

DS #:

5413

APN:

137-23.410.003; 137-26.112.004

PROJECT:

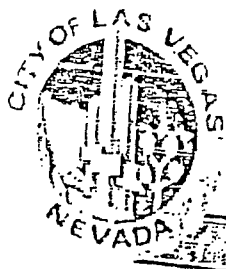
Mono Pointe

SUBMITTAL:

1st

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM		DATE: February 2, 2021
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for:	COPIES TO:
	Moro Pointe	Westwood Professional Services
Cross Streets:	SEC Desert Foothills Dr. & Red Pass Drive	Howard Hughes Company
File Number:	F:\Depot\DSMemos\DS5413A.doc	Bart Anderson, P.E., DevCo
Parcel Number:	137-23-410-003 & 137-26-112-004	CCRFCD
Zoning Action:	20-0196-TMP1	
FEMA Flood Zone	YES NO X	
Proposed Storm Drain	YES X NO	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	1/19/2021	2/2/2021	See Comments Below	\$400.00	4135868: \$400
			TOTAL FEES (LDDRS):	\$400.00	----

REMARKS:

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

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

1. The site is adjacent to or crosses an existing or proposed *Clark County Regional Flood Control District* (CCRFCD) master planned facility. Therefore, CCRFCD concurrence is required prior to final approval of the drainage study.

Please note that effective March 15, 2019, the CCRFCD adopted new requirements for drainage study concurrence submittal. Follow the link below for specific guidance.

<http://gustfront.ccrfcd.org/LandDev/LandDev.aspx>

2. The subject development is under the premise of flood protection by the surrounding perimeter streets and the associated storm drain systems, ie, *Desert Foothills Boulevard, Red Pass Drive, Clowder Springs Way and Kindle Corner Avenue*. No occupancy permit of the houses will be issued prior to the substantial buildout of the perimeter streets.
3. Sites with a grade difference of 2 feet above or below existing grades are required to have approval from the *City of Las Vegas Planning and Development Department*. The engineer must submit copies of the grading plans and detail sheet with a letter justifying the grade difference to the *City Planning Department* (229-6301). The engineer must provide *City Planning* approval with the next submittal.

4. Provide the Engineer's Seal on the *Drainage Study Information Form*.
5. **Parcel NP-2** drains to *Red Pass Drive* through the amenity zone and the sidewalk in the interim condition. Obtain approval from *Summerlin Master Homeowners Association* prior to the final approval of the subject drainage study.
6. **Sheet G-2**: Label the street slope in *Bear Hill Street* north of *Bobcat Point Avenue*.
7. **Sheet G-3** and **Sheet G-4**: Label the width of the drainage easements on the lot grading details.
8. **Sheet G-3** and **Sheet G-4**: It appears that the typical lot drainage is to install a grate inlet in one lot and discharge by a pipe through another lot. It is however, not clear that, if the grate inlet in the upstream lot is clogged, is there any emergency overflow path available? This must be addressed in the next submittal.
9. The maintenance of the grate inlet in individual lot should fall under the HOA. Expand the drainage easement to include the grate inlets. Revise the typical lot drainage detail accordingly.
10. **Sheet PP-3**: Provide the 100-year HGL for SD Lateral I and SD Lateral II.
11. All drainage easements must be public drainage easements to be privately maintained to be labeled on the grading plans and to be dedicated as such in the final map.
12. Private streets must be public drainage easements. Provide a note on the grading plans "Note: All private streets are P.U.E., Public Sewer Easements, and Public Drainage Easements to be privately maintained by HOA."
13. The engineer must provide a table on the grading plans that shows a quantity estimate of all drainage improvements within Public Drainage Easements. All drainage improvements within Public Drainage Easements must be bonded and inspected.

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

END OF REMARKS
HDR/AYS

T/R/S: T20S/R59E/23
AREA K-23



TECHINICAL DRAINAGE STUDY

Moro Pointe

JANUARY 2021

PREPARED FOR:

Richmond American Homes

Las Vegas, NV

PREPARED BY:

Westwood

Moro Pointe

Technical Drainage Study

City of Las Vegas, NV

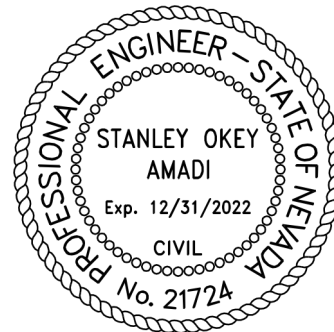
Prepared For:

Richmond American Homes
7770 Dean Martin Dr., Suite #308
Las Vegas, Nevada 89139

Prepared By:

Westwood Professional Services
5740 S. Arville Street, Suite 216
Las Vegas, NV 89118
Phone: (702) 284-5300
Fax: (702) 284-5339

Project Number: RAH2007.000
Date: January 2021



Stanley Okey Amadi, P.E., CFM
NV Professional Engineer No. 21724
Assisted by: Caitlyn Alcantara, E.I.

Jennifer Shinn, P.E.
Engineering Associate

City of Las Vegas
495 S. Main Street
Las Vegas, NV 89101

Re: Technical Drainage Study for Moro Pointe

Dear Mrs. Shinn

This letter certifies that all items provided on the Technical Drainage Study for Moro Pointe submittal CD match the paper version bound into the study.

Please contact me if you have any questions.

Respectfully Submitted,

WESTWOOD PROFESSIONAL SERVICES



Caitlyn Alcantara, E.I.
Graduate Engineer – Water Resources Department

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Technical Drainage Study for Moro Pointe Date: January 2021
 Location of Development: a) Descriptive (Cross Streets): North/South: N Desert Foothills Dr
East/West: Kindle Corner Way
 b) Section: 23 & 26 Township: 20 S Range: 59 E
 c) APN: 137-23-410-003 & 137-26-112-004

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

Contact Person – Name: Stanley Okey Amadi, P.E., CFM Telephone No.: (702) 284-5300
 *E-mail Address: Stanley.amadi@westwoodps.com Fax No.: (702) 284-5399
 Firm: Westwood Professional Services
 Address: 5740 S. Arville #216 Las Vegas NV 89118

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At Site: ± 6 acres Being Developed/Disturbed: ± 6 acres

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

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

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

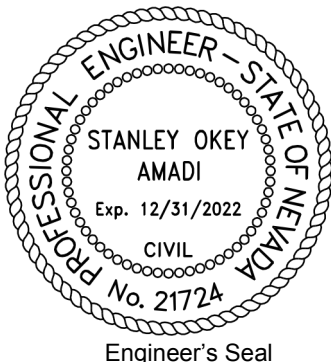
5. Approximate upstream land area which drains to the subject site: 0

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

Summerlin West Planning Area MPU Update DS4926, TDS for Summerlin West V21 – Street C Improvements (Carriage Hill Drive to Desert Foothills Drive) DS5093, TDS for Summerlin Village 21 - Clowder Spring Way (Street D) DS5110

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Project will discharge flows to storm drain in Clowder Springs Way

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



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

***Newly Required Field**

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

	Revision	Date
Local Entity File No. _____		

REFERENCE: STANDARD FORM 1

Updated 05/01/2008



CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 5/18/11)

The following checklist is intended as a supplemental guide for the engineer preparing a Technical Drainage Study submittal to the City of Las Vegas. This supplement focuses on requirements specific to the City of Las Vegas. The requirements presented are in addition to the Clark County Regional Flood Control District (CCRFCDD) 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 CCRFCDD Hydrologic Criteria and Drainage Design Manual (Design Manual).

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

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

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

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

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

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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Technical Drainage Study for Moro Pointe

Map ID:

Firm Name: Westwood Professional Services

Engineer: Stanley Okey Amadi, P.E., CFM

Address: 5740 S. Arville #216

City: Las Vegas

State: NV

Zip: 89118

Phone Number: (702) 284-5300

Fax Number: (702) 284-5399

Property Owner: Owner: Hughes Howard Company, LLC Developer: Richmond American Homes

Address: 7770 Dean Martin Drive #308

City: Las Vegas

State: NV

Zip: 89139

Reviewed By:

Date Received:

Date Accepted for Review:

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

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

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

I. GENERAL REQUIREMENT

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

II. MAPS AND EXHIBITS

Yes	No	
<u>X</u>	-	A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated.
<u>X</u>	-	A copy of the current CCRFCD Master Plan Update Figure, (F-x), for Flood Control Facilities and Environmental areas with the site delineated.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS (Continued)

Yes	No	
<u>X</u>	<u>-</u>	Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.
<u>X</u>	<u>-</u>	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.
<u>X</u>	<u>-</u>	Vicinity Map with local and major cross streets identified and a north arrow.

III. DRAINAGE PLAN

Yes	No	
<u>X</u>	<u>-</u>	Sheet size: 24" x 36" sealed by a registered engineer in the State of Nevada.
<u>X</u>	<u>-</u>	Minimum scale: 1" = 60'.
<u>X</u>	<u>-</u>	Project name.
<u>X</u>	<u>-</u>	Vicinity Map with local and major cross streets.
<u>X</u>	<u>-</u>	Revision box.
<u>X</u>	<u>-</u>	North arrow and bar scale.
<u>X</u>	<u>-</u>	Engineer's/consultant's address and phone number.
<u>X</u>	<u>-</u>	Elevation datum and benchmark.
<u>X</u>	<u>-</u>	Legend for symbols and abbreviations.
<u>-</u>	<u>N/A</u>	Cut/fill scarps, where applicable.
<u>X</u>	<u>-</u>	Street names, grades, widths.
<u>X</u>	<u>-</u>	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.
<u>X</u>	<u>-</u>	Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate.
<u>X</u>	<u>-</u>	Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.
<u>X</u>	<u>-</u>	Proposed typical street sections.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
-	N/A	Streets with off-set crowns.
N/A	-	Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.
X	-	Property lines.
X	-	Right-of-way lines and widths, existing and proposed.
X	-	Existing improvements and their elevations.
X	-	Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.
X	-	Concentration points and drainage flow direction with Q_{100} and V_{100} and D_{100} in streets.
X	-	Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
X	-	Location and cross-section of street capacity calculations.
X	-	Cross-sectional detail for channels, including cutoff wall locations.
X	-	Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations.
X	-	Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
-	N/A	Location and detail of existing, proposed, and future block wall openings. Minimum size is 16" x 48". Wrought iron gate is required for flows > 10 cfs.
-	N/A	Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.
X	-	Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood walls with 8-inch concrete masonry unit.
X	-	Building and/or lot numbers.
X	-	Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
-	N/A	Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
☐	N/A	For areas in Zone A, AE, AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE.
☐	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.
☒	☐	Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.
☐	N/A	Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required).

IV. HYDROLOGIC ANALYSIS

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

REFERENCE:

STANDARD FORM 2

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, whichever is greater.
-	N/A	A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. • Field survey data. • Input and output information. • Plotted cross-sections based on survey with proper encroachments. • A map showing the location of the cross-sections. • Analysis of both sub and super-critical flow segments. • A summary table and a discussion of the results in the text of the report.
X	-	Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
X	-	Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.
X	-	The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.
-	N/A	Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:

STANDARD FORM 2

Table of Contents

Table of Contents i

List of Appendices..... ii

1.0 Introduction 1

1.1 Project Overview 1

1.2 Study Purpose..... 1

1.3 Site Description 1

1.4 FEMA Flood Zone Designation..... 1

1.5 CCRFCD Facility Information..... 2

1.6 CCRFCD Watershed Information 2

1.7 Referenced Documents..... 2

2 Methodology..... 2

2.1 Compliance 2

2.2 Hydrologic Modeling 3

2.3 Hydraulic Modeling 3

3 Existing Drainage Condition..... 3

3.1 Definition of Existing Condition 3

4 Proposed Drainage Condition..... 4

4.1 Definition of Proposed Condition 4

4.2 Discussion of Proposed Condition 4

4.3 Summary of Proposed Condition Flows 4

5 Street Improvements..... 4

6 Drainage Facilities.....5

7 Finished Floor Elevations 6

8 Conclusions & Recommendations 6

9 References.....7

List of Appendices

Appendix A	Drainage Exhibits • Exhibit A – Location Map • Exhibit B – FEMA FIRM Map • Exhibit C1 – CCRFCD MPU Facilities Map • Exhibit C2 - CCRFCD MPU Facilities Inventory • Exhibit C3 – CCRFCD MPU Hydrologic Map • Exhibit D – Proposed Condition Drainage Map
Appendix B	Hydraulic Analyses • Perimeter Street Flow Computations • Interior Street Flow Computations • Inlet Sizing Computations • Lateral Sizing Computations • WSPG Model • Inlet Control Nomographs • Emergency Overflow Computations • Ditch Computation
Appendix C	Finished Floor Analyses
Appendix D	Reference Material Drainage Study for Summerlin West Planning Area Master Plan Update (DS4926) • Approval Letters • Referenced Drainage Exhibits • Referenced Hydrology
Appendix E	Reference Material Technical Drainage Study for Summerlin West Village 21 – Street C Improvements (Carriage Hill Drive to Desert Foothills Drive) (DS5093) • Approval Letters • Referenced Drainage Exhibits • Referenced Hydraulics • Referenced Plan Sheets
Appendix F	Reference Material Technical Drainage Study for Summerlin Village 21 – Clowder Springs Way (Street D) (DS5110) • Approval Letters • Referenced Drainage Exhibits • Referenced Hydraulics • Referenced Plan Sheets
Appendix G	Zoning and Planning Conditions
Appendix H	CD of Electronic Files & Improvement Plans

1.0 Introduction

1.1 Project Overview

Richmond American Homes is proposing a residential development on approximately 5.95 acres, located north of the undeveloped roadway, Kindle Corner Avenue, and east of undeveloped roadway, Desert Foothills Drive, within the Summerlin Village 21 Master Planned Community in the City of Las Vegas, Nevada. The project site is identified on the included improvement plans as Moro Pointe also known as Summerlin Village 21 Parcels N & O (hereinafter referred to as the project site). The proposed improvements include single-family lots as well as interior and perimeter roadways, utilities, and drainage facilities. Please note that the project site will be constructed in a single phase.

1.2 Study Purpose

The purpose of this study is to provide detailed hydrologic and hydraulic analysis for the project site to protect the property from onsite and offsite runoff in accordance with local stormwater management criteria. The study addresses offsite drainage impacts to the project site, establishes onsite drainage patterns, and accommodates the allowable discharge restrictions at appropriate downstream locations. The study also assesses the required drainage infrastructure and establishes finished floor elevations of the proposed lots.

1.3 Site Description

The project site consists of APNs 137-23-410-003 and 137-26-112-004 within Township 20 South, Range 59 East, and Sections 23 & 26. The project site is bound by Desert Foothills Drive and an undeveloped parcel for the future park to the west, Kindle Corner Avenue to the south and undeveloped property to the north and east. The location of the project site, relative to the surrounding streets, is identified on the Location Map (Exhibit A), included in Appendix A for reference.

The current condition of the project site is undeveloped desert terrain with sparse desert shrub, generally draining in an easterly direction. The project site proposes 64 attached single-family residential lots with a typical lot size of 2,500 square feet. The tentative map has been approved and the conditions of approval are included in Appendix G for reference.

The project site is within the Summerlin Village 21 Master Plan area and was most recently addressed in the Update #1 to the Flood Control Master Plan Update – Summerlin West Planning Area. This master study established overall drainage patterns and drainage infrastructure required for the Village 21 area. It is assumed that the future perimeter streets around the project site will be in place with their associated storm drain facilities per the Master Study and follow-up infrastructure studies in all of the developed conditions for this study.

1.4 FEMA Flood Zone Designation

The project site is located on Flood Insurance Rate Map (FIRM) Panel 32003C2150E, dated September 27, 2002 and revised to reflect a Letter of Map Revision (LOMR) dated February 05, 2018. The project site is located within FEMA designated unshaded Zone X. Zone X (unshaded) is described by FEMA as an area determined to be outside the 0.2% annual chance floodplain. Exhibit B identifying the project site on the FIRM Panel has been included in Appendix A for reference.

1.5 CCRFCD Facility Information

The project site has been identified on the current 2018 CCRFCD MPU Figure F-22, which is included as Exhibit C1 in Appendix A for reference. Per the 2018 CCRFCD MPU (Reference 1), the Angel Park- Desert Foothills Branch (APDF) is the closest regional facility adjacent to the site. This facility is located west of the project site in Foothills Drive and is identified as a Category B Proposed Facility. The facility is adjacent to the project site with no direct impact from the project site but provides flood protection to the site. Refer to Exhibit C2 for the facility inventory summary table.

1.6 CCRFCD Watershed Information

Figure W-4, from the 2018 Las Vegas Valley Flood Control Master Plan Update (MPU, Reference 1), shows that the project site lies within the MPU subbasin SWFH-13. This subbasin appears to drain south into subbasin SWFH-14. Exhibit C3 identifying the project site on the MPU figure has been included in Appendix A for reference.

1.7 Referenced Documents

This document was prepared in coordination with various relevant documents, studies and improvement plans previously reviewed and approved by the governing agency. All referenced studies and improvement plans have been reviewed and determined acceptable for reference. The following drainage studies and improvement plans were utilized as reference in the preparation of this study. These approved studies have been reviewed and are considered acceptable for referencing with exceptions noted in this report.

- Technical Drainage Study Update #1 for the Flood Control Master Plan Update – Summerlin West Planning Area (hereinafter referred to as the Master Study, DS 4926), prepared by VTN Nevada. The Master Study has been utilized to establish the flow rate generated by the developed site as well as the flows conveyed within the adjacent perimeter street. Relevant reference material from the Master Study has been included in Appendix E.
- Technical Drainage Study for Summerlin Village 21 – Street C Improvements (Carriage Hill Drive to Desert Foothill Drive) (hereinafter referred to as the Red Pass Study, DS5093), prepared by VTN Nevada. The Red Pass Study addressed the street and utilities in the street adjacent to the project site. The study also addressed and assessed the project site as it impacts the street and provided street sections for finished floor analyses.
- Technical Drainage Study for Summerlin Village 21 – Clowder Spring Way (Street D) (hereinafter referred to as the Clowder Springs Study, DS5110), prepared by VTN Nevada. The Clowder Springs Study addressed the street and utilities in the street adjacent to the site including a 24” RCP storm drain stub for the project site to tie into. The study addressed a portion of the project site as it is intended to contribute to the street and storm drain as well as provided street sections for finished floor analyses.

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 (hereinafter referred to as the CCRFCD Manual, adopted in 1999, Reference 2).

2.2 Hydrologic Modeling

No hydrologic basins are being analyzed with this study. The site is within a master plan area where the developed condition drainage patterns, discharge points and allowable peak flow rates have been determined by the Master Study. The proposed land use is the same as master planned and analyzed by the Master Study. Therefore, a revised analysis is not necessary and have not been provided. The developed condition hydrologic analysis for the site and the tributary areas have been referenced from the Master Study. The referenced developed condition hydrologic computations have been included in Appendix E.

2.3 Hydraulic Modeling

Street Flow: Street flows have been analyzed utilizing FlowMaster Connect Edition Update 3. In accordance with Section 304.4 of the CCRFCD Manual, the depth times velocity factor ($D \times V$) for street flow for the minor 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 major 100-year storm event must be less than or equal to 8, with a maximum depth of 2-ft.

Specific to streets with rights-of-way width that are 80-ft wide or greater, they are required to meet the 10-year dry lane criteria. A 12-ft wide dry lane (excluding center turning lane) must be provided in each direction of traffic during the 10-year storm event. Additionally, the 10-year depth of flow at intersections with other streets with 80-ft and or greater right-of-way width must be limited to curb height.

When transverse flow crosses a roadway (not as a result of a culvert) during the 100-year event, the depth of flow and $D \times V$ shall not exceed 1-ft and 8, respectively.

Cul-de-sacs within the City of Las Vegas requires a minimum slope of 1%.

Drop Inlets: Drop inlets have been assessed using an in-house computation spreadsheet which utilizes equations outlined in Section 805 of the CCRFCD Manual, which includes a 50% clogging factor in determining sizes.

Storm Drains: The hydraulic analysis for the proposed storm drain has been performed utilizing the Water Surface and Pressure Gradient (WSPG) Hydraulic Analysis System software by the Los Angeles County Department of Public Works. As outlined in the Section 800 of the CCRFCD Manual, storm drain facilities are designed to maintain its hydraulic gradient line (HGL) a minimum of 1-ft below above finished grade and rim elevations and limit the flow velocities in the facility to less than 25 ft/s.

At locations where proposed storm drain temporarily daylight onto surface terrain, outlet projection is assessed, and outlet protection measures are proposed.

3 Existing Drainage Condition

3.1 Definition of Existing Condition

The existing drainage condition of the project site has been addressed by the Master Study and will not be revisited by this study. Note that the Master Study has set the developed condition drainage patterns and allowable flow rates for the entire master plan area; therefore, a site-specific existing condition hydrologic analysis is not necessary and has not been provided.

4 Proposed Drainage Condition

4.1 Definition of Proposed Condition

The proposed condition considers that the site and the entire Summerlin Village 21 including the roadway and drainage infrastructures are fully installed and operational. The project site also graded the park at the northwest corner of the project site to convey flows north to Red Pass Drive. Therefore, no offsite flows will directly impact or convey thru the site.

4.2 Discussion of Proposed Condition

The proposed condition hydrologic analysis of the site has been referenced from the Master Study. The site was analyzed as drainage basins N & O and is planned to surface flow east and be collected by proposed drop inlets and grate inlets. Captured flows are routed to an existing storm drain system in Clowder Springs Way. The onsite basins have been prorated into several sub-basins for the purpose of street flows, inlet computations, and finished floor evaluations.

Parcel NP-2, the park parcel northwest of the project site, has been graded by the project site's proposed condition development to convey runoff north onto Red Pass Drive, away from the project site. Note that this condition is considered temporary. When the park is developed, it is anticipated that the park flow will be collected and conveyed into the stub provided by the Summerlin Village 21 Infrastructure. This is considered acceptable since in the existing condition, flows are anticipated to drain into streets before their full build-out. Though flow from the park is not anticipated to impact the project site, a street section analysis has been provided to ensure that finished floors have been protected from any additional flow that may impact the site from the park.

Refer to Exhibit D provided in Appendix A for the Proposed Condition Drainage Map depicting the prorated onsite sub-basins and a summary table of the street flow calculations.

4.3 Summary of Proposed Condition Flows

A summary of existing condition flow rates, as determined by the reference material, are presented in a summary table on Exhibit D in Appendix A. Refer to Appendix B for the proposed condition HEC-1 model. Relevant hydrologic data for the referenced basins are provided in the appendix of the appropriate reference study.

5 Street Improvements

A summary table of the street flow hydraulic computations for the perimeter and interior roadways has been provided on Exhibit D, in Appendix A. Hydraulic calculations for the perimeter and interior roadways are provided in Appendix B. All sections have been analyzed and determined to meet the 100-year and 10-year criteria stated in Section 2.3.

Interior Section(s): Interior sections were created with both minimum and maximum applicable slopes for a conservative estimate of flow depth at a given section if applicable. Note that though the proposed condition analysis assumes that the NP-2 park parcel is assumed to be developed prior to the development of the project site, a conservative street section has been provided specifically for section N1. The conservative section assumes the flow of the park impacts the project site and utilizes the shallowest slope to give the most conservative flow depth. The section was utilized for finished floor analyses to demonstrate that flow impacting the project site via the NP-2 park site would not negatively impact the finished floors of the project site.

Perimeter Section(s): The surface flows in the adjacent perimeter streets have been referenced from the Master Study and utilized for the supporting street hydraulic computations. Note that the Master Study has planned stubs for all parcel to discharge directly into the mainline storm drain facilities. Therefore, the surface flows in the perimeter streets only comprise of the runoff generated by the respective rights-of-way. Street sections have been referenced from both the Red Pass Study and the Clowder Springs Study. For conservative estimates of flow depths in either roadway for the applicable finished floor analyses.

6 Drainage Facilities

Two sump curb inlets, two grate inlets, and one continuous curb inlet has been proposed as part of the project site design. The two sump inlets are provided on Bear Hills Drive south of the entry of the project site. The two grate inlets have been provided in the two large, landscaped areas to prevent nuisance flows from overtopping curbs. The one continuous curb inlet has been provided along the lower side of the superelevated entryway street to capture runoff before entering into Clowder Springs Way. A curb cut has been proposed within the entryway median to allow flows to cross to the lower side of the street.

Though curb inlet computations have been provided for the project site, grate inlet computations have not been provided; this is due to the small amounts of flow impacting both grate inlets. Since less than one cfs is anticipated to impact either grate inlet, a 2'x2' grate inlet is considered acceptable to collect the nuisance flows generated by the landscaped areas. Note that an emergency overflow computation has been provided to illustrate an emergency event in which the two sump curb inlets, DI#3 and DI#2 have become clogged. In the event sump grate inlets DI#1A, and DI#2A have become clogged, no finished floors are anticipated to be impacted since both routes of overflow are into the entryway street.

A WSPGW model has been provided to analyze the mainline storm drain (MAINNO). The mainline storm drain begins in Bear Hills Street at DI#3, continues through DI#2 in Bear Hills Street and junctions with DI#2A. The mainline then turns east onto the entryway road, Bobcat Point Avenue, collects flow from DI#1 and DI#1A and connects to the provided stub from the Clowder Springs Study. The resulting HGL from the WSPGW model meets the storm drain design criteria stipulated in the CCRFCD Manual and the velocities of the storm drain are below 25 fps. With the exception of flow through DI#2, velocities are above 3 fps.

Storm drain laterals for DI#1, DI#1A, and DI#2a are analyzed with the Standard Form 6 lateral loss computation. The lateral computations indicate that the storm drain design criteria stipulated in the CCRFCD Manual are satisfied. Refer to Appendix B for the mainline storm drain and lateral computations. A summary table of the recommended facilities have been provided on the Proposed Condition Drainage Map (Exhibit D) included in Appendix A.

A ditch computation has been provided to analyze the flows impacting the project site's western wall. The computation illustrates that the flow is contained when utilizing the most conservative side slopes. Three courses of solid grouting have also been provided for the western wall to protect finished floors from twice the depth of flow. The location and summary of the proposed park ditch section (Section PD) has been provided on the Proposed Condition Drainage Map (Exhibit D) included in Appendix A.

7 Finished Floor Elevations

Finished floor elevations for the proposed lots per the City of Las Vegas criteria are determined to be a vertical distance above the gutter flow line of twice the depth of flow in the street on the high side of the lot, and 6-inches above the top of curb at the high side of the lot, whichever is higher.

Several finished floors along Red Pass Drive, Desert Foothills Drive, and Kindle Corner Avenue are below the adjacent street. Solid grouting has been proposed for the walls adjacent to these streets where applicable, but sidewalk access has been provided for lots adjacent to Red Pass Drive and Kindle Corner Avenue. Though solid grouting has been provided, it is not needed to protect the homes. Flow depths in either Red Pass Drive or Kindle Corner Avenue are less than 0.34-ft and therefore twice the depth of flow will be contained by the large landscape easement containing the sidewalk.

Three courses of solid grouting have also been provided for walls adjacent to the northwestern park. Though flow is only concentrated for the short span of the proposed ditch, proposed finished floors are below the future park grades.

A spreadsheet showing the finished floor analysis and the supplemental assessments have been included in Appendix C. Where necessary for flood protection, solid grouting of walls have been proposed.

8 Conclusions & Recommendations

1. This project site is in compliance with the applicable drainage laws as recognized by the state of Nevada and with the CCRFCD Manual.
2. The project site is not located within a FEMA designated Special Flood Hazard Area (SFHA). The project site and the proposed improvements are located within a FEMA Flood Zone "X" (unshaded). Therefore, FEMA notification will not be required.
3. The project site is adjacent to an existing/planned CCRFCD regional facility. Therefore, concurrence from CCRFCD is anticipated.
4. The perimeter and interior roadways have been designed to meet all the CCRFCD Manual criteria as discussed in Section 2.3
5. Finished floor elevations for the proposed lots are determined to be a vertical distance above the gutter flow line of twice the depth of flow in the street on the high side of the lot, and 6-inches above the top of curb at the high side of the lot, whichever is higher.
6. The improvement plans for this project has been included in the last appendix of this study. These improvement plans support the drainage patterns and conclusions detailed in this study.

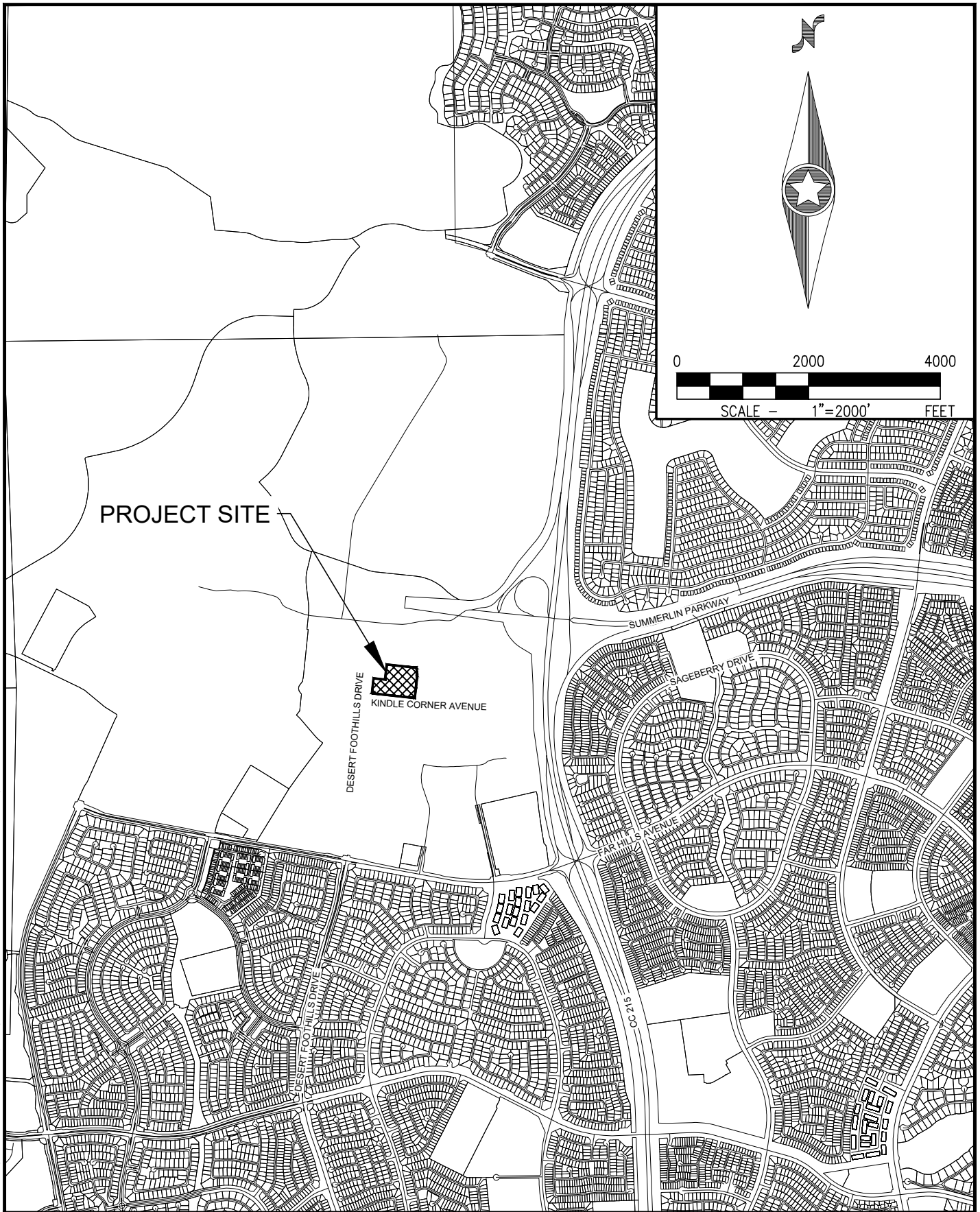
9 References

1. Las Vegas Valley Flood Control Master Plan Update. Atkins, 2018.
2. Hydrologic Criteria and Drainage Design Manual. Clark County Regional Flood Control District, 1999.
3. Soil Survey of Las Vegas Valley Area, Nevada. U.S. Department of Agriculture, Soil Conservation Service, July 2018.
4. Drainage Study for Summerlin West Planning Area Master Plan Update, VTN Nevada, April 2019.
5. Technical Drainage Study for Summerlin West Village 21 – Street C Improvements (Carriage Hill Drive to Desert Foothills Drive), April 2019.
6. Technical Drainage Study for Summerlin West Village 21 –Clowder Springs Way (Street D), June 2019.

APPENDIX A

Drainage Exhibits

j:\rah2007 v21 no\drainage\technical study\figures\rah2007 tds exhibits a-c.dwg 12/21/2020 5:21 PM Kevin Hurtado



Westwood

Phone (702) 284-5300
Fax (702) 284-5399

5740 S. Arville Street
Suite 216
Las Vegas, NV 89118

westwoodps.com

Westwood Professional Services, Inc.

RICHMOND AMERICAN HOMES, INC

MORO POINTE
VICINITY MAP

DATE: DEC 2021

DRAFTER: KH

DESIGNER: KH

CHECKED: SOA

PROJECT NO.

RAH2007.000

EXHIBIT A

SHEET 1 OF 1

NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP			
CLARK COUNTY, NEVADA And Incorporated Areas			
PANEL	2150 OF 4090		
Panel Contains:		FEMA	
COMMUNITY	NUMBER	PANEL	SUFFIX
LAS VEGAS, CITY OF	325276	2150	E
UNINCORPORATED AREAS CLARK COUNTY	320003	2150	E
 REVISED TO REFLECT LOMR EFFECTIVE: February 5, 2018			
VERSION NUMBER		1.1.1.0	
MAP NUMBER		32003C2150E	
EFFECTIVE DATE		SEPTEMBER 27, 2002	

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA

And Incorporated Areas

PANEL
2125
OF
4090

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
LAS VEGAS, CITY OF	325276	2125	E
UNINCORPORATED AREAS CLARK COUNTY	320003	2125	E



FEMA

REVISED TO REFLECT LOMR EFFECTIVE: February 5, 2018

VERSION NUMBER

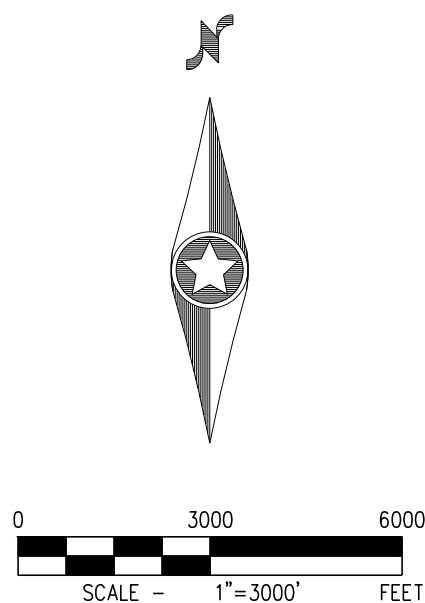
1.1.1.0

MAP NUMBER

32003C2125E

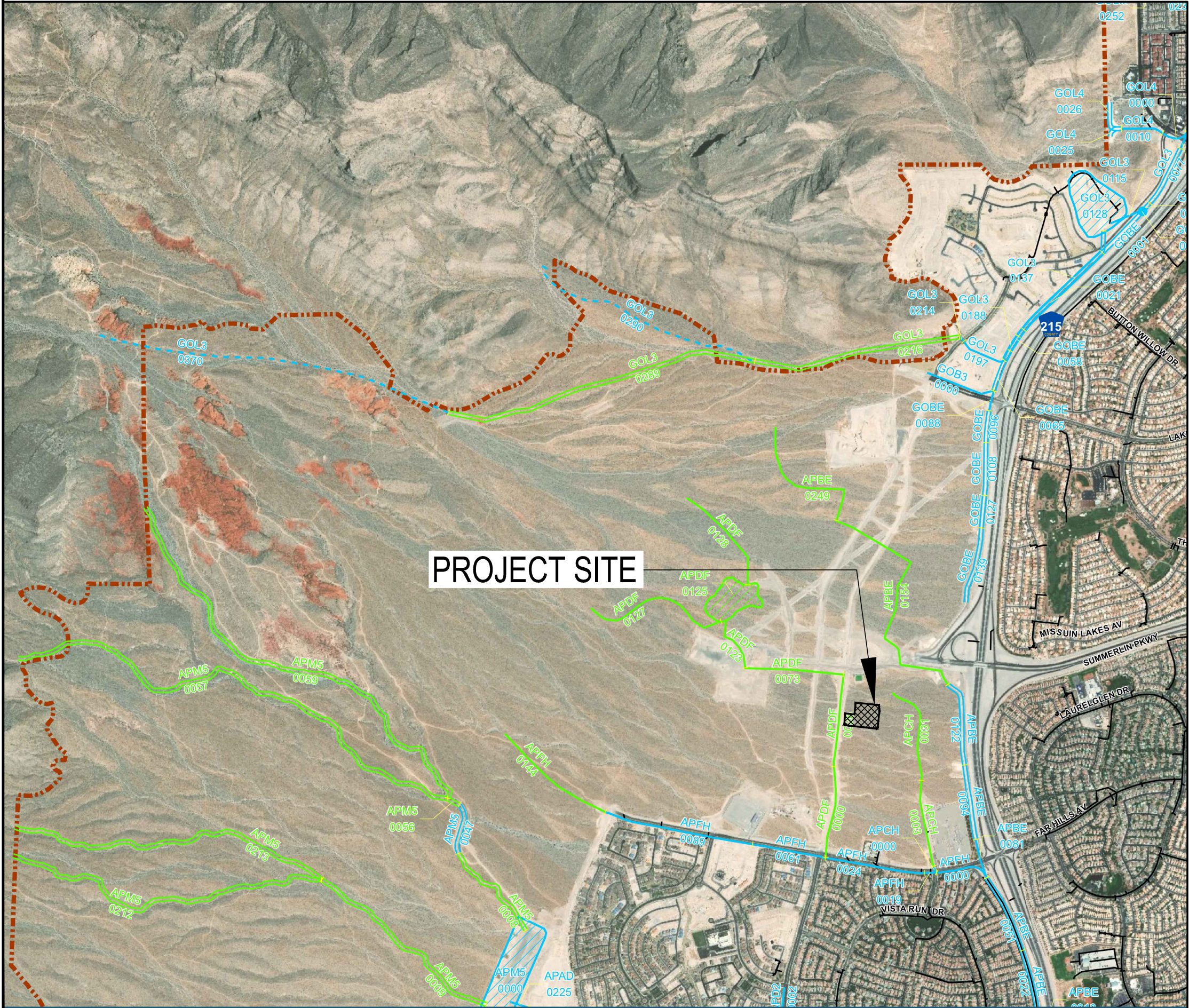
EFFECTIVE DATE

SEPTEMBER 27, 2002



RICHMOND AMERICAN HOMES, INC MORO POINTE FEMA FIRM MAP PANEL		NO. DESCRIPTION DATE BY APP. DATE APP.	Westwood (702) 284-5300 Suite 216 Las Vegas, NV 89118 Phone Fax (702) 284-5399 5740 S. Anville Street Westwood Professional Services, Inc. westwoodps.com
DATE: DEC 2020			
DRAFTER: KH			
DESIGNER: KH			
CHECKED: SOA			
PROJECT NO. RAH2007.000			
EXHIBIT B SHEET 1 OF 1			

j:\rah2007 v21 no\drainage\technical study\figures\rah2007 tds exhibits a-c.dwg 12/21/2020 5:19 PM Kevin Hurtado





2018
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

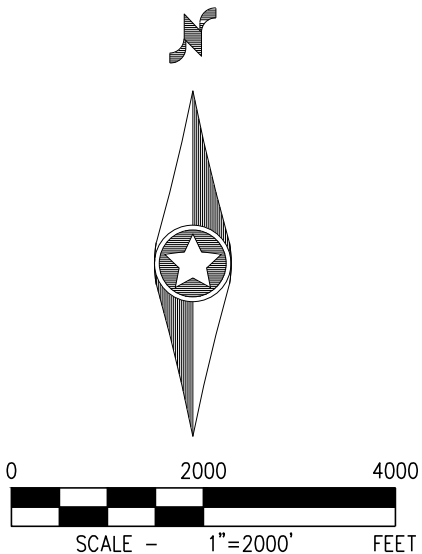
FIGURE F-22
FLOOD CONTROL FACILITIES

LEGEND

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

Remove & Replace/Parallel Facilities

Category A	Category B
Channel	Channel
Stormdrain	Stormdrain
Crossing	Crossing



Westwood

5740 S. Arville Street
Suite 216
Las Vegas, NV 89118

Phone (702) 284-5300
Fax (702) 284-5399

www.westwood.com

Westwood Professional Services, Inc.

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

RICHMOND AMERICAN HOMES, INC

MORO POINTE

2018 MPU CCRFCD FACILITIES MAP

DATE: DEC 2021

DRAFTER: KH

DESIGNER: KH

CHECKED: SOA

PROJECT NO.
RAH2007.000

EXHIBIT C1

SHEET 1 OF 1

ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
APAD		ANGEL PARK - ALTA DRIVE BRANCH						
0203	E	2: 7" X 5.5' RCB	1104	2200	CSWAA-1	GOW3A	6.95	5.28
0225	E	2: 7" X 5.5' RCB OUTLET	360	2137	SUM50B	GOW3A	6.73	3.40
APBE		ANGEL PARK - BELTWAY BRANCH						
0022	E	CONC CHNL 20"W 7D 2:1 SS	1556	3366	CCSWFH15	GOW3A	3.39	1.81
0061	E	CONC CHNL 20"W 7D 2:1 SS	1583	3366	CCSWFH15	GOW3A	3.39	2.77
0081	E	6' X 6' RCBC @ FAR HILLS	777	1048	CSWFH-15	GOW3A	0.59	2.32
0094	E	CONC CHNL 10"W 5D 2:1 SS	1465	1048	CSWFH-15	GOW3A	0.59	1.68
0122	E	CONC CHNL 10"W 4D 2:1 SS	1685	1048	CSWFH-15	GOW3A	0.59	0.60
0154	P0	6' X 6' RCB	5012	781	CSWFH-12	GOW3A	0.41	1.30
0249	P0	6' X 5' RCB	2556	606	CSWFH-11	GOW3A	0.31	3.00
APCH		ANGEL PARK - CARRIAGE HILL BRANCH						
0000	E	6' X 6' RCB	152	399	CSWFH-14	GOW3A	0.21	0.87
0003	P0	72" RCP	1665	399	CSWFH-14	GOW3A	0.21	2.00
0031	P0	60" RCP	2006	206	SWFH-13	GOW3A	0.10	1.38
APD2		ANGEL PARK - DESERT FOOTHILLS 2 BRANCH						
0002	E	7' X 6' RCB	883	674	SWAA-2	GOW3A	0.66	1.08
APDF		ANGEL PARK - DESERT FOOTHILLS BRANCH						
0000	P0	10" X 6' RCB	1766	1426	CSWFI-9	GOW3G	0.80	3.55
0026	P0	6' X 6' RCB	1613	968	CSWFH-8	GOW3A	1.80	2.00
0073	P0	6' X 4' RCB	1922	466	CSWFH-4	GOW3A	1.52	4.40
0123	P0	42" RCP	1076	141	GPDB	GOW3A	1.26	6.00
0126	P0	130 AC-FT GRAND PARK DETENTION BASIN		1543	CSWFH-3	GOW3A	1.29	
0127	P0	6' X 6' RCB	2677	853	SWFH-1	GOW3A	0.69	3.60
0128	P0	5' X 4' RCB	2167	509	SWFH-2	GOW3A	0.37	5.70
APFH		ANGEL PARK - FAR HILLS BRANCH						
0000	E	2: 8' X 8' RCB	1070	2494	CCSWFH14	GOW3B	1.51	3.50
0019	E	2: 8' X 8' RCB	250	2149	CCSWFH-9	GOW3B	1.30	4.19
0024	E	16" X 8' RCAP	1951	2146	CCSWFH-9	GOW3G	1.30	5.10
0061	E	8' X 6' RCB	1435	839	CSWFH-7	GOW3A	0.50	2.00
0069	E	8' X 6' RCB	2946	839	CSWFH-7	GOW3A	0.50	2.00
0144	P0	5' X 4' RCB	2467	456	SWFH-6	GOW3A	0.26	5.50
APM5		DETENTION BASIN #5						
0000	E	384 AC-FT DETENTION BASIN #5		6856	SUM5IN	GOW3A	6.73	
0008	P0	CONC CHNL 50"W 4.5D 2:1 SS	2102	3634	CCDB54-7	GOW3A	4.13	5.20
0009	P0	CONC CHNL 50"W 4D 2:1 SS	4180	3495	CCDB5-7	GOW3A	2.60	5.60
0047	E	DIVERSION BERM WITH GABION BANK PROTECTION	1000	3634	CCDB54-7	GOW3A	4.13	1.30
0056	P0	CONC CHNL 80"W 4D 2:1 SS	264	3634	CCDB54-7	GOW3A	4.13	1.30
0057	P0	CONC CHNL 50"W 3D 2:1 SS	9922	1664	CCDB54-4	GOW3A	0.81	6.60
0059	P0	CONC CHNL 100"W 3D 2:1 SS	9075	2606	CCDB54-7	GOW3A	3.31	7.00
0212	P0	CONC CHNL 30"W 3D 2:1 SS	6655	1092	DB55-1	GOW3A	0.64	7.50
0213	P0	CONC CHNL 50"W 3D 2:1 SS	6522	1729	CCDB55-5	GOW3A	1.30	7.30
APSP		ANGEL PARK - SUMMERLIN PARKWAY						
0163	E	CONC CHNL 10"W 6D 2:1 SS	1660	884	C11B-1	GOW3A	0.84	1.70
GOB3		GOWAN LONE MOUNTAIN SYST. 3 BELTWAY						
0000	E	66" RCP	1370	341	SV22-1	GOW3A	0.16	4.50
GOBE		GOWAN LONE MOUNTAIN SYST. BELTWAY						
0000	E	20" X 10' RCBC @ ACCESS RD	30	1044	CSV22	GOW3A	0.67	5.67
0001	E	CONC CHNL 20"W 5D 2:1 SS	1100	1044	CSV22	GOW3A	0.67	8.50
0021	E	CONC CHNL 11"W 6.8D 0:1 SS	2143	1044	CSV22	GOW3A	0.67	6.50
0058	E	CONC CHNL 15"W 7.5D 0:1 SS	487	1044	CSV22	GOW3A	0.67	3.83
0065	E	CONC CHNL 17"W 5.5D 0:1 SS	844	1044	CSV22	GOW3A	0.67	0.76
0068	E	2: 10' X 9' RCBC @ LAKE MEAD	400	782	SV22-2	GOW3A	0.46	0.50
0096	E	CONC CHNL 20"W 9D 2:1 SS	627	782	SV22-2	GOW3A	0.49	0.50
0108	E	CONC CHNL 20"W 6D 2:1 SS	1021	782	SV22-2	GOW3A	0.49	0.50
0127	E	CONC CHNL 20"W 6D 2:1 SS	638	782	SV22-2	GOW3A	0.46	0.50
0139	E	CONC CHNL 10"W 5.5D 2:1 SS	1500	782	SV22-2	GOW3A	0.49	1.02
GOL3		GOWAN LONE MOUNTAIN SYSTEM-BRANCH 3						
0010	E	CONC CHNL 20"W 10D 0:1 SS	3037	3277	CRCLMT1R	GOW3A	7.31	2.78
0068	E	TRANSITION STRUCTURE	100	3277	CRCLMT1R	GOW3A	7.31	3.50
0070	E	20" X 6' RCBC @ CLIFF SHADOWS	350	1271	CRCSV22	GOW3A	4.99	2.44
0077	E	CONC CHNL 20"W 6D 0:1 SS	1229	1271	CRCSV22	GOW3A	4.99	6.11

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

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



2018 LAS VEGAS VALLEY FLOOD CONTROL MASTER PLAN UPDATE

**FACILITY INVENTORY
FIGURE F-22**

L E G E N D	ID (Facility Identifier)	AA
	Parent Stream Name	
	Stream Name	
	Mile	0000
	Distance Above Confluence with Parent Stream (Miles)	
	Miles in Hundredths	

Existing Facility.....	E
Proposed or Modified Facility.....	P
Contingency Level	
Category A.....	P
Category B.....	P0

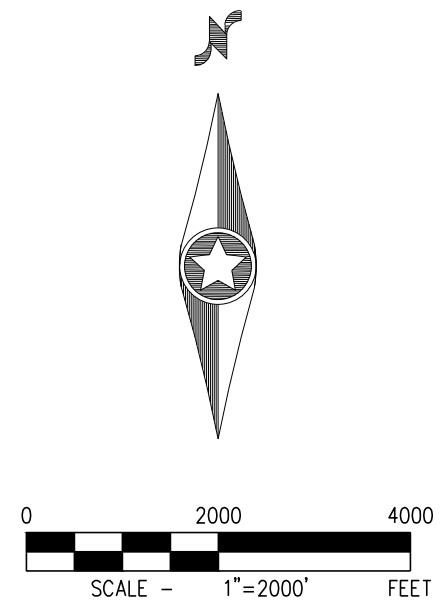
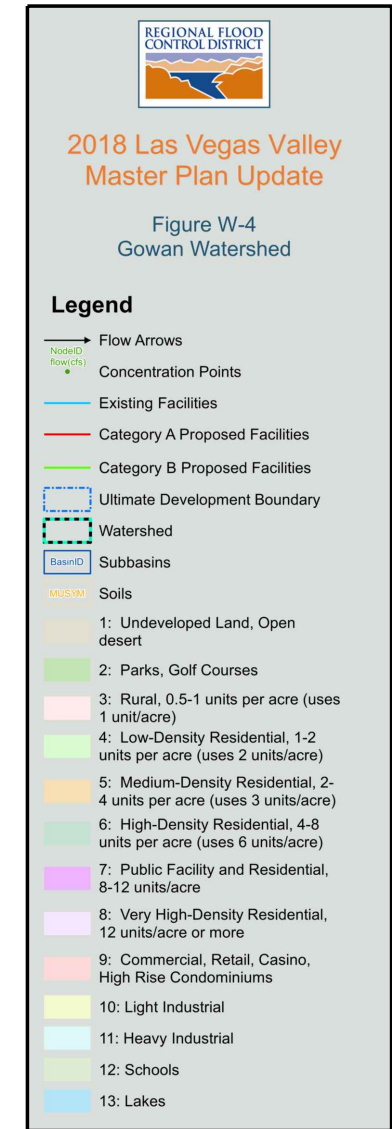
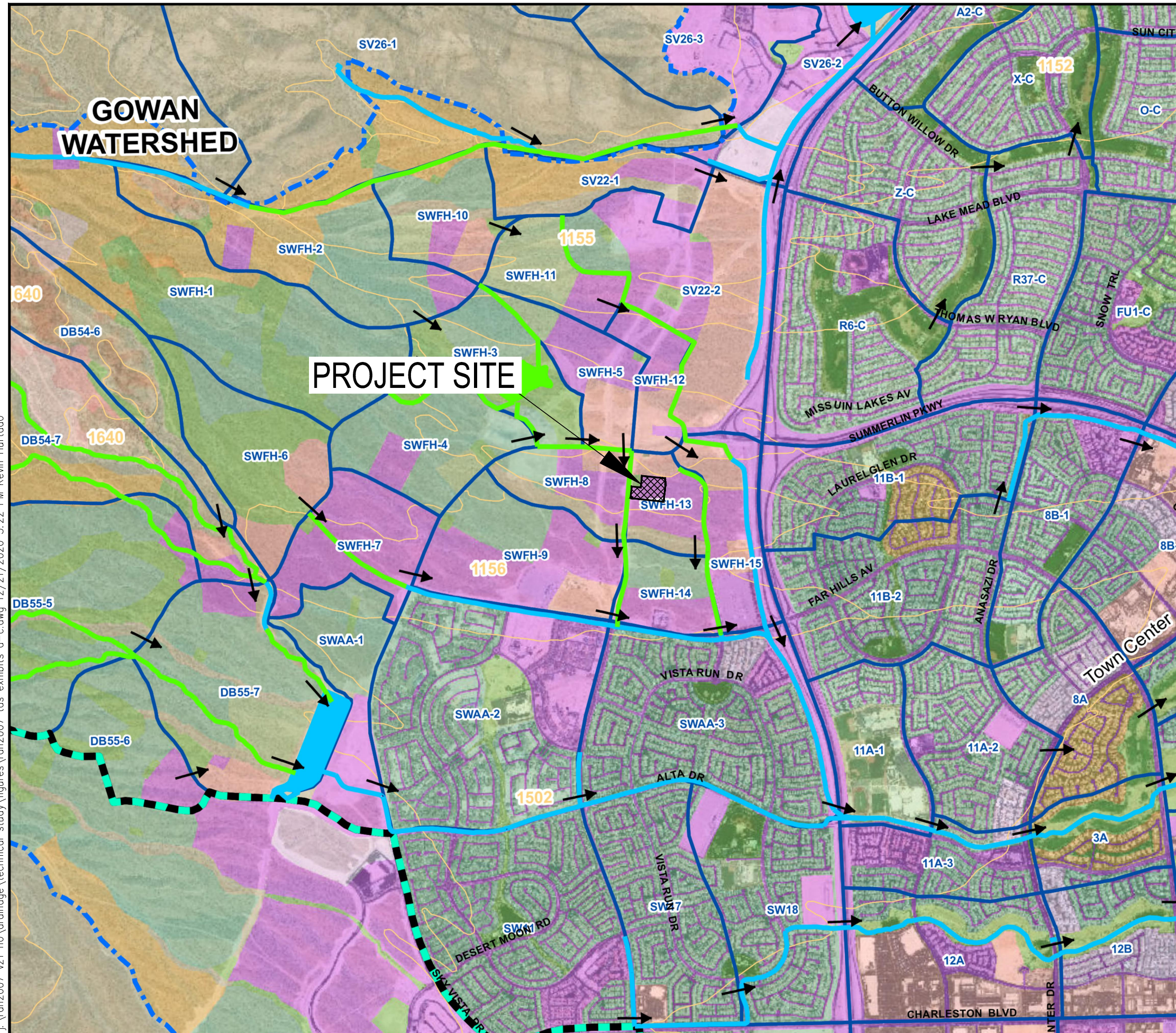
Bottom Width..... W
Depth..... D
Side Slope, H:V..... SS

Construction Features

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



DATE: DEC 2021		NO.		DESCRIPTION		DATE	BY	APP. DATE	APP.
DRAFTER: KH									
DESIGNER: KH									
CHECKED: SOA									
PROJECT NO. RAH2007.000									
EXHIBIT C2									
SHEET 1 OF 1									
RICHMOND AMERICAN HOMES, INC									
MORO POINTE									
2018 CCRFCD MPU FACILITIES TABLE									
Westwood 5740 S. Anville Street Suite 216 Las Vegas, NV 89118 (702) 284-5300 (702) 284-5399 Phone Fax westwood.com Westwood Professional Services, Inc.									

