	STATION
STD	STANDARD
STL	STEEL
SW	SIDEWALK
T	TANGENT DISTANCE
TC	TOP OF CURB
TF	TOP OF FOOTING
TOC	TOP OF CHANNEL
TMH	TOP OF MANHOLE
TRANS	TRANSITION
TRC	TOP OF ROLL CURB
TSC	TRAFFIC SIGNAL CONDUIT
TSW	TOP OF SIDEWALK
TW	TOP OF WALL
TR	TOP OF RETAINING WALL
VC	VERTICAL CURVE
VCP	VITRIFIED CLAY PIPE
VERT	VERTICAL
VG	VALLEY GUTTER
W	WATER

SOILS REPORT

AMERICAN SOILS ENGINEERING,LLC
6000 S. EASTERN AVENUE, SUITE 6B
LAS VEGAS, NEVADA 89119
PHONE:(702) 889-9617

PROJECT NO. 1635-GEO
MAY 24, 2013

LAS VEGAS VALLEY WATER DISTRICT (LVVWD) STANDARD NOTES

L.V.V.W.D. PROJECT #__________

1. NO WORK SHALL BEGIN UNTIL THE WATER PLANS HAVE BEEN APPROVED FOR CONSTRUCTION BY THE LVVWD. FOLLOWING WATER PLAN APPROVAL, NOTICE SHALL BE GIVEN TO THE LVVWD COMMUNICATION SUPPORT CENTER (258-7171) TWO (2) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION. FOR FUTURE INSPECTIONS, NOTICE MUST BE GIVEN BY 2:00 P.M. THE BUSINESS DAY PRIOR TO THE REQUESTED LVVWD INSPECTION. WHEN REQUESTING INSPECTIONS, PLEASE REFER TO THE PROJECT # IDENTIFIED ABOVE.
2. ALL WORK SHALL CONFORM TO LVVWD STANDARD PLATES, DRAWINGS, AND SPECIFICATIONS, AND TO THE 2010 EDITION OF THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS (UDACS). THE LATEST EDITION OF UDACS SHALL SUPERCEDE ANY CONFLICTS CONTAINED IN THE APPROVED DRAWINGS AND/OR SPECIFICATIONS.
3. ALL WORK, EXCEPT AS MODIFIED BY THESE PLANS OR BY NOTE 2, SHALL BE DONE IN ACCORDANCE WITH THE MOST CURRENT DRAFT OR EDITION OF THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENT, CLARK COUNTY AREA.
4. A SINGLE PIPE MATERIAL SHALL BE USED THROUGHOUT THE PROJECT UNLESS OTHERWISE APPROVED BY THE LVVWD.
5. ALL SERVICE LATERALS TWO (2) INCHES DIAMETER AND SMALLER SHALL BE TYPE K COPPER TUBING WITH LVVWD APPROVED SERVICE SADDLES.
6. ALL WATER METER BOXES SHALL BE LOCATED OUTSIDE OF DRIVEWAY AREAS.
7. ALL VALVES SHALL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY AND CURB GUTTERS.
8. ALL WATER AND STORM DRAIN OR SANITARY SEWER CROSSINGS SHALL CONFORM TO SECTION 2.22 OF THE 2010 EDITION OF THE UDACS.
9. ALL WATER FACILITIES SHALL BE FILLED, DISINFECTED, PRESSURE TESTED, FLUSHED, FILLED AND AN ACCEPTABLE WATER SAMPLE OBTAINED, PRIOR TO CONNECTION TO THE LVVWD'S DISTRIBUTION SYSTEM
10. THE CONTRACTOR MUST OBTAIN ALL METERS TWO INCHES (2") AND SMALLER FROM THE LVVWD CENTRAL STORES. TELEPHONE 258-3152 OR 258-3802, TWO (2) WORKING DAYS PRIOR TO METER PICKUP.
11. ANY INTERUPTION OF SERVICE MUST BE PERFORMED IN ACCORDANCE WITH UDACS SECTION 3.14.01, AND APPROVED BY THE LVVWD INSPECTION DIVISION PRIOR TO SHUTDOWN. PROPER WRITTEN NOTIFICATION MUST BE GIVEN TO ALL AFFECTED CUSTOMERS.
12. ALL WATER FACILITY CONSTRUCTION MATERIALS USED MUST BE AS LISTED ON THE LVVWD'S PRE-APPROVED MATERIALS AND MANUFACTURER'S LISTING FOR NEW FACILITIES, LATEST REVISION, OR SPECIFICALLY APPROVED ON THESE PLANS.
13. TELEPHONE "CALL BEFORE YOU DIG" AT "811" OR 1-800-227-2600.
14. THE INSTALLATION OF LAS VEGAS VALLEY DISTRICT (LVVWD) MUNICIPAL WATER FACILITIES WITHIN ALL STREETS IS ASSUMED TO BE IN COMPLIANCE WITH THE UNIFORM STANDARDS, INCLUDING THE PLACEMENT OF ASPHALT PAVING STREET SURFACES. ANY REPAIR WORK DONE BY THE LVVWD TO THE MUNICIPAL WATER FACILITIES WILL INCLUDE THE PLACEMENT OF AN APPROPRIATELY SIZED ASPALT REPAIR PATCH ON THE STREET SURFACE.

ANY DECORATIVE PAVING SURFACE WITHIN THE STREET IS THE RESPONSIBILTY OF THE OWNER'S ASSOCIATION, OR THE INDIVIDUAL PROPERTY OWNERS IF NO OWNER ASSOCIATION IS IN EXISTENCE, OR THE AGENCY HAVING JURISDICTION. DECORATIVE SURFACE MATERIAL PLACED WITHIN THE TEN FOOT EASEMENT ABUTTING A PUBLIC OR PRIVATE STREET, IF DISTURBED BY THE LVVWD DURING THE REPAIR OR OPERATION OF ITS FACILITIES, WILL BE REPLACED BY THE LVVWD WITH AN APPROPRIATELY SIZED PLAIN FINISHED CONCRETE PATCH. THE LVVWD WILL NOT RESTORE, AND WILL NOT BE RESPONSIBLE FOR THE RESTORATION OF, ANY DECORATIVE PAVING SURFACE WITHIN THE STREET. THE LVVWD WILL NOT ATTEMPT TO MATCH COLOR OR FINISH OF ANY ADJACENT MATERIALS.

REVISED 06/14/12

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER

PROJECT # __________ DATE: __________

CHARLES KAJKOWSKI, P.E. #4784 DATE
CLV City Engineer

APPROVAL OF THESE PLANS IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHTS-OF-WAY AND/OR DEDICATED EASEMENTS. THE APPROVAL DOES NOT AUTHORIZE THE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDSAND/OR SPECIFICATIONS EXCEPT THOSE SPECIFICALLY LISTED UNDER "DEVIATIONS FROM STANDARDS". THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN "DEVIATIONS FROM STANDARDS" IN FAVOR OF THE UNIFORM STANDARDS DRAWINGS AND SPECIFICATIONS CLARK COUNTY AREA NEVADA.

CLARK COUNTY FIRE DEPARTMENT APPROVAL

BY __________ DATE __________

APPROVAL OF THESE PLANS 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.
FIRE FLOW 1,500 GPM AT 20 PSI RESIDUAL

REV. | DATE | BY | REVISION

DRAWN BY: DLG
DESIGNED BY: DLG
CHECKED BY:
SCALE: N/A N/A
COMMENTS ADDRESSED BY:
PROJECT NO. 126.13002

THOMASON CONSULTING ENGINEERS
3277 E. WARM SPRINGS ROAD, SUITE 400
LAS VEGAS, NEVADA 89120
702-932-6125 FAX: 702-932-6129

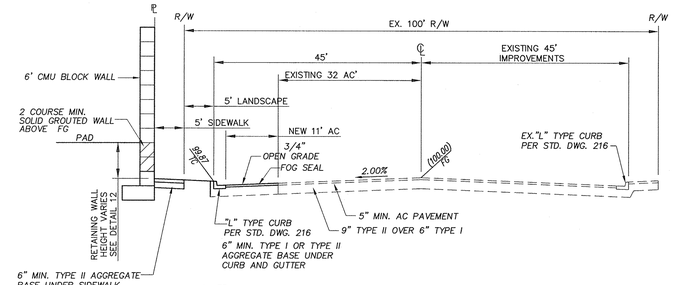
D.R. HORTON
330 CAROUSEL PARKWAY , HENDERSON NV 89014
PH: (702) 672-1939 FAX:(702) 208-9460

GILMORE CREEK
GENERAL NOTES

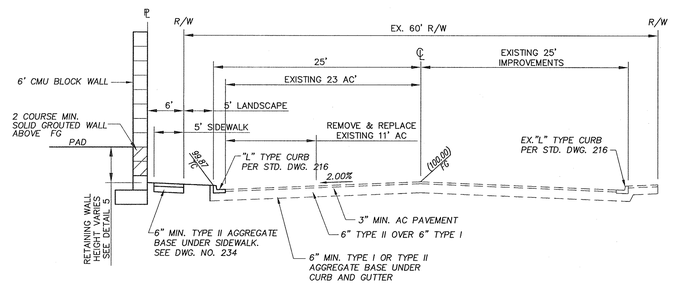
REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA
GARY S. KAZIO
CIVIL
No. 11907
GARY S.KAZIO, P.E.
R.P.E. NO. 14970
EXP. 6-30-15
10-30-13

SHEET C3
3 OF
DRAWING NO.
HTE#

T:\Projects\126\13-002 Ft Ap - Gilmore\12613002-COVER.dwg 10/29/2013 5:26:16 PM PDT



1 / D1 **100' PUBLIC STREET SECTION - FORT APACHE ROAD**
NOT TO SCALE
PER : CCAUSD 205



2 / D1 **60' PUBLIC STREET SECTION - GILMORE AVENUE**
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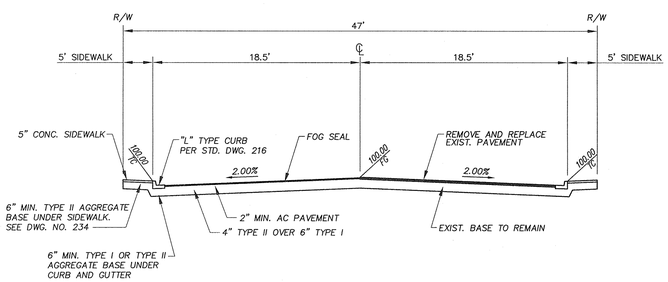
PER : CCAUSD 205



