

DS #: 4658

APN: 125-19-601-008

PROJECT: DEER SPRINGS 5

SUBMITTAL: 1ST

SCANNED BY/DATE:

CHECKED BY/DATE:





CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		March 20, 2014
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: Deer Springs 5	COPIES TO: Slater Hanifan Group
Cross Streets:	NEQ Deer Springs Way & Grand Canyon Dr.	Richmond American Homes
File Number:	F:\Depot\DSMemos\DS4658A.doc	Bart Anderson, P.E., DevCo
Parcel Number:	125-19-601-008	
Zoning Action:	TMP-52094; GPA-52090; ZON-52091 & VAR-52093	
FEMA Flood Zone	YES NO X	
Proposed Storm Drain	YES NO X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	3/5/2014	3/19/2014	See Comments Below	\$400.00	349856: \$400
			TOTAL FEES (LDDRS):	\$400.00	----

REMARKS:

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

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

1. Note that offset crown street is a deviation from standard. Apply for a deviation meeting with *City Land Development Section* for approval prior to the final acceptance of the improvement plans.
2. **Sheet D-1: Section 2:** Specify clearly that the solid grouted portion of the wall must be of "8"-thick CMU".
3. 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.

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

END OF REMARKS

ays

T/R/S: T19S/R60E/19

AREA G-19

 *** FAX TX REPORT ***

TRANSMISSION OK

JOB NO. 3263
 DESTINATION ADDRESS 2845399
 PSWD/SUBADDRESS
 DESTINATION ID
 ST. TIME 03/20 16:07
 USAGE T 00' 31
 PGS. 2
 RESULT OK

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R-CL
TMP-52094 2/19/14 cc
VAR-52093

RAH1009.001

March 5, 2014

Linda Hartman-Maynard
City of Las Vegas
Department of Building and Safety
333 S. Rancho Drive
Las Vegas, NV 89101

SUBJECT: Justification Letter for proposed grades greater than 2-feet from existing ground for Deer Springs 5 (APN 125-19-601-008)

Ms. Hartman-Maynard,

Slater Hanifan Group, respectfully submits this justification letter in support of proposed grades greater than 2-feet above and below existing ground on the subject site. The site is located at Grand Canyon Drive and Deer Springs Way. The Assessor's Parcel Number is 125-19-601-008 and the site is 5 gross acres.

The existing slope of the site has an average rate of grade of approximately 3% from west to east. Although the intent is to match existing grade and adjacent development as closely as possible, there is much of the site which exceeds a difference of 2-feet from our proposed grades to existing ground. This is mostly due to the excessive steepness of the site and the requirement of Type "A" drainage for the single family residential lots, where the entire lot area must drain to the front of the lot. In many cases, there are lots which must slope opposite of the existing ground to accomplish this drainage pattern with a resultant grade differential of greater than 2-feet. Additionally, we must also follow the street design criteria, which establish limitations on various aspects for the steepness of which we can design streets. Also, much of the perimeter conditions for this site are either existing or have been established, and require that we match these perimeter designs, which further reduced the flexibility to help mitigate the proposed grading differential. I hope that you find that we have adequately justified our design, but should you have any questions, please do not hesitate to contact our office.

Slater Hanifan Group, Inc.

Todd Steadham
Todd Steadham, P.E.
Associate

PLANS APPROVED
PLANNING
Building & Safety Dept.
City of Las Vegas, Nevada
2' KO ONLY / GRADE DIFFERENCE ONLY
LHM MAR 17 2014
NO SITE CHANGES APPROVED
Conforms to the minimum requirements of
LVMC Title 19, applicable Master Plan
development standards and/or Conditions of
Approval. Make No Change Without Approval.
Plan is Not a Permit to Violate Any Ordinance.

TRANSMITTAL

To: Albert Sung, P.E.

Date: March 5, 2014

City of Las Vegas

Project No.: RAH1009.001

333 N. Rancho Drive

Las Vegas, NV 89106

From: Amy Poechmann, P.E.

Subject: Technical Drainage Study for Deer Springs 5

CC: Todd Steadham, SHG

CC: _____

CC: Chelsea Peltier, SHG

CC: _____

CC: Mark Failla, SHG

CC: _____

Transmitting Via:

- ☐ Mail
☒ Messenger / MDS
☐ Federal Express
☐ Pickup

For:

- ☒ Review & Comment
☐ Per your Request
☐ Information/File

Acknowledgement of Receipt:

- ☐ Not Required
☒ Acknowledgement Required

Received By: _____

Date: _____ Time: _____

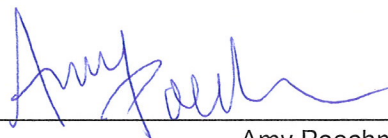
Copies	Description
1	Subject Study
1	Grading Plan, Profile and Detail Sheets
1	Stamped and Signed Standard Form 1 (bound in front)
1	\$400 Submittal Fee (Check No. 1019380)
1	CD containing PDF of submittal documents

Comments:

Enclosed please find the above listed items in support of development of a residential subdivision located about 300-ft east of the Grand Canyon Drive and Deer Springs Way intersection in Town Center. This study is intended to show the project's conformance with previously established drainage patterns in the area, specifically set forth in the City of Las Vegas Northwest Neighborhood Phase 2 Study and CCRFCD.

Please contact us if there are any questions at 702-284-5300. Thanks.

Signed: _____



Amy Poechmann, P.E.
Project Engineer – Flood Control Division

TECHNICAL DRAINAGE STUDY

Deer Springs 5

City of Las Vegas, Nevada

Job No.: RAH1009-001

Date: March 2014

Prepared By:

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

Prepared For:

Richmond America Homes
7770 Dean Martin Dr., Suite #308
Las Vegas, Nevada 89139
Phone: 702-617-84 • Fax: 702-348-5964



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

Assisted by: Andrew Howard, P.E.

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Deer Springs 5 Date: March 2014
 Location of Development: a) Descriptive (Cross Streets) North/South: Grand Canyon Dr
 East/West: Deer Springs Way
 b) Section: 19 Township: 19S Range: 60E
 c) APN : 125-19-601-008

Name of Owner: Richmond America Homes
 Telephone No.: (702) 617-8400 Fax No.: 702-348-5964 E-Mail Address: brian.walsh@mdch.com
 Address: 7770 Dean Martin Dr #308 Las Vegas NV 89139

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

Type of Land Development/Land Disturbance Process:

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

- Total Owned Land Area: At Site: 4.5 acres Being Developed/Disturbed: 4.5 acres
- Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ Yes** ☒ No
- Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☐ Yes** ☒ No
- Proposed type of development (Residential, Commercial, Etc.): Single-Family Residential
- Approximate upstream land area which drains to the subject site: <1 acre
- Has the site drainage been evaluated in the past? ☐ YES ☒ NO If yes, please identify documentation: _____
- If known, please briefly identify the proposed discharge point(s) of runoff from the site: Onsite flow will drain south to Deer Springs Way
- Briefly describe your proposed schedule for the subject project: Project will be constructed in a single phase



Engineer's Seal

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

***New Required Field**

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

	Revision	Date
Local Entity File No. _____		

REFERENCE:

STANDARD FORM 1

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Deer Springs 5		Map ID:
Firm Name: Slater Hanifan Group		
Address: 5740 S. Arville Street #216		
City: Las Vegas	State: NV	Zip: 89118
Phone Number: 702-284-5300		Fax Number: 702-284-5399
Property Owner: Richmond America Homes		
Address: 7770 Dean Martin Dr #308		
City: Las Vegas	State: NV	Zip: 89139
Reviewed By:	Date Received:	Date Accepted for Review:

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

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

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

I. GENERAL REQUIREMENT:

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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

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

III. DRAINAGE PLAN

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

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

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

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

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

IV. HYDROLOGIC ANALYSIS

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

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

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

REFERENCE:

STANDARD FORM 2



CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 5/18/11)

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

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

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

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

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

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

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

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

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

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

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

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

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LIST OF APPENDICES

Appendix A Drainage Exhibits

- Exhibit A – Location Map
- Exhibit B – FEMA FIRM Map
- Exhibit C – CCRFCD 2013 MPU Facilities Map
- Exhibit D – Soils Map
- Exhibit E – Existing Condition Drainage Map
- Exhibit F – Developed Condition Drainage Map

Appendix B Hydrologic Data & Computations

- Precipitation Data
- Soils Data & Curve Number Computations
- Standard Form 4 Computations

Appendix C HEC-1 Analyses

- Existing Condition
- Developed Condition

Appendix D FlowMaster Hydraulic Computations

- Deer Springs Way
- Other Street Sections

Appendix E Finished Floor Analysis

Appendix F Reference Material

Technical Drainage Study for Town Center L-TC 60/75 No. 5, by SHG

- Approval Letters
- Developed Condition Drainage Exhibit

Appendix G Reference Material

CLV Northwest Neighborhood Study – Phase 2

Appendix H Planning and Zoning Conditions

Appendix I Grading Plan, Profile, and Detail Sheets

Appendix J CD of Drainage Study and Improvement Plans

1 INTRODUCTION

1.1 Project Overview & Study Purpose

Richmond America Homes is proposing a single-family residential development on approximately 4.5 acres, located approximately 300-ft east of the Grand Canyon Drive and Deer Springs Way intersection, within the City of Las Vegas, Nevada. The project is comprised of a total of 21 residential lots, and included are the adjacent half street improvements to Deer Springs Way and Haley Ave. The proposed project is identified on improvement plans as *Deer Springs 5* (hereafter referred to as the Project Site).

The purpose of this study is to provide a detailed hydrologic and hydraulic analysis for the Project Site in order to protect the property from onsite and offsite runoff in accordance with local storm water criteria as well as to support the finished floor elevation design of the proposed lots. This study also provides an inventory of existing drainage facilities in the vicinity and provides recommendations for site specific facilities necessary to control runoff impacting the Project Site.

1.2 Site Location

The Project Site (APN 125-19-601-008) is located in Township 19 South, Range 60 East, Section 19. The Project Site is bound by Deer Springs Way to the south, existing Town Center 55 No. 3 development to the east, Haley Avenue to the north, and existing Town Center 60/75 No. 5 development to the west. A location map identified as Exhibit A is included in Appendix A for reference.

1.3 Description of Improvements

The proposed lot size ranges from 5,919 square feet to 8,053 square feet with a typical lot size of 6,000 square feet per the tentative map. The onsite improvements include 47-ft wide private interior roadways.

In addition to the onsite improvements, half street improvements are proposed to both Deer Springs Way and Haley Ave, adjacent to the Project Site. The Deer Springs Way half street is proposed as a 40-ft right-of-way to back of sidewalk with an additional 6-ft wide landscape buffer. The Haley Avenue half street is proposed as a 30-ft right-of-way to back of sidewalk with an additional 6-ft wide landscape buffer.

The Project Site is proposed to be constructed in one (1) phase, technically addressed by this study. The land use conditions (GPA-52090, ZON-52091, VAR-52093, and TMP-52094) required for development of the Project Site have been approved and this study and associated improvement plans show conformance with the land use conditions. A copy of the planning and zoning conditions for the site are included in Appendix H.

1.4 FEMA Flood Zone Designation

The Project Site is located on Flood Insurance Rate Map (FIRM) Panel 32003C1745E, dated September 27, 2002, designating that the site is located within a FEMA designated

Zone X (unshaded). A Zone X (unshaded) is described as an area determined to be outside the 500-year flood plain. Exhibit B, identifying the project site on the FIRM Panel, has been included in Appendix A for reference.

1.5 CCRFCD Facility Information

Figure F-13, from the 2013 Las Vegas Valley Flood Control Master Plan Update (MPU, Reference 1), shows that the Project site is not adjacent to or crossed by a Clark County Regional Flood Control District (CCRFCD) existing or future Regional Facility. Exhibit C identifying the Project Site on the MPU figure has been included in Appendix A for reference.

1.6 CLV Northwest Neighborhood Study

The Project Site is located within the City of Las Vegas Northwest Neighborhood area; therefore, this study has been prepared in a manner to show utilization and conformance to the drainage patterns set forth in the *Phase 2 Northwest Neighborhood Flood Control Master Plan* (hereafter referred to as the CLV NWNS). This project intends to discharge its storm runoff into adjacent Deer Springs Way which is in conformance with the CLV NWNS.

1.7 Referenced Studies

The following approved drainage study and master plan have been utilized in preparation of this study. This study and corresponding plans have been reviewed and determined acceptable for use as reference material.

- The study entitled *Technical Drainage Study for Town Center L-TC 60/75 No. 5* (hereafter referred to as the Town Center 60/75 Study, Reference 4), DS-3877, prepared by SHG and approved by the City of Las Vegas in December 2005, established flow from the Town Center 60/75 site outlet into Deer Springs Way and drainage patterns to Haley Avenue. Although this study also established street flows in Deer Springs Way, the higher CLV NWNS flow rates were used instead. Relevant reference material from the Town Center 60/75 Study has been included in Appendix F.
- The document entitled *City of Las Vegas Northwest Neighborhood Flood Control Master Plan – Phase 2* (hereafter referred to as the CLV NWNS, Reference 5), prepared by PBS&J, defined the historic existing and future planned drainage patterns for the vicinity (inclusive of the Project Site). CLV NWNS has been utilized for comparative and reference purposes in establishing the Project Site's design. Although the Town Center 60/75 Study also established street flows in Deer Springs at Grand Canyon Drive, the CLV NWNS flow rates were used because they are higher and therefore, more conservative. Relevant exhibits from the CLV NWNS have been included in Appendix G.

2 METHODOLOGY

2.1 Compliance

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

2.2 Hydrologic Modeling

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

Precipitation: The Project Site is located outside the McCarran Rainfall Area per CCRFCD Manual Figure 513. The adjusted precipitation values utilized by this study were obtained from the CCRFCD Manual Figures 503 and 506. The 10-year and 100-year adjusted point precipitation values are 1.67 inches and 3.00 inches, respectively. Since the drainage area of the contributing watershed is less than 8 square miles, the SDN 3 design storm distribution from Table 503 in the CCRFCD Manual was used. Reference tables and figures from the CCRFCD Manual have been included in Appendix B.

Curve Number: The SCS curve number loss rate methodology was utilized to approximate infiltration for the drainage sub-basins. The soils information within the watershed was obtained from the *SCS Soil Survey of the Las Vegas Valley Area* (Soil Survey, Reference 3). Exhibit D depicts this study's project boundary on the soils map and has been included in Appendix A. The basins analyzed in this study lie within Soil Type 191, which is comprised of 5% Hydrologic Soil Group (HSG) 'A', 85% HSG 'B', and 10% HSG 'D'.

The land within the basin boundaries is typical of southern Nevada desert, undeveloped with sparse desert shrub; therefore, a curve number associated with "desert shrub (poor)" has been utilized for the existing undeveloped onsite area.

The typical lot size proposed by this project is approximately 6,000 square feet in area. Therefore, a curve number associated with "Residential (6,000 sf)" has been utilized for the developed onsite area.

Perimeter street improvements are proposed by the project; therefore a curve number of 98 has been utilized for the perimeter street basins.

All soil data and curve number computations, including CCRFCD Manual reference tables, have been included in Appendix B.

Lag Time: The lag time is defined as the time measured from the center of mass of effective rainfall to the time to peak of the outflow hydrograph. The lag time is related to the time of concentration as 0.6 times the time of concentration. The time of concentration is

defined as the time required for runoff to flow from the hydraulically most distant point of a basin to the outlet point of the basin. Standard Form 4, as outlined in the CCRFCD Manual, was utilized to determine the lag times for basins modeled. The lag time computations have been included in Appendix B.

2.3 Hydraulic Modeling

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

The Deer Springs Way right-of-way is a minimum 80-ft width; therefore, a 12-ft dry lane (not utilizing the center turning lane) is required to be provided during the 10-year storm event. The street flow in Deer Springs Way has been assessed with both CLV NWNS existing and future condition flow rates. Note that the analysis of CLV NWNS existing condition flows in Deer Springs Way is not subject to street flow criteria, only to show adequate flood protection is provided.

3 EXISTING DRAINAGE CONDITION

3.1 Definition of Existing Condition

The existing Project Site is considered to be in an undeveloped state with sparse desert shrub typical of southern Nevada, and a natural drainage pattern that flows in a southerly direction. The single-family residential developments, which border the Project Site to the west and east, are considered to be in their fully developed condition. Haley Avenue and Deer Springs Way, which border the Project Site to the north and south respectively, are both partially developed as half-streets. However, both Haley Avenue and Deer Springs Way are considered to be in their fully developed condition beyond the east and west limits of the Project Site.

There is an existing 36-inch RCP storm drain line sized per the CLV NWNS in Deer Springs Way adjacent to the Project Site.

3.2 Discussion of Existing Condition

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

The Project Site is represented by a single basin (Basin ONX) and consists of undeveloped land which slopes in a southerly direction. Onsite flow follows the existing contours southward to Deer Springs Way where it is then conveyed east as surface flow. No offsite flow is conveyed through the Project Site.

In addition to the onsite basin, there are two (2) street basins analyzed with this study. Haley Avenue (Basin HAL) and Deer Springs Way (Basin DSP) drain east past the Project

Site without diverting any flow through the site. Haley Avenue accepts no offsite flows; therefore, the only flow in Haley Avenue are the street flows generated by the street itself as represented by Basin HAL.

However, Deer Springs Way accepts offsite flows from the west from two sources. The existing Town Center 60/75 No. 5 development discharges flows into Deer Springs Way through a drainage easement at the end of Desert Island Street. This offsite flow is referenced from Concentration Point CP.7D from the Town Center 60/75 Study per the ultimate condition. In addition, 119/35 cfs (Q_{100}/Q_{10}) crosses Grand Canyon Drive at Deer Springs Way and is referenced from the CLV NWNS Existing Condition. Refer to Appendix F and Appendix G for relevant reference material. The flows from Concentration Point CP.7D and the CLV NWNS combine with the flows from Basin ONX, and DSP at Concentration Point CP1 at the east edge of the Project Site.

3.3 Summary of Existing Condition Flows

A summary of the existing condition flow rates, as determined by HEC-1 analysis and reference material, has been presented below in the Existing Condition Flow Rate Summary Table. Refer to Appendix C for the applicable HEC-1 analysis.

Existing Condition Flow Rate Summary			
Basin/Concentration Point ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
ONX	4.4	7	2
HAL	0.3	1	1
DSP	1.3	5	3
CP.7D*	N/A	22	7
CP1 $Q = ONX + DSP + CP.7D^* + 119/35^{**}$	N/A	153	47
* Referenced from Town Center 60/75 Study			
** Referenced from CLV NWNS (Existing Condition)			

4 DEVELOPED DRAINAGE CONDITION

4.1 Definition of Developed Condition

The developed condition considers the Project Site as constructed. The offsite areas draining toward the Project Site are in their full build-out condition; therefore, the drainage patterns are not likely to change in the future beyond what is defined by this study's developed condition, and an additional drainage condition is not necessary.

4.2 Discussion of Developed Condition

Refer to Exhibit F, included in Appendix A, for a detailed illustration of the developed condition drainage patterns.

The Project Site is analyzed as a single onsite basin (Basin OND). Flows from Basin OND will be conveyed south into Deer Springs Way as surface flow as in the existing condition and in conformance with the drainage patterns established by the CLV NWNS. Once in Deer Springs Way, flows from Basin OND will be conveyed east toward Concentration Point CP1.

The two (2) street basins (Basin HAL and DSP) remain the same as in the existing condition; however, most of the street flows from Basin HAL are now directed south into Deer Springs Way rather than continuing east as in the existing condition. It is anticipated that a portion of the flows from Basin HAL (Subbasin HAL(A)) are diverted through the Project Site to Concentration Point CP1. This diversion of flows is considered acceptable because the amount of flow being diverted is negligible. In addition, Deer Springs Way has been analyzed with the additional flow and found to meet street criteria as discussed further in Section 4.4 of this report. Therefore, there will be no negative impact to downstream properties.

Basin DSP and the flows from Concentration Point CP.7D remain as in the existing condition, they drain to Concentration Point CP1. However, for the developed condition the flows at the intersection of Grand Canyon Drive and Deer Springs Way are referenced from the CLV NWNS Future Drainage Condition.

4.3 Summary of Developed Condition Flows

A summary of the developed condition flow rates, as determined by HEC-1 analysis and reference material, has been presented below in the Developed Condition Flow Rate Summary Table. Refer to Appendix C for the applicable HEC-1 analysis.

Developed Condition Flow Rate Summary			
Basin/Concentration Point ID	Area (ac)	Q100 (cfs)	Q10 (cfs)
OND	4.4	11	4
HAL	0.3	1	1
DSP	1.3	5	3
CP.7D*	N/A	22	7
CP1 Q = OND + HAL + DSP + CP.7D* + 109/0**	N/A	149	15
* Referenced from Town Center 60/75 Study			
** Referenced from CLV NWNS (Future Condition/Surface Flow only)			

As previously discussed, a portion of Basin HAL is routed thru the Project Site. To quantify that flow rate, Basin HAL was split into two sub-basins. The Developed Condition Prorated Flow Summary Table provides a summary of the sub-basin flow rates, as determined by a proration method.

Developed Condition Prorated Flow Summary			
Basin	Q100 (cfs)	Area (acres)	Unit Flow (cfs/acre)
HAL	1	0.29	3.4
Subbasin	Q100 (cfs)	Area (acres)	Unit Flow (cfs/acre)
HAL(A)	1	0.22	3.4
HAL(B)	0	0.07	3.4
TOTAL	1	0.29	

In the developed condition, all flows are discharged to Deer Springs Way. A comparison has been performed to show the post-development impacts, in comparison to the pre-development impacts, to Deer Springs Way as shown in the table below.

Developed Condition vs. Existing Condition Flow Rates to Deer Springs		
Source	Developed Condition Q_{100/10} (cfs)	Existing Condition Q_{100/10} (cfs)
Project Site	11/4 cfs (Basin OND)	7/2 cfs (Basin ONX)
Haley Avenue	1/1 cfs (Basin HAL)	N/A*
West of Grand Canyon Drive (per CLV NWNS)	109/0 cfs (in street) 58/58 (in storm drain)	119/35 cfs (in street) 0/0 cfs (in storm drain)
CP1	149/15 cfs (CP1 = OND + HAL + DSP + CP.7D + 109/0 cfs	153/47 cfs (CP1 = ONX + DSP + CP.7D + 119/35 cfs

*Flows from Haley Avenue continue east in the existing condition and therefore, have no impact on Deer Springs Way.

Review of the above table shows that development of the Project Site increases the amount of flow discharged to Deer Springs Way. This increase is mostly due to the development of the Project Site which increases runoff. Less than 1 cfs of increase is caused by the routing of street flows from Haley Avenue south through the Project Site into Deer Springs Way.

The total flow to Deer Springs Way (109/0 cfs of street flow and 58/58 cfs of storm flow) referenced from the CLV NWNS is greater in the developed condition. However, because of the 58 cfs in the storm drain, there is actually less street flow in Deer Springs Way in the developed condition than in the existing condition.

Flows to Concentration Point CP1 are increased both because of the development of the Project Site and because of the diversion of the street flows from Haley Avenue south into Deer Springs as discussed above. Although the development of the Project Site increases flow to Deer Springs Way, the surface flow in Deer Springs Way (Concentration Point CP1) is less in the developed condition because of the flows in the Deer Springs storm drain. Therefore, the increase in flow to Deer Springs Way is acceptable.

4.4 Summary of Developed Condition Street Flows

Hydraulically analysis shows that street flow criteria for onsite street improvements (Sections 1 and 2) and Haley Avenue (Section HA), as outlined in Section 2.3 of this report, are satisfied. The 100-year flows conveyed in these streets also satisfy 10-year street flow criteria; therefore, only 100-year hydraulic sections were performed onsite and for Haley Avenue.

Section DS for Deer Springs Way is analyzed for two (2) flow rates. One flow rate accounts for CLV NWNS existing condition flows (using CP1 from the existing condition) to demonstrate that the Project Site is adequately flood protected during the 100-year storm event, prior to the completion of planned upstream improvements. Note that street flow criteria are waived for the analysis of the CLV NWNS existing condition flows. The other flow rate uses the CLV NWNS future condition street flows (using CP1 in the developed condition) to demonstrate that the Project Site is adequately flood protected during the 100-year storm event and that criteria is met without additional storm drain infrastructure.

Tables shown below provide a summary of the street flow hydraulic computations. Refer to Exhibit F for the location of analyzed street sections and refer to Appendix D for street flow calculations.

10-Year Street Flow Summary						
Cross Section	Slope (%)	Q10 (cfs)	Depth (ft)	Velocity (fps)	DxV	Dry Lane Width (ft)
DS (Q = CP1)	2.50	15	0.39	4.47	1.7	22.0
DS (Q = CP1*)	2.50	47	0.56	5.0	2.8	13.5
* Existing Condition CP1 - Refer to Exhibit E						

100-Year Street Flow Summary					
Cross Section	Slope (%)	Q100 (cfs)	Depth (ft)	Velocity (fps)	DxV
HA (Q = HAL(A))	3.06	1	0.23	3.0	0.7
1 (Q = HAL(A) + OND)	1.75	12	0.47	4.1	1.9
2 (Q = OND)	4.05	11	0.36	4.9	1.7
DS (Q = CP1)	2.50	149	0.76	6.7	3.2
DS (Q = CP1*)	2.50	153	0.76	6.7	3.2
* Existing Condition CP1 - Refer to Exhibit E					

Please note that street flows in the developed condition meet CCRFCD criteria, as set forth in Section 2.3 of this report.

4.5 Summary of Proposed Drainage Facilities

Drop Inlets: No drop inlets have been proposed onsite and within Haley Avenue, because street criteria are met and no significant maintenance impacts are anticipated for non-erosive flows thru the site. One drop inlet is proposed on Deer Springs Way just upstream of the site entrance from the existing 18-inch stub and to collect nuisance flows just upstream of the site entrance. The proposed drop inlet is sized for nuisance flows and will connect to the existing 18-inch RCP stub from the existing 36-inch RCP main in Deer Springs Way. Note that the existing Deer Spring storm drain is sized and located per the CLV NWNS.

Storm Drain: A short section of storm drain lateral will be constructed from the proposed drop inlet to the existing storm drain stub. The remaining storm drain in Deer Spring Way is existing and was sized and analyzed with previous studies and per the CLV NWNS Study. Since the flow conveyed thru the proposed lateral is considered nuisance, no hydraulic analysis is necessary.

4.6 Summary of Proposed Finished Floors

The proposed finished floor elevations satisfy local City of Las Vegas policy and are elevated minimum 6-inches above the adjacent top of curb elevation at the high side of the lot. In addition, all finished floors are adequately flood protected and elevated above twice the depth of flow in the adjacent street. Refer to Appendix E for finish floor analysis.

The street flow conveyed in Deer Springs Way is below the proposed lot finished floor elevations. Additionally, all lots adjacent to Deer Springs Way (Lots 1, 2, 3 and 21) are elevated above twice the depth of flow in Deer Springs Way. Therefore, no solid grouting is required along Deer Springs Way adjacent to the proposed lots.

The street flow conveyed in Haley Avenue is minimal. Twice the depth of flow in Haley Avenue is still less than 6-inches and therefore is still below the top of curb. However, because Haley Avenue is above the adjacent proposed lots, three (3) courses of solid grouting is required along Haley Avenue adjacent to the proposed lots (Lots 10, 11, 12 and 13).