[illegible]

\\h0207_021\va\drainage\technical\study\h0207\h0207.dwg 1/14/2021 9:14 AM Gulliver, Alcantara



LEGEND

- BASIN BOUNDARY
- PRO-RATED SUBBASIN BOUNDARY
- BASIN ID
- PRO-RATED SUBBASIN ID
- FLOW DIRECTION
- FLOWMASTER SECTION
- FACILITY ID

Proposed Condition Ditch Section Summary				
Section ID	Q ₁₀₀ (cfs)	Depth (ft)	Velocity (fps)	
PD				
Q = Basin NP-2*				
	2.0	0.39	1.41	

Proposed Condition Flow Rate Summary		
Basin ID	Area (ac)	Q ₁₀₀ (cfs)
N*	2.54	10
O*	3.47	13
NP-2*	0.88	4
NP-2*	0.93	3
ST3*	1.70	8
STB*	2.65	12
DES2*	2.39	10

Subbasin Prorated Flow Rate Summary				
Basin ID	Q ₁₀₀ (cfs)	Area (acres)	100-yr Unit Flow (cfs/acre)	
N*	10	2.54	3.9	
O*	13	3.47	3.7	
Subbasin ID				
Subbasin ID	Q ₁₀₀ (cfs)	Area (acres)	100-yr Unit Flow (cfs/acre)	
N*(a)	8.7	2.20	3.9	
N*(b)	0.7	0.19	3.9	
N*(c)	0.6	0.15	3.9	
TOTAL	10	2.54		
O*(a)	11.8	3.15	3.7	
O*(b)	0.6	0.17	3.7	
O*(c)	0.2	0.05	3.7	
O*(d)	0.4	0.10	3.7	
TOTAL	13	3.47		

Proposed Condition 100-Year Street Flow Summary						
Section ID	Q ₁₀₀ (cfs)	Slope (%)	Depth (ft)	Velocity (fps)	DxV	
N1	8.7	6.50	0.31	5.14	1.6	
Q = Basin N*(a)						
	6.15	0.31	5.02	1.6		
N1 Conservative Flow & Depth	11.7	6.15	0.33	5.34	1.8	
Q = Basin N*(a)						
N2 Half Street	8.7	6.97	0.36	6.14	2.2	
Q = Basin O*(a)						
O1	11.8	6.15	0.33	5.35	1.8	
Q = 1/6 of Basin O*						
O2	2	1.00	0.27	1.81	0.5	
Q = Basin N*(c) + O*(d)						
O3	1	7.54	0.19	4.92	0.9	
Q = Basin NP-2* + 1/4 of Basin ST3*						
RP1	8.43	0.29	5.38	1.6		
	6.48	0.30	4.78	1.4		
Q = Basin NP-2* + 1/2 of Basin ST3*						
RP2	8.43	0.31	5.62	1.7		
	7.44	0.32	5.33	1.7		
Q = Basin DES2*						
DHD	10	1.90	0.38	3.28	1.2	
Q = Half of Basin STB*						
KCA	6	5.97	0.32	4.73	1.5	

Referenced 100-Year Street Flow Summary						
Section ID	Q ₁₀₀ (cfs)	Slope (%)	Depth (ft)	Velocity (fps)	DxV	
RP***	7	8.40	0.28	5.48	1.5	
(Section named "Red Pass" in referenced study)						
1**	2	2.00	0.34	3.09	1.1	
2**	2	1.60	0.25	2.25	0.6	
	2	1.60	0.25	2.25	0.6	

*Referenced from Summerlin 21 MDS
**Referenced from Summerlin Clowder Spring Way TDS
***Referenced from Red Pass Drive TDS

Proposed Condition Emergency Overflow Hydraulic Summary					
Section ID	Q ₁₀₀ (cfs)	Width (ft)	Type of Analysis	Depth (ft)	Velocity (fps)
EO1	20.3	15	Normal Depth	0.45	7.94
Q = Facilities D#3 + D#2					Weir
				0.6	N/A

Recommended Flood Control Facility Summary				
Facility ID	Facility Description	Total/Approaching Flow (cfs) Q ₁₀₀	Facility Flow (cfs) Q ₁₀₀	Surface/Bypass Flow (cfs) Q ₁₀₀
D#1	Proposed 5" Type CM2 Drop Inlet	1	1	0
D#1A	Proposed 2x2' Grate Inlet	0.7	0.7	0
D#2	Proposed 5" Type CM2 Drop Inlet	0.2	0.2	0
D#2A	Proposed 2x2' Grate Inlet	0.6	0.6	0
D#3	Proposed 12.5" Type CM2 Drop Inlet	20.5	20.5	0
Facility ID	Facility Description	Q _{Design} (cfs)		
EX1	Existing 24" RCP	23		
P1	Proposed 18" RCP	1		
P1A	Proposed 12" RCP	0.7		
P2	Proposed 24" RCP	21.3		
P2A	Proposed 12" RCP	0.6		
P3	Proposed 24" RCP	20.5		

Westwood

5740 S. Arville Street
Suite 216
Las Vegas, NV 89118
Phone (702) 284-5300
Fax (702) 284-5399
westwoods.com

Westwood Professional Services, Inc.

CLAR

CO

NTY, NV

DATE

BY

APP

DATE

DESCRIPTION

NO.

RICHMOND AMERICAN HOMES, INC

MORO POINTE

PROPOSED DRAINAGE CONDITION

DATE:

JAN 2021

DRAFTER:

KH

DESIGNER:

KH

CHECKED:

SOA

PROJECT NO.

RAH2007.000

EXHIBIT D

SHEET 1 OF 1

APPENDIX B

Hydraulic Analyses

Perimeter Street Sections

Worksheet for RP1 (Max Slope)

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	8.43 %
Discharge	5.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	1.06
0+08.00	0.90
0+13.00	0.80
0+24.00	0.58
0+24.50	0.56
0+24.50	0.08
0+26.00	0.21
0+26.00	0.25
0+32.00	0.37
0+40.50	0.54
0+59.00	0.17
0+59.00	0.13
0+60.50	0.00
0+60.50	0.48
0+61.00	0.50
0+68.00	0.64
0+73.00	0.74
0+81.00	0.90

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1.06)	(0+08.00, 0.90)	0.200
(0+08.00, 0.90)	(0+13.00, 0.80)	0.013
(0+13.00, 0.80)	(0+24.00, 0.58)	0.020
(0+24.00, 0.58)	(0+26.00, 0.21)	0.013
(0+26.00, 0.21)	(0+59.00, 0.13)	0.016
(0+59.00, 0.13)	(0+61.00, 0.50)	0.013
(0+61.00, 0.50)	(0+68.00, 0.64)	0.020
(0+68.00, 0.64)	(0+73.00, 0.74)	0.013
(0+73.00, 0.74)	(0+81.00, 0.90)	0.020

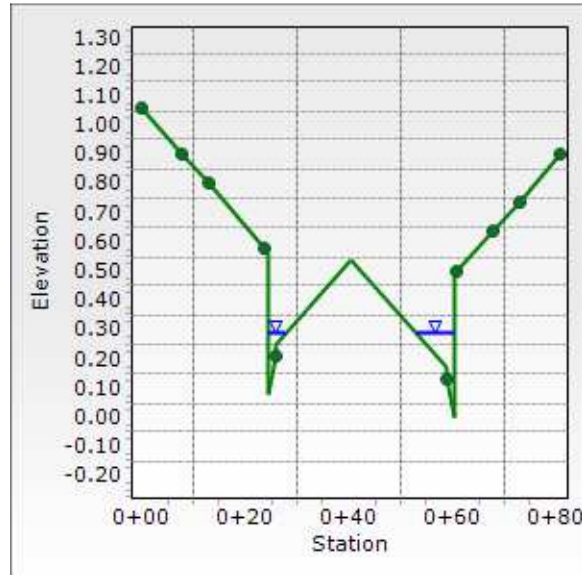
Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for RP1 (Max Slope)

Options	
Closed Channel Weighting Method	Pavlovskii's Method
Results	
Normal Depth	0.29 ft
Roughness Coefficient	0.015
Elevation	0.29 ft
Elevation Range	0.00 to 1.06 ft
Flow Area	0.9 ft ²
Wetted Perimeter	11.36 ft
Hydraulic Radius	0.08 ft
Top Width	10.77 ft
Normal Depth	0.29 ft
Critical Depth	0.39 ft
Critical Slope	0.71 %
Velocity	5.38 ft/s
Velocity Head	0.45 ft
Specific Energy	0.74 ft
Froude Number	3.225
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.29 ft
Critical Depth	0.39 ft
Channel Slope	8.43 %
Critical Slope	0.71 %

Cross Section for RP1 (Max Slope)

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	8.43 %
Normal Depth	0.29 ft
Discharge	5.0 cfs



Worksheet for RP1 (Min Slope)

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	6.48 %
Discharge	5.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	1.06
0+08.00	0.90
0+13.00	0.80
0+24.00	0.58
0+24.50	0.56
0+24.50	0.08
0+26.00	0.21
0+26.00	0.25
0+32.00	0.37
0+40.50	0.54
0+59.00	0.17
0+59.00	0.13
0+60.50	0.00
0+60.50	0.48
0+61.00	0.50
0+68.00	0.64
0+73.00	0.74
0+81.00	0.90

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1.06)	(0+08.00, 0.90)	0.200
(0+08.00, 0.90)	(0+13.00, 0.80)	0.013
(0+13.00, 0.80)	(0+24.00, 0.58)	0.020
(0+24.00, 0.58)	(0+26.00, 0.21)	0.013
(0+26.00, 0.21)	(0+59.00, 0.13)	0.016
(0+59.00, 0.13)	(0+61.00, 0.50)	0.013
(0+61.00, 0.50)	(0+68.00, 0.64)	0.020
(0+68.00, 0.64)	(0+73.00, 0.74)	0.013
(0+73.00, 0.74)	(0+81.00, 0.90)	0.020

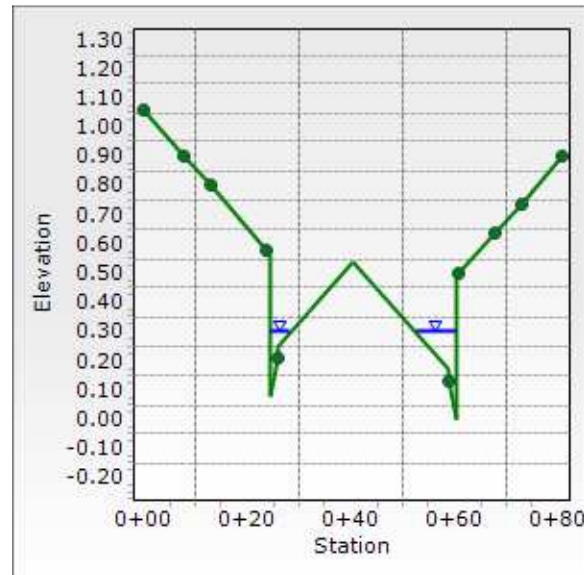
Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for RP1 (Min Slope)

Options	
Closed Channel Weighting Method	Pavlovskii's Method
Results	
Normal Depth	0.30 ft
Roughness Coefficient	0.015
Elevation	0.30 ft
Elevation Range	0.00 to 1.06 ft
Flow Area	1.0 ft ²
Wetted Perimeter	12.40 ft
Hydraulic Radius	0.08 ft
Top Width	11.80 ft
Normal Depth	0.30 ft
Critical Depth	0.39 ft
Critical Slope	0.72 %
Velocity	4.78 ft/s
Velocity Head	0.36 ft
Specific Energy	0.65 ft
Froude Number	2.831
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.30 ft
Critical Depth	0.39 ft
Channel Slope	6.48 %
Critical Slope	0.72 %

Cross Section for RP1 (Min Slope)

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	6.48 %
Normal Depth	0.30 ft
Discharge	5.0 cfs



Worksheet for RP2 (Max Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Channel Slope	8.43 %
Discharge	7.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	1.06
0+08.00	0.90
0+13.00	0.80
0+24.00	0.58
0+24.50	0.56
0+24.50	0.08
0+26.00	0.21
0+26.00	0.25
0+32.00	0.37
0+40.50	0.54
0+59.00	0.17
0+59.00	0.13
0+60.50	0.00
0+60.50	0.48
0+61.00	0.50
0+68.00	0.64
0+73.00	0.74
0+81.00	0.90

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1.06)	(0+08.00, 0.90)	0.200
(0+08.00, 0.90)	(0+13.00, 0.80)	0.013
(0+13.00, 0.80)	(0+24.00, 0.58)	0.020
(0+24.00, 0.58)	(0+26.00, 0.21)	0.013
(0+26.00, 0.21)	(0+59.00, 0.13)	0.016
(0+59.00, 0.13)	(0+61.00, 0.50)	0.013
(0+61.00, 0.50)	(0+68.00, 0.64)	0.020
(0+68.00, 0.64)	(0+73.00, 0.74)	0.013
(0+73.00, 0.74)	(0+81.00, 0.90)	0.020

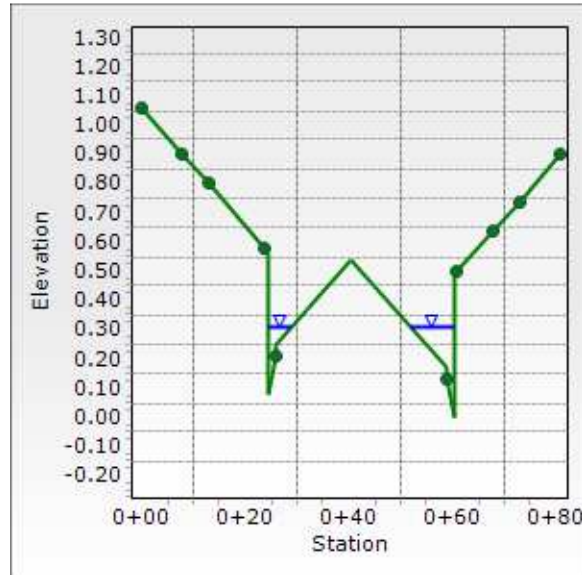
Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for RP2 (Max Slope)

Options	
Closed Channel Weighting Method	Pavlovskii's Method
Results	
Normal Depth	0.31 ft
Roughness Coefficient	0.015
Elevation	0.31 ft
Elevation Range	0.00 to 1.06 ft
Flow Area	1.2 ft ²
Wetted Perimeter	14.03 ft
Hydraulic Radius	0.09 ft
Top Width	13.39 ft
Normal Depth	0.31 ft
Critical Depth	0.42 ft
Critical Slope	0.69 %
Velocity	5.62 ft/s
Velocity Head	0.49 ft
Specific Energy	0.80 ft
Froude Number	3.246
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.31 ft
Critical Depth	0.42 ft
Channel Slope	8.43 %
Critical Slope	0.69 %

Cross Section for RP2 (Max Slope)

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	8.43 %
Normal Depth	0.31 ft
Discharge	7.0 cfs



Worksheet for RP2 (Min Slope)

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	7.44 %
Discharge	7.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	1.06
0+08.00	0.90
0+13.00	0.80
0+24.00	0.58
0+24.50	0.56
0+24.50	0.08
0+26.00	0.21
0+26.00	0.25
0+32.00	0.37
0+40.50	0.54
0+59.00	0.17
0+59.00	0.13
0+60.50	0.00
0+60.50	0.48
0+61.00	0.50
0+68.00	0.64
0+73.00	0.74
0+81.00	0.90

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1.06)	(0+08.00, 0.90)	0.200
(0+08.00, 0.90)	(0+13.00, 0.80)	0.013
(0+13.00, 0.80)	(0+24.00, 0.58)	0.020
(0+24.00, 0.58)	(0+26.00, 0.21)	0.013
(0+26.00, 0.21)	(0+59.00, 0.13)	0.016
(0+59.00, 0.13)	(0+61.00, 0.50)	0.013
(0+61.00, 0.50)	(0+68.00, 0.64)	0.020
(0+68.00, 0.64)	(0+73.00, 0.74)	0.013
(0+73.00, 0.74)	(0+81.00, 0.90)	0.020

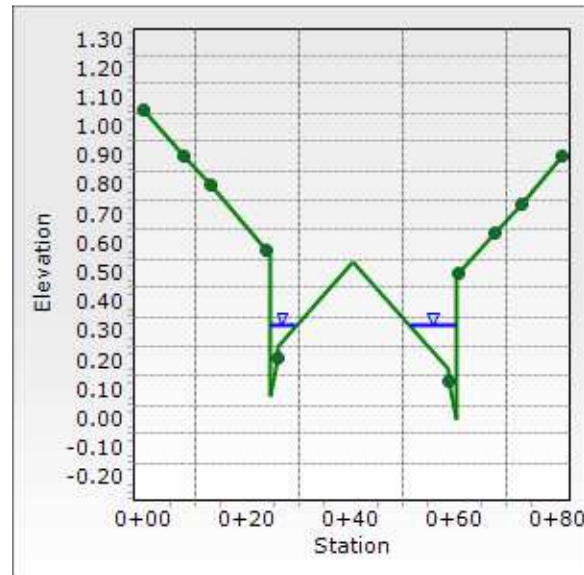
Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for RP2 (Min Slope)

Options	
Closed Channel Weighting Method	Pavlovskii's Method
Results	
Normal Depth	0.32 ft
Roughness Coefficient	0.015
Elevation	0.32 ft
Elevation Range	0.00 to 1.06 ft
Flow Area	1.3 ft ²
Wetted Perimeter	14.52 ft
Hydraulic Radius	0.09 ft
Top Width	13.87 ft
Normal Depth	0.32 ft
Critical Depth	0.42 ft
Critical Slope	0.70 %
Velocity	5.33 ft/s
Velocity Head	0.44 ft
Specific Energy	0.76 ft
Froude Number	3.058
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.32 ft
Critical Depth	0.42 ft
Channel Slope	7.44 %
Critical Slope	0.70 %

Cross Section for RP2 (Min Slope)

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	7.44 %
Normal Depth	0.32 ft
Discharge	7.0 cfs



Worksheet for KCA

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	5.97 %
Discharge	6.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	1.06
0+08.00	0.90
0+13.00	0.80
0+24.00	0.58
0+24.50	0.56
0+24.50	0.08
0+26.00	0.21
0+26.00	0.25
0+32.00	0.37
0+40.50	0.54
0+59.00	0.17
0+59.00	0.13
0+60.50	0.00
0+60.50	0.48
0+61.00	0.50
0+68.00	0.64
0+73.00	0.74
0+81.00	0.90

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1.06)	(0+08.00, 0.90)	0.200
(0+08.00, 0.90)	(0+13.00, 0.80)	0.013
(0+13.00, 0.80)	(0+24.00, 0.58)	0.020
(0+24.00, 0.58)	(0+26.00, 0.21)	0.013
(0+26.00, 0.21)	(0+59.00, 0.13)	0.016
(0+59.00, 0.13)	(0+61.00, 0.50)	0.013
(0+61.00, 0.50)	(0+68.00, 0.64)	0.020
(0+68.00, 0.64)	(0+73.00, 0.74)	0.013
(0+73.00, 0.74)	(0+81.00, 0.90)	0.020

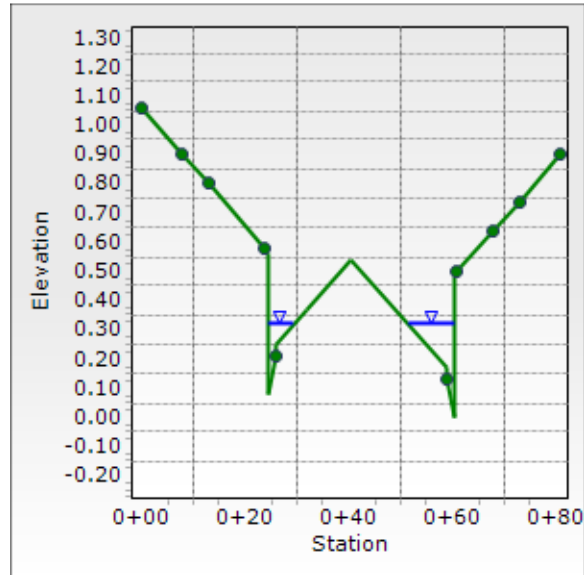
Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for KCA

Options	
Closed Channel Weighting Method	Pavlovskii's Method
Results	
Normal Depth	0.32 ft
Roughness Coefficient	0.015
Elevation	0.32 ft
Elevation Range	0.00 to 1.06 ft
Flow Area	1.3 ft ²
Wetted Perimeter	14.19 ft
Hydraulic Radius	0.09 ft
Top Width	13.55 ft
Normal Depth	0.32 ft
Critical Depth	0.41 ft
Critical Slope	0.71 %
Velocity	4.73 ft/s
Velocity Head	0.35 ft
Specific Energy	0.66 ft
Froude Number	2.729
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.32 ft
Critical Depth	0.41 ft
Channel Slope	5.97 %
Critical Slope	0.71 %

Cross Section for KCA

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	5.97 %
Normal Depth	0.32 ft
Discharge	6.0 cfs



Worksheet for DHD

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	1.90 %
Discharge	10.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+29.00	0.71
0+29.00	1.19
0+29.50	1.21
0+38.00	1.38
0+46.50	1.21
0+47.00	1.19
0+47.00	0.71
0+74.00	0.17
0+74.00	0.13
0+75.50	0.00
0+75.50	0.48
0+76.00	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+02.00, 0.13)	0.013
(0+02.00, 0.13)	(0+29.00, 0.71)	0.016
(0+29.00, 0.71)	(0+47.00, 0.71)	0.013
(0+47.00, 0.71)	(0+74.00, 0.13)	0.016
(0+74.00, 0.13)	(0+76.00, 0.50)	0.013

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

Results	
Normal Depth	0.38 ft

Worksheet for DHD

Results

Roughness Coefficient	0.016
Elevation	0.38 ft
Elevation Range	0.00 to 1.38 ft
Flow Area	3.0 ft ²
Wetted Perimeter	24.41 ft
Hydraulic Radius	0.12 ft
Top Width	23.57 ft
Normal Depth	0.38 ft
Critical Depth	0.43 ft
Critical Slope	0.69 %
Velocity	3.28 ft/s
Velocity Head	0.17 ft
Specific Energy	0.54 ft
Froude Number	1.609
Flow Type	Supercritical

GVF Input Data

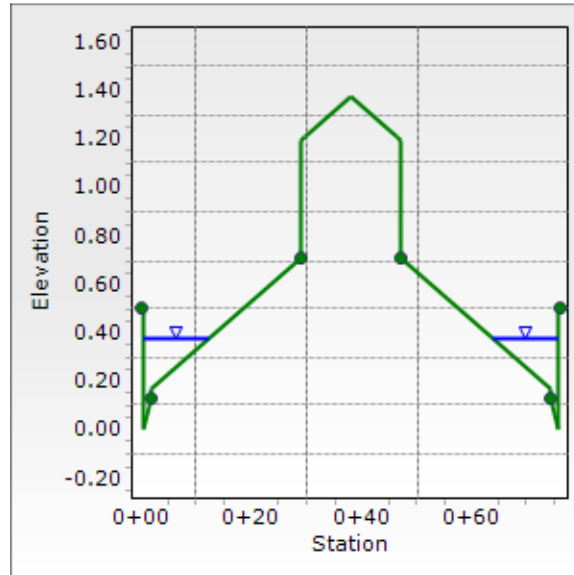
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.38 ft
Critical Depth	0.43 ft
Channel Slope	1.90 %
Critical Slope	0.69 %

Cross Section for DHD

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	1.90 %
Normal Depth	0.38 ft
Discharge	10.0 cfs



Interior Street Sections

Worksheet for N1 (max%)

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	6.50 %
Discharge	8.7 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.35	0.38
0+01.33	0.06
0+01.33	0.00
0+02.50	0.13
0+02.50	0.17
0+15.00	0.42
0+27.50	0.17
0+27.50	0.13
0+28.67	0.00
0+28.67	0.06
0+29.65	0.38
0+30.00	0.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+02.50, 0.13)	0.013
(0+02.50, 0.13)	(0+27.50, 0.13)	0.016
(0+27.50, 0.13)	(0+30.00, 0.38)	0.013

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

Results	
Normal Depth	0.31 ft
Roughness Coefficient	0.015
Elevation	0.31 ft
Elevation Range	0.00 to 0.42 ft
Flow Area	1.7 ft ²
Wetted Perimeter	17.85 ft

Worksheet for N1 (max%)

Results

Hydraulic Radius	0.09 ft
Top Width	17.56 ft
Normal Depth	0.31 ft
Critical Depth	0.41 ft
Critical Slope	0.67 %
Velocity	5.14 ft/s
Velocity Head	0.41 ft
Specific Energy	0.72 ft
Froude Number	2.919
Flow Type	Supercritical

GVF Input Data

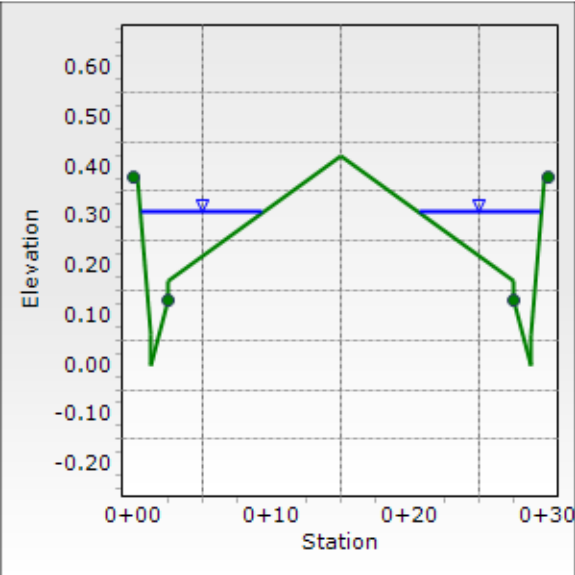
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.31 ft
Critical Depth	0.41 ft
Channel Slope	6.50 %
Critical Slope	0.67 %

Cross Section for N1 (max%)

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	6.50 %
Normal Depth	0.31 ft
Discharge	8.7 cfs



Worksheet for N1 (min%)

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	6.15 %
Discharge	8.7 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.35	0.38
0+01.33	0.06
0+01.33	0.00
0+02.50	0.13
0+02.50	0.17
0+15.00	0.42
0+27.50	0.17
0+27.50	0.13
0+28.67	0.00
0+28.67	0.06
0+29.65	0.38
0+30.00	0.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+02.50, 0.13)	0.013
(0+02.50, 0.13)	(0+27.50, 0.13)	0.016
(0+27.50, 0.13)	(0+30.00, 0.38)	0.013

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

Results	
Normal Depth	0.31 ft
Roughness Coefficient	0.015
Elevation	0.31 ft
Elevation Range	0.00 to 0.42 ft
Flow Area	1.7 ft ²
Wetted Perimeter	18.09 ft

Worksheet for N1 (min%)

Results

Hydraulic Radius	0.10 ft
Top Width	17.80 ft
Normal Depth	0.31 ft
Critical Depth	0.41 ft
Critical Slope	0.67 %
Velocity	5.02 ft/s
Velocity Head	0.39 ft
Specific Energy	0.70 ft
Froude Number	2.838
Flow Type	Supercritical

GVF Input Data

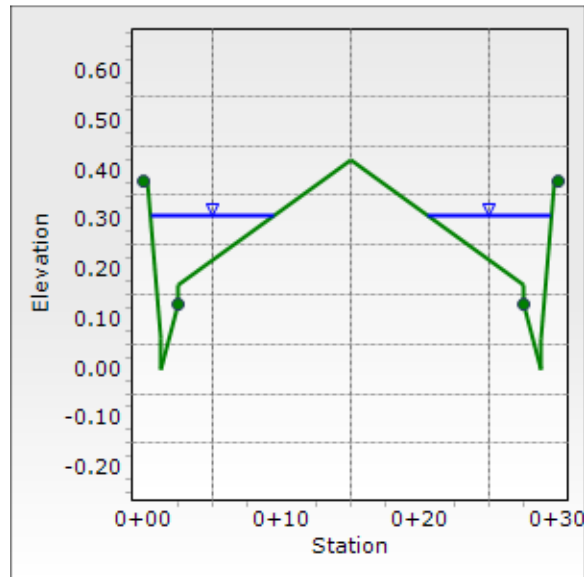
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.31 ft
Critical Depth	0.41 ft
Channel Slope	6.15 %
Critical Slope	0.67 %

Cross Section for N1 (min%)

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	6.15 %
Normal Depth	0.31 ft
Discharge	8.7 cfs



Worksheet for N1 - Conservative Flow & Depth

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	6.15 %
Discharge	11.7 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.35	0.38
0+01.33	0.06
0+01.33	0.00
0+02.50	0.13
0+02.50	0.17
0+15.00	0.42
0+27.50	0.17
0+27.50	0.13
0+28.67	0.00
0+28.67	0.06
0+29.65	0.38
0+30.00	0.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+02.50, 0.13)	0.013
(0+02.50, 0.13)	(0+27.50, 0.13)	0.016
(0+27.50, 0.13)	(0+30.00, 0.38)	0.013

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

Results	
Normal Depth	0.33 ft
Roughness Coefficient	0.015
Elevation	0.33 ft
Elevation Range	0.00 to 0.42 ft
Flow Area	2.2 ft ²
Wetted Perimeter	20.66 ft

Worksheet for N1 - Conservative Flow & Depth

Results

Hydraulic Radius	0.11 ft
Top Width	20.36 ft
Normal Depth	0.33 ft
Critical Depth	0.44 ft
Critical Slope	0.64 %
Velocity	5.34 ft/s
Velocity Head	0.44 ft
Specific Energy	0.78 ft
Froude Number	2.867
Flow Type	Supercritical

GVF Input Data

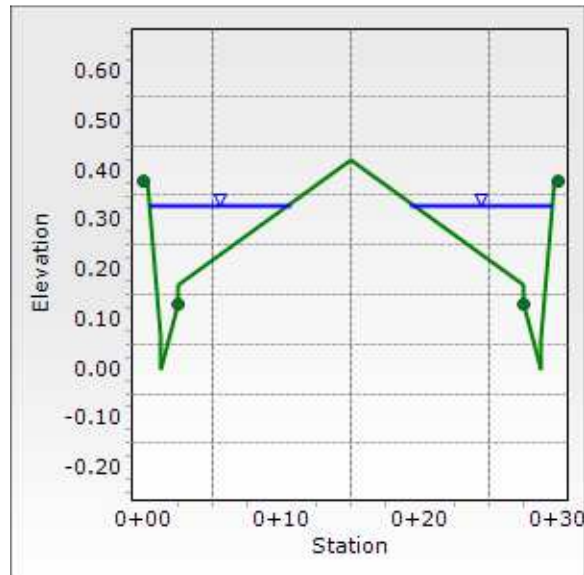
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.33 ft
Critical Depth	0.44 ft
Channel Slope	6.15 %
Critical Slope	0.64 %

Cross Section for N1 - Conservative Flow & Depth

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	6.15 %
Normal Depth	0.33 ft
Discharge	11.7 cfs



Worksheet for N2

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Channel Slope	6.97 %
Discharge	8.7 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.35	0.38
0+01.33	0.06
0+01.33	0.00
0+02.50	0.13
0+02.50	0.17
0+15.00	0.42

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+02.50, 0.13)	0.013
(0+02.50, 0.13)	(0+15.00, 0.42)	0.016

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

Results		
Normal Depth	0.36 ft	
Roughness Coefficient	0.015	
Elevation	0.36 ft	
Elevation Range	0.00 to 0.42 ft	
Flow Area	1.4 ft ²	
Wetted Perimeter	11.89 ft	
Hydraulic Radius	0.12 ft	
Top Width	11.73 ft	
Normal Depth	0.36 ft	
Critical Depth	0.49 ft	
Critical Slope	0.60 %	
Velocity	6.14 ft/s	
Velocity Head	0.59 ft	

Worksheet for N2

Results

Specific Energy	0.95 ft
Froude Number	3.115
Flow Type	Supercritical

GVF Input Data

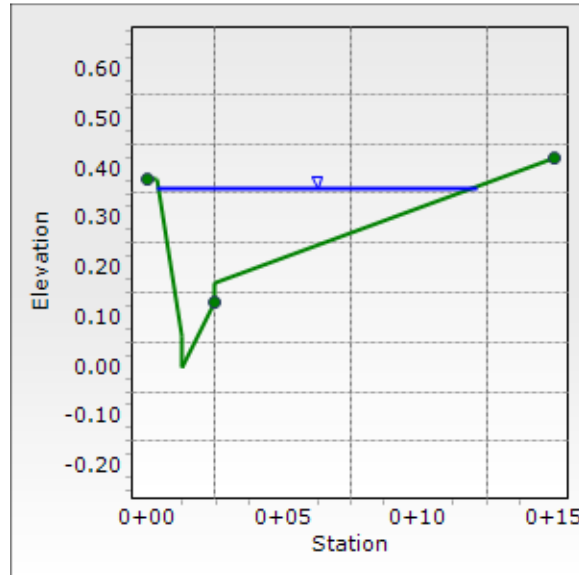
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.36 ft
Critical Depth	0.49 ft
Channel Slope	6.97 %
Critical Slope	0.60 %

Cross Section for N2

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	6.97 %
Normal Depth	0.36 ft
Discharge	8.7 cfs



Worksheet for O1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Channel Slope	6.15 %
Discharge	11.8 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.35	0.38
0+01.33	0.06
0+01.33	0.00
0+02.50	0.13
0+02.50	0.17
0+15.00	0.42
0+27.50	0.17
0+27.50	0.13
0+28.67	0.00
0+28.67	0.06
0+29.65	0.38
0+30.00	0.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+02.50, 0.13)	0.013
(0+02.50, 0.13)	(0+27.50, 0.13)	0.016
(0+27.50, 0.13)	(0+30.00, 0.38)	0.013

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

Results	
Normal Depth	0.33 ft
Roughness Coefficient	0.015
Elevation	0.33 ft
Elevation Range	0.00 to 0.42 ft
Flow Area	2.2 ft ²
Wetted Perimeter	20.74 ft

Worksheet for O1

Results

Hydraulic Radius	0.11 ft
Top Width	20.43 ft
Normal Depth	0.33 ft
Critical Depth	0.44 ft
Critical Slope	0.64 %
Velocity	5.35 ft/s
Velocity Head	0.44 ft
Specific Energy	0.78 ft
Froude Number	2.868
Flow Type	Supercritical

GVF Input Data

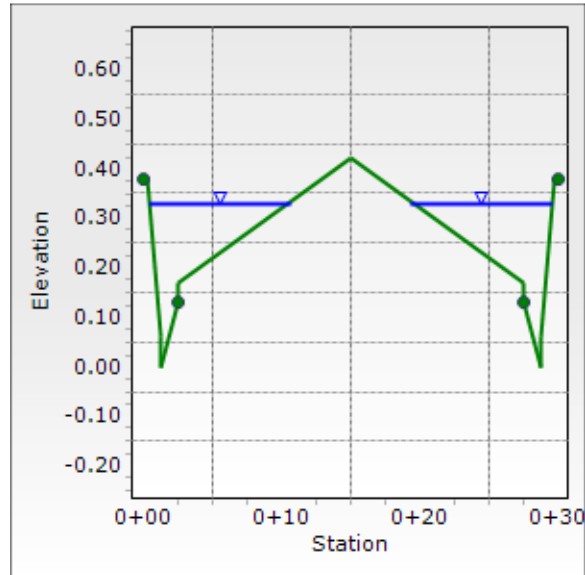
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.33 ft
Critical Depth	0.44 ft
Channel Slope	6.15 %
Critical Slope	0.64 %

Cross Section for O1

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	6.15 %
Normal Depth	0.33 ft
Discharge	11.8 cfs



Worksheet for O2

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Channel Slope	1.00 %
Discharge	2.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.35	0.38
0+01.33	0.06
0+01.33	0.00
0+02.50	0.13
0+02.50	0.17
0+15.00	0.42
0+27.50	0.17
0+27.50	0.13
0+28.67	0.00
0+28.67	0.06
0+29.65	0.38
0+30.00	0.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+02.50, 0.13)	0.013
(0+02.50, 0.13)	(0+27.50, 0.13)	0.016
(0+27.50, 0.13)	(0+30.00, 0.38)	0.013

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

Results	
Normal Depth	0.27 ft
Roughness Coefficient	0.015
Elevation	0.27 ft
Elevation Range	0.00 to 0.42 ft
Flow Area	1.1 ft ²
Wetted Perimeter	13.84 ft

Worksheet for O2

Results

Hydraulic Radius	0.08 ft
Top Width	13.56 ft
Normal Depth	0.27 ft
Critical Depth	0.28 ft
Critical Slope	0.79 %
Velocity	1.81 ft/s
Velocity Head	0.05 ft
Specific Energy	0.32 ft
Froude Number	1.116
Flow Type	Supercritical

GVF Input Data

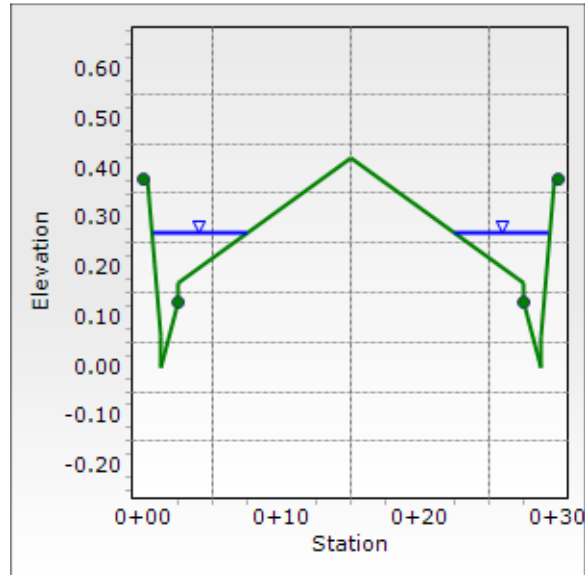
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.27 ft
Critical Depth	0.28 ft
Channel Slope	1.00 %
Critical Slope	0.79 %

Cross Section for O2

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	1.00 %
Normal Depth	0.27 ft
Discharge	2.0 cfs



Worksheet for O3

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Channel Slope	7.54 %
Discharge	1.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	1.68
0+00.50	1.66
0+00.50	1.18
0+02.00	1.31
0+02.00	1.35
0+24.73	0.90
0+24.73	1.40
0+25.23	1.40
0+31.98	1.26
0+38.73	1.13
0+39.23	1.13
0+39.23	0.63
0+62.00	0.17
0+62.00	0.13
0+63.50	0.00
0+63.50	0.48
0+64.00	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1.68)	(0+02.00, 1.31)	0.013
(0+02.00, 1.31)	(0+24.73, 0.90)	0.016
(0+24.73, 0.90)	(0+25.23, 1.40)	0.013
(0+25.23, 1.40)	(0+38.73, 1.13)	0.020
(0+38.73, 1.13)	(0+39.23, 0.63)	0.013
(0+39.23, 0.63)	(0+62.00, 0.13)	0.016
(0+62.00, 0.13)	(0+64.00, 0.50)	0.013

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

Worksheet for 03

Results

Normal Depth	0.19 ft
Roughness Coefficient	0.014
Elevation	0.19 ft
Elevation Range	0.00 to 1.68 ft
Flow Area	0.2 ft ²
Wetted Perimeter	2.84 ft
Hydraulic Radius	0.07 ft
Top Width	2.60 ft
Normal Depth	0.19 ft
Critical Depth	0.28 ft
Critical Slope	0.71 %
Velocity	4.92 ft/s
Velocity Head	0.38 ft
Specific Energy	0.57 ft
Froude Number	3.106
Flow Type	Supercritical

GVF Input Data

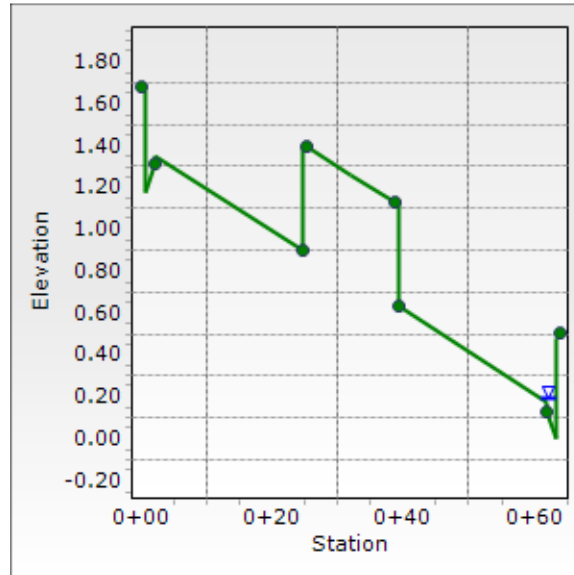
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.19 ft
Critical Depth	0.28 ft
Channel Slope	7.54 %
Critical Slope	0.71 %

Cross Section for O3

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	7.54 %
Normal Depth	0.19 ft
Discharge	1.0 cfs



Inlet Sizing Computations

Curb Inlet Sizing Computation			
Project Name & Number:	RAH2007: MORO POINT		Westwood
Date:	12/21/2020		
By:	CAA		
Notes:			
Facility ID:	DI#3		
Drainage Condition	Proposed		
Source of Flow	Q100 = Basin N(a) + O(a)		
Design Flow (cfs)	20.5		
Inlet Type:	Type CM2 (Sump)		
Inlet Length:	12.5-ft		
Number of Grates:	4		
Input:	Variable:	Input:	
Depth at Inlet (ft)	D	0.58	
Grate Width (ft)	W	1.50	
Length of Grate (ft)	L_g	9.75	
Length of Curb Opening (ft)	L_c	12.00	
Height of Curb Opening (ft)	H	0.50	
Weir Coef. - Curb Opening	W_c	2.3	
Weir Coef. - Grate	W_g	3.0	
Orifice Coef.	O_c	0.67	
Grate Coef.	G_c	0.60	
Clogging Factor - Grate (%)	CF_g	50	
Clogging Factor - Curb (%)	CF_c	50	
Output (Grate):	Equation:	Output (Grate):	
Effective Weir Length (ft)	$2*W+L_g$	12.75	
Adjusted Effective Weir Length (ft)	$2*(1-CF_g/100)*W+(1-CF_g/100)*L_g$	6.38	
Grate Open Area (sf)	$W*L_g$	14.63	
Adjusted Grate Open Area (sf)	Grate Open Area * $G_c*(1-CF_g/100)$	4.39	
Controlling Flow Type (weir/orifice)	If $D < 1.792*(Adj. \text{ Grate Open Area}/Adj. \text{ Eff. Length})$ use weir, else orifice	weir	
Intercepted Flow (cfs)	weir: $W_g*(Adj. \text{ Eff. Weir Length})*D^{1.5}$ orifice: $O_c*(Adj. \text{ Grate Open Area})*(64.4*D)^{0.5}$	8.3	
Output (Curb):	Equation:	Output (Curb):	
Effective Weir Length (ft)	$L+1.8*W$	14.70	
Adjusted Effective Weir Length (ft)	$L+1.8*(1-CF_c/100)*W$	13.41	
Curb Open Area (sf)	$L*H$	6.00	
Adjusted Curb Open Area (sf)	Curb Open Area * $(1-CF_c/100)$	3.00	
Controlling Flow Type (weir/orifice)	If $D < H$, weir, else orifice	orifice	
Intercepted Flow (cfs)	weir: $W_c*(Adj. \text{ Eff. Weir Length})*D^{1.5}$ orifice: $O_c*(Adj. \text{ Curb Open Area})*(64.4*(D-H/2))^{0.5}$	12.19	
Output (Total):	Equation:	Output (Total):	
Capacity Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	20.5	

Curb Inlet Sizing Computation			
Project Name & Number:	RAH2007: MORO POINT		Westwood
Date:	12/21/2020		
By:	CAA		
Notes:			
Facility ID:	DI#2		
Drainage Condition	Proposed		
Source of Flow	Q100 = Basin O(c) = 0.2 cfs		
Depth Provided:	$D = (3332.83 - 0.38) - (3332.88 - 0.67) = 0.24'$		
Inlet Type:	Type CM2 (Sump)		
Inlet Length:	5.-ft		
Number of Grates:	1		
Input:	Variable:	Input:	
Depth at Inlet (ft)	D	0.24	
Grate Width (ft)	W	1.50	
Length of Grate (ft)	L_g	2.25	
Length of Curb Opening (ft)	L_c	4.50	
Height of Curb Opening (ft)	H	0.50	
Weir Coef. - Curb Opening	W_c	2.3	
Weir Coef. - Grate	W_g	3.0	
Orifice Coef.	O_c	0.67	
Grate Coef.	G_c	0.60	
Clogging Factor - Grate (%)	CF_g	50	
Clogging Factor - Curb (%)	CF_c	50	
Output (Grate):	Equation:	Output (Grate):	
Effective Weir Length (ft)	$2*W + L_g$	5.25	
Adjusted Effective Weir Length (ft)	$2*(1 - CF_g/100)*W + (1 - CF_g/100)*L_g$	2.63	
Grate Open Area (sf)	$W*L_g$	3.38	
Adjusted Grate Open Area (sf)	Grate Open Area * $G_c*(1 - CF_g/100)$	1.01	
Controlling Flow Type (weir/orifice)	If $D < 1.792*(Adj. \text{ Grate Open Area}/Adj. \text{ Eff. Length})$ use weir, else orifice	weir	
Intercepted Flow (cfs)	weir: $W_g*(Adj. \text{ Eff. Weir Length})*D^{1.5}$ orifice: $O_c*(Adj. \text{ Grate Open Area})*(64.4*D)^{0.5}$	0.9	
Output (Curb):	Equation:	Output (Curb):	
Effective Weir Length (ft)	$L + 1.8*W$	7.20	
Adjusted Effective Weir Length (ft)	$L + 1.8*(1 - CF_c/100)*W$	5.91	
Curb Open Area (sf)	$L*H$	2.25	
Adjusted Curb Open Area (sf)	Curb Open Area * $(1 - CF_c/100)$	1.13	
Controlling Flow Type (weir/orifice)	If $D < H$, weir, else orifice	weir	
Intercepted Flow (cfs)	weir: $W_c*(Adj. \text{ Eff. Weir Length})*D^{1.5}$ orifice: $O_c*(Adj. \text{ Curb Open Area})*(64.4*(D - H/2))^{0.5}$	1.60	
Output (Total):	Equation:	Output (Total):	
Capacity Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	2.5	

Curb Inlet Sizing Computation		
Project Name & Number:	RAH2007: MORO POINT	
Date:	12/21/2020	Westwood
By:	CAA	
Notes:		
Facility ID:	DI#1	
Drainage Condition:	Proposed	
Source of Flow:	Q100 = Basin N(c) + O(d)	
Inlet Type:	Type CM2 (Continuous Grade)	
Inlet Length:	5.-ft	
Number of Grates	1	
Input:	Variable:	Input:
Street Flow (cfs)	Q	1.0
Longitudinal Slope (ft/ft)	S _o	0.0754
Manning's Coefficient	n	0.016
Street Flow Velocity (fps)	V	4.92
Street Flow Depth (ft)	D	0.2
Street Cross Slope (ft/ft)	S _x	0.02
Grate Width (ft)	W	1.5
Grate Depression (in)	D _g	2.0
Length of Grate (ft)	L _g	2.25
Length of Curb Opening (ft)	L _c	4.50
Clogging Factor - Grate (%)	CF _g	50%
Clogging Factor - Curb (%)	CF _c	50%
Effective Grate Length (ft)	L _{ge}	1.1
Effective Curb Opening Length (ft)	L _{ce}	2.25
Output (Grate):	Equation:	Output (Grate):
¹ R _f - Frontal Flow Factor	1-0.09*(V-V _x) if V>V _x ; else Frontal Flow Factor=1	0.95
² V _o - Splash Over Velocity (fps)	V _x =p+q*L _g -r*L _{ge} ² +sy*L _{ge} ³ ; where p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate)	4.31
¹ E - Grate Flow Ratio	Frontal Flow/Side Flow	1.00
² Q _w - Frontal Flow (cfs)	Q _w = Q[1-(1-(W/T)) ^{2.67}]	1.00
¹ Q _s - Side Flow (cfs)	Q _s = Q-Q _w	0.0
T - Side Flow Spread (ft)	(D-D _g)/S _x	1.67
¹ R _s - Side Flow Factor	1/(1+(0.15*V ^{1.8})/(S _x *L _{ge} ^{2.3}))	0.01
¹ Q _{gi} - Intercepted Flow (cfs)	(R _f *E+R _s *(1-E))*Q	0.9
Output (Curb):	Equation:	Output (Curb):
¹ S _e - Equivalent Cross Slope (ft/ft)	S _x +S _q *E	0.131
Q _{sx} - Remaining Flow After Grate Interception (cfs)	Q-Q _{gi}	0.057
S _g - Gutter Cross Slope (ft/ft)	D _g /W	0.111
¹ L _t - Effective Interception Length (ft)	0.60*Q _{sx} ^{0.42} *S _o ^{0.30} *(1/n*S _e) ^{0.6}	3.35
¹ Q _{ci} - Intercepted Flow (cfs)	(1-(1-L _{ce} /L _t) ^{1.8})*Q _{sx} or Q _{sx} if L _t is less than L _{ce}	0.0
Output (Combination):	Equation:	Output (Combination):
Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	1
Bypass Flow (cfs)	Street Flow - Total Intercepted Flow	0
¹ Formula referenced from the CCRFCD Manual		
² Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)		

Lateral Sizing Computations

Westwood

CONDUIT DATA							FLOW DATA							LOSS	HGL		COMMENTS	
STATION		SIZE / TYPE	n Manning's Roughness	INVERTS		LENGTH	A (FT ²)	R (FT)	Φ	Q (CFS)	V (FPS)	H _v = V ² /2g (FT)	S _f (FT/FT)	PIPE	PIPE		PRESS. FLOW?	OTHER
FROM	TO			H _f (FT)	D/S HGL ELEV.									U/S HGL ELEV.				