3 / D1 **47' PUBLIC STREET SECTION**
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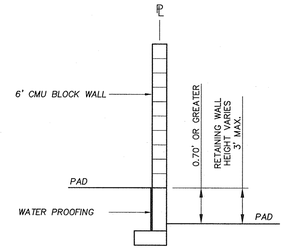

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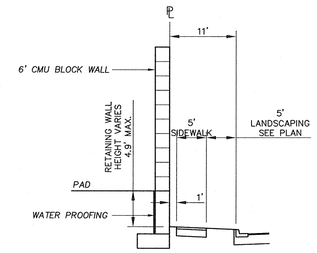
NOT TO SCALE



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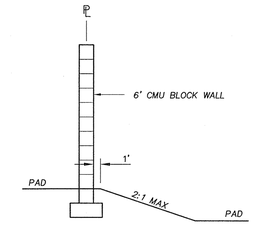

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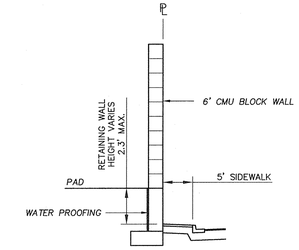

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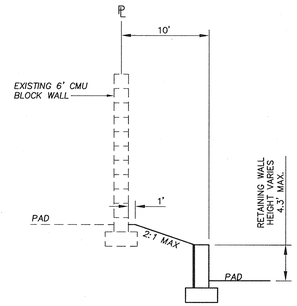

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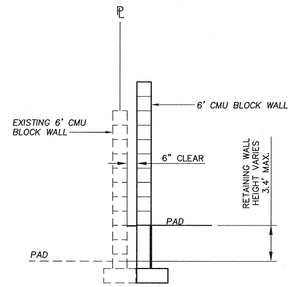

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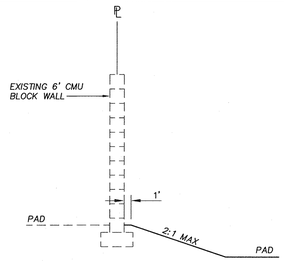

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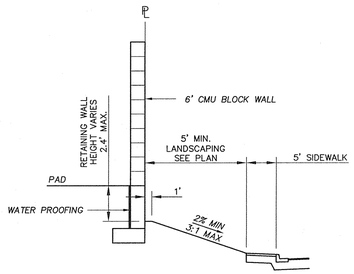
NOT TO SCALE



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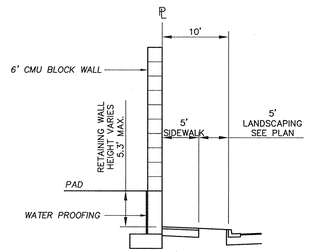

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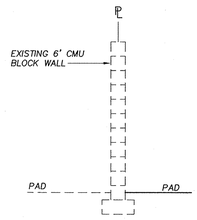

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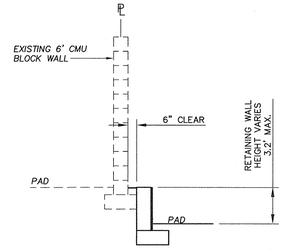

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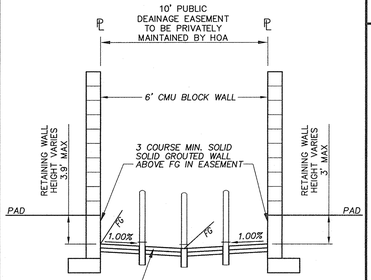

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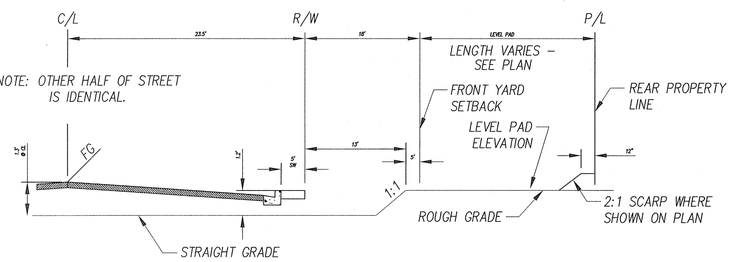
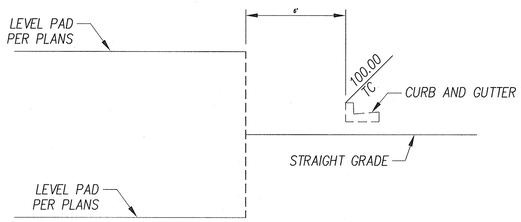


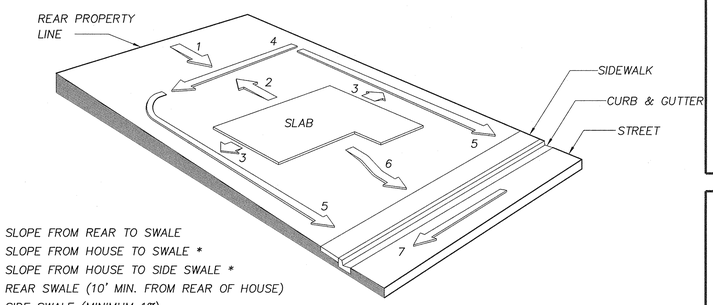
ROUGH GRADE SECTION ALL STREETS

NO SCALE



TYPICAL CORNER LOT ROUGH GRADE

NO SCALE



1. SLOPE FROM REAR TO SWALE
2. SLOPE FROM HOUSE TO SWALE *
3. SLOPE FROM HOUSE TO SIDE SWALE *
4. REAR SWALE (10' MIN. FROM REAR OF HOUSE)
5. SIDE SWALE (MINIMUM 1%)
6. SLOPE FROM HOUSE TO SIDEWALK *
7. SLOPE OF STREET

* 5% MINIMUM SLOPE FOR 5' AWAY FROM FOUNDATIONS

TYPICAL GRADING - FHA TYPE 'A' DRAINAGE
NOT TO SCALE

REV	DATE	BY	REVISION

DRAWN BY: DLG
DESIGNED BY: DLG
CHECKED BY:
COMMENTS ADDRESSED BY:
SCALE: N/A N/A
PROJECT NO. 126.13002

T:\Projects\126\13-002 Ft Ap - Gilmore\126130O2-GRADING.dwg 10/29/2013 5:28:46 PM PDT

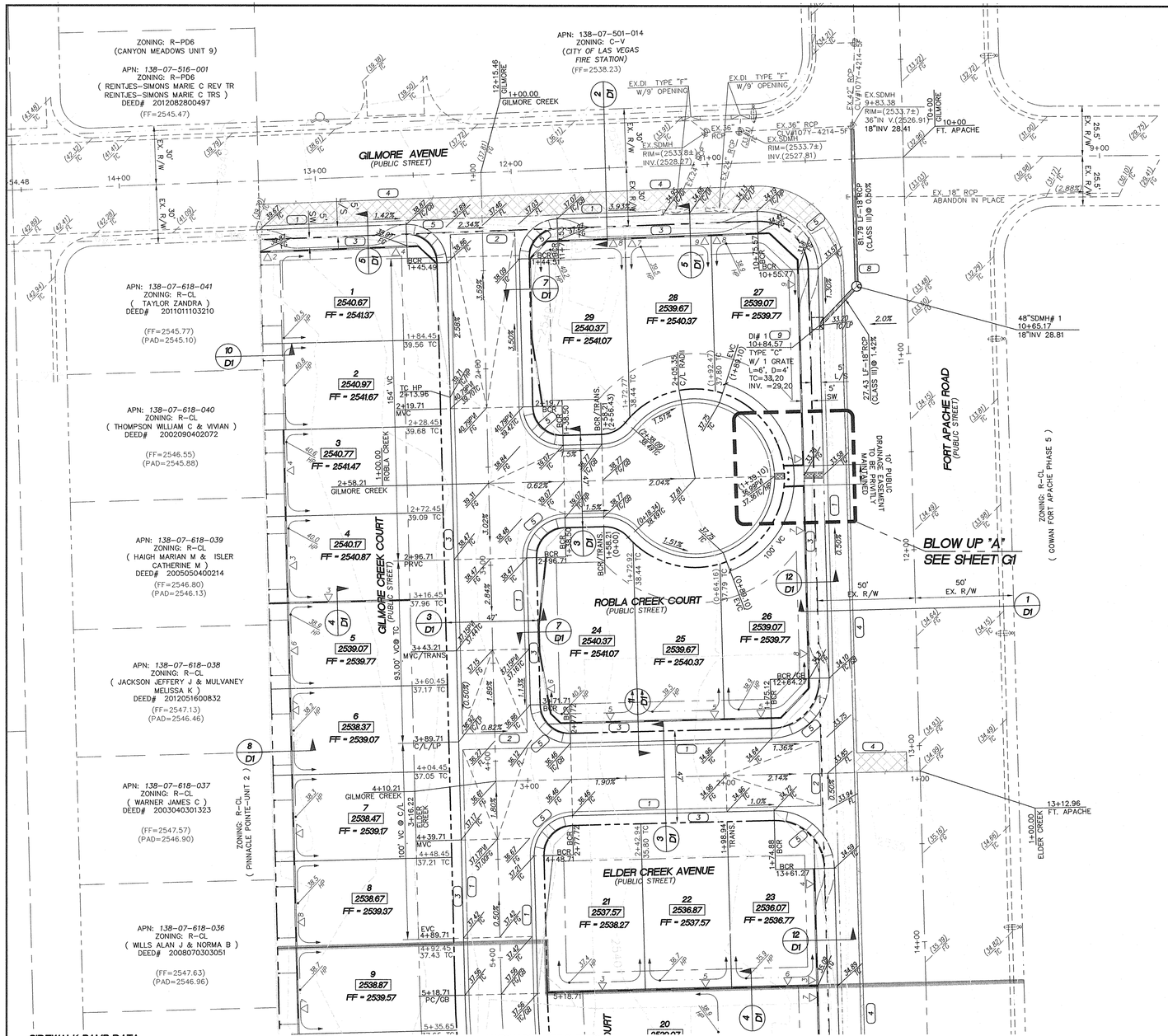
THOMASON CONSULTING ENGINEERS
3277 E. WARM SPRINGS ROAD, SUITE 400
LAS VEGAS, NEVADA 89120
702-932-6125 FAX: 702-932-6129