5 CONCLUSIONS & RECOMMENDATIONS

1. The Project Site is not located within a FEMA designated SFHA. Therefore, FEMA acceptance is not required.
2. The Project Site is not adjacent to or crossed by an existing or future CCRFCD Regional Facility. Therefore, CCRFCD concurrence is not required
3. The development of the Project Site is in conformance with the drainage patterns established in the CLV NWNS as well as the existing (historic) drainage pattern.

4. The CLV NWNS existing and future condition flows have been utilized to determine adequate flood protection from the flows in Deer Springs Way.
5. The proposed 100-year and 10-yr street flows satisfy CCRFCD Manual criteria.
6. The Project Site discharges its storm runoff to Deer Springs Way and diverts 1/1 cfs from Haley Avenue into Deer Springs Way, which increases the street flow values. However, the total 10-year and 100-year storm flow discharge to Deer Springs Way does not exceed the allowable CCRFCD design criteria and is offset by the existing storm drain system in Deer Springs Way.
7. The proposed finished floor elevations have been set at a minimum of 6-inches above the highest top of curb elevation adjacent to the lot. Additionally, each lot is elevated above twice the depth of flow conveyed in the adjacent streets.
8. The project's grading plan and detail sheets included in Appendix I of this study support the drainage patterns, conclusions and/or recommendations detailed in this study.

6 REFERENCES

1. *Las Vegas Valley Flood Control Master Plan Update*. PBS&J, Louis Berger Group and Parsons Brinckerhoff, October 2013.
2. *Hydrologic Criteria and Drainage Design Manual*. Clark County Regional Flood Control District, 1990.
3. *Soil Survey of Las Vegas Valley Area, Nevada*. U.S. Department of Agriculture, Soil Conservation Service, July 1985.
4. *Technical Drainage Study for Town Center L-TC 60/75 No. 5*, SHG, December 2005.
5. *City of Las Vegas Northwest Neighborhood Flood Control Master Plan – Phase 2* by PBS&J for City of Las Vegas Dept. Public Works.

APPENDIX A

Drainage Exhibits

Exhibit A – Location Map

Exhibit B – FEMA FIRM Map

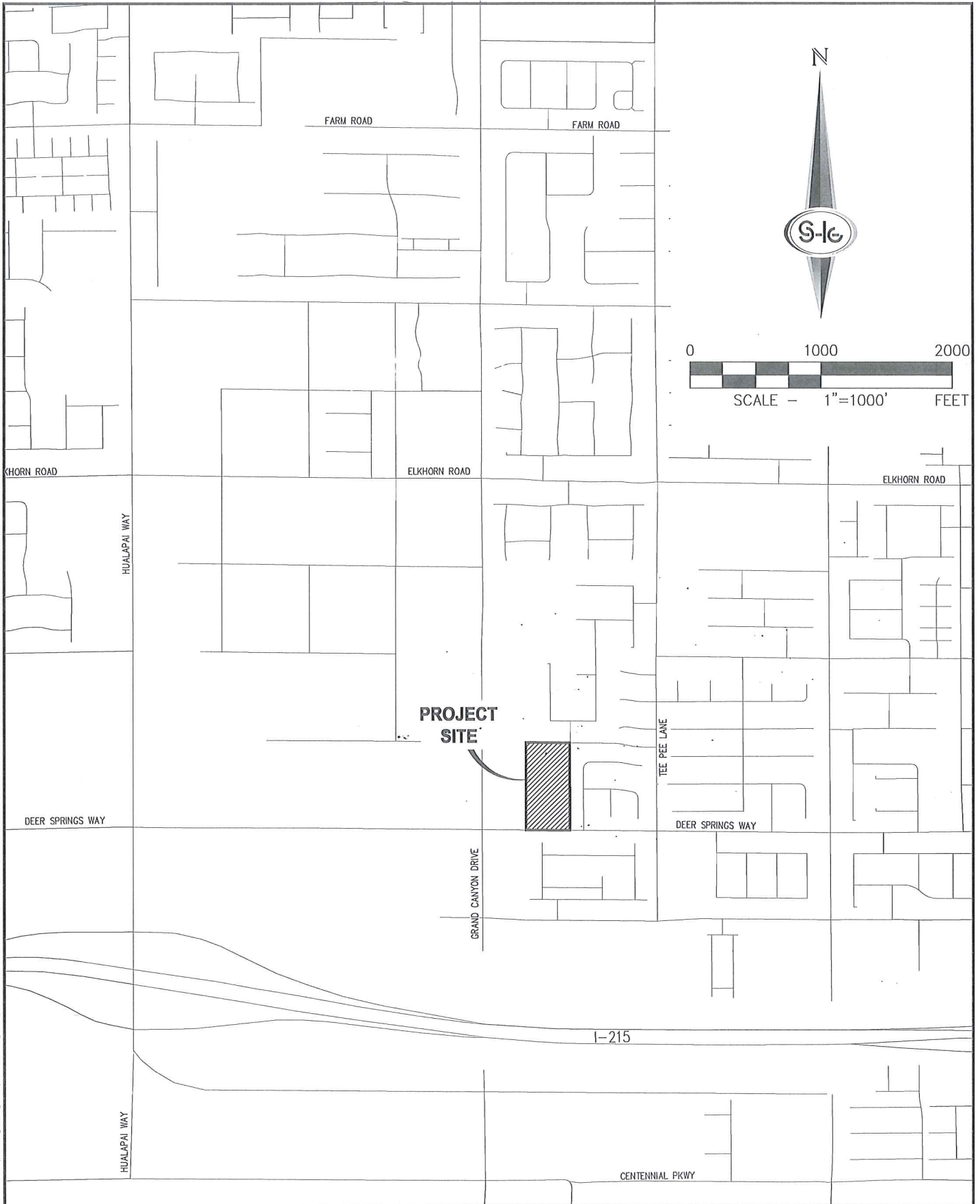
Exhibit C – CCRFCD 2013 MPU Facilities Map

Exhibit D – Soils Map

Exhibit E – Existing Condition Drainage Map

Exhibit F – Developed Condition Drainage Map

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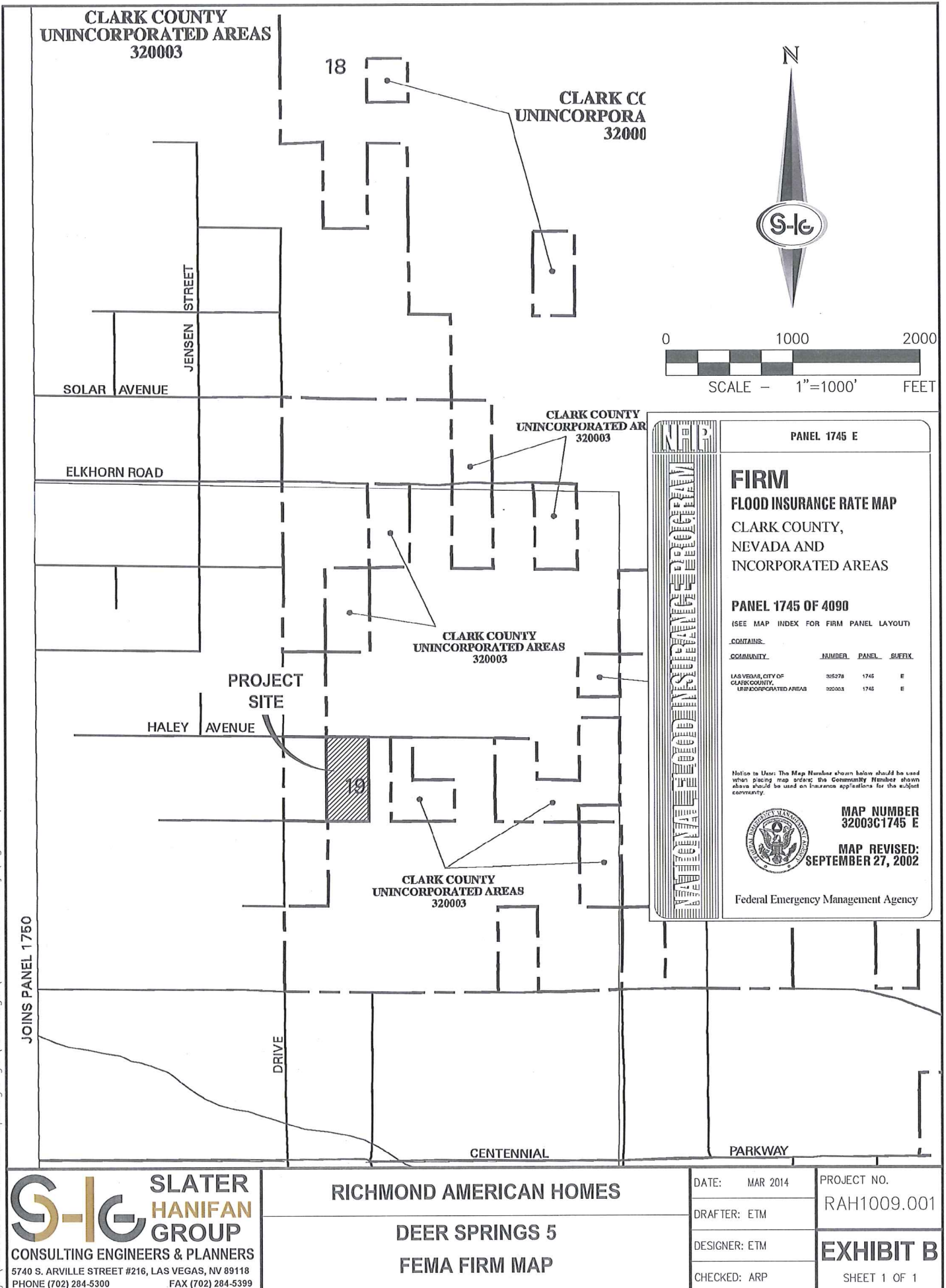


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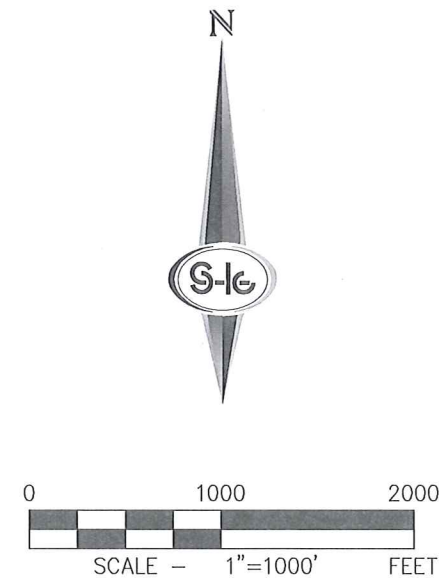
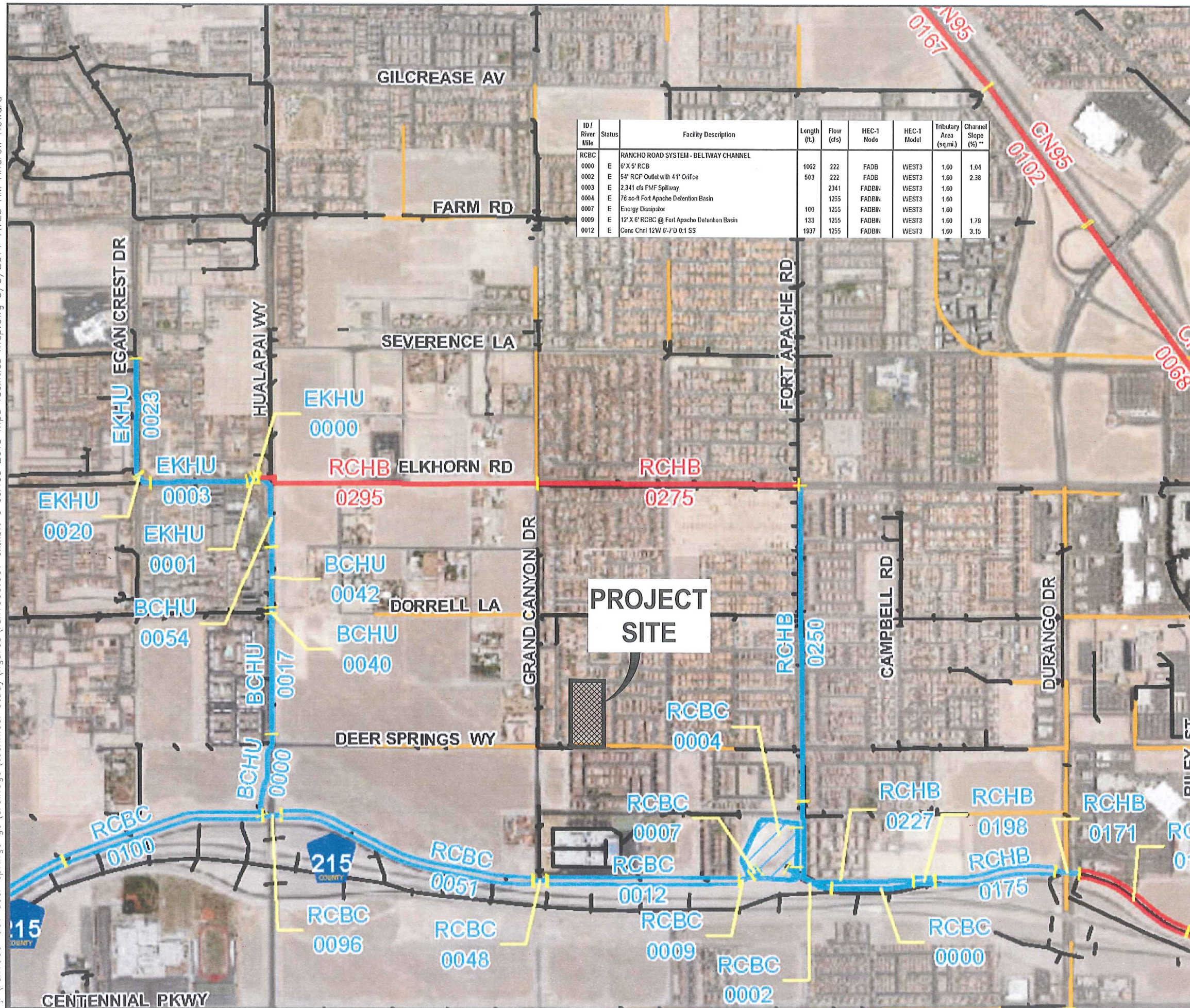
RICHMOND AMERICAN HOMES
DEER SPRINGS 5
LOCATION MAP

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DRAFTER: ETM	
DESIGNER: ETM	
CHECKED: ARP	EXHIBIT A
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2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE
FIGURE F- 13
FLOOD CONTROL FACILITIES

LEGEND

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

Remove & Replace/Parallel Facilities

 Channel	 Channel
 Stormdrain	 Stormdrain

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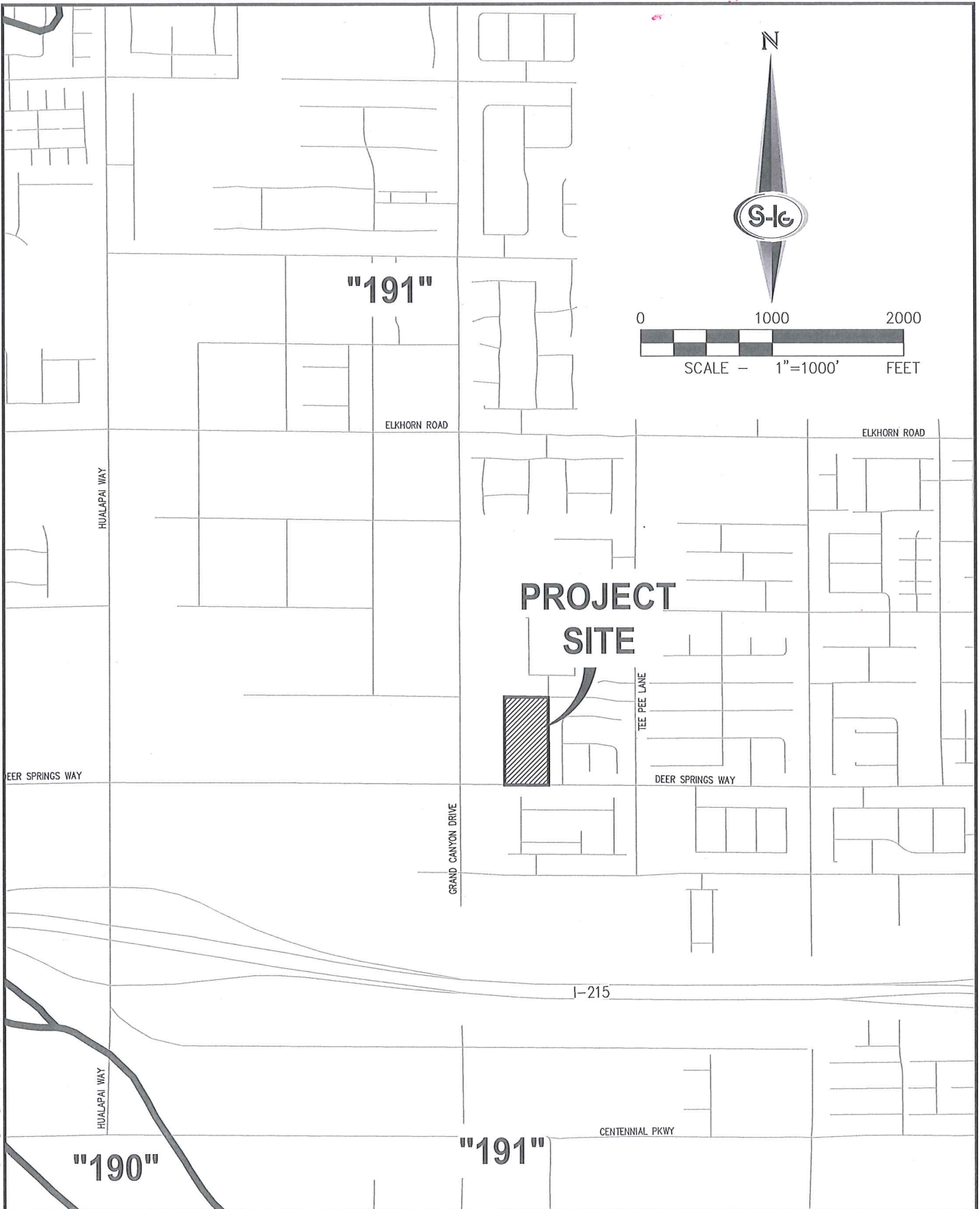
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RICHMOND AMERICAN HOMES
DEER SPRINGS 5
CCRFD 2013 MPU FACILITIES MAP

DATE: MAR 2014
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DESIGNER: ETM
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EXHIBIT C
SHEET 1 OF 1

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RICHMOND AMERICAN HOMES
DEER SPRINGS 5
SOILS MAP

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RAH1009.001
EXHIBIT D
SHEET 1 OF 1

APPENDIX B

Hydrologic Data and Computations

Precipitation Data

Soils Data and Curve Number Computations

Standard Form 4 Computations

Precipitation Data

Rainfall and Precipitation Computation

Project Name: DEER SPRINGS 5

Date: 02/12/14

File Name: RAH1009.001 TDS Lag Time Sta

By: AJH

Data:

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

Reference:

APN Map

Site is NOT located in the McCarran Airport Rainfall Area

Figure 513*

Rainfall Depth-Duration-Frequency 10-Year, 6-Hour: 1.4 inches

Figure 503*

Rainfall Depth-Duration-Frequency 100-Year, 6-Hour: 2.1 inches

Figure 506*

Precipitation Adjustment Ratios:

10-Year: 1.24

Table 501*

100-Year: 1.43

Table 501*

Six Hour Depth Area Reduction Factors (DARF):

Area (gross acres): 5.0 = 0.0078 square miles

Table 502*

DARF = 1.00

Calculations:

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

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

$P_{10}/P_{100} = 0.56$ HEC-1 Multiple Ratio Value

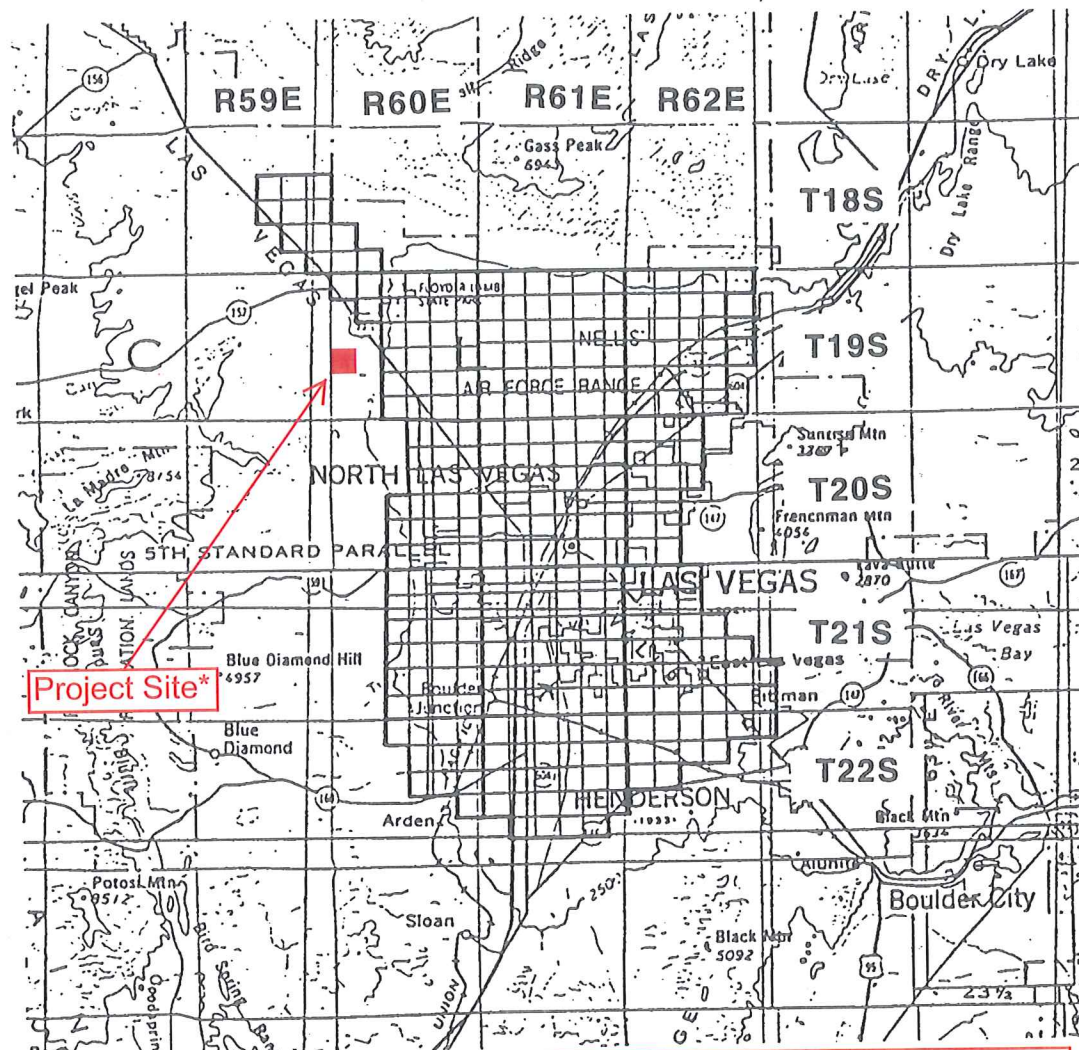
Equations:

$P = (\text{Rainfall}) * (\text{Precipitation Adjustment Ratio}) * (\text{Depth Area Reduction Factor})$

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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

McCARRAN AIRPORT RAINFALL AREA



*Project site not located within the McCarran Rainfall area (T19-R60-S19)

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

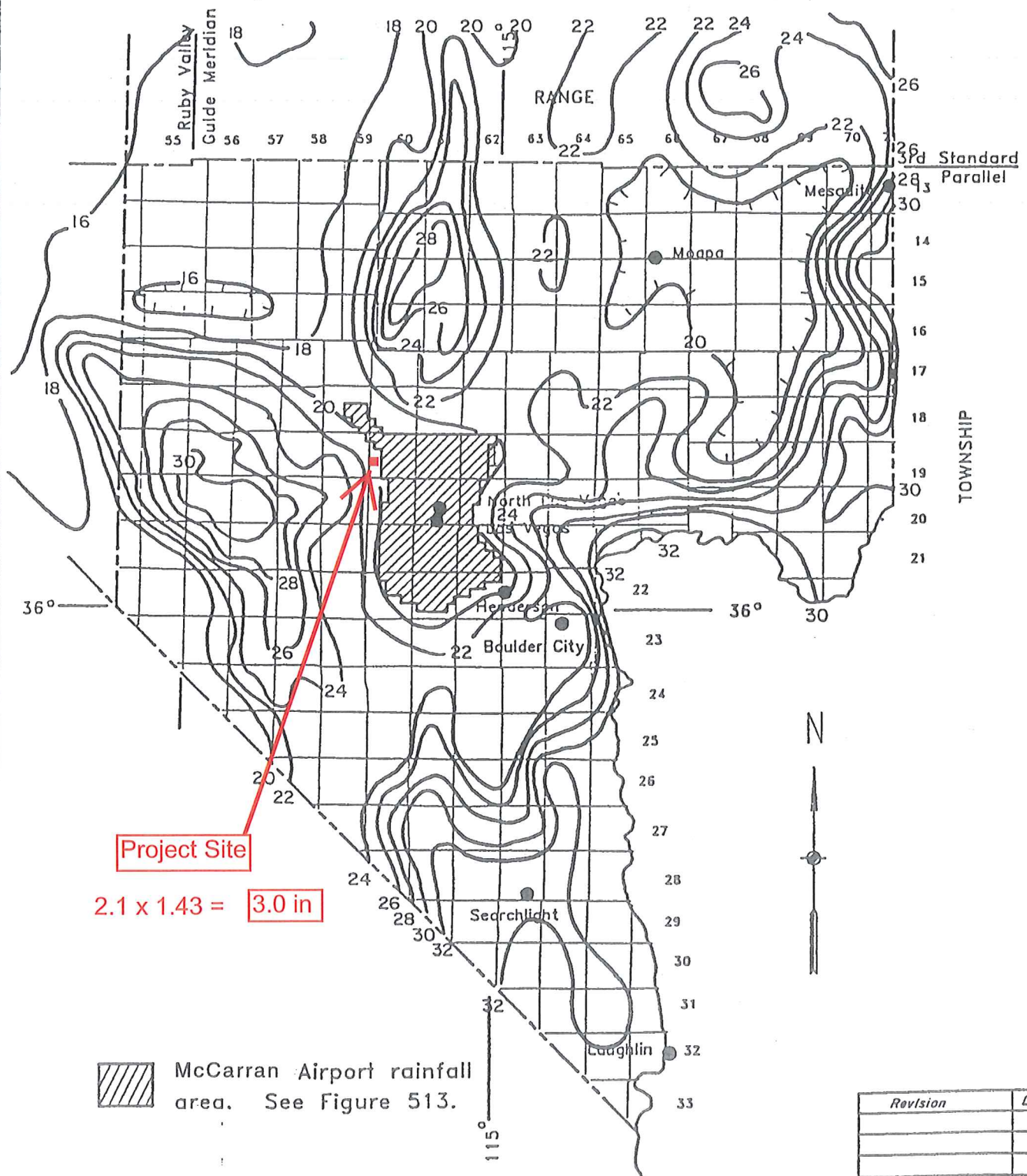
Notes:

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

Revision	Date

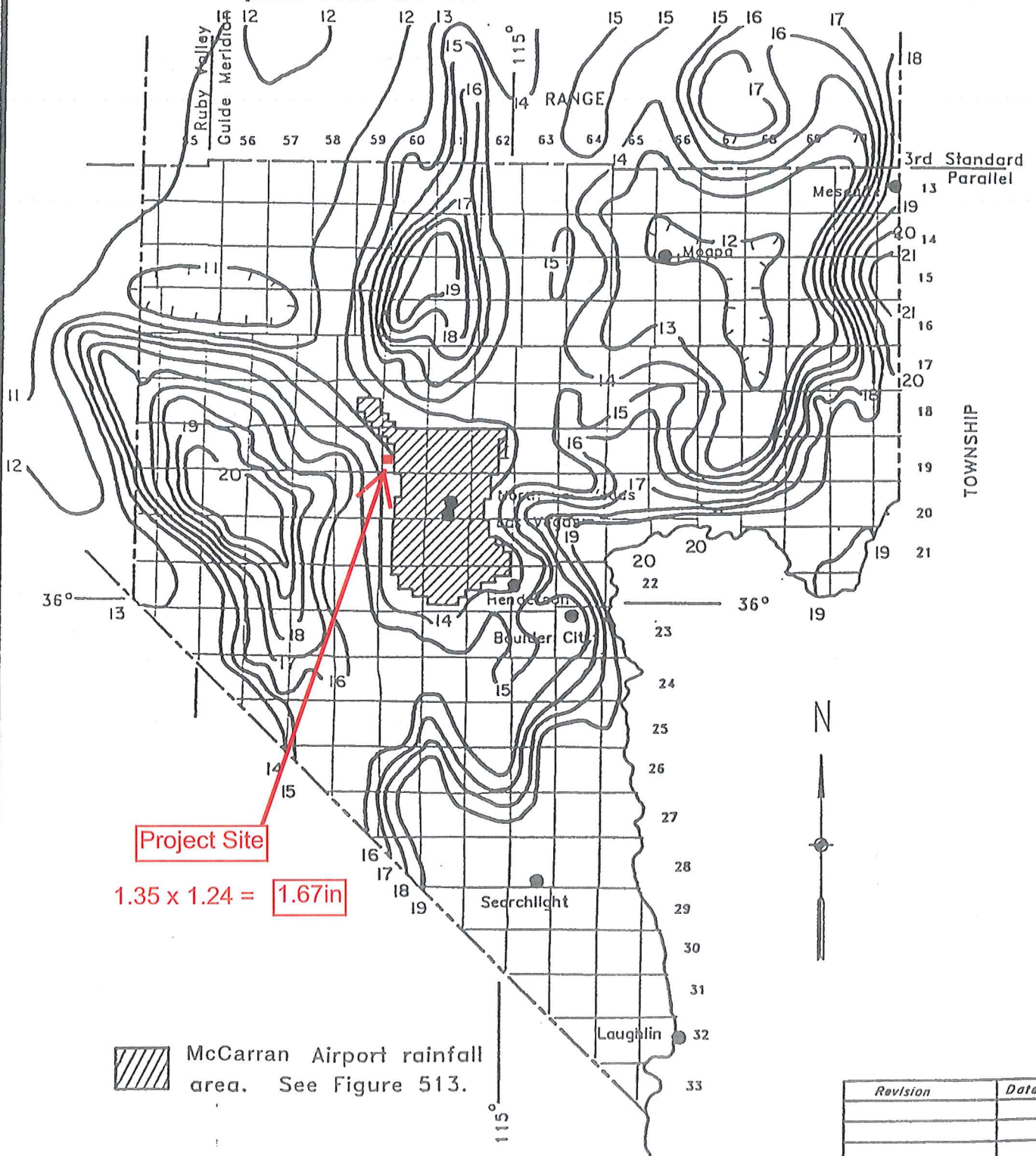
HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

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



HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

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



PRECIPITATION ADJUSTMENT RATIOS

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

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

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

SIX HOUR DEPTH-AREA REDUCTION FACTORS

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

- NOTES: 1. A graphical representation of these factors is presented in Figure 514.
2. Consult with the local entity and/or the CCRFCD for guidance in using the Depth-Area Reduction Factors for drainage areas greater than 200 square miles.

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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

SIX-HOUR STORM DISTRIBUTIONS

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

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

Revision	Date

REFERENCE:

TABLE 503

Soils Data and Curve Number Computations

Soil & Curve Number Computation

Project Name: Deer Springs 5

Date: 03/04/14

File Name: RAH1009.001 TDS Curve Number Calcs.xlsx

By: AJH/ARP

Data:

Reference:

Soil Type & Description	A	B	C	D
191 Dalian very cobbly fine sandy loam, 2 to 8 percent slopes	5%	85%	0%	10%

Exhibit G
SCS Soil Data

Land Use	A	B	C	D
Residential (6,000 sf)	80	87	90	92
Desert Shrub (poor)	63	77	85	88
Roadway	98	98	98	98

Existing Condition

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CALCULATED CN
				A	B	C	D	A	B	C	D		
ONX	191	100.0%	Desert Shrub (poor)	5%	85%	0%	10%	63	77	85	88	4.39	77.40
TOTAL PERCENT		100.0%		TOTAL AREA								4.39	77.40

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CALCULATED CN
				A	B	C	D	A	B	C	D		
HAL	191	100.0%	Roadway	5%	85%	0%	10%	98	98	98	98	0.29	98.00
TOTAL PERCENT		100.0%		TOTAL AREA								0.29	98.00

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CALCULATED CN
				A	B	C	D	A	B	C	D		
DSP	191	100.0%	Roadway	5%	85%	0%	10%	98	98	98	98	1.33	98.00
TOTAL PERCENT		100.0%		TOTAL AREA								1.33	98.00

Developed Condition

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CALCULATED CN
				A	B	C	D	A	B	C	D		
OND	191	100.0%	Residential (6,000 sf)	5%	85%	0%	10%	80	87	90	92	4.39	87.15
TOTAL PERCENT		100.0%		TOTAL AREA								4.39	87.15



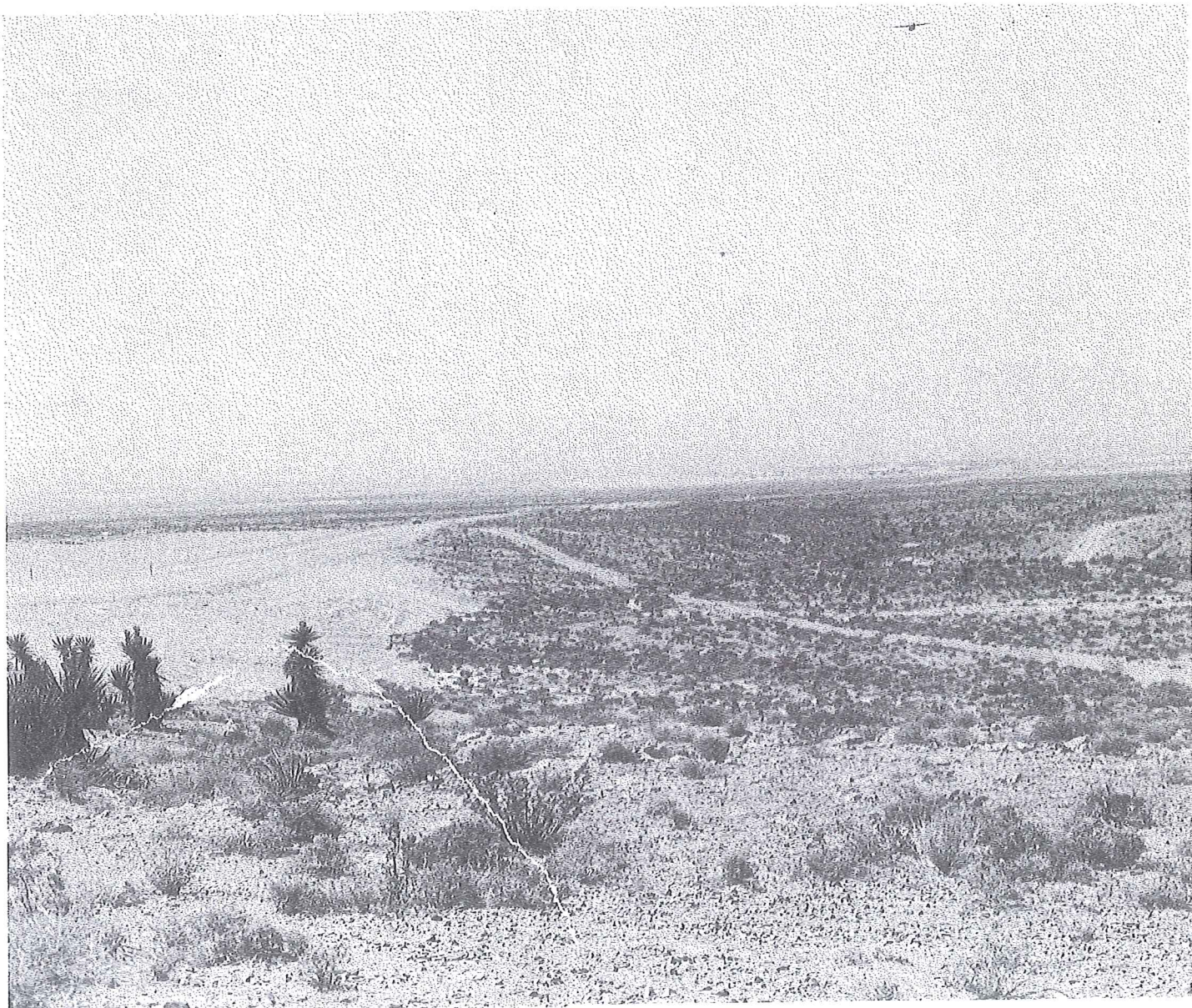
United States
Department of
Agriculture

Soil
Conservation
Service

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

Soil Survey of Las Vegas Valley Area Nevada

Part of Clark County



ndy loam about 4 inches thick. The upper 7 inches of e underlying material is light yellowish brown extremely avelly fine sandy loam, the next 6 inches is light yellowish brown very gravelly sandy loam, and the lower art to a depth of 61 inches is light yellowish brown (tremely gravelly fine sandy loam. Pebbles cover 50 to 5 percent of the surface.

Included in this unit are about 5 percent Tencee soils 1 erosional fan remnants and 10 percent Arizo soils, ooded, in channels. Included areas make up about 15 percent of the total acreage. The percentage varies from re area to another.

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

This unit is used mainly as habitat for desert wildlife rd for recreation. It is also used for urban development. This unit is well suited to the construction of dwellings. Septic tank absorption fields generally function well less the density of housing is too high.

Roads are easily constructed and maintained.

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

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

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

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

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

Included in this unit are about 10 percent Tencee soils 1 erosional fan remnants and 5 percent Arizo soils, ooded, in channels. Included areas make up about 15 percent of the total acreage. The percentage varies from re area to another.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

See footnote at end of table.

RUNOFF CURVE NUMBERS (URBAN AREAS¹)

Cover description		Curve numbers for hydrologic soil group—			
Cover type and hydrologic condition	Average percent impervious area ²	A	B	C	D
<i>Fully developed urban areas (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.) ³ :					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) ⁴ ...		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
See Table 602A					

Developing urban areas

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

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

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

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

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

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

Revision	Date

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RUNOFF CURVE NUMBERS (SEMIARID RANGELANDS¹)

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

¹Average runoff condition, and $I_n = 0.2S$.

²Poor: <30% ground cover (litter, grass, and brush overstory).

Fair: 30 to 70% ground cover.

Good: >70% ground cover.

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

Revision	Date

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RUNOFF CURVE NUMBERS - RESIDENTIAL DISTRICTS

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

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

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

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

Revision	Date

REFERENCE:

TABLE 602A

Standard Form 4 Computations



Project Name:	DEER SPRINGS 5
Description:	Existing and Developed Conditions
File Name:	RAH11009.001 TDS Lag Time Standard Form 4.xls
By:	AJH/ARP
Date:	03/04/14

SUB-BASIN DATA					INITIAL / OVERLAND TIME (Ti)		TRAVEL TIME (Tt)					Tc	Tc Check	Flag			
DESIG:	DEV./EX. (D or E)	CN	K	AREA Ac	AREA Mi^2	INITIAL LENGTH Feet	SLOPE %	Ti Min	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY FPS	V2 VELOCITY FPS	Tt Min	Tc Calc.	Total Length Feet	Tc Check	Flag
								[3]			[4]	[5]	[6]	[7]	[8]	[9]	[10]

[illegible][illegible]

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

STANDARD FORM 4

APPENDIX C

HEC-1 Analyses

Existing Condition
Developed Condition

Existing Condition


```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 04MAR14 TIME 07:59:38
*
*****

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EX.OUT

```

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

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

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

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

1

HEC-1 INPUT

PAGE 1

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

*DIAGRAM
1 ID SLATER HANIFAN GROUP
2 ID DEER SPRINGS 5
3 ID TECHNICAL DRAINAGE STUDY
4 ID EXISTING DRAINAGE CONDITION
5 ID
6 ID RETURN PERIOD ----- 100 & 10-YEAR
7 ID DISTRIBUTION ----- 6-HOUR SDN3
8 ID PROJECT NO. ----- RAH1009.001
9 ID FILENAME ----- EX.H1
10 ID DATE ----- 03/04/14
11 ID MODELED BY ----- AJH/ARP
12 ID
13 ID PRECIPITATION STORM EVENT RATIOS
14 ID STORM EVENT RATIO
15 ID 100-YR 1.00
16 ID 10-YR 0.56
17 ID
18 IT 5 0 0 300
19 IO 5 0 0
20 IN 5 0 0
21 JR PREC 1.00 0.56
*

22 KK ONX
23 KM EXISTING ONSITE BASIN
24 BA .0069
25 PB 3.00
26 PC 0 0.020 0.057 0.070 0.087 0.108 0.124 0.130 0.130 0.130
27 PC 0.130 0.130 0.130 0.133 0.140 0.142 0.148 0.158 0.172 0.181
28 PC 0.190 0.197 0.199 0.200 0.201 0.204 0.214 0.229 0.241 0.249
29 PC 0.251 0.256 0.270 0.278 0.281 0.283 0.295 0.322 0.352 0.409
30 PC 0.499 0.590 0.710 0.744 0.781 0.812 0.819 0.835 0.851 0.856
31 PC 0.860 0.868 0.876 0.888 0.910 0.926 0.937 0.950 0.970 0.976
32 PC 0.982 0.985 0.987 0.989 0.990 0.993 0.993 0.994 0.995 0.998
33 PC 0.998 0.999 1
34 LS 0 77.4
35 UD 0.100
*

36 KK DSP
37 KM DEER SPRINGS BASIN ADJACENT TO SITE
38 BA .0021
39 LS 0 98.0
40 UD 0.050
*

41 KK CP1
42 KM ONX + DSP
43 KM COLLECTION POINT IN DEER SPRINGS WAY AT EAST EDGE OF PROJECT SITE
44 HC 2
*

```

1

HEC-1 INPUT

PAGE 2

```

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

45 KK HAL
46 KM HALEY AVE BASIN
47 BA .0005
48 LS 0 98.0
49 UD 0.050
*
50 ZZ

```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

Page 1

EX.OUT

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

22 ONX

36 DSP

41 CP1.....

45 HAL

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

FLOOD HYDROGRAPH PACKAGE (HEC-1)

JUN 1998

VERSION 4.1

RUN DATE 04MAR14 TIME 07:59:38

U.S. ARMY CORPS OF ENGINEERS

HYDROLOGIC ENGINEERING CENTER

609 SECOND STREET

DAVIS, CALIFORNIA 95616

(916) 756-1104

SLATER HANIFAN GROUP

DEER SPRINGS 5

TECHNICAL DRAINAGE STUDY

EXISTING DRAINAGE CONDITION

RETURN PERIOD ----- 100 & 10-YEAR

DISTRIBUTION ----- 6-HOUR SDN3

PROJECT NO. ----- RAH1009.001

FILENAME ----- EX.H1

DATE ----- 03/04/14

MODELED BY ----- AJH/ARP

PRECIPITATION STORM EVENT RATIOS

STORM EVENT RATIO

100-YR 1.00

10-YR 0.56

19 IO OUTPUT CONTROL VARIABLES

IPRNT 5 PRINT CONTROL

IPLOT 0 PLOT CONTROL

QSCAL 0. HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN 5 MINUTES IN COMPUTATION INTERVAL

IDATE 1 0 STARTING DATE

ITIME 0000 STARTING TIME

NQ 300 NUMBER OF HYDROGRAPH ORDINATES

NDDATE 2 0 ENDING DATE

NDTIME 0055 ENDING TIME

ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .08 HOURS

TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

DRAINAGE AREA SQUARE MILES

PRECIPITATION DEPTH INCHES

LENGTH, ELEVATION FEET

FLOW CUBIC FEET PER SECOND

STORAGE VOLUME ACRE-Feet

SURFACE AREA ACRES

TEMPERATURE DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION

NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION

RATIOS OF PRECIPITATION

1.00 .56

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS

FLOW IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES

TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION	
					RATIO 1 1.00	RATIO 2 .56
HYDROGRAPH AT	ONX	.01	1	FLOW	7.	2.
+				TIME	3.50	3.58
HYDROGRAPH AT	DSP	.00	1	FLOW	5.	3.
+				TIME	3.50	3.50
2 COMBINED AT	CP1	.01	1	FLOW	12.	5.
+				TIME	3.50	3.50
HYDROGRAPH AT	HAL	.00	1	FLOW	1.	1.
+				TIME	3.50	3.50

EX.OUT

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

Developed Condition

1*****
 *
 * FLOOD HYDROGRAPH PACKAGE (HEC-1) *
 * JUN 1998 *
 * VERSION 4.1 *
 * RUN DATE 04MAR14 TIME 07:59:46 *
 * *****

DEV.OUT

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

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

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

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

1

HEC-1 INPUT

PAGE 1

```

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

*DIAGRAM
1 ID SLATER HANIFAN GROUP
2 ID DEER SPRINGS 5
3 ID TECHNICAL DRAINAGE STUDY
4 ID DEVELOPED DRAINAGE CONDITION
5 ID
6 ID RETURN PERIOD ----- 100 & 10-YEAR
7 ID DISTRIBUTION ----- 6-HOUR SDN3
8 ID PROJECT NO. ----- RAH1009.001
9 ID FILENAME ----- DEV.H1
10 ID DATE ----- 03/05/14
11 ID MODELED BY ----- AJH/ARP
12 ID
13 ID PRECIPITATION STORM EVENT RATIOS
14 ID STORM EVENT RATIO
15 ID 100-YR 1.00
16 ID 10-YR 0.56
17 ID
18 IT 5 0 0 300
19 IO 5 0 0
20 IN 5 0 0
21 JR PREC 1.00 0.56
*

22 KK OND
23 KM DEVELOPED ONSITE BASIN
24 BA .0069
25 PB 3.00
26 PC 0 0.020 0.057 0.070 0.087 0.108 0.124 0.130 0.130 0.130
27 PC 0.130 0.130 0.130 0.133 0.140 0.142 0.148 0.158 0.172 0.181
28 PC 0.190 0.197 0.199 0.200 0.201 0.204 0.214 0.229 0.241 0.249
29 PC 0.251 0.256 0.270 0.278 0.281 0.283 0.295 0.322 0.352 0.409
30 PC 0.499 0.590 0.710 0.744 0.781 0.812 0.819 0.835 0.851 0.856
31 PC 0.860 0.868 0.876 0.888 0.910 0.926 0.937 0.950 0.970 0.976
32 PC 0.982 0.985 0.987 0.989 0.990 0.993 0.993 0.994 0.995 0.998
33 PC 0.998 0.999 1
34 LS 0 87.2
35 UD 0.098
*

36 KK DSP
37 KM DEER SPRINGS BASIN
38 BA .0021
39 LS 0 98.0
40 UD 0.050
*

41 KK HAL
42 KM HALEY AVE BASIN
43 BA .0005
44 LS 0 98.0
45 UD 0.050
*
  
```

1

HEC-1 INPUT

PAGE 2

```

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

46 KK CP1
47 KM HAL + OND + DSP
48 KM COLLECTION POINT IN DEER SPRINGS WAY AT EAST EDGE OF PROJECT SITE
49 HC 3
*
50 ZZ
  
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

Page 1

DEV.OUT

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

22	OND		
36	.	DSP	
41	.	.	HAL
46	CP1	.	.

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

* FLOOD HYDROGRAPH PACKAGE (HEC-1) *

* JUN 1998 *

* VERSION 4.1 *

* RUN DATE 04MAR14 TIME 07:59:46 *

* U.S. ARMY CORPS OF ENGINEERS *

* HYDROLOGIC ENGINEERING CENTER *

* 609 SECOND STREET *

* DAVIS, CALIFORNIA 95616 *

* (916) 756-1104 *

SLATER HANIFAN GROUP
DEER SPRINGS 5
TECHNICAL DRAINAGE STUDY
DEVELOPED DRAINAGE CONDITION

RETURN PERIOD ----- 100 & 10-YEAR
DISTRIBUTION ----- 6-HOUR SDN3
PROJECT NO. ----- RAH1009.001
FILENAME ----- DEV.H1
DATE ----- 03/05/14
MODELED BY ----- AJH/ARP

PRECIPITATION STORM EVENT RATIOS

STORM EVENT	RATIO
100-YR	1.00
10-YR	0.56

19 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

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

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

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

JP MULTI-PLAN OPTION

NPLAN	1	NUMBER OF PLANS
-------	---	-----------------

JR MULTI-RATIO OPTION

RATIOS OF PRECIPITATION	1.00	.56
-------------------------	------	-----

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS

FLows IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES

TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1 1.00	RATIO 2 .56
HYDROGRAPH AT	OND	.01	1	11. 3.50	4. 3.50
HYDROGRAPH AT	DSP	.00	1	5. 3.50	3. 3.50
HYDROGRAPH AT	HAL	.00	1	1. 3.50	1. 3.50
3 COMBINED AT	CP1	.01	1	18. 3.50	8. 3.50

DEV.OUT

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

APPENDIX D

FlowMaster Hydraulic Computations

Deer Springs Way
Other Street Sections

Deer Springs Way

SECTION DS: DEER SPRINGS WAY (10-YR) - EXISTING

Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION DS: DEER SPRINGS WAY (10-YR) - EXISTING
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.025000 ft/ft
Discharge	47.00 cfs

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

Results	
Mannings Coefficient	0.015
Water Surface Elevation	0.56 ft
Elevation Range	0.00 to 2.00
Flow Area	9.4 ft ²
Wetted Perimeter	50.29 ft
Top Width	49.23 ft
Actual Depth	0.56 ft
Critical Elevation	0.69 ft
Critical Slope	0.005642 ft/ft
Velocity	5.00 ft/s
Velocity Head	0.39 ft
Specific Energy	0.95 ft
Froude Number	2.02
Flow Type	Supercritical

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+06.00	0.025
0+06.00	0+13.00	0.013
0+13.00	0+79.00	0.016
0+79.00	0+86.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	2.00
0+00.00	0.72
0+06.00	0.60
0+11.00	0.50
0+11.50	0.48
0+11.50	0.00
0+13.00	0.13

SECTION DS: DEER SPRINGS WAY (10-YR) - EXISTING
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+13.00	0.17
0+46.00	0.83
0+79.00	0.17
0+79.00	0.13
0+80.50	0.00
0+80.50	0.48
0+81.00	0.50
0+86.00	0.60
0+86.00	2.00

Notes:

Q includes NWNS (EX.) @ CP1

CP1 = 47 CFS

SECTION DS: DEER SPRINGS WAY (10-YR) - EXISTING

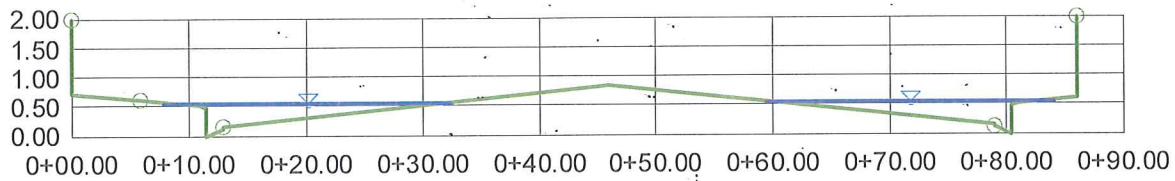
Cross Section for Irregular Channel

Project Description

Worksheet	SECTION DS: DEER SPRINGS WAY (10-YR) - EXISTING
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data

Mannings Coefficient	0.015
Channel Slope	0.025000 ft/ft
Water Surface Elevation	0.56 ft
Elevation Range	0.00 to 2.00
Discharge	47.00 cfs



V:5.0
H:1
NTS

SECTION DS: DEER SPRINGS WAY (100-YR) - EXISTING

Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION DS: DEER SPRINGS WAY (100-YR) - EXISTING
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.025000 ft/ft
Discharge	153.00 cfs

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

Results	
Mannings Coefficient	0.015
Water Surface Elevation	0.76 ft
Elevation Range	0.00 to 2.00
Flow Area	22.8 ft ²
Wetted Perimeter	80.70 ft
Top Width	79.42 ft
Actual Depth	0.76 ft
Critical Elevation	0.96 ft
Critical Slope	0.004389 ft/ft
Velocity	6.71 ft/s
Velocity Head	0.70 ft
Specific Energy	1.46 ft
Froude Number	2.21
Flow Type	Supercritical

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+06.00	0.025
0+06.00	0+13.00	0.013
0+13.00	0+79.00	0.016
0+79.00	0+86.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	2.00
0+00.00	0.72
0+06.00	0.60
0+11.00	0.50
0+11.50	0.48
0+11.50	0.00
0+13.00	0.13

SECTION DS: DEER SPRINGS WAY (100-YR) - EXISTING
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+13.00	0.17
0+46.00	0.83
0+79.00	0.17
0+79.00	0.13
0+80.50	0.00
0+80.50	0.48
0+81.00	0.50
0+86.00	0.60
0+86.00	2.00

Notes:

Q includes NWNS (EX.) @ CP1

CP1 = 153CFS

SECTION DS: DEER SPRINGS WAY (100-YR) - EXISTING

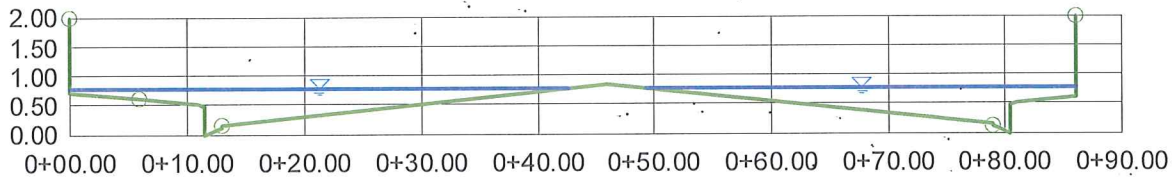
Cross Section for Irregular Channel

Project Description

Worksheet	SECTION DS: DEER SPRINGS WAY (100-YR) - EXISTING
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data