$S_f = \Phi H_v / R^{1.33}$	$\Phi = 2g (n^2) / 2.21$	1 - Where pipes are not under pressure, assume U/S HGL is at top of pipe
-----------------------------	--------------------------	--

WSPGW Model

Proposed Condition WSPG Summary								
MAIN STORM DRAIN (MAINNO.WSW): FROM SDDI3 TO CONNECTION TO EXISTING SD IN CLOWDER SPRINGS WAY								
WSPG Station	Storm Drain Dimension	Invert Elevation (ft)	Q ₁₀₀ (cfs)	WSE (ft)	Velocity (ft/s)	FG Elevation	Facility Description	HGL Check ¹
1 - 'HGL Check' reflects the minimum 1-ft below finished grade.								
1000.00	24" RCP	3315.93	23.00	3321.67	7.32	3327.01	Existing SD	OK
1071.65	24" RCP	3320.39	23.00	3321.47	13.29	3329.19	Connection to existing and Facilities DI#1A and DI#1	OK
1074.15	24" RCP	3320.55	21.30	3321.50	14.51	3329.19		OK
1118.22	24" RCP	3323.21	21.30	3324.43	10.65	3332.23		OK
1118.72	24" RCP	3323.24	21.30	3324.46	10.57	3332.23		OK
1119.22	24" RCP	3323.27	21.30	3324.50	10.48	3332.23		OK
1119.72	24" RCP	3323.30	21.30	3324.54	10.38	3332.23		OK
1120.22	24" RCP	3323.33	21.30	3324.58	10.29	3332.23		OK
1120.72	24" RCP	3323.36	21.30	3324.62	10.19	3332.23		OK
1173.31	24" RCP	3324.41	21.30	3326.06	7.67	3332.07		OK
1173.31	4' x 9' RCB	3324.41	21.30	3327.61	1.66	3332.07	Facility DI#2	OK
1174.56	4' x 9' RCB	3324.44	21.30	3327.61	1.68	3332.07		OK
1175.81	4' x 9' RCB	3324.46	20.50	3327.61	1.62	3332.07		OK
1176.14	4' x 9' RCB	3324.47	20.50	3327.61	1.63	3332.07		OK
1176.48	4' x 9' RCB	3324.47	20.50	3327.61	1.63	3332.07		OK
1176.81	4' x 9' RCB	3324.48	20.50	3327.61	1.64	3332.07		OK
1177.14	4' x 9' RCB	3324.49	20.50	3327.61	1.64	3332.07		OK
1177.48	4' x 9' RCB	3324.49	20.50	3327.61	1.64	3332.07		OK
1177.81	4' x 9' RCB	3324.50	20.50	3327.61	1.65	3332.07		OK
1177.81	24" RCP	3324.50	20.50	3327.62	6.53	3332.07		OK
1205.81	24" RCP	3325.06	20.50	3327.85	6.53	3332.07	Facility DI#3	OK
1205.81	24" RCP	3325.06	20.50	3327.85	6.53	3332.07		OK

T1 RAH2007: MORO POINT
 T2 MAIN STORM DRAIN (MAINNO.WSW)
 T3 FROM SDDI3 TO CONNECTION TO EXISTING SD IN CLOWDER SPRINGS WAY
 SO 1000.0003315.930 24 3321.670
 R 1071.6503320.394 24 .013
 JX 1074.1503320.550 24 18 12.013 1.0 0.7 3321.0503021.550-90.0 76.0
 R 1118.2203323.209 24 .013 -15.0
 R 1118.7203323.239 24 .013 -15.0
 R 1119.2203323.269 24 .013 -15.0
 R 1119.7203323.300 24 .013 -15.0
 R 1120.2203323.330 24 .013 -15.0
 R 1120.7203323.360 24 .013 -15.0
 R 1173.3103324.410 24 .013
 WE 1173.3103324.410 1
 R 1174.5603324.435 1 .015
 JX 1175.8103324.460 1 1 12.015 0.2 0.6 3324.4603325.460 90.0-90.0
 R 1176.1433324.467 1 .015 15.0
 R 1176.4773324.473 1 .015 15.0
 R 1176.8103324.480 1 .015 15.0
 R 1177.1433324.487 1 .015 15.0
 R 1177.4773324.493 1 .015 15.0
 R 1177.8103324.500 1 .015 15.0
 WX 1177.8103324.500 24
 R 1205.8103325.060 24 .013
 SH 1205.8103325.060 24
 CD 12 4 1 0.000 1.000 0.000 0.000 0.000 0.0000.00 0.00
 CD 18 4 1 0.000 1.500 0.000 0.000 0.000 0.0000.00 0.00
 CD 24 4 1 0.000 2.000 0.000 0.000 0.000 0.0000.00 0.00
 CD 1 3 0 0.000 9.000 4.000 0.000 0.000 0.0000.00 0.00
 Q 20.500

FILE: MAINNO.WSW

W S P G W - EDIT LISTING - Version 14.10

Date:12-11-2020 Time: 9:33:31

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

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

CD	12	4	1		1.000														
CD	18	4	1		1.500														
CD	24	4	1		2.000														
CD	1	3	0	.000	9.000	4.000	.000	.000	.00										

W S P G W

PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

RAH2007: MORO POINT

HEADING LINE NO 2 IS -

MAIN STORM DRAIN (MAINNO.WSW)

HEADING LINE NO 3 IS -

FROM SDDI3 TO CONNECTION TO EXISTING SD IN CLOWDER SPRINGS WAY

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	1 IS A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV												
				1000.000	3315.930	24	3321.670												
ELEMENT NO	2 IS A	REACH	U/S DATA	STATION	INVERT	SECT													
				1071.650	3320.394	24													
ELEMENT NO	3 IS A	JUNCTION	U/S DATA	STATION	INVERT	SECT													
				1074.150	3320.550	24													
ELEMENT NO	4 IS A	REACH	U/S DATA	STATION	INVERT	SECT													
				1118.220	3323.209	24													
ELEMENT NO	5 IS A	REACH	U/S DATA	STATION	INVERT	SECT													
				1118.720	3323.239	24													
ELEMENT NO	6 IS A	REACH	U/S DATA	STATION	INVERT	SECT													
				1119.220	3323.269	24													
ELEMENT NO	7 IS A	REACH	U/S DATA	STATION	INVERT	SECT													
				1119.720	3323.300	24													
ELEMENT NO	8 IS A	REACH	U/S DATA	STATION	INVERT	SECT													
				1120.220	3323.330	24													
ELEMENT NO	9 IS A	REACH	U/S DATA	STATION	INVERT	SECT													
				1120.720	3323.360	24													
ELEMENT NO	10 IS A	REACH	U/S DATA	STATION	INVERT	SECT													
				1173.310	3324.410	24													

															MAINNO.EDT		
ELEMENT NO	11	IS A	WALL ENTRANCE	*													
			U/S DATA	STATION	INVERT	SECT			FP								
				1173.310	3324.410	1			.500								
ELEMENT NO	12	IS A	REACH	*	*	*											
			U/S DATA	STATION	INVERT	SECT			N	RADIUS	ANGLE	ANG PT	MAN H				
				1174.560	3324.435	1			.015	.000	.000	.000	0				
															W S P G W		
															PAGE NO 3		
WATER SURFACE PROFILE - ELEMENT CARD LISTING																	
ELEMENT NO	13	IS A	JUNCTION	*	*	*	*										
			U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4		
				1175.810	3324.460	1	1	12	.015	.200	.600	3324.460	3325.460	90.000	-90.000		
												RADIUS	ANGLE				
												.000	.000				
ELEMENT NO	14	IS A	REACH	*	*	*											
			U/S DATA	STATION	INVERT	SECT			N	RADIUS	ANGLE	ANG PT	MAN H				
				1176.143	3324.467	1			.015	.000	.000	15.000	0				
ELEMENT NO	15	IS A	REACH	*	*	*											
			U/S DATA	STATION	INVERT	SECT			N	RADIUS	ANGLE	ANG PT	MAN H				
				1176.477	3324.473	1			.015	.000	.000	15.000	0				
ELEMENT NO	16	IS A	REACH	*	*	*											
			U/S DATA	STATION	INVERT	SECT			N	RADIUS	ANGLE	ANG PT	MAN H				
				1176.810	3324.480	1			.015	.000	.000	15.000	0				
ELEMENT NO	17	IS A	REACH	*	*	*											
			U/S DATA	STATION	INVERT	SECT			N	RADIUS	ANGLE	ANG PT	MAN H				
				1177.143	3324.487	1			.015	.000	.000	15.000	0				
ELEMENT NO	18	IS A	REACH	*	*	*											
			U/S DATA	STATION	INVERT	SECT			N	RADIUS	ANGLE	ANG PT	MAN H				
				1177.477	3324.493	1			.015	.000	.000	15.000	0				
ELEMENT NO	19	IS A	REACH	*	*	*											
			U/S DATA	STATION	INVERT	SECT			N	RADIUS	ANGLE	ANG PT	MAN H				
				1177.810	3324.500	1			.015	.000	.000	15.000	0				
ELEMENT NO	20	IS A	WALL EXIT	*													
			U/S DATA	STATION	INVERT	SECT											
				1177.810	3324.500	24											
ELEMENT NO	21	IS A	REACH	*	*	*											
			U/S DATA	STATION	INVERT	SECT			N	RADIUS	ANGLE	ANG PT	MAN H				
				1205.810	3325.060	24			.013	.000	.000	.000	0				
ELEMENT NO	22	IS A	SYSTEM HEADWORKS	*													
			U/S DATA	STATION	INVERT	SECT				W S ELEV							
				1205.810	3325.060	24				.000							

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING

Date:12-11-2020 Time: 9:33:35

RAH2007: MORO POINT

MAIN STORM DRAIN (MAINNO.WSW)

FROM SDDI3 TO CONNECTION TO EXISTING SD IN CLOWDER SPRINGS WAY

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	3315.930	5.740	3321.670	23.00	7.32	.83	3322.50	.00	1.71	.00	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
56.081	.0623					.0103	.58	5.74	.00	.89	.013	.00	.00	PIPE
1056.081	3319.424	2.825	3322.249	23.00	7.32	.83	3323.08	.00	1.71	.00	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
HYDRAULIC JUMP														
1056.081	3319.424	1.013	3320.437	23.00	14.41	3.22	3323.66	.00	1.71	2.00	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
7.256	.0623					.0379	.28	1.01	2.84	.89	.013	.00	.00	PIPE
1063.337	3319.876	1.039	3320.916	23.00	13.94	3.02	3323.93	.00	1.71	2.00	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
8.313	.0623					.0342	.28	1.04	2.70	.89	.013	.00	.00	PIPE
1071.650	3320.394	1.080	3321.474	23.00	13.29	2.74	3324.22	.00	1.71	1.99	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0624					.0373	.09	1.08	2.51		.013	.00	.00	PIPE
1074.150	3320.550	.948	3321.499	21.30	14.51	3.27	3324.77	.00	1.65	2.00	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
6.807	.0603					.0412	.28	.95	2.98	.86	.013	.00	.00	PIPE
1080.957	3320.961	.966	3321.927	21.30	14.18	3.12	3325.05	.00	1.65	2.00	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
10.864	.0603					.0376	.41	.97	2.88	.86	.013	.00	.00	PIPE
1091.821	3321.616	1.002	3322.619	21.30	13.52	2.84	3325.46	.00	1.65	2.00	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
8.066	.0603					.0331	.27	1.00	2.68	.86	.013	.00	.00	PIPE
1099.887	3322.103	1.041	3323.144	21.30	12.89	2.58	3325.72	.00	1.65	2.00	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
6.233	.0603					.0292	.18	1.04	2.50	.86	.013	.00	.00	PIPE

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING

Date:12-11-2020 Time: 9:33:35

MAINNO.OUT

RAH2007: MORO POINT

MAIN STORM DRAIN (MAINNO.WSW)

FROM SDDI3 TO CONNECTION TO EXISTING SD IN CLOWDER SPRINGS WAY

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

1106.119	3322.479	1.081	3323.560	21.30	12.29	2.35	3325.91	.00	1.65	1.99	2.000	.000	.00	1	.0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.934	.0603					.0257	.13	1.08	2.32	.86	.013	.00	.00	PIPE	
1111.053	3322.777	1.124	3323.900	21.30	11.72	2.13	3326.03	.00	1.65	1.98	2.000	.000	.00	1	.0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.965	.0603					.0227	.09	1.12	2.16	.86	.013	.00	.00	PIPE	
1115.018	3323.016	1.168	3324.184	21.30	11.17	1.94	3326.12	.00	1.65	1.97	2.000	.000	.00	1	.0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.202	.0603					.0201	.06	1.17	2.00	.86	.013	.00	.00	PIPE	
1118.220	3323.209	1.216	3324.425	21.30	10.65	1.76	3326.19	.00	1.65	1.95	2.000	.000	.00	1	.0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
.500	.0601					.0187	.01	1.22	1.86	.86	.013	.00	.00	PIPE	
1118.720	3323.239	1.224	3324.463	21.30	10.57	1.73	3326.20	.00	1.65	1.95	2.000	.000	.00	1	.0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
.500	.0601					.0183	.01	1.22	1.83	.86	.013	.00	.00	PIPE	
1119.220	3323.269	1.233	3324.502	21.30	10.48	1.70	3326.21	.00	1.65	1.94	2.000	.000	.00	1	.0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
.500	.0620					.0179	.01	1.23	1.81	.85	.013	.00	.00	PIPE	
1119.720	3323.300	1.243	3324.543	21.30	10.38	1.67	3326.22	.00	1.65	1.94	2.000	.000	.00	1	.0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
.500	.0601					.0175	.01	1.24	1.78	.86	.013	.00	.00	PIPE	
1120.220	3323.330	1.253	3324.583	21.30	10.29	1.64	3326.23	.00	1.65	1.94	2.000	.000	.00	1	.0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
.500	.0601					.0170	.01	1.25	1.75	.86	.013	.00	.00	PIPE	
1120.720	3323.360	1.263	3324.623	21.30	10.19	1.61	3326.23	.00	1.65	1.93	2.000	.000	.00	1	.0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21.769	.0200					.0160	.35	1.26	1.72	1.19	.013	.00	.00	PIPE	

▲ FILE: MAINNO.WSW

W S P G W - CIVILDESIGN Version 14.08

PAGE 3

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING

Date:12-11-2020 Time: 9:33:35

RAH2007: MORO POINT

MAIN STORM DRAIN (MAINNO.WSW)

FROM SDDI3 TO CONNECTION TO EXISTING SD IN CLOWDER SPRINGS WAY

MAINNO.OUT

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1142.489	3323.795	1.313	3325.107	21.30	9.74	1.47	3326.58	.00	1.65	1.90	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
13.505	.0200					.0142	.19	1.31	1.60	1.19	.013	.00	.00	PIPE
1155.994	3324.064	1.369	3325.434	21.30	9.29	1.34	3326.77	.00	1.65	1.86	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
8.367	.0200					.0127	.11	1.37	1.47	1.19	.013	.00	.00	PIPE
1164.361	3324.231	1.430	3325.662	21.30	8.86	1.22	3326.88	.00	1.65	1.81	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
5.160	.0200					.0113	.06	1.43	1.35	1.19	.013	.00	.00	PIPE
1169.520	3324.334	1.497	3325.831	21.30	8.45	1.11	3326.94	.00	1.65	1.74	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.864	.0200					.0102	.03	1.50	1.23	1.19	.013	.00	.00	PIPE
1172.385	3324.391	1.569	3325.961	21.30	8.05	1.01	3326.97	.00	1.65	1.64	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.925	.0200					.0092	.01	1.57	1.12	1.19	.013	.00	.00	PIPE
1173.310	3324.410	1.652	3326.062	21.30	7.67	.91	3326.98	.00	1.65	1.52	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
WALL ENTRANCE														
1173.310	3324.410	3.199	3327.609	21.30	1.66	.04	3327.65	.00	.96	4.00	9.000	4.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.250	.0201					.0002	.00	3.20	.16	.62	.015	.00	.00	BOX
1174.560	3324.435	3.173	3327.609	21.30	1.68	.04	3327.65	.00	.96	4.00	9.000	4.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0199					.0002	.00	3.17	.17		.015	.00	.00	BOX
1175.810	3324.460	3.154	3327.614	20.50	1.62	.04	3327.66	.00	.93	4.00	9.000	4.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.333	.0213					.0002	.00	3.15	.16	.60	.015	.00	.00	BOX

FILE: MAINNO.WSW

W S P G W - CIVILDESIGN Version 14.08

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING

Date:12-11-2020 Time: 9:33:35

RAH2007: MORO POINT

MAIN STORM DRAIN (MAINNO.WSW)

FROM SDDI3 TO CONNECTION TO EXISTING SD IN CLOWDER SPRINGS WAY

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

MAINNO.OUT															
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type	Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1176.143	3324.467	3.147	3327.614	20.50	1.63	.04	3327.66	.00	.93	4.00	9.000	4.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.334	.0175					.0002	.00	3.15	.16	.64	.015	.00	.00	BOX	
1176.477	3324.473	3.141	3327.614	20.50	1.63	.04	3327.66	.00	.93	4.00	9.000	4.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.333	.0213					.0002	.00	3.14	.16	.60	.015	.00	.00	BOX	
1176.810	3324.480	3.134	3327.614	20.50	1.64	.04	3327.66	.00	.93	4.00	9.000	4.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.333	.0213					.0002	.00	3.13	.16	.60	.015	.00	.00	BOX	
1177.143	3324.487	3.127	3327.614	20.50	1.64	.04	3327.66	.00	.93	4.00	9.000	4.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.334	.0175					.0002	.00	3.13	.16	.64	.015	.00	.00	BOX	
1177.477	3324.493	3.121	3327.614	20.50	1.64	.04	3327.66	.00	.93	4.00	9.000	4.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.333	.0213					.0002	.00	3.12	.16	.60	.015	.00	.00	BOX	
1177.810	3324.500	3.114	3327.614	20.50	1.65	.04	3327.66	.00	.93	4.00	9.000	4.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
WALL EXIT															
1177.810	3324.500	3.115	3327.615	20.50	6.53	.66	3328.28	.00	1.62	.00	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
28.000	.0200					.0082	.23	3.11	.00	1.16	.013	.00	.00	PIPE	
1205.810	3325.060	2.785	3327.845	20.50	6.53	.66	3328.51	.00	1.62	.00	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

↑
↑

RAH2007: MORO POINT

MAIN STORM DRAIN (MAINNO.WSW)

FROM SDDI3 TO CONNECTION TO EXISTING SD IN CLOWDER SPRINGS WAY

1000.00 .I C H W E . R

MAINNO.OUT

1002.98	.	.
1005.97	.	.
1008.95	.	.
1011.93	.	.
1014.91	.	.
1017.90	.	.
1020.88	.	.
1023.86	.	.
1026.84	.	.
1029.83	.	.
1032.81	.	.
1035.79	.	.
1038.78	.	.
1041.76	.	.
1044.74	.	.
1047.72	.	.
1050.71	.	.

MAINNO.OUT

1053.69	.									.	
1056.67	.	I		C H	W	E				.	R
1059.66	.	I	W	C H		E				.	R
1062.64	.									.	
1065.62	.		I	W	CH		E			.	R
1068.60	.									.	
1071.59	.									.	
1074.57	.		I	W	CH		E			.	JX
1077.55	.		I	W	C H		E			.	R
1080.53	.									.	
1083.52	.		I	W	C H		E			.	R
1086.50	.									.	
1089.48	.									.	
1092.47	.			I	W	C H		E		.	R
1095.45	.									.	
1098.43	.									.	
1101.41	.			I	W	C H		E		.	R

MAINNO.OUT

[illegible]

MAINNO.OUT

1155.10	.					.
1158.09	.	I	WC H E			. R
1161.07	.					.
1164.05	.					.
1167.03	.	I	WC H E			. R
1170.02	.	I	WC H E			. R
1173.00	.	I	W H E			. R
1175.98	.	I	YYYYYYYWH E			. WE
1178.97	.	I	C	W	H .	R
1181.95	.	I	C	W	H .	JX
1184.93	.	I	C	W	H .	R
1187.91	.	I	C	W	H .	R
1190.90	.	I	C	W	H .	R
1193.88	.	I	C	W	H .	R
1196.86	.	I	C	W	H .	R
1199.84	.	I	C	W	H .	R
1202.83	.	I	YYYYCYYYYYYYYYWYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYH.			WX

MAINNO.OUT

1205.81	.	I	C	H	W	E	.	R		
3315.930	3317.687	3319.444	3321.201	3322.958	3324.715	3326.472	3328.229	3329.987	3331.744	3333.500

N O T E S

1. GLOSSARY

I = INVERT ELEVATION
 C = CRITICAL DEPTH
 W = WATER SURFACE ELEVATION
 S = SUPER-ELEVATION
 H = HEIGHT OF CHANNEL
 E = ENERGY GRADE LINE
 X = CURVES CROSSING OVER
 B = BRIDGE ENTRANCE OR EXIT
 Y = WALL ENTRANCE OR EXIT

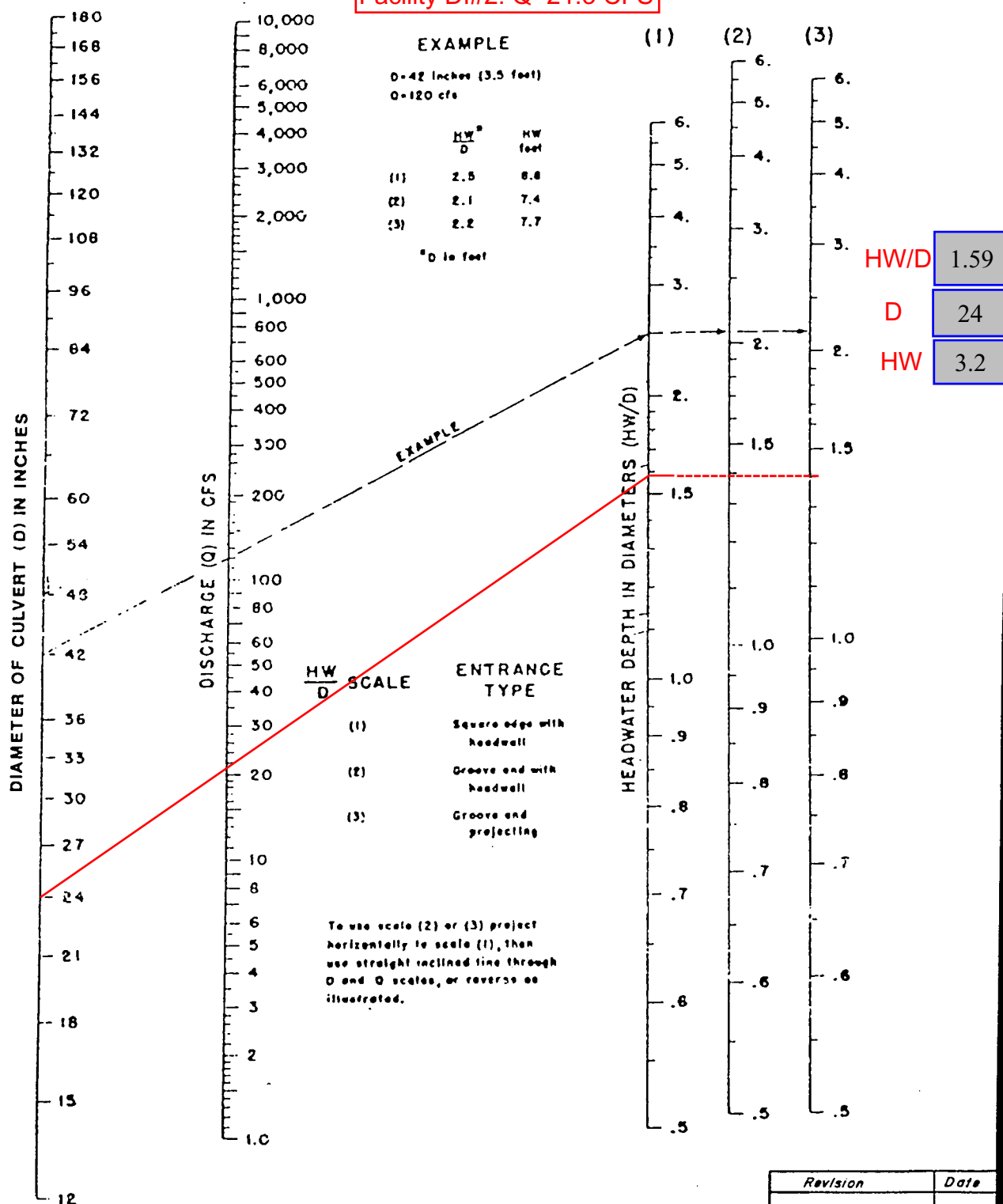
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

Inlet Control Nomographs

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

Facility DI#2: Q=21.3 CFS

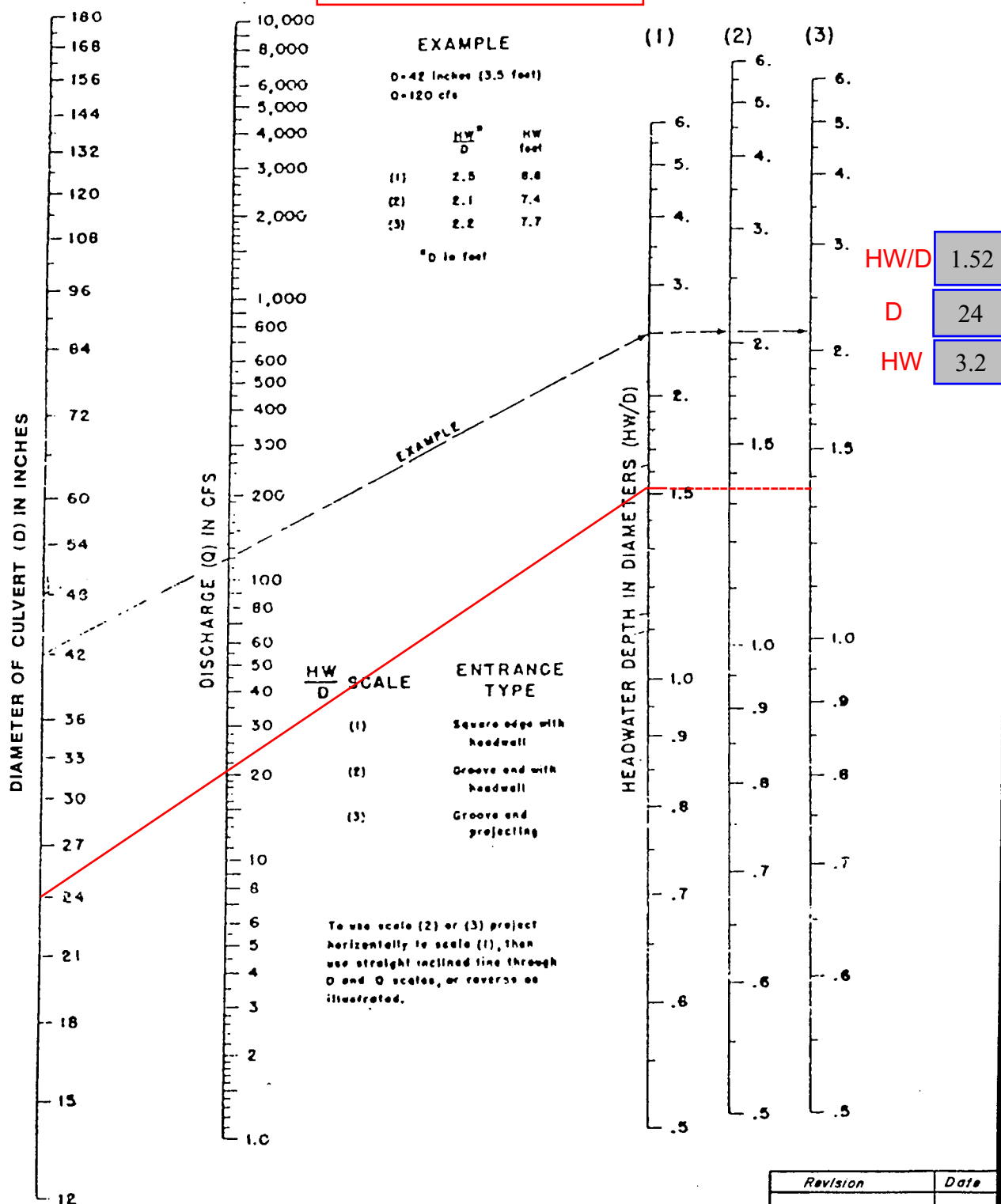


Revision	Date

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

Facilities DI#3: Q=20.5 CFS



Revision	Date

Emergency Overflow Computations

Worksheet for E01 (Normal Depth)

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	6.96 %
Discharge	21.3 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.35	0.38
0+01.33	0.06
0+01.33	0.00
0+02.50	0.13
0+02.50	0.17
0+15.00	0.42

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+02.50, 0.13)	0.013
(0+02.50, 0.13)	(0+15.00, 0.42)	0.016

Options

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

Results

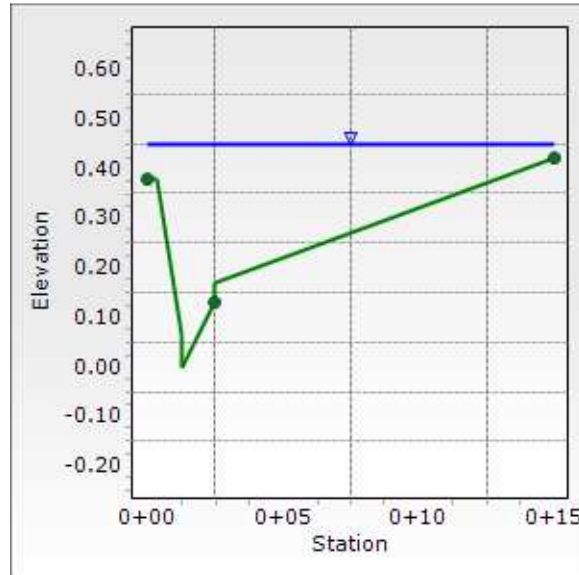
Normal Depth	0.45 ft
Roughness Coefficient	0.016
Elevation	0.45 ft
Elevation Range	0.00 to 0.42 ft
Flow Area	2.7 ft ²
Wetted Perimeter	15.27 ft
Hydraulic Radius	0.18 ft
Top Width	15.00 ft
Normal Depth	0.45 ft
Critical Depth	0.67 ft
Critical Slope	0.51 %
Velocity	7.94 ft/s
Velocity Head	0.98 ft

Worksheet for E01 (Normal Depth)

Results	
Specific Energy	1.43 ft
Froude Number	3.309
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.45 ft
Critical Depth	0.67 ft
Channel Slope	6.96 %
Critical Slope	0.51 %

Cross Section for E01 (Normal Depth)

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	6.96 %
Normal Depth	0.45 ft
Discharge	21.3 cfs

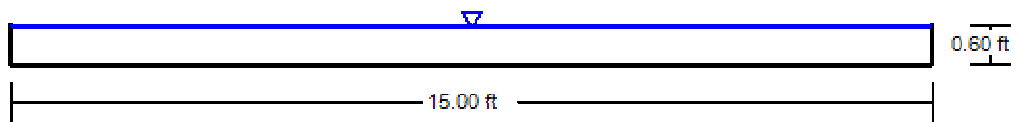


Worksheet for E01 (Weir)

Project Description	
Solve For	Headwater Elevation
Input Data	
Discharge	21.3 cfs
Crest Elevation	0.00 ft
Tailwater Elevation	0.45 ft
Crest Surface Type	Paved
Crest Breadth	5.00 ft
Crest Length	15.00 ft
Results	
Headwater Elevation	0.60 ft
Headwater Height Above Crest	0.60 ft
Tailwater Height Above Crest	0.45 ft
Weir Coefficient	$3.02 \text{ ft}^{(1/2)}/\text{s}$
Submergence Factor	1.000
Adjusted Weir Coefficient	$3.02 \text{ ft}^{(1/2)}/\text{s}$
Flow Area	9.1 ft ²
Velocity	2.35 ft/s
Wetted Perimeter	16.21 ft
Top Width	15.00 ft

Cross Section for EO1 (Weir)

Project Description	
Solve For	Headwater Elevation
Input Data	
Discharge	21.3 cfs
Headwater Elevation	0.60 ft
Crest Elevation	0.00 ft
Tailwater Elevation	0.45 ft
Crest Surface Type	Paved
Crest Breadth	5.00 ft
Crest Length	15.00 ft



V: 1
H: 1

Ditch Computation

Worksheet for PD - Park Ditch

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.50 %
Discharge	2.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.40
0+06.50	0.00
0+07.50	0.50
0+08.50	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.40)	(0+08.50, 0.50)	0.025

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

Results	
Normal Depth	0.39 ft
Roughness Coefficient	0.025
Elevation	0.39 ft
Elevation Range	0.00 to 0.50 ft
Flow Area	1.4 ft ²
Wetted Perimeter	7.30 ft
Hydraulic Radius	0.19 ft
Top Width	7.20 ft
Normal Depth	0.39 ft
Critical Depth	0.31 ft
Critical Slope	1.72 %
Velocity	1.41 ft/s
Velocity Head	0.03 ft
Specific Energy	0.43 ft
Froude Number	0.560
Flow Type	Subcritical

Worksheet for PD - Park Ditch

GVF Input Data

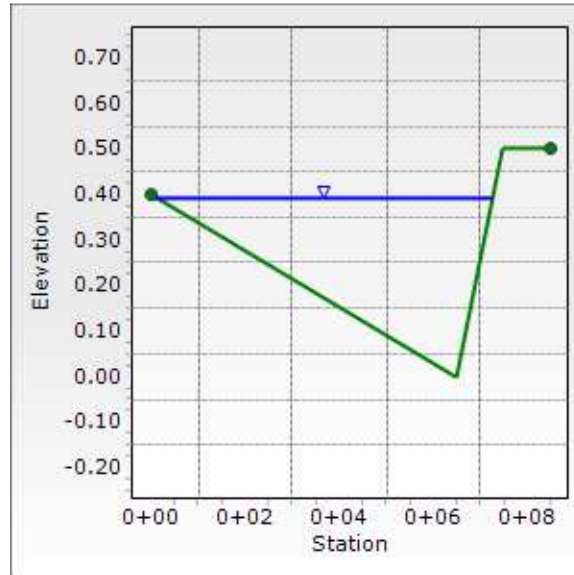
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.39 ft
Critical Depth	0.31 ft
Channel Slope	0.50 %
Critical Slope	1.72 %

Cross Section for PD - Park Ditch

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.50 %
Normal Depth	0.39 ft
Discharge	2.0 cfs



APPENDIX C

Finished Floor Analyses

MORO POINTE FINISHED FLOOR - CITY OF LAS VEGAS JURISDICTION										
INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C ¹ (ft)	F/L ² (ft)	D ₁₀₀ (ft)	Flowline F.F. _{min} ³ (ft)	T/C + 6" F.F. _{min} ⁴ (ft)	F.F. _{Design} (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
1	O2	3339.54	3339.16	0.27	3339.70	3340.04	3341.6	OK	OK	
2	N1	3339.43	3339.05	0.33	3339.71	3339.93	3341.6	OK	OK	
3	N1	3340.31	3339.93	0.33	3340.59	3340.81	3343.1	OK	OK	
4	N1	3341.20	3340.82	0.33	3341.48	3341.70	3343.1	OK	OK	
5	N1	3342.54	3342.16	0.33	3342.82	3343.04	3345.0	OK	OK	
6	N1	3344.06	3343.68	0.33	3344.34	3344.56	3345.0	OK	OK	
7	N1	3345.64	3345.26	0.33	3345.92	3346.14	3348.1	OK	OK	
8	N1	3347.23	3346.85	0.33	3347.51	3347.73	3348.1	OK	OK	
9	N1	3348.82	3348.44	0.33	3349.10	3349.32	3351.3	OK	OK	
10	N1	3350.41	3350.03	0.33	3350.69	3350.91	3351.3	OK	OK	
11	N1	3352.00	3351.62	0.33	3352.28	3352.50	3354.5	OK	OK	
12	N1	3353.59	3353.21	0.33	3353.87	3354.09	3354.5	OK	OK	
13	N1	3355.19	3354.81	0.33	3355.47	3355.69	3357.7	OK	OK	
14	N1	3356.80	3356.42	0.33	3357.08	3357.30	3357.7	OK	OK	
15	N1	3358.40	3358.02	0.33	3358.68	3358.90	3361.0	OK	OK	
16	N1	3359.96	3359.58	0.33	3360.24	3360.46	3361.0	OK	OK	
17	N1	3354.22	3353.84	0.33	3354.50	3354.72	3355.1	OK	OK	
18	N1	3352.64	3352.26	0.33	3352.92	3353.14	3355.1	OK	OK	
19	N1	3351.05	3350.67	0.33	3351.33	3351.55	3352.0	OK	OK	
20	N1	3349.46	3349.08	0.33	3349.74	3349.96	3352.0	OK	OK	
21	N1	3347.87	3347.49	0.33	3348.15	3348.37	3348.8	OK	OK	
22	N1	3346.29	3345.91	0.33	3346.57	3346.79	3348.8	OK	OK	
23	N1	3344.70	3344.32	0.33	3344.98	3345.20	3345.6	OK	OK	
24	N1	3343.13	3342.75	0.33	3343.41	3343.63	3345.6	OK	OK	
25	N1	3341.70	3341.32	0.33	3341.98	3342.20	3342.6	OK	OK	
26	N1	3340.36	3339.98	0.33	3340.64	3340.86	3342.6	OK	OK	
27	O1	3334.86	3334.48	0.33	3335.14	3335.36	3336.9	OK	OK	
28	O1	3336.03	3335.65	0.33	3336.31	3336.53	3336.9	OK	OK	
29	O1	3337.47	3337.09	0.33	3337.75	3337.97	3339.9	OK	OK	
30	O1	3339.04	3338.66	0.33	3339.32	3339.54	3339.9	OK	OK	
31	O1	3340.63	3340.25	0.33	3340.91	3341.13	3343.1	OK	OK	
32	O1	3342.22	3341.84	0.33	3342.50	3342.72	3343.1	OK	OK	
33	O1	3343.81	3343.43	0.33	3344.09	3344.31	3346.3	OK	OK	
34	O1	3345.40	3345.02	0.33	3345.68	3345.90	3346.3	OK	OK	
35	O1	3346.98	3346.60	0.33	3347.26	3347.48	3349.5	OK	OK	
36	O1	3348.57	3348.19	0.33	3348.85	3349.07	3349.5	OK	OK	
37	O1	3350.16	3349.78	0.33	3350.44	3350.66	3352.7	OK	OK	
38	O1	3351.75	3351.37	0.33	3352.03	3352.25	3352.7	OK	OK	
39	O1	3360.41	3360.03	0.33	3360.69	3360.91	3362.9	OK	OK	
40	O1	3362.00	3361.62	0.33	3362.28	3362.50	3362.9	OK	OK	
41	O1	3363.59	3363.21	0.33	3363.87	3364.09	3366.0	OK	OK	
42	O1	3365.01	3364.63	0.33	3365.29	3365.51	3366.0	OK	OK	
43	O1	3364.43	3364.05	0.33	3364.71	3364.93	3365.3	OK	OK	
44	O1	3362.84	3362.46	0.33	3363.12	3363.34	3365.3	OK	OK	
45	O1	3361.25	3360.87	0.33	3361.53	3361.75	3362.2	OK	OK	
46	O1	3359.66	3359.28	0.33	3359.94	3360.16	3362.2	OK	OK	
47	O1	3358.07	3357.69	0.33	3358.35	3358.57	3359.0	OK	OK	
48	O1	3356.48	3356.10	0.33	3356.76	3356.98	3359.0	OK	OK	
49	O1	3353.05	3352.67	0.33	3353.33	3353.55	3354.0	OK	OK	
50	O1	3351.46	3351.08	0.33	3351.74	3351.96	3354.0	OK	OK	
51	O1	3349.87	3349.49	0.33	3350.15	3350.37	3350.8	OK	OK	
52	O1	3348.28	3347.90	0.33	3348.56	3348.78	3350.8	OK	OK	
53	O1	3346.69	3346.31	0.33	3346.97	3347.19	3347.6	OK	OK	
54	O1	3345.10	3344.72	0.33	3345.38	3345.60	3347.6	OK	OK	
55	O1	3343.51	3343.13	0.33	3343.79	3344.01	3344.4	OK	OK	
56	O1	3341.93	3341.55	0.33	3342.21	3342.43	3344.4	OK	OK	
57	O1	3340.34	3339.96	0.33	3340.62	3340.84	3341.2	OK	OK	
58	O1	3338.75	3338.37	0.33	3339.03	3339.25	3341.2	OK	OK	
59	O1	3337.19	3336.81	0.33	3337.47	3337.69	3338.1	OK	OK	
60	O1	3335.78	3335.40	0.33	3336.06	3336.28	3338.1	OK	OK	
61	O1	3334.79	3334.41	0.33	3335.07	3335.29	3335.4	OK	OK	
62	O1	3333.90	3333.52	0.33	3334.18	3334.40	3335.4	OK	OK	

MORO POINTE FINISHED FLOOR - CITY OF LAS VEGAS JURISDICTION										
INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C ¹ (ft)	F/L ² (ft)	D ₁₀₀ (ft)	Flowline F.F. _{min} ³ (ft)	T/C + 6" F.F. _{min} ⁴ (ft)	F.F. _{Design} (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
63	O2	3333.86	3333.48	0.27	3334.02	3334.36	3335.0	OK	OK	
64	O2	3333.86	3333.48	0.27	3334.02	3334.36	3335.0	OK	OK	
Where: 1: Top of Curb at High Side of Lot 2: TC-0.38 (For Roll Curb), TC-0.5 (For L Curb) 3: Minimum Allowable Finished Floor Elevation above flowline elevation @ high side of lot = (2 x D ₁₀₀) + F/L 4: City of Las Vegas minimum allowable finished floor elevation = T.C. @ high side of lot + 6-inches 5: These lots have an adjacent solid grouted wall that protects the FF.										
City of Las Vegas Finished Floor Criteria: <i>-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. Per HCDDM, Section 304.4.</i> <i>-The finished floor shall be set a vertical distance of at least 6-inches above the highest adjacent top of curb. Per HCDDM, Section 1602.</i>										

Supplemental Finish Floor Checks

Adjacent/Perimeter Street Check									
Lot Number	Street	High TC ¹	High FL ²	Section	Flow Depth ³	Min FF ⁴	Design FF	Check	Solid Grout
1	Clowder Springs Way	3336.05	3335.55	1**	0.25	3336.05	3341.6	OK	No
1	Red Pass Drive	3337.92	3337.42	RP**	0.34	3338.10	3341.6	OK	No
2	Red Pass Drive	3339.23	3338.73	RP**	0.34	3339.41	3341.6	OK	No
3	Red Pass Drive	3341.04	3340.54	RP**	0.34	3341.22	3343.1	OK	No
4	Red Pass Drive	3343.06	3342.56	RP**	0.34	3343.24	3343.1	CHECK	Yes
5	Red Pass Drive	3343.06	3342.56	RP2	0.32	3343.20	3345.0	OK	No
6	Red Pass Drive	3345.04	3344.54	RP2	0.32	3345.18	3345.0	CHECK	Yes
7	Red Pass Drive	3347.06	3346.56	RP2	0.32	3347.20	3348.1	OK	No
8	Red Pass Drive	3349.37	3348.87	RP2	0.32	3349.51	3348.1	CHECK	Yes
9	Red Pass Drive	3351.72	3351.22	RP2	0.32	3351.86	3351.3	CHECK	Yes
10	Red Pass Drive	3354.01	3353.51	RP2	0.32	3354.15	3351.3	CHECK	Yes
11	Red Pass Drive	3356.06	3355.56	RP2	0.32	3356.20	3354.5	CHECK	Yes
12	Red Pass Drive	3358.03	3357.53	RP2	0.32	3358.17	3354.5	CHECK	Yes
13	Red Pass Drive	3360.15	3359.65	RP2	0.32	3360.29	3357.7	CHECK	Yes
14	Red Pass Drive	3362.50	3362.00	RP2	0.32	3362.64	3357.7	CHECK	Yes
15	Red Pass Drive	3364.85	3364.35	RP1	0.30	3364.95	3361.0	CHECK	Yes
16	Red Pass Drive	3369.15	3368.65	RP1	0.30	3369.25	3361.0	CHECK	Yes
26	Bear Hill St	3336.95	3336.57	N2	0.36	3337.29	3342.6	OK	No
27	Bear Hill St	3332.88	3332.50	N2	0.36	3333.22	3336.9	OK	No
42	Desert Foothills St	3372.00	3371.62	DF	0.00	3371.62	3366.0	CHECK	Yes
43	Desert Foothills St	3369.60	3369.22	DF	0.00	3369.22	3365.3	CHECK	Yes
43	Kindle Corner Ave	3365.50	3365.12	KC	0.00	3365.12	3365.3	OK	No
44	Kindle Corner Ave	3364.67	3364.17	KCA	0.32	3364.81	3365.3	OK	No
45	Kindle Corner Ave	3363.93	3363.43	KCA	0.32	3364.07	3362.2	CHECK	Yes
46	Kindle Corner Ave	3363.03	3362.53	KCA	0.32	3363.17	3362.2	CHECK	Yes
47	Kindle Corner Ave	3362.03	3361.53	KCA	0.32	3362.17	3359.0	CHECK	Yes
48	Kindle Corner Ave	3361.04	3360.54	KCA	0.32	3361.18	3359.0	CHECK	Yes
49	Kindle Corner Ave	3357.46	3356.96	KCA	0.32	3357.60	3354.0	CHECK	Yes
50	Kindle Corner Ave	3355.79	3355.29	KCA	0.32	3355.93	3354.0	CHECK	Yes
51	Kindle Corner Ave	3354.02	3353.52	KCA	0.32	3354.16	3350.8	CHECK	Yes
52	Kindle Corner Ave	3352.05	3351.55	KCA	0.32	3352.19	3350.8	CHECK	Yes
53	Kindle Corner Ave	3350.03	3349.53	KCA	0.32	3350.17	3347.6	CHECK	Yes
54	Kindle Corner Ave	3348.03	3347.53	KCA	0.32	3348.17	3347.6	CHECK	Yes
55	Kindle Corner Ave	3346.26	3345.76	KCA	0.32	3346.40	3344.4	CHECK	Yes
56	Kindle Corner Ave	3344.53	3344.03	KCA	0.32	3344.67	3344.4	CHECK	Yes
57	Kindle Corner Ave	3342.80	3342.30	KCA	0.32	3342.94	3341.2	CHECK	Yes
58	Kindle Corner Ave	3341.00	3340.50	KCA	0.32	3341.14	3341.2	OK	No
59	Kindle Corner Ave	3339.03	3338.53	KCA	0.32	3339.17	3338.1	CHECK	Yes
60	Kindle Corner Ave	3337.07	3336.57	KCA	0.32	3337.21	3338.1	OK	No
61	Kindle Corner Ave	3335.04	3334.54	KCA	0.32	3335.18	3335.4	OK	No
62	Kindle Corner Ave	3333.07	3332.57	KCA	0.32	3333.21	3335.4	OK	No
63	Kindle Corner Ave	3331.40	3330.90	KCA	0.32	3331.54	3335.0	OK	No
64	Kindle Corner Ave	3330.00	3329.50	KCA	0.32	3330.14	3335.0	OK	No
64	Clowder Springs Way	3325.04	3324.54	2**	0.25	3325.04	3335.0	OK	No

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

2: 0.5-ft is subtracted from the High TC to obtain the High FL elevation

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

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

Emergency Overflow Finish Floor Checks

Adjacent/Perimeter Street Check - Emergency Overflow									
Lot Number	Street	High TC ¹	High FL ²	Section	Flow Depth ³	Min FF ⁴	Design FF	Check	Solid Grout
27	Bear Hill St	3332.80	3332.42	EO2	0.00	3332.42	3336.9	OK	No

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

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

3: Flow depth is the normal depth of emergency overflow in adjacent perimeter street.

4: Min FF is the High FL plus the depth of emergency overflow.

APPENDIX D

Reference Material

*Technical Drainage Study Update for the Flood Control Master Plan
Update – Summerlin West Area
by VTN Nevada (DS 4926)*

Approval Letters

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		April 17, 2019
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: Summerlin West Planning Area Master Plan Update		COPIES TO: VTN Nevada
Cross Streets:	West of I-215 between Lake Mead Boulevard and Charleston Boulevard	The Howard Hughes Corporation
File Number:	F:\Depot\DSMemos\DS4926H.doc	Bart Anderson, P.E., DevCo
Parcel Number:	137-22-000-017	CCRFC
Zoning Action:		CCPW
FEMA Flood Zone	YES ☒ NO	
Proposed Storm Drain	YES ☒ NO	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	10/9/2017 & 10/25/2017	11/8/2017	Not Approved	\$400.00	490518: \$400
2 nd Submittal	12/6/2017	12/20/2017 & 1/10/2018	Not Approved	\$400.00	492005: \$400
3 rd Submittal	2/27/2018	3/24/2018	Not Approved	\$400.00	493739: \$400
4 th Submittal & Supplement	4/23/2018 & 5/22/2018	5/22/2018	See Comments Below	\$400.00	495223: \$400
CCPW & CCRFC	7/30/2018	7/30/2018	Concurrence Recv'd	N/C	N/C
5 th Submittal	1/3/2019 (Paid on 1/7/2019)	1/30/2019	Not Approved	\$100.00	502286: \$100
6 th Submittal	2/19/2019	3/13/2019	Conditional Approval	\$400.00	503267: \$400
CCPW & CCRFC	4/15/2019	4/17/2019	Concurrence Recv'd	N/C	N/C
			TOTAL FEES (LDDRS):	\$2,100.00	----

REMARKS:

5th & 6th Submittals: Update #1 & Addendum #1 to address Land Use Changes in the Summerlin West Planning Area

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. The proposed revision of the overall *Summerlin West Planning Area* (SWPA) will have impact to the various existing downstream regional facilities. All impacted downstream facilities must be modified and substantially completed prior to the onsite development of upstream Villages.

With the exception of ***Summerlin West Villages 21 and 22***, no occupancy permits will be issued to the remaining villages prior to the pertinent downstream facility modifications being completed.

2. The *Study* states that ***Detention Basin 5 (DB5)*** needs additional capacity to accommodate the increased flows from the proposed SWPA revision. An update to the **DB5** technical drainage study must be submitted and approved prior to any upstream Villages development with the exception of Villages 21 and 22.
3. The *Study* states that a portion of the existing *Beltway Channel* between *Far Hills Avenue* and *Summerlin Parkway* requires modification with heightened stem walls. An update to the Western Beltway Channel modification must be submitted and approved prior to any upstream Villages development with the exception of Villages 21 and 22.

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

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

END OF REMARKS
WSP/AYS

T/R/S: T21S/R69E/22
AREA K-22



Department of Public Works

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

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

Drainage Study Concurrence Letter

Date: April 10, 2019
Firm: VTN Nevada
Engineer: Joanna Ayson / Brian Ruiz
Address: 2727 South Rainbow Boulevard, Las Vegas, NV 89146
Phone: (702) 873-7550
Fax: (702) 362-2597
E-mail: jayson@vtnnv.com; bruiz@vtnnv.com

Subject: Update for Summerlin West Planning Area Master Plan Update
Location: West of I-215 between Lake Mead Blvd and Charleston Blvd
APN: 137-21-000-002, 137-26-101-001 and others
Sec, Township, Range: S33 and others T20S, R59E
Flood Zone & Panel: Zone A and Zone X, 2125E and 2150E, Dated September 27, 2002
Application Number: PW19-12378

Submittals	Date Received	Date Returned	Reviewer	Miscellaneous
Update	03/21/2019	04/10/2019	CR	
Addendum 1	03/21/2019	04/10/2019	CR	

The above-referenced project is located within the **City of Las Vegas** adjacent to Clark County unincorporated areas. The drainage study was submitted to the County for concurrence on March 21, 2019. In addition, the County has received the City of Las Vegas acceptance letter dated March 13, 2019 for the Technical Drainage Study (DS4926G).

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.

This update addresses; changes to land densities and parcel configurations; addition of drainage channels to Village 27; interim flood control berm to Village 21; revisions to existing washes to be designated as MPU facilities; upsizing Detention Basins DB5 and Grand Central Park to account for increased flow routing. The previously approved Technical Drainage Studies are: PW18-14248.

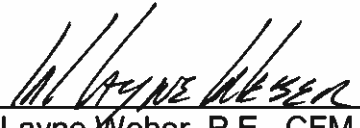
Additional Conditions:

1. The individual Technical Drainage Studies for the areas adjacent to the County to the west of the project site will need to be submitted for County review to verify acceptance of drainage flows.
2. Exhibits in future submittals need to show parcel lines and numbers; entity boundaries; ultimate development boundary; street names; etc.

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



Crissy Riland, P.E.
Senior Civil Engineer
Development Review
crissy@ClarkCountyNV.gov



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



Steven C. Parrish, P.E.
General Manager/Chief
Engineer

BOARD OF DIRECTORS

Lawrence L. Brown, III
Chair
Clark County

Mayor Debra March
Vice-Chair
City of Henderson

George Gault
City of Mesquite

James B. Gibson
Clark County

Mayor Carolyn Goodman
City of Las Vegas

Isaac Barron
City of North Las Vegas

Mayor Pro Tem
Dr. Lois Tarkanian
City of Las Vegas

Mayor Rodney Woodbury
City of Boulder City

April 4, 2019

Mr. Oh Sang Kwon, P.E.
City of Las Vegas Department of Public Works
333 North Rancho Drive
Las Vegas, NV 89106

**DISTRICT CONCURRENCE: SUMMERLIN WEST PLANNING AREA MASTER
PLAN UPDATE
(DS4926G) (RFC D No. 19-11232)**

Dear Mr. Kwon:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated January 3, 2019, and Addendum No. 1 dated February 19, 2019 for above-mentioned project as submitted by VTN NEVADA. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas Department of Public Works dated March 13, 2019.

District concurs with acceptance of this Technical Drainage Study by City of Las Vegas Department of Public Works.

District's review of this project was limited to issues of Regional Flood Control Significance as defined in *Uniform Regulations for the Control of Drainage*.

Please be aware that as additional information becomes available and/or restudies of Flood Insurance Studies are performed, information submitted by VTN NEVADA may be superseded. Compliance with regulatory elements and design standards specified in *Uniform Regulations for the Control of Drainage* does not imply a guarantee that properties will be free from flooding or flood damage. The District, its officials, or employees assume no liability for information, data, or conclusions presented by consulting engineers. We, therefore, make no warranties, either expressed or implied, in conducting this review.

STEVEN C. PARRISH, P.E.
General Manager/Chief Engineer

BY:


Ching C. Wang, P.E.
Senior Civil Engineer

CCW:dd

c: Brian Troy Ruiz, P.E., VTN Nevada
PALetters and Memos\Local Drainage\Land Development & Drainage\2019\1-19-11232 doc

Referenced Drainage Exhibits

Addendum #1 to Update #1 to the FLOOD CONTROL MASTER PLAN UPDATE

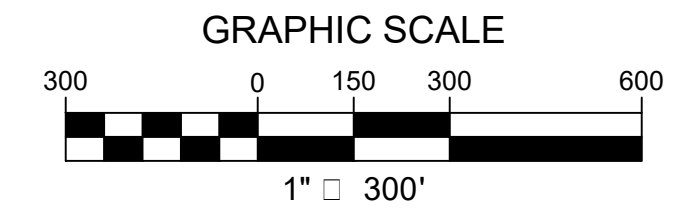
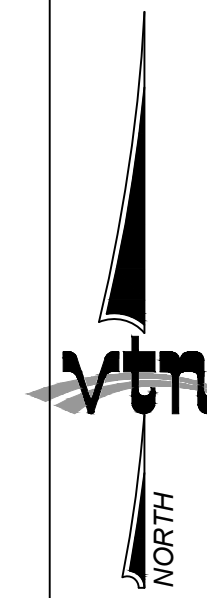
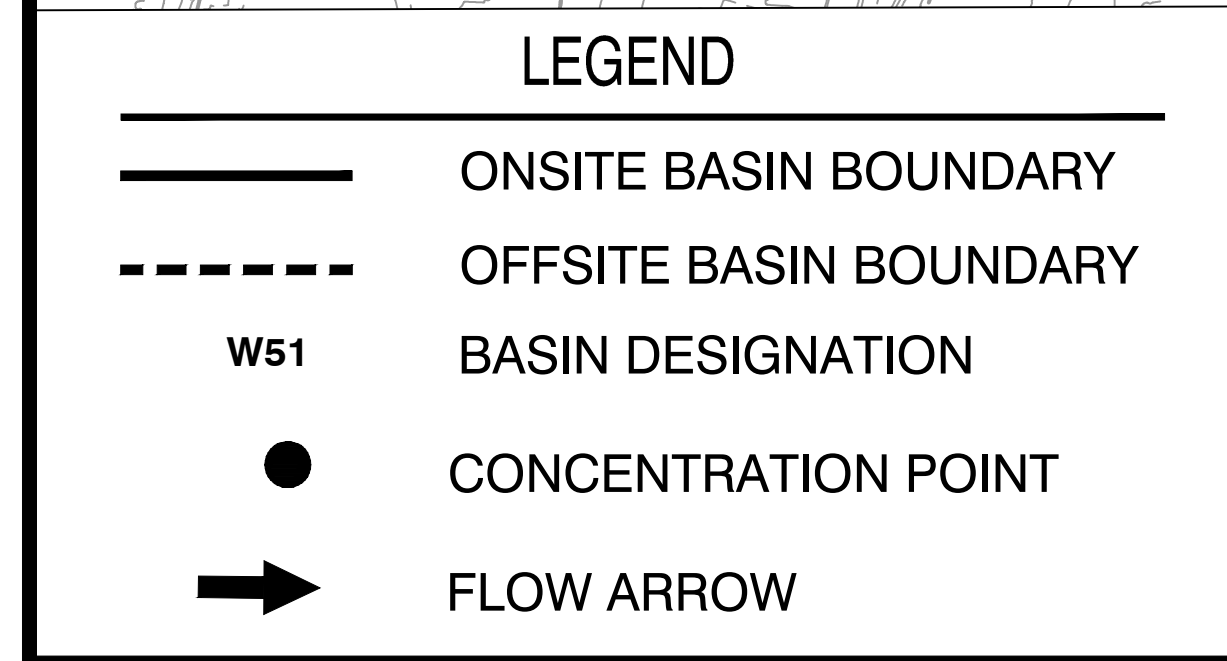
SUMMERLIN WEST PLANNING AREA *Las Vegas, Nevada*

W.O. # 7809

Prepared for:
Howard Hughes Corp.