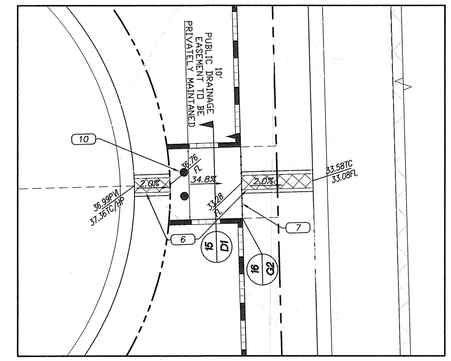
D.R. HORTON
330 CAROUSEL PARKWAY, HENDERSON NV 89014
PH: (702) 672-1939 FAX:(702) 208-9460

GILMORE CREEK
DETAIL SHEET 1

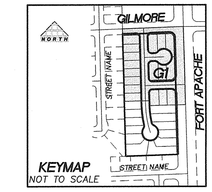
REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA GARY S. KAZIO CIVIL No. 11907
GARY S.KAZIO, P.E.
R.P.E. NO. 14970
EXP. 6-30-15
10-30-13

SHEET D1 OF
DRAWING NO. HTE#





BLOW UP DETAIL "A"
1"=10'



KEYMAP
NOT TO SCALE

LEGEND

(FOR ALL ABBREVIATIONS SEE SHEET C3)

- PROPERTY LINE / RIGHT-OF-WAY
- "L" TYPE CURB AND GUTTER
- "A" TYPE CURB
- EXISTING CURB AND GUTTER
- PROPOSED WATER LINE (SIZE AS SHOWN)
- PROPOSED SEWER LINE (SIZE AS SHOWN)
- EXISTING UTILITY (AS SHOWN)
- CROSS GUTTER
- WHEELCHAIR RAMP
- CUT OR FILL SLOPE
- PROPOSED PAVEMENT AREA
- XX.XX / TC — PROPOSED ELEVATION (DESCRIPTION AS SHOWN)
- (XX.XX) / TC — EXISTING ELEVATION (DESCRIPTION AS SHOWN)
- [XX.XX] / TC — FUTURE DESIGN ELEVATION (DESCRIPTION AS SHOWN)
- TF — TOP OF FOOTING
- TW — TOP OF WALL
- TRW — TOP OF RETAINING WALL
- TCW — TOP OF CHANNEL WALL
- NG — NATURAL GROUND
- C.A. — COMMON AREA/LOT
- 10 — LOT NUMBER
- 95.5 — PAD ELEVATION
- FF = 96.3 — FINISHED FLOOR ELEVATION
- EXISTING PAVEMENT TO BE REMOVED AND REPLACED
- CUT / FILL LINES
- SIGHT VISIBILITY RESTRICTION ZONES PER STD. DWG. 201.1 (NOTHING OVER 24" IN HEIGHT ALLOWED IN SVZ EXEPT TRAFFIC CONTROL DEVICES)
- 6' SCREEN WALL
- STEM WALL
- RETAINING WALL
- FENCE
- MATCH LINE

BONDABLE DRAINAGE QUANTITIES

DESCRIPTION	QUANTITY PUBLIC	QUANTITY PRIVATE
"L" TYPE CURB AND GUTTER PER CCASD 216	2,552 LF	---
8' VALLEY GUTTER	1,952 SF	---
18" RCP STORM PIPE (CLASS III)	110 LF	---
TYPE "C" DROP INLET	1 EA	---
48" STORM MANHOLE	1 EA	---
SIDEWALK UNDERDRAIN	2 EA	---
CONCRETE EASEMENT	100 S.F.	---

CONSTRUCTION NOTES

1. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD 216
2. CONSTRUCT 8' CROSS GUTTER PER CCAUSD 228
3. CONSTRUCT 5' SIDEWALK PER CCAUSD 234
4. SAWCUT, REMOVE AND MATCH EDGE OF EXISTING A.C. PAVEMENT OR EXISTING IMPROVEMENT.
5. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD NO. 235, CASE 1
6. CONSTRUCT SIDEWALK UNDERDRAIN PER CCAUSD 236 TO BE PRIVATELY MAINTAINED.
7. CONSTRUCT WROUGHT IRON FENCE AT EASEMENT WALL. SEPERATE PERMIT BY OTHERS.
8. CONSTRUCT 18" RCP (CLASS III) STORM PIPE
9. CONSTRUCT 6' TYPE "C" DROP INLET PER CCASD 412.1, 402 & 421, DEPTH AND INVERTS VARIES SEE PLANS.
10. CONSTRUCT REMOVABLE BOLLARDS @ 5' SPACING PER DETAIL SHEET G2

SIDEWALK RAMP DATA

PER STD. DWG. 235

	A	B	table 1
A	8'	8'	1

EARTHWORK QUANTITIES
NOTE: RAW VOLUMES ONLY AND ARE FOR PERMITTING PURPOSED ONLY.

CUT: 19,913 CY
FILL: 1,241 CY
TOTAL: 18,673 CY (EXPORT)

FLOOD ZONE

THIS SITE IS LOCATED WITHIN FLOOD ZONE X, WHICH IS SPECIFIED AS "AREAS TO BE DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE OF FLOODPLAIN" FIRM MAP NUMBER 32003C2135 F LOMR DATED NOVEMBER 16, 2011.

Avoid cutting underground utility lines. It's costly. Call before you Dig 1-800-227-2600 UNDERGROUND SERVICE (USA)

Avoid overhead power line contact. Call before you Overhead 1-702-593-6111 NEVADA POWER ENVIRONMENT SAFETY SERVICES DEPARTMENT

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL SYSTEMS AND STREET LIGHT SYSTEMS CONDUITS IT'S COSTLY CALL BEFORE YOU DIG UNDERGROUND Call before you UnderGround 1-702-455-7511 1-702-229-6611 LAS VEGAS VALLEY WATER DISTRICT

SOILS REPORT

AMERICAN SOILS ENGINEERING,LLC
6000 S. EASTERN AVENUE, SUITE 6B
LAS VEGAS, NEVADA 89119
PHONE:(702) 889-9617

PROJECT NO. 1635-GEO
MAY 24, 2013

BENCHMARK

CITY OF LAS VEGAS BENCH MARK NO. 6LV008N1WW6 BEING A RIVET AND PLATE IN TOP OF CURB, SOUTHEAST CORNER OF FORT APACHE AND GILMORE .

ELEVATION: 2532.23 FEET OR 771.826 METERS, NAVD 88

BASIS OF BEARING

NORTH 87°51'05" EAST, BEING THE CENTERLINE OF GILMORE AVENUE AND BEING THE NORTH LINE OF THE SOUTH HALF (S 1/2) OF THE NORTHEAST QUARTER (NE 1/4) OF SECTION 7, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA, AS SHOWN IN BOOK 77, PAGE 90 OF PLATS IN THE RECORDER'S OFFICE OF CLARK COUNTY, NEVADA.

FOR ALL GRADING AND STREET SECTIONS SEE DETAIL SHEET D1 AND G2 . FOR ALL NOTES SEE GENERAL NOTES SHEET C3.

DISCLAIMER NOTE

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

NOTIFY ENGINEER IMMEDIATELY IF DESCREPENCIES ARE ENCOUNTERED.

STORMWATER MANAGEMENT NOTES

1. THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF THE CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM DRAIN SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN THE TITLE 24.40 AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICAL AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS APPLY; REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPs WEEKLY, AND WITHIN 24 HOURS AFTER ANY RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE AND MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS AMY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMPs SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

RETAINING WALL HEIGHT

	PAD DIFFERENCE	RET. WALL HEIGHT (# COURSES)
△1	.4-.7	8" (1 crs)
△2	.71-.83	1'4" (2 crs)
△3	.84-1.5	2' (3 crs)
△4	1.51-2.17	2'8" (4 crs)
△5	2.18-2.83	3'4" (5 crs)
△6	2.84-3.5	4' (6 crs)
△7	3.51-4.17	4'8" (7 crs)
△8	4.18-4.83	5'4" (8 crs)
△9	4.84-5.5	6' (9 crs)
△10	5.51-6.17	6'8" (10 crs)
△11	6.18-6.83	7'4" (11 crs)
△12	6.84-7.5	8' (12 crs)
△13	7.51-8.17	8'8" (13 crs)
△14	8.18-8.83	9'4" (14 crs)
△15	8.84-9.5	10' (15 crs)
△16	9.51-10.17	10'8" (16 crs)

ALL OF THE RETAINING WALL HEIGHTS ARE DETERMINED WITH THE TOP OF THE FOOTING BEING APPROXIMATELY 4" BELOW THE LOW SIDE GRADE. WITH THE EXCEPTION OF RETAINING WALLS WHICH ARE NEXT TO A SIDEWALK, ALL OF THESE ARE FIGURED TO HAVE THE TOP OF FOOTING BEING 8" BELOW THE TOP OF THE SIDEWALK

CHARLES KAJKOWSKI, P.E. #4784 DATE
CLV City Engineer

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CLARK COUNTY
DEPARTMENT OF PUBLIC WORKS

ACCEPTANCE OF PLANS FOR FILING:

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NOTE: POWER POLES AND/OR OTHER EXISTING FACILITIES NOT IN PROPER LOCATION, BASED ON PROPOSED IMPROVEMENTS SHOWN HEREON, WILL BE RELOCATED AT NO EXPENSE TO CLARK COUNTY.