Mannings Coefficient	0.015
Channel Slope	0.025000 ft/ft
Water Surface Elevation	0.76 ft
Elevation Range	0.00 to 2.00
Discharge	153.00 cfs



V:5.0
H:1
NTS

SECTION DS: DEER SPRINGS WAY (10-YR) - DEVELOPED

Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION DS: DEER SPRINGS WAY (10-YR) - DEVELOPI
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.025000 ft/ft
Discharge	15.00 cfs

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

Results	
Mannings Coefficient	0.014
Water Surface Elevation	0.39 ft
Elevation Range	0.00 to 2.00
Flow Area	3.4 ft ²
Wetted Perimeter	25.70 ft
Top Width	24.83 ft
Actual Depth	0.39 ft
Critical Elevation	0.49 ft
Critical Slope	0.004910 ft/ft
Velocity	4.47 ft/s
Velocity Head	0.31 ft
Specific Energy	0.70 ft
Froude Number	2.15
Flow Type	Supercritical

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+06.00	0.025
0+06.00	0+13.00	0.013
0+13.00	0+79.00	0.016
0+79.00	0+86.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	2.00
0+00.00	0.72
0+06.00	0.60
0+11.00	0.50
0+11.50	0.48
0+11.50	0.00
0+13.00	0.13

SECTION DS: DEER SPRINGS WAY (10-YR) - DEVELOPED
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+13.00	0.17
0+46.00	0.83
0+79.00	0.17
0+79.00	0.13
0+80.50	0.00
0+80.50	0.48
0+81.00	0.50
0+86.00	0.60
0+86.00	2.00

Notes:

Q includes NWNS (FUT.) @ CP1

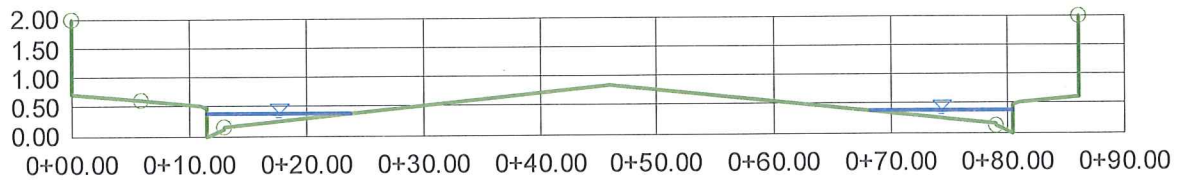
CP1 = 15 CFS

SECTION DS: DEER SPRINGS WAY (10-YR) - DEVELOPED

Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION DS: DEER SPRINGS WAY (10-YR) - DEVELOPI
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.014
Channel Slope	0.025000 ft/ft
Water Surface Elevation	0.39 ft
Elevation Range	0.00 to 2.00
Discharge	15.00 cfs



V:5.0
H:1
NTS

SECTION DS: DEER SPRINGS WAY (100-YR) - DEVELOPED

Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION DS: DEER SPRINGS WAY (100-YR) - DEVELOPI
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.025000 ft/ft
Discharge	149.00 cfs

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

Results	
Mannings Coefficient	0.015
Water Surface Elevation	0.76 ft
Elevation Range	0.00 to 2.00
Flow Area	22.4 ft ²
Wetted Perimeter	80.13 ft
Top Width	78.86 ft
Actual Depth	0.76 ft
Critical Elevation	0.96 ft
Critical Slope	0.004401 ft/ft
Velocity	6.67 ft/s
Velocity Head	0.69 ft
Specific Energy	1.45 ft
Froude Number	2.21
Flow Type	Supercritical

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+06.00	0.025
0+06.00	0+13.00	0.013
0+13.00	0+79.00	0.016
0+79.00	0+86.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	2.00
0+00.00	0.72
0+06.00	0.60
0+11.00	0.50
0+11.50	0.48
0+11.50	0.00
0+13.00	0.13

SECTION DS: DEER SPRINGS WAY (100-YR) - DEVELOPED
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+13.00	0.17
0+46.00	0.83
0+79.00	0.17
0+79.00	0.13
0+80.50	0.00
0+80.50	0.48
0+81.00	0.50
0+86.00	0.60
0+86.00	2.00

Notes:

Q includes NWNS (FUT.) @ CP1

CP1 = 149 CFS

SECTION DS: DEER SPRINGS WAY (100-YR) - DEVELOPED

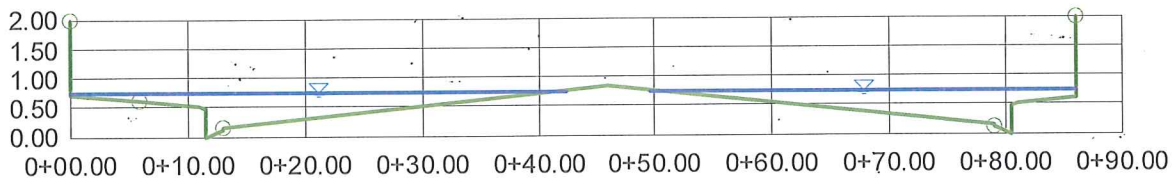
Cross Section for Irregular Channel

Project Description

Worksheet	SECTION DS: DEER SPRINGS WAY (100-YR) - DEVELOPI
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data

Mannings Coefficient	0.015
Channel Slope	0.025000 ft/ft
Water Surface Elevation	0.76 ft
Elevation Range	0.00 to 2.00
Discharge	149.00 cfs



V:5.0
H:1
NTS

Other Street Sections

Section 1: Daytonflyer ST (100-YR) Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION 1: DAYTONFLYER ST (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.017000 ft/ft
Discharge	12.00 cfs

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

Results	
Mannings Coefficient	0.014
Water Surface Elevation	0.47 ft
Elevation Range	0.00 to 1.00
Flow Area	2.9 ft ²
Wetted Perimeter	18.05 ft
Top Width	17.45 ft
Actual Depth	0.47 ft
Critical Elevation	0.56 ft
Critical Slope	0.005236 ft/ft
Velocity	4.10 ft/s
Velocity Head	0.26 ft
Specific Energy	0.73 ft
Froude Number	1.77
Flow Type	Supercritical

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+07.00	0.013
0+07.00	0+40.00	0.016
0+40.00	0+47.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.48
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+33.50	0.70
0+40.00	0.57

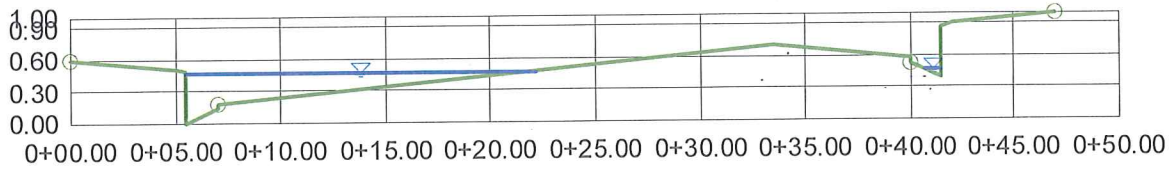
Section 1: Daytonflyer ST (100-YR) Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+40.00	0.53
0+41.50	0.40
0+41.50	0.88
0+42.00	0.90
0+47.00	1.00

Section 1: Daytonflyer ST (100-YR) **Cross Section for Irregular Channel**

Project Description	
Worksheet	SECTION 1: DAYTONFLYER ST (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.014
Channel Slope	0.017000 ft/ft
Water Surface Elevation	0.47 ft
Elevation Range	0.00 to 1.00
Discharge	12.00 cfs



V:5.0
H:1
NTS

Section 2: Cul-de-sac (100-YR) Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION 2: CUL-DE-SAC (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.040500 ft/ft
Discharge	11.00 cfs

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

Results	
Mannings Coefficient	0.014
Water Surface Elevation	0.36 ft
Elevation Range	0.00 to 0.93
Flow Area	2.3 ft ²
Wetted Perimeter	21.36 ft
Top Width	20.92 ft
Actual Depth	0.36 ft
Critical Elevation	0.46 ft
Critical Slope	0.005324 ft/ft
Velocity	4.85 ft/s
Velocity Head	0.37 ft
Specific Energy	0.73 ft
Froude Number	2.60
Flow Type	Supercritical

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+07.00	0.013
0+07.00	0+40.00	0.016
0+40.00	0+47.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.93
0+05.00	0.83
0+05.50	0.81
0+05.50	0.33
0+07.00	0.46
0+07.00	0.50
0+40.00	0.17
0+40.00	0.13

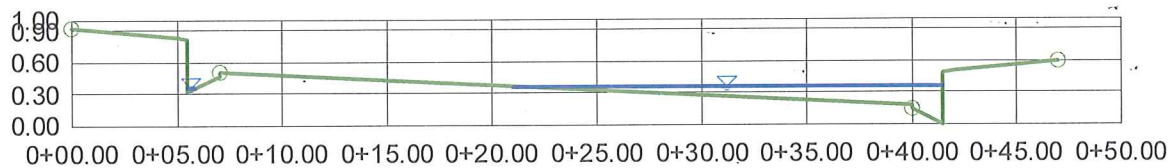
Section 2: Cul-de-sac (100-YR) Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+41.50	0.00
0+41.50	0.48
0+42.00	0.50
0+47.00	0.60

Section 2: Cul-de-sac (100-YR) Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION 2: CUL-DE-SAC (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.014
Channel Slope	0.040500 ft/ft
Water Surface Elevation	0.36 ft
Elevation Range	0.00 to 0.93
Discharge	11.00 cfs



V:5.0
H:1
NTS

SECTION HA: HALEY AVE. (100-YR)

Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION HA: HALEY AVE. (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.030600 ft/ft
Discharge	1.00 cfs

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

Results	
Mannings Coefficient	0.015
Water Surface Elevation	0.23 ft
Elevation Range	0.00 to 2.00
Flow Area	0.3 ft ²
Wetted Perimeter	4.70 ft
Top Width	4.43 ft
Actual Depth	0.23 ft
Critical Elevation	0.27 ft
Critical Slope	0.007777 ft/ft
Velocity	2.99 ft/s
Velocity Head	0.14 ft
Specific Energy	0.37 ft
Froude Number	1.92
Flow Type	Supercritical

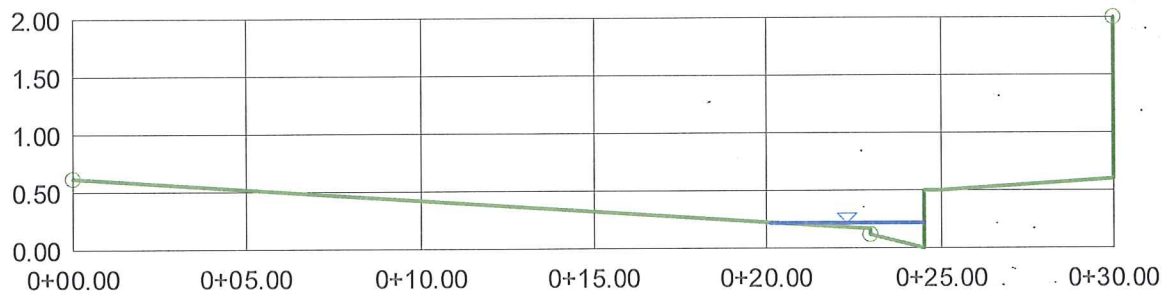
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+23.00	0.016
0+23.00	0+30.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.63
0+23.00	0.17
0+23.00	0.13
0+24.50	0.00
0+24.50	0.50
0+25.00	0.50
0+30.00	0.60
0+30.00	2.00

SECTION HA: HALEY AVE. (100-YR) Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION HA: HALEY AVE. (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.015
Channel Slope	0.030600 ft/ft
Water Surface Elevation	0.23 ft
Elevation Range	0.00 to 2.00
Discharge	1.00 cfs



V:3.33333333
H:1
NTS

APPENDIX E

Finished Floor Analysis

DEER SPRINGS 5 FINISH FLOOR - CITY OF LAS VEGAS JURISDICTION										
INPUT INFORMATION				FINISHED FLOORS					NOTES	
Lot Number	Hydraulic Section Utilized	T/C ¹ (ft)	F/L ² (ft)	D ₁₀₀ (ft)	Flowline F.F. _{min} ³ (ft)	T/C + 6" F.F. _{min} ⁴ (ft)	F.F. ⁵ -design (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
1	1	2713.70	2713.20	0.47	2714.14	2714.20	2714.8	OK	OK	
2	1	2716.51	2716.01	0.47	2716.95	2717.01	2717.6	OK	OK	
3	1	2717.95	2717.45	0.47	2718.39	2718.45	2720.0	OK	OK	
4	1	2718.05	2717.55	0.47	2718.49	2718.55	2720.7	OK	OK	
5	1	2716.75	2716.25	0.47	2717.19	2717.25	2718.5	OK	OK	
6	1	2714.15	2713.65	0.47	2714.59	2714.65	2715.9	OK	OK	
7	1	2718.98	2718.48	0.47	2719.42	2719.48	2720.1	OK	OK	
8	1	2721.86	2721.36	0.47	2722.30	2722.36	2723.0	OK	OK	
9	1	2723.34	2722.84	0.47	2723.78	2723.84	2725.4	OK	OK	
10	1	2723.45	2722.95	0.47	2723.89	2723.95	2726.2	OK	OK	
11	1	2722.11	2721.61	0.47	2722.55	2722.61	2723.8	OK	OK	
12	1	2719.45	2718.95	0.47	2719.89	2719.95	2721.2	OK	OK	
13	1	2718.87	2718.37	0.47	2719.31	2719.37	2720.1	OK	OK	
14	1	2717.25	2716.75	0.47	2717.69	2717.75	2718.6	OK	OK	
15	1	2715.79	2715.29	0.47	2716.23	2716.29	2717.2	OK	OK	
16	1	2714.54	2714.04	0.47	2714.98	2715.04	2716.0	OK	OK	
17	1	2713.37	2712.87	0.47	2713.81	2713.87	2714.8	OK	OK	
18	1	2712.20	2711.70	0.47	2712.64	2712.70	2713.6	OK	OK	
19	1	2711.03	2710.53	0.47	2711.47	2711.53	2712.5	OK	OK	
20	1	2709.95	2709.45	0.47	2710.39	2710.45	2711.6	OK	OK	
21	1	2709.19	2708.69	0.47	2709.63	2709.69	2710.8	OK	OK	
Where: 1: Top of Curb at High Side of Lot 2: TC-0.38 (For Roll Curb), TC-0.5 (For L Curb) 3: Minimum Allowable Finished Floor Elevation above flowline elevation @ high side of lot = (2 x D ₁₀₀) + F/L 4: City of Las Vegas minimum allowable finished floor elevation = T.C. @ high side of lot + 6-inches 5: These lots have an adjacent solid grouted wall that protects the FF. City of Las Vegas Finished Floor Criteria: -The finished floor shall be set a vertical distance above the gutter flowline of at least twice the depth of flow in the gutter flowline up to a maximum of 18 inches above the WSEL in the street. -The finished floor shall be set a vertical distance of at least 6-inches above the highest adjacent top of curb.										

Other Finish Floor Checks

Specific Energy Check					
Lot Number	High FL ¹	Specific Energy ²	Min FF ³	Design FF	Check
15	2715.29	0.73	2716.02	2717.20	OK
19	2710.53	0.73	2711.26	2712.50	OK
20	2709.45	0.73	2710.18	2711.60	OK

1: High FL is along the lot frontage or where the flow is directed.

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

3: Min FF is the High FL plus the Specific Energy Depth.

APPENDIX F

Reference Material

Technical Drainage Study for Town Center L-TC 60/75 No. 5
by SHG (DS-3877, HTE #05-55610)

Approval Letters
Developed Condition Drainage Exhibits

Approval Letters

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM

DATE:

May 17, 2007

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:

Town Center L-TC 60/75 No. 5 - Update #3

Cross Streets:

Grand Canyon Dr. & Deer Springs Way

File Number:

F:\Depot\DSMEMOS\DS3877F.doc

Parcel Number:

125-19-501-009, -010, -601-001, 007

Zoning Action:

SDR-6315, ZON-6312, VAR-6328

COPIES TO:

Slater Harifan Group

Pardee Homes

Bart Anderson, P.E., DevCo

Darcy Hayes, Ward 4 Liaison

CCDDS

FEMA Flood Zone

YES

NO

X

Proposed Storm Drain

YES

X

NO

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Trn. No.
1 st Submittal	8/12/2005	9/1/2005	Not Approved	\$400.00	27654: \$400
2 nd Submittal	10/27/2005	11/18/2005	Not Approved	\$400.00	32344: \$400
3 rd Submittal	12/6/2005	12/19/2005	Conditional Approval	\$400.00	34590: \$400
4 th Submittal	3/13/2006	3/27/2006	Approved	\$400.00	40420: \$400
5 th Submittal	11/22/2006	12/7/2006	Approved	\$100.00	58310: \$100
6 th Submittal	5/3/2007	5/17/2007	See Comments Below	\$100.00	68445: \$100
TOTAL FEES (LDDRS):				\$1,800.00	

REMARKS:

6th Submittal: Update #3 for minor grading revision at the cul-de-sac of Haley Avenue

5th Submittal: Update #2 to revise Common Lot D to have landscape rock in place of concrete

4th Submittal: Update to Re-align the main line storm drain in Grand Canyon Drive and Deer Springs Drive to accommodate for an existing gas line and Raise Finish Floor Elevation of Lots 41, 42, 48 & 49. The Raise varies from 0.2 ft to 0.5 ft.

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

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

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



Department of Development Services Civil Engineering Division

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

Phil Rosenquist, Director

RECEIVED

MAR 13 2006

March 6, 2006

Slater Hanifan Group
5740 South Arville Street, Suite 216
Las Vegas, NV 89118

TECHNICAL DRAINAGE STUDY FOR TOWN CENTER 60/75 NO.5 - SEC. 19, T. 19 S., R. 60 E. - HTE 05 - 55610

The above-referenced site is located in the City of Las Vegas adjacent to Clark County unincorporated areas. The drainage study was submitted to the County for concurrence. The County has received the study with all addenda, and the approval letter dated December 19, 2005 from the City of Las Vegas.

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

No liability is assumed by the County for information, data, and conclusions of the consulting engineer.

DEPARTMENT OF DEVELOPMENT SERVICES

BY:


Jeffery J. Jensen, P.E.
Senior Civil Engineer
Civil Engineering Division

JJJ: pts *pl*

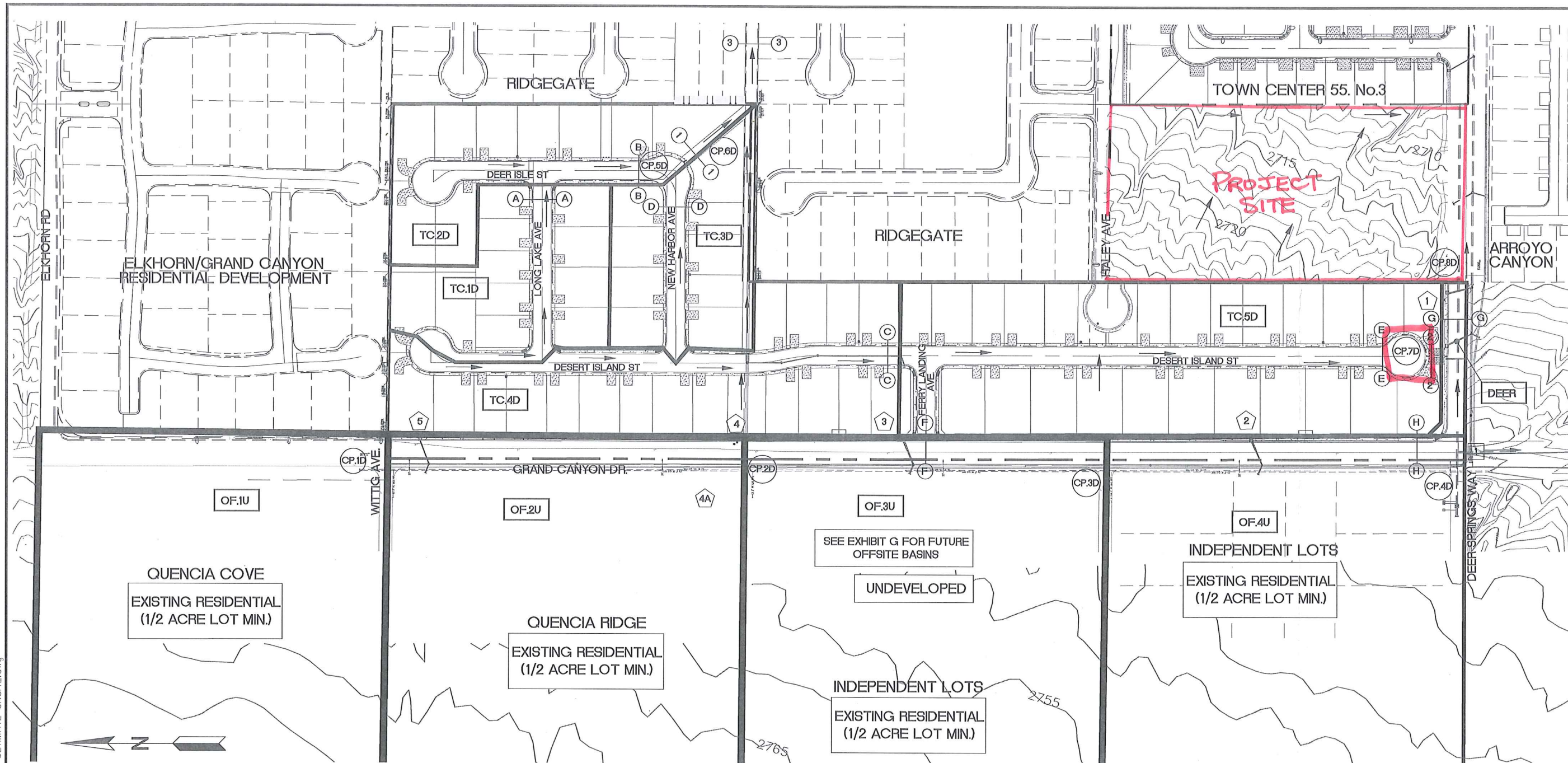
cc: Greg McDermott, P.E., Flood Control Project Manager
City of Las Vegas Department of Public Works

BOARD OF COUNTY COMMISSIONERS

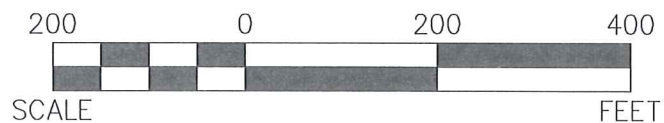
RORY REID, Chairman • MYRNA WILLIAMS, Vice Chair
TOM COLLINS • YVONNE ATKINSON GATES • CHIP MAXFIELD • LYNETTE BOGGS McDONALD • BRUCE L. WOODBURY
THOM REILLY, County Manager

Developed Condition Drainage Exhibits

File: J:\PAR0302-007\Drainage\Technical Study\Figures\EXHIBIT I ULTIMATE ON-SITE.dwg



SYMBOL KEY	
TC.1D	DRAINAGE SUBBASIN
(C1)	COMBINATION POINT
—	SUBBASIN BOUNDARY
→	FLOW DIRECTION
A—A	STREET CROSS SECTION
①—①	DRAINAGE EASEMENT SECTION
1	FLOW SPLIT & BYPASS LOCATION
1	DROP INLET & BYPASS LOCATION



SUMMARY OF INLETS AND FLOW SPLITS		
COMBINATION PT	Q100 (CFS)	Q10 (CFS)
DI5	12	3
BP1	77	0
DI4A	7	0
BP2	70	0
DI4	47	4
BP3	95	0
DI3	27	0
BP4	68	4
DI2	14	3
BP5	79	6
FS1	38	0
BP6	66	4
DI1	NUISANCE ONLY	

NOTE: DI# IS RUNOFF CAPTURED BY THE DROP INLET, FS# IS RUNOFF FROM A FLOWSPLIT THAT LEAVE THE MAIN LINE. BP# IS THE RUNOFF THAT BY PASSES THE INLET OR MAINTAINS FLOW PATH FROM A FLOW SPLIT.