Submitted to:
Public Works Department
City of Las Vegas





HEC-1 SUMMARY TABLE							
VILLAGE 21							
ULTIMATE CONDITION							
Basin / Concentration Point	Area (Acre)			Q ₁₀₀ (cfs)			SDN
	Update	Previous	Difference	Update	Previous	Difference	
SUMM3	7.73	5.00	2.73	13	30	-17	SDN3
Z	4.50	4.50	0.00	18	17	1	SDN3
AA	4.02	3.71	0.31	17	14	3	SDN3
CAA	-	-	-	48	-	N/A	SDN3
NP-4	1.05	N/A	N/A	3	0	n/a	SDN3
NP-3	1.14	1.49	-0.35	3	4	-1	SDN3
CNP-3	-	-	-	7	-	N/A	SDN3
SUMM1	5.05	5.00	0.05	20	19	1	SDN3
Y	3.98	3.98	0.00	16	15	1	SDN3
X	3.94	3.63	0.31	16	14	2	SDN3
DES1	1.80	1.83	-0.03	8	7	1	SDN3
CSUMM1	-	-	-	113	-	N/A	SDN3
S	6.33	6.56	-0.23	24	25	-1	SDN3
V25-G	11.44	N/A	N/A	45	-	N/A	SDN3
R	3.07	3.10	-0.03	12	11	1	SDN3
CR	-	-	-	56	-	N/A	SDN3
Q	3.16	3.16	0.00	12	11	1	SDN3
CQ	-	-	-	68	-	N/A	SDN3
ST1	1.50	1.62	-0.12	7	6	1	SDN3
CST1	-	-	-	74	54	20	SDN3
P	3.00	3.17	-0.17	11	11	0	SDN3
DES2	2.39	2.27	0.12	10	9	1	SDN3
CDES2	-	-	-	119	-	N/A	SDN3
DES3	3.73	3.78	-0.05	17	15	2	SDN3
L	7.44	7.36	0.08	30	26	4	SDN3
COS-3	5.90	6.10	-0.20	17	18	-1	SDN3
DES4	2.79	2.88	-0.09	12	11	1	SDN3
V25-F	10.45	N/A	N/A	43	-	N/A	SDN3
V25-COS4	4.64	N/A	N/A	15	-	N/A	SDN3
V25-FOXN	3.23	N/A	N/A	14	-	N/A	SDN3
CFOXN	-	-	-	72	-	N/A	SDN3
V25-B	19.93	N/A	N/A	76	-	N/A	SDN3
V25-FOX5	3.19	N/A	N/A	11	-	N/A	SDN3
CFOX5	-	-	-	85	-	N/A	SDN3
V25-C	26.54	N/A	N/A	99	-	N/A	SDN3
V25-COS2	1.79	N/A	N/A	5	-	N/A	SDN3
STA1	2.98	N/A	N/A	13	-	N/A	SDN3
CSTA1	-	-	-	274	-	N/A	SDN3
V25-E	17.13	N/A	N/A	65	-	N/A	SDN3
V25-COS3	2.37	N/A	N/A	8	-	N/A	SDN3
ST2	2.88	2.93	-0.05	12	12	0	SDN3
CST2	-	-	-	360	-	N/A	SDN3
F	16.58	16.88	-0.30	65	59	6	SDN3
E	20.15	20.20	-0.05	78	77	1	SDN3
DES5	5.83	5.46	0.37	22	20	2	SDN3
CDES5	-	-	-	624	-	N/A	SDN3
C	14.83	14.05	0.78	54	44	10	SDN3
NP-1	1.27	1.35	-0.08	4	5	-1	SDN3
ST7	2.30	2.30	0.00	9	9	0	SDN3
D	14.73	15.42	-0.69	56	53	3	SDN3
CST7	-	-	-	124	108	16	SDN3
W	8.31	7.11	1.20	31	27	4	SDN3
SUMM2	3.63	3.28	0.35	16	13	3	SDN3
T	5.98	5.99	-0.01	23	23	0	SDN3
NP-2	0.93	0.87	0.06	3	3	0	SDN3
ST3	1.70	2.09	-0.39	8	8	0	SDN3
CST3	-	-	-	11	43	-32	SDN3
CARR1	3.52	3.52	0.00	15	14	1	SDN3
M	9.11	9.11	0.00	32	32	0	SDN3
CCARR1	-	-	-	129	-	N/A	SDN3
N	2.54	2.54	0.00	10	9	1	SDN3
O	3.47	3.43	0.04	13	13	0	SDN3
STD	0.88	N/A	N/A	4	-	N/A	SDN3
CSTD	-	-	-	26	-	N/A	SDN3
K	8.20	8.01	0.19	30	29	1	SDN3
STB	2.65	N/A	N/A	12	-	N/A	SDN3
CSTB	-	-	-	68	-	N/A	SDN3
J	11.83	11.83	0.00	42	42	0	SDN3
COS-2	0.58	N/A	N/A	2	-	N/A	SDN3
COS-1	7.80	7.78	0.02	22	22	0	SDN3
CCOS-1	-	-	-	24	-	N/A	SDN3
CARR2	2.45	2.49	-0.04	10	10	0	SDN3
ST6	3.08	3.01	0.07	13	12	1	SDN3
CCARR2	-	-	-	286	-	N/A	SDN3
B	13.90	13.71	0.19	54	46	8	SDN3
A	14.15	14.36	-0.21	51	47	4	SDN3
CARR3	4.87	4.85	0.02	19	19	0	SDN3
CCARR3	-	-	-	410	-	N/A	SDN3
V	7.25	7.19	0.06	29	27	2	SDN3
SUMM4	4.87	N/A	N/A	21	-	N/A	SDN3
CSUMM4	-	-	-	50	-	N/A	SDN3
DC-2	1.19	1.40	-0.21	5	5	0	SDN3
U	20.17	20.42	-0.25	73	74	-1	SDN3
I	18.69	18.50	0.19	61	60	1	SDN3
STA	1.01	0.00	n/a	5	0	n/a	SDN3
G	5.01	5.71	-0.70	19	21	-2	SDN3
H	5.79	6.26	-0.47	21	22	-1	SDN3
CGH	-	-	-	39	-	N/A	SDN3
DC-1	8.19	8.19	0.00	23	25	-2	SDN3
NVE	21.74	21.74	0.00	75	79	-4	SDN3
DCD1	-	-	-	326	-	N/A	SDN3
CFAR	-	-	-	1598	-	N/A	SDN3

V21 MDS UP#1 ADD#1

THE HOWARD HUGHES CORPORATION
10801 WEST CHARLESTON BLVD, 3RD FLOOR
HOUSTON, TEXAS 77036

SUMMERLIN WEST PLANNING AREA

**VILLAGE 21
DRAINAGE BASIN MAP**

	JYA/GSB	NOV 2018
DESIGNED BY		

DESIGNED BY:
JYA/GSB
NOV 2018

CHECKED BY: WJM
FEB 2018

PROJECT NO:	SCALE:	N/A	HC
-------------	--------	-----	----

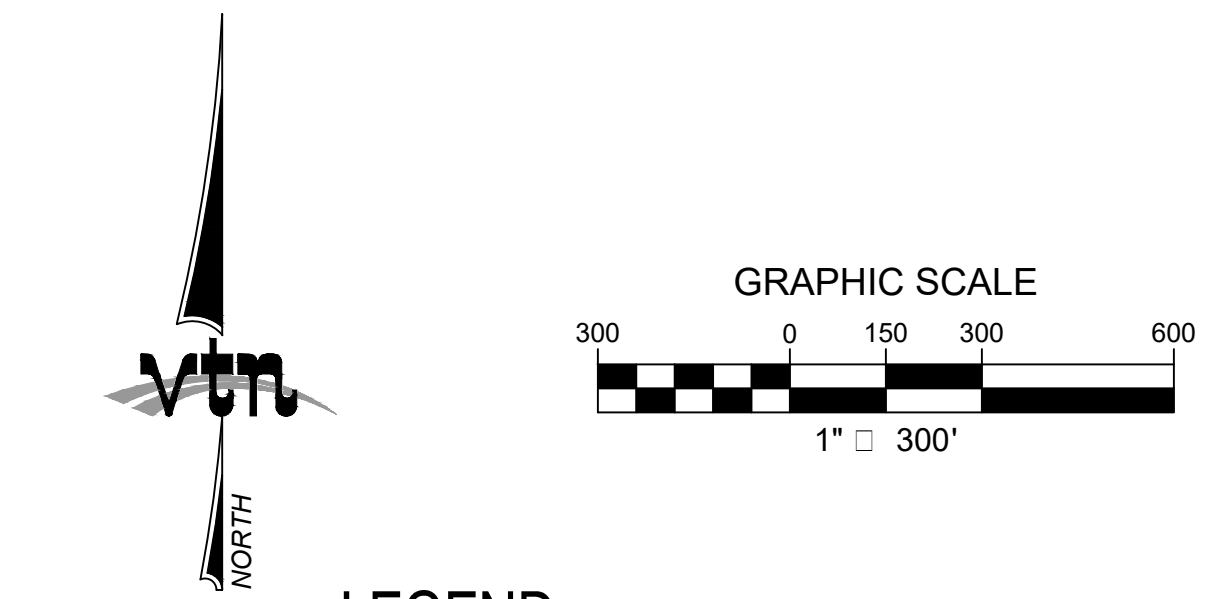
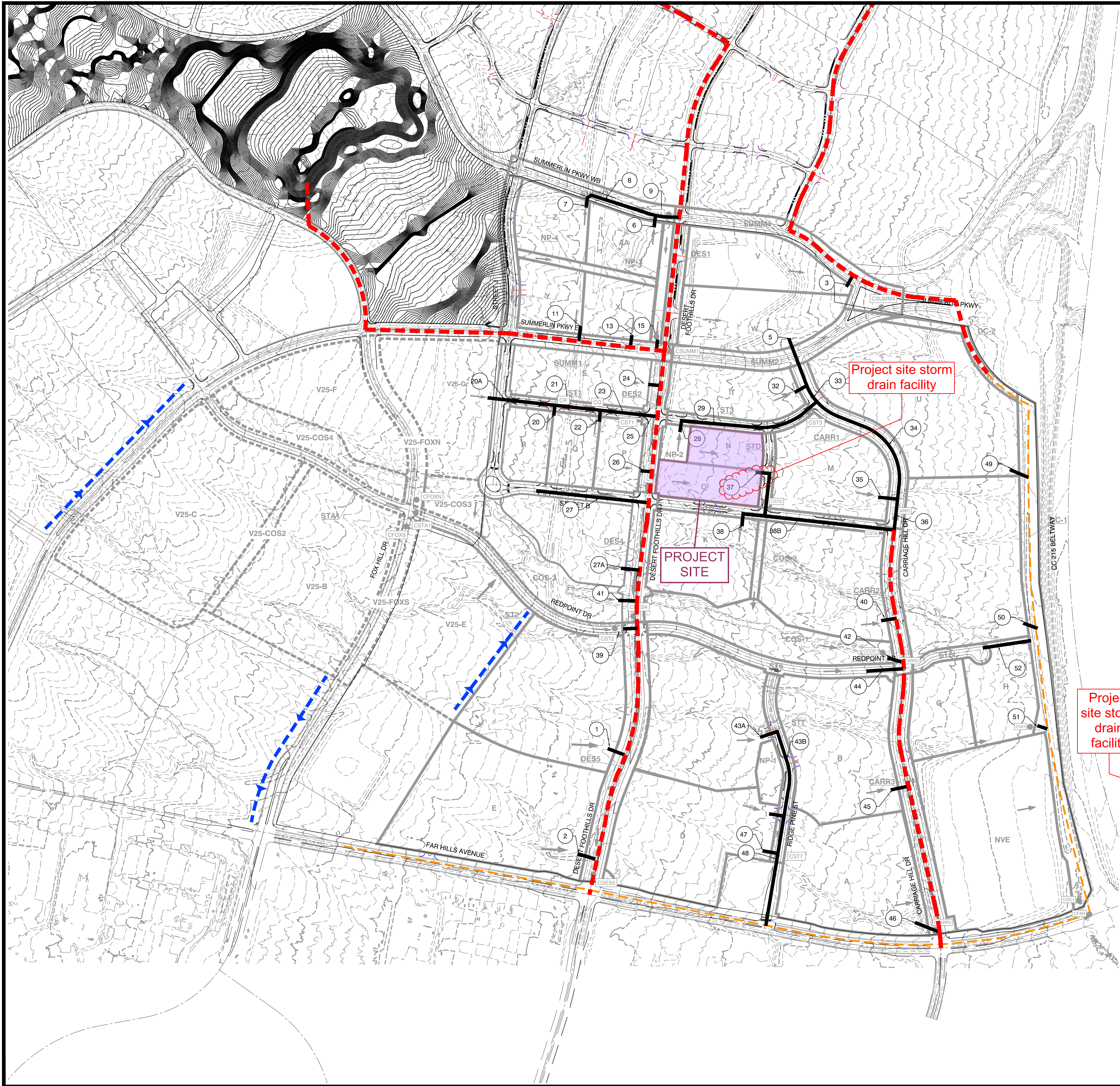
			7809	N/A
--	--	--	------	-----

\\H:\7809\Drainage\7_UPI_ADD\1A_Figures\A.6.6_Village 21 Drainage Basin Map\A.6.6_Area 1 Drainage Basin Map.dwg

GRADES CORPORATION
1, 3RD FLOOR
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PH. (702) 873-7550 FAX (702) 382-2597 WEB WWW.VTNNV.COM
CONSULTING ENGINEERS ● PLANNERS ● LAND SURVEYORS



\\c:\work\7809\Drainage\7_UP1_ADD1\A Figures\A.6.6 Village 21 Drainage Basin Map\A.6.6 Area 1 Drainage Basin Map.dwg



LEGEND

- REGIONAL STORM DRAIN ALIGNMENT
- EXISTING STORM DRAIN ALIGNMENT
- INTERIM BERM/CHANNEL ALIGNMENT
- VILLAGE 21 LOCAL STORM DRAIN ALIGNMENT
- BASIN DESIGNATION
- CONCENTRATION POINT
- LOCAL FACILITY DESIGNATION
- DEVELOPED CONDITION FLOW ARROW

VILLAGE 21 LOCAL FLOOD PROTECTION FACILITIES									
Facility Label	Design Slope (%)	Q100 ULT (cfs)		Tributary Basin/CP		Facility		Technical Drainage Study	
		Previous	Updated	Previous	Updated	Previous	Updated		
1	9.0%	59	65	F	F	30" RCP	36" RCP	Reference 1	
2	8.8%	77	78	E	E	30" RCP	36" RCP	Reference 1	
3	4.2%	27	29	V	V	24" RCP	24" RCP		
5	4.8%	27	31	W	W	24" RCP	24" RCP		
6	1.3%	14	17	AA	AA	24" RCP	24" RCP		
7	1.0%	18	18	Z	Z	24" RCP	24" RCP		
8	4.2%	31	18	CZAA	Z	24" RCP	24" RCP		
9	4.2%	35	18	CNP-4A	CAA	24" RCP	24" RCP		
11	1.0%	15	16	Y	Y	24" 4CP	24" RCP		
13	3.3%	14	16	X	X	24" RCP	24" RCP		
15	0.5%	4	7	NP-3	CNP-3	24" 4CP	24" RCP		
20A	5.4%	n/a	45	n/a	V25-G	N/A	30" RCP		
20	2.1%	11	12	R	R	24" RCP	24" RCP		
21	5.4%	11	56	R	CR	24" RCP	30" RCP		
22	1.0%	11	12	Q	Q	24" RCP	24" RCP		
23	5.4%	23	68	CQR	CQ	24" RCP	36" RCP		
24	10.0%	25	24	S	S	24" RCP	30" RCP	Reference 6	
25	8.0%	54	74	CST1	CST1	30" RCP	36" RCP	Reference 6	
26	10.0%	11	11	P	P	24" RCP	30" RCP	Reference 6	
27	10.0%	n/a	17	n/a	DES3	N/A	30" RCP	Reference 6	
27A	10.0%	26	30	L	L	30" RCP	30" RCP	Reference 6	
28	1.5%	3	3	NP-2	NP-2	24" RCP	24" RCP		
29	5.0%	3	11	NP-2	CST3	24" RCP	24" RCP	Reference 7	
32	3.0%	23	23	T	T	24" RCP	24" RCP	Reference 7	
33	3.0%	N/A	55	N/A	N/A	N/A	24" RCP	Reference 7	
34	3.2%	N/A	66	N/A	N/A	N/A	36" RCP	Reference 7	
35	5.0%	32	32	M	M	30" RCP	36" RCP	Reference 7	
36	1.5%	N/A	104	N/A	N/A	N/A	48"	Reference 7	
37	6.0%	N/A	22	CNO	CNO	N/A	24" RCP		
38	0.5%	29	30	K	K	30" RCP	36" RCP		
38B	4.0%	108	68	CST4	CSTB	36" RCP	36" RCP	Reference 7	
39	6.1%	n/a	360	n/a	CST2	N/A	54" RCP	Reference 1	
40	4.0%	42	42	J	J	24" RCP	42" RCP	Reference 7	
41	6.3%	18	17	COS-3	COS-3	24" RCP	10'X10' RCB*	Reference 1	
42	10.0%	22	24	COS-1	CCOS1	24" RCP	24" RCP	Reference 7	
43A	1.5%	44	58	C	C, NP-1	36" RCP	42" RCP	Reference 3	
43B	1.3%	58	58	C, NP-1, ST7	C, NP-1	36" RCP	42" RCP	Reference 3	
44	5.6%	12	13	ST6	ST6	24" RCP	24" RCP	Reference 4	
45	6.0%	46	54	B	B	30" RCP	36" RCP	Reference 2	
46	6.0%	47	51	A	A	30" RCP	36" RCP	Reference 2	
47A	N/A	N/A	N/A	N/A	For Flexibility	N/A	24" RCP	Reference 3	
47	4.0%	53	56	D	D	30" RCP	36" RCP	Reference 3	
48	1.3%	108	124	CST7	CST7	42" RCP	54" RCP	Reference 3	
49	6.0%	74	73	U	U	30" RCP	36" RCP		
50	2.0%	60	61	I	I	36" RCP	42" RCP		
51	0.9%	43	39	G, H	CGH	24" RCP	Riprap Chnl	Reference 5	
52	N/A	N/A	5	N/A	STA	N/A	24" RCP		

References:
1- Desert Foothills (Far Hills to Redpoint)
2- Carriage Hill (Far Hills to Street A)
3- Ridge Pine Street
4- Street A (Carriage Hill to Desert Foothills)
5- Street A (Carriage Hill to Parcel H)
6- Desert Foothills (Redpoint to Summerlin Parkway)
7- Carriage Hill (Redpoint to Summerlin Parkway)

THE HOWARD HUGHES CORPORATION
10801 WEST CHARLESTON BLVD, 3RD FLOOR
LAS VEGAS, NEVADA 89135

2018 UPDATE TO SUMMERLIN
WEST PLANNING AREA

DRAWN BY:
JYA/GBB
DESIGNED BY:
JYA/GBB
CHECKED BY:
JYA/GBB
PROJECT NO.
7200

NOV 2018
NOV 2018
SCALE: 1"=300'
HORIZ.
VERT.

2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PH: (702) 813-7500 FAX: (702) 362-2897
WWW.VTNV.COM
CONSULTING ENGINEERS & PLANNERS & LAND SURVEYORS

A.6.7
VILLAGE 21 LOCAL FLOOD
CONTROL FACILITIES MAP

SHEET
A.6.7
OF
SHEETS
DRAWING NO.

REV

DATE

BY

REVISION

V21 MDS UP#1 ADD#1

Referenced Hydrology

Update #1 to the FLOOD CONTROL MASTER PLAN UPDATE

SUMMERLIN WEST PLANNING AREA

Las Vegas, Nevada

W.O. # 7809

Prepared for:

Howard Hughes Corp.

Submitted to:

Public Works Department
City of Las Vegas



B.2.4 VILLAGE 21

TRAVEL TIME CALCULATIONS

DEVELOPMENT: Village 21

W.O. # 7809

CALCULATED BY: GB

$$Velocity = CS^{\frac{1}{2}}$$

C1 applies to the first 500 feet of travel distance			
C2 applies to the remaining travel distance			
Existing:		Developed	
C1=14.8	C2=29.4	C1=20.2	C2=30.6

Project Site Basin

					First 500 feet		Remaining Travel Distance	
Basin	Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (ft/ft)	C1	V1 (fps)	C2	V2 (fps)
DEVELOPED CONDITION ONSITE								
A	1614	3295	3236	0.037	20.2	3.9	30.6	5.9
B	1039	3308	3265	0.041	20.2	4.1	30.6	6.2
C	1596	3357	3304	0.033	20.2	3.7	30.6	5.6
D	1240	3347	3292	0.044	20.2	4.3	30.6	6.4
E	1545	3402	3301	0.065	20.2	5.2	30.6	7.8
F	1350	3401	3323	0.058	20.2	4.9	30.6	7.4
G	780	3260	3248	0.015	20.2	2.5	30.6	3.8
H	1078	3237	3221	0.015	20.2	2.5	30.6	3.7
I	1599	3274	3223	0.032	20.2	3.6	30.6	5.5
J	1010	3323	3275	0.048	20.2	4.4	30.6	6.7
K	867	3366	3322	0.051	20.2	4.6	30.6	6.9
L	1027	3422	3366	0.055	20.2	4.7	30.6	7.1
M	1026	3326	3280	0.045	20.2	4.3	30.6	6.5
N	558	3358	3335	0.041	20.2	4.1	30.6	6.2
O	779	3371	3330	0.053	20.2	4.6	30.6	7.0
P	644	3389	3371	0.028	20.2	3.4	30.6	5.1
Q	587	3408	3389	0.021	20.2	2.9	30.6	4.4
R	555	3433	3411	0.040	20.2	4.0	30.6	6.1
S	1240	3436	3376	0.048	20.2	4.4	30.6	6.7
T	1100	3369	3322	0.043	20.2	4.2	30.6	6.3
U	1700	3314	3237	0.045	20.2	4.3	30.6	6.5
V	1020	3395	3315	0.078	20.2	5.7	30.6	8.6
W	1290	3383	3319	0.050	20.2	4.5	30.6	6.8
X	636	3408	3382	0.041	20.2	4.1	30.6	6.2
Y	721	3453	3409	0.061	20.2	5.0	30.6	7.6
Z	785	3470	3410	0.076	20.2	5.6	30.6	8.5
AA	462	3416	3387	0.063	20.2	5.1	30.6	7.7
COS-3	1556	3450	3360	0.058	14.8	3.6	29.4	7.1
COS-2	506	3325	3323	0.004	14.8	0.9	29.4	1.8
COS-1	1604	3357	3268	0.055	14.8	3.5	29.4	6.9
NP-4	896	3443	3385	0.065	20.2	5.1	30.6	7.8
NP-3	750	3402	3389	0.017	20.2	2.7	30.6	4.0
NP-2	389	3375	3360	0.039	20.2	4.0	30.6	6.0
NP-1	218	3310	3301	0.041	20.2	4.1	30.6	6.2
SUMM1	2080	3445	3385	0.029	20.2	3.4	30.6	5.2
SUMM2	1370	3385	3300	0.062	20.2	5.0	30.6	7.6
SUMM3	1070	3452	3396	0.052	20.2	4.6	30.6	7.0
SUMM4	1545	3396	3288	0.070	20.2	5.3	30.6	8.1
DES1	775	3395	3385	0.013	20.2	2.3	30.6	3.5

TRAVEL TIME CALCULATIONS

DEVELOPMENT: Village 21

W.O. # 7809

CALCULATED BY: GB

$$Velocity = CS^{\frac{1}{2}}$$

C1 applies to the first 500 feet of travel distance			
C2 applies to the remaining travel distance			
Existing:		Developed	
C1=14.8	C2=29.4	C1=20.2	C2=30.6

					First 500 feet		Remaining Travel Distance	
Basin	Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (ft/ft)	C1	V1 (fps)	C2	V2 (fps)
DEVELOPED CONDITION ONSITE								
DES2	855	3385	3370	0.018	20.2	2.7	30.6	4.1
DES3	995	3445	3375	0.070	20.2	5.4	30.6	8.1
DES4	900	3370	3360	0.011	20.2	2.1	30.6	3.2
DES5	1620	3360	3340	0.012	20.2	2.2	30.6	3.4
CARR1	1315	3320	3275	0.034	20.2	3.7	30.6	5.7
CARR2	980	3280	3265	0.015	20.2	2.5	30.6	3.8
CARR3	1685	3265	3230	0.021	20.2	2.9	30.6	4.4
ST1	910	3435	3380	0.060	20.2	5.0	30.6	7.5
ST2	1555	3450	3360	0.058	20.2	4.9	30.6	7.4
ST3	985	3375	3315	0.061	20.2	5.0	30.6	7.6
ST6	1615	3355	3270	0.053	20.2	4.6	30.6	7.0
ST7	1230	3306	3290	0.013	20.2	2.3	30.6	3.5
DC-1	3243	3233	3194	0.012	20.2	2.2	30.6	3.4
DC-2	1220	3302	3233	0.057	20.2	4.8	30.6	7.3
NVE	1480	3253	3197	0.038	20.2	3.9	30.6	6.0
STD	466	3335	3326	0.019	20.2	2.8	30.6	4.3
STB	1439	3366	3279	0.060	20.2	5.0	30.6	7.5
STA	454	3263	3237	0.057	20.2	4.8	30.6	7.3
V25-E	1250	3447	3406	0.033	20.2	3.7	30.6	5.5
V25-FOXS	2150	3457	3442	0.007	20.2	1.7	30.6	2.6
V25-FOXN	1230	3502	3452	0.041	20.2	4.1	30.6	6.2
V25-G	720	3482	3438	0.061	20.2	5.0	30.6	7.6
V25-F	1030	3538	3455	0.081	20.2	5.7	30.6	8.7
V25-COS3	390	3453	3422	0.079	20.2	5.7	30.6	8.6
V25-COS4	1205	3538	3451	0.072	20.2	5.4	30.6	8.2
V25-COS2	1036	3507	3496	0.010	20.2	2.1	30.6	3.1
STA1	1455	3537	3456	0.056	20.2	4.8	30.6	7.2
V25-C	1465	3537	3497	0.027	20.2	3.3	30.6	5.1
V25-B	1311	3499	3452	0.036	20.2	3.8	30.6	5.8

Curve Number calculations for basins															
Subbasin	Area	Type	Soil Percentage	1	2	4	5	6	7	8	9	11	12	Soil Weighted CN	CN Value
DEVELOPED CONDITION ONSITE															
V21-COS3 - COS W	5.90	156	100%								100%			88.0	88.0
V21-L - SF3	7.44	152	35%									100%		33.4	95.0
		156	65%									100%		61.6	
V21-P - VC/SFA	3.02	152	100%				95%					5%		92.1	92.1
V21-Q - VC/SFA	3.18	152	100%				95%					5%		92.2	92.2
V21-R - VC/SFA	3.05	152	100%				95%					5%		92.2	92.2
V21-S - VC/MF3	6.33	152	99%			40%						60%		93.7	94.2
		156	1%			40%						60%		0.5	
V25-COS3 - COS W	2.32	152	9%								100%			8.1	88.1
		156	91%								100%			80.0	
V25-COS4 - COS W	4.71	156	100%								100%			88.0	88.0
V25-F - SF3	10.40	152	79%									100%		75.3	95.0
		156	21%									100%		19.7	
V25-G - MF3 (R)	11.44	152	84%			100%								77.7	93.0
		156	16%			100%								15.3	
V21-B - SF3	0.16	156	100%									100%		95.0	95.0
V21-COS1 - COS	7.79	156	100%								100%			88.0	88.0
V21-COS2 - COS	0.58	152	35%								100%			30.7	88.3
		156	65%								100%			57.6	
V21J - SFA	11.75	152	28%				100%							25.4	92.0
		156	72%				100%							66.6	
V21-K - SFA	8.20	152	26%				100%							24.0	92.0
		156	74%				100%							68.0	
V21-M - SFA	8.94	152	99%				100%							90.8	92.0
		156	1%				100%							1.2	
V21-N - VC/SFA	2.50	152	100%				95%					5%		92.2	92.2
V21-NP2 - COS	0.94	152	100%								100%			89.0	89.0
V21-O - VC/SFA	3.45	152	100%				95%					5%		92.1	92.1
V21-T - EC/MF3	5.93	152	26%			40%						60%		24.7	94.2
		156	74%			40%						60%		69.5	

Curve Number calculations for basins															
Subbasin	Area	Type	Soil Percentage	1	2	4	5	6	7	8	9	11	12	Soil Weighted CN	CN Value
DEVELOPED CONDITION ONSITE															
V21-DC1 - DC	8.07	152	36%										100%	33.1	93.0
		156	64%										100%	59.9	
V21-DC2 - DC	1.19	152	21%										100%	19.7	93.0
		156	79%										100%	73.3	
V21-G - EC	4.93	152	32%									100%		30.8	95.0
		156	68%									100%		64.2	
V21-H - EC	5.86	152	74%									100%		70.3	95.0
		156	26%									100%		24.7	
V21-I - SFA	18.62	152	0%				100%							0.4	92.0
		156	100%				100%							91.6	
V21-NVE - DC	21.78	152	6%										100%	5.5	93.0
		156	94%										100%	87.5	
V21-U - EC/MF3	20.09	152	56%			40%						60%		52.7	94.2
		156	44%			40%						60%		41.5	
V21-E - SF3	19.83	156	100%									100%		95.0	95.0
V21-F - SF3	16.64	156	100%									100%		95.0	95.0
V25-A - SF3	21.16	156	100%									100%		95.0	95.0
V25-B - SF1	19.86	156	100%									100%		95.0	95.0
V25-C - SF1	26.55	156	74%									100%		70.6	95.0
		731	26%									100%		24.4	
V25-COS1 - COS	3.46	156	100%								100%			88.0	88.0
V25-COS2 - COS	1.79	156	100%								100%			88.0	88.0
V25-D - SF3	27.17	156	100%									100%		95.0	95.0
V25-E - SF2	17.13	156	100%									100%		95.0	95.0
V25-LVVWD - COS	13.89	156	100%								100%			88.0	88.0
V25-NV - COS	2.41	156	100%								100%			88.0	88.0

Curve Number calculations for basins															
Subbasin	Area	Type	Soil Percentage	1	2	4	5	6	7	8	9	11	12	Soil Weighted CN	CN Value
DEVELOPED CONDITION ONSITE															
V21-A - SF3	13.75	156	97%									100%		92.1	94.9
		502	3%									100%		2.8	
V21-B - SF3	13.65	156	100%									100%		95.0	95.0
V21-C - SF3	15.15	156	100%									100%		95.0	95.0
V21-D - SF3	14.75	156	100%									100%		95.0	95.0
V21-FIRE - DC	1.90	156	100%										100%	93.0	93.0
V21-NP1 - COS	1.27	156	100%								100%			88.0	88.0

STANDARD FORM 4					V1 applies to the first 500 feet of travel distance V2 applies to the remaining travel distance		$T_i = \frac{1.8(1-k)L^{1/2}}{S^{1/3}}$ $T_t = \frac{L}{60V}$ $k = 0.0132C_n - 0.39$ $T_c = T_i + T_t$										
DEVELOPMENT: Village 21					Existing:		Developed										
W.O. # 7809		CALCULATED BY: GB		$V1 = 148 * S^{1/2}$ $V2 = 294 * S^{1/2}$		$V1 = 202 * S^{1/2}$ $V2 = 306 * S^{1/2}$											
SUB-BASIN DATA					INITIAL/OVERLAND TIME (Ti)		TRAVEL TIME (Tt)					Tc CHECK (URBANIZED BASINS)		FINAL Tc	LAG TIME	REMARKS	
DESIG.	Cn	K	AREA Ac.	AREA Mi^2	LENGTH Ft	SLOPE %	Ti Min.	LENGTH Ft	SLOPE %	V1 fps	V2 fps	Tt Min.	TOTAL LENGTH (11)	Tc Min. (12)	Min.	TLag Hr.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9a)	(9b)	(10)	(11)	(12)					
DEVELOPED CONDITION ONSITE																	
A	94.9	0.863	14.15	0.0221	100	1.0	4.27	1614	3.7	3.9	5.9	5.33	1714	19.52	9.60	0.096	
B	95.0	0.864	13.90	0.0217	100	1.0	4.25	1039	4.1	4.1	6.2	3.47	1139	16.33	7.72	0.077	
C	95.0	0.864	14.83	0.0232	100	1.0	4.25	1596	3.3	3.7	5.6	5.54	1696	19.42	9.79	0.098	
D	95.0	0.864	14.73	0.0230	100	1.0	4.25	1240	4.4	4.3	6.4	3.87	1340	17.44	8.12	0.081	
E	95.0	0.864	20.15	0.0315	100	1.0	4.25	1545	6.5	5.2	7.8	3.84	1645	19.14	8.09	0.081	
F	95.0	0.864	16.58	0.0259	100	1.0	4.25	1350	5.8	4.9	7.4	3.64	1450	18.06	7.89	0.079	
G	95.0	0.864	5.01	0.0078	100	1.0	4.25	780	1.5	2.5	3.8	4.56	880	14.89	8.80	0.088	
H	95.0	0.864	5.79	0.0091	100	1.0	4.25	1078	1.5	2.5	3.7	5.97	1178	16.54	10.22	0.102	
I	92.0	0.824	18.69	0.0292	100	1.0	4.96	1599	3.2	3.6	5.5	5.66	1699	19.44	10.62	0.106	
J	92.0	0.824	11.83	0.0185	100	1.0	4.96	1010	4.8	4.4	6.7	3.17	1110	16.17	8.13	0.081	
K	92.0	0.824	8.20	0.0128	100	1.0	4.96	867	5.1	4.6	6.9	2.72	967	15.37	7.68	0.077	
L	95.0	0.864	7.44	0.0116	100	1.0	4.25	1027	5.5	4.7	7.1	3.00	1127	16.26	7.24	0.072	
M	92.0	0.824	9.11	0.0142	100	1.0	4.96	1027	5.5	4.7	7.1	3.00	1127	16.26	7.96	0.080	
N	92.2	0.827	2.54	0.0040	100	1.0	4.91	558	4.1	4.1	6.2	2.19	658	13.66	7.10	0.071	
O	92.1	0.826	3.47	0.0054	100	1.0	4.93	779	5.3	4.6	7.0	2.46	879	14.88	7.39	0.074	
P	92.1	0.826	3.00	0.0047	100	1.0	4.93	644	2.8	3.4	5.1	2.94	744	14.13	7.86	0.079	
Q	92.2	0.826	3.16	0.0049	100	1.0	4.93	587	2.1	2.9	4.4	3.17	687	13.82	8.10	0.081	
R	92.2	0.826	3.07	0.0048	100	1.0	4.93	555	4.0	4.0	6.1	2.22	655	13.64	7.15	0.071	
S	94.2	0.853	6.33	0.0099	100	1.0	4.44	1240	4.8	4.4	6.7	3.71	1340	17.44	8.15	0.081	
T	94.2	0.853	5.98	0.0093	100	1.0	4.44	1100	4.3	4.2	6.3	3.58	1200	16.67	8.01	0.080	
U	94.2	0.853	20.17	0.0315	100	1.0	4.44	1700	4.5	4.3	6.5	5.01	1800	20.00	9.45	0.094	
V	94.2	0.853	7.25	0.0113	100	1.0	4.44	1020	7.8	5.7	8.6	2.48	1120	16.22	6.92	0.069	
W	94.2	0.853	8.31	0.0130	100	1.0	4.44	1290	5.0	4.5	6.8	3.78	1390	17.72	8.22	0.082	
X	94.2	0.853	3.94	0.0061	100	1.0	4.44	636	4.1	4.1	6.2	2.41	736	14.09	6.84	0.068	
Y	94.2	0.853	3.98	0.0062	100	1.0	4.44	721	6.1	5.0	7.6	2.16	821	14.56	6.60	0.066	
Z	94.2	0.853	4.50	0.0070	100	1.0	4.44	785	7.6	5.6	8.5	2.05	885	14.92	6.49	0.065	
AA	94.2	0.853	4.02	0.0063	100	1.0	4.44	462	6.3	5.1	7.7	1.52	562	13.12	5.96	0.060	
COS-3	88.0	0.772	5.90	0.0092	100	1.0	5.91	1556	5.8	3.6	7.1	4.83	1656	19.20	10.74	0.107	
COS-2	88.3	0.776	0.58	0.0009	50	1.0	4.13	506	0.4	0.9	1.8	9.01	556	13.09	13.09	0.131	
COS-1	88.0	0.772	7.80	0.0122	100	1.0	5.91	1604	5.5	3.5	6.9	5.05	1704	19.47	10.96	0.110	
NP-4	88.0	0.772	1.05	0.0016	100	1.0	5.91	896	6.5	5.1	7.8	2.47	996	15.53	8.38	0.084	
NP-3	88.0	0.772	1.14	0.0018	100	1.0	5.91	750	1.7	2.7	4.0	4.17	850	14.72	10.08	0.101	
NP-2	89.0	0.785	0.93	0.0015	100	1.0	5.67	389	3.9	4.0	6.0	1.63	489	12.72	7.31	0.073	
NP-1	88.0	0.772	1.27	0.0020	100	1.0	5.91	218	4.1	4.1	6.2	0.89	318	11.77	6.80	0.068	
SUMM1	98.0	0.904	5.05	0.0079	40	2.0	1.77	2080	2.9	3.4	5.2	7.50	2120	21.78	9.27	0.093	
SUMM2	98.0	0.904	3.63	0.0057	40	2.0	1.77	1370	6.2	5.0	7.6	3.56	1410	17.83	5.33	0.053	
SUMM3	98.0	0.904	2.85	0.0045	40	2.0	1.77	1070	5.2	4.6	7.0	3.16	1110	16.17	4.93	0.049	

STANDARD FORM 4									V1 applies to the first 500 feet of travel distance V2 applies to the remaining travel distance				$T_i = \frac{1.8(1.1 - k)L^{1/2}}{S^{1/3}}$ $T_t = \frac{L}{60V}$ $k = 0.0132C_n - 0.39$ $T_c = T_i + T_t$				
DEVELOPMENT: Village 21									Existing:		Developed						
W.O. # 7809		CALCULATED BY: GB							$V1 = 148 * S^{1/2}$ $V2 = 294 * S^{1/2}$		$V1 = 202 * S^{1/2}$ $V2 = 306 * S^{1/2}$						
SUB-BASIN DATA					INITIAL/OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc CHECK (URBANIZED BASINS)		FINAL Tc	LAG TIME	REMARKS
DESIG. (1)	Cn	K (2)	AREA Ac. (3)	AREA Mi^2	LENGTH Ft (4)	SLOPE % (5)	Ti Min. (6)	LENGTH Ft (7)	SLOPE % (8)	V1 fps (9a)	V2 fps (9b)	Tt Min. (10)	TOTAL LENGTH (11)	Tc Min. (12)	Min.	TLAG Hr.	
DEVELOPED CONDITION ONSITE																	
SUMM4	98.0	0.904	4.87	0.0076	40	2.0	1.77	1545	7.0	5.3	8.1	3.71	1585	18.81	5.49	0.055	
DES1	98.0	0.904	1.80	0.0028	35	2.0	1.66	775	1.3	2.3	3.5	4.95	810	14.50	6.61	0.066	
DES2	98.0	0.904	2.39	0.0037	35	2.0	1.66	855	1.8	2.7	4.1	4.57	890	14.94	6.23	0.062	
DES3	98.0	0.904	3.73	0.0058	35	2.0	1.66	995	7.0	5.4	8.1	2.57	1030	15.72	4.23	0.042	T _{LAG} =0.050
DES4	98.0	0.904	2.79	0.0044	35	2.0	1.66	900	1.1	2.1	3.2	5.98	935	15.19	7.64	0.076	
DES5	98.0	0.904	5.83	0.0091	32	2.0	1.59	1620	1.2	2.2	3.4	9.20	1652	19.18	10.79	0.108	
CARR1	98.0	0.904	3.52	0.0055	24	2.0	1.37	1315	3.4	3.7	5.7	4.63	1339	17.44	6.00	0.060	
CARR2	98.0	0.904	2.45	0.0038	24	2.0	1.37	980	1.5	2.5	3.8	5.45	1004	15.58	6.82	0.068	
CARR3	98.0	0.904	4.87	0.0076	30	2.0	1.54	1685	2.1	2.9	4.4	7.34	1715	19.53	8.88	0.089	
ST1	98.0	0.904	1.50	0.0023	20	2.0	1.25	910	6.0	5.0	7.5	2.59	930	15.17	3.84	0.038	T _{LAG} =0.050
ST2	98.0	0.904	2.88	0.0045	41	2.0	1.80	1555	5.8	4.9	7.4	4.10	1596	18.87	5.90	0.059	
ST3	98.0	0.904	1.70	0.0027	20	2.0	1.25	985	6.1	5.0	7.6	2.74	1005	15.58	4.00	0.040	T _{LAG} =0.050
ST6	98.0	0.904	3.08	0.0048	24	2.0	1.37	1615	5.3	4.6	7.0	4.45	1639	19.11	5.82	0.058	
ST7	98.0	0.904	2.30	0.0036	40	2.0	1.77	1230	1.3	2.3	3.5	7.10	1270	17.06	8.88	0.089	
DC-1	93.0	0.838	8.19	0.0128	50	1.0	3.34	3243	1.2	2.2	3.4	17.39	3293	28.29	20.73	0.207	
DC-2	93.0	0.838	1.19	0.0019	25	1.0	2.36	1220	5.7	4.8	7.3	3.38	1245	16.92	5.75	0.057	
NVE	93.0	0.838	21.74	0.0340	100	1.0	4.72	1480	3.8	3.9	6.0	4.86	1580	18.78	9.59	0.096	
STD	98.0	0.904	0.88	0.0014	20	2.0	1.25	466	1.9	2.8	4.3	2.77	486	12.70	4.02	0.040	T _{LAG} =0.050
STB	98.0	0.904	2.65	0.0041	20	2.0	1.25	1439	6.0	5.0	7.5	3.76	1459	18.11	5.01	0.050	
STA	98.0	0.904	1.01	0.0016	30	2.0	1.54	454	5.7	4.8	7.3	1.57	484	12.69	3.10	0.031	T _{LAG} =0.050
V25-E	95.0	0.864	17.13	0.0268	100	1.0	4.25	1250	3.3	3.7	5.5	4.53	1350	17.50	8.78	0.088	
V25-FOXs	98.0	0.904	3.19	0.0050	60	2.0	2.17	2150	0.7	1.7	2.6	15.70	2210	22.28	17.87	0.179	
V25-FOXN	98.0	0.904	3.23	0.0050	60	2.0	2.17	1230	4.1	4.1	6.2	4.02	1290	17.17	6.19	0.062	
V25-G	93.0	0.838	11.44	0.0179	100	1.0	4.72	720	6.1	5.0	7.6	2.15	820	14.56	6.88	0.069	
V25-F	95.0	0.864	10.45	0.0163	100	1.0	4.25	1030	8.1	5.7	8.7	2.47	1130	16.28	6.72	0.067	
V25-COS3	88.1	0.773	2.37	0.0037	100	1.0	5.89	390	7.9	5.7	8.6	1.14	490	12.72	7.03	0.070	
V25-COS4	88.0	0.772	4.64	0.0073	100	1.0	5.91	1205	7.2	5.4	8.2	2.96	1305	17.25	8.88	0.089	
V25-COS2	88.0	0.772	1.79	0.0028	100	1.0	5.91	1036	1.0	2.1	3.1	6.94	1136	16.31	12.85	0.128	
STA1	98.0	0.904	2.98	0.0046	18	2.0	1.19	1455	5.6	4.8	7.2	3.95	1473	18.18	5.14	0.051	
V25-C	95.0	0.864	26.54	0.0415	100	1.0	4.25	1465	2.7	3.3	5.1	5.68	1565	18.69	9.93	0.099	
V25-B	95.0	0.864	19.93	0.0311	100	1.0	4.25	1311	3.6	3.8	5.8	4.51	1411	17.84	8.76	0.088	
															Tc Min (DEV)= 5 min		
															Tc Min (UNDEV)= 10 min		

B.3.7 VILLAGE 21 – V21-SDN3.OUT

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*   JUN 1998
*   VERSION 4.1
*
* RUN DATE 27DEC18 TIME 16:51:33
*
*****

V21-SDN3.OUT

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

```

```

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

```

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

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

1 HEC-1 INPUT PAGE 1

```

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

*** FREE ***

*DIAGRAM
1 ID INPUT FILE DATE = SEPTEMBER 12,2017
2 ID DESIGN STORM = 100-YEAR 6-HR STORM
3 ID STORM DISTRIBUTION = SDN #3
4 ID MODELED BY VTN (JYA)
5 ID
6 ID *****
7 ID * VILLAGE 21 (PREVIOUSLY AREA 1) HEC-1 MODE *
8 ID * REFER TO LAND USE EXHIBIT BY VTN FOR LOCATION OF AREAS 1 *
9 ID * *
10 ID *****
11 ID
12 ID
13 ID
14 ID 100-YEAR, 6-HOUR STORM, SDN3
15 ID
16 IT 5 0 0 100
17 IO 5 0 0
18 IN 5 0 0
19 JR PREC 1.00
*

20 KK SUMM3
21 BA 0.0045
22 PB 3.40
23 PC 0 0.02 0.057 0.07 0.087 0.108 0.124 0.13 0.13 0.130
24 PC 0.13 0.13 0.13 0.133 0.14 0.142 0.148 0.158 0.172 0.181
25 PC 0.19 0.197 0.199 0.2 0.201 0.204 0.214 0.229 0.241 0.249
26 PC 0.251 0.256 0.27 0.278 0.281 0.283 0.295 0.322 0.352 0.409
27 PC 0.499 0.59 0.71 0.744 0.781 0.812 0.819 0.835 0.851 0.856
28 PC 0.86 0.868 0.876 0.888 0.91 0.926 0.937 0.95 0.97 0.976
29 PC 0.982 0.985 0.987 0.989 0.99 0.993 0.993 0.994 0.995 0.998
30 PC 0.998 0.999 1
31 LS 0 98
32 UD 0.050
*