CERTIFICATION

I HEREBY CERTIFY THAT THE GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE WITH CLARK COUNTY PUBLIC WORKS FOR THIS PROJECT. – DS HTE#_____

GARY S. KAZIO, P.E. # 14970 DATE

REV.	DATE	BY	REVISION

T:\Projects\126\13-002 Ft Ap - Gilmore\126130G2-GRADING.dwg 10/29/2013 5:28:48 PM PDT

DRAWN BY: DLG
DESIGNED BY: DLG
CHECKED BY:
COMMENTS ADDRESSED BY:
SCALE: N/A N/A
PROJECT NO. 126.13002

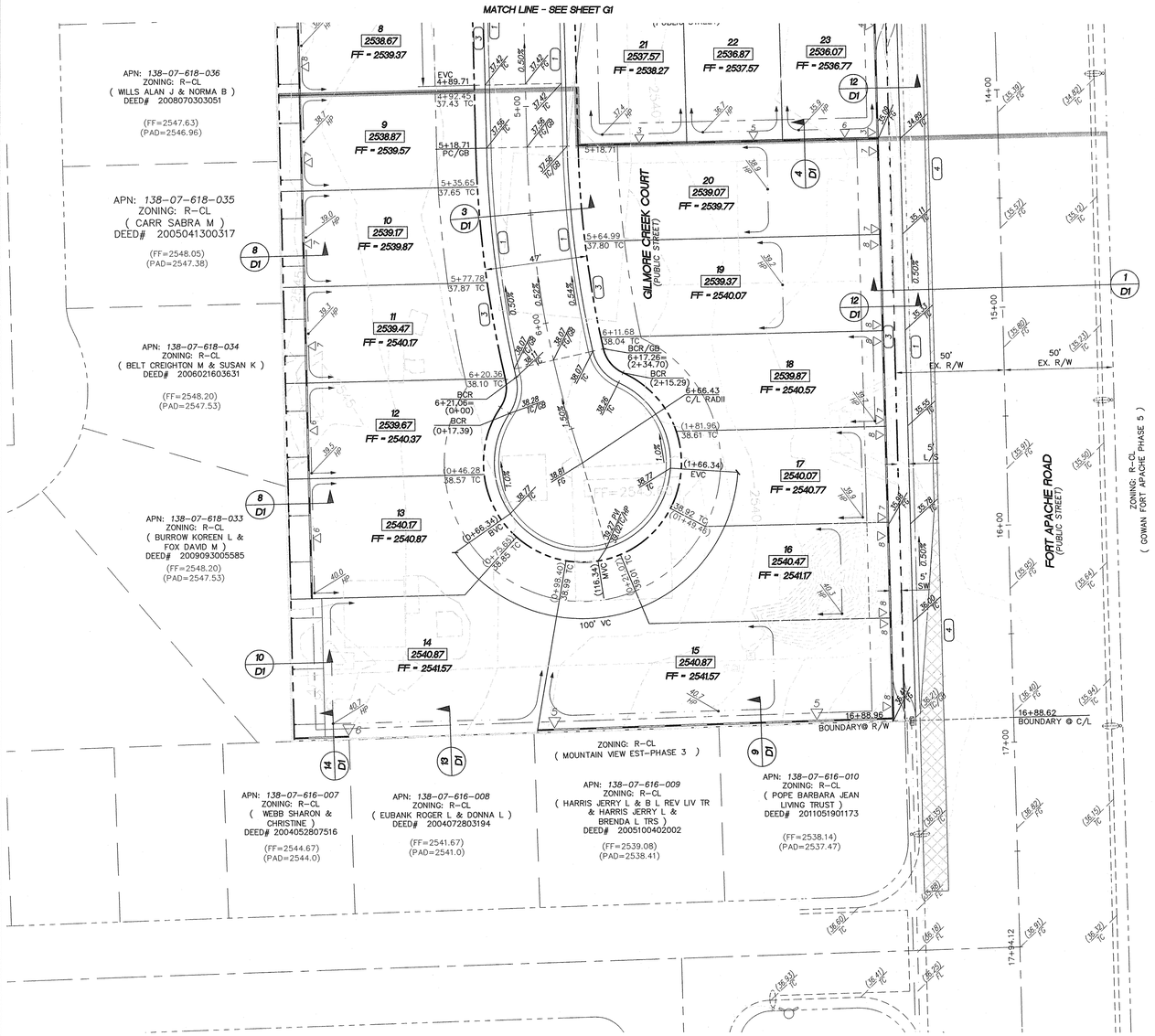
THOMASON CONSULTING ENGINEERS
3277 E. WARM SPRINGS ROAD, SUITE 400
LAS VEGAS, NEVADA 89120
702-932-6125 FAX: 702-932-6129

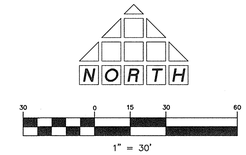
D.R. HORTON
330 CAROUSEL PARKWAY, HENDERSON NV 89014
PH: (702) 672-1939 FAX:(702) 208-9460

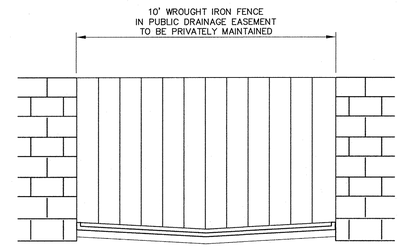
GILMORE CREEK GRADING PLAN 1

PROFESSIONAL ENGINEER STATE OF NEVADA GARY S. KAZIO CIVIL No. 11907
GARY S.KAZIO, P.E.
R.P.E. NO. 14970
EXP. 6-30-15
10-30-13

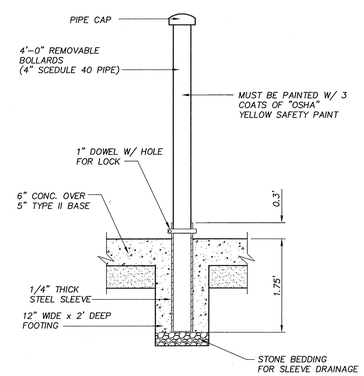
SHEET G1 OF 4
DRAWING NO. HTE#



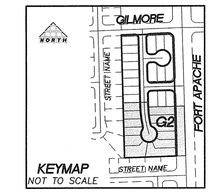




16 G2 **GATE WALL SECTION**
NOT TO SCALE



REMOVABLE BOLLARD DETAIL
NOT TO SCALE



LEGEND

(FOR ALL ABBREVIATIONS SEE SHEET C3)

- PROPERTY LINE / RIGHT-OF-WAY
- "L" TYPE CURB AND GUTTER
- "A" TYPE CURB
- EXISTING CURB AND GUTTER
- PROPOSED WATER LINE (SIZE AS SHOWN)
- PROPOSED SEWER LINE (SIZE AS SHOWN)
- EXISTING UTILITY (AS SHOWN)
- CROSS GUTTER
- WHEELCHAIR RAMP
- CUT OR FILL SLOPE
- PROPOSED PAVEMENT AREA
- XX.XX / TC — PROPOSED ELEVATION (DESCRIPTION AS SHOWN)
- (XX.XX) / TC — EXISTING ELEVATION (DESCRIPTION AS SHOWN)
- [XX.XX] / TC — FUTURE DESIGN ELEVATION (DESCRIPTION AS SHOWN)
- TF — TOP OF FOOTING
- TW — TOP OF WALL
- TRW — TOP OF RETAINING WALL
- TCW — TOP OF CHANNEL WALL
- NG — NATURAL GROUND
- C.A. — COMMON AREA/LOT
- 10 — LOT NUMBER
- 95.5 — PAD ELEVATION
- FF = 96.3 — FINISHED FLOOR ELEVATION
- EXISTING PAVEMENT TO BE REMOVED AND REPLACED
- CUT / FILL LINES
- SIGHT VISIBILITY RESTRICTION ZONES PER STD. DWG. 201.1 (NOTHING OVER 24" IN HEIGHT ALLOWED IN SVZ EXEPT TRAFFIC CONTROL DEVICES)
- 6' SCREEN WALL
- STEM WALL
- RETAINING WALL
- FENCE
- MATCH LINE

CONSTRUCTION NOTES

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5. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD NO. 235, CASE 1
6. CONSTRUCT SIDEWALK UNDERDRAIN PER CCAUSD 236 TO BE PRIVATELY MAINTAINED.
7. CONSTRUCT WROUGHT IRON FENCE AT EASEMENT WALL. SEPERATE PERMIT BY OTHERS.
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9. CONSTRUCT 6' TYPE "C" DROP INLET PER CCASD 412.1, 402 & 421, DEPTH AND INVERTS VARIES SEE PLANS.
10. CONSTRUCT REMOVABLE BOLLARDS @ 5' SPACING PER DETAIL SHEET G2

RETAINING WALL HEIGHT

	PAD DIFFERENCE	RET. WALL HEIGHT (# COURSES)
△1	.4–.7	8" (1 crs)
△2	.71–.83	1'4" (2 crs)
△3	.84–1.5	2' (3 crs)
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NOTIFY ENGINEER IMMEDIATELY IF DESCREPENCIES ARE ENCOUNTERED.

BENCHMARK

CITY OF LAS VEGAS BENCH MARK NO. 6LV008NWW6 BEING A RIVET AND PLATE IN TOP OF CURB, SOUTHEAST CORNER OF FORT APACHE AND GILMORE .

ELEVATION: 2532.23 FEET OR 771.826 METERS, NAVD 88

BASIS OF BEARING

NORTH 87°51'05" EAST, BEING THE CENTERLINE OF GILMORE AVENUE AND BEING THE NORTH LINE OF THE SOUTH HALF (S 1/2) OF THE NORTHEAST QUARTER (NE 1/4) OF SECTION 7, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA, AS SHOWN IN BOOK 77, PAGE 90 OF PLATS IN THE RECORDER'S OFFICE OF CLARK COUNTY, NEVADA.

FLOOD ZONE

THIS SITE IS LOCATED WITHIN FLOOD ZONE X, WHICH IS SPECIFIED AS "AREAS TO BE DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE OF FLOODPLAIN" FIRM MAP NUMBER 32003C2135 F LOMR DATED NOVEMBER 16, 2011.