SUMMARY OF CONCENTRATION PTS		
COMBINATION PT	Q100 (CFS)	Q10 (CFS)
CP.1D	89	3
CP.2D	142	4
CP.3D	95	3
CP.4D	106	4
CP.5D	10	3
CP.6D	15	5
CP.7D	22	7
CP.8D	45	8
C-SD	61	6
C-EASE	48	6

SUMMARY OF BASIN FLOWRATES			
SUBBASIN	Q100 (CFS)	Q10 (CFS)	AREA (ACRES)
TC.1D	5	2	2.38
TC.2D	5	2	2.58
TC.3D	5	2	2.19
TC.4D	9	3	4.18
TC.5D	14	5	6.59
DEER	1	1	0.32
OF.1U	28	3	40.0
OF.2U	28	3	40.0
OF.3U	28	3	40.0
OF.4U	28	3	40.0

FLOW SPLIT 1 (FS1) AND FLOW SPLIT 2 (FS2) CORRESPOND TO BYPASS (BP2.5) AND (BP5) RESPECTIVELY

TOWN CENTER ASSEMBLAGE 60/75 NO.5

ON-SITE DRAINAGE MAP
ULTIMATE CONDITIONS

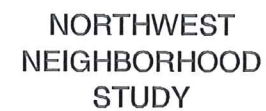
DATE: 08/10/05
DRAFTER: JDS
DESIGNER: JDS
CHECKED: MJF
PROJECT NO.
PAR0302.007A

EXHIBIT I
SHEET 1 OF 1

APPENDIX G

Reference Material

CLV Northwest Neighborhood Study – Phase 2



LEGEND

- SUB-BASIN BOUNDARY

FLOW ARROW

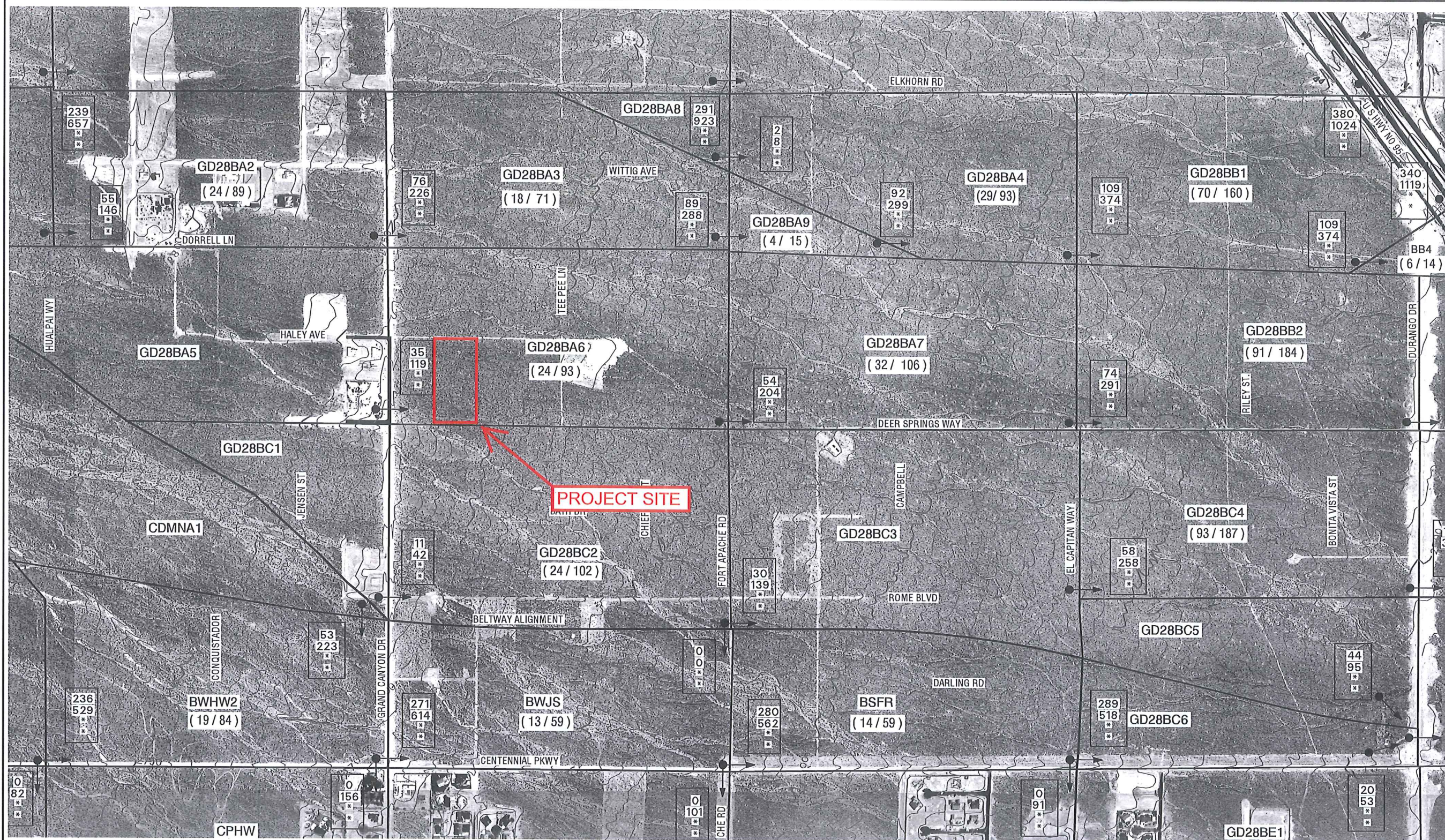
250	10-YEAR STREET FLOW
500	100-YEAR STREET FLOW
300	10-YEAR FACILITY FLOW
800	100-YEAR FACILITY FLOW

(FLOWS IN CFS)

BWJS ↔ Basin-ID
13 / 59) ↔ Contributing flow
(10-Year / 100-Year
from the basin (cfs)

PHOTO DATE: APRIL 1996

FIGURE E-1



EXISTING DRAINAGE CONDITIONS



**POST,
BUCKLEY,
SCHUH &
JERNIGAN, INC.**

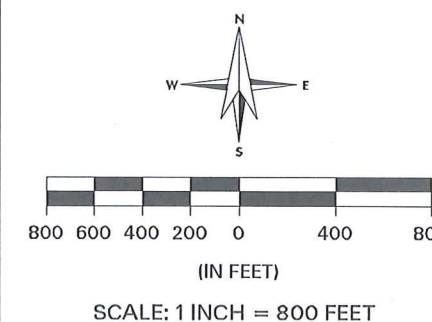
ENGINEERING PLANNING SURVEYING GIS
901, N. Green Valley Pkwy, Ste 100, Henderson NV 89014
Phone: (702) 263-7275 Fax: (702) 263-7200

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

REVISÉD SEPTEMBER 1999

NOTE:

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



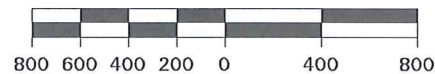
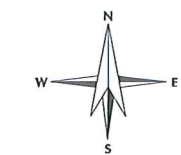
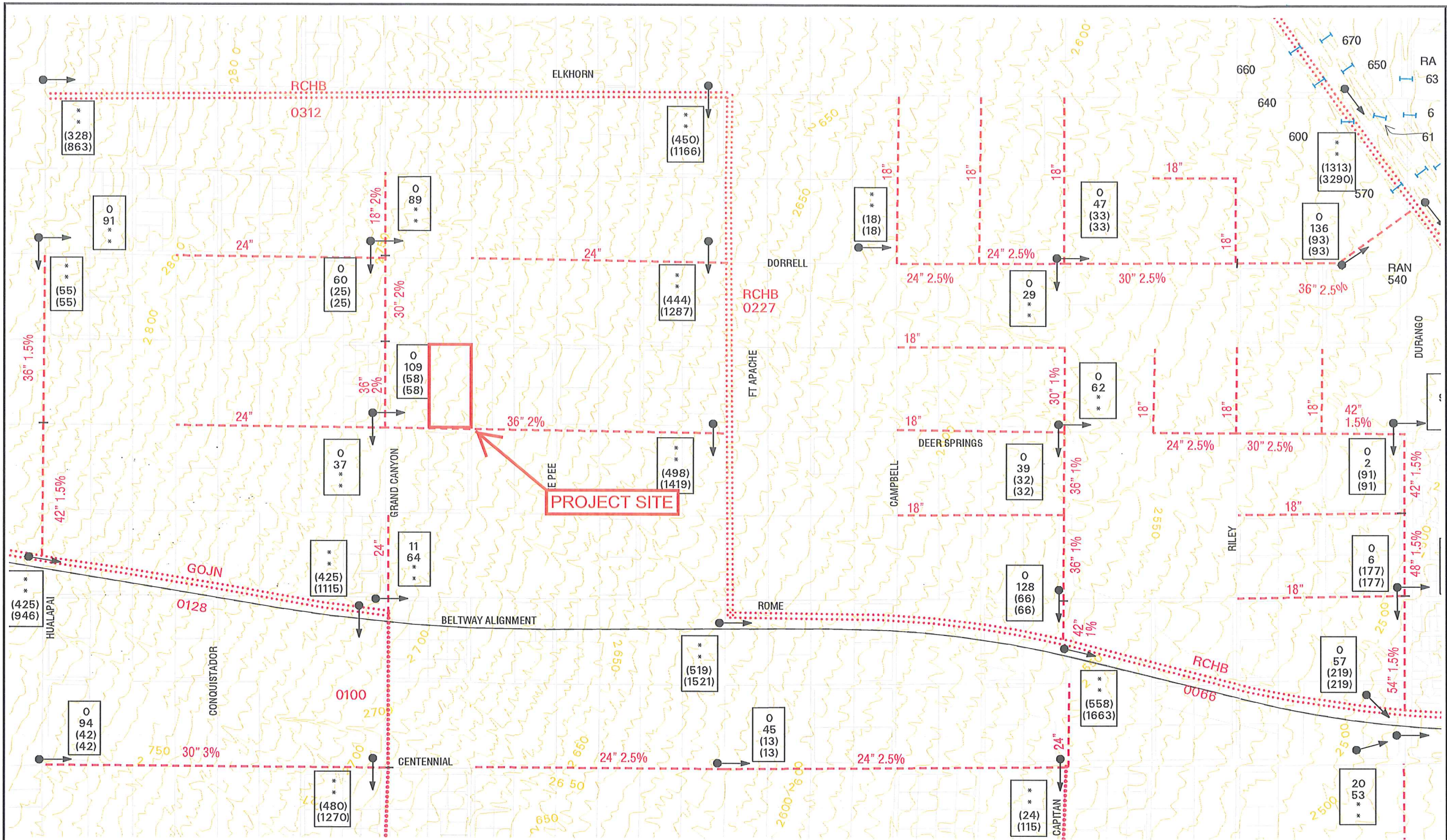


NORTHWEST NEIGHBORHOOD STUDY

LEGEND

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

FIGURE F-1



SCALE: 1 INCH = 800 FEET

FLOW ARROW

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

(FLOWS IN CFS)

NOTE:

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

See the "September 1999 City of Las Vegas Northwest Neighborhood Study Phase 2" for proposed facilities in and north of Elkhorn.

REVISED SEPTEMBER 1999

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

FUTURE DRAINAGE CONDITIONS



601 North Green Valley Parkway, Suite 100
Henderson, Nevada 89014-6139
Phone: 702/263-7275
Fax: 702/263-7200

ENGINEERING PLANNING GIS SURVEYING CONSTRUCTION SERVICES

APPENDIX H

Planning and Zoning Conditions



LAS VEGAS
CITY COUNCIL

CAROLYN G. GOODMAN
MAYOR

STAVROS S. ANTHONY
MAYOR PRO TEM

LOIS TARKANIAN
STEVEN D. ROSS
RICKI Y. BARLOW
BOB COFFIN
BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

February 20, 2014

Big Teton, LLC
5580 West Flamingo Road, Suite #108
Las Vegas, Nevada 89103

RE: GPA-52090 - (PRJ-52012) GENERAL PLAN AMENDMENT RELATED TO
ZON-52091, VAR-52093, AND TMP-52094
CITY COUNCIL MEETING OF FEBRUARY 19, 2014

Dear Applicant:

The City Council at a regular meeting held February 19, 2014, APPROVED the request for a General Plan Amendment FROM: R (RURAL DENSITY RESIDENTIAL) TO: ML (MEDIUM LOW DENSITY RESIDENTIAL) on 5.06 acres on the north side of Deer Springs Way, approximately 290 feet east of Grand Canyon Drive (APN 125-19-601-008). The Notice of Final Action was filed with the Las Vegas City Clerk on February 20, 2014.

Sincerely,


Gabriela Portillo-Brenner
Deputy City Clerk II for
Beverly K. Bridges, MMC, City Clerk

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

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

CITY OF LAS VEGAS
495 S. MAIN STREET
LAS VEGAS, NEVADA 89101

VOICE 702.229.6011
TTY 702.386.9108
www.lasvegasnevada.gov



LAS VEGAS
CITY COUNCIL

CAROLYN G. GOODMAN
MAYOR

STAVROS S. ANTHONY
MAYOR PRO TEM

LOIS TARKANIAN

STEVEN D. ROSS

RICKI Y. BARLOW

BOB COFFIN

BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

CITY OF LAS VEGAS
495 S. MAIN STREET
LAS VEGAS, NEVADA 89101

VOICE 702.229.6011
TTY 702.386.9108
www.lasvegasnevada.gov

February 20, 2014

Big Teton, LLC
5580 West Flamingo Road, Suite #108
Las Vegas, Nevada 89103

RE: TMP-52094 (PRJ-52063) - TENTATIVE MAP
RELATED TO GPA-52090, ZON-52091 AND VAR-52093
CITY COUNCIL MEETING OF FEBRUARY 19, 2014

Dear Applicant:

The City Council at a regular meeting held February 19, 2014, APPROVED the request for a Tentative Map FOR A PROPOSED 21-LOT SINGLE FAMILY RESIDENTIAL SUBDIVISION on 5.06 acres on the north side of Deer Springs Way, approximately 290 feet east of Grand Canyon Drive (APN 125-19-601-008), U (Undeveloped) Zone [R (Rural Density Residential) General Plan Designation] [PROPOSED: R-CL (Single Family Compact-Lot)]. The Notice of Final Action was filed with the Las Vegas City Clerk on February 20, 2014. This approval is subject to:

Planning

1. Approval of and conformance to the Conditions of Approval for Variance (VAR-52093) shall be required, if approved.
2. This approval shall be void four years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.
3. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.
4. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.
5. The standards for this development shall include a Minimum lot size of 3,000 square feet and Building height shall not exceed two stories or 35 feet, whichever is less.

6. A technical landscape plan, signed and sealed by a Registered Architect, Landscape Architect, Residential Designer or Civil Engineer, must be submitted prior to or at the same time as Final Map submittal. A permanent underground sprinkler system is required, and shall be permanently maintained in a satisfactory manner; the landscape plan shall include irrigation specifications.
7. Installed landscaping shall not impede visibility of any traffic control device.
8. No turf shall be permitted in the non-recreational common areas, such as medians and amenity zones in this development.
9. A fully operational fire protection system, including fire apparatus roads, fire hydrants and water supply, shall be installed and shall be functioning prior to construction of any combustible structures.
10. In conjunction with creation, declaration and recordation of the subject common-interest community, and prior to recordation of the Covenants, Codes and Restrictions "CC&R"), or conveyance of any unit within the community, the Developer is required to record a Declaration of Private Maintenance Requirements ("DPMR") as a covenant on all associated properties, and on behalf of all current and future property owners. The DPMR is to include a listing of all privately owned and/or maintained infrastructure improvements, along with assignment of maintenance responsibility for each to the common interest community or the respective individual property owners, and is to provide a brief description of the required level of maintenance for privately maintained components. The DPMR must be reviewed and approved by the City of Las Vegas Department of Field Operations prior to recordation, and must include a statement that all properties within the community are subject to assessment for all associated costs should private maintenance obligations not be met, and the City of Las Vegas be required to provide for said maintenance. Also, the CC&R are to include a statement of obligation of compliance with the DPMR. Following recordation, the Developer is to submit copies of the recorded DPMR and CC&R documents to the City of Las Vegas Department of Field Operations.
11. All City Code requirements and design standards of all City Departments must be satisfied, except as modified herein.

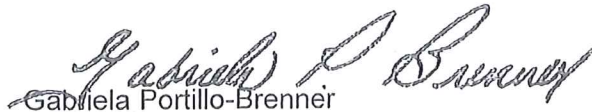
Public Works

12. Dedicate 40 feet of right-of-way adjacent to this site for Deer Springs Way and 30 feet for Haley Avenue.
13. Construct half-street improvements on Deer Springs Way and Haley Avenue concurrent with development of this site. In addition, if legally able, construct full width temporary pavement adjacent to Assessor Parcel Number #125-19-701-001 concurrent with development of this site in accordance with Municipal Code 19.02.200.

Big Teton, LLC
TMP-52094 (PRJ-52012) - Page Three
February 20, 2014

14. All landscaping and private improvements installed with this project shall be situated and maintained so as to not create sight visibility obstructions for vehicular traffic at all development access drives and abutting street intersections.
15. A Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works prior to the issuance of any building or grading permits, submittal of any construction drawings or the submittal of a Map subdividing this site, whichever may occur first. Provide and improve all drainageways recommended in the approved drainage plan/study. The developer of this site shall be responsible to construct such neighborhood or local drainage facility improvements as are recommended by the City of Las Vegas Neighborhood Drainage Studies and approved Drainage Plan/Study concurrent with development of this site.

Sincerely,



Gabriela Portillo-Brenner
Deputy City Clerk II for
Beverly K. Bridges, MMC, City Clerk

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

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



LAS VEGAS
CITY COUNCIL

CAROLYN G. GOODMAN
MAYOR

STAVROS S. ANTHONY
MAYOR PRO TEM

LOIS TARKANIAN

STEVEN D. ROSS

RICKI Y. BARLOW

BOB COFFIN

BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

February 20, 2014

Big Teton, LLC
5580 West Flamingo Road, Suite #108
Las Vegas, Nevada 89103

RE: VAR-52093 (PRJ-52012) - VARIANCE
RELATED TO GPA-52090, ZON-52091, AND TMP-52094
CITY COUNCIL MEETING OF FEBRUARY 19, 2014

Dear Applicant:

The City Council at a regular meeting held February 19, 2014, APPROVED the request for a Variance TO ALLOW A 1.0 CONNECTIVITY RATIO WHERE A 1.3 RATIO IS REQUIRED on 5.06 acres on the north side of Deer Springs Way, approximately 290 feet east of Grand Canyon Drive (APN 125-19-601-008), U (Undeveloped) Zone [R (Rural Density Residential) General Plan Designation] [PROPOSED: R-CL (Single Family Compact-Lot)]. The Notice of Final Action was filed with the Las Vegas City Clerk on February 20, 2014. This approval is subject to:

Planning

1. Approval of and conformance to the Conditions of Approval for Tentative Map (TMP-52094) shall be required, if approved.
2. This approval shall be void four years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.
3. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.
4. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.
5. All City Code requirements and design standards of all City departments must be satisfied, except as modified herein.

Sincerely,


Gabriela Portillo-Brenner

Deputy City Clerk II for
Beverly K. Bridges, MMC, City Clerk

cc: Mr. Brian Walsh
Richmond American Homes
7770 So. Dean Martin Dr., Ste. #308
Las Vegas, Nevada 89139

Ms. Chelsea Peltier
Slaters Hanifan Group
5740 So. Arville St., Ste. #216
Las Vegas Nevada 89118

CITY OF LAS VEGAS
495 S. MAIN STREET
LAS VEGAS, NEVADA 89101

VOICE 702.229.6011
TTY 702.386.9108
www.lasvegasnevada.gov





February 20, 2014

LAS VEGAS
CITY COUNCIL

CAROLYN G. GOODMAN
MAYOR

STAVROS S. ANTHONY
MAYOR PRO TEM

LOIS TARKANIAN
STEVEN D. ROSS
RICKI Y. BARLOW
BOB COFFIN
BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

Big Teton, LLC
5580 West Flamingo Road, Suite #108
Las Vegas, Nevada 89103

RE: ZON-52091 (PRJ-52012) - REZONING RELATED TO GPA-52090,
VAR-52093, AND TMP-52094
CITY COUNCIL MEETING OF FEBRUARY 19, 2014

Dear Applicant:

The City Council at a regular meeting held February 19, 2014, APPROVED the request for a Rezoning FROM: U (UNDEVELOPED) [R (RURAL DENSITY RESIDENTIAL) GENERAL PLAN DESIGNATION] TO: R-CL (SINGLE FAMILY COMPACT-LOT) on 5.06 acres on the north side of Deer Springs Way, approximately 290 feet east of Grand Canyon Drive (APN 125-19-601-008). The Notice of Final Action was filed with the Las Vegas City Clerk on February 20, 2014.

Sincerely,


Gabriela Portillo-Brenner
Deputy City Clerk II for
Beverly K. Bridges, MMC, City Clerk

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

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

CITY OF LAS VEGAS
495 S. MAIN STREET
LAS VEGAS, NEVADA 89101

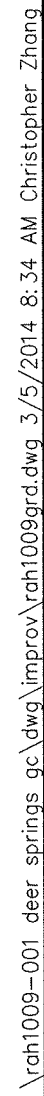
VOICE 702.229.6011
TTY 702.386.9108
www.lasvegasnevada.gov