33 KK Z
34 BA 0.0070
35 PB 3.41
36 LS 0 94.2
37 UD 0.065
*

38 KK AA
39 BA 0.0063
40 PB 3.40
41 LS 0 94.2
42 UD 0.060
*

```

LINE	ID	1	2	3	4	5	6	7	8	9	10
43	KK	CAA									
44	KM	COMBINES	SUMM3, Z, AND AA								
45	HC	3									
	*										
46	KK	NP-4									
47	BA	0.0016									
48	PB	3.40									
49	LS	0	88.0								
50	UD	0.084									
	*										
51	KK	NP-3									
52	BA	0.0018									
53	PB	3.38									
54	LS	0	88.0								
55	UD	0.101									
	*										
56	KK	CNP-3									
57	KM	COMBINES	NP-3 AND NP-4								
58	HC	2									
	*										
59	KK	SUMM1									
60	PB	3.40									
61	BA	0.0079									
62	LS	0	98								
63	UD	0.093									
	*										
64	KK	Y									
65	PB	3.40									
66	BA	0.0062									
67	LS	0	94.2								
68	UD	0.066									
	*										
69	KK	X									
70	PB	3.40									
71	BA	0.0061									
72	LS	0	94.2								
73	UD	0.068									
	*										
74	KK	DES1									
75	BA	0.0028									
76	PB	3.38									
77	LS	0	98								
78	UD	0.066									
	*										

LINE	ID	1	2	3	4	5	6	7	8	9	10
79	KK	CSUMM1									
80	KM	RFCD FACILITY IN DESERT FOOTHILLS DRIVE									
81	HC	6									
	*										
82	KK	S									
83	BA	0.0099									
84	PB	3.40									
85	LS	0	94.2								
86	UD	0.081									
	*										
87	KK	V25-G									
88	KM	OLD PARCEL NAME IS W48									
89	BA	0.0179									
90	PB	3.41									
91	LS	0	93.0								
92	UD	0.069									
	*										
93	KK	R									
94	BA	0.0048									
95	PB	3.40									
96	LS	0	92.2								
97	UD	0.071									
	*										
98	KK	CR									

99 KM COMBINE Q AND R
100 HC 2
*

101 KK Q
102 BA 0.0049
103 PB 3.40
104 LS 0 92.2
105 UD 0.075
*

106 KK CQ
107 KM COMBINE Q AND CR
108 HC 2
*

109 KK RCQ
110 KM ROUTE CQR TO CST1
111 RD 330 0.055 0.013 0 CIRC 3
*

1

HEC-1 INPUT

PAGE 4

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

112 KK ST1
113 BA 0.0023
114 PB 3.40
115 LS 0 98
116 UD 0.050
*

117 KK CST1
118 KM COMBINES CQ AND ST1
119 HC 2
*

120 KK DUMMY2
121 KM RFCD FACILITY IN DESERT FOOTHILLS DR
122 HC 2
*

123 KK P
124 BA 0.0047
125 PB 3.40
126 LS 0 92.1
127 UD 0.079
*

128 KK DES2
129 PB 3.40
130 BA 0.0037
131 LS 0 98
132 UD 0.062
*

133 KK CDES2
134 KM RFCD FACILITY IN DESERT FOOTHILLS DR
135 HC 3
*

136 KK DES3
137 BA 0.0058
138 PB 3.40
139 LS 0 98
140 UD 0.050
*

141 KK L
142 BA 0.0116
143 PB 3.40
144 LS 0 95.0
145 UD 0.072
*

1

HEC-1 INPUT

PAGE 5

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

146 KK COS-3
147 BA 0.0092
148 PB 3.39
149 LS 0 88.0
150 UD 0.107
*

151 KK DES4
152 BA 0.0044
153 PB 3.40

154	LS	0	98.0
155	UD	0.076	
	*		
156	KK	CDES4	
157	KM	RFCD FACILITY IN DESERT FOOTHILLS DR	
158	HC	5	
	*		
159	KK	V25-F	
160	BA	0.0163	
161	PB	3.44	
162	LS	0	95.0
163	UD	0.067	
	*		
164	KKV25-COS4		
165	BA	0.0073	
166	PB	3.43	
167	LS	0	88.0
168	UD	0.089	
	*		
169	KKV25-FOXN		
170	BA	0.0050	
171	PB	3.41	
172	LS	0	98.0
173	UD	0.062	
	*		
174	KK	CFOXN	
175	KM	COMBINE V25-F, V25-COS4, V25-FOXN	
176	HC	3	
	*		
177	KK	V25-B	
178	KM	OLD BASIN NAME GP20	
179	BA	0.0311	
180	PB	3.42	
181	LS	0	91.0
182	UD	0.097	
	*		

1

HEC-1 INPUT

PAGE 6

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

183	KKV25-FOXS		
184	BA	0.0050	
185	PB	3.40	
186	LS	0	98.0
187	UD	0.179	
	*		
188	KK	CFOX5	
189	KM	COMBINE V25-B, AND V25-FOXS	
190	HC	2	
	*		
191	KK	V25-C	
192	BA	0.0415	
193	PB	3.45	
194	LS	0	90.7
195	UD	0.109	
	*		
196	KK	RV25-C	
197	KM	ROUTE V25-C TO CSTA1	
198	RD	2047 0.013 0.023 0 CIRC 3.5	
	*		
199	KKV25-COS2		
200	BA	0.0028	
201	PB	3.43	
202	LS	0	88.0
203	UD	0.128	
	*		
204	KKRV25-COS2		
205	KM	ROUTE V25-COS2	
206	RD	1947 0.013 0.023 0 CIRC 3.5	
	*		
207	KK	STA1	
208	KM	OLD PARCEL NAME IS SAME	
209	BA	0.0046	
210	PB	3.43	
211	LS	0	98.0
212	UD	0.051	

*

213 KK CSTA1
 214 KM COMBINE V25-FOX5, V25-C, CFOXS, V25-COS2, STA1, AND CFOXS
 215 HC 5
 *

1

HEC-1 INPUT

PAGE 7

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

216 KK RCSTA1
 217 KM ROUTE STA1 TO CST2
 218 RD 1530 0.013 0.060 0 CIRC 3.5
 *

219 KK V25-E
 220 KM OLD PARCEL NAME IS W63
 221 BA 0.0268
 222 PB 3.40
 223 LS 0 95.0
 224 UD 0.088
 *

225 KK RV25-E
 226 KM ROUTE V25-E TO CST2
 227 RD 702 0.013 0.060 0 CIRC 3.5
 *

228 KKV25-COS3
 229 KM OLD PARCEL NAME IS GPPW3
 230 BA 0.0037
 231 PB 3.41
 232 LS 0 88.1
 233 UD 0.070
 *

234 KK ST2
 235 BA 0.0045
 236 PB 3.39
 237 LS 0 98
 238 UD 0.059

239 KK CST2
 240 KM RFCD FACILITY IN DESERT FOOTHILLS DR
 241 HC 4
 *

242 KK DUMMYS
 243 KM RFCD FACILITY IN DESERT FOOTHILLS DR
 244 HC 2
 *

245 KK F
 246 BA 0.0259
 247 PB 3.39
 248 LS 0 95.0
 249 UD 0.079
 *

1

HEC-1 INPUT

PAGE 8

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

250 KK E
 251 BA 0.0315
 252 PB 3.38
 253 LS 0 95.0
 254 UD 0.081
 *

255 KK DES5
 256 BA 0.0091
 257 PB 3.38
 258 LS 0 98.0
 259 UD 0.108
 *

260 KK CDES5
 261 KM RFCD FACILITY IN DESERT FOOTHILLS DR
 262 HC 4
 *

263 KK C
 264 BA 0.0232
 265 PB 3.36
 266 LS 0 95.0
 267 UD 0.098
 *

V21-SDN3.OUT

268 KK NP-1
269 BA 0.0020
270 PB 3.36
271 LS 0 88.0
272 UD 0.068
*

273 KK ST7
274 BA 0.0036
275 PB 3.36
276 LS 0 98
277 UD 0.089
*

278 KK D
279 BA 0.0230
280 PB 3.36
281 LS 0 95.0
282 UD 0.081
*

283 KK CST7
284 KM COMBINES IN RIDGE PINE ST
285 HC 4
*

1

HEC-1 INPUT

PAGE 9

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

286 KK DUMMY7
287 KM RFCD FACILITY IN FAR HILLS
288 HC 2
*

289 KK W
290 BA 0.0130
291 PB 3.38
292 LS 0 94.2
293 UD 0.082
*

294 KK SUMM2
295 BA 0.0057
296 PB 3.38
297 LS 0 98
298 UD 0.053
*

299 KK T
300 PB 3.38
301 BA 0.0093
302 LS 0 94.2
303 UD 0.080
*

304 KK NP-2
305 BA 0.0015
306 PB 3.38
307 LS 0 89.0
308 UD 0.073
*

309 KK ST3
310 BA 0.0027
311 PB 3.38
312 LS 0 98.0
313 UD 0.050
*

314 KK CST3
315 KM COMBINE NP-2 AND ST3
316 HC 2
*

317 KK DUMMY8
318 KM COMBINE CT AND CST3
319 HC 4
*

1

HEC-1 INPUT

PAGE 10

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

320 KK CARR1
321 BA 0.0055
322 PB 3.36
323 LS 0 98.0

324 UD 0.060
*
325 KK M
326 BA 0.0142
327 PB 3.36
328 LS 0 92.0
329 UD 0.083
*
330 KK CCARR1
331 KM RFCD FACILITY IN CARRIAGE HILL DR
332 HC 3
*

333 KK N
334 BA 0.0040
335 PB 3.38
336 LS 0 92.2
337 UD 0.071
*

338 KK O
339 BA 0.0054
340 PB 3.38
341 LS 0 92.1
342 UD 0.074
*

343 KK STD
344 BA 0.0014
345 PB 3.38
346 LS 0 98
347 UD 0.050
*

348 KK CSTD
349 KM COMBINE N, O, AND STD
350 HC 3
*

351 KK K
352 BA 0.0128
353 PB 3.37
354 LS 0 92.0
355 UD 0.077
*

Project Site Basin

1

HEC-1 INPUT

PAGE 11

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

356 KK STB
357 BA 0.0041
358 PB 3.38
359 LS 0 98
360 UD 0.050
*

361 KK CSTB
362 HC 3
*

363 KK DUMMY10
364 KM RFCD FACILITY IN CARRIAGE HILL DR
365 HC 2
*

366 KK J
367 BA 0.0185
368 PB 3.35
369 LS 0 92.0
370 UD 0.081
*

371 KK DUMMY11
372 KM RFCD FACILITY IN CARRIAGE HILL DR
373 HC 2
*

374 KK COS-2
375 BA 0.0009
376 PB 3.37
377 LS 0 88.3
378 UD 0.131
*

379 KK COS-1
380 BA 0.0122

381 PB 3.37
 382 LS 0 88.0
 383 UD 0.110
 *

384 KK CCOS-1
 385 HC 2
 *

386 KK CARR2
 387 BA 0.0038
 388 PB 3.35
 389 LS 0 98.0
 390 UD 0.068
 *

1

HEC-1 INPUT

PAGE 12

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

391 KK ST6
 392 BA 0.0048
 393 PB 3.37
 394 LS 0 98
 395 UD 0.058
 *

396 KK CCARR2
 397 KM RFCD FACILITY IN CARRIAGE HILL DR
 398 HC 4
 *

399 KK B
 400 BA 0.0217
 401 PB 3.34
 402 LS 0 95.0
 403 UD 0.077
 *

404 KK A
 405 BA 0.0221
 406 PB 3.33
 407 LS 0 94.9
 408 UD 0.096
 *

409 KK CARR3
 410 BA 0.0076
 411 PB 3.34
 412 LS 0 98
 413 UD 0.089
 *

414 KK CCARR3
 415 KM RFCD FACILITY IN CARRIAGE HILL DR
 416 HC 4
 *

417 KK DUMMY13
 418 KM RFCD FACILITY IN FAR HILLS
 419 HC 3
 *

420 KK V
 421 BA 0.0113
 422 PB 3.38
 423 LS 0 94.2
 424 UD 0.069
 *

1

HEC-1 INPUT

PAGE 13

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

425 KK SUMM4
 426 BA 0.0076
 427 PB 3.38
 428 LS 0 98
 429 UD 0.055
 *

430 KK CSUMM4
 431 KM COMBINES IN EX BELTWAY CHANNEL
 432 HC 2
 *

433 KK DC-2
 434 BA 0.0019
 435 PB 3.36

436	LS	0	93.0
437	UD	0.057	
	*		
438	KK	U	
439	BA	0.0315	
440	PB	3.36	
441	LS	0	94.2
442	UD	0.094	
	*		
443	KK	I	
444	BA	0.0292	
445	PB	3.35	
446	LS	0	92.0
447	UD	0.106	
	*		
448	KK	STA	
449	BA	0.0016	
450	PB	3.35	
451	LS	0	98.0
452	UD	0.050	
	*		
453	KK	G	
454	BA	0.0078	
455	PB	3.35	
456	LS	0	95.0
457	UD	0.088	
	*		
458	KK	H	
459	BA	0.0091	
460	PB	3.33	
461	LS	0	95.0
462	UD	0.102	
	*		

1

HEC-1 INPUT

PAGE 14

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

463	KK	CGH	
464	KM	COMBINES G AND H	
465	HC	2	
	*		
466	KK	DC-1	
467	BA	0.0128	
468	PB	3.33	
469	LS	0	93.0
470	UD	0.207	
	*		
471	KK	NVE	
472	BA	0.0340	
473	PB	3.32	
474	LS	0	93.0
475	UD	0.096	
	*		
476	KK	CDC1	
477	KM	COMBINES IN EX BELTWAY CHANNEL	
478	HC	8	
	*		
479	KK	CFAR	
480	KM	EX FAR HILLS AVE SD	
481	HC	2	
	*		
482	ZZ		

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
LINE	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
NO.		
20	SUMM3	
	.	
	.	
33	.	Z
	.	
	.	
38	.	AA
	.	
	.	
43	CAA.....	

46	.	NP-4				
51	.		NP-3			
56	.	CNP-3.....				
59	.		SUMM1			
64	.			Y		
69	.				X	
74	.					DES1
79	CSUMM1.....					
82	.	S				
87	.		V25-G			
93	.			R		
98	.		CR.....			
101	.			Q		
106	.		CQ.....			
109	.		V			
	.		V			
	.		RCQ			
112	.			ST1		
117	.		CST1.....			
120	DUMMY2.....					
123	.		P			
128	.			DES2		
133	CDES2.....					
136	.		DES3			
141	.			L		
146	.				COS-3	
151	.					DES4
156	CDES4.....					
159	.		V25-F			
164	.			V25-COS4		
169	.				V25-FOXN	

174	.	.	CFOXN.....	V21-SDN3.OUT
177	.	.	.	
183	.	.	V25-B	
188	.	.	V25-FOX	
191	.	.	CFOX.....	
196	.	.	.	
199	.	.	V25-C	
204	.	.	V	
207	.	.	V	
213	.	.	RV25-C	
216	.	.	.	
219	.	.	V25-COS2	
225	.	.	V	
228	.	.	V	
234	.	.	RV25-COS	
239	.	.	.	
242	.	.	.	STA1
245	.	.	CSTA1.....	
250	.	.	V	
255	.	.	V	
260	.	.	RCSTA1	
263	.	.	.	
268	.	.	V25-E	
273	.	.	V	
278	.	.	V	
283	.	.	RV25-E	
286	.	.	.	
289	.	.	V25-COS3	
294	.	.	.	
299	.	.	.	ST2
	.	.	CST2.....	
	.	.	.	
	.	.	DUMMYS.....	
	.	.	.	
	.	.	F	
	.	.	.	
	.	.	E	
	.	.	.	
	.	.	DESS	
	.	.	.	
	.	.	CDESS.....	
	.	.	.	
	.	.	C	
	.	.	.	
	.	.	NP-1	
	.	.	.	
	.	.	ST7	
	.	.	.	
	.	.	.	D
	.	.	.	
	.	.	CST7.....	
	.	.	.	
	.	.	DUMMY7.....	
	.	.	.	
	.	.	W	
	.	.	.	
	.	.	SUMM2	
	.	.	.	
	.	.	.	T
	.	.	.	

					V21-SDN3.OUT
304	.	.	.	.	NP-2
309	.	.	.	.	ST3
314	.	.	.	.	CST3.....
317	.	.	DUMMY8.....	.	
320	.	.	CARR1	.	
325	.	.	.	M	
330	.	.	CCARR1.....	.	
333	.	.	N	.	
338	.	.	.	O	
343	.	.	.	STD	
348	.	.	CSTD.....	.	
351	.	.	.	K	
356	.	.	.	STB	
361	.	.	CSTB.....	.	
363	.	.	DUMMY10.....	.	
366	.	.	J	.	
371	.	.	DUMMY11.....	.	
374	.	.	COS-2	.	
379	.	.	.	COS-1	
384	.	.	CCOS-1.....	.	
386	.	.	.	CARR2	
391	.	.	.	ST6	
396	.	.	CCARR2.....	.	
399	.	.	B	.	
404	.	.	.	A	
409	.	.	.	CARR3	
414	.	.	CCARR3.....	.	
417	DUMMY13.....	.	.	.	
420	.	V	.	.	
425	.	.	SUMM4	.	

430 CSUMM4.....

433 DC-2

438 U

443 I

448 STA

453 G

458 H

463 CGH.....

466 DC-1

471 NVE

476 CDC1.....

479 CFAR.....

```

1*****
*
*   FLOOD HYDROGRAPH PACKAGE   (HEC-1)   *
*           JUN   1998           *
*           VERSION 4.1           *
*
*   RUN DATE   27DEC18   TIME   16:51:33   *
*
*****

```

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