Avoid cutting underground utility lines. It's costly. Call before you Dig 1-800-227-2600 UNDERGROUND SERVICE (USA)

Avoid overhead power line contact. Call before you Overhead 1-702-593-6111 NEVADA POWER ENVIRONMENT SAFETY SERVICES DEPARTMENT

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL SYSTEMS, STREET LIGHT, SYSTEMS CONDUITS & CABLES. CALL BEFORE YOU DIG UNDERGROUND Call before you Underground 1-702-435-7511 1-702-229-6611 or visit our website www.nvbell.com

CHARLES KAJKOWSKI, P.E. #4784 — DATE
CLV City Engineer

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CLARK COUNTY
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GARY S. KAZIO, P.E. # 14970 — DATE

REV.	DATE	BY	REVISION

DRAWN BY: DLG
DESIGNED BY: DLG
CHECKED BY:
COMMENTS ADDRESSED BY:
SCALE: N/A / N/A
PROJECT NO. 126.13002

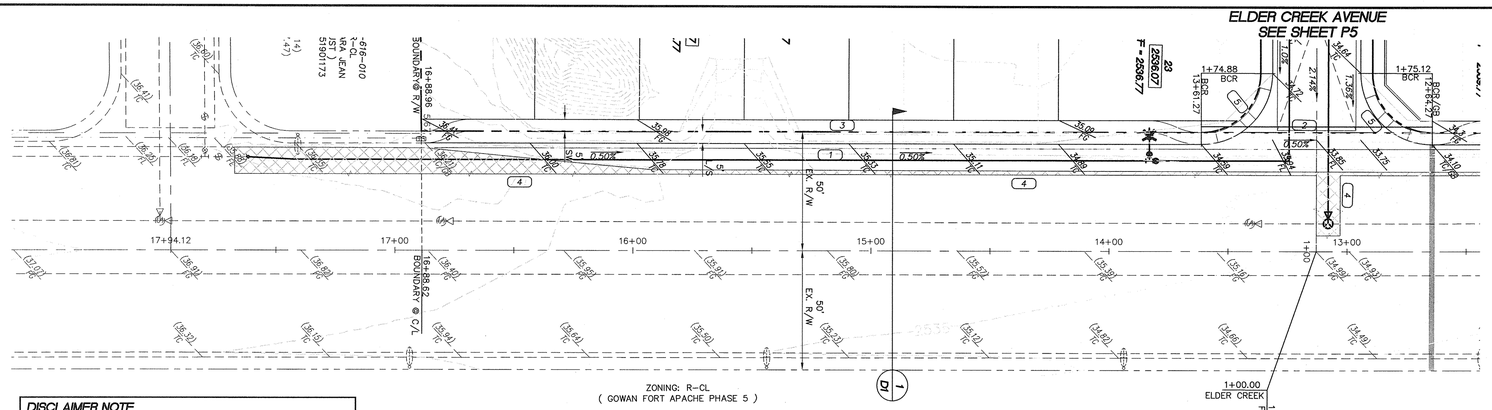
THOMASON CONSULTING ENGINEERS
3277 E. WARM SPRINGS ROAD, SUITE 400
LAS VEGAS, NEVADA 89120
702-932-6125 FAX: 702-932-6129

D.R. HORTON
330 CAROUSEL PARKWAY , HENDERSON NV 89014
PH: (702) 672-1939 FAX:(702) 208-9460

GILMORE CREEK GRADING PLAN 2

GARY S.KAZIO, P.E.
R.P.E. NO. 14970
EXP. 6-30-15
10-30-13

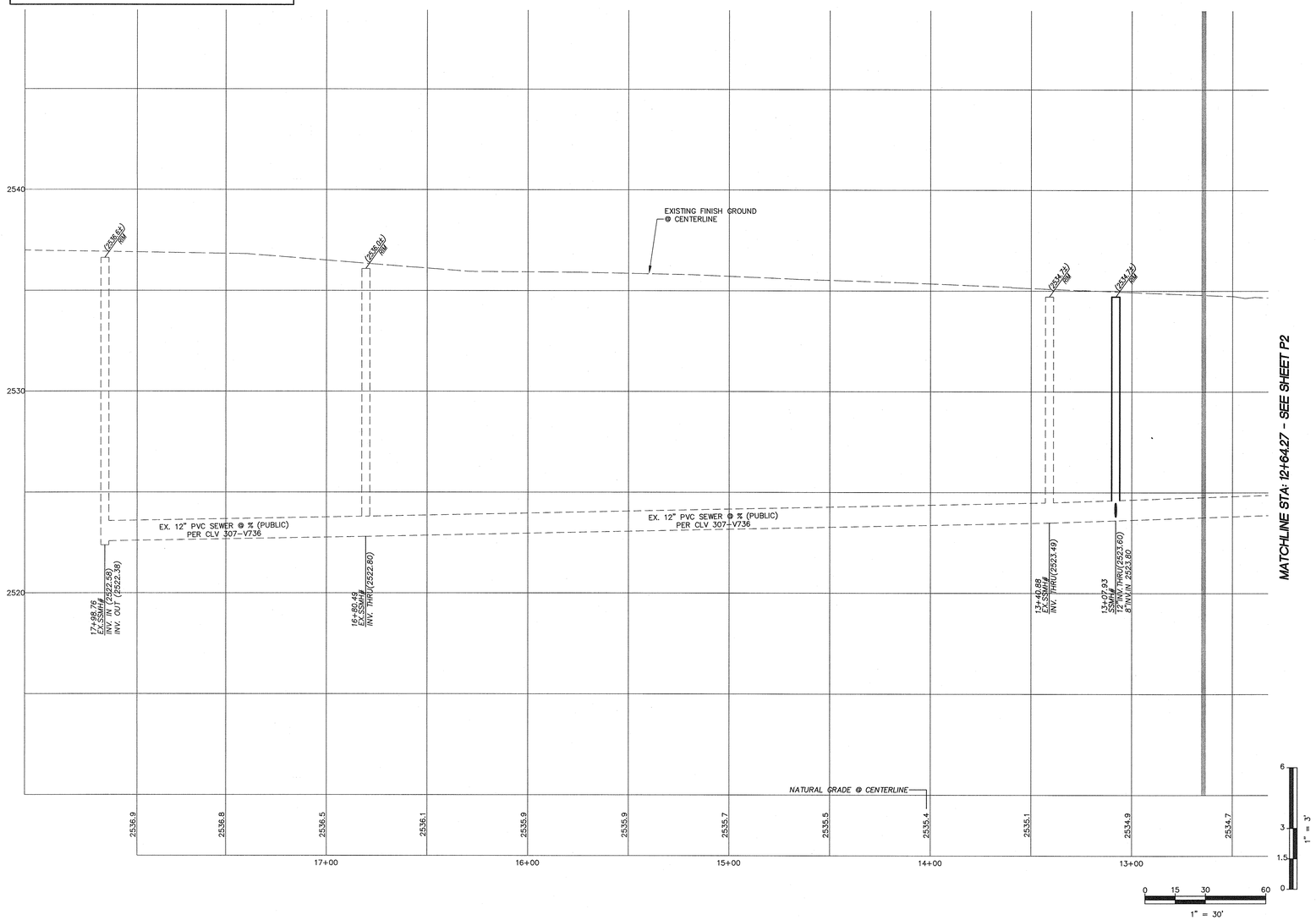
SHEET G2 5 OF
DRAWING NO. HTE#



ZONING: R-CL
(GOWAN FORT APACHE PHASE 5)

FORT APCHE ROAD

(PUBLIC STREET)



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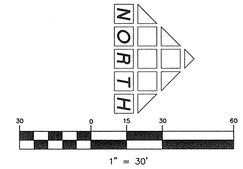

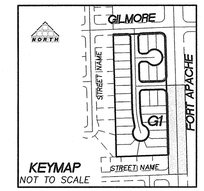

KEYMAP
NOT TO SCALE

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STREET LIGHT SYSTEMS CONDUITS & P.S. CONDUIT
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Call 811 before you UnderGround
1-702-455-7511
1-702-229-6611
24 HOURS AND WEEKENDS NOTICE REQUIRED

BENCHMARK

CITY OF LAS VEGAS BENCH MARK NO. 6LV00BNWW6 BEING A RIVET AND PLATE IN TOP OF CURB, SOUTHEAST CORNER OF FORT APACHE AND GILMORE .

ELEVATION: 2532.23 FEET OR 771.826 METERS, NAVD 88

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CONSTRUCTION NOTES

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CLARK COUNTY
DEPARTMENT OF PUBLIC WORKS

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LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER

PROJECT NO. _____ DATE: _____

LVVWD APPROVED FIRE FLOW 1,500 GPM AT 20 PSI RESIDUAL

CERTIFICATION

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GARY S. KAZIO, P.E. # 14970 DATE

REV.	DATE	BY	REVISION

DRAWN BY: DLG
DESIGNED BY: DLG
CHECKED BY:
COMMENTS ADDRESSED BY:
SCALE: N/A
N/A
PROJECT NO. 126.13002

T:\Projects\126\13-002 Ft Ap - Gilmore\126130 02-PRELIM GRADING.dwg 5/28/2013 4:38:46 PM PDT

THOMASON CONSULTING ENGINEERS
3277 E. WARM SPRINGS ROAD, SUITE 400
LAS VEGAS, NEVADA 89120
702-932-6125 FAX: 702-932-6129

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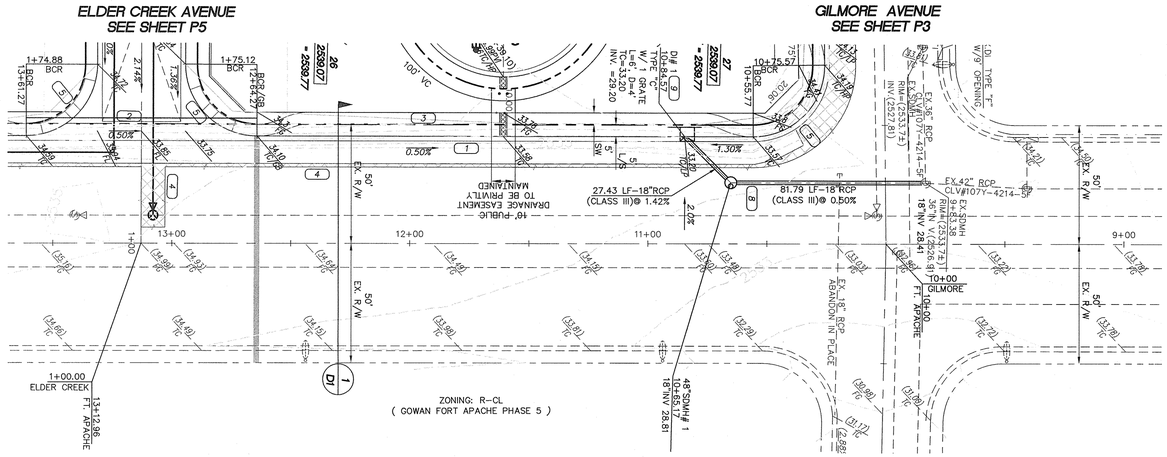
PH: (702) 872-1939 FAX:(702) 208-9460