APPENDIX I

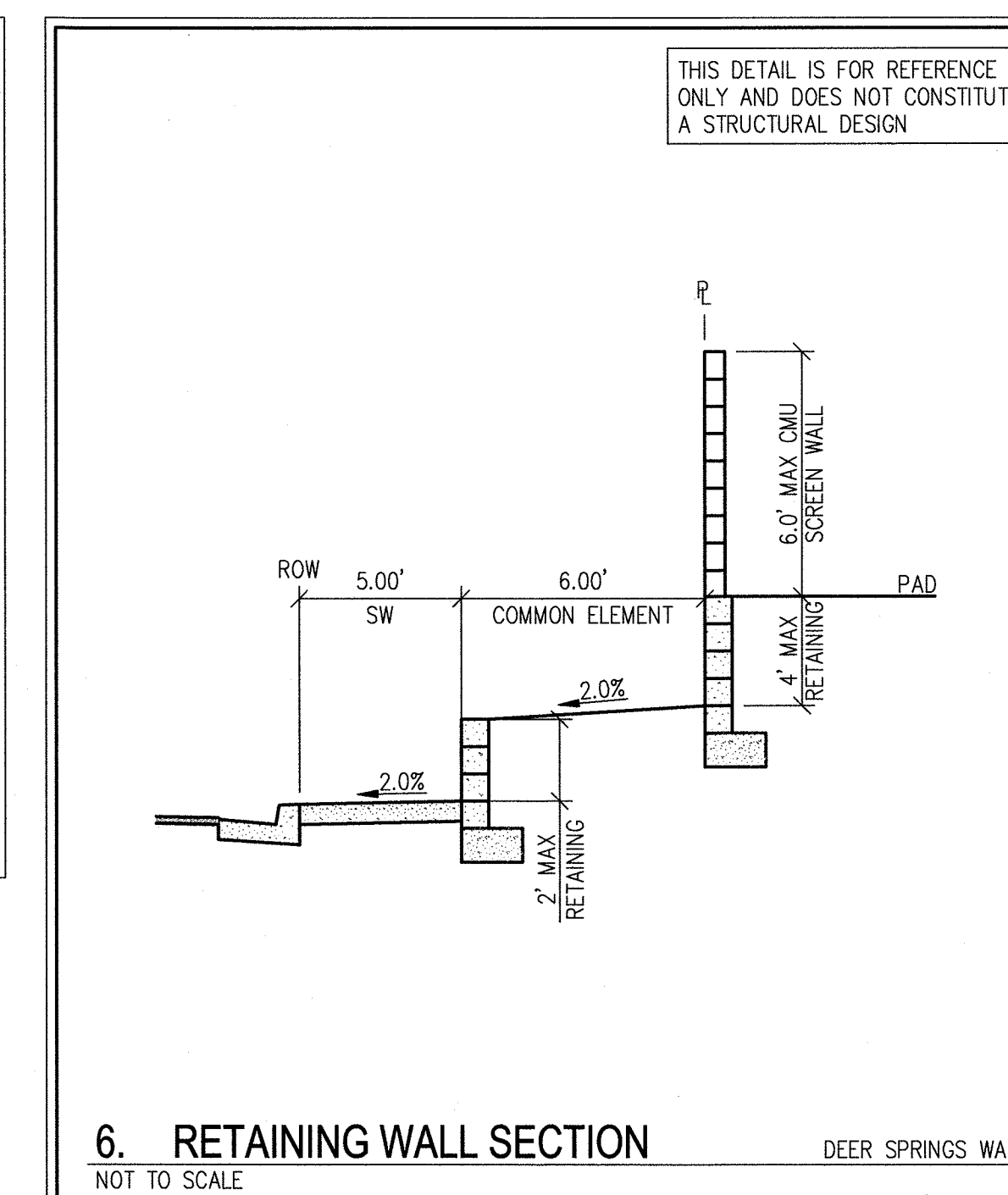
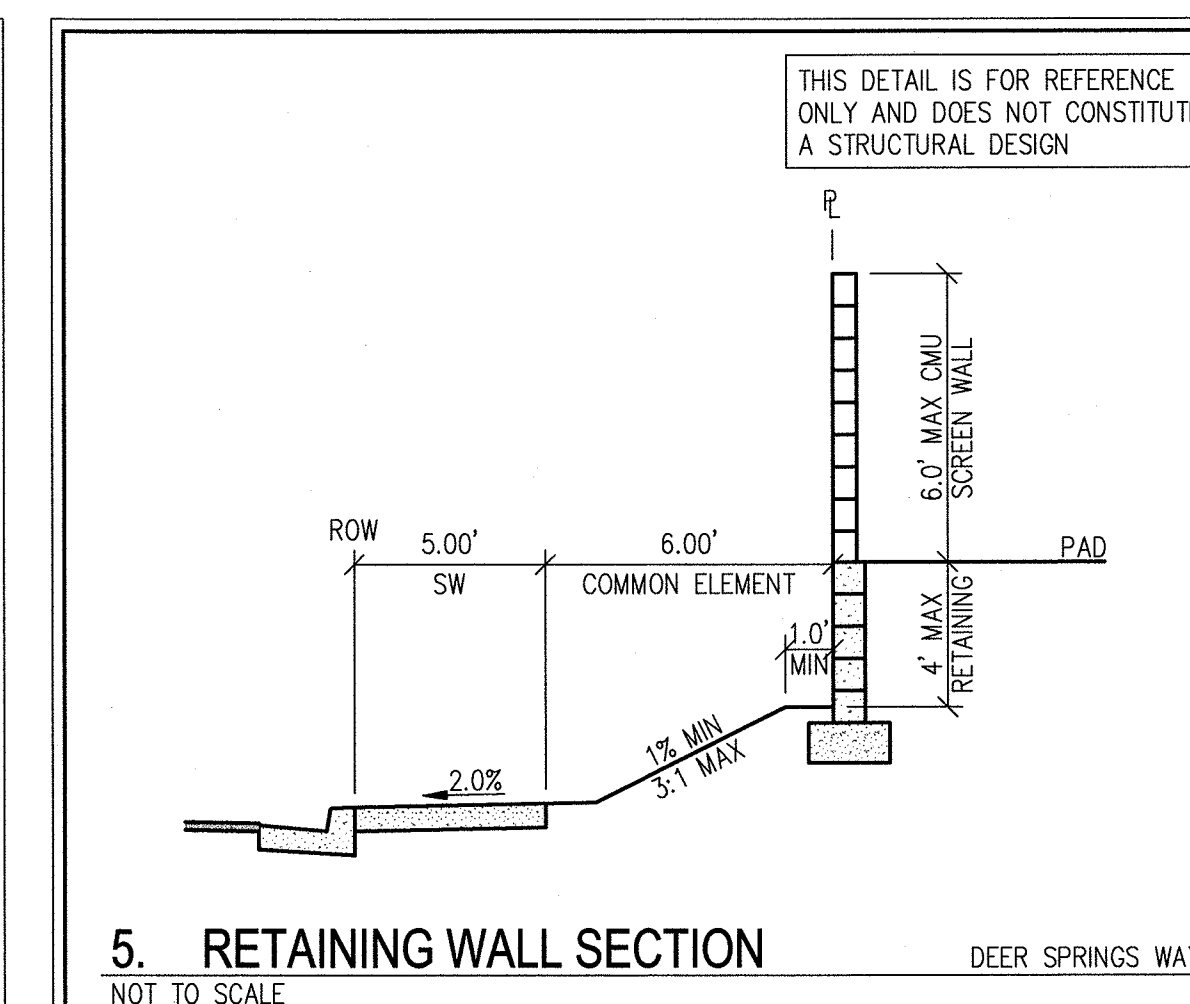
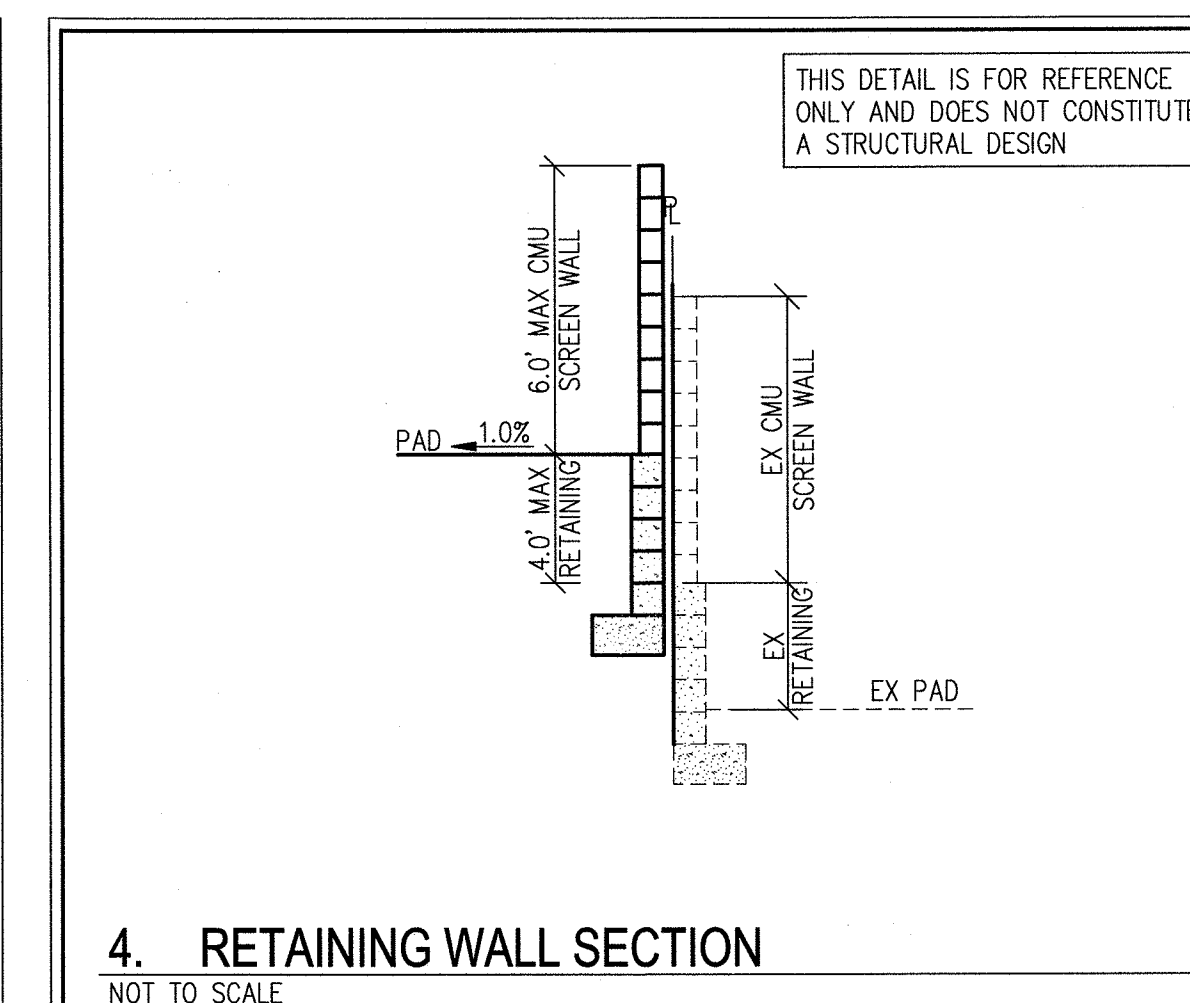
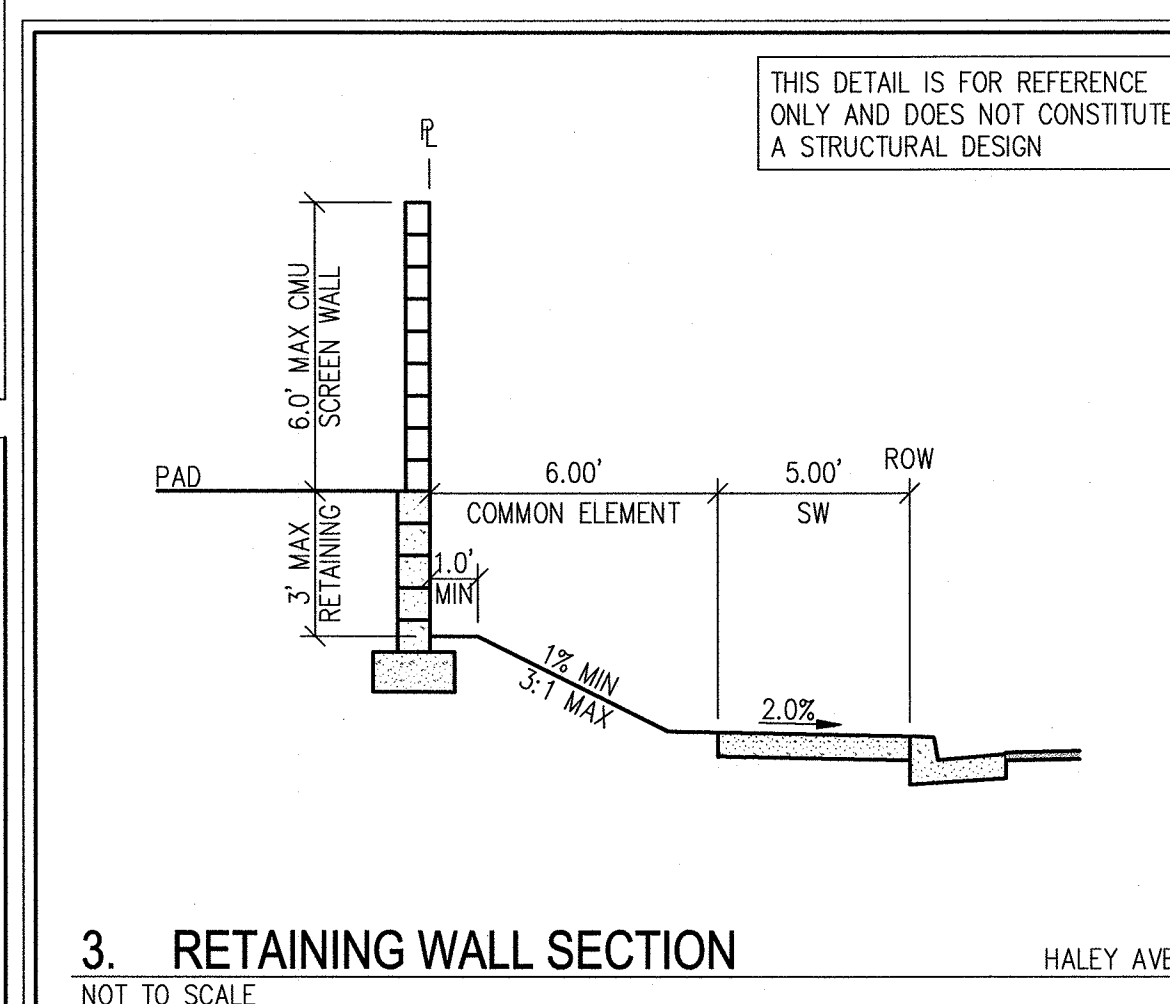
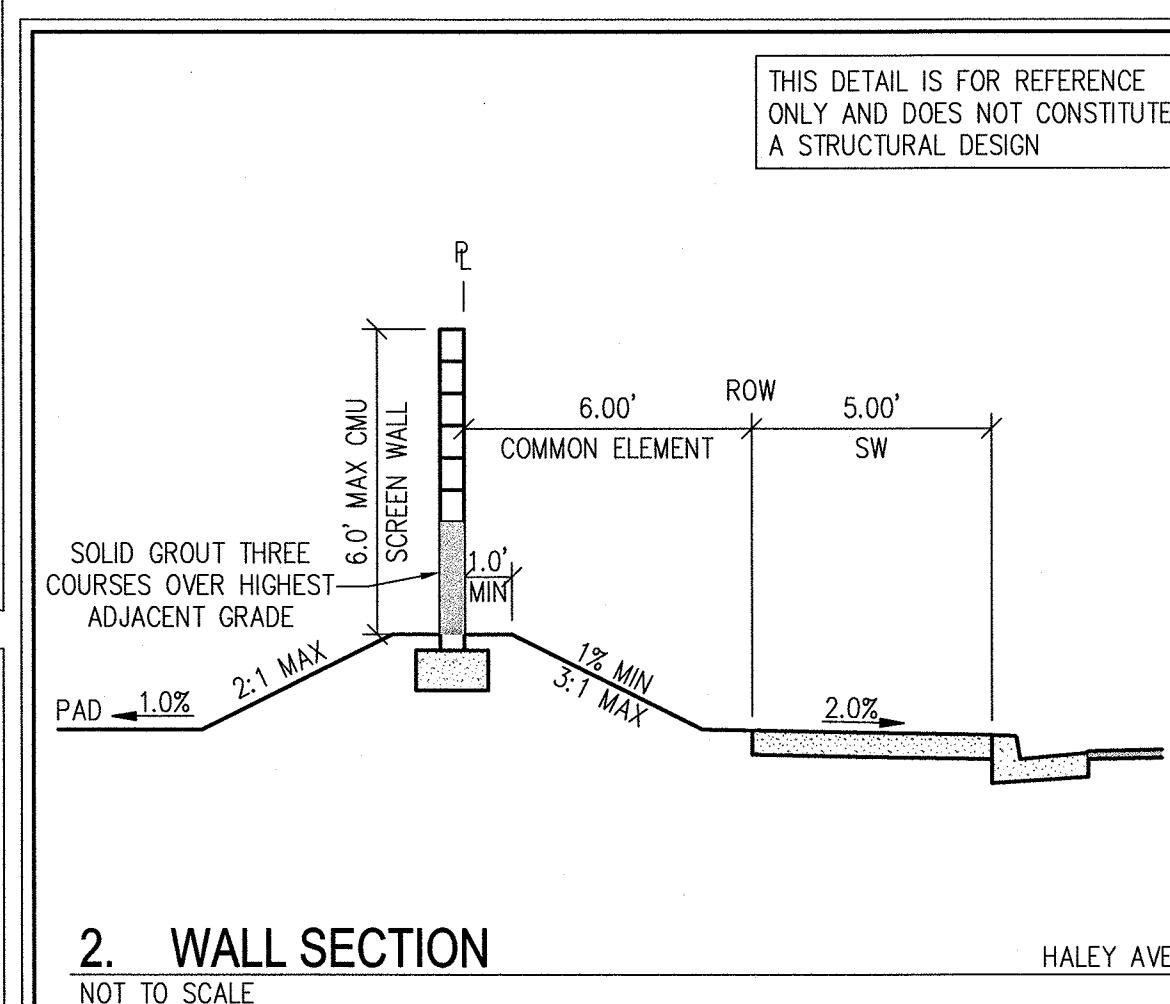
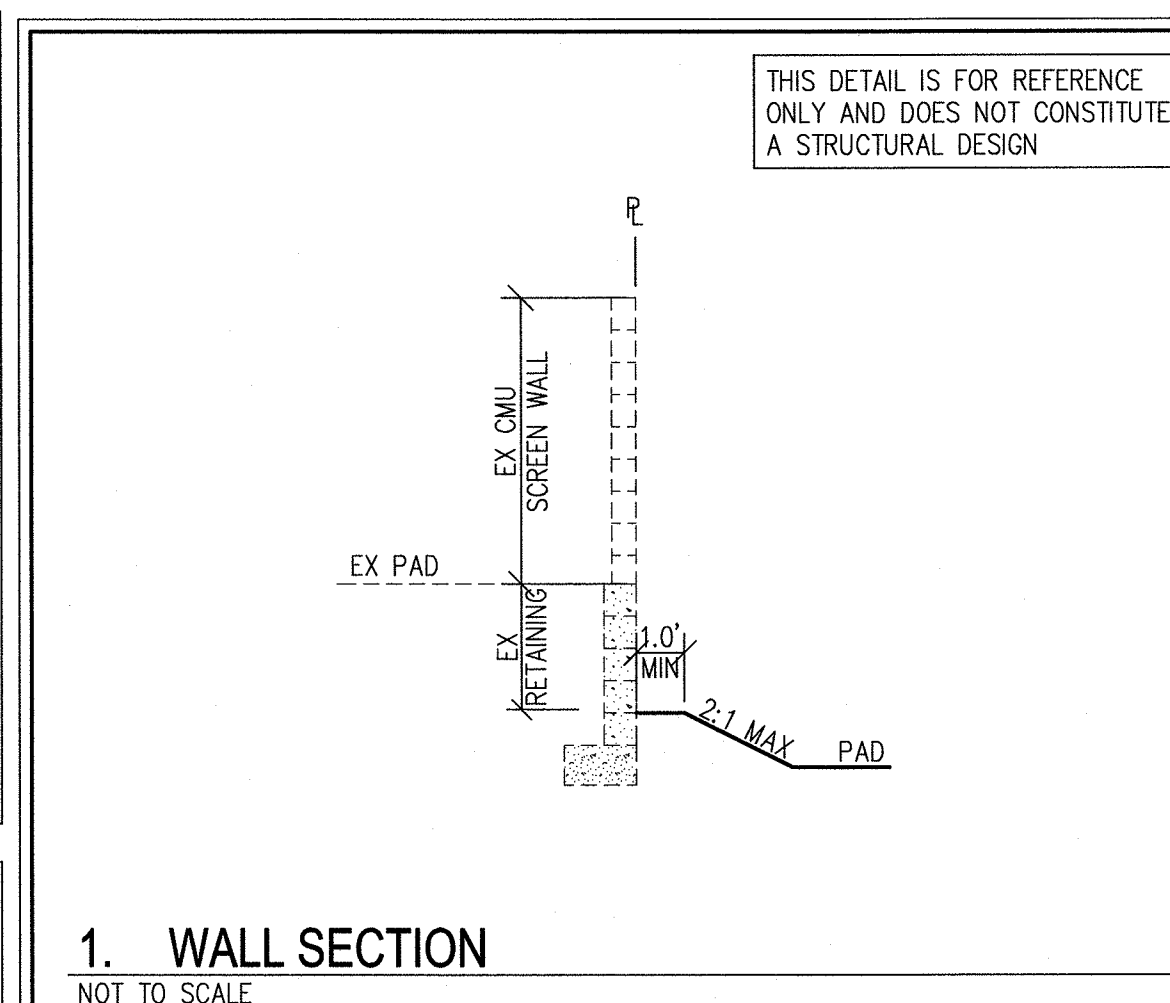
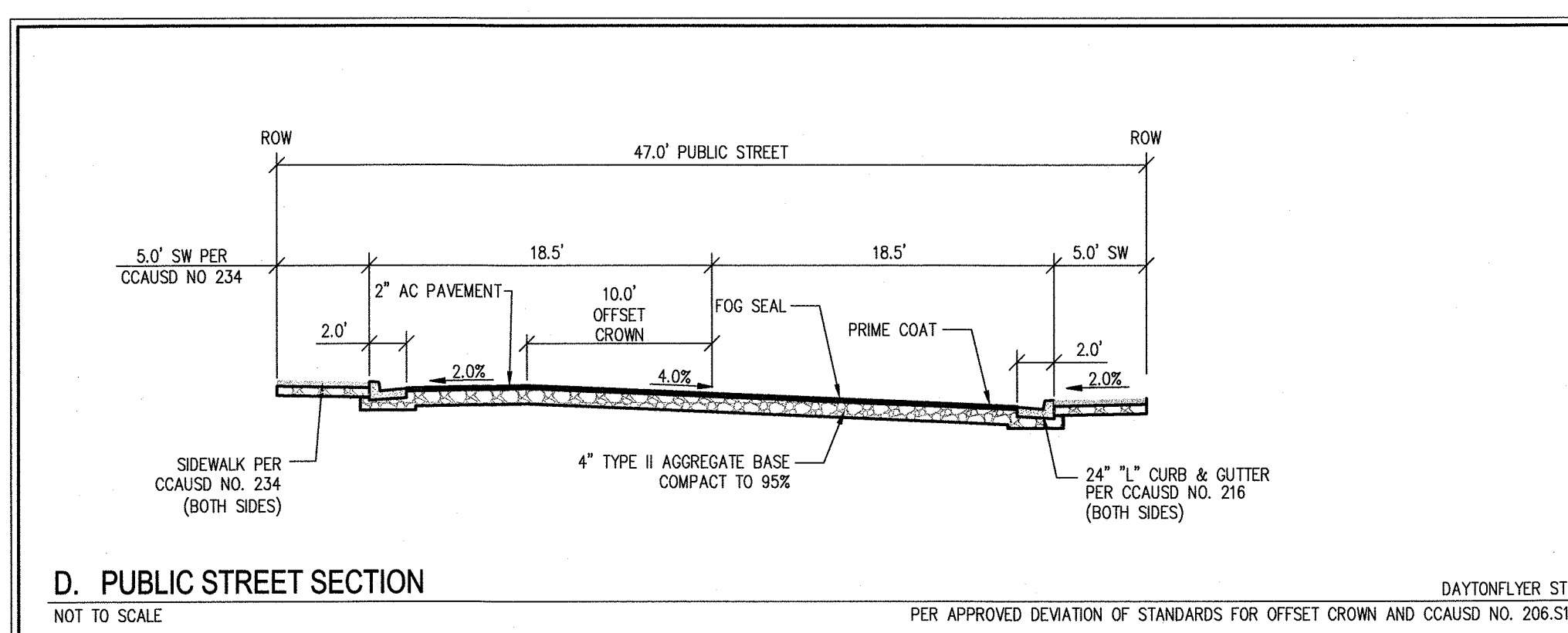
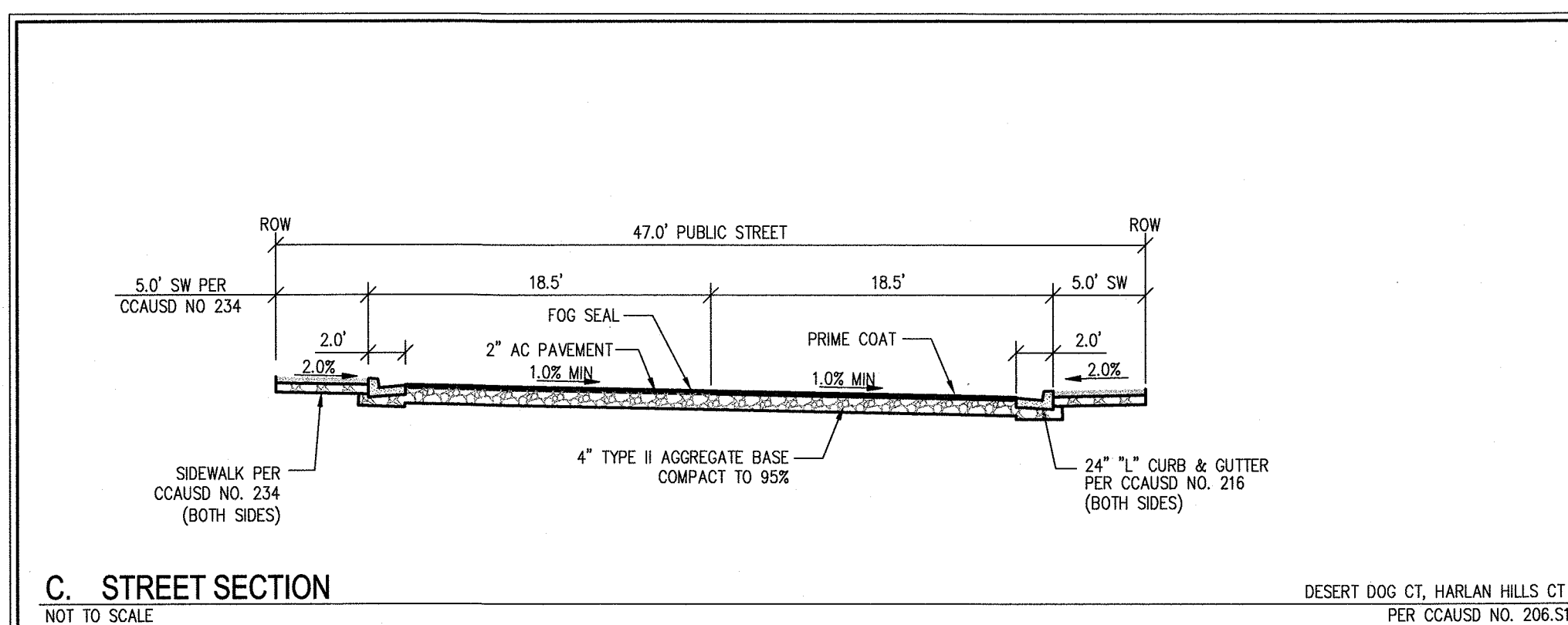
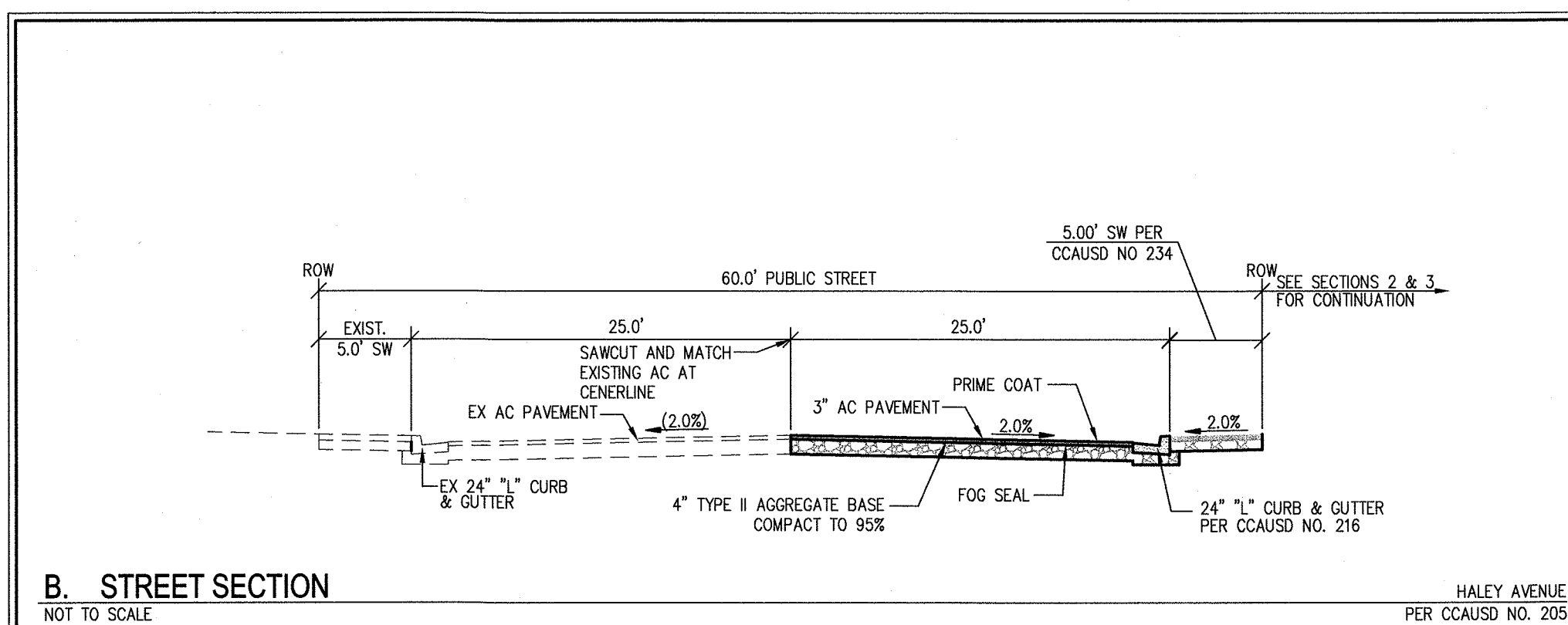
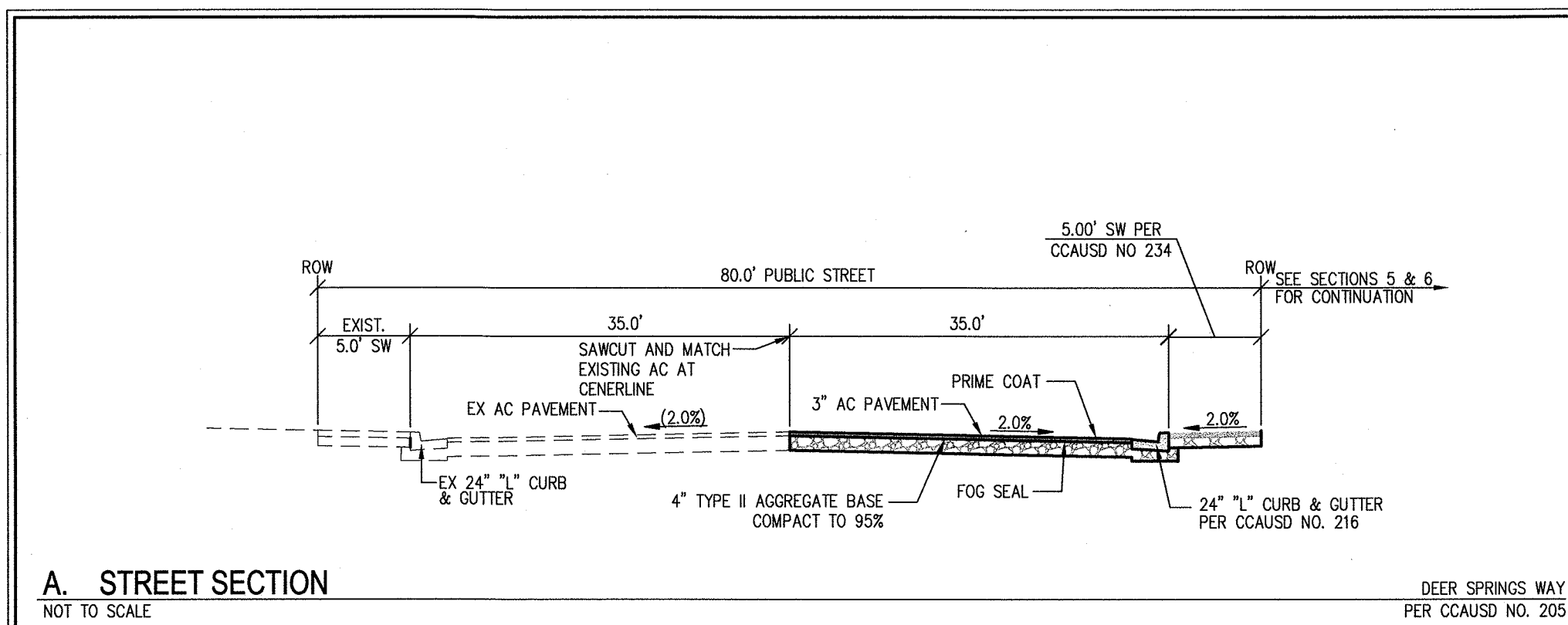
Grading Plan, Profile, and Detail Sheets