```
*****
* VILLAGE 21 (PREVIOUSLY AREA 1) HEC-1 MODE *
* REFER TO LAND USE EXHIBIT BY VTN FOR LOCATION OF AREAS 1 *
* *
*****
```

Page 13

FLOW
STORAGE VOLUME
SURFACE AREA
TEMPERATURE

CUBIC FEET PER SECOND
ACRE-FEET
ACRES
DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
1.00

1

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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00
HYDROGRAPH AT +	SUMM3	.00	1 FLOW TIME	13. 3.50
HYDROGRAPH AT +	Z	.01	1 FLOW TIME	18. 3.50
HYDROGRAPH AT +	AA	.01	1 FLOW TIME	17. 3.50
3 COMBINED AT +	CAA	.02	1 FLOW TIME	48. 3.50
HYDROGRAPH AT +	NP-4	.00	1 FLOW TIME	3. 3.50
HYDROGRAPH AT +	NP-3	.00	1 FLOW TIME	3. 3.50
2 COMBINED AT +	CNP-3	.00	1 FLOW TIME	7. 3.50
HYDROGRAPH AT +	SUMM1	.01	1 FLOW TIME	20. 3.50
HYDROGRAPH AT +	Y	.01	1 FLOW TIME	16. 3.50
HYDROGRAPH AT +	X	.01	1 FLOW TIME	16. 3.50
HYDROGRAPH AT +	DES1	.00	1 FLOW TIME	8. 3.50
6 COMBINED AT +	CSUMM1	.04	1 FLOW TIME	113. 3.50
HYDROGRAPH AT +	S	.01	1 FLOW TIME	24. 3.50
HYDROGRAPH AT +	V25-G	.02	1 FLOW TIME	45. 3.50
HYDROGRAPH AT +	R	.00	1 FLOW TIME	12. 3.50
2 COMBINED AT +	CR	.02	1 FLOW TIME	56. 3.50
HYDROGRAPH AT +	Q	.00	1 FLOW TIME	12. 3.50

2 COMBINED AT					
+	CQ	.03	1	FLOW TIME	68. 3.50
ROUTED TO					
+	RCQ	.03	1	FLOW TIME	67. 3.50
HYDROGRAPH AT					
+	ST1	.00	1	FLOW TIME	7. 3.50
2 COMBINED AT					
+	CST1	.03	1	FLOW TIME	74. 3.50
2 COMBINED AT					
+	DUMMY2	.04	1	FLOW TIME	98. 3.50
HYDROGRAPH AT					
+	P	.00	1	FLOW TIME	11. 3.50
HYDROGRAPH AT					
+	DES2	.00	1	FLOW TIME	10. 3.50
3 COMBINED AT					
+	CDES2	.05	1	FLOW TIME	119. 3.50
HYDROGRAPH AT					
+	DES3	.01	1	FLOW TIME	17. 3.50
HYDROGRAPH AT					
+	L	.01	1	FLOW TIME	30. 3.50
HYDROGRAPH AT					
+	COS-3	.01	1	FLOW TIME	17. 3.50
HYDROGRAPH AT					
+	DES4	.00	1	FLOW TIME	12. 3.50
5 COMBINED AT					
+	CDES4	.08	1	FLOW TIME	195. 3.50
HYDROGRAPH AT					
+	V25-F	.02	1	FLOW TIME	43. 3.50
HYDROGRAPH AT					
+	V25-COS4	.01	1	FLOW TIME	15. 3.50
HYDROGRAPH AT					
+	V25-FOXN	.00	1	FLOW TIME	14. 3.50
3 COMBINED AT					
+	CFOXN	.03	1	FLOW TIME	72. 3.50
HYDROGRAPH AT					
+	V25-B	.03	1	FLOW TIME	67. 3.50
HYDROGRAPH AT					
+	V25-FOX5	.00	1	FLOW TIME	11. 3.58
2 COMBINED AT					
+	CFOX5	.04	1	FLOW TIME	77. 3.50
HYDROGRAPH AT					
+	V25-C	.04	1	FLOW TIME	86. 3.50
ROUTED TO					
+	RV25-C	.04	1	FLOW TIME	84. 3.58

HYDROGRAPH AT					
+	V25-COS2	.00	1	FLOW TIME	5. 3.58
ROUTED TO					
+	RV25-COS	.00	1	FLOW TIME	5. 3.67
HYDROGRAPH AT					
+	STA1	.00	1	FLOW TIME	13. 3.50
5 COMBINED AT					
+	CSTA1	.11	1	FLOW TIME	238. 3.50
ROUTED TO					
+	RCSTA1	.11	1	FLOW TIME	217. 3.58
HYDROGRAPH AT					
+	V25-E	.03	1	FLOW TIME	65. 3.50
ROUTED TO					
+	RV25-E	.03	1	FLOW TIME	59. 3.58
HYDROGRAPH AT					
+	V25-COS3	.00	1	FLOW TIME	8. 3.50
HYDROGRAPH AT					
+	ST2	.00	1	FLOW TIME	12. 3.50
4 COMBINED AT					
+	CST2	.15	1	FLOW TIME	291. 3.58
2 COMBINED AT					
+	DUMMY5	.23	1	FLOW TIME	461. 3.50
HYDROGRAPH AT					
+	F	.03	1	FLOW TIME	65. 3.50
HYDROGRAPH AT					
+	E	.03	1	FLOW TIME	78. 3.50
HYDROGRAPH AT					
+	DES5	.01	1	FLOW TIME	22. 3.50
4 COMBINED AT					
+	CDES5	.29	1	FLOW TIME	624. 3.50
HYDROGRAPH AT					
+	C	.02	1	FLOW TIME	54. 3.50
HYDROGRAPH AT					
+	NP-1	.00	1	FLOW TIME	4. 3.50
HYDROGRAPH AT					
+	ST7	.00	1	FLOW TIME	9. 3.50
HYDROGRAPH AT					
+	D	.02	1	FLOW TIME	56. 3.50
4 COMBINED AT					
+	CST7	.05	1	FLOW TIME	124. 3.50
2 COMBINED AT					
+	DUMMY7	.35	1	FLOW TIME	748. 3.50
HYDROGRAPH AT					
+	W	.01	1	FLOW TIME	31. 3.50
HYDROGRAPH AT					

+	SUMM2	.01	1	FLOW TIME	16. 3.50
HYDROGRAPH AT +	T	.01	1	FLOW TIME	23. 3.50
HYDROGRAPH AT +	NP-2	.00	1	FLOW TIME	3. 3.50
HYDROGRAPH AT +	ST3	.00	1	FLOW TIME	8. 3.50
2 COMBINED AT +	CST3	.00	1	FLOW TIME	11. 3.50
4 COMBINED AT +	DUMMY8	.03	1	FLOW TIME	81. 3.50
HYDROGRAPH AT +	CARR1	.01	1	FLOW TIME	15. 3.50
HYDROGRAPH AT +	M	.01	1	FLOW TIME	32. 3.50
3 COMBINED AT +	CCARR1	.05	1	FLOW TIME	129. 3.50
HYDROGRAPH AT +	N	.00	1	FLOW TIME	10. 3.50
HYDROGRAPH AT +	O	.01	1	FLOW TIME	13. 3.50
HYDROGRAPH AT +	STD	.00	1	FLOW TIME	4. 3.50
3 COMBINED AT +	CSTD	.01	1	FLOW TIME	26. 3.50
HYDROGRAPH AT +	K	.01	1	FLOW TIME	30. 3.50
HYDROGRAPH AT +	STB	.00	1	FLOW TIME	12. 3.50
3 COMBINED AT +	CSTB	.03	1	FLOW TIME	68. 3.50
2 COMBINED AT +	DUMMY10	.08	1	FLOW TIME	197. 3.50
HYDROGRAPH AT +	J	.02	1	FLOW TIME	42. 3.50
2 COMBINED AT +	DUMMY11	.10	1	FLOW TIME	239. 3.50
HYDROGRAPH AT +	COS-2	.00	1	FLOW TIME	2. 3.58
HYDROGRAPH AT +	COS-1	.01	1	FLOW TIME	22. 3.50
2 COMBINED AT +	CCOS-1	.01	1	FLOW TIME	24. 3.50
HYDROGRAPH AT +	CARR2	.00	1	FLOW	10.

Referenced Basin
Flow

				TIME	3.50
HYDROGRAPH AT					
+	ST6	.00	1	FLOW TIME	13. 3.50
4 COMBINED AT					
+	CCARR2	.12	1	FLOW TIME	286. 3.50
HYDROGRAPH AT					
+	B	.02	1	FLOW TIME	54. 3.50
HYDROGRAPH AT					
+	A	.02	1	FLOW TIME	51. 3.50
HYDROGRAPH AT					
+	CARR3	.01	1	FLOW TIME	19. 3.50
4 COMBINED AT					
+	CCARR3	.17	1	FLOW TIME	410. 3.50
3 COMBINED AT					
+	DUMMY13	.56	1	FLOW TIME	1271. 3.50
HYDROGRAPH AT					
+	V	.01	1	FLOW TIME	29. 3.50
HYDROGRAPH AT					
+	SUMM4	.01	1	FLOW TIME	21. 3.50
2 COMBINED AT					
+	CSUMM4	.02	1	FLOW TIME	50. 3.50
HYDROGRAPH AT					
+	DC-2	.00	1	FLOW TIME	5. 3.50
HYDROGRAPH AT					
+	U	.03	1	FLOW TIME	73. 3.50
HYDROGRAPH AT					
+	I	.03	1	FLOW TIME	61. 3.50
HYDROGRAPH AT					
+	STA	.00	1	FLOW TIME	5. 3.50
HYDROGRAPH AT					
+	G	.01	1	FLOW TIME	19. 3.50
HYDROGRAPH AT					
+	H	.01	1	FLOW TIME	21. 3.50
2 COMBINED AT					
+	CGH	.02	1	FLOW TIME	39. 3.50
HYDROGRAPH AT					
+	DC-1	.01	1	FLOW TIME	23. 3.58
HYDROGRAPH AT					
+	NVE	.03	1	FLOW TIME	75. 3.50
8 COMBINED AT					
+	CDC1	.15	1	FLOW TIME	326. 3.50
2 COMBINED AT					
+	CFAR	.71	1	FLOW TIME	1598. 3.50
1					

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
INTERPOLATED TO

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	V21-SDN3.OUT COMPUTATION		INTERVAL TIME TO PEAK	VOLUME
						DT	PEAK		
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1	RATIO=	.00							
RCQ	MANE	.22	67.72	210.18	2.62	5.00	67.37	210.00	2.62
CONTINUITY SUMMARY (AC-FT) - INFLOW= .3853E+01 EXCESS= .0000E+00 OUTFLOW= .3853E+01 BASIN STORAGE= .1974E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RV25-C	MANE	3.60	84.77	216.10	2.46	5.00	83.86	215.00	2.47
CONTINUITY SUMMARY (AC-FT) - INFLOW= .5451E+01 EXCESS= .0000E+00 OUTFLOW= .5449E+01 BASIN STORAGE= .5287E-03 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RV25-COS	MANE	4.00	5.08	220.00	2.20	5.00	5.08	220.00	2.21
CONTINUITY SUMMARY (AC-FT) - INFLOW= .3289E+00 EXCESS= .0000E+00 OUTFLOW= .3289E+00 BASIN STORAGE= .4677E-03 PERCENT ERROR= -.2									
FOR PLAN = 1	RATIO=	.00							
RCSTA1	MANE	4.00	220.97	216.00	2.58	5.00	217.33	215.00	2.58
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1570E+02 EXCESS= .0000E+00 OUTFLOW= .1562E+02 BASIN STORAGE= .7824E-03 PERCENT ERROR= .5									
FOR PLAN = 1	RATIO=	.00							
RV25-E	MANE	2.81	61.69	213.68	2.84	5.00	59.42	215.00	2.83
CONTINUITY SUMMARY (AC-FT) - INFLOW= .4061E+01 EXCESS= .0000E+00 OUTFLOW= .4053E+01 BASIN STORAGE= .2477E-03 PERCENT ERROR= .2									

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

APPENDIX E

Reference Material

*Technical Drainage Study for Summerlin West Village 21 – Street C
Improvements (Carriage Hill Drive to Desert Foothills Drive)*

by VTN Nevada (DS 5093)

Approval Letters

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM

DATE:

April 23, 2019

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:

**Summerlin West Village 21 – Street C Improvements
(Carriage Hill Drive to Desert Foothills Drive)**

COPIES TO:

VTN Nevada

Cross Streets:

SEQ Summerlin Pkwy. & Desert Foothill Dr.

Howard Hughes Company

File Number:

F:\Depot\DSMemos\DS5093D.doc

Bart Anderson, P.E., DevCo

Parcel Number:

137-26-101-001

CCRFC

Zoning Action:

TMP-73332

FEMA Flood Zone

YES

NO

X

Proposed Storm Drain

YES

X

NO

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	10/24/2019	2/14/2019	Not Approved	\$400.00	502717: \$400
2 nd Submittal	3/4/2019	3/13/2019	Not Approved	\$400.00	503492: \$400
3 rd Submittal	3/20/2019	3/26/2019	Conditional Approval	\$400.00	\$400
CCRFC	4/23/2019	4/23/2019	Concurrence Recv'd	N/C	N/C
TOTAL FEES (LDDRS):				\$800.00	----

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.

- The subject drainage study is premised on the fully developed (ie, constructed) *Desert Foothills Drive* (Redpoint to Summerlin Parkway) and *Summerlin West Village 21 Carriage Hill Drive* (Redpoint to Summerlin Parkway). The subject improvement plans will not be approved prior to the execution of construction bonds of both *Desert Foothills Drive* and *Carriage Hill Drive* and the associated facilities.
- All storm drain inlets that are more than 10'-deep require a special structural detail. Provide structural calculations and details of the special design inlets to **City Building & Safety** for review and approval prior to the final acceptance of the improvement plans.

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

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

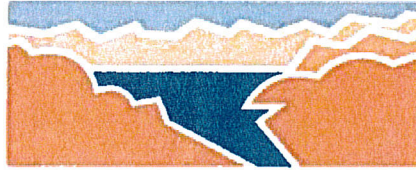
END OF REMARKS

ays

T/R/S: T20S/R59E/26
AREA K-26

Rec'd: 4/23/19

REGIONAL FLOOD CONTROL DISTRICT



Steven C. Parrish, P.E.
General Manager/Chief
Engineer

BOARD OF DIRECTORS

Lawrence L. Brown, III
Chair
Clark County

Mayor Debra March
Vice-Chair
City of Henderson

George Gault
City of Mesquite

James B. Gibson
Clark County

Mayor Carolyn Goodman
City of Las Vegas

Isaac Barron
City of North Las Vegas

Mayor Pro Tem
Dr. Lois Tarkanian
City of Las Vegas

Mayor Rodney Woodbury
City of Boulder City

April 18, 2019

Mr. Oh Sang Kwon, P.E.
City of Las Vegas Department of Public Works
333 North Rancho Drive
Las Vegas, NV 89106

**DISTRICT CONCURRENCE: SUMMERLIN WEST VILLAGE 21 - STREET C
IMPROVEMENTS (CARRIAGE HILL DR. TO
DESERT FOOTHILLS DRIVE)
(DS5093C) (RFCD No. 19-11243)**

Dear Mr. Kwon:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated January 23, 2019, Addendum No. 1 dated March 4, 2019, and Addendum No. 2 dated March 18, 2019 for above-mentioned project as submitted by VTN NEVADA. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas Department of Public Works dated March 26, 2019.

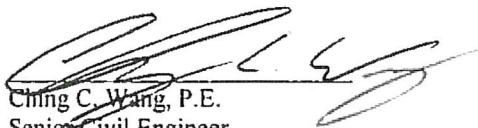
District concurs with acceptance of this Technical Drainage Study by City of Las Vegas Department of Public Works.

District's review of this project was limited to issues of Regional Flood Control Significance as defined in *Uniform Regulations for the Control of Drainage*.

Please be aware that as additional information becomes available and/or restudies of Flood Insurance Studies are performed, information submitted by VTN NEVADA may be superseded. Compliance with regulatory elements and design standards specified in *Uniform Regulations for the Control of Drainage* does not imply a guarantee that properties will be free from flooding or flood damage. The District, its officials, or employees assume no liability for information, data, or conclusions presented by consulting engineers. We, therefore, make no warranties, either expressed or implied, in conducting this review.

STEVEN C. PARRISH, P.E.
General Manager/Chief Engineer

BY:

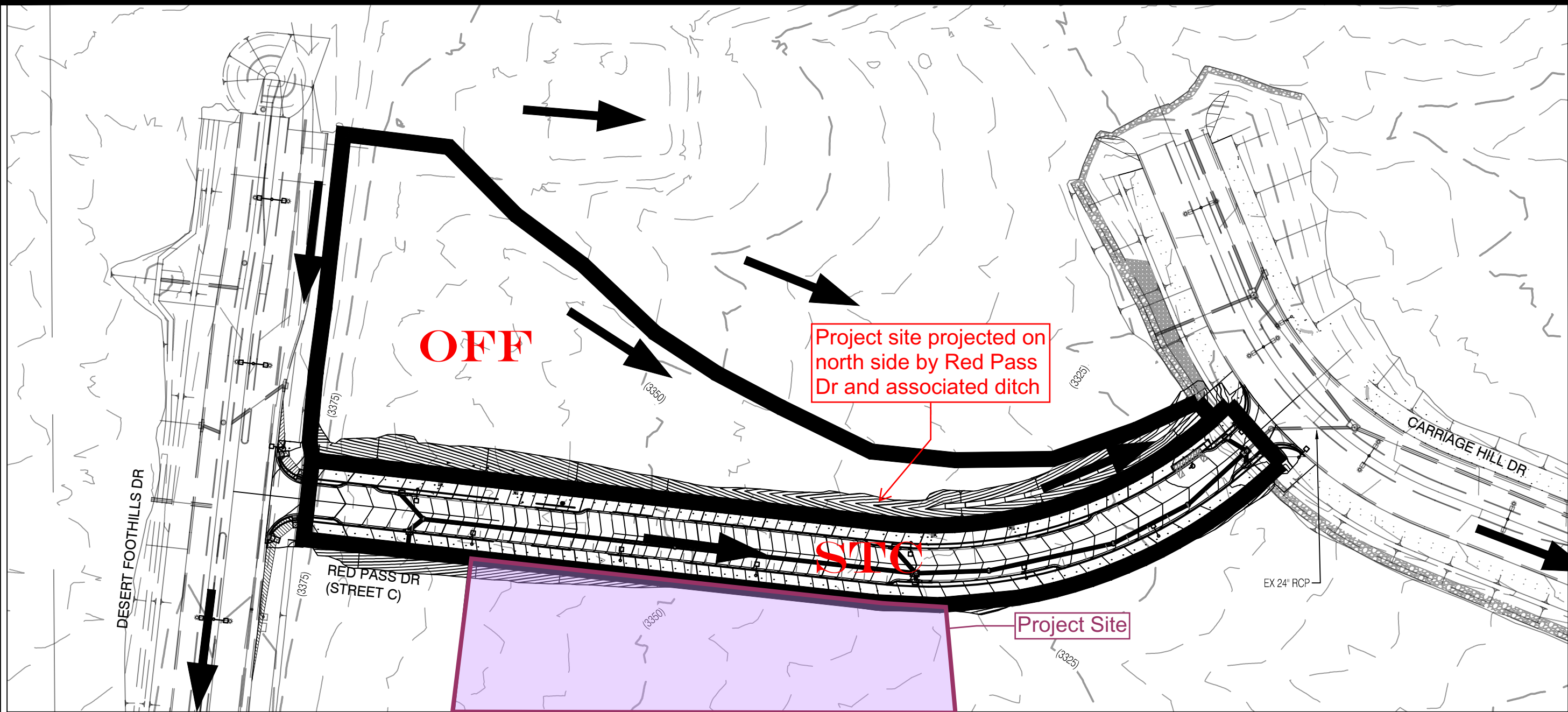

Ching C. Wang, P.E.
Senior Civil Engineer

CCW:dd

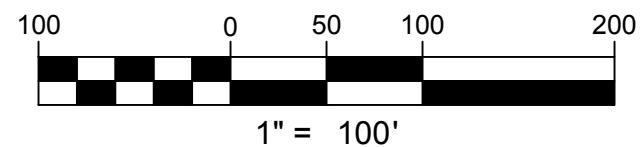
c: Brian Troy Ruiz, P.E., VTN Nevada

P:\Letters and Memos\Local Drainage\Land Development & Drainage\2019\1-19-11243.doc

Referenced Drainage Exhibits



GRAPHIC SCALE



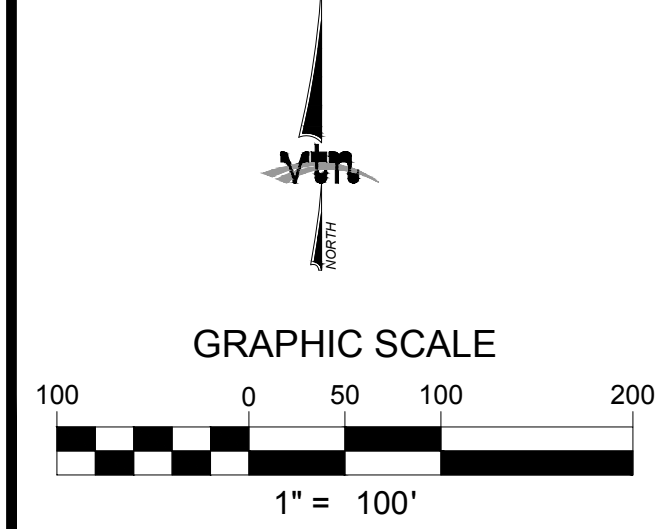
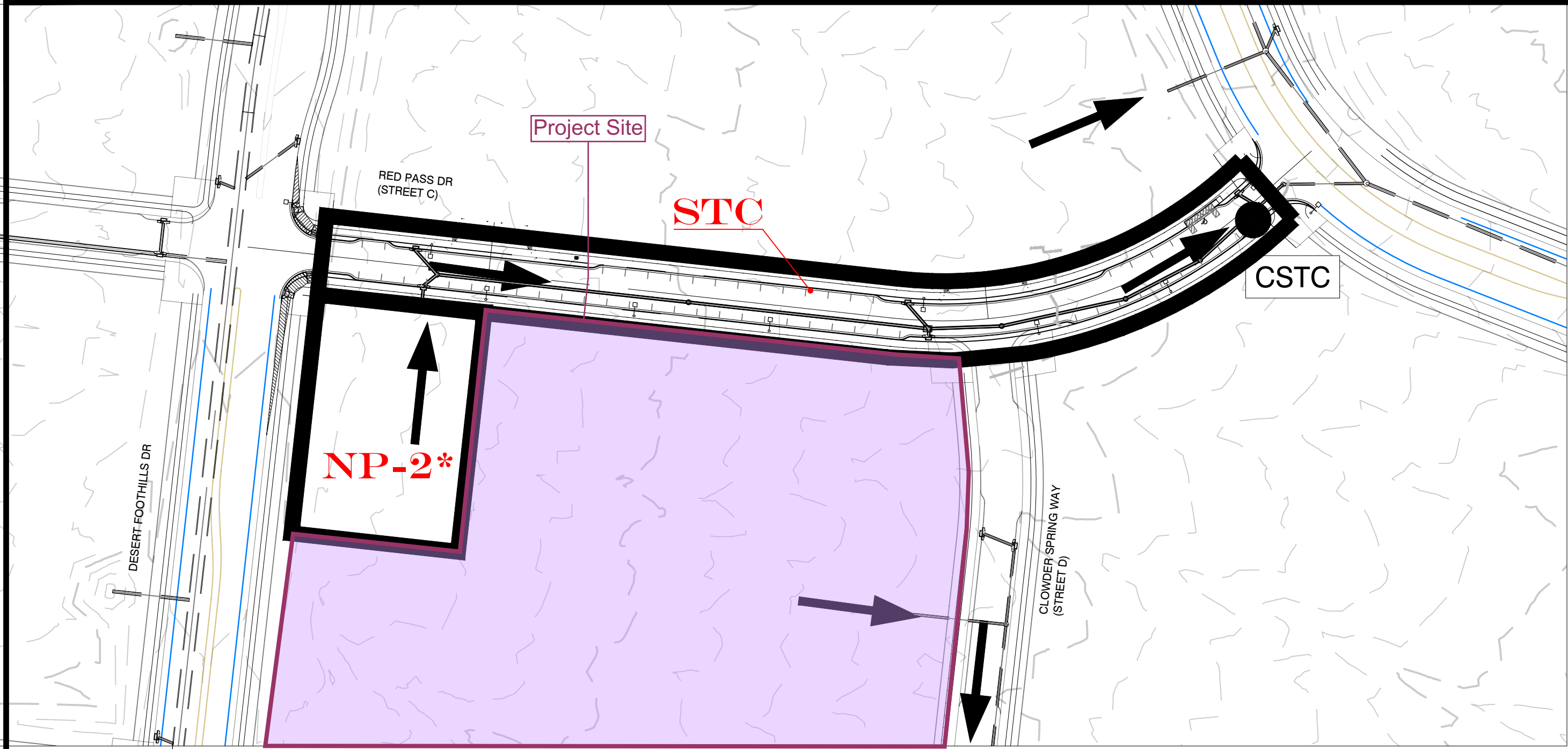
LEGEND

-  BASIN BOUNDARY
-  BASIN DESIGNATION
-  FLOW ARROW

INTERIM CONDITION HEC-1 SUMMARY TABLE		
BASIN ID	AREA (ac)	Q100 (CFS)
STC*	1.68	7
OFF	2.88	9

INTERIM CONDITION CHANNEL SUMMARY TABLE								
Channel	Q100 (cfs)	Slope	Normal Depth (ft)	Freeboard Req'd (ft)	Total Depth (ft)	Velocity (ft/s)	Side Slopes	Bottom Width
OFF Max	9	5.5%	0.28	1.09	1.37	5.44	3:1/3:1	5'
OFF Min	9	1.0%	0.46	1.00	1.46	3.09	3:1/3:1	5'

**FIGURE 7: INTERIM CONDITION BASIN MAP
SUMMERLIN WEST VILLAGE 21 STREET C
CARRIAGE HILL TO DESERT FOOTHILLS**



- LEGEND**
- CONCENTRATION POINT
 - BASIN BOUNDARY
 - ST7** BASIN DESIGNATION
 - FLOW ARROW

ULTIMATE CONDITION HEC-1 SUMMARY TABLE		
BASIN ID	AREA (ac)	Q100 (CFS)
NP-2*	0.93	3
STC*	1.68	7
CSTC*	-	10

*Referenced from the Carriage Hill Study

ULTIMATE CONDITION STREET FLOW ANALYSIS SUMMARY						
Street Section	Q100 (cfs)	Slope	Velocity (ft/s)	Depth (ft)	V x D	Tributary Basin
Max Slope	7	8.4%	5.48	0.29	1.59	STC
Min Slope	7	2.0%	3.09	0.34	1.05	STC

Referenced Hydraulics

Project Description

Input Data

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+16.50	0.46
0+31.00	0.17
0+31.00	0.13
0+32.50	0.00
0+32.50	0.50
0+33.00	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+02.00, 0.13)	0.013
(0+02.00, 0.13)	(0+31.00, 0.13)	0.016
(0+31.00, 0.13)	(0+33.00, 0.50)	0.013

Options

Worksheet for Red Pass (Max)

Results

Normal Depth		0.28	ft
Elevation Range	0.00 to 0.50 ft		
Flow Area		1.28	ft ²
Wetted Perimeter		14.85	ft
Hydraulic Radius		0.09	ft
Top Width		14.19	ft
Normal Depth		0.28	ft
Critical Depth		0.39	ft
Critical Slope		0.00699	ft/ft
Velocity		5.48	ft/s
Velocity Head		0.47	ft
Specific Energy		0.75	ft
Froude Number		3.22	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.28	ft
Critical Depth	0.39	ft
Channel Slope	8.4	%
Critical Slope	0.00699	ft/ft

Cross Section for Red Pass (Max)

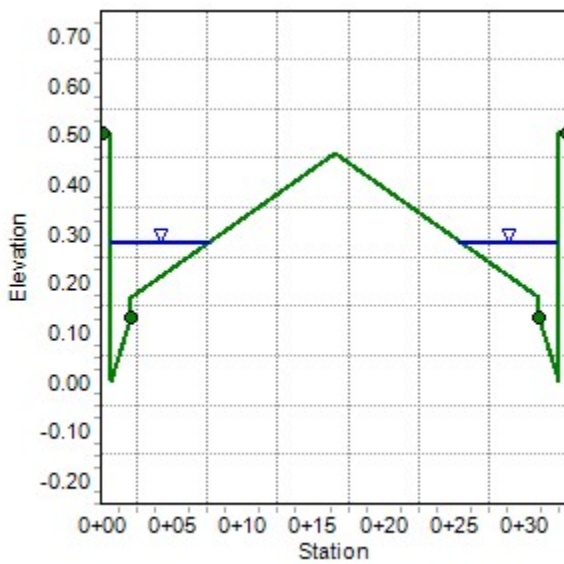
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	8.4	%
Normal Depth	0.28	ft
Discharge	7.00	ft ³ /s

Cross Section Image



Project Description

Manning Formula

Normal Depth

Channel Slope	2.0	%
Discharge	7.00	ft ³ /s
Section Definitions		

Roughness Segment Definitions

Options

Bentley Systems, Inc. Haestad Methods Solution Center
5/22/2019 9:44:21 AM 27 Siemons Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666 Page 1 of 2

Worksheet for Red Pass (Min)

Results

Normal Depth		0.34	ft
Elevation Range	0.00 to 0.50 ft		
Flow Area		2.26	ft ²
Wetted Perimeter		20.75	ft
Hydraulic Radius		0.11	ft
Top Width		19.97	ft
Normal Depth		0.34	ft
Critical Depth		0.39	ft
Critical Slope		0.00715	ft/ft
Velocity		3.09	ft/s
Velocity Head		0.15	ft
Specific Energy		0.49	ft
Froude Number		1.62	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.34	ft
Critical Depth	0.39	ft
Channel Slope	2.0	%
Critical Slope	0.00715	ft/ft

Cross Section for Red Pass (Min)

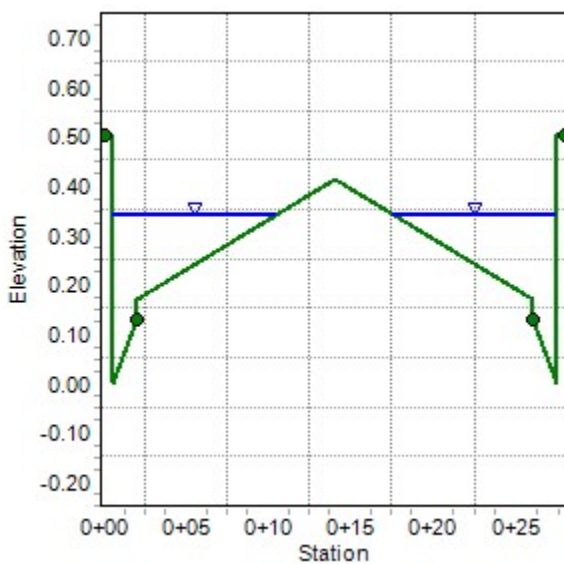
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.0	%
Normal Depth	0.34	ft
Discharge	7.00	ft ³ /s

Cross Section Image



Referenced Plan Sheets

SUMMERLIN WEST VILLAGE 21 RED PASS DRIVE

DESERT FOOTHILLS TO CARRIAGE HILL

APN: 137-26-101-001

CITY OF LAS VEGAS
STATE OF NEVADA

DEVELOPED BY:

HOWARD HUGHES COMPANY, LLC
A DELAWARE LIMITED LIABILITY COMPANY

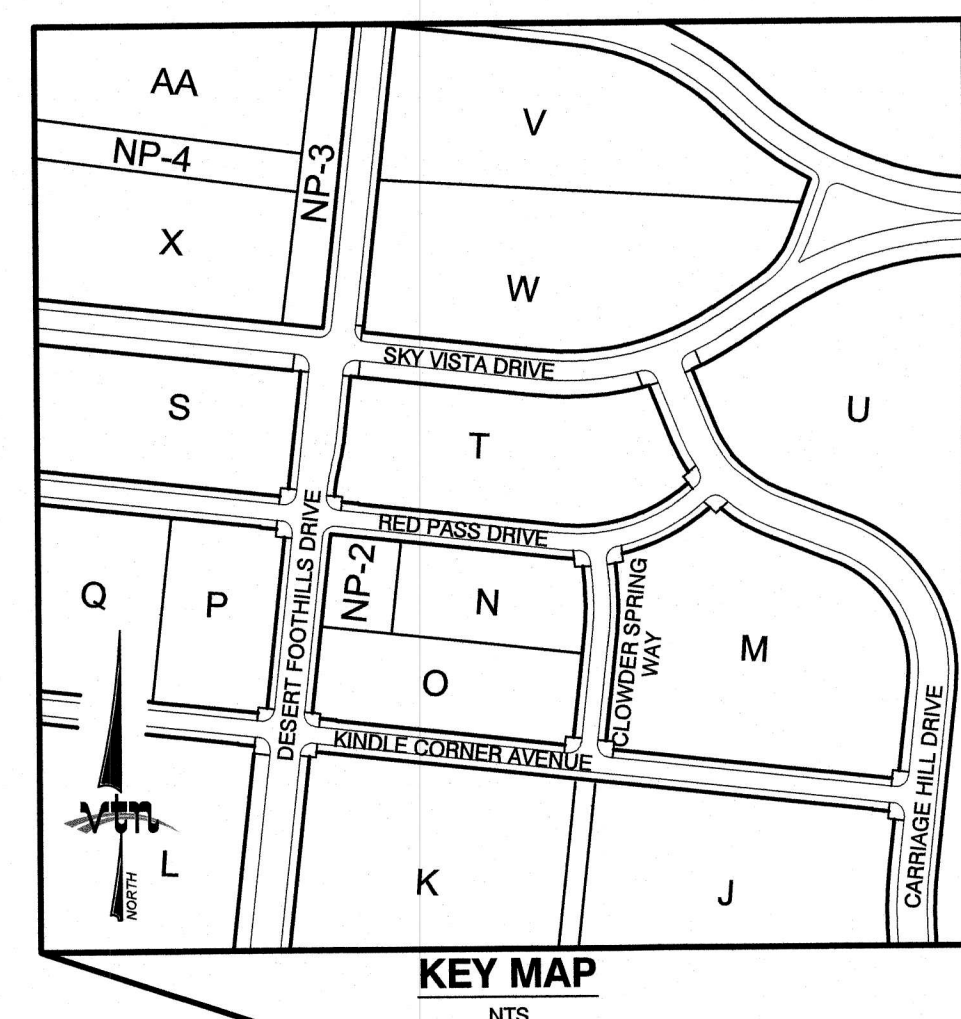
10801 W CHARLESTON BLVD SUITE 300
LAS VEGAS, NEVADA 89135
702-791-4000

FUTURE S.I.D. PROJECT



LOCATION MAP

N.T.S.

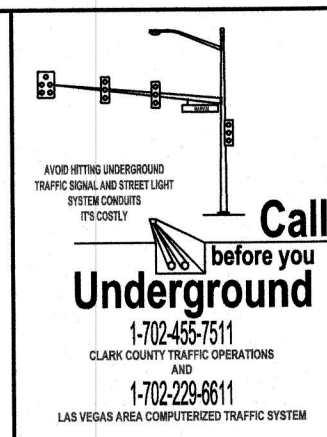
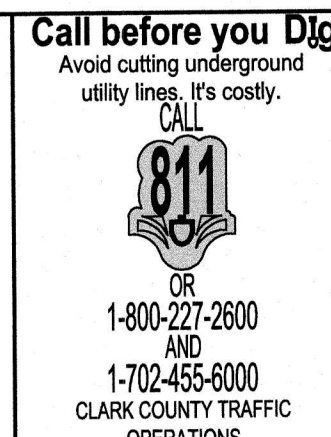
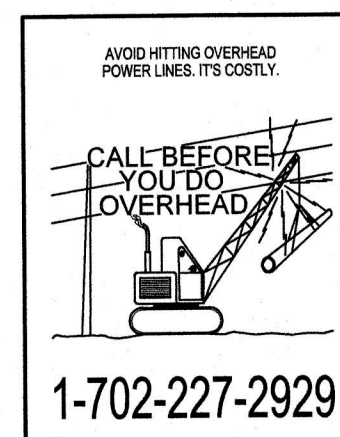


KEY MAP
N.T.S.

OWNER
HOWARD HUGHES COMPANY, LLC
A DELAWARE LIMITED LIABILITY COMPANY
10801 W CHARLESTON BLVD SUITE 300
LAS VEGAS, NEVADA 89135
702-791-4000

DEVELOPER
HOWARD HUGHES COMPANY, LLC
A DELAWARE LIMITED LIABILITY COMPANY
10801 W CHARLESTON BLVD SUITE 300
LAS VEGAS, NEVADA 89135
702-791-4000

ENGINEERING FIRM
VTN
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PH: (702) 873-7550
FAX (702) 362-2597



THIS PROJECT PROVIDES FOR THE INSTALLATION OF
THE OFF-SITE WATER MAINS ONLY, AND DOES NOT
PROVIDE OR IMPLY ANY WATER COMMITMENT.

FIRE DEPARTMENT APPROVAL

APPROVAL BY THE FIRE DEPARTMENT HAVING
JURISDICTION IS REQUIRED PRIOR TO OBTAINING
FINAL APPROVAL FROM THE LVVWD.

BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE
NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS
VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF
1983, SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST
OF THE GREENWICH MERIDIAN.

LINEAR UNIT: US SURVEY FOOT (FT/US)

DATUM (REFERENCE FRAME): NAD 83 (2011) EPOCH 2010.00

SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)

ZONE: LAS VEGAS HIGH ELEVATION ZONE

PROJECTION: TRANSVERSE MERCATOR
STANDARD PARALLEL (AND LATITUDE OF GRID
ORIGIN): 36°15'00"N
LONGITUDE OF CENTRAL MERIDIAN: 114°58'00"W
NORTHING AT GRID ORIGIN: 400,000.00 M (1,312,333.3333 FT/US)
EASTING AT CENTRAL MERIDIAN: 300,000.00 M (984,250.0000
FT/US)
SCALE FACTOR ON CENTRAL MERIDIAN: 1.000135 (EXACT)

NOTES:

1. ALL DISTANCES AND BEARINGS SHOWN HEREON ARE
PROJECTED (GRID) VALUES BASED ON THE PRECEDING
PROJECTION DEFINITION. THE PROJECTION WAS DEFINED
SUCH THAT PROJECTED (GRID) DISTANCES ARE EQUIVALENT
TO "GROUND" DISTANCES IN THE PROJECT AREA.

2. GRID BEARINGS SHOWN HEREON (OR IMPLIED BY GRID
COORDINATES) DO NOT EQUAL GEODETIC BEARINGS DUE TO
MERIDIAN CONVERGENCE.

BENCHMARK

PROJECT DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988
(NAVD88)

CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)

NAVD88 ELEVATION: 989.574 METERS (3,246.65 FEET)

FND USGS DISC SET IN ROCK RIDGE 150' SOUTH OF
CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S, R59E, S03

THESE PLANS AND THE DESIGN CRITERIA CONTAINED WITHIN THESE PLANS ARE BASED
UPON THE INFORMATION PRESENTLY KNOWN BY THE ENGINEER. ALL CONSTRUCTION SHALL
BE IN CONFORMANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL STATUTES, LAWS,
CODES, REGULATIONS AND ORDINANCES, INCLUDING BUT NOT LIMITED TO THE FEDERAL
FAIR HOUSING AMENDMENTS ACT, AMERICANS WITH DISABILITIES ACT, THE ARCHITECTURAL
BARRIERS ACT AND ANY APPLICABLE UNIFORM STANDARDS, SPECIFICATIONS OR DRAWINGS.
THE PERSON OR ENTITY PERFORMING THE CONSTRUCTION SHALL BE SOLELY RESPONSIBLE
TO MAKE SURE CONSTRUCTION IS IN CONFORMANCE WITH ALL LOCAL, STATE AND FEDERAL
STATUTES, LAWS, CODES, REGULATIONS, STANDARDS, GUIDELINES AND ORDINANCES AND
FURTHER, IS IN CONFORMANCE WITH ANY APPLICABLE DESIGN CRITERIA, INCLUDING BUT
NOT LIMITED TO SOILS REPORTS, TRAFFIC STUDIES, GEOTECHNICAL REPORTS,
ARCHITECTURAL PLANS AND SPECIFICATIONS, DRAINAGE PLANS OR STUDIES AND ANY
OTHER CRITERIA, STANDARDS OR REQUIREMENTS LISTED IN THE PLANS OR THE GENERAL
NOTES RELATED TO THESE PLANS OR PROVIDED BY ANYONE IN REFERENCE TO THIS
PROJECT.

APPROVALS

CITY ENGINEER

ALLEN PAVELKA, P.E. # 9029

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

CITY OF LAS VEGAS DEPARTMENT OF PLANNING

DATE

THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE PLANNING AND
DEVELOPMENT DEPARTMENT

LAS VEGAS FIRE & RESCUE

DATE

CENTRAL TELEPHONE COMPANY d/b/a CENTURYLINK

DATE

"THE AFFIXED CENTURY LINK NEVADA APPROVAL DOES NOT
ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN
CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS.
RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT
TO LOCAL ORDINANCES, NEVADA REVISED STATUTES AND/OR
PUBLIC UTILITY COMMISSION RULES AND REGULATIONS."

NV ENERGY

DATE

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

COX COMMUNICATIONS LAS VEGAS, INC.

DATE

SOUTHWEST GAS CORPORATION

DATE

LAS VEGAS VALLEY WATER DISTRICT

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

PROJECT: 136387 FIRST APPROVED DATE:

LVVWD APPROVED FIRE FLOW: TOTAL 1500 GPM/ONSITE N/A GPM

SHEETS: CV, NT, MUTSS, MUTW, MUTX, DT1, UT1-UT14

KEVIN T. ORROCK, VICE PRESIDENT

DATE

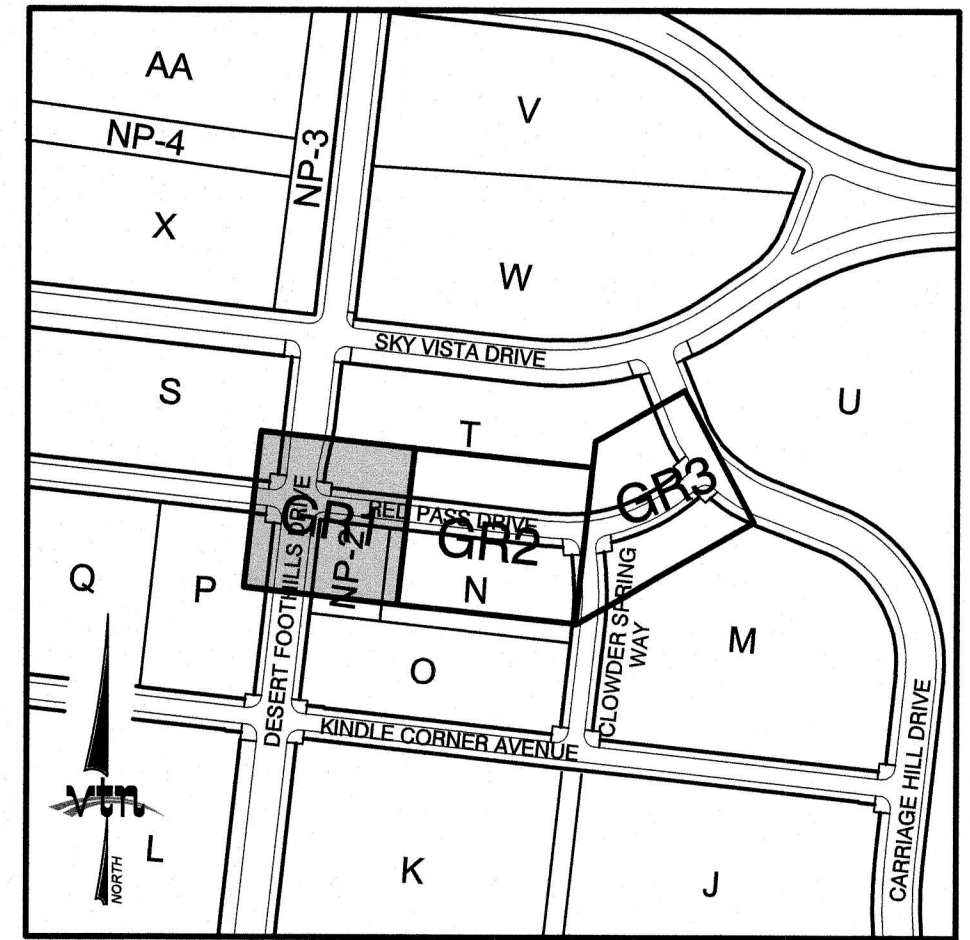
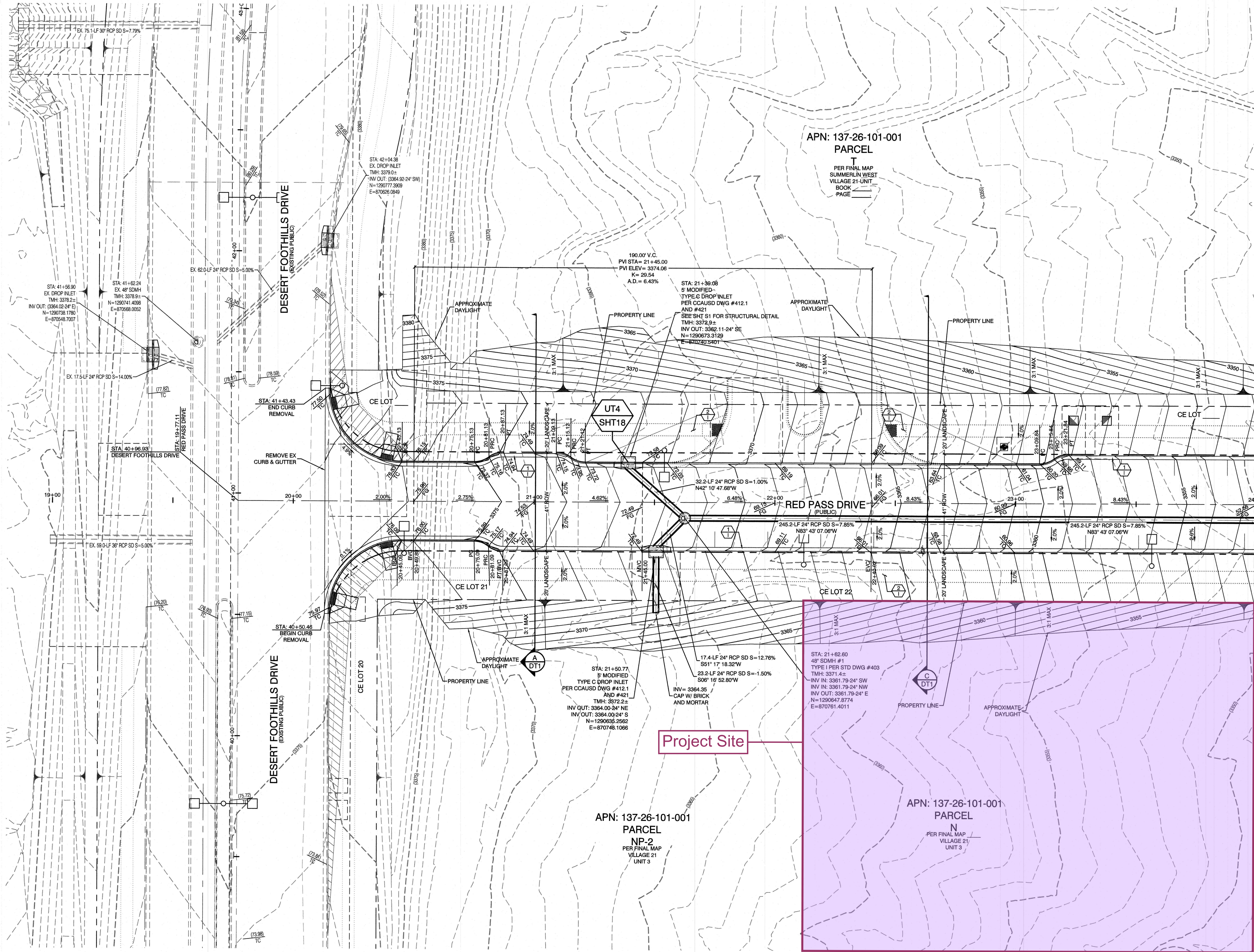
HOWARD HUGHES COMPANY, LLC
A DELAWARE LIMITED LIABILITY COMPANY

HOWARD HUGHES COMPANY, LLC
A DELAWARE LIMITED LIABILITY COMPANY
10801 W CHARLESTON BLVD SUITE 300
LAS VEGAS, NEVADA 89135
702-791-4000

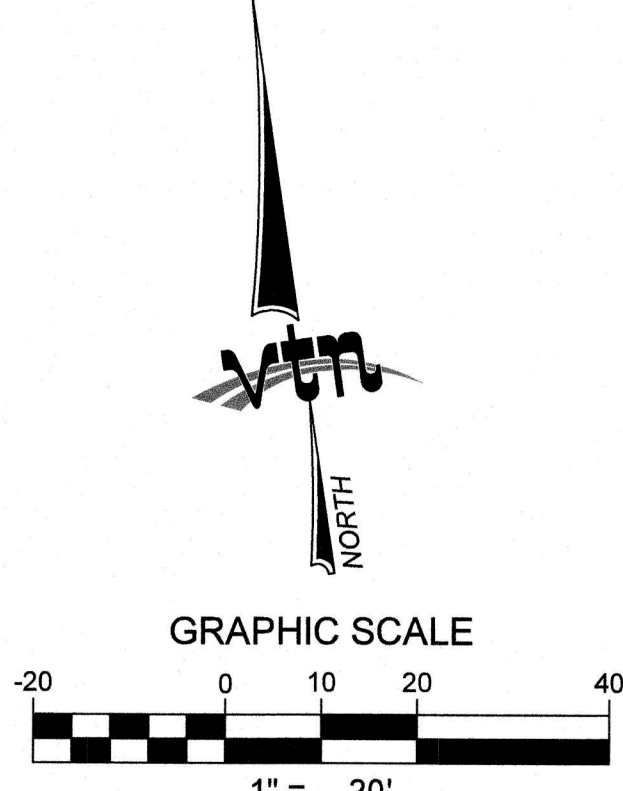
CITY OF LAS VEGAS
SUMMERLIN WEST VILLAGE 21
RED PASS DRIVE DESERT
FOOTHILLS TO CARRIAGE HILL

DRAWN BY: BCC
DESIGNED BY: BCC
CHECKED BY: WJM
PROJECT NO: 7861
SCALE: N/A
HORIZ: VERT:

WILLIAM J. MEYER
ENGINEER
No. 15745
SHEET
CV
1 OF 25 SHEETS
DRAWING NO.
L19-00453



KEY MAP
NTS



- CONSTRUCTION NOTES**
- UTILITY PROFILE REFERENCE LABEL
UT # = SHEET INDEX
SHT # = SHEET NUMBER
 - CONSTRUCTION NOTES**
 - CONSTRUCT 24" TYPE 'L' CURB & GUTTER
PER STD. DWG. 216.
 - FUTURE 5' SIDEWALK
 - CONSTRUCT HANDICAP RAMP
PER STD. DWG. 235 CASE II SEE SHEET DT2
 - SAW CUT AND REMOVE ASPHALT PAVING AND MATCH
WITH NEW CONSTRUCTION PER CAUSD #500.5 & #503.
 - FIELD VERIFY AND MATCH EXISTING

OFFSITE FLOOD CONTROL NOTE:
ALL OFFSITE INTERIM FLOOD CONTROL FACILITIES SUCH AS BUT NOT LIMITED TO BERMS, DITCHES AND TEMPORARY SUMPS ARE PRIVATELY OWNED AND TO BE PRIVATELY MAINTAINED BY THE HOWARD HUGHES COMPANY.

GRADING PERMIT NOTE
THIS GRADING PERMIT DOES NOT INCLUDE THE CONSTRUCTION OF RETAINING WALLS AND OTHERS STRUCTURES. SEPARATE PERMITS AND APPLICATIONS ARE REQUIRED FOR THESE.

GEOTECHNICAL NOTE:
REFER TO SOILS REPORT: NOVA GEOTECHNICAL PROJECT #G-18-003, DATED MARCH 5, 2018

SIGHT VISIBILITY ZONES:
NO STRUCTURE, WALLS, VEGETATION, OR OBJECT OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY ZONES.

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

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE WITH CITY OF LAS VEGAS, #DS5093

WILLIAM J MEYER, P.E. No. 15746 DATE 5/22/19

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

811
OR
1-800-227-2600
AND
1-702-455-6000
CLARK COUNTY TRAFFIC OPERATIONS

Call before you Dig
Avoid hitting overhead power lines. It's costly.

Call before you Dig
Underground
1-702-455-7511
CLARK COUNTY TRAFFIC OPERATIONS
1-702-228-8611
LAS VEGAS AREA COMPOSITE TRAFFIC SYSTEM

Call before you Dig
Avoid hitting overhead power lines. It's costly.

Call before you Dig
Overhead
1-702-227-2929

HOWARD HUGHES COMPANY, LLC
A DELAWARE LIMITED LIABILITY COMPANY
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PH: (702) 873-7550 FAX: (702) 962-2397 WEB: WWW.VTNV.COM
CONSULTING ENGINEERS & LAND SURVEYORS

CITY OF LAS VEGAS

GRADING PLAN 1

SUMMERLIN WEST VILLAGE 21
RED PASS DRIVE DESERT
FOOTHILLS TO CARRIAGE HILL

DRAWN BY:	BCC	05/25/2018	SCALE: NA	HORIZ. VERT.
DESIGNED BY:	BCC	05/25/2018		
CHECKED BY:	WJM	05/15/2019		
PROJECT NO.:	7551			

5/22/19

GR1

9 OF 25 SHEETS

DRAWING NO. L19-00453

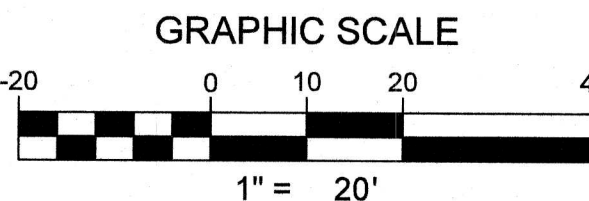
PROFESSIONAL ENGINEER STATE OF NEVADA
No. 15746
WILLIAM J MEYER
EXP. 12/31/19
CIVIL

5/22/19

GR1

9 OF 25 SHEETS

DRAWING NO. L19-00453



UTILITY PROFILE REFERENCE LABEL
 UT # = SHEET INDEX
 SHT # = SHEET NUMBER

- | | |
|---|--|
| 1 | CONSTRUCT 24" TYPE "L" CURB & GUTTER
PER STD. DWG. 216. |
| 2 | FUTURE 5' SIDEWALK |
| 3 | CONSTRUCT HANDICAP RAMP
PER STD. DWG. 235 CASE II SEE SHEET DT2 |
| 4 | SAWCUT AND REMOVE ASPHALT PAVING AND MATCH
WITH NEW CONSTRUCTION PER CCAUD #500.5 & #503. |
| 5 | FIELD VERIFY AND MATCH EXISTING |

ALL OFFSITE INTERIM FLOOD CONTROL FACILITIES SUCH AS BUT NOT LIMITED TO BERMS/DITCHES AND TEMPORARY SUMPS ARE PRIVATELY OWNED AND TO BE PRIVATELY MAINTAINED BY THE HOWARD HUGHES COMPANY.

THIS GRADING PERMIT DOES NOT INCLUDE THE CONSTRUCTION OF RETAINING WALLS AND OTHERS STRUCTURES. SEPARATE PERMITS AND APPLICATIONS ARE REQUIRED FOR THESE.

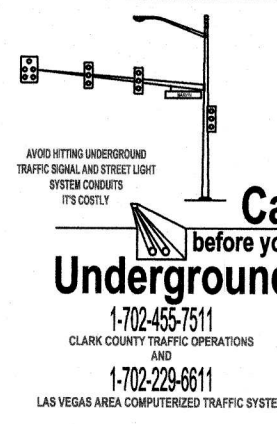
REFER TO SOILS REPORT: NOVA GEOTECHNICAL
PROJECT #G-18-003, DATED MARCH 5, 2018

NO STRUCTURE, WALLS, VEGETATION, OR OBJECT OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY ZONES.

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

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE
APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE WITH
CITY OF LAS VEGAS, #DS5093

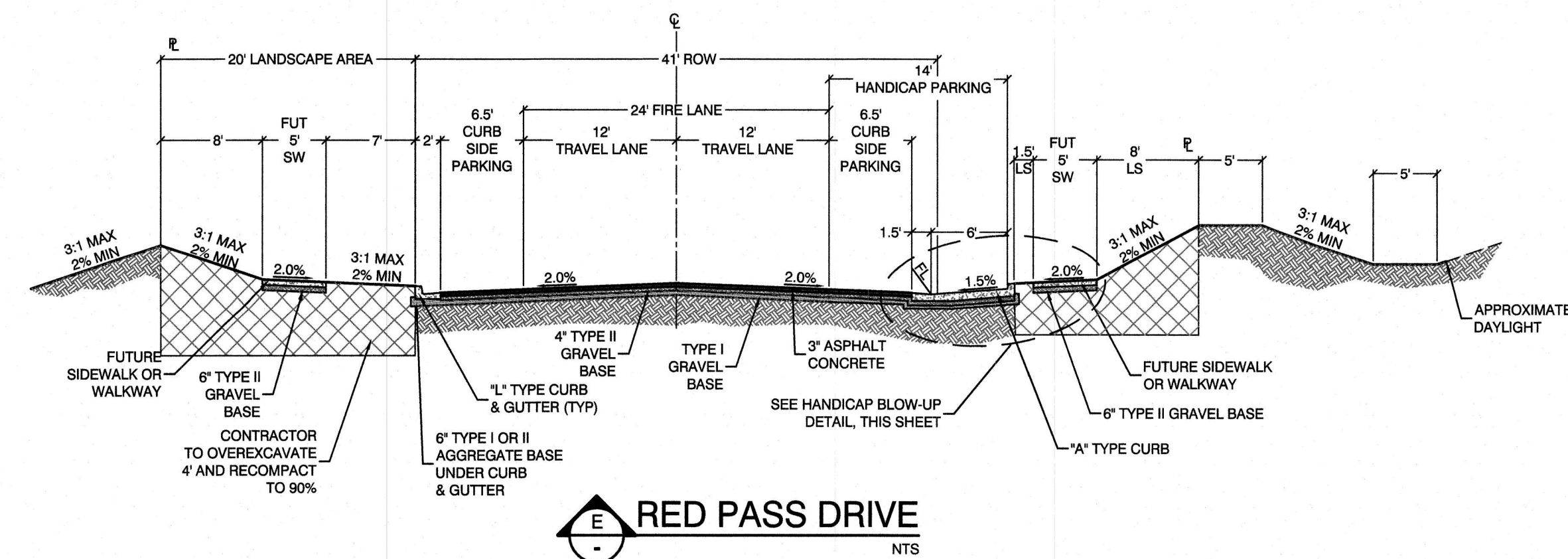
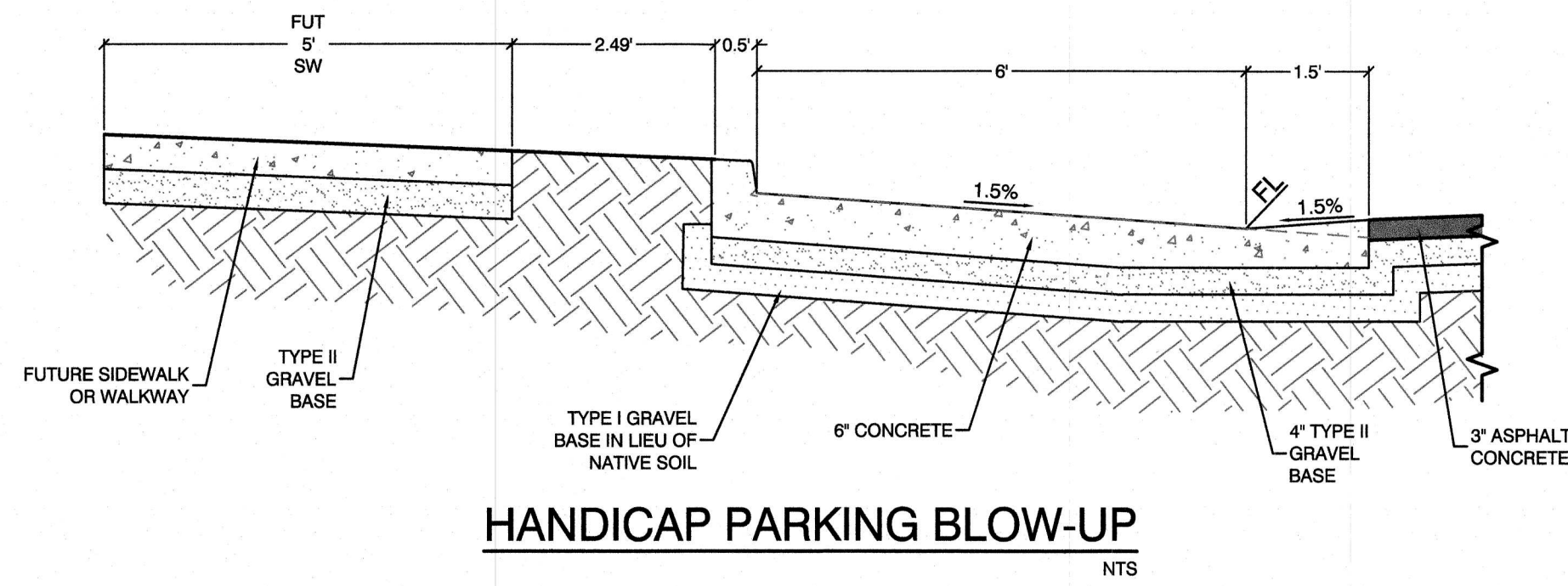
WILLIAM J MEYER P.E. No. 15745 DATE 5/22/19



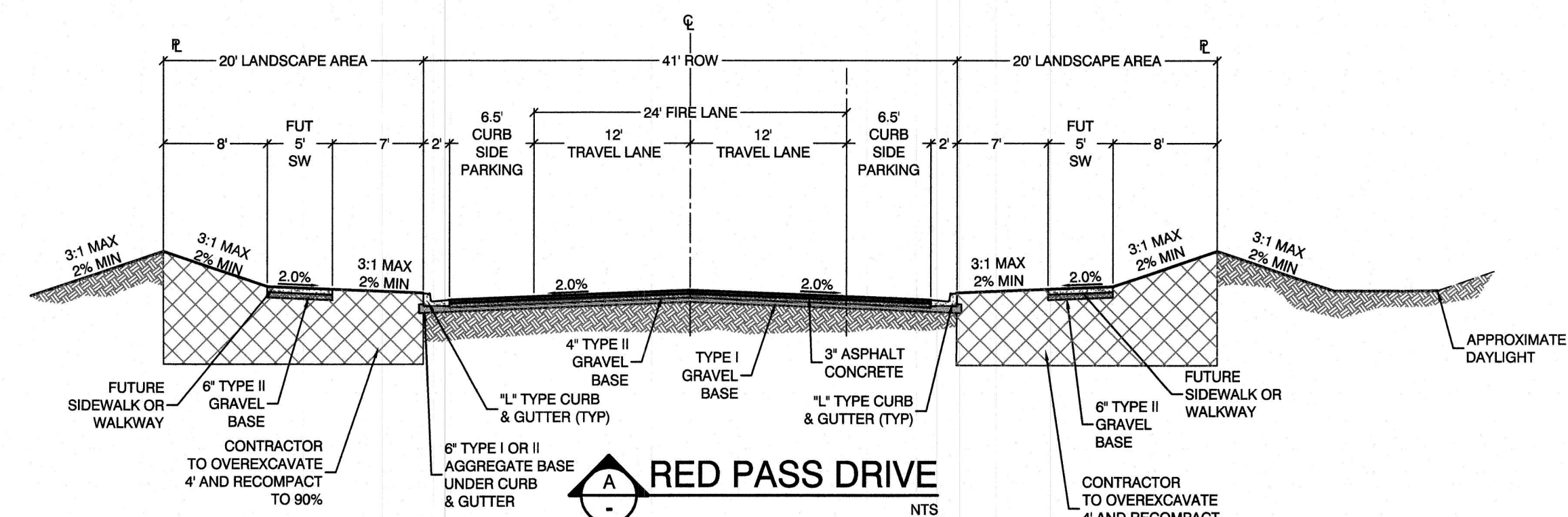
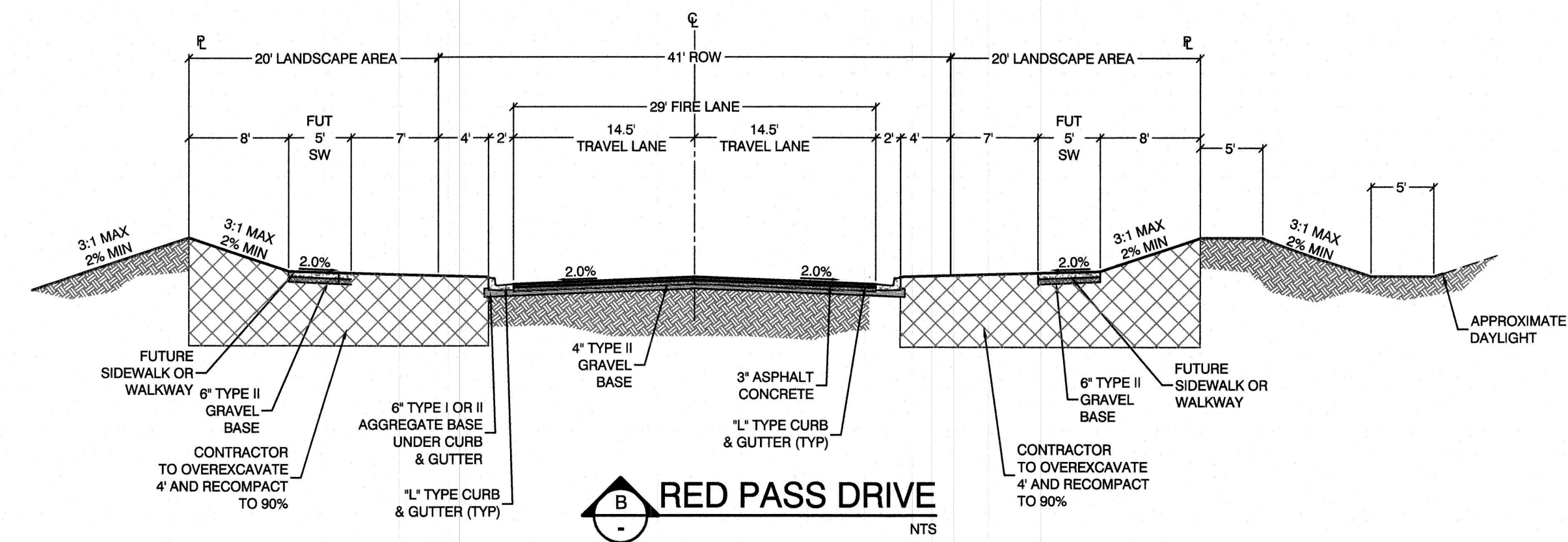
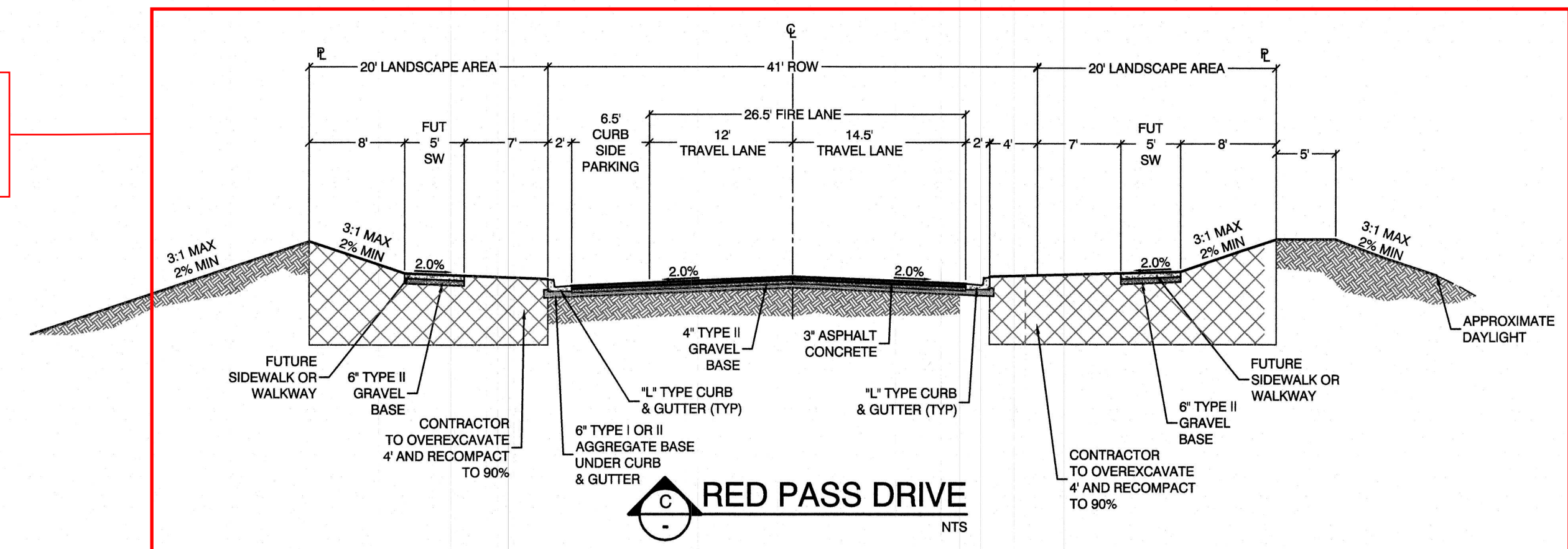
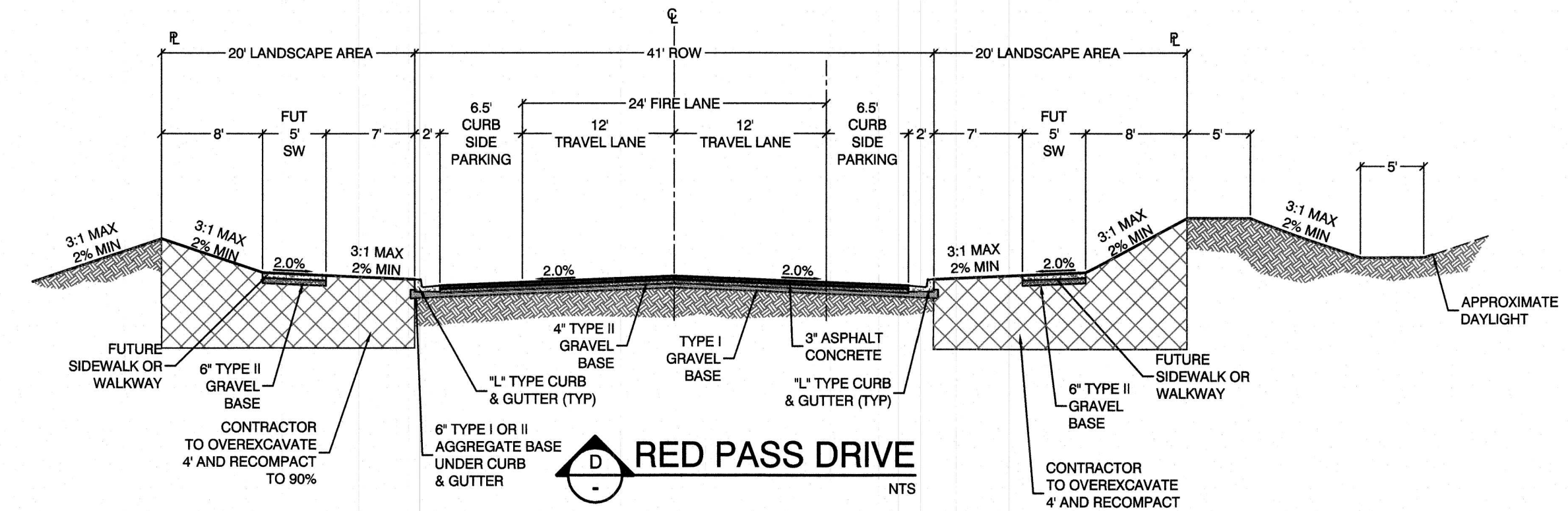
AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.

CALL BEFORE YOU DO OVERHEAD

1-702-227-292



Section adjacent
to project site
with offset crown



HOWARD HUGHES COMPANY, LLC
A DELAWARE LIMITED LIABILITY COMPANY
10801 W CHARLESTON BLVD SUITE 300
LAS VEGAS, NEVADA 89135
702.951.6000

CITY OF LAS VEGAS

DETAIL SHEET 1
SUMMERLIN WEST VILLAGE 21
RED PASS DRIVE DESERT
FOOTHILLS TO CARRIAGE HILL

DRAWN BY: BCC
DESIGNED BY: BCC
CHECKED BY: WJM
PROJECT NO: 7851
SCALE: N/A
HORIZ: VERT:

PROFESSIONAL ENGINEER STATE OF NEVADA
WILLIAM J. MEYER
EXP. 12/31/19
CIVIL
No. 15749
SHEET
DT1
12 OF 25 SHEETS
DRAWING NO.
L19-00453

APPENDIX F

Reference Material

Technical Drainage Study for Summerlin West Village 21 – Clowder

Springs Way (Street D)

by VTN Nevada (DS 5110)

Approval Letters

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		June 10, 2019
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:	
	Summerlin Village 21 – Clowder Spring Way (Street D)	
Cross Streets:	Clowder Springs Way Between Kindle Corner Ave. (St B) & Red Pass Dr. (St C)	COPIES TO: VTN Nevada
File Number:	F:\Depot\DSMemos\DS5110C.doc	Howard Hughes Company, LLC
Parcel Number:	137-26-101-001	Bart Anderson, P.E., DevCo
Zoning Action:		
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES X	NO

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	3/13/2019	4/4/2019	Not Approved	\$400.00	503775: \$400
2 nd Submittal	5/8/2019	5/22/2019	Not Approved	\$400.00	3125696: \$400
3 rd Submittal	6/6/2019	6/10/2019	See Comments Below	\$400.00	3444124: \$400
			TOTAL FEES (LDDRS):	\$1,200.00	----

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.

- The project proposed to construct temporary drainage facilities including drainage berms/swales for the interim protection of the proposed segment of *Clowder Spring Way*. Prior to the final plans approval, the developer must complete a **Maintenance & Liability Agreement** for the interim drainage improvements and post a minimum maintenance bond of \$50,000 or 50-percent of the construction cost for the improvements, whichever is greater. The engineer must submit an estimate of the quantities for constructing the facilities and an exhibit that adequately shows the location and limits of the drainage facilities to *City Flood Control* for approval. Once the drainage study is conditionally approved, the engineer/developer should contact the *City's Land Development Section* (702-229-6371) to begin the agreement process.

In order for the maintenance bond to be released in the future, a drainage update/letter will be required to justify that the berm/swale are no longer necessary and can be removed.

- The subject improvement is premised on the fully developed (ie, constructed) *Desert Foothills Drive* (from *Kindle Corner Ave.* to *Red Pass Dr.*). The subject improvement plans will not be approved prior to the execution of construction bonds of *Desert Foothills Drive* and the associated facilities.

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.

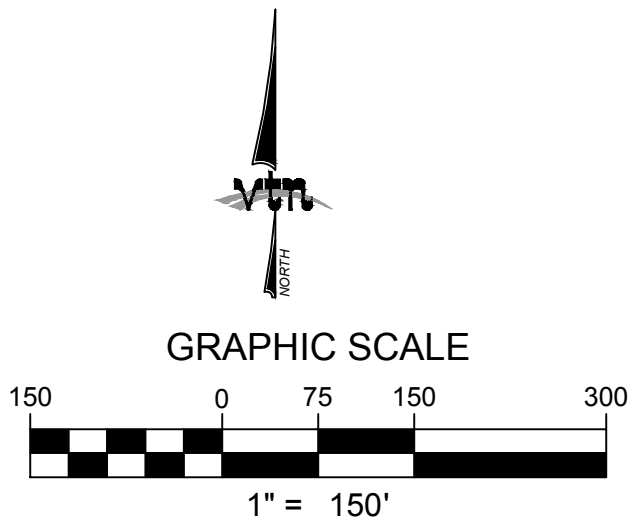
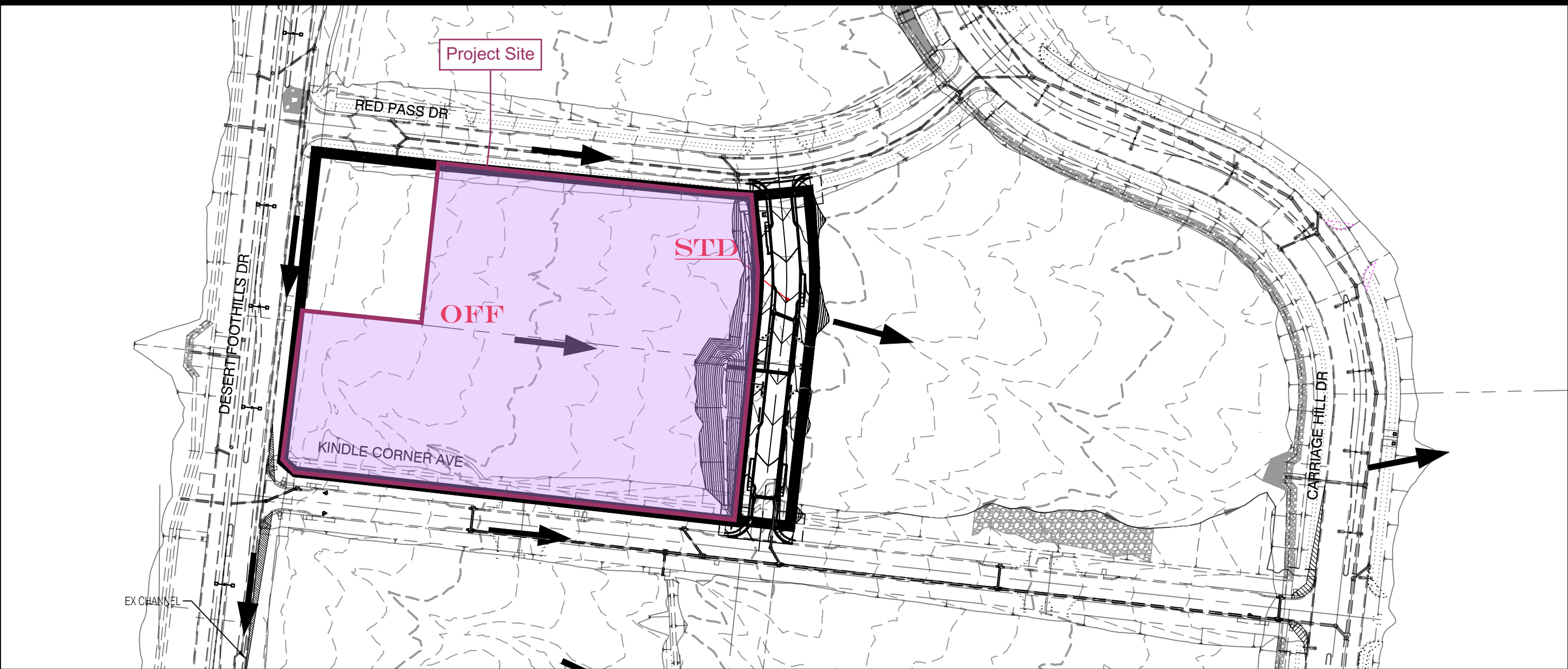
NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Update and accepted by the *City of Las Vegas Flood Control Section*. Additionally, conditional 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: T20S/R59E/26
AREA K-26

Referenced Drainage Exhibits



LEGEND

- CONCENTRATION POINT
- BASIN BOUNDARY
- OFF1** BASIN DESIGNATION
- FLOW ARROW

INTERIM CONDITION HEC-1 SUMMARY TABLE		
BASIN ID	AREA (ac)	Q100 (CFS)
OFF**	6.95	21
STD*	0.88	4

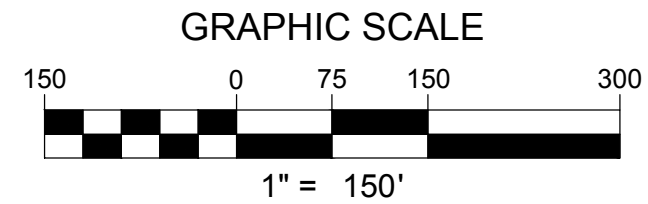
*Referenced from Carriage Hill Study
**Refer to Existing Condition HEC-1 Model

Referenced as project site's
existing drainage condition.

INTERIM CONDITION CHANNEL SUMMARY TABLE									
Channel	Q100 (cfs)	Slope	Normal Depth (ft)	Freeboard Req'd (ft)	Total Depth (ft)	Velocity (ft/s)	Side Slopes	Riprap D50	Description
North Channel (Max)	10.5	3.5%	0.35	1.09	1.4	4.91	3:1	N/A	5' BW Trap Channel
North Channel (Min)	10.5	1.0%	0.50	1.00	1.5	3.22	3:1	N/A	5' BW Trap Channel
South Channel	10.5	1.9%	0.42	1.08	1.5	4.01	3:1	N/A	5' BW Trap Channel

W.O.#:	7851-MISC-29
DATE:	APR 2019
BY:	JYA
SCALE:	1" = 150'
SHEET	OF

FIGURE 7: INTERIM CONDITION BASIN MAP
SUMMERLIN WEST VILLAGE 21
CLOWDER SPRING WAY (KINDLE CORNER TO RED PASS)



- LEGEND
- CONCENTRATION POINT
 - BASIN BOUNDARY
 - ST7** BASIN DESIGNATION
 - - - PRORATED SUBBASIN BOUNDARY
 - CARR-1 PRORATED SUBBASIN DESIGNATION
 - FLOW ARROW
 - ▲ CROSS SECTION

ULTIMATE CONDITION HEC-1 SUMMARY TABLE		
BASIN ID	AREA (ac)	Q100 (CFS)
N*	2.54	10
O*	3.43	13
CNO*	-	23
STD*	0.88	4
CSTD*	-	26

*Referenced from the Carriage Hill Study

ULTIMATE CONDITION STREET FLOW ANALYSIS SUMMARY						
Street Section	Q100 (cfs)	Slope	Velocity (ft/s)	Depth (ft)	V x D	Tributary Basin
1	2	1.60%	2.25	0.25	0.56	1/4STD
2	2	1.60%	2.25	0.25	0.56	1/4STD

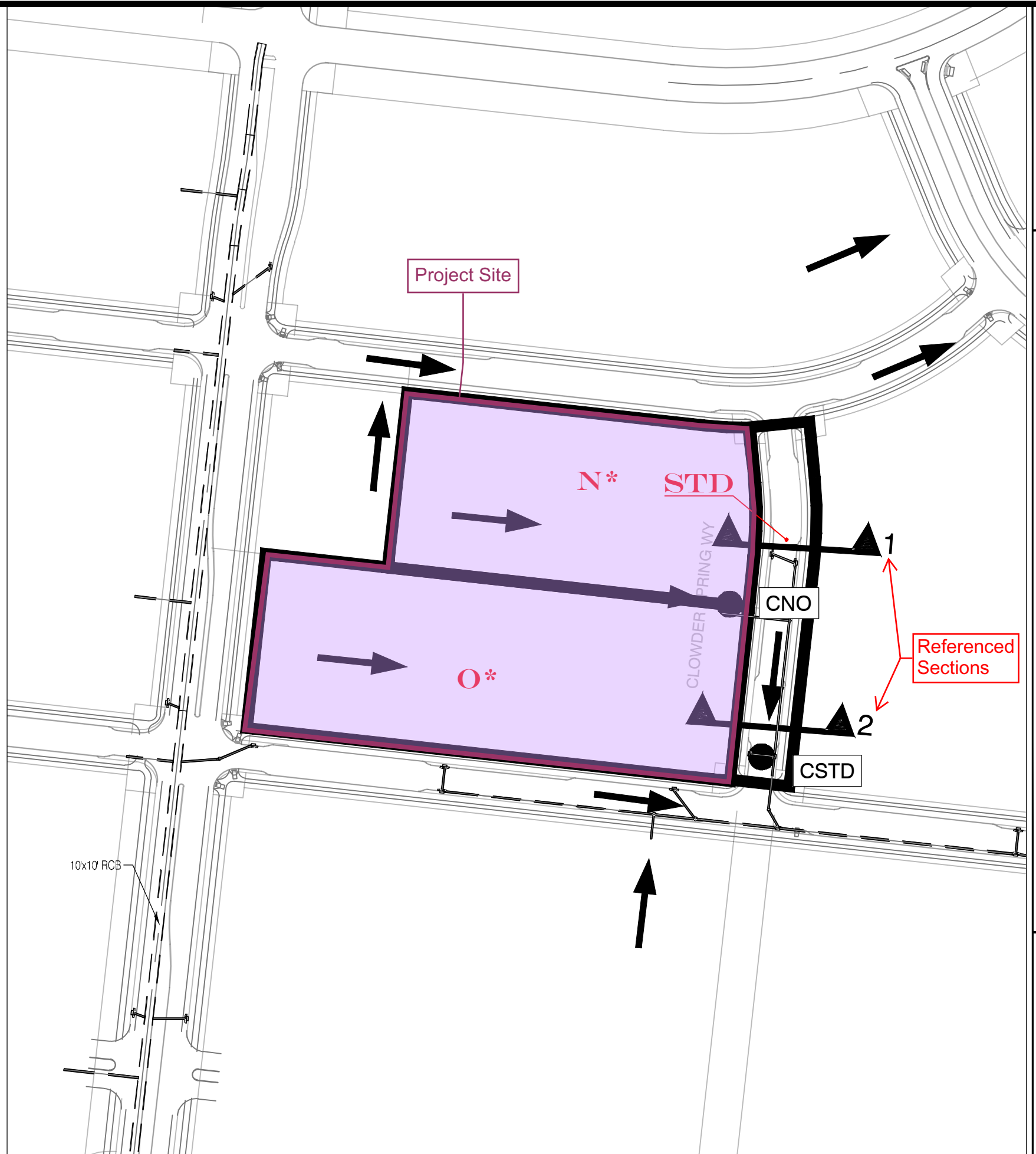
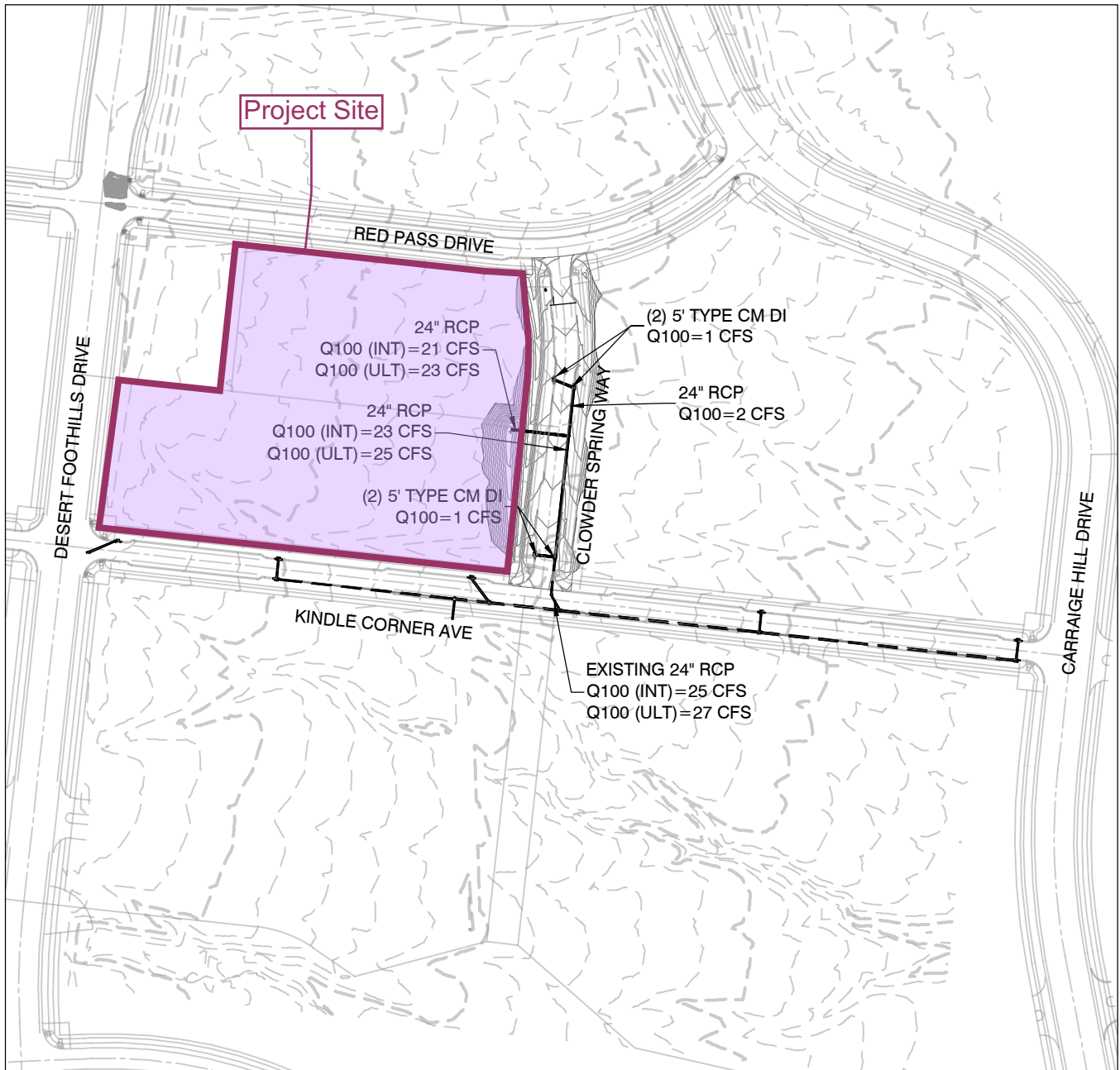
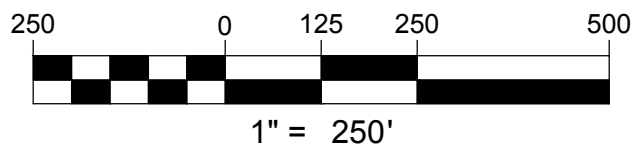


FIGURE 8: ULTIMATE CONDITION BASIN MAP
SUMMERLIN VILLAGE 21
CLOWDER SPRING WAY



GRAPHIC SCALE



H:\7851\Street D\Drainage\2_ADD 1\A Figures\Figure 9 - Facility Map STD.dwg

vtm
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NV 89146-5148

FIGURE 9: PROPOSED STORM DRAIN FACILITY MAP

**SUMMERLIN WEST VILLAGE 21
STREET D**

SCALE	HORZ. 1"=250'
	VERT. N/A
W.O. NO. 7851-MISC- 29	
DRAWN BY: RBR	
DATE: 3/7/2019	
SHEET 1 OF 1	

Referenced Hydraulics

Project Description

Input Data

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

Roughness Segment Definitions

Options

4/30/2019 10:30:49 AM Bentley Systems, Inc. Haestad Methods Solution Center Master V8i (SELECTseries 1) [08.11.01.03] 27 Siemens Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666 Page 1 of 2

Worksheet for Cross Section 1

Results

Normal Depth		0.25	ft
Elevation Range	0.00 to 0.50 ft		
Flow Area		0.89	ft ²
Wetted Perimeter		11.71	ft
Hydraulic Radius		0.08	ft
Top Width		11.12	ft
Normal Depth		0.25	ft
Critical Depth		0.28	ft
Critical Slope		0.00802	ft/ft
Velocity		2.25	ft/s
Velocity Head		0.08	ft
Specific Energy		0.33	ft
Froude Number		1.41	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.25	ft
Critical Depth	0.28	ft
Channel Slope	1.6	%