GILMORE CREEK
PLAN AND PROFILE
FORT APCHE ROAD

REGISTERED PROFESSIONAL ENGINEER GARY S. KAZIO CIVIL No. 11907 STATE OF NEVADA

GARY S.KAZIO, P.E.
R.P.E. NO. 14970
EXP. 6-30-15
10-30-13

SHEET P1 OF
DRAWING NO. HTE#



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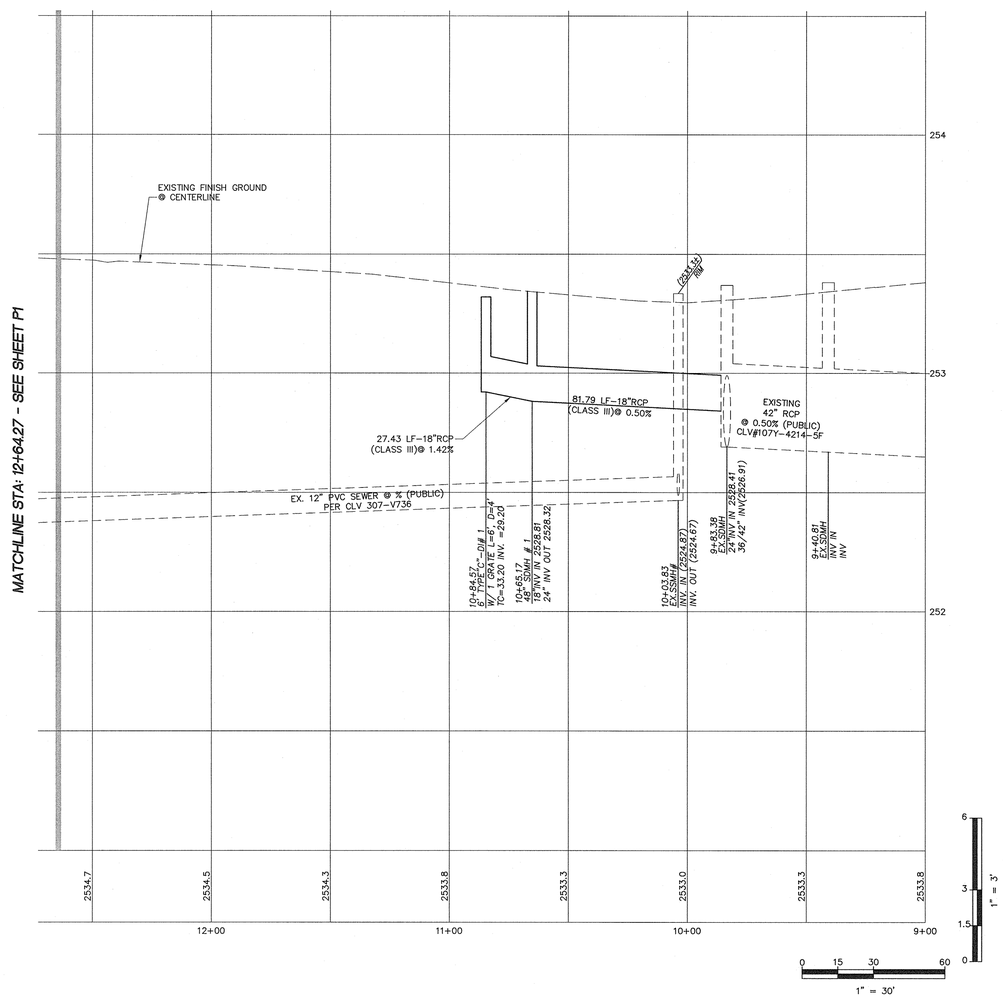

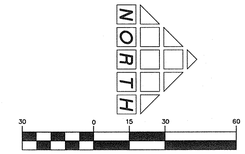

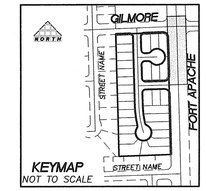

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LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER

PROJECT NO. _____ DATE: _____

LVVWD APPROVED FIRE FLOW 1,500 GPM AT 20 PSI RESIDUAL

CERTIFICATION

I HEREBY CERTIFY THAT THE GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE WITH CLARK COUNTY PUBLIC WORKS FOR THIS PROJECT. – DS HTE#_____

GARY S. KAZIO, P.E. # 14970 DATE

REV.	DATE	BY	REVISION

DRAWN BY: D.G.
DESIGNED BY: D.G.
CHECKED BY:
COMMENTS ADDRESSED BY:

SCALE: N/A N/A

PROJECT NO. 126.13002

I:\Projects\126\13-002 Ft Ap - Gilmore\126130022- PRELIM GRADING.dwg 5/28/2013 4:38:46 PM PDT

THOMASON CONSULTING ENGINEERS
3277 E. WARM SPRINGS ROAD, SUITE 400
LAS VEGAS, NEVADA 89120
702-932-6125 FAX: 702-932-6129

D.R. HORTON
330 CAROUSEL PARKWAY , HENDERSON NV 89014
Ph: (702) 672-1939 FAX:(702) 208-9460

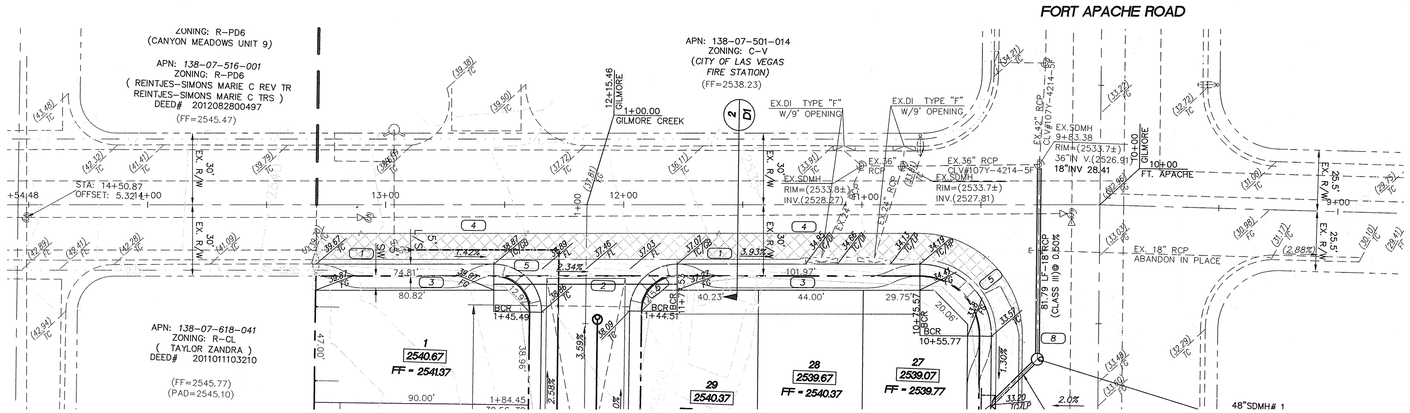
GILMORE CREEK
PLAN AND PROFILE
FORT APCHE ROAD

REGISTERED PROFESSIONAL ENGINEER GARY S. KAZIO CIVIL No. 14970 STATE OF NEVADA

GARY S.KAZIO, P.E.
R.P.E. NO. 14970
EXP. 6-30-15
10-30-13

SHEET P2 OF

DRAWING NO. HTE#



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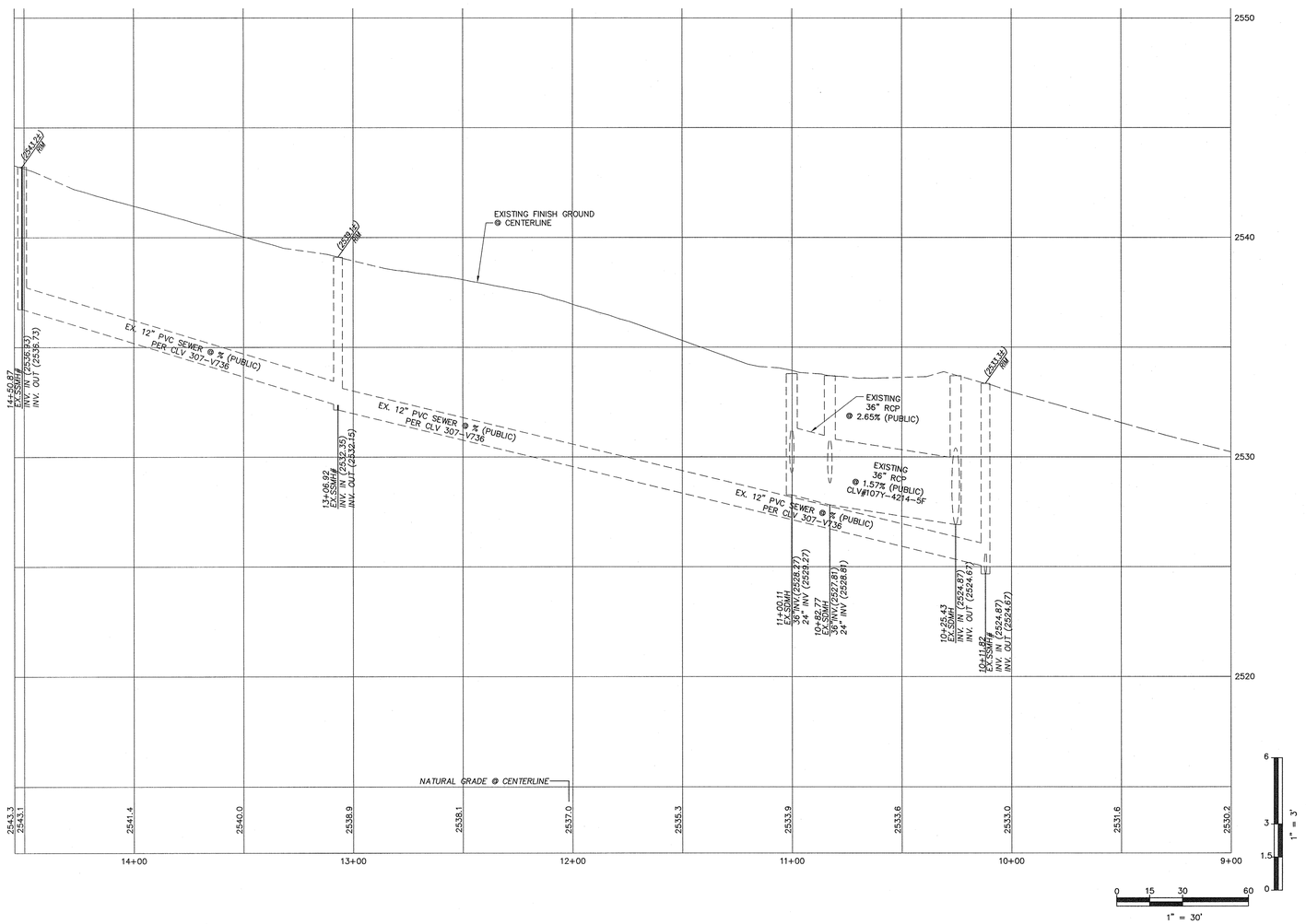