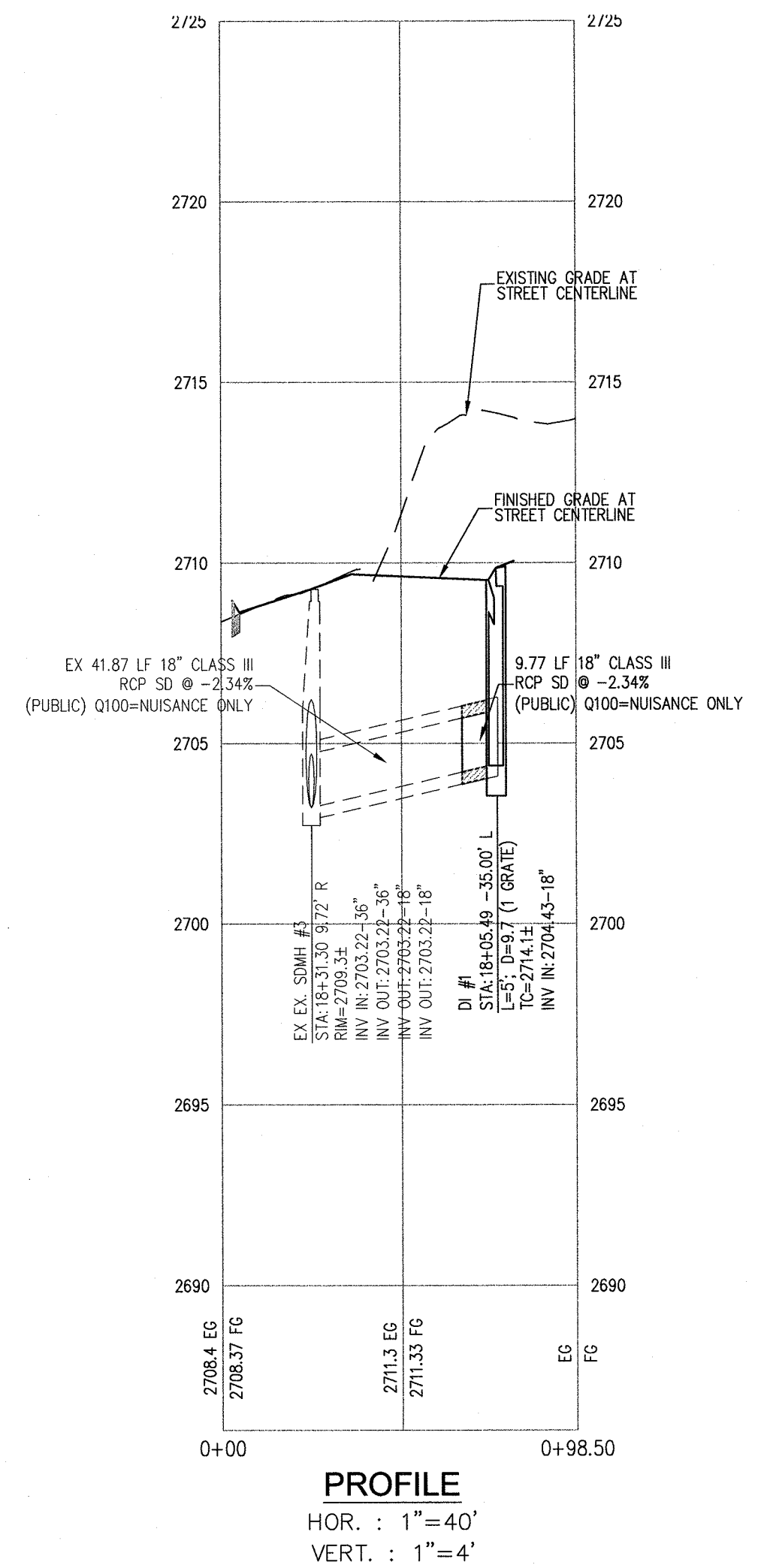
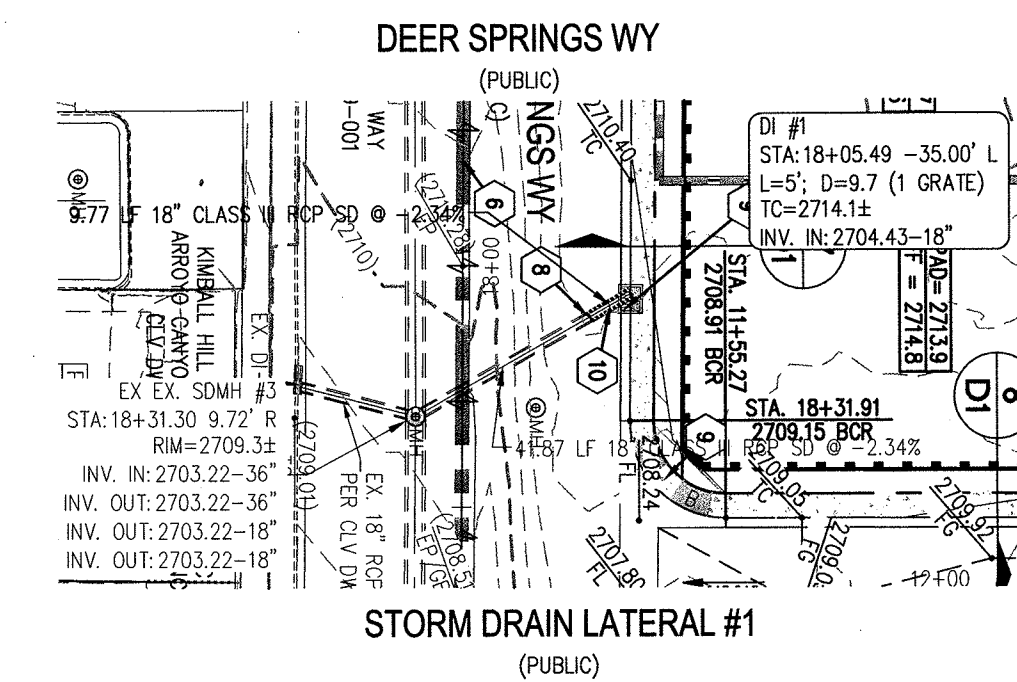
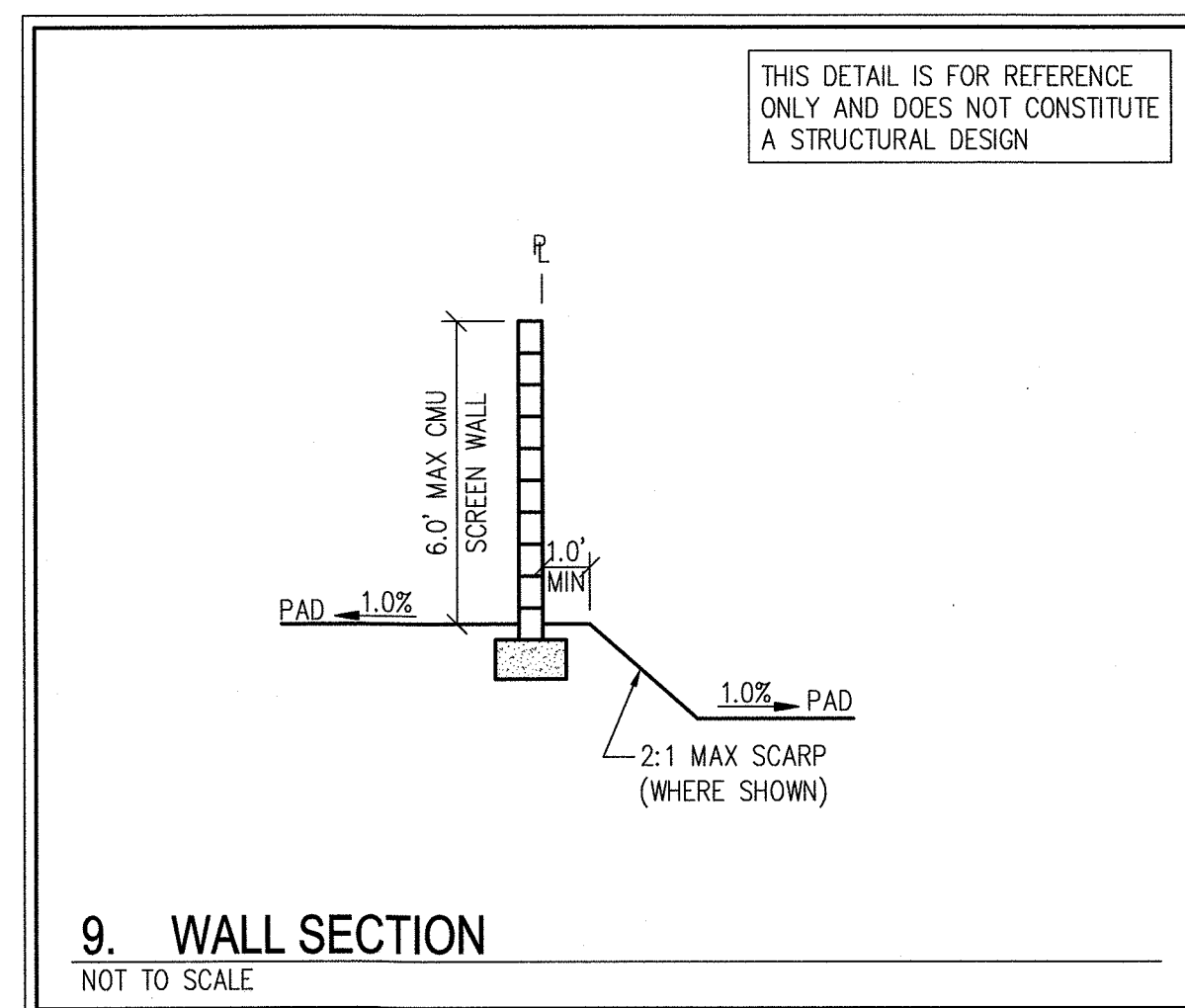
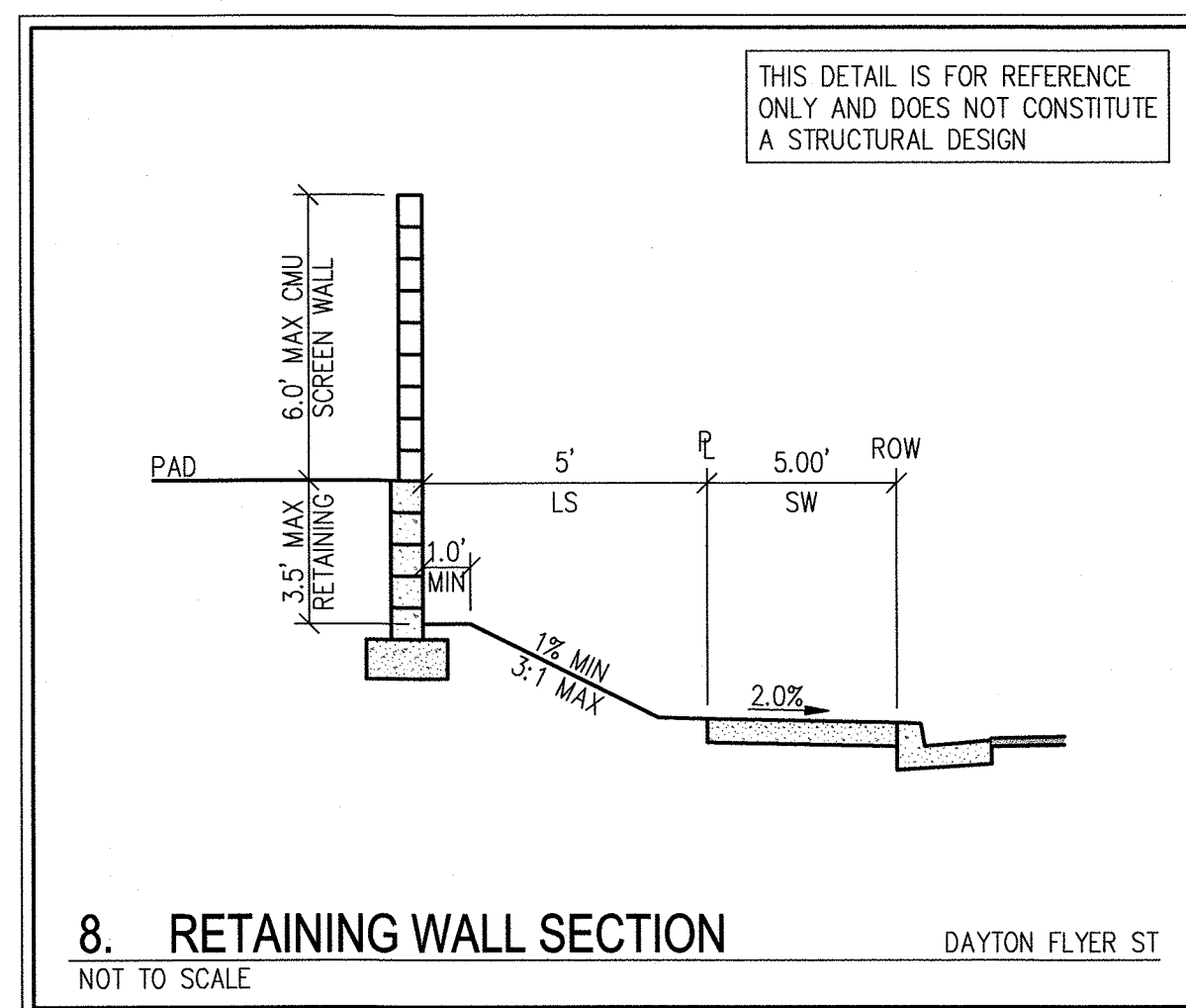
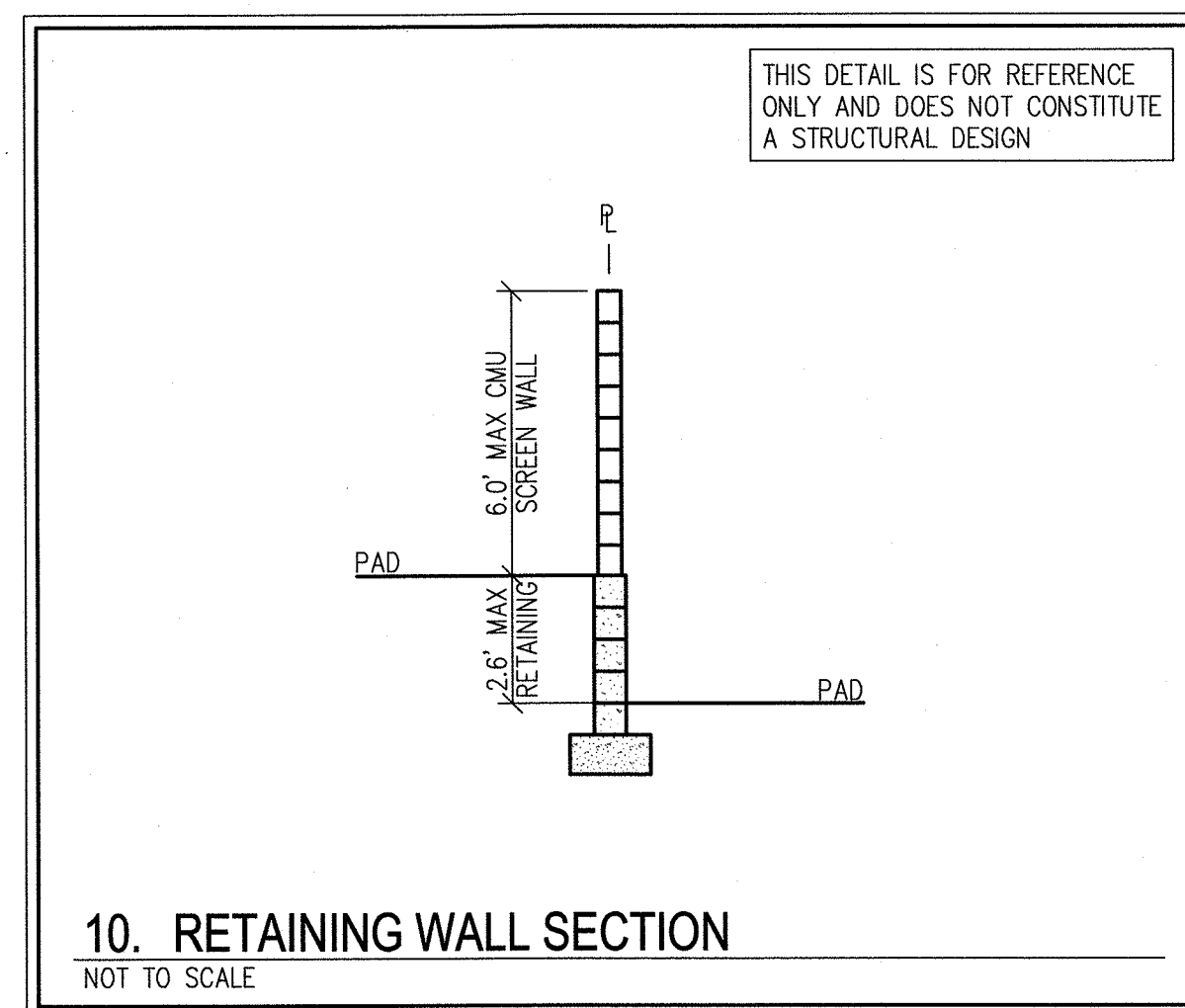
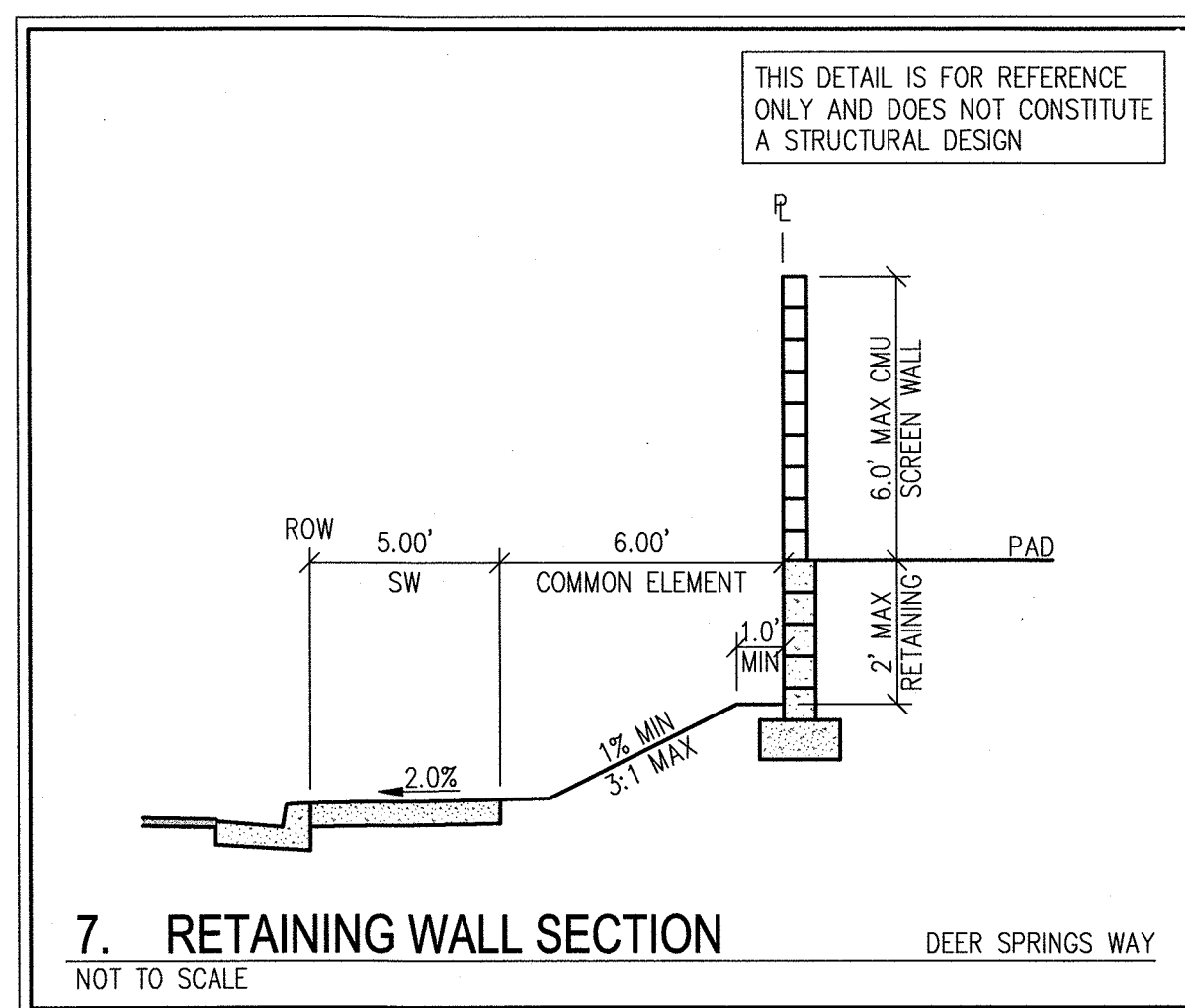
APPENDIX J

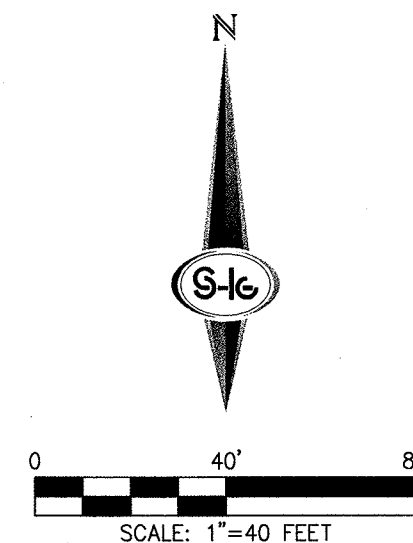
CD of Drainage Study and Improvement Plans



SHEET 3 OF 12







HALEY AVE

DESERT DOG CT

DAYTON/VER ST

HARLAN HILLS CT

DEER SPRINGS WY

P-1

N

34° 46'

KEY MAP
NOT TO SCALE

[illegible]

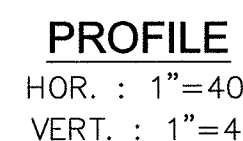
RICHMOND
AMERICAN HOMES

DEER SPRINGS 5

END PROFILE - DEER SPRING

DATE:	2/7/14
DRAFTER:	CZ
DESIGNER:	CZ
CHECKED:	TJS
PROJECT NO.	RAH1009-001

P-1
SHEET 6 OF 12



LEGEND

	BOUNDARY LINE
	MATCHLINE
	ROADWAY CENTERLINE
	RIGHT-OF-WAY
	LOT LINE
	CURB AND GUTTER
	EXISTING CURB AND GUTTER
	FUTURE CURB AND GUTTER
	FLOWLINE
	EDGE OF PAVEMENT (EP)
	SAWTOOTH LINE PER CCAUSD NO. 503AF & 503BT
	HAND RAIL
	WROUGHT IRON FENCE
	PAD ELEVATION
	FINISHED FLOOR ELEVATION
	PROPOSED ELEVATION
	EXISTING ELEVATION
	FUTURE ELEVATION
	EXISTING CONTOUR (5-Ft)
	EXISTING CONTOUR (1-Ft)
	PROPOSED CONTOUR (5-Ft)
	PROPOSED CONTOUR (1-Ft)
	STREETLIGHT
	EXISTING STREETLIGHT
	FIRE HYDRANT ASSEMBLY
	SIGHT VISIBILITY ZONE
	RETAINING WALL
	DECORATIVE PERIMETER WALL
	DECORATIVE PERIMETER
	RETAINING WALL

SOILS REPORT BY ANGLE ENGINEERING
PROJECT NO. 2615-1, DATED 12/6/13
EARTHWORK QUANTITIES (RAW):
CUT= XXXXXX CU YDS/FILL= XXXX CU YDS

FEMA FLOOD ZONE DESIGNATION

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE 'X', (OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD), PER FIRM PANELS 32003C1745E, DATED SEPTEMBER 27, 2002.

BASIS OF BEARING NORTH 00°03'58" WEST, BEING THE BEARING OF THE WEST LINE OF THE FOURTH QUARTER (SW¼) OF THE NORTHEAST QUARTER (NE¼) OF SECTION 19, TOWNSHIP 19 SOUTH, RANGE 60 EAST, W.D.M., CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN BOOK 132, PAGE 11 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.	BENCHMARK CITY OF LAS VEGAS BENCHMARK NUMBER: 6LV09109C4 REVEST AND PLATE IN TOP OF CURB AT NORTHEAST CORNER OF DEER SPRINGS WAY AND GRAND CANYON DRIVE. ELEVATION: 2724.21 US SURVEY FEET (NAVD88) 850.340 METERS PER CITY OF LAS VEGAS BENCHMARKS, 2008 ADJUSTMENT (UPDATED MAY 24, 2010)
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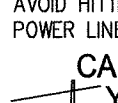
BASIS OF BEARING

NORTH 00°03'58" WEST, BEING THE BEARING OF THE WEST LINE OF THE SOUTHWEST QUARTER (SW1/4) OF THE NORTHEAST QUARTER (NE1/4) OF SECTION 19, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN BOOK 132, PAGE 11 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

BENCHMARK
CITY OF LAS VEGAS BENCHMARK NUMBER: 6LV9019C4
PIVOT AND PLATE IN TOP OF CURB AT NORTHEAST CORNER OF DEER SPRINGS WAY AND GRAND CANYON DRIVE.
ELEVATION: 2724.21 US SURVEY FEET (NAVD88)
830.340 METERS
PER CITY OF LAS VEGAS BENCHMARKS, 2008 ADJUSTMENT (UPDATED MAY 24, 2010)

AVOID HITTING OVERHEAD
POWER LINES. IT'S COSTLY.

**CALL BEFORE
YOU DO
OVERHEAD**



1-702-227-2929

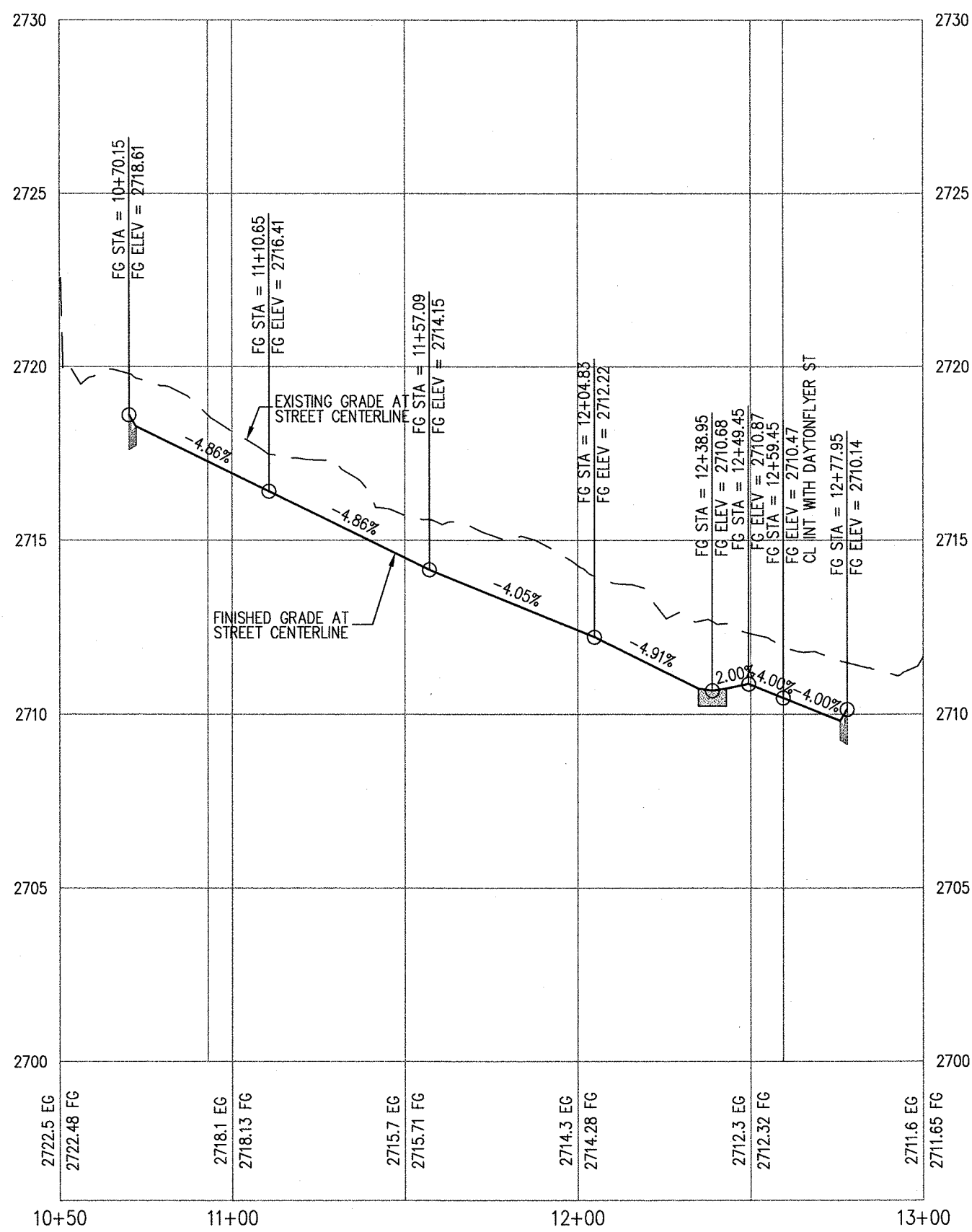
AVOID HITTING UNDERGROUND
TRAFFIC SIGNAL SYSTEMS
AND STREET LIGHT SYSTEM
CONDUITS. IT'S COSTLY.