Critical Slope	0.00802	ft/ft

Cross Section for Cross Section 1

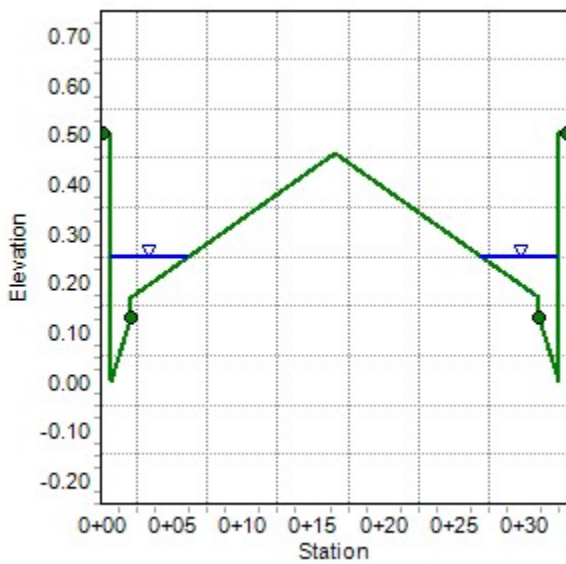
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.6	%
Normal Depth	0.25	ft
Discharge	2.00	ft ³ /s

Cross Section Image



Worksheet for Cross Section 2

Project Description

Friction Method	Manning Formula
-----------------	-----------------

Solve For Normal Depth

Input Data

Channel Slope	1.6	%
---------------	-----	---

Discharge	2.00	ft ³ /s
-----------	------	--------------------

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+16.50	0.46
0+31.00	0.17
0+31.00	0.13
0+32.50	0.00
0+32.50	0.50
0+33.00	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+02.00, 0.13)	0.013
(0+02.00, 0.13)	(0+31.00, 0.13)	0.016
(0+31.00, 0.13)	(0+33.00, 0.50)	0.013

Options

Current Roughness weighted Pavlovskii's Method

Open Channel Weighting Method Pavlovskii's Method

Closed Channel Weighting Method Pavlovskii's Method

Worksheet for Cross Section 2

Results

Normal Depth		0.25	ft
Elevation Range	0.00 to 0.50 ft		
Flow Area		0.89	ft ²
Wetted Perimeter		11.71	ft
Hydraulic Radius		0.08	ft
Top Width		11.12	ft
Normal Depth		0.25	ft
Critical Depth		0.28	ft
Critical Slope		0.00802	ft/ft
Velocity		2.25	ft/s
Velocity Head		0.08	ft
Specific Energy		0.33	ft
Froude Number		1.41	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.25	ft
Critical Depth	0.28	ft
Channel Slope	1.6	%
Critical Slope	0.00802	ft/ft

Cross Section for Cross Section 1

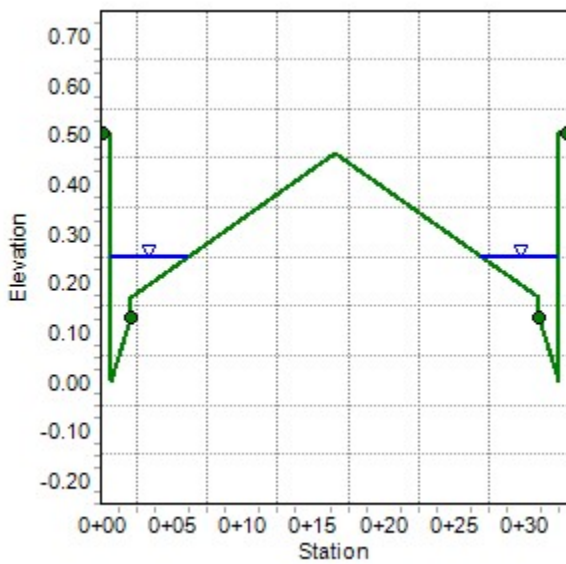
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.6	%
Normal Depth	0.25	ft
Discharge	2.00	ft ³ /s

Cross Section Image



Drop Inlet Interception

Project: SV21 Street D
 Work Order no.: 7851
 Calculated By: JYA
 Date: Apr-19

Inlet ID: All onsite drop inlets
 Drainage Condition: Ultimate 100-Year Storm
 Flow Summary: 1/4STD=1 cfs
 Inlet Description: 5' Type C Modified

Equations referenced from CCRFCD HCDDM and FHWA HEC-22

Input:	Variable:	Input:
Street Flow (cfs)	Q	1.0
Longitudinal Slope (ft/ft)	S _o	0.013
Manning's Coefficient	n	0.016
Street Flow Velocity (fps)	V	2.25
Street Flow Depth (ft)	D	0.25
Street Cross Slope (ft/ft)	S _x	0.02
Grate Width (ft)	W	1.5
Grate Depression (in)	D _g	4
Length of Grate (ft)	L _g	2.5
Length of Curb Opening (ft)	L _c	5
Clogging Factor - Grate (%)	CF _g	50%
Clogging Factor - Curb (%)	CF _c	50%
Effective Grate Length (ft)	L _{ge}	1.25
Effective Curb Opening Length (ft)	L _{ce}	2.5

Output (Grate):	Equation:	Output (Grate):
R _f - Frontal Flow Factor	$1 - 0.09 * (V - V_x)$ if $V > V_x$; else 1	1.00
V _o - Splash Over Velocity (fps)	$p + q * L_{ge} - r * L_{ge}^2 + sy * L_{ge}^3$; where $p=0.30$, $q=4.85$, $r=1.31$, $sy=0.15$ (vane grate)	4.61
E - grate Flow Ratio	Q _w /Q _s	1.34
Q _w - Frontal Flow (cfs)	$Q[1 - (1 - (W/T))^{2.67}]$	0.57
Q _s - Side Flow (cfs)	Q - Q _w	0.43
T - Side Flow Spread (ft)	$1.5 + (D - 0.17) / S_x$	5.50
R _s - Side Flow Factor	$1 / (1 + (0.15 * V^{1.8}) / (S_x * L_{ge}^{2.3}))$	0.05
Q _{gi} - Intercepted Flow (cfs)	$(R_f * E + R_s * (1 - E)) * Q$	1.0

Output (Curb):	Equation:	Output (Curb):
S _e - Equivalent Cross Slope (ft/ft)	S _x + S _g * E	0.32
Q _{sx} - Remaining Flow After Grate Interception (cfs)	Q - Q _{gi}	0.00
S _g - Gutter Cross Slope (ft/ft)	D _g /W	0.22
L _t - Effective Interception Length (ft)	$0.60 * Q_{sx}^{0.42} * S_o^{0.30} [1 / (n * S_e)]^{0.6}$	0.00
Q _{ci} - Intercepted Flow (cfs)	$(1 - (1 - L_{ce} / L_t)^{1.8}) * Q_{sx}$ or Q _{sx} if $L_t < L_{ce}$	0.0

Output (Combination):	Equation:	Output (Combination):
Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	1.0
Bypass Flow (cfs)	Street Flow - Total Intercepted Flow	0.0

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
3317.29	3312.61	4.68	1.83	2.0	1.914187	3317.29	0.98	3318.27

Phi Index

n Value	Phi
0.013	0.004925

$Sf = \frac{\Phi H v}{R^{1.33}}$

$\Phi = \frac{2g (n^2)}{2.21}$

STANDARD FORM 6

DEVELOPMENT:	Clowder Spring Way (Street D)
CALCULATED BY:	RBR WO# 7851-MISC-29
STORM DRAIN SEGMENT:	Mainline
DESCRIPTION:	100-Year Interim Condition

$H_j = (V_2^2 / 2g) - K_j (V_1^2 / 2g)$ $H_m = K_m (V_2^2 / 2g)$ $H_b = K_b (V_2^2 / 2g)$ $H_i = K_i (V_2^2 / 2g)$

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+06.52	2	3312.61	3314.21	39.7	3.14	0.00492	25.0	4.03	7.96	0.98	0.01217	0.01217	0.48						0.48	3318.76	3317.77	Yes	3317.20	3318.76	3317.77
2	SDMH #1	10+06.52	10+06.52	2	3314.21	3314.21	0.0	3.14	0.00492	25.0	N/A	7.96	0.98	0.01217	0.01217	0.00		0.27				0.27	3319.02	3318.04	Yes	3317.04	3319.02	3318.04
3	PIPE	10+06.52	10+67.23	2	3314.21	3314.78	60.7	3.14	0.00492	23.0	0.94	7.32	0.83	0.01030	0.01124	0.68						0.68	3319.71	3318.87	Yes	3317.62	3319.71	3318.87
4	SDMH #2	10+67.23	10+67.23	2	3314.78	3314.78	0.0	3.14	0.00492	23.0	N/A	7.32	0.83	0.01030	0.01030	0.00		0.02				0.02	3319.72	3318.89	Yes	3317.48	3319.72	3318.89
5	PIPE	10+67.23	12+49.34	2	3314.78	3315.93	182.1	3.14	0.00492	21.0	0.63	6.68	0.69	0.00859	0.00945	1.72						1.72	3321.44	3320.75	Yes	3318.62	3321.44	3320.75
6	SDMH #3	12+49.34	12+49.34	2	3315.93	3315.93	0.0	3.14	0.00492	21.0	N/A	6.68	0.69	0.00859	0.00859	0.00		0.92				0.92	3322.37	3321.67	Yes	3318.62	3322.37	3321.67
7	PIPE	12+49.34	13+33.14	2	3315.93	3321.14	83.8	3.14	0.00492	21.0	6.22	6.68	0.69	0.00859	0.00859	0.72						0.72	3323.09	3322.39	Yes	3323.83	3323.83	3323.14
8	STUB	13+33.14	13+33.14	2	3321.14	3321.14	0.0	3.14	0.00492	21.0	N/A	6.68	0.69	0.00859	0.00859	0.00				0.35		0.35	3324.18	3323.49				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole					Bend Losses				Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)	Bend Angle	Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2	36	0.272	0.983	0.267												
3																
4	0	0.020	0.832	0.017												
5																
6	90	1.329	0.694	0.922												
7																
8														0.5	0.694	0.347

HGL Criteria Check			
Segment Description	TMH Elevation	Cover (ft)	Criteria Met?
PIPE			
SDMH #1	3324.1	6.06	Yes
PIPE			
SDMH #2	3324	5.11	Yes
PIPE			
SDMH #3	3326.8	5.13	Yes
PIPE			
STUB	3330.8	7.31	Yes

Box		Elliptical/ Other			#
Span (ft)	Rise (ft)	Rise (ft)	Area (ft²)	Hyd. Rad. (ft)	
					1.00
					1.00
					1.00
					1.00
					1.00
					1.00
					1.00

Stub provided for project site

Referenced Plan Sheets

SHEET INDEX

SHEET #	SHEET	DESCRIPTION	STATION RANGE
CV	1	COVER SHEET	
NT	2	NOTE SHEET	
HC1	3	HORIZONTAL CONTROL 1	
HC2	4	HORIZONTAL CONTROL 2	
MUTSD	5	MASTER UTILITY STORM DRAIN	
MUTSS	6	MASTER UTILITY SANITARY SEWER	
MUTW	7	MASTER UTILITY WATER	
MGRD	8	MASTER GRADING PLAN	
GR1	9	GRADING PLAN 1	
GR2	10	GRADING PLAN 2	
DT1	11	DETAIL SHEET 1	
DT2	12	DETAIL SHEET 2	
DT3	13	DETAIL SHEET 3	
UT1	14	UTILITY PLAN AND PROFILE 1	10+00 TO 13+50
UT2	15	UTILITY PLAN AND PROFILE 2	13+50 TO 16+00
UT3	16	UTILITY PLAN AND PROFILE 3	
UT4	17	UTILITY PLAN AND PROFILE 4	
UT5	18	UTILITY PLAN AND PROFILE 5	
UT6	19	UTILITY PLAN AND PROFILE 6	
UT7	20	UTILITY PLAN AND PROFILE 7	
TR1	21	TRAFFIC AND STREET LIGHTING PLAN 1	
S1	22	DROP INLET STRUCTURAL DETAILS	

SUMMERLIN WEST VILLAGE 21

CLOWDER SPRING WAY

KINDLE CORNER AVENUE TO RED PASS DRIVE

APN: 137-26-101-001

CITY OF LAS VEGAS

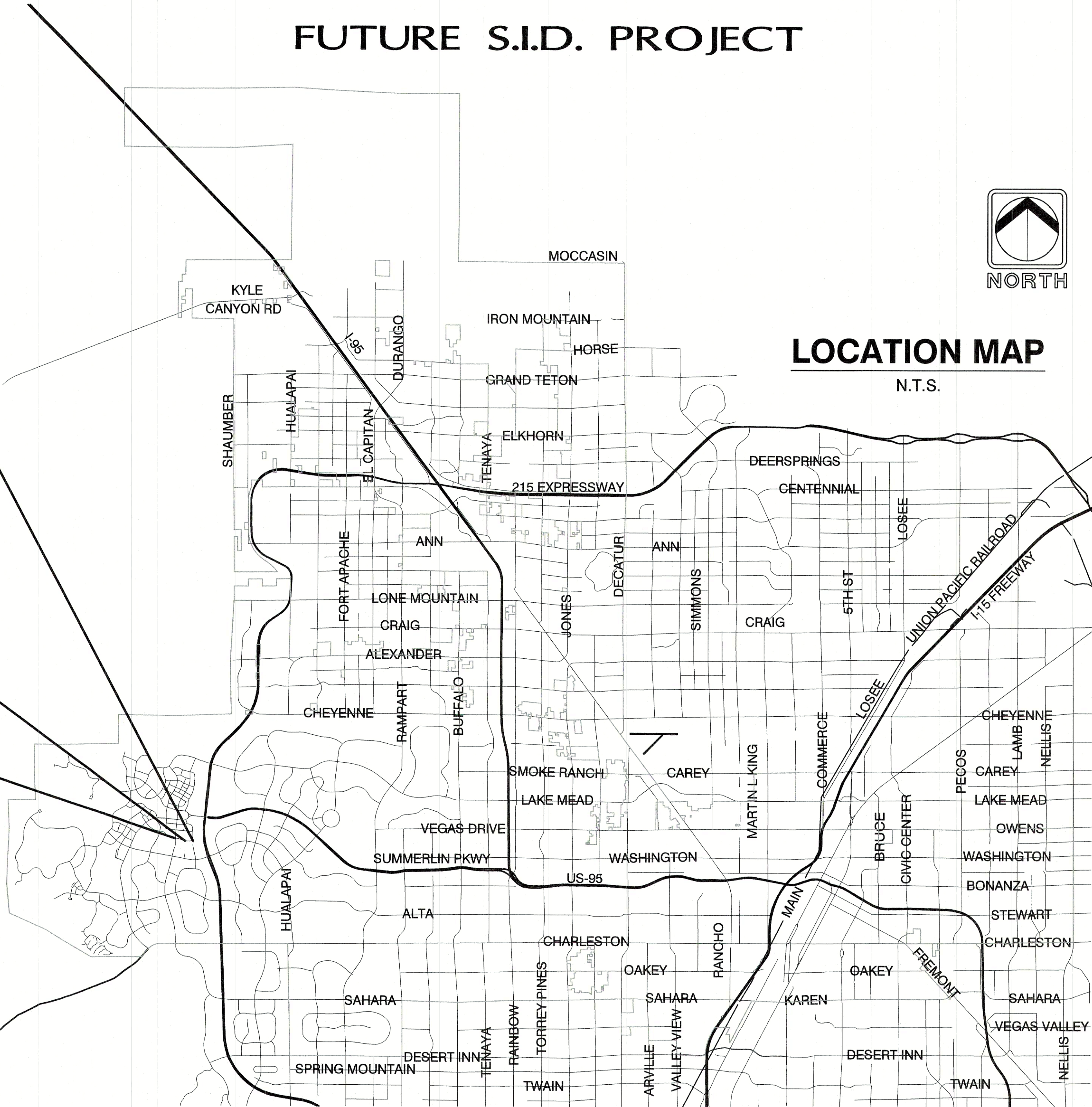
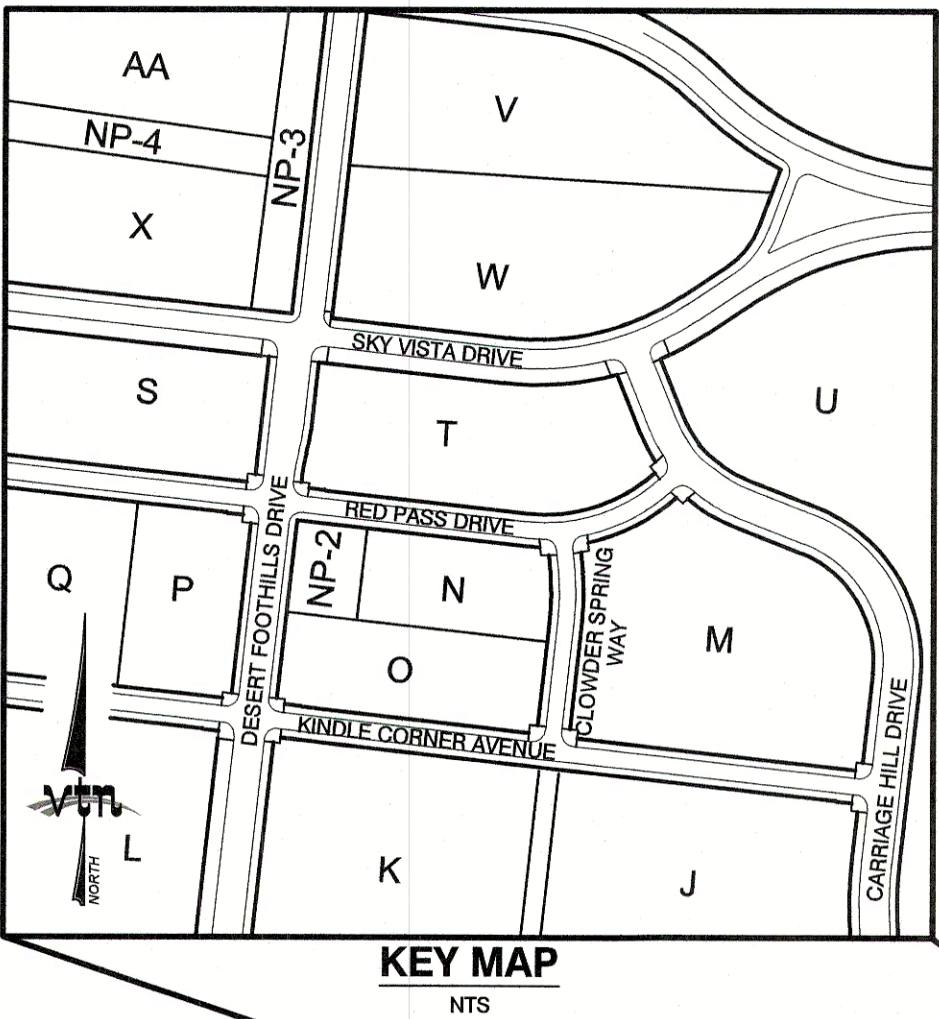
STATE OF NEVADA

DEVELOPED BY:

HOWARD HUGHES COMPANY, LLC
A DELAWARE LIMITED LIABILITY COMPANY

10801 W CHARLESTON BLVE SUITE 300
LAS VEGAS, NEVADA 89135
702-791-4000

FUTURE S.I.D. PROJECT



LOCATION MAP

N.T.S.

BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983, SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

LINEAR UNIT: US SURVEY FOOT (FT/US)

DATUM (REFERENCE FRAME): NAD 83 (2011) EPOCH 2010.00

SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)

ZONE: LAS VEGAS HIGH ELEVATION ZONE

PROJECTION: TRANSVERSE MERCATOR
STANDARD PARALLEL (AND LATITUDE OF GRID ORIGIN): 36°15'00"N
LONGITUDE OF CENTRAL MERIDIAN: 114°58'00"W
NORTHING AT GRID ORIGIN: 400,000.00 M (1,312,333.3333 FT/US)
EASTING AT CENTRAL MERIDIAN: 300,000 M (984,250.0000 FT/US)
SCALE FACTOR ON CENTRAL MERIDIAN: 1.000135 (EXACT)

BENCHMARK

PROJECT DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD83)

CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
NAVD83 ELEVATION: 989.574 METERS (3,246.63 FEET)

END USCGAS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S, R99E, S03

NOTES:

1. ALL DISTANCES AND BEARINGS SHOWN HEREON ARE PROJECTED (GRID) VALUES BASED ON THE PRECEDING PROJECTION DEFINITION. THE PROJECTION WAS DEFINED SUCH THAT PROJECTED (GRID) DISTANCES ARE EQUIVALENT TO "GROUND" DISTANCES IN THE PROJECT AREA.

2. GRID BEARINGS SHOWN HEREON (OR IMPLIED BY GRID COORDINATES) DO NOT EQUAL GEODETIC BEARINGS DUE TO MERIDIAN CONVERGENCE.

THESE PLANS AND THE DESIGN CRITERIA CONTAINED WITHIN THESE PLANS ARE BASED UPON THE INFORMATION PRESENTLY KNOWN BY THE ENGINEER. ALL CONSTRUCTION SHALL BE IN CONFORMANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL STATUTES, LAWS, CODES, REGULATIONS AND ORDINANCES, INCLUDING BUT NOT LIMITED TO THE FEDERAL FAIR HOUSING AMENDMENTS ACT, AMERICANS WITH DISABILITIES ACT, THE ARCHITECTURAL BARRIERS ACT AND ANY APPLICABLE UNIFORM STANDARDS, SPECIFICATIONS OR DRAWINGS. THE PERSON OR ENTITY PERFORMING THE CONSTRUCTION SHALL BE SOLELY RESPONSIBLE TO MAKE SURE CONSTRUCTION IS IN CONFORMANCE WITH ALL LOCAL, STATE AND FEDERAL STATUTES, LAWS, CODES, REGULATIONS, STANDARDS, GUIDELINES AND ORDINANCES AND FURTHER, IS IN CONFORMANCE WITH ANY APPLICABLE DESIGN CRITERIA, INCLUDING BUT NOT LIMITED TO SOILS REPORTS, TRAFFIC STUDIES, GEOTECHNICAL REPORTS, ARCHITECTURAL PLANS AND SPECIFICATIONS, DRAINAGE PLANS OR STUDIES AND ANY OTHER CRITERIA, STANDARDS OR REQUIREMENTS LISTED IN THE PLANS OR THE GENERAL NOTES RELATED TO THESE PLANS OR PROVIDED BY ANYONE IN REFERENCE TO THIS PROJECT.

APPROVALS

CITY ENGINEER ALLEN PAVELKA, P.E. # 9029

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

PLANNING DEPARTMENT, CITY OF LAS VEGAS DATE

THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE PLANNING AND DEVELOPMENT DEPARTMENT

CENTRAL TELEPHONE COMPANY d/b/a CENTURYLINK DATE

"THE AFFIXED CENTURY LINK NEVADA APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUTES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS."

NV ENERGY DATE

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

COX COMMUNICATIONS LAS VEGAS, INC. DATE

SOUTHWEST GAS CORPORATION DATE

LAS VEGAS FIRE & RESCUE DATE

LAS VEGAS VALLEY WATER DISTRICT

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

PROJECT NO.: FIRST APPROVED DATE:

LVVWD APPROVED FIRE FLOW 1,500 GPM / ON SITE N/A GPM

SHEETS: CV, NT, MUTSS, MUTSD, MUTW, UT1-UT7

KEVIN T. ORROCK, VICE PRESIDENT DATE

HOWARD HUGHES COMPANY, LLC
A DELAWARE LIMITED LIABILITY COMPANY

OWNER
HOWARD HUGHES COMPANY, LLC
A DELAWARE LIMITED LIABILITY COMPANY
10801 W CHARLESTON BLVE SUITE 300
LAS VEGAS, NEVADA 89135
702-791-4000

DEVELOPER
HOWARD HUGHES COMPANY, LLC
A DELAWARE LIMITED LIABILITY COMPANY
10801 W CHARLESTON BLVE SUITE 300
LAS VEGAS, NEVADA 89135
702-791-4000

ENGINEERING FIRM
VTN
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PH. (702) 875-7550
FAX (702) 362-2597

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.

CALL BEFORE YOU DIG

1-702-227-2929

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

811

1-800-227-2600
OR
1-702-455-7511
CLARK COUNTY TRAFFIC OPERATIONS

AVOID HITTING UNDERGROUND TRAFFIC SIGNALS AND STREET LIGHTS. IT'S COSTLY.

Call before you Dig

1-702-455-7511
CLARK COUNTY TRAFFIC OPERATIONS
LAS VEGAS AREA COMPREHENSIVE TRAFFIC SYSTEM

FIRE DEPARTMENT APPROVAL

APPROVAL BY THE FIRE DEPARTMENT HAVING JURISDICTION IS REQUIRED PRIOR TO OBTAINING FINAL APPROVAL FROM THE LVVWD.

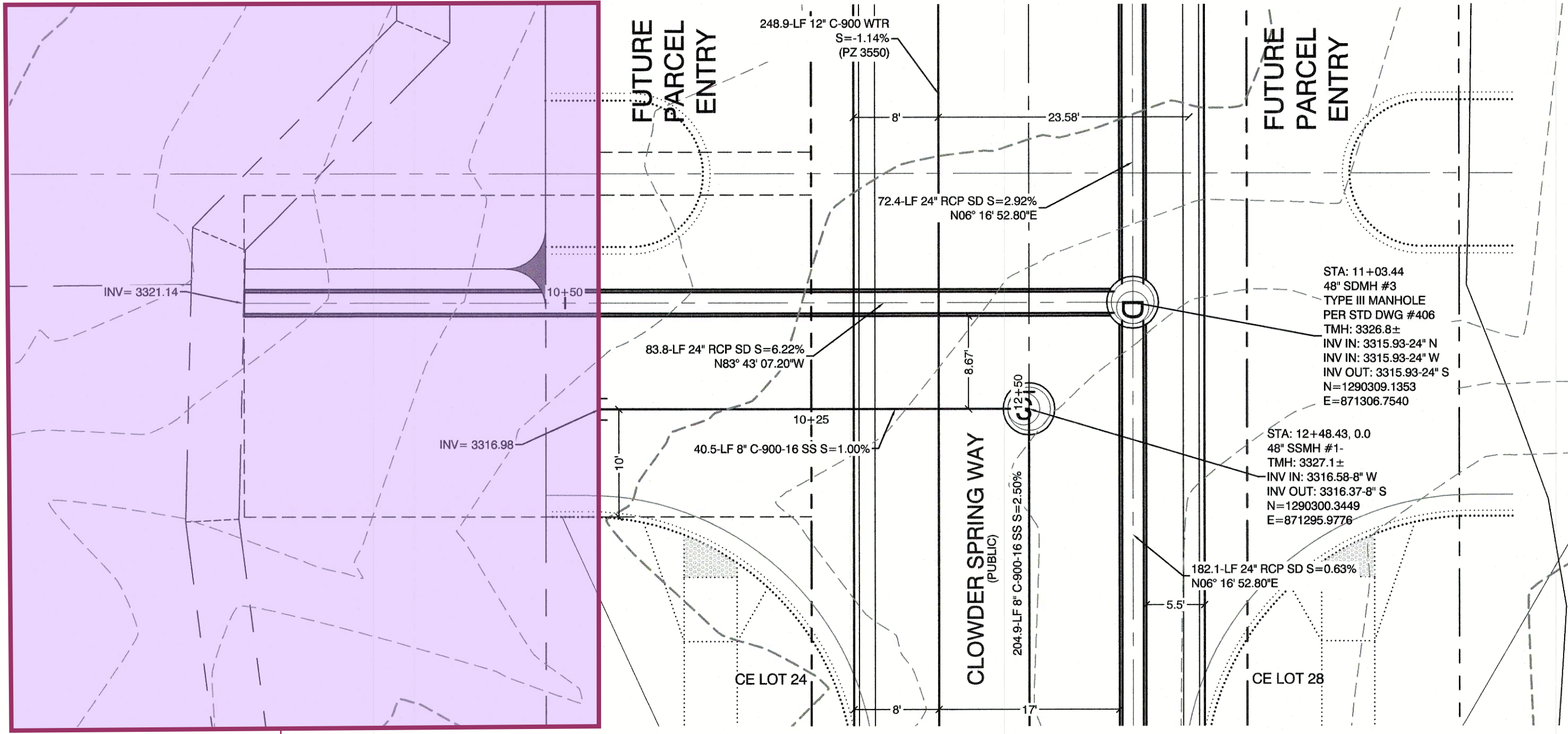
HOWARD HUGHES COMPANY, LLC
A DELAWARE LIMITED LIABILITY COMPANY
10801 W CHARLESTON BLVE SUITE 300
LAS VEGAS, NEVADA 89135
702-791-4000

COVER SHEET
SUMMERLIN WEST VILLAGE 21
CLOWDER SPRING WAY
KINDLE CORNER AVENUE TO RED PASS DRIVE

DRAWN BY: KTC
DESIGNED BY: DEH
CHECKED BY: WJM
PROJECT NO.: 7651
SCALE: N/A
DATE: 10/01/2018
DATE: 10/01/2018
DATE: 06/06/2019

PROFESSIONAL ENGINEER STATE OF NEVADA
No. 18745
6/6/19
WILLIAM J. MEYER
EXP. 12/31/19
CIVIL

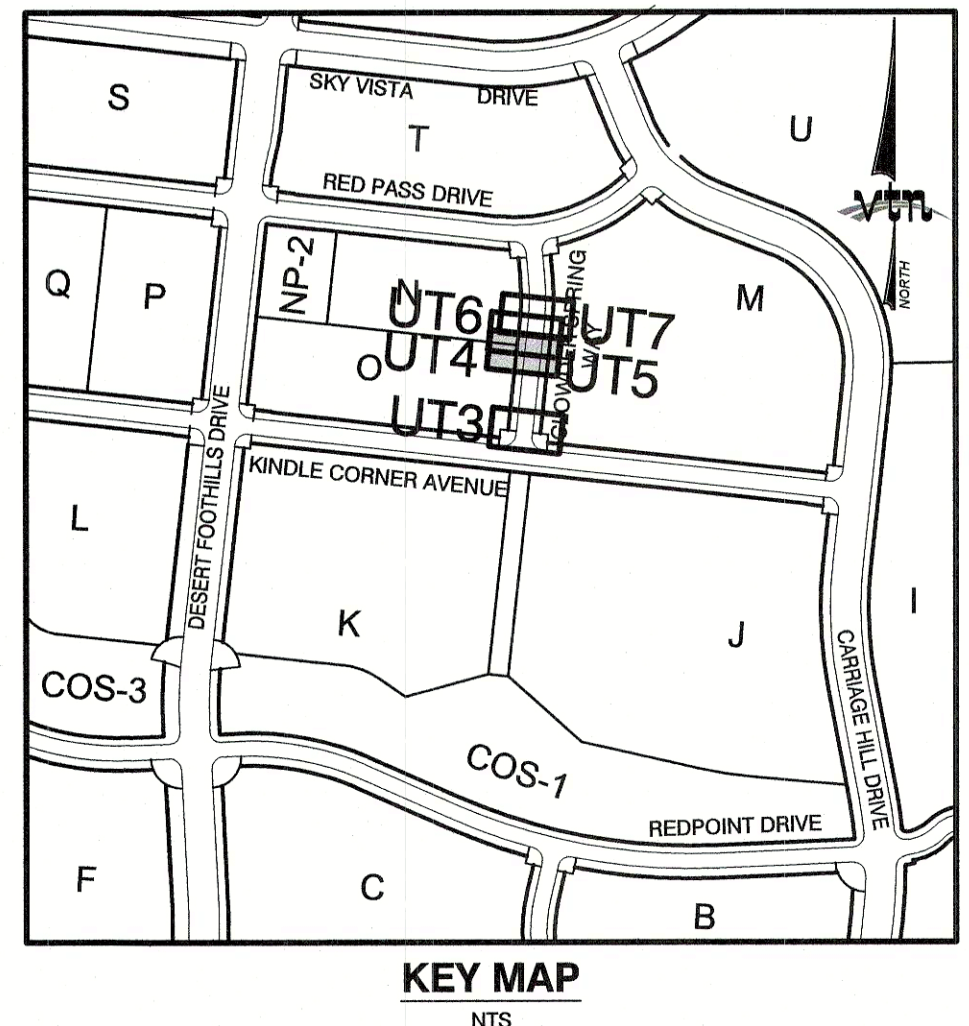
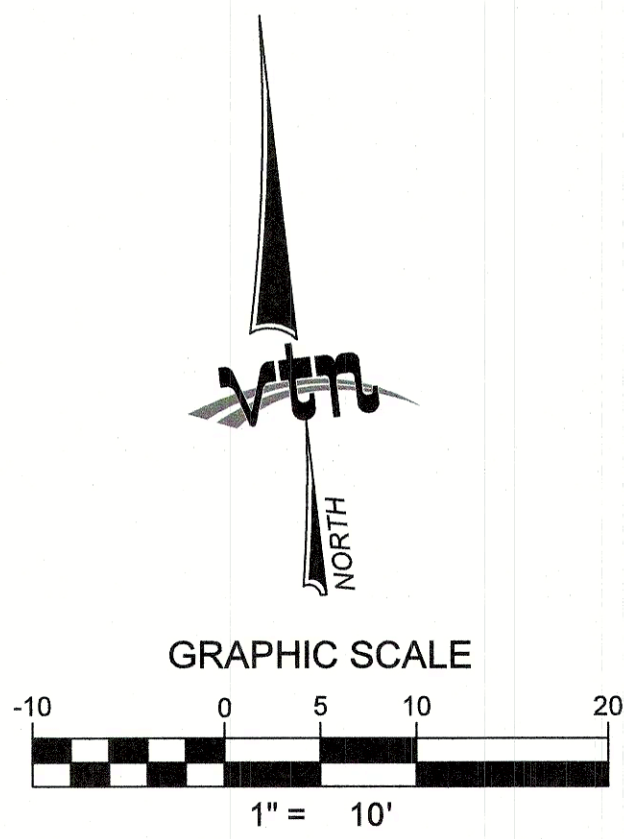
SHEET **CV**
1 OF 22 SHEETS
DRAWING NO.



Project Site

CROWDER SPRING WAY
STA:12+58.35
SD LATERAL
(PUBLIC)

PROFILE SCALES:
HORIZ. = 1"=10'
VERT. = 1"=4'



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

811
OR
1-800-227-2600
AND
1-702-455-8000
CLARK COUNTY TRAFFIC OPERATIONS

Call before you Dig
Underground
1-702-455-5111
CLARK COUNTY TRAFFIC OPERATIONS

Call before you Dig
Overhead
1-702-227-2929
LAS VEGAS AREA COMPRESSOR TRAFFIC SYSTEM

- WATER PRESSURE ZONE:**
WATER SERVICE LOCATED IN THE 3550 PRESSURE ZONE.
- WATER MAIN COVER NOTE:**
ALL NEW WATER MAIN TO HAVE MINIMUM DEPTH OF COVER PER UDACS SECTION 2.08
- WATERLINE TRENCH NOTE:**
CONSTRUCT WATERLINE TRENCH SECTION AND BACKFILL PER UDACS PLATE NO. 17.
- WATER LINE MARKER BALLS NOTE:**
INSTALL PIPELINE MARKER BALLS IN TRENCH ABOVE EACH HORIZONTAL ELBOW FITTING, PER UDACS PLATE No. 15

- FIRE HYDRANT MARKER NOTES**
BLUE COLORED REFLECTIVE RAISED PAVEMENT MARKERS ARE TO BE INSTALLED:
1. ON ROADWAYS WITH NO PARKING PERMITTED ON HYDRANT SIDE; LOCATE MARKER 8' FROM FACE OF CURB ON HYDRANT SIDE.
2. ON ROADWAYS WITH PARKING PERMITTED ON HYDRANT SIDE; LOCATE MARKER 16' FROM FACE OF CURB ON HYDRANT SIDE.

- WATER MAIN JOINT DEFLECTION**
PVC PIPE SHALL BE DEFLECTED AT THE JOINT ONLY. THE MAXIMUM ALLOWABLE DEFLECTION SHALL BE ONE (1) DEGREE PER JOINT WITH A MINIMUM RADIUS OF CURVATURE OF 1,150 FEET, PER UDACS 2.07.01 AND 2.07.02.
FOR CHANGES IN DIRECTION EXCEEDING THE MAXIMUM ALLOWABLE JOINT DEFLECTION, FITTINGS SHALL BE USED.

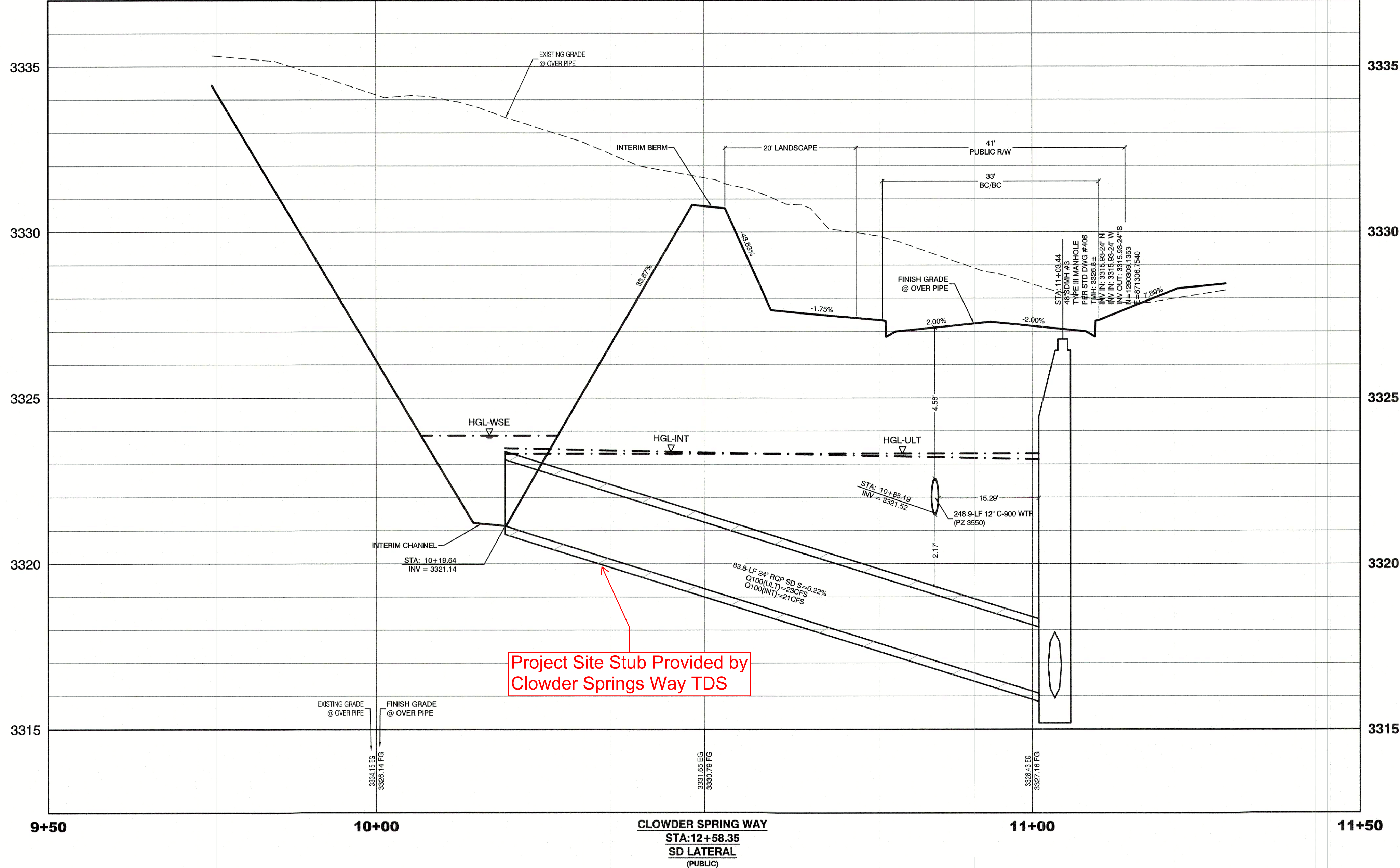
- UTILITY CROSSING NOTE:**
ALL SEWER/STORM DRAINS CROSSING WATER LINES MUST CONFORM TO SECTION 2.22 OF UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR PORTABLE WATER SYSTEMS (UDACS) FOR WATER AND STORM MAIN CROSSINGS AND CLEARANCES.

- ENGINEER DISCLAIMER NOTE:**
UTILITY LOCATIONS SHOWN HERE ON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UNDERGROUND AND OVERHEAD UTILITIES AND NOTIFY THE DESIGN ENGINEER IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HERE ON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

LAS VEGAS FIRE & RESCUE APPROVAL
BY: _____ DATE: _____
APPROVAL OF THESE PLANS SHALL NOT BE CONSTRUED TO BE A PERMIT FOR, OR AN APPROVAL OF, ANY VIOLATION OF ANY OF THE PROVISIONS OF THE STATE OR COUNTY LAWS. FIRE FLOW 1,500 GPM AT 20 P.S.I. RESIDUAL.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
PROJECT:----- FIRST APPROVED DATE:-----
LVVWD APPROVED FIRE FLOW: TOTAL 1500 GPM/ONSITE N/A GPM



Project Site Stub Provided by
Crowder Springs Way TDS

CONSTRUCTION NOTES	
WATER	PUBLIC
	FIRE HYDRANT ASSEMBLY: INCLUDING 12"x6" TEE WITH 6" G.V. (PER UDACS PLATE 39 & 40) 1 EA.
	12" GATE VALVE (PER UDACS PLATE 30 & 39) 2 EA.
	12" 5" BEND (PER UDACS PLATE 31) 2 EA.
	12"x12" TEE (PER UDACS PLATE 31) 1 EA.
	12" CAP & BLOW OFF (PER UDACS PLATE 36) 1 EA.
	12" C900 WATER MAIN PER UDACS 2.06.01 & PLATE 17 529 LF.
	WATER POINT OF CONNECTION
SEWER	PUBLIC
	STANDARD MANHOLE PER SD-1 & SD-4 W/ SINGLE 24" DIAMETER MANHOLE COVER (UNLESS NOTED OTHERWISE) 1 EA.
	8" C-900-16 SANITARY SEWER MAIN 245 LF.
	SEWER POINT OF CONNECTION

HOWARD HUGHES COMPANY, LLC
A DELAWARE LIMITED LIABILITY COMPANY
10801 W CHARLESTON BLVD SUITE 300
LAS VEGAS, NEVADA 89135
702.791.6000

CITY OF LAS VEGAS

UTILITY PLAN AND PROFILE 4
STORM DRAIN LATERAL

SUMMERLIN WEST VILLAGE 21
CROWDER SPRING WAY
KINDLE CORNER AVENUE TO RED PASS DRIVE

DRAWN BY:
BCC

DESIGNED BY:
BCC

CHECKED BY:
NMM

PROJECT NO:
7851

11/14/2018

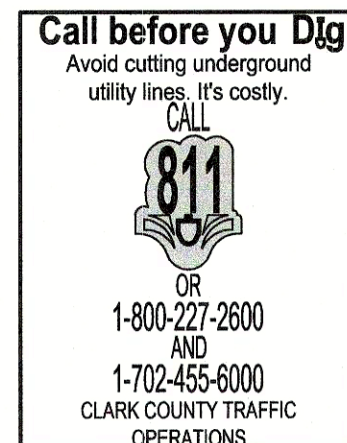
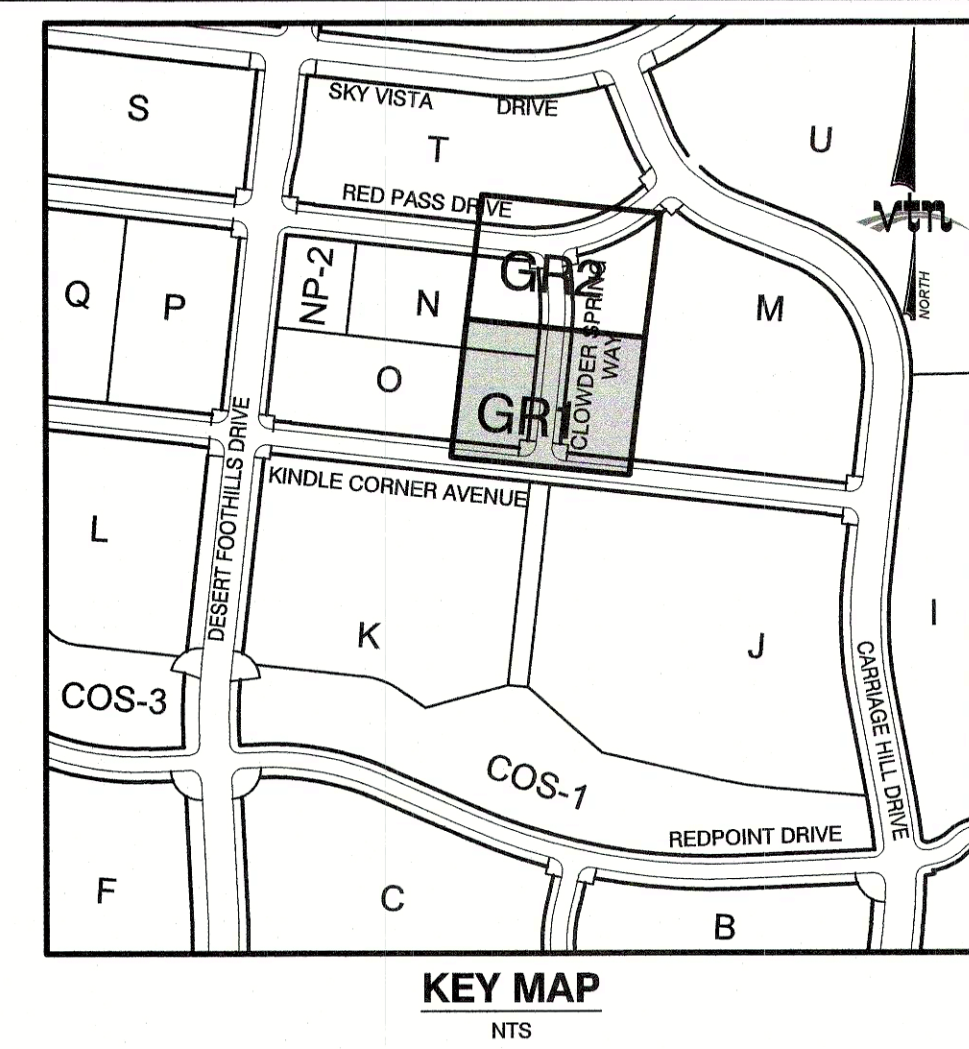
11/14/2018

08/06/2019

SCALE: 1"=10' HORIZ.
1"=4' VERT.

PROFESSIONAL ENGINEER - STATE OF NEVADA
No. 15745
WILLIAM J. MEYER
CIVIL
6/6/19

SHEET
UT4
17 OF 22 SHEETS
DRAWING NO.



- ## **CONSTRUCTION NOTES**
- | | |
|---|---|
|  | CONSTRUCT 24" TYPE 1" CURB & GUTTER
PER STD. DWG. 216. |
|  | FUTURE SIDEWALK |
|  | CONSTRUCT HANDICAP RAMP SEE SHEET DT2 & DT3 |
|  | SAWCUT AND REMOVE ASPHALT PAVING AND MATCH
WITH NEW CONSTRUCTION PER C/AUSD #500.5 & #503. |
|  | FIELD VERIFY AND MATCH EXISTING |

GRADING PERMIT NOTE	
THIS GRADING PERMIT DOES NOT INCLUDE THE CONSTRUCTION OF RETAINING WALLS AND OTHERS STRUCTURES. SEPARATE PERMITS AND APPLICATIONS ARE REQUIRED FOR THESE.	

GEOTECHNICAL NOTE:
REFER TO SOILS REPORT: NOVA GEOTECHNICAL
PROJECT #G-18-003, DATED MARCH 5, 2018

GRADING NOTE:	
ALL OFFSITE INTERIM FLOOD CONTROL FACILITIES SUCH AS BUT NOT LIMITED TO BERMS / DITCHES AND A TEMPORARY LOCAL MINOR SEDIMENT BASIN ARE PRIVATELY OWNED AND TO BE PRIVATELY MAINTAINED BY HOWARD HUGHES COMPANY.	

SIGHT VISIBILITY ZONES:
NO STRUCTURE, WALLS, VEGETATION, OR OBJECT OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY ZONES.

ENGINEER DISCLAIMER NOTE:

UTILITY LOCATIONS SHOWN HERE ON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UNDERGROUND AND OVERHEAD UTILITIES AND NOTIFY THE DESIGN ENGINEER IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HERE ON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

WILLIAM J MEYER, P.E. No. 15745 DATE 6/6/19

HOWARD HUGHES COMPANY, LLC
A DELAWARE LIMITED LIABILITY COMPANY
 1000 LAS VEGAS BLVD., SUITE 300
 LAS VEGAS, NEVADA 89135
 702-791-4000

2727 SOUTH RAINBOW BOULEVARD
 LAS VEGAS, NEVADA 89146-5148
 PH. (702) 872-7650 FAX. (702) 362-2597 WEB. WWW.VTNV.COM

CONSULTING ENGINEERS • PLANNERS • LAND SURVEYORS

vin

CITY OF LAS VEGAS

GRADING PLAN 1

SUMMERLIN WEST VILLAGE 21
CLOWDER SPRING WAY
KINDLE CORNER AVENUE TO RED PASS DRIVEWAY

DRAWN BY: BCC	10/1/2018
DESIGNED BY: DEH	10/1/2018
CHECKED BY: WJM	06/08/2019
PROJECT NO: 7851	SCALE: 1"=30' HORIZ: N/A VERT:

WILLIAM J. MEYER
EXP. 12/31/19
CIVIL
No. 19745

6/6/18

SHEET
GR1
9 OF 22 SHEETS
DRAWING NO.

APN:137-26-101-001
PARCEL N
FINAL MAP
BOOK _____
PAGE _____

STA: 13+43.54
5' MODIFIED TYPE C DROP INLET
PER COALSD #412.1 & #421
TC: 3328.8±
INV OUT: 3318.46-24" SE
N=1290396.5545
E=871288.9275

APPROXIMATE DAYLIGHT

CE LOT 23

CE LOT 24

CE LOT 28

CE LOT 29

CLOWDER SPRING WAY

RED PASS DRIVE (EXISTING PUBLIC)

APN:137-26-101-001
PARCEL T
FINAL MAP
BOOK _____
PAGE _____

STA: 26+19.79
EX. DROP INLET
TMH: 3336.2±
INV OUT: (3336.73-24" SE)
N=1290393.9854
E=871217.9183

STA: 26+41.91
EX. 48" SDMH
TMH: 3334.8±
INV IN: (3324.18-24" W)
INV IN: (3324.18-24" NW)
INV IN: (3324.18-24" S)
INV OUT: (3324.18-24" E)
N=1290596.3724
E=871238.4089

STA: 27+11.31
EX. 48" SDMH
TMH: 3331.6±
INV IN: (3320.81-24" W)
INV OUT: (3320.81-24" E)
N=1290697.6173
E=871308.5552

STA: 29+10.94
EX. 48" SDMH
TMH: 3323.0±
INV IN: (3311.44-24" SW)
INV OUT: (3311.44-24" NE)
N=1290661.7577
E=871501.5510

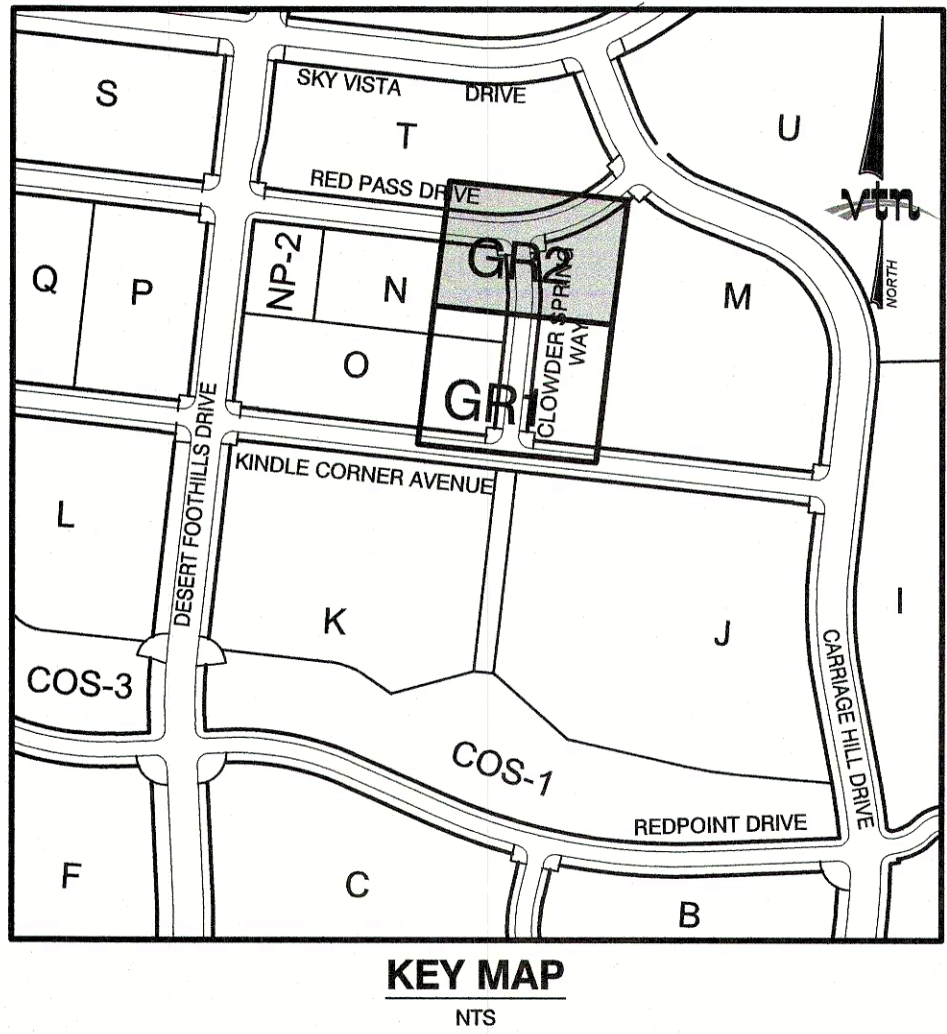
APN:137-26-101-001
PARCEL M
FINAL MAP
BOOK _____
PAGE _____

STA: 13+35.32
5' MODIFIED TYPE C DROP INLET
PER COALSD #412.1 & #421
TC: 3328.8±
INV OUT: 3318.14-24" SW
N=1290394.9064
E=871191.8851

STA: 13+30.73
48" SDMH #4
TYPE III MANHOLE
PER STD DWG #406
TMH: 3326.3±
INV IN: 3318.04-24" NE
INV IN: 3318.04-24" NW
INV OUT: 3318.04-24" S
N=1290361.0889
E=871314.6741

STA: 28+31.86
EX. 48" SDMH
TMH: 3326.1±
INV IN: (3316.83-24" W)
INV OUT: (3316.83-24" NE)
N=1290624.3415
E=871429.3245

EX. 77.2 LF 24" RCP SD S=6.62%



KEY MAP
NTS

CALL
811

1-800-227-2600
AND
1-702-455-6000
CLARK COUNTY TRAF
OPERATIONS

CONSTRUCTION NOTES

- | | |
|---|---|
|  | CONSTRUCT 24" TYPE "L" CURB & GUTTER
PER STD. DWG. 216. |
|  | FUTURE SIDEWALK |
|  | CONSTRUCT HANDICAP RAMP SEE SHEET DT2 & DT3 |
|  | SAWCUT AND REMOVE ASPHALT PAVING AND MATCH
WITH NEW CONSTRUCTION PER CCAUD #500.5 & #503 |
|  | FIELD VERIFY AND MATCH EXISTING |

GRADING PERMIT NOTE

THIS GRADING PERMIT DOES NOT INCLUDE THE CONSTRUCTION OF RETAINING WALLS AND OTHERS STRUCTURES. SEPARATE PERMITS AND APPLICATIONS ARE REQUIRED FOR THESE.

GEOTECHNICAL NOTE:

REFER TO SOILS REPORT: NOVA GEOTECHNICAL
PROJECT #G-18-003, DATED MARCH 5, 2018

GRADING NOTE:

ALL OFFSITE INTERIM FLOOD CONTROL FACILITIES SUCH AS BUT NOT LIMITED TO BERMS / DITCHES AND A TEMPORARY LOCAL MINOR SEDIMENT BASIN ARE PRIVATELY OWNED AND TO BE PRIVATELY MAINTAINED BY HOWARD HUGHES COMPANY.

SIGHT VISIBILITY ZONES:

NO STRUCTURE, WALLS, VEGETATION, OR OBJECT OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY ZONES.

ENGINEER DISCLAIMER NOTE:

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

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE
APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE WITH
CITY OF LAS VEGAS, #DS5110A

With 1 Meyer 6/6/19

**HOWARD HUGHES COMPANY, LLC
A DELAWARE LIMITED LIABILITY COMPANY**

GRADING PLAN 2

**SUMMERLIN WEST VILLAGE 21
CLOWDER SPRING WAY**

2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PH. (702) 873-7550 FAX (702) 362-2597 WEB WWW.VTNNV.COM
CONSULTING ENGINEERS • PLANNERS • LAND SURVEYORS

DRAWN BY:

DESIGNED BY:

CHECKED BY: _____

PROJECT NO. SCALE:

Professional Engineer - State of Nevada
WILLIAM J. MEYER
EXP: 12/31/19
CIVIL
No. 15745
6/6/19
SHEET
GR2
10 OF 22 SHEETS
DRAWING NO.

APPENDIX G

Zoning and Planning Conditions



**LAS VEGAS
CITY COUNCIL**

CAROLYN G. GOODMAN
Mayor

STAVROS S. ANTHONY
Mayor Pro Tem

MICHELE FIORE

CEDRIC CREAR

BRIAN KNUDSEN

VICTORIA SEAMAN

OLIVIA DÍAZ

SCOTT D. ADAMS
City Manager

DEPARTMENT OF PLANNING

ROBERT SUMMERFIELD
DIRECTOR

**DEVELOPMENT
SERVICES CENTER**

333 N. RANCHO DRIVE
3RD FLOOR
LAS VEGAS, NV 89106
702.229.6301 | VOICE
702.474.7463 | FAX
711 | TTY



cityoflasvegas
lasvegasnevada.gov

November 12, 2020

Howard Hughes Company, LLC
10845 Griffith Peak Drive, Ste. 160
Las Vegas, Nevada 89135

RE: 20-0196-TMP1

PLANNING COMMISSION MEETING OF NOVEMBER 10, 2020

Dear Applicant:

The Planning Commission at a regular meeting held on *November 10, 2020* voted to **APPROVE** a request for a Tentative Map FOR A 64-LOT SINGLE FAMILY ATTACHED RESIDENTIAL SUBDIVISION on 5.95 acres at the northwest corner of Kindle Corner Avenue and Clowder Springs Way (APNs 137-23-410-003 and 137-26-112-004), P-C (Planned Community) Zone [SFSD (Single Family Special Lot Development) Summerlin Special Land Use Designation], Ward 2 (Seaman).

This approval is subject to the following conditions:

Planning

1. Approval of the Tentative Map shall be for no more than four (4) years. If a Final Map is not recorded on all or a portion of the area embraced by the Tentative Map within four (4) years of the approval of the Tentative Map, this action is void.
2. Street names must be provided in accordance with the City's Street Naming Regulations.
3. Handicap parking shall be provided in accordance with Title 19 within the guest parking lot areas.
4. 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.

5. 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.
6. All development is subject to the conditions of City Departments and State Subdivision Statutes.

Public Works

7. Private streets shall be granted and labeled on the Final Map for this site as Public Utility Easements (P.U.E.), Public Sewer Easements, and Public Drainage Easements with private surface maintenance by the Homeowner's Association. Additionally, grant a 5-foot public utility easement behind the back of curbs to provide adequate separation between the various utilities.
8. 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, grading permits or the recordation of a Final Map, 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.

9. The approval of all Public Works related improvements shown on this Tentative Map is in concept only. Specific design and construction details relating to size, type and/or alignment of improvements, including but not limited to street, sewer and drainage improvements, shall be resolved prior to approval of the construction plans by the City. No deviations from adopted City Standards shall be allowed unless specific written approval for such is received from the City Engineer prior to the recordation of a Final Map or the approval of subdivision related construction plans, whichever may occur first. Approval of this Tentative Map does not constitute approval of any deviations. If such approval cannot be obtained, a revised Tentative Map must be submitted showing elimination of such deviations. Roadway locations and parcel entries are schematic and final studies and engineering improvements designs. Geometric design of Parcel entry points must be approved through the development review of each parcel.

This action by the Planning Commission on **November 10, 2020** is final unless a written appeal is filed with the City Clerk within seven days of the date of the Planning Commission's decision as allowed by code or there is a review action filed by the City Council within the same time period. For additional information on appeals or review requests submitted please access <https://www.lasvegasnevada.gov/Business/Permits-Licenses/Building-Permits/Permit-Application-Status>, or contact the Department of Planning and Development at 702.229.6301 after **November 17, 2020**. No building permits or business licenses related to these items shall be issued prior to the expiration of the required seven day waiting period, or until any filed appeal is resolved pursuant to LVMC Title 19.18.

Sincerely,



Eric McCammond
Senior Management Analyst
Case Planning Division

EM:nl

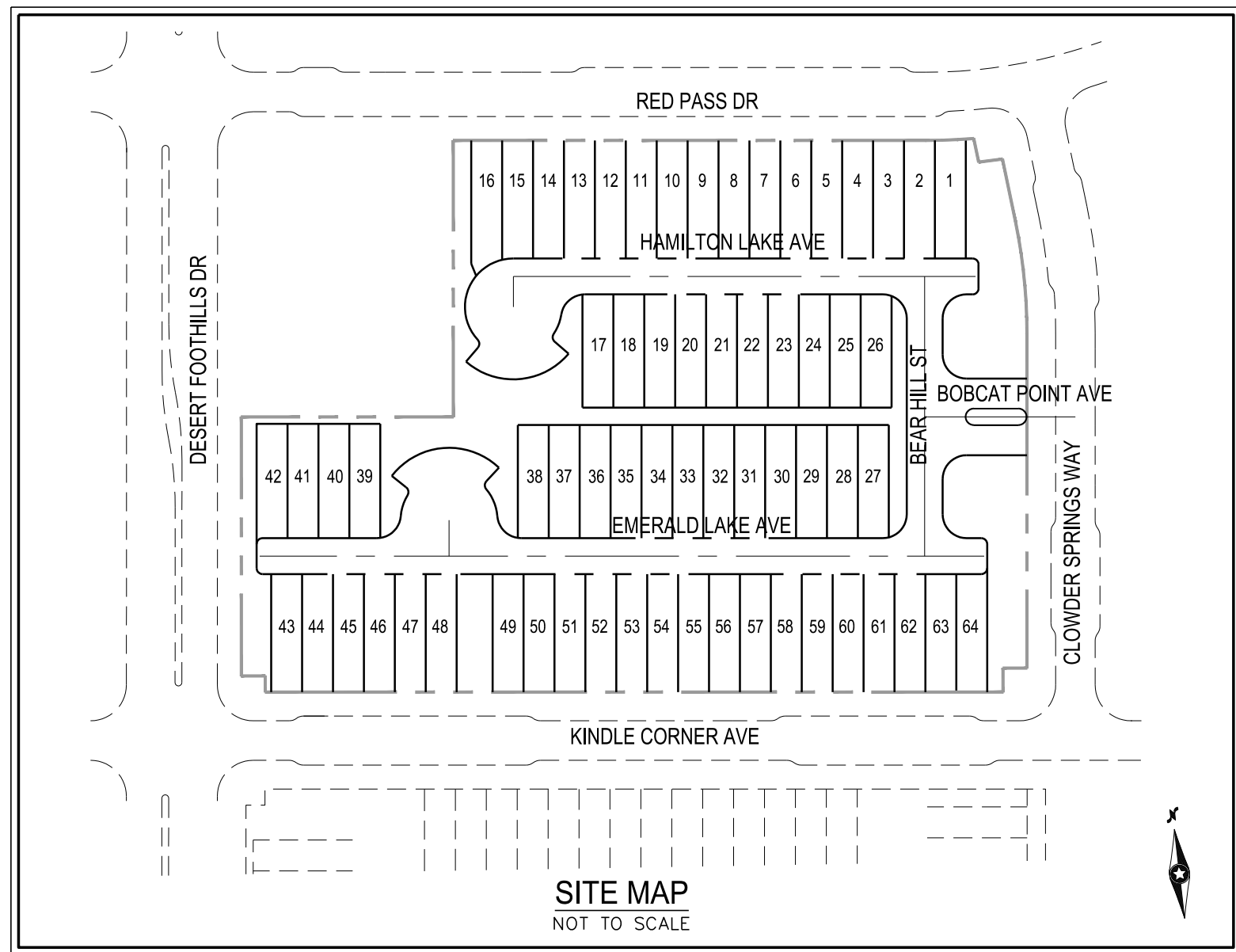
cc:

Ms. Angela Pinley
Richmond American Homes of Nevada, Inc.
7770 S. Dean Martin Drive, Ste. 308
Las Vegas, Nevada 89139

Ms. Roxanne Leigh
Westwood Professional Services
5740 S. Arville Street, Ste. 216
Las Vegas, Nevada 89118

APPENDIX H

CD of Electronic Files & Improvement Plans



CITY OF LAS VEGAS, NEVADA
RESIDENTIAL SUBDIVISION
APN: 137-26-112-004 & 137-23-410-003



Sheet List Table		
NO.	SHEET	TITLE
1	C-1	COVER SHEET
2	C-2	STANDARD NOTES
3	C-3	QUANTITIES & LEGEND
4	G-1	GRADING PLAN I
5	G-2	GRADING PLAN II
6	D-1	STREET SECTIONS AND GRADING DETAILS I
7	D-2	GRADING DETAILS II
8	D-3	GRADING DETAILS III
9	D-4	GRADING DETAILS IV
10	PP-1	PLAN AND PROFILE - BOBCAT POINT AVE
11	PP-2	PLAN AND PROFILE - BEAR HILL ST
12	PP-3	PLAN AND PROFILE - STORM DRAIN LATERALS

LAS VEGAS FIRE AND RESCUE	DATE
CITY OF LAS VEGAS PLANNING DEPARTMENT	
CENTRAL TELEPHONE CO. DBA CENTURYLINK	DATE
THE AFFIXED CENTURYLINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUTES AND / OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.	
APPROVED FOR CONSTRUCTION	
LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES PROJECT NO. <u>#####</u> FIRST APPROVED DATE _____ LVWDD APPROVED FIRE FLOW <u>1,500</u> GPM AT 20 PSY RESIDUAL MAXIMUM AVAILABLE FIRE SPRINKLER FLOW <u>20</u> GPM	
SHEETS: <u>ADD FIELD</u>	
NV ENERGY	DATE
NV ENERGY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NV ENERGY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.	
SOUTHWEST GAS CORPORATION	DATE
COX COMMUNICATIONS LAS VEGAS, INC.	DATE

OWNER/DEVELOPER	ENGINEER
RICHMOND AMERICAN HOMES 7270 S. DEAN MARTIN DR., #308 LAS VEGAS, NV 89139 PH: 702-617-8400 FX: 702-348-5964 CONTACT: NICOLE BLOOM	WESTWOOD PROFESSIONAL SERVICE 5740 S. ARVILLE STREET, SUITE 210 LAS VEGAS, NV 89118 PH: (702) 284-5300 FX: (702) 284-5399 CONTACT: KEVIN BROSS

LOTS N AND O OF SUMMERLIN VILLAGE 21 - UNIT 3, AS SHOWN BY MAP THEREOF ON FILE
IN BOOK 159 OF PLATS, PAGE 50 IN THE OFFICE OF THE COUNTY RECORDER OF CLARK
COUNTY, NEVADA.

BENCHMARK NUMBER: 5LV0926W6

RIVET AND PLATE IN TOP OF CURB AT SOUTHEAST CORNER OF CARRIAGE HILL DRIVE AND FAR HILLS AVENUE.

ELEVATION = 3229.29 FEET, 984.288 METERS
N.A.V.D. 88 DATUM

PER THE CITY OF LAS VEGAS VERTICAL CONTROL

SOUTH 89°51'25" EAST, BEING THE BEARING OF THE NORTH LINE OF SECTION 27, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN BOOK 161, PAGE 84 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X, UNSHADED (AREA OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN), PER FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C2150E, UPDATED SEPTEMBER 27, 2002 AND REVISED TO REFLECT LOMR EFFECTIVE FEBRUARY 5, 2018.

3. HYDRANT SPACING REQUIREMENTS WILL BE AS PER PRESCRIBED ADOPTED CODE.
4. MINIMUM STREETS WIDTHS AS DESCRIBED WITHIN GATED PRIVATE COMMUNITY INTERIOR STREETS AS FOLLOWS:
 - A. 24' WITH NO PARKING ON EITHER SIDE MEASURED TO FACE OF CURB
11. SPRINKLER INSTALLATION REQUIREMENTS WILL FOLLOW THE BASE NPFA 130 REQUIREMENTS FOR SUCH LOCATIONS.
14. CITY OF LAS VEGAS AGREES THAT FOR SINGLE FAMILY DWELLINGS PROVIDED WITH FIRE SPRINKLERS, THERE WILL BE NO ADDITIONAL FEE FOR THE FIRE SPRINKLER REVIEW, PERMIT OR INSPECTIONS.
15. PLANS FOR RESIDENTIAL FIRE SPRINKLERS WILL BE PART OF THE STANDARD PLAN SUBMITTAL FOR SINGLE FAMILY DWELLING TRACT OR PRODUCTION HOME.
17. NO NET INCREASE IN ENTERPRISE FUND FOR IMPLEMENTING THE INSTALLATION OF FIRE SPRINKLER SYSTEMS WITHIN SINGLE FAMILY DWELLING TRACT OR PRODUCTION HOMES.
18. HYDRANT SPACING REQUIREMENT AT "ALL INTERSECTIONS," MINIMUM SPACING AND REQUIRED LOCATIONS WILL BE IN ACCORDANCE WITH ADOPTED CODE.
19. ITEMS RECORDED WITHIN THIS MOU FOR ALL PROJECTS PERMITTED WILL BE EFFECTIVE AND ENFORCEABLE WITH THE ADOPTION OF 2018 INTERNATIONAL RESIDENTIAL CODE AS THE CODE OF RECORD; OR EFFECTIVE DATE OF THE TITLE 19 CHANGES, WHICHEVER IS LATER.
20. STREET LIGHTS ON PRIVATE STREETS WITHIN SINGLE FAMILY SUBDIVISIONS SHALL NOT BE REQUIRED.
21. SINGLE FAMILY DEVELOPMENTS WITH A TENTATIVE MAP APPROVED PRIOR TO THE EFFECTIVE DATE OF THIS MOU SHALL BE EXEMPT FROM RESIDENTIAL FIRE SPRINKLER REQUIREMENTS.

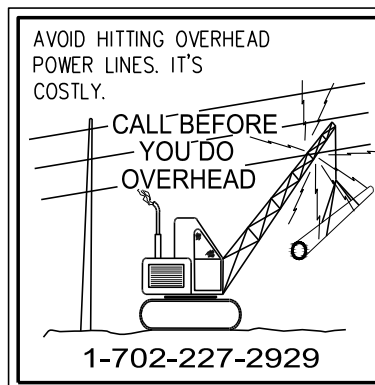
NONE

NOTE: A LAND SURFACE AREA DISTURBANCES OVER 1 ACRE REQUIRE A STORMWATER DISCHARGE PERMIT ISSUED BY THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDPE). A PHASED CONSTRUCTION UNIT IN A CONTIGUOUS SUBDIVISION IS CONSIDERED UNDER CONSTRUCTION UNTIL ALL STRIPPED SURFACE AREAS HAVE BEEN COVERED BY PAVING, BUILDING CONSTRUCTION OR PLANTING. A STORMWATER DISCHARGE PERMIT APPLICATION AND ASSOCIATED INFORMATION MAY BE DOWNLOADED FROM THE WEB SITE: <http://www.state.nv.us/bwpc/storm1.htm>. PROJECTS THAT DISTURB MORE THAN ONE ACRE OF LAND MUST SUBMIT TO NDPE A "NOTICE OF INTENT" FOR INCLUSION UNDER STORMWATER PERMIT NO. NVRT000000 ALONG WITH THE APPROPRIATE FILING FEE.