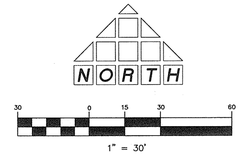

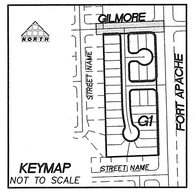

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NEVADA POWER ENVIRONMENT SAFETY SERVICES DEPARTMENT

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CALL BEFORE YOU DIG UNDERGROUND
Call before you Dig
Underground
1-702-455-7511
1-702-229-5611

BENCHMARK

CITY OF LAS VEGAS BENCH MARK NO. 6LVO08NW06 BEING A RIVET AND PLATE IN TOP OF CURB, SOUTHEAST CORNER OF FORT APACHE AND GILMORE .

ELEVATION: 2532.23 FEET OR 771.826 METERS, NAVD 88

BASIS OF BEARING

NORTH 87°51'05" EAST, BEING THE CENTERLINE OF GILMORE AVENUE AND BEING THE NORTH LINE OF THE SOUTH HALF (S 1/2) OF THE NORTHEAST QUARTER (NE 1/4) OF SECTION 7, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA, AS SHOWN IN BOOK 77, PAGE 90 OF PLATS IN THE RECORDER'S OFFICE OF CLARK COUNTY, NEVADA.

FOR ALL GRADING AND STREET SECTIONS SEE DETAIL SHEET D1 AND G2 . FOR ALL NOTES SEE GENERAL NOTES SHEET C3.

CONSTRUCTION NOTES

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3. CONSTRUCT 5' SIDEWALK PER CCAUSD 234
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5. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD NO. 235, CASE 1
6. CONSTRUCT SIDEWALK UNDERDRAIN PER CCAUSD 236 TO BE PRIVATELY MAINTAINED.
7. CONSTRUCT WROUGHT IRON FENCE AT EASEMENT WALL. SEPERATE PERMIT BY OTHERS.
8. CONSTRUCT 18" RCP (CLASS III) STORM PIPE
9. CONSTRUCT 6' TYPE "C" DROP INLET PER CCASD 412.1, 402 & 421, DEPTH AND INVERTS VARIES SEE PLANS.
10. CONSTRUCT REMOVABLE BOLLARDS @ 5' SPACING PER DETAIL SHEET G2

CLARK COUNTY
DEPARTMENT OF PUBLIC WORKS

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LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER

PROJECT NO. _____ DATE: _____

LVVWD APPROVED FIRE FLOW 1,500 GPM AT 20 PSI RESIDUAL

CERTIFICATION

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GARY S. KAZIO, P.E. # 14970 DATE

REV	DATE	BY	REVISION

F:\Projects\126\13-002 Ft Ap - Gilmore\126.13002- PRELIM GRADING.dwg 5/28/2013 4:38:46 PM PDT

DRAWN BY: DLG
DESIGNED BY: DLG
CHECKED BY:
COMMENTS ADDRESSED BY:
PROJECT NO. 126.13002
SCALE: N/A
N/A

THOMASON CONSULTING ENGINEERS
3277 E. WARM SPRINGS ROAD, SUITE 400
LAS VEGAS, NEVADA 89120
702-932-6125 FAX: 702-932-6129

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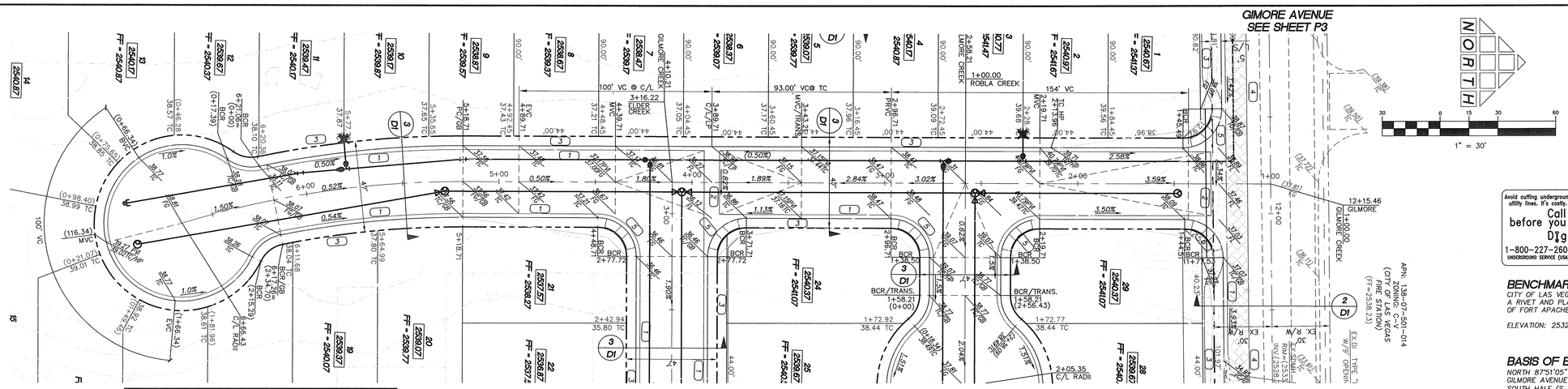
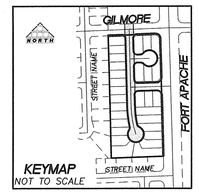
GILMORE CREEK
PLAN AND PROFILE
GILMORE AVENUE

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA
GARY S. KAZIO
CIVIL
No. 11907
GARY S.KAZIO, P.E.
R.P.E. NO. 14970
EXP. 6-30-15
10-30-13

SHEET P3 OF
DRAWING NO. HTE#





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LAS VEGAS VALLEY WATER DISTRICT

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BENCHMARK

CITY OF LAS VEGAS BENCH MARK NO. 6LVO08NWW6 BEING A RIVET AND PLATE IN TOP OF CURB, SOUTHEAST CORNER OF FORT APACHE AND GILMORE

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BASIS OF BEARING

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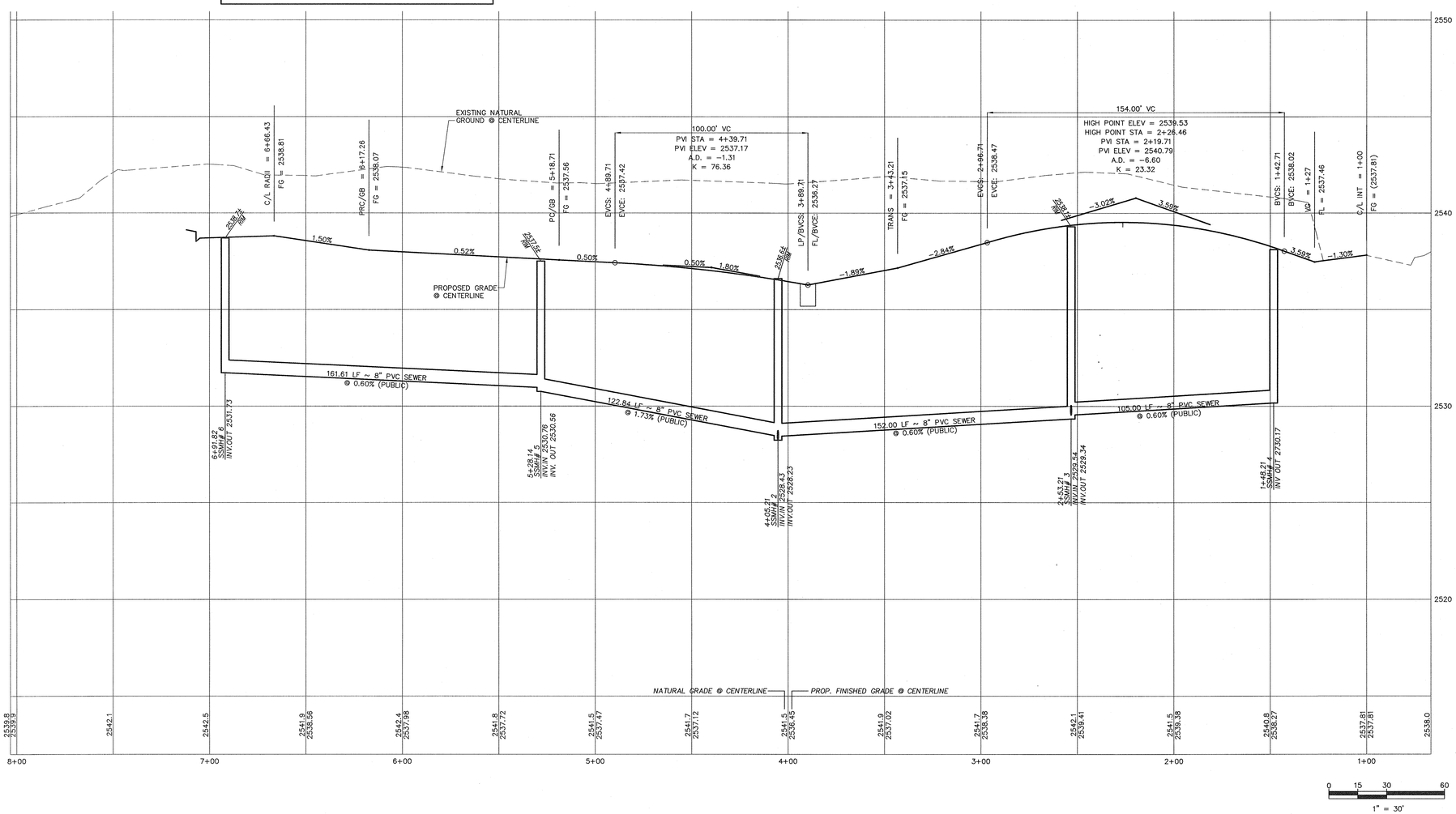