 **before you
do UnderGround**

1-702-455-7511
CLARK COUNTY TRAFFIC OPERATIONS
AND
1-702-432-5300
LAS VEGAS AREA
COMPUTERIZED TRAFFIC SYSTEM

Call before you Dig
Avoid cutting underground
utility lines. It's costly.
Call

OR
1-800-227-2600
AND
CLARK COUNTY TRAFFIC OPERATIONS
1-702-455-7544



HALEY AVE

DESERT DOG CT

DAYTON/ELVER ST

DEER SPRINGS WY

Harlan Hills CT

P-2

KEY MAP

NOT TO SCALE

- | SYMBOL | DESCRIPTION | SYMBOL | DESCRIPTION |
|--------|---|--------|--------------------------|
| | BOUNDARY LINE | | MATCHLINE |
| | ROADWAY CENTERLINE | | RIGHT-OF-WAY |
| | LOT LINE | | CURB AND GUTTER |
| | EXISTING CURB AND GUTTER | | FUTURE CURB AND GUTTER |
| | FLOWLINE | | EIDGE OF PAVEMENT (EP) |
| | SAWTOOTH LINE PER CCAUSD
NO. 5034B & 5035T | | HAND RAIL |
| | WROUGHT IRON FENCE | | PAD ELEVATION |
| | FINISHED FLOOR ELEVATION | | PROPOSED ELEVATION |
| | EXISTING ELEVATION | | FUTURE ELEVATION |
| | EXISTING CONTOUR (5-Ft) | | EXISTING CONTOUR (1-Ft) |
| | PROPOSED CONTOUR (5-Ft) | | PROPOSED CONTOUR (1-Ft) |
| | STREETLIGHT | | EXISTING STREETLIGHT |
| | FIRE HYDRANT ASSEMBLY | | SIGHT VISIBILITY ZONE |
| | RETAINING WALL | | DECORATIVE PERMETER WALL |
| | DECORATIVE PERMETER
RETAINING WALL | | |

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE 'X', (OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD), PER FIRM PANELS 32003C1745E, DATED SEPTEMBER 27, 2002.

CITY OF LAS VEGAS BENCHMARK NUMBER: 6LV9019C4
RIVET AND PLATE IN TOP OF CURB AT NORTHEAST CORNER OF DEER SPRINGS WAY AND GRAND
CANYON DRIVE.
ELEVATION: 2724.21 US SURVEY FEET (NAVD88)
830.340 METERS
PER CITY OF LAS VEGAS BENCHMARKS, 2008 ADJUSTMENT (UPDATED MAY 24, 2010)

Call before you Dig
Avoid cutting underground utility lines. It's costly.

Call



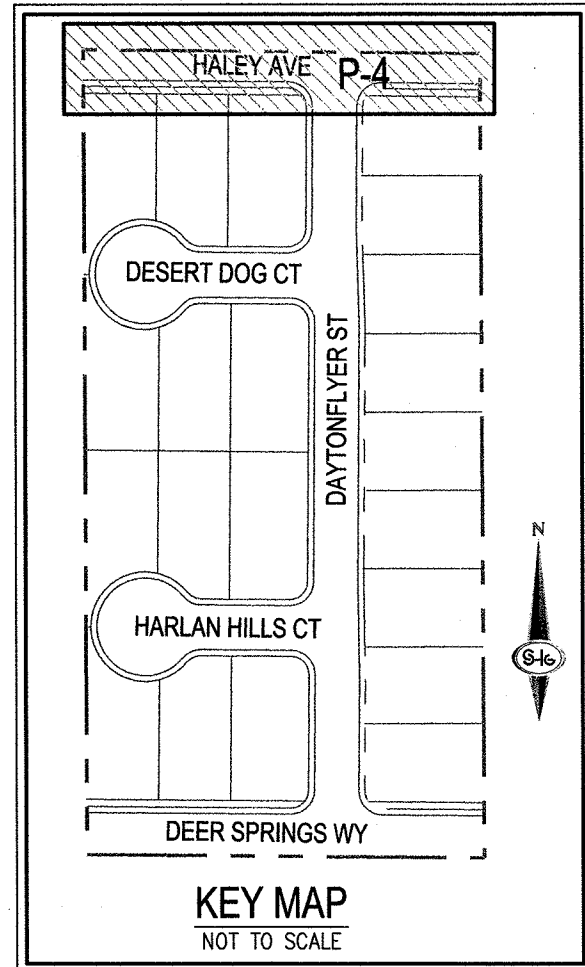
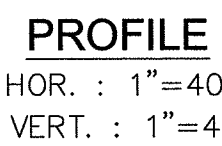
OR

1-800-227-2600

AND

CLARK COUNTY TRAFFIC OPERATIONS
1-702-455-7544

P-2



1. FINAL GRADES ADJACENT TO STRUCTURES SHALL BE IN CONFORMANCE WITH IBC 2006, SECTION 2304.11.2.2.
2. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
3. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP.
4. MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET ELEVATIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.
5. SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
6. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
7. CONSTRUCTION OF BLOCK WALLS REQUIRES A PERMIT FOR EROSION CONTROL REMOVAL BY THE CLARK COUNTY BUILDING DEPARTMENT.
8. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES AND REPORT TO ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN PLACE ALL EXISTING UTILITIES AND FACILITIES. IF NOT NOTIFIED OF PRIOR DAMAGE TO EXISTING FACILITIES PRIOR TO CONSTRUCTION, CONTRACTOR WILL BE RESPONSIBLE FOR REPAIRS TO EXISTING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO BEGINNING.
9. NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF THE CONCRETESIDEWALK IF CURB EXIST) WITHIN THE SIGHT TRIANGLE ZONE.

- (1) CONSTRUCT 2" AC PAVEMENT WITH 4" TYPE II
AGGREGATE BASE OVER NATIVE MATERIAL PER SOils
- (2) CONSTRUCT 3" AC PAVEMENT WITH 4" TYPE II
AGGREGATE BASE OVER NATIVE MATERIAL PER SOils.
REPORT.
- (3) CONSTRUCT "L" TYPE CURB AND GUTTER PER CAUSD NO. 228
- (4) CONSTRUCT 8" CROSS GUTTER PER CAUSD NO. 228
- (5) CONSTRUCT 6" WIDE SIDEWALK PER CAUSD NO. 234
- (6) SAWCUT AND MATCH EXISTING IMPROVEMENTS
- (7) FIELD VERIFY AND CONNECT TO EXISTING CURB,
GUTTER AND SIDEWALK
- (8) FIELD VERIFY, REMOVE CAP AND CONNECT TO
EXISTING STORM DRAIN
- (9) INSTALL 5" 18" OUP DRIP INLET PER CAUSD NO.
4121 & 421. SEE PROFILE, SHEET D-1.
- (10) INSTALL 18" R-2 FOR APPX 33 SD (PUBLIC)

SEE SHEET C-2 FOR CLASSIFICATIONS, LEGEND & QUANTITIES

 BOUNDARY LINE
 MATCHLINE
 ROADWAY CENTERLINE
 RIGHT-OF-WAY
 LOT LINE
 CURB AND GUTTER
 EXISTING CURB AND GUTTER
 FUTURE CURB AND GUTTER
 FLOWLINE
 EDGE OF PAVEMENT (EP)
 SAWCUT LINE PER CAAUSD NO. 50344 & 50381
 HAND RAIL
 WROUGHT IRON FENCE
 PAD ELEVATION
 FINISHED FLOOR ELEVATION
 PROPOSED ELEVATION
 EXISTING ELEVATION
 FUTURE ELEVATION
 EXISTING CONTOUR (5-FT)
 EXISTING CONTOUR (1-FT)
 PROPOSED CONTOUR (5-FT)
 PROPOSED CONTOUR (1-FT)
 STREETLIGHT
 EXISTING STREETLIGHT
 FIRE HYDRANT ASSEMBLY
 SIGHT VISIBILITY ZONE
 RETAINING WALL
 DECORATIVE PERIMETER WALL
 RETAINING WALL

1. EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.
2. FOR ROADWAY WIDENING AND HALF STREET IMPROVEMENTS THE CONTRACTOR SHALL BE RESPONSIBLE FOR SURVEYING AND SETTING SUNKIN LINE TO PROPOSED EDGE OF PAVEMENT OR PROJECTED LINE OF CURB PRIOR TO SUBGRADE PREPARATION AND CONSTRUCTION OF PROPOSED CURB LINE. IF MINIMUM OR MAXIMUM CROSS SLOPES DO NOT MEET AGENCY STANDARDS THE CONTRACTOR SHALL NOTIFY THE ENGINEER.

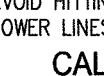
SOILS REPORT BY ANGLE ENGINEERING
PROJECT NO. 26165-1, DATED 12/6/13
EARTHWORK QUANTITIES (RAW):
CUT= XXXXXX CU YDS/FILL= XXXX CU YDS

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE 'X', (OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD), PER FIRM PANELS 32003C1745E, DATED SEPTEMBER 27, 2002.

NORTH 00°03'58" WEST, BEING THE BEARING OF THE WEST LINE OF THE SOUTHWEST QUARTER (SW1/4) OF THE NORTHEAST QUARTER (NE1/4) OF SECTION 19, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN BOOK 132, PAGE 11 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

CITY OF LAS VEGAS BENCHMARK NUMBER: 6LVB019C4
RIVET AND PLATE IN TOP OF CURB AT NORTHEAST CORNER OF DEER SPRINGS WAY AND GRAND CANYON DRIVE.
ELEVATION: 7274.21 US SURVEY FEET (NAVD88)
830.340 METERS
PER CITY OF LAS VEGAS BENCHMARKS, 2008 ADJUSTMENT (UPDATED MAY 24, 2010)

AVOID HITTING OVERHEAD
POWER LINES. IT'S COSTLY.
**CALL BEFORE
YOU DO
OVERHEAD**



1-702-227-2929

AVOID HITTING UNDERGROUND
TRAFFIC SIGNAL SYSTEMS
AND STREET LIGHT SYSTEM
CONDUITS. IT'S COSTLY.



Cal
before you
do UnderGround
1-702-455-7511
CLARK COUNTY TRAFFIC OPERATIONS
AND
1-702-432-5300
LAS VEGAS AREA
COMPUTERIZED TRAFFIC SYSTEM

Call before you Dig
Avoid cutting underground utility lines. It's costly.

Call



OR

1-800-227-2600

AND

CLARK COUNTY TRAFFIC OPERATIONS
1-702-455-7544

[illegible]

RICHMOND
AMERICAN HOMES

**DEER SPRINGS 5
PLAN AND PROFILE - HALEY AVE**

**S 19
T 19S
R 60E**

DATE: 2/7/14

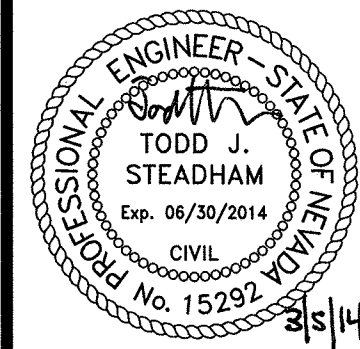
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DESIGNER: C2

CHECKED: T

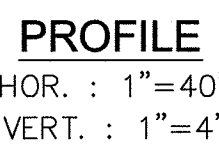
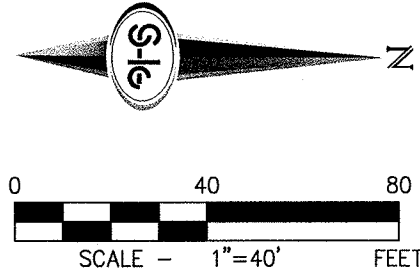
PROJECT NO.

RAH1009-001



P-4

SHEET 9 OF 12



1. FINAL GRASSES ADJACENT TO STRUCTURES SHALL BE IN CONFORMANCE WITH IBC 2006, SECTION 2304.11.2.2.
2. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DISCREPANCIES AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
3. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP.
4. MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.
5. SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
6. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
7. CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUSINESS PLAN FOR APPROVAL BY THE CLARK COUNTY BUILDING DEPARTMENT.
8. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES AND REPORT DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN PLACE EXISTING UTILITY STRUCTURES AND FACILITIES. IF NOT NOTIFIED OF PRIOR DAMAGE TO EXISTING FACILITIES PRIOR TO CONSTRUCTION, CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPLACING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMPLETION.
9. NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY TYPE SHALL BE PLACED WITHIN 240 INCHES IN HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB IF CURB EXIST) WITHIN THE SIGHT TRIANGLE.



1. CONSTRUCT 2" AC PAVEMENT WITH 4" TYPE II AGGREGATE BASE OVER NATIVE MATERIAL PER SOILS REPORT.
 2. CONSTRUCT 3" AC PAVEMENT WITH 4" TYPE II AGGREGATE BASE OVER NATIVE MATERIAL PER SOILS REPORT.
 3. CONSTRUCT 1" L" TYPE CURB AND GUTTER PER SOILS REPORT.
 4. CONSTRUCT 6" CROSS GUTTER PER CCAUSD NO. 228
 5. CONSTRUCT 5' WIDE SIDEWALK PER CCAUSD NO. 234
 6. SAWCUT AND MATCH EXISTING IMPROVEMENTS
 7. FIELD VERIFY AND CONNECT TO EXISTING CURB, GUTTER AND SIDEWALK
 8. FIELD VERIFY REMOVE CAP AND CONNECT TO EXISTING STORM DRAIN
 9. INSTALL 8" RCP ON DOW INLET PER CCAUSD NO. 4121 & 421. SEE PROFILE, SHEET D-1.
 10. INSTALL 18" RCP CLASS III SD (PUBLIC)
- SEE SHEET C-7 FOR ABBREVIATIONS, LEGEND & QUANTITIES

BOUNDARY LINE
MATCHLINE
ROADWAY CENTERLINE
RIGHT-OF-WAY
LOT LINE
CURB AND GUTTER
EXISTING CURB AND GUTTER
FUTURE CURB AND GUTTER
FLOWLINE
EDGE OF PAVEMENT (EP)
SAW CUT LINE PER CCAUSD NO. 503AR & 503BR
HAND RAIL
WROUGHT IRON FENCE
PAD ELEVATION
FINISHED FLOOR ELEVATION
PROPOSED ELEVATION
EXISTING ELEVATION
FUTURE ELEVATION
EXISTING CONTOUR (5-FT)
EXISTING CONTOUR (1-FT)
PROPOSED CONTOUR (5-FT)
PROPOSED CONTOUR (1-FT)
STREETLIGHT
EXISTING STREETLIGHT
FIRE HYDRANT ASSEMBLY
SIGHT VISIBILITY ZONE
RETAINING WALL
DECORATIVE PERIMETER WALL
DECORATIVE PERIMETER RETAINING WALL

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

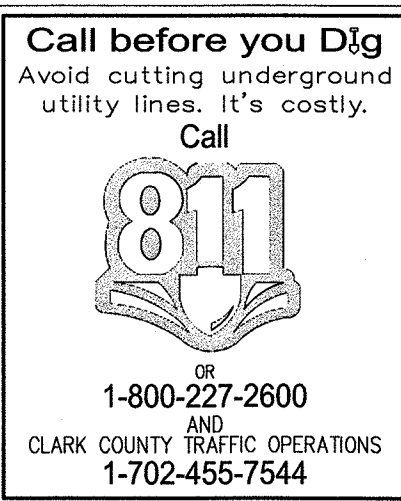
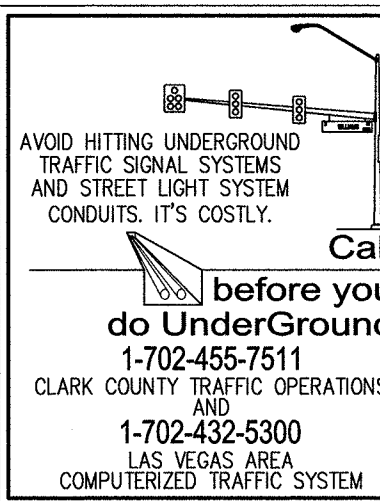
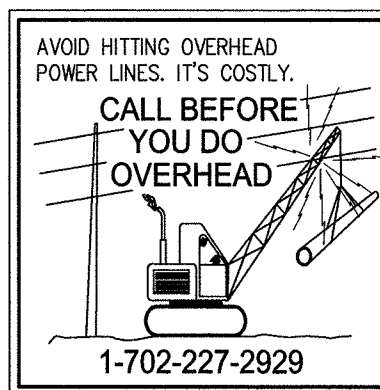
2. FOR ROADWAY WIDENING AND STREET RECONSTRUCTION, THE CONTRACTOR SHALL VERIFY THE EXISTING UTILITY LOCATIONS AND DEPTHS TO THE PROPOSED EDGE OF PAVEMENT OR PROJECTED PL OF CURB PRIOR TO SUBGRADE PREPARATION AND CONSTRUCTION OF PROPOSED CURB LINE. IF MINIMUM OR MAXIMUM CROSS SLOPES DO NOT MEET AGENCY STANDARDS THE CONTRACTOR SHALL NOTIFY THE ENGINEER.

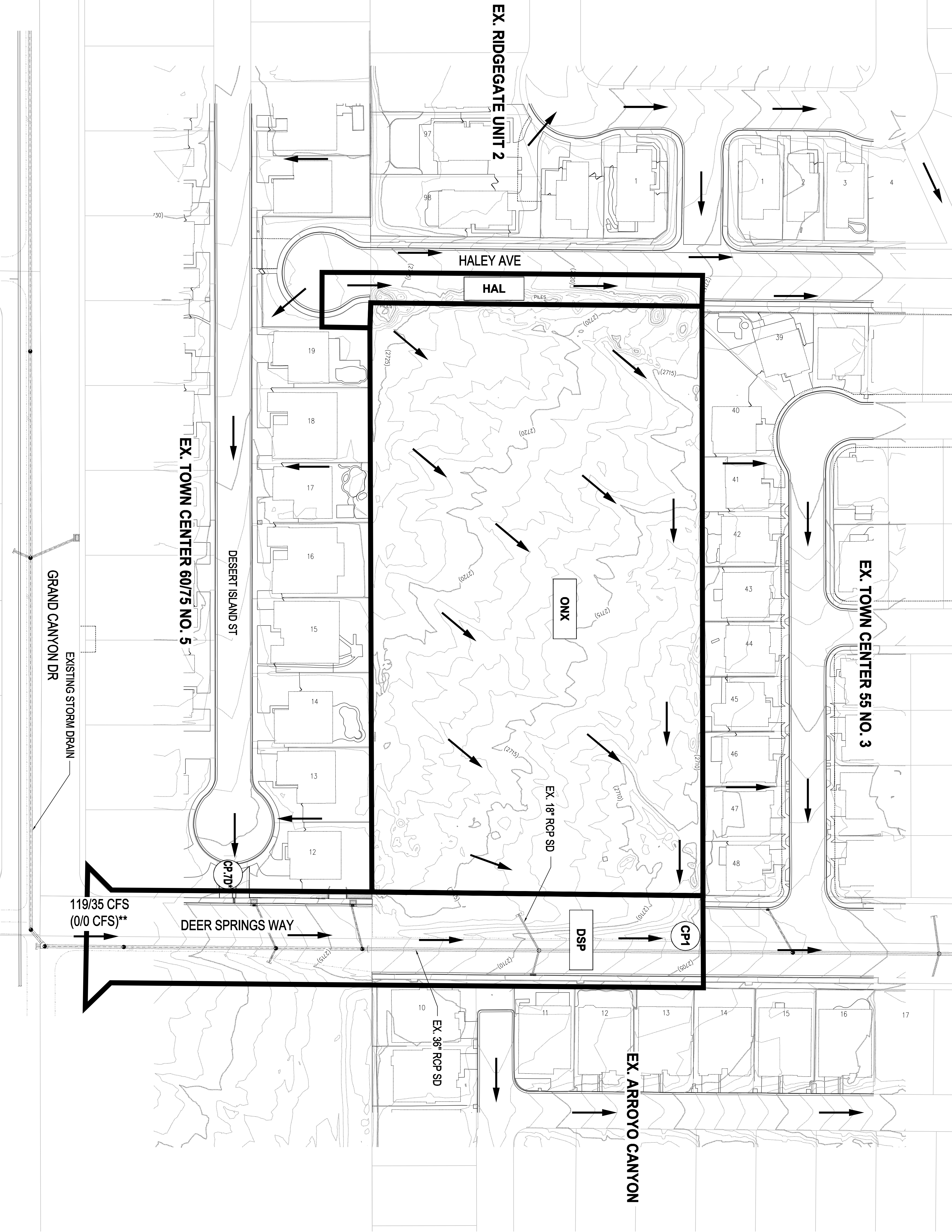
SOILS REPORT BY ANGLE ENGINEERING
PROJECT NO. 26165-1, DATED 12/6/13
EARTHWORK QUANTITIES (RAW):
CUT= XXXXXX CU YDS/FILL= XXXX CU YDS

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE 'X', (OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD), PER FIRM PANELS 32003C1745E, DATED SEPTEMBER 27, 2002.

NORTH 00°03'58" WEST, BEING THE BEARING OF THE WEST LINE OF THE SOUTHWEST QUARTER (SW1/4) OF THE NORTHEAST QUARTER (NE1/4) OF SECTION 19, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN BOOK 132, PAGE 11 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

CITY OF LAS VEGAS BENCHMARK NUMBER: 6LV901904
RIVET AND PLATE IN TOP OF CURB AT NORTHEAST CORNER OF DEER SPRINGS WAY AND GRAND
CANYON DRIVE.
ELEVATION: 2724.21 US SURVEY FEET (NAVD88)
830.340 METERS
PER CITY OF LAS VEGAS BENCHMARKS, 2008 ADJUSTMENT (UPDATED MAY 24, 2010)





Existing Condition Flow Rate Summary				
Basin/Concentration Point ID	Area (ac)	Q ₁₀₀ (cfs)	Q ₁₀ (cfs)	
ONX	4.4	7	2	
HAL	0.3	1	1	
DSP	1.3	5	3	
CP 7D*	N/A	22	7	
CP1	N/A	153	47	

Q = ONX + DSP + CP 7D + 119/35*
* Referenced from Town Center 60/75 Study
* Referenced from CLV WWS (Existing Condition)

LEGEND

—

BASIN BOUNDARY

ID

BASIN ID

→

FLOW DIRECTION

ID

CONCENTRATION POINT

119/35 CFS

100-YR/10-YR FLOW RATES

000/00 CFS

100-YR/10-YR FLOW RATES

000/00 CFS

100-YR/10-YR FLOW RATES

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

S-I-G

SLATER HANIFAN GROUP

CONSULTING ENGINEERS & PLANNERS

5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118

PHONE (702) 284-5300

FAX (702) 284-5399

RICHMOND AMERICAN HOMES

DEER SPRINGS 5

EXISTING CONDITION DRAINAGE MAP

19
18
R60E

DATE: FEB 2014

DRAFTER: AJH

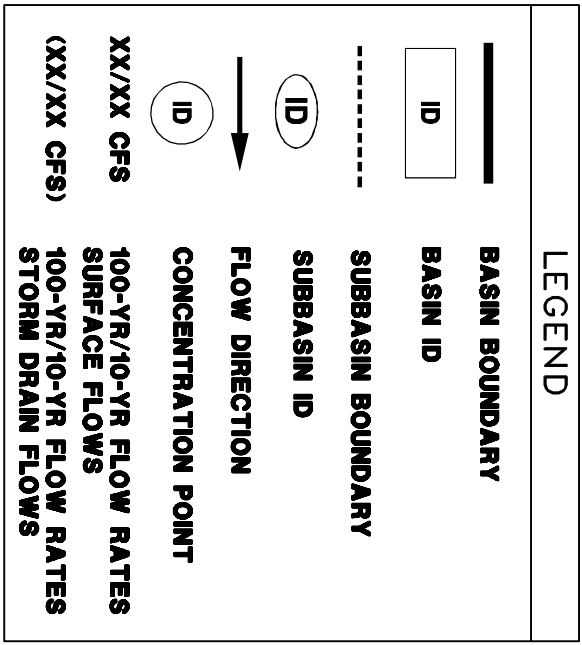
DESIGNER: AJH

CHECKED: ARP

PROJECT NO.
RAH1009.001

EXHIBIT E

SHEET 1 OF 1



Developed Condition Flow Rate Summary			
Basin/Concentration Point ID	Area (ac)	Flow (cfs)	Q _o (cfs)
OND	4.4	11	4
HAU	0.3	1	1
DSP	1.3	5	3
CP-ZD	N/A	22	7
CP1	N/A	149	15

Q = OND + HAU + DSP + CP-ZD + CP1
1090³

* Referenced from Town Center 6075 Study
* Referenced from CLV MWNIS (Future Condition/Surface Flow only)

Developed Condition Priorated Flow Summary			
Basin	Q ₁₀₀ (cfs)	Area (acres)	Unit Flow (cfs/acre)
HAL	1	0.29	3.4
Subbasin	Q ₁₀₀ (cfs)	Area (acres)	Unit Flow (cfs/acre)
HAL(A)	1	0.22	3.4
HAL(B)	0	0.07	3.4
TOTAL	1	0.29	

10-Year Street Flow Summary					
Cross Section	Slope	Q ₁₀	Depth	Velocity	Dry Lane
DS	(%)	(cfs)	(ft)	(fps)	Width (ft)
DS (0+0P1)	2.50	15	0.39	4.47	1.7
DS (0+0P1)	2.50	47	0.56	5.0	2.8
Existing Condition CP1 - Refer to Exhibit E					

100-Year Storm Flow Summary					
Cross Section	Slope (%)	Q ₁₀₀ (cfs)	Depth (ft)	Velocity (fps)	Dx/V
H4 (Q = H4(LA))	3.06	1	0.23	3.0	0.7
(Q = H4(LA) + OHD)	1.75	12	0.47	4.1	1.9
2 (Q = OHD)	4.05	11	0.36	4.9	1.7
DS (Q = CPT)	2.50	149	0.76	6.7	3.2
DS (Q = CPT) + Existing Condition CPT - Refer to Exhibit E	2.50	153	0.76	6.7	3.2

[illegible]

S-I-G **SLATER**
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