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CLARK COUNTY
DEPARTMENT OF PUBLIC WORKS

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LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER

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F:\Projects\126\13-002 Ft Ap - Gilmore\126.13002- PRELIM GRADING.dwg 5/28/2013 4:38:46 PM PDT

SCALE: NA
NA
N/A

DRAWN BY: DLG
DESIGNED BY: DLG
CHECKED BY:
COMMENTS ADDRESSED BY:

PROJECT NO. 126.13002

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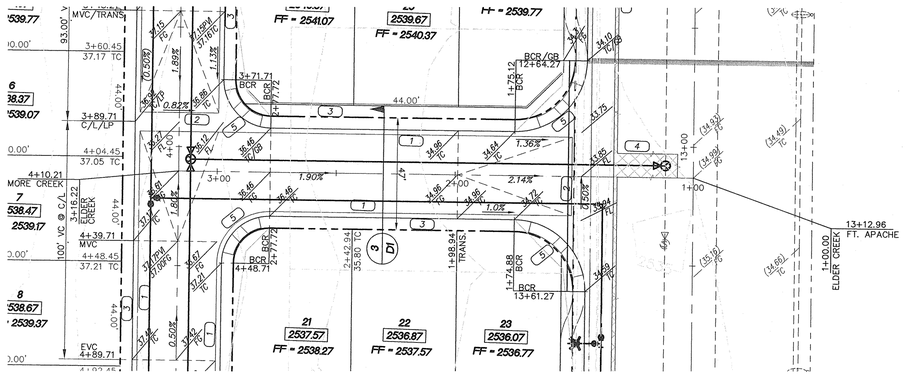
GILMORE CREEK
PLAN AND PROFILE
GILMORE CREEK COURT

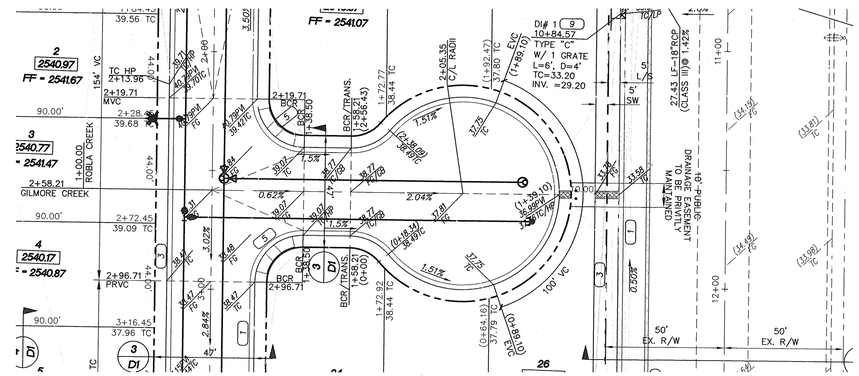
REGISTERED PROFESSIONAL ENGINEER
GARY S. KAZIO
No. 14970
CIVIL
STATE OF NEVADA
GARY S. KAZIO, P.E.
R.P.E. NO. 14970
EXP. 6-30-15
10-30-13

SHEET P4 OF
DRAWING NO. HTE#



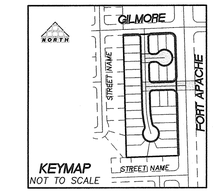
ELDER CREEK AVENUE

(PUBLIC STREET)



ROBLA CREEK COURT

(PUBLIC STREET)



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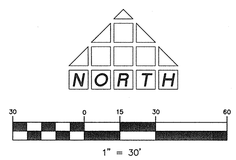

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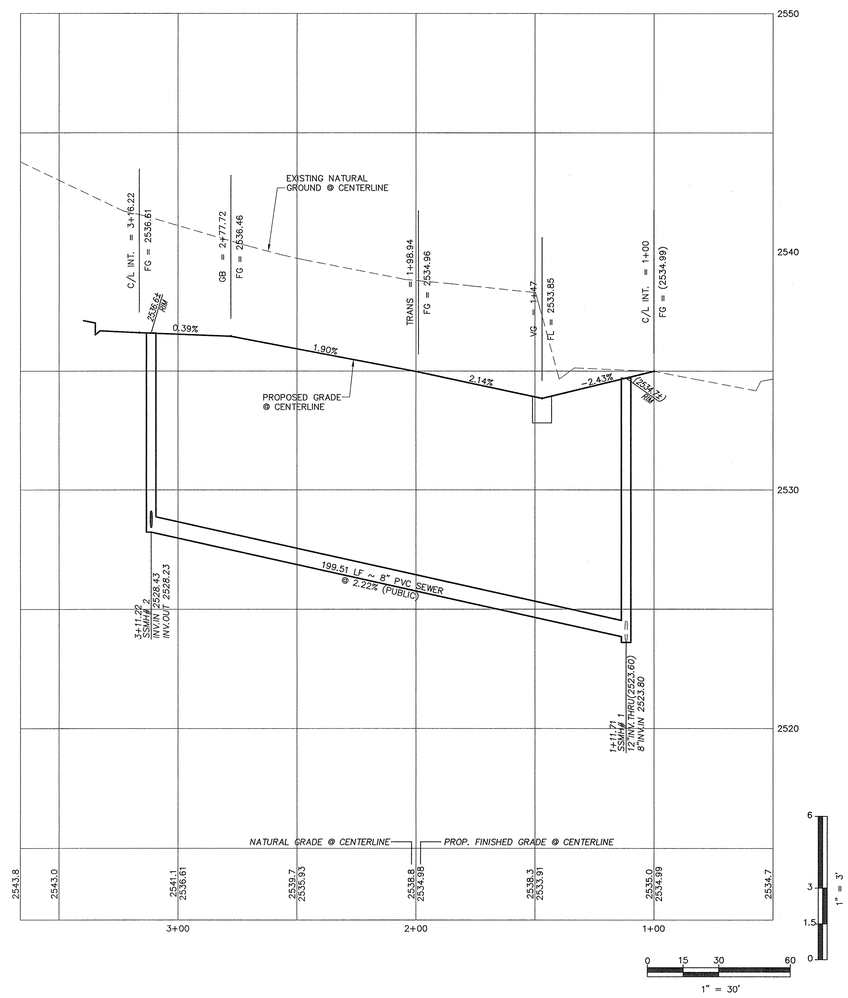

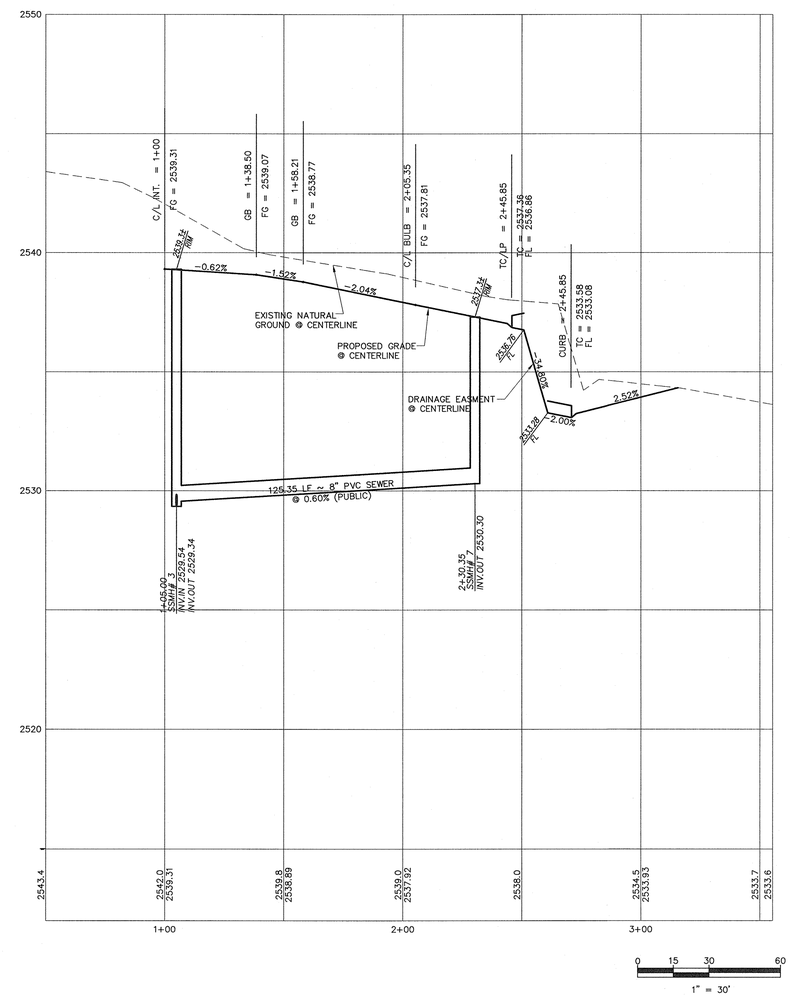

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DRAWN BY: DJG
DESIGNED BY: DJG
CHECKED BY:
COMMENTS ADDRESSED BY:
SCALE: N/A N/A
PROJECT NO. 126.13002

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GILMORE CREEK
PLAN AND PROFILE
ELDER CREEK AVENUE / ROBLA CREEK COURT

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA
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CIVIL
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GARY S.KAZIO, P.E.
R.P.E. NO. 14970
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16-30-13

SHEET P5 OF
DRAWING NO. HTE#