ACREAGE (GROSS):	= 5.95 AC
ACREAGE (NET):	= 4.74 AC
DENSITY (LOTS/NET ACRE):	= 13.50 DU/NET AC
ZONING:	= P-C
TOTAL NO. OF RESIDENTIAL LOTS	= 64
TOTAL NO. OF COMMON ELEMENTS *	= 4
MINIMUM LOT SIZE	= 2,441 SF ±
MAXIMUM LOT SIZE	= 2,721 SF ±
PROVIDED OPEN SPACE	= 45,921 SF ±

CUT	15,721 CY.
FILL	9,129 CY.
NET	6,592 CY. (CUT)

PREPARED BY: ANGLE ENGINEERING
ADDRESS: 5995 SOUTH EDMOND STREET, LAS VEGAS, NV 89118
PHONE: 702-382-6453
PROJECT No. 26233-1
DATED: 8/17/20



Westwood

Phone (702) 284-5300
Fax (702) 284-5399

5740 S. Avillie Street
Suite 216
Las Vegas, NV 89118

westwoodpa.com

Westwood Professional Services, Inc.

[illegible]

CITY OF LAS VEGAS, NV



RICHMOND
AMERICAN HOMES

**MORO POINTE
COVER SHEET**

S23 & 26
T20

DATE: 1/13/21

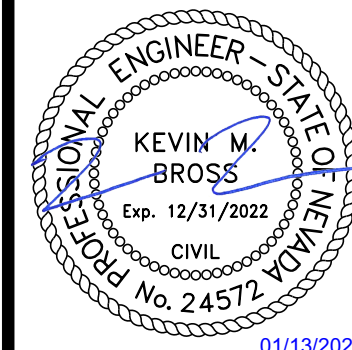
DRAFTER: HAA

DESIGNER: HAA

CHECKED: KME

PROJECT NO.

RAH2007



C-1

SHEET 1 OF 12

STORMMATER RUNOFF MANAGEMENT

(REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ.FT.))

1. THE OWNER, SITE DEVELOPER, CONTRACTOR AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATE IN, THE PUBLIC RIGHTS OF WAYS OF CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN TITLE 24.40 AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BEST MANAGEMENT PRACTICES MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVRI00000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS AND ALL BMPs WEEKLY, AND WITHIN 24 HOURS AFTER ANY ACTUAL RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVRI00000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMPs SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

LEGAL DESCRIPTION

LOTS N AND O OF SUMMERLIN VILLAGE 21 - UNIT 3, AS SHOWN BY MAP THEREOF ON FILE IN BOOK 159 OF PLATS, PAGE 50 IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA.

BENCHMARK

BENCHMARK NUMBER: 5LV0926W6

RIVET AND PLATE IN TOP OF CURB AT SOUTHEAST CORNER OF CARRIAGE HILL DRIVE AND FAR HILLS AVENUE.

ELEVATION = 3229.29 FEET, 984.288 METERS

N.A.D. 88 DATUM

PER THE CITY OF LAS VEGAS VERTICAL CONTROL.

BASIS OF BEARINGS

SOUTH 89°51'25" EAST, BEING THE BEARING OF THE NORTH LINE OF SECTION 27, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN BOOK 161, PAGE 84 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

SOUTHERN NEVADA - SOUTHWEST GAS CORPORATION GENERAL NOTES

1. IN THE EVENT OF NATURAL GAS EMERGENCIES CALL 911 AND 1-877-860-6020
2. MINIMUM HORIZONTAL AND VERTICAL CLEARANCES BETWEEN NATURAL GAS FACILITIES AND ANY UNDERGROUND UTILITIES AND/OR STRUCTURES, INCLUDING BUT NOT LIMITED TO WATER, SEWER, STORM DRAIN, COMMUNICATIONS, AND ELECTRICAL, SHALL BE AT LEAST 12-INCHES OR GREATER AS DICTATED BY LOCAL CODES AND STANDARDS.
 - A) ANY DEVIATION FROM SPECIFIED MINIMUM CLEARANCES MUST BE APPROVED BY ALL AFFECTED UTILITIES AND/OR MUNICIPALITIES
3. FOR VALVE ADJUSTMENT CONTACT 702-528-7881 14 DAYS PRIOR TO CONSTRUCTION.
4. IN THE EVENT OF NATURAL GAS CONFLICT WITH PROPOSED UTILITIES AND STRUCTURES CONTACT 702-365-2099

SOUTHWEST GAS APPROVAL

SOUTHWEST GAS CORPORATION

DATE

CITY OF LAS VEGAS SEWER NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, AS AMENDED. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.
2. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS. ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEER.
3. CHISEL "S" OR "C" IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.
4. POLYVINYL (PVC) SEWER PIPE SHALL MEET ASTM D-3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND BACKFILL OF TYPE II AGGREGATE BASE.
5. ALL MANHOLES PAVED IN STREETS EIGHTY (80) FOOT R/W AND LARGER SHALL HAVE CONCRETE COLLARS. STREETS LESS THAN EIGHTY (80) FOOT R/W WILL REQUIRE RETROFIT IF PAVING DOES NOT CONFORM TO CITY STANDARDS AT THE MANHOLE.
6. TEE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCH (12) DIAMETER, CONNECTIONS TO FIFTEEN INCH (15) OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE "Y"-'S SHALL BE USED ON LINES TWELVE INCHES (12) OR ABOVE.
7. WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVVMD STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A WATER MAIN OR THE SEWER IS LESS THAN EIGHTEEN INCH (18") UNDER A WATER MAIN.
8. ALL CONTRACTORS INSTALLING SEWER MAINS THAT WILL BE UNDER THE JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS "A" CONTRACTORS.
9. THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN ONE TENTH (0.1) OF A FOOT FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. SEWER MAINS FOUND TO EXCEED THIS TOLERANCE WILL HAVE TO BE REPAIRED OR REMOVED OR REPLACED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.
10. INSTALLATION OF CURVED SEWER REQUIRES THE USE OF C-900 PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.

REVISED 04/15/10

LAS VEGAS VALLEY WATER DISTRICT (LVVMD) STANDARD NOTES

LVVMD PROJECT # ##### (REVISED 08/01/2017)

1. NO WORK SHALL BEGIN UNTIL THE WATER PLANS HAVE BEEN APPROVED FOR CONSTRUCTION BY THE LVVMD. WORKING WATER PLAN APPROVAL, NOTICE SHALL BE GIVEN TO THE LVVMD COMMUNICATIONS SUPPORT CENTER (258-7771) TWO (2) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION FOR FUTURE INSPECTIONS. NOTICE MUST BE GIVEN BY 2:00 P.M. THE BUSINESS DAY PRIOR TO THE REQUESTED LVVMD INSPECTION. WHEN REQUESTING INSPECTIONS, PLEASE REFER TO THE PROJECT # IDENTIFIED ABOVE.
2. ALL WORK SHALL CONFORM TO LVVMD STANDARD PLATES, DRAWINGS, AND SPECIFICATIONS, AND TO THE 2010 EDITION OF THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS (UDACS), THE LATEST EDITION OF UDACS SHALL SUPERSEDE ANY CONFLICTS CONTAINED IN THE APPROVED DRAWINGS AND/OR SPECIFICATIONS.
3. ALL WORK, EXCEPT AS MODIFIED BY THESE PLANS OR BY NOTE 2 ABOVE, SHALL BE DONE IN ACCORDANCE WITH THE MOST RECENT DRAFT OR EDITION OF THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENT, CLARK COUNTY AREA.
4. A SINGLE PIPE MATERIAL SHALL BE USED THROUGHOUT THE PROJECT UNLESS OTHERWISE APPROVED BY THE LVVMD.
5. ALL SERVICE LATERALS TWO (2) INCHES IN DIAMETER AND SMALLER SHALL BE TYPE K COPPER TUBING WITH LVVMD APPROVED SERVICE SADDLES.
6. ALL WATER METER BOXES SHALL BE LOCATED OUTSIDE OF DRIVEWAY AREAS.
7. ALL VALVES SHALL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY AND CURB GUTTERS.
8. ALL WATER AND STORM DRAIN OR SANITARY SEWER CROSSINGS SHALL CONFORM TO SECTION 2.22 OF THE 2010 EDITION OF THE UDACS.
9. ALL WATER FACILITIES AND APPURTENANCES SHALL BE DISINFECTED, PRESSURE TESTED, AND HAVE AN ACCEPTABLE PASSING HEALTH WATER SAMPLE OBTAINED, PRIOR TO OPERATION AND USE.
10. THE CONTRACTOR MUST OBTAIN ALL METERS TWO (2) INCHES AND SMALLER FROM LVVMD CENTRAL STORES. TELEPHONE 258-3152 OR 258-3802, TWO (2) WORKING DAYS PRIOR TO METER PICKUP.
11. ANY INTERRUPTION OF SERVICE MUST BE PERFORMED IN ACCORDANCE WITH UDACS SECTION 3.14.01, AND APPROVED BY THE LVVMD INSPECTION DIVISION PRIOR TO SHUTDOWN. PROPER WRITTEN NOTIFICATION MUST BE GIVEN TO ALL AFFECTED CUSTOMERS.
12. ALL WATER FACILITY CONSTRUCTION MATERIALS USED MUST BE AS LISTED ON THE LVVMD APPROVED PRODUCTS LIST FOR NEW FACILITIES, LATEST REVISION, OR SPECIFICALLY APPROVED ON THESE PLANS BY SUBMITTING SHOP DRAWINGS.
13. TELEPHONE "CALL BEFORE YOU DIG" AT "811" OR 1-800-227-2600.
14. THE INSTALLATION OF LVVMD MUNICIPAL WATER FACILITIES WITHIN ALL STREETS IS ASSUMED TO BE IN COMPLIANCE WITH THE UNIFORM STANDARDS, INCLUDING THE PLACEMENT OF ASPHALT PAVING STREET SURFACES. ANY REPAIR WORK DONE BY THE LVVMD TO THE MUNICIPAL WATER FACILITIES WILL INCLUDE THE PLACEMENT OF AN APPROPRIATELY SIZED ASPHALT REPAIR PATCH ON THE STREET SURFACE.

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

15. NO LEAD COMPLIANCE NOTE:
TO COMPLY WITH THE FEDERAL SAFE DRINKING WATER ACT, ALL WATER WORKS BRASS PRODUCTS PROPOSED TO BE RELOCATED OR INSTALLED AS NEW MUST BE INSTALLED WITH THE LEAD FREE APPROVED PRODUCT. THE OLD LEADED PRODUCT MAY NOT BE REUSED.

GRADING NOTES

1. INDICATED GRADES OTHER THAN T.C., F.G. & CUTTER F.L. ARE ROUGH GRADES.
2. THE ROUGH GRADING PLANS SHALL BE ON THE JOB SITE AT ALL TIMES. THE ROUGH GRADING SHALL BE FINISHED IN CONFORMANCE WITH THE LINES AND GRADES SHOWN ON THE PLANS. THE GRADING QUANTITIES ARE BASED ON THE ELEVATION AND DETAILS SHOWN ON THE PLANS. ANY DEVIATIONS FROM THE PLANS WILL RESULT IN QUANTITY CHANGES.
3. CARE SHALL BE EXERCISED IN GRADING CORNER LOTS.
4. ROUGH PAD ELEVATIONS SHALL BE GRADED TO WITHIN 0.1' OF THE PAD ELEVATIONS SHOWN ON THE PLANS. WHEN GRADING IS COMPLETE PER THE PLANS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER SO THAT THE LOTS CAN BE INSPECTED. AT THAT TIME THE ENGINEER SHALL ALSO DECIDE IF ANY ADDITIONAL DITCHES OR BERMS ARE REQUIRED. THE CONTRACTOR IS REQUESTED NOT TO REMOVE ANY OF HIS ROUGH GRADING EQUIPMENT UNTIL HE RECEIVES GRADING APPROVAL FROM THE ENGINEER.
5. SOILS REPORT PREPARED BY ANGLE ENGINEERING, PROJECT NO. 26233-1, DATED 8/17/20.
6. EARTHWORK QUANTITIES (RAW):
 - CUT = 15,721 CUBIC YARDS
 - FILL = 9,129 CUBIC YARDS
 - A) THE ABOVE QUANTITIES DO NOT REFLECT LOSSES DUE TO SUBSIDENCE OR SHRINKAGE.
 - B) THE ABOVE QUANTITIES DO REFLECT USING NATIVE MATERIAL IN LIEU OF TYPE I GRAVEL BASE MATERIAL FOR STREET SECTIONS.
 - C) THE ABOVE QUANTITIES DO NOT REFLECT ANY EARTHWORK WHICH MAY BE REQUIRED BY THE ENGINEER TO CONSTRUCT ADDITIONAL PROTECTIVE DITCHES OR BERMS NOT SHOWN ON THESE DRAWINGS.

CITY OF LAS VEGAS FIRE AND RESCUE GENERAL NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE ORDINANCE # 6631 FOR HYDRANT SPECIFICATIONS AND HYDRANT INSTALLATION SPECIFICATIONS.
2. ONLY FIRE HYDRANTS THAT ARE ON THE LAS VEGAS VALLEY WATER DISTRICTS - APPROVED PRODUCTS LIST ARE ALLOWED TO BE INSTALLED.
3. A PERMIT IS REQUIRED FROM LAS VEGAS FIRE AND RESCUE FOR THE INSTALLATION OF ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK. IFC #1006.6.15
4. ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS ACCESS ROADS SHALL BE MAINTAINED BEFORE COMMENCEMENT OF ANY COMBUSTIBLE CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW. IFC #1330, #1332
5. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF THE STREET ADJACENT TO THE FIRE HYDRANTS. IFC #5075.7.3
6. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TESTS WITH PRIOR FIRE PREVENTION APPROVAL. IFC #106.3
7. ALL ON-SITE UNDERGROUND WATER MAINS AND MATERIALS SHALL BE U.L.-LISTED, A.W.W.A APPROVED AND SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE. IFC #5072.1, N.W.P.A 24
8. PAINTING OF CURBS, FIRE HYDRANTS, PADS, PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE, AND ALL OTHER WORK NECESSARY PER PLANS SHALL BE COMPLETED BEFORE APPROVAL BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION. IFC #507
9. PRIVATE HYDRANTS SHALL BE PAINTED RED. IFC #5075.5.7.1
10. PRIOR TO THE FINAL OCCUPANCY, A FIRE FLOW TEST SHALL BE WITNESSED BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW. IFC #507
11. FIRE HYDRANT SPACING SHALL BE AS FOLLOWS: IFC #C102
 - RESIDENTIAL - 500 FT UNSPRINKLERED, 600 FT SPRINKLERED
 - COMMERCIAL - 300 FT UNSPRINKLERED, 400 FT SPRINKLERED
12. WHERE THE WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT A MAXIMUM OF 1000 FT SPACING, TO PROVIDE FOR TRANSPORTATION HAZARDS. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 500 FT ON AN ALTERNATING BASIS. IFC #C102.8
13. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE RADIUS OF A CUL-DE-SAC OR WITHIN 20 FT OF THE PERIMETER OF THE RADIUS OF THE CUL-DE-SAC.
14. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FT OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION. IFC #C102.10
15. A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT, AS MEASURED BY AN APPROVED ROUTE. IFC #C102.4
16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FT, AS MEASURED BY AN APPROVED ROUTE. IFC #C102.7
17. THE MAXIMUM DISTANCE FROM A HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. IFC #C102.6
18. TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE IS 4 OR MORE FIRE HYDRANTS/SPRINKLER LEAD-INS ARE INSTALLED ON A SINGLE SYSTEM, FOR SYSTEMS REQUIRED TO HAVE TWO (2) SOURCES OF WATER SUPPLY, SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS AND/OR FIRE SPRINKLER LEAD-INS CAN BE OUT OF SERVICE DUE TO A SERVICE INTERRUPTION. FOR SYSTEMS PERMITTED TO HAVE ONE SOURCE OF WATER SUPPLY, SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 3 FIRE HYDRANTS AND/OR FIRE SPRINKLER LEAD-INS CAN BE OUT OF SERVICE DUE TO A SERVICE INTERRUPTION. IFC #C104
19. ALL FIRE APPARATUS ACCESS ROADS SHALL BE PAVED TO PROVIDE ADEQUATE LOAD-BEARING CAPABILITIES, AND SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF THE FIRE APPARATUS. IFC #503.2.3
20. THE GRADIENT FOR THE FIRE APPARATUS ACCESS SHALL NOT EXCEED 12% ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 6% PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6%. IFC #503.2.7, #503.2.8
21. THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 52 FT OUTSIDE AND 28 FT INSIDE TURNING RADIUS. IFC #503.2.4
22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13FT 6 INS. IFC #503.2.1
23. FIRE DEPARTMENT ACCESS ROADS SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 33 FT WITH PARKING ON BOTH SIDES MEASURED TO FACE OF CURB. NOT LESS THAN 28 FT WIDE WITH PARKING RESTRICTED TO ONE SIDE MEASURED TO FACE OF CURB. NOT LESS THAN 24 FT WIDE WITH NO PARKING ON EITHER SIDE. MEASURED TO FACE OF CURB. FIRE LANES THROUGH PARKING LOTS SHALL BE NOT LESS THAN 24 FT. IFC #503.2.1.1
24. A FIRE APPARATUS ACCESS ROAD SHALL BE REQUIRED WHEN ANY PORTION OF AN EXTERIOR WALL OF THE FIRST STORY IS LOCATED MORE THAN 150 FT FROM A FIRE DEPARTMENT VEHICLE ACCESS. IFC #503.1.1
25. APPROVED SECONDARY FIRE APPARATUS ACCESS SHALL BE PROVIDED FOR 200 OR MORE DWELLING UNITS, ROAD(S) WITH DEAD- ENDS OR A SINGLE POINT OF ACCESS IN EXCESS OF 600 FT, CLV REGULATION AND MOU
26. ALL DEAD-END FIRE APPARATUS ROADS AND/OR FIRE LANES, PUBLIC OR PRIVATE, IN EXCESS OF 150 FT IN LENGTH SHALL BE PROVIDED WITH AN APPROVED TURN AROUND HAVING A MINIMUM DIAMETER OF 81 FT. CLV REGULATION
27. ALL FIRE APPARATUS ACCESS ROADS SHALL BE MARKED BY PLACING APPROVED SIGNS AT THE START OF THE DESIGNATED FIRE LANE, ONE SIGN AT THE END OF THE FIRE LANE AND WITH SIGNS AT INTERVALS OF 100 FT ALONG THE DESIGNATED FIRE LANES. SIGNS TO BE PLACED ON BOTH SIDES OF AN ACCESS ROADWAY IF NEEDED TO PREVENT PARKING OR TO INSTALL SIGNS TO BE INSTALLED NO MORE THAN 6 FT OR LESS THAN 6 FT FROM THE ROADWAY LEVEL. THE CURB ALONG OR ON THE PAVEMENT OR CEMENT (IF NO CURB IS PROVIDED) SHALL BE PAINTED WITH A RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. IFC #503.3
28. ELECTRICALLY CONTROLLED ACCESS GATES SHALL BE PROVIDED WITH AN APPROVED EMERGENCY VEHICLE DETECTOR/RECEIVER SYSTEM. IFC #503.6
29. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS, OR HAVING FOUR OR MORE TRAVEL LANES AND A TRAFFIC COUNT OF MORE THAN 30,000 VEHICLES PER DAY, ALL HYDRANTS BEING UTILIZED TO DELIVER FIRE FLOW TO THE PROPOSED LOCATION SHALL BE LOCATED ON THE SAME SIDE OF THE STREET AS THE PROPOSED DEVELOPMENT. CLV REGULATION

CITY OF LAS VEGAS GRADING NOTES

1. IN THE EVENT THAT ANY UNFORESEEN CONDITIONS NOT COVERED BY THESE NOTES ARE ENCOUNTERED DURING GRADING OPERATIONS, THE OWNER/ENGINEER SHALL BE IMMEDIATELY NOTIFIED FOR DIRECTION.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM ALL NECESSARY CUTS AND FILLS WITHIN THE LIMITS OF THIS PROJECT AND THE RELATED OFF-SITE WORK, SO AS TO GENERATE THE DESIRED SUBGRADE, FINISH GRADES AND SLOPES SHOWN.
3. CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL EXCAVATION. ADEQUATE SHORING SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR TO PREVENT UNDERMINING OF ANY ADJACENT FEATURES OR FACILITIES AND/OR CAVING OF THE EXCAVATION.
4. THE CONTRACTOR IS WARNED THAT AN EARTHWORK BALANCE WAS NOT NECESSARILY THE INTENT OF THIS PROJECT. ANY ADDITIONAL MATERIAL REQUIRED OR LEFTOVER MATERIAL FOLLOWING EARTHWORK OPERATIONS BECOMES THE RESPONSIBILITY OF THE CONTRACTOR.
5. THE GRADING CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE OWNER TO PROVIDE FOR THE REQUIREMENTS OF THE PROJECT STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ASSOCIATED PERMIT.
6. CONTRACTOR SHALL GRADE TO THE LINES AND ELEVATIONS SHOWN ON THE PLANS WITHIN THE FOLLOWING HORIZONTAL AND VERTICAL TOLERANCES AND DEGREES OF COMPACTION, IN THE AREAS INDICATED:

	HORIZONTAL	VERTICAL	COMPACTION
A. PAVEMENT AREA SUBGRADE	0.1"	+0.0 TO -0.1'	SEE SOILS REPORT
B. ENGINEERED FILL	0.5"	+0.1 TO -0.1'	SEE SOILS REPORT

COMPACTION TESTING WILL BE PERFORMED BY THE OWNER OR HIS REPRESENTATIVE.
7. ALL CUT AND FILL SLOPES SHALL BE PROTECTED UNTIL EFFECTIVE EROSION CONTROL HAS BEEN ESTABLISHED.
8. THE USE OF POTABLE WATER WITHOUT A SPECIAL PERMIT FOR BUILDING OR CONSTRUCTION PURPOSES INCLUDING CONSOLIDATION OF BACKFILL OR DUST CONTROL IS PROHIBITED. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR CONSTRUCTION WATER.
9. THE CONTRACTOR SHALL MAINTAIN THE STREETS, SIDEWALKS AND ALL OTHER PUBLIC RIGHT-OF-WAY IN A CLEAN, SAFE AND USABLE CONDITION. ALL SPILLS OF SOIL, ROCK OR CONSTRUCTION DEBRIS SHALL BE PROMPTLY REMOVED FROM THE PUBLICLY OWNED PROPERTY DURING CONSTRUCTION AND UPON COMPLETION OF THE PROJECT. ALL ADJACENT PROPERTY, PRIVATE OR PUBLIC SHALL BE MAINTAINED IN A CLEAN, SAFE AND USABLE CONDITION.
10. IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED THAT IS NOT SHOWN ON THESE DRAWINGS, THE OWNER AGREES TO PROVIDE AND INSTALL SUCH ITEM AT HIS OWN EXPENSE AND AT THE DIRECTION OF THE CITY ENGINEER. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERMS, ROAD SIGNS AND BARRICADES, ETC.

REVISED 04/15/10

UTILITY LOCATION NOTE TO CONTRACTOR

EXISTING UTILITY LOCATIONS SHOWN HEREIN ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATIONS. CALL BEFORE YOU DIG: 1 (800) 227-2600; SOUTHWEST GAS CORPORATION: 702-278-8451 (STANDEY CONTACT NUMBER)

CITY OF LAS VEGAS GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST ISSUE, THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST REVISED EDITION; THE "SUMMERLIN IMPROVEMENT STANDARDS" FOR WORK IN THE SUMMERLIN AREA; AND THE AVAILABLE APPROVED STANDARDS FOR THE GRADING AGENCY, THE UNIFORM BUILDING CODE; AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".
2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CLV PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE PLANS. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCES WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.
3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER AND OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS, ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.
5. TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS, MIX DESIGNS TO BE APPROVED BY THE CITY, PRIOR TO THE USE ON THE PROJECT.
6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.
 - EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTENDED-TYPE CURB.
8. AC PAVEMENT TO BE ONE-AND-ONE-HALF (1 1/2") ABOVE UP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS AND CROSS GUTTERS.
9. CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.
10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.
11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF THE TRANSITIONS TO BE AS SHOWN ON PLANS.
12. ALL GRADING WORK SHALL CONFORM TO THE SOILS REPORT AS PREPARED BY ANGLE ENGINEERING, REPORT #26233-1, 8/17/20 APPROVED BY THE CITY ENGINEER, AND AS SHOWN ON THESE PLANS.
13. EXACT LOCATION OF ALL SAWCUT LINES MAY BE ADJUSTED OR DETERMINED IN THE FIELD BY A CITY OF LAS VEGAS ENGINEER IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION requires RELOCATIONS.
14. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH N.R.S. STATUTE NO. 625.380 & CITY OF LAS VEGAS TITLE 18, APPENDIX D.
15. UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC., SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APRONS, FLOWLINES, AND CROSS GUTTERS UNLESS WRITTEN APPROVAL IS GRANTED BY THE UTILITY COMPANY AND THE CITY ENGINEER.
16. ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVIL PLANS FOR THE PURPOSE OF REVIEWING GRADING RELATIONSHIPS; FLOOD CONTROL AND SIGHT DISTANCE AT INTERSECTIONS. NEW WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE BUILDING DEPARTMENT.
17. ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHT OF WAY.
18. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.
19. MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF NDOT OR THE CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.
20. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC., THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO OFFSITE INSPECTION AND TESTING CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.
21. SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S) SHALL BE PROVIDED TO THE CITY AND APPROVED PRIOR TO ACCEPTANCE OF FACILITY VIDEO INSPECTION. THE MAP(S) SHALL INCLUDE THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF THE PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES AND TRANSITION STRUCTURES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND THE CONNECTION TO A DROP INLET, THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXIT THE PUBLIC RIGHT-OF-WAY, SEWER AND STORM DRAIN MAIN ALIGNMENT, INCLUDING DEFLECTION POINTS. THE LOCATION SHALL BE DESCRIBED BY COORDINATES WHICH SHALL BE BASED ON THE OFFICIAL HORIZONTAL AND VERTICAL CONTROL NETWORKS OF THE CITY OF LAS VEGAS. FINAL LOCATION MAP(S) MUST BE SEALED AND CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CERTANTIES OF ± 0.09 METERS (± 0.3 FEET) HORIZONTALLY AND VERTICALLY. A SEPARATION ELECTROLOC COMMA DELIMITED FILE FOR THE SANITARY SEWER AND STORM DRAIN COORDINATES SHALL ALSO ACCOMPANY THE SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S).
22. CCTV VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST ADDITION.
23. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

REVISED 06/04/2018

CITY OF LAS VEGAS TRAFFIC NOTES

1. ALL CONSTRUCTION SIGNING, BARRICADING, AND TRAFFIC DELINEATION SHALL CONFORM TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", LATEST EDITION.
2. THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE PLANNING DEPARTMENT PRIOR TO CONSTRUCTION.
3. BEFORE ANY WORK IS STARTED IN THE RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ALL ADVANCE WARNING SIGNS FOR THE CONSTRUCTION ZONE. THE CONTRACTOR SHALL INSTALL TEMPORARY STOP SIGNS AT ALL NEW STREET ENCROACHMENTS INTO EXISTING CITY STREETS WHERE WARRANTED IMMEDIATELY AFTER FIRST GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN SAID SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.
4. WHEN A DESIGNATED "SUGGESTED ROUTE TO SCHOOL" IS ENCROACHED UPON BY A CONSTRUCTION WORK ZONE AND PUBLIC WORKS STAFF IDENTIFIES A NEED FOR STUDENTS TO BE ASSISTED IN THE SAFE CROSSING THROUGH THAT WORK ZONE, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A QUALIFIED "CROSSING GUARD" WHO SHALL BE PRESENT FOR THE FULL DURATION OF THE TIME THAT CHILDREN ARE LIKELY TO BE PRESENT.
5. IF THE IMPROVEMENTS NECESSITATE THE OBLITERATION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL OR RELOCATION OF ANY EXISTING TRAFFIC PAVEMENT MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED WITH LIKE MATERIALS TO THE SATISFACTION OF THE CITY TRAFFIC ENGINEER.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL PERMANENT SIGNS SHOWN ON THE PLANS. ALL NEW TRAFFIC SIGNS SHALL UTILIZE TYPE XI RETROREFLECTIVE SHEETING IN ACCORDANCE WITH CCAGS 627 AND 716 AND SHALL HAVE AN ANTI-GRAFFITI PROTECTIVE OVERLAY FILM THAT IS A MATCHING COMPONENT TO, AND OF THE SAME MANUFACTURER AS THE RETROREFLECTIVE SHEETING TO WHICH IT IS APPLIED. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CURRENT CITY STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIGNS UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.
7. WHEN A PROPOSED STREET LIGHT STANDARD IS LOCATED WITHIN FIVE (5) FEET OF ANY PROPOSED SIGN SHOWN ON THE PLANS TO BE MOUNTED ON A SIGNPOST, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGNPOST SHALL BE ELIMINATED.
8. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ONTO THE PORTIONS OF THE ROAD(S) BEING IMPROVED HERE, REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER OFF-SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.
9. STREET SIGNS AND STOP SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR PLACEMENT OF STREET NAME SIGNS.
10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO INSURE THE SAFETY OF THE PUBLIC IN OR AROUND THE WORK AREA. THE CONTRACTOR SHALL HAVE A CERTIFIED ATSSA TRAFFIC CONTROL TECHNICIAN OR NWSA WORK ZONE SAFETY SPECIALIST SET UP, MAINTAIN AND/OR REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHT OF WAY.
11. WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE EXPEDITED TO COMPLETION SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO THE TRAVELING PUBLIC.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING REGIONAL TRANSPORTATION COMMISSION OF SOUTHERN NEVADA (RTC) IF THE CONSTRUCTION INTERRUPTS OR RELOCATES A BUS STOP OR HAS AN ADVERSE EFFECT ON BUS SERVICE ON THAT STREET TO ARRANGE FOR TEMPORARY RELOCATION OF STOP.
13. GUARDS SHALL BE OBTAINED BY CONTACTING THE METROPOLITAN POLICE DEPARTMENT SPECIAL EVENTS UNIT (PHONE # 828-3442) WHO WILL PROVIDE OFFICERS PROPERLY TRAINED IN TRAFFIC CONTROL FEES FOR THE USE OF THESE OFFICERS SHALL BE SET BY METRO AND WILL BE PAID BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.
14. ANY WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.
15. THE CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGH THE PROJECT'S OFFSITE ENGINEER PRIOR TO INITIATING PAVING TO RECEIVE DIRECTION FOR ANY PERMANENT OR TEMPORARY MODIFICATIONS TO THE APPROVED DRAWINGS REGARDING FINAL PAVEMENT TRANSITIONS, MARKINGS AND SIGNING THAT ARE REQUIRED TO MATCH ADJACENT ROADWAY SEGMENTS. THE CONTRACTOR SHALL PROVIDE A DRAWING FOR APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPICTING ANY ADJUSTMENTS TO THE FINAL PAVEMENT MARKINGS AND SIGNAGE, WHICH MAY INCLUDE OMITTING, ADDING OR MODIFYING PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SUCH THAT ADEQUATE TRANSITIONS AND LANE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE CONSTRUCTED.

REVISED JUNE 4, 2018

CITY OF LAS VEGAS STREETLIGHT NOTES

1. ALL STREET LIGHTING INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE STREET LIGHTING PLANS, THE "UNIFORM STANDARD SPECIFICATION FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", LATEST REVISION (USS), AND THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA" (USD), LATEST REVISION.
2. DESIGN PROFESSIONAL AND CONTRACTOR SHALL VERIFY CITY'S LATEST LED FIXTURE SPECIFICATIONS AND APPROVED FIXTURES PER CLV WEBSITE, UNDER BUILDING AND SAFETY FORMS, PRIOR TO ORDERING MATERIALS.
3. LUMINAIRES SHALL BE WARNED TO INDICATE INSTALLATION ORIENTATION, AND SHALL HAVE EXTERNAL LABELS PER ANSI C136 THAT INDICATE WATTAGE AND ARE CLEARLY VISIBLE FROM STREET LEVEL.
4. NO DEVIATION OF STREET LIGHT, PULL BOX, CONDUITS, ETC., LOCATIONS SHALL BE PERMITTED WITHOUT WRITTEN APPROVAL OF THE TRAFFIC AND CITY ENGINEER. ANY DEVIATION FROM THE PLAN LOCATION WILL REQUIRE COMPLIANCE WITH SECTION 623 OF THE USS.
5. ALL EXISTING STREET LIGHTING SHALL REMAIN OPERATIONAL DURING CONSTRUCTION IN ACCORDANCE WITH SECTION 623 G.03.01 OF THE USS.
6. ALL EMPTY CONDUIT SHALL HAVE AT LEAST ONE GREEN NO. #8 AWG WIRE INSTALLED AS TRACER WIRE IN ACCORDANCE WITH SECTION 623 G.02.01 OF THE USS PRIOR TO BACKFILLING AND FINAL INSPECTION.
7. ANY STRUCTURE SUCH AS BLOCK WALLS, CHAIN LINK FENCES, RETAINING WALLS, ETC., SHALL LEAVE A MINIMUM CLEARANCE IN COMPLIANCE WITH USD NO. 320A WHEN POLE IS INSTALLED BEHIND SIDEWALK, AND SHALL AT NO TIME COMPLETELY ENCLOSE THE STREET LIGHTING POLE.
8. AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE TRAFFIC ENGINEERING DIVISION PRIOR TO ANY PRE-FINAL INSPECTION. THE AS-BUILT DRAWING NEEDS TO BE STAMPED AS-BUILT AND SIGNED BY THE PREPARER.
9. SERVICE POINTS SHALL BE COORDINATED WITH NV ENERGY AND WHEREVER POSSIBLE, BE LOCATED NEAR THE CENTER OF THE GROUT. SERVICE POINTS SHALL BE SHOWN ON THE PLANS.
10. NEW STREETLIGHT SERVICES SHALL BE 200 AMP PADMOUNT AND SHALL PROVIDE CAPACITY FOR 20 OR 24 AVAILABLE CIRCUITS.
11. WHEREVER THERE IS AN OVERHEAD UTILITY THAT MAY CONFLICT WITH THE INSTALLATION OF STREETLIGHTING CIRCUITS AND/OR POLES, THESE CONFLICTS MUST BE RESOLVED BETWEEN THE DEVELOPER AND THE UTILITIES INVOLVED BEFORE STREETLIGHT BASES ARE INSTALLED. AT NO EXPENSE TO THE CITY OF LAS VEGAS.
12. THE CONTRACTOR SHALL FURNISH COMPLETE CONDUIT, WIRE, ETC. FROM SERVICE TO TRANSFORMERS AND CONTROL SYSTEMS IF REQUIRED ON THE PLANS.

REVISED MAY 19, 2020 (LO VERSION)

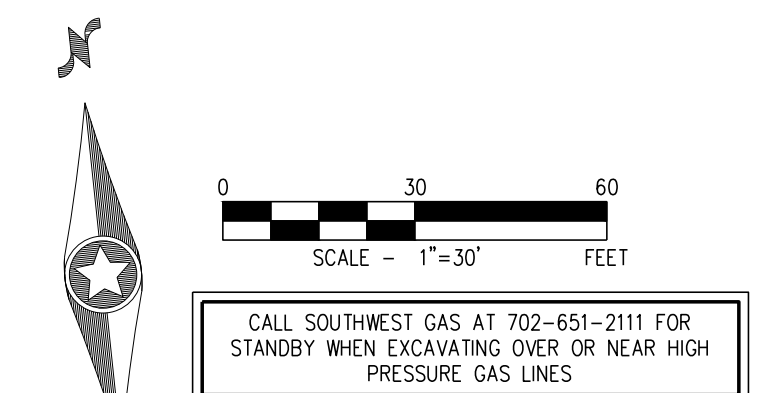
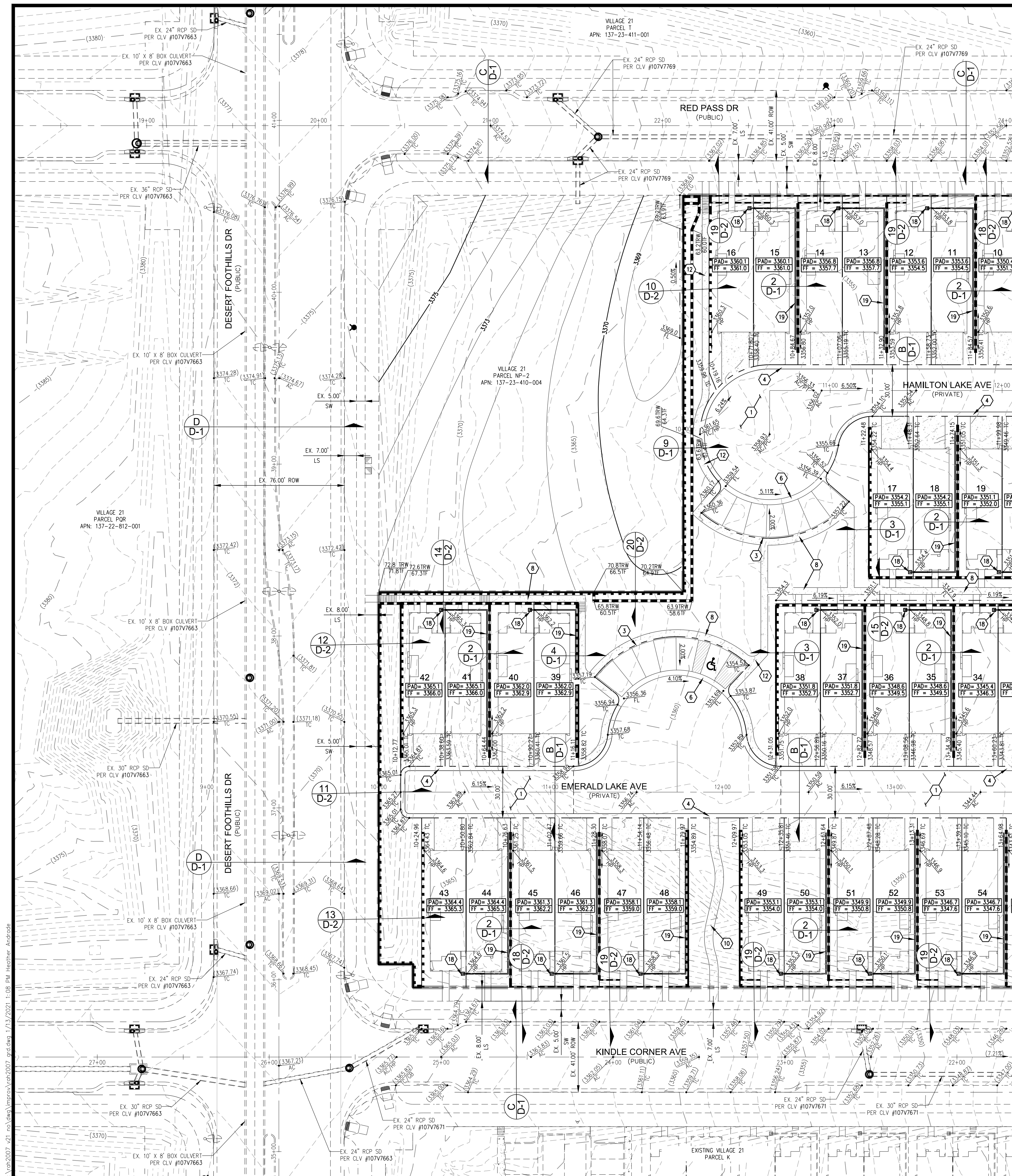
DEVIATIONS FROM STANDARDS

NONE

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
PROJECT NO. ##### FIRST APPROVED DATE: 11/13/2021
LVVMD APPROVED FIRE FLOW: 1,500 GPM AT 20 PSI RESIDUAL
MAXIMUM AVAILABLE FIRE SPRINKLER FLOW: 20 GPM





DRAINAGE IMPROVEMENT QUANTITIES		
1.	3" WIDE CONCRETE VALLEY GUTTER	SF 460
2.	8" WIDE CONCRETE VALLEY GUTTER	SF 785
3.	12"x12" INLET NYLOPLAST GRATE YARD DRAIN	EA 28
4.	6" 40-PVC DRAINAGE PIPE	LF 3,060
5.	60" TYPE III STORM DRAIN MANHOLE	EA 2
6.	5.0' TYPE "CM2" DROP INLET	EA 2
7.	12.5' TYPE "CM2" DROP INLET	EA 1
8.	16"x16" JENSEN PRECAST DROP INLET	EA 2
9.	12" RCP CLASS III STORM DRAIN	LF 86
10.	18" RCP CLASS III STORM DRAIN	LF 20
11.	24" RCP CLASS III STORM DRAIN	LF 132
11	NDOT TYPE II DROP INLET	EA 1

SURVEY NOTE
OWNER RESPONSIBLE TO PROVIDE SURVEY MONUMENTATION AS SHOWN AND TO REPLACE ALL SURVEY MONUMENTATION DAMAGED, DISTURBED, DESTROYED, OR OBLISCURED DURING CONSTRUCTION.

SOILS REPORT
SOILS REPORT BY ANGLE ENGINEERING
PROJECT NO. 26233-1 DATED 8/17/20
EARTHWORKS
EARTHWORK QUANTITIES (RAW):
CUT= 15,721 CU YDS
FILL= 9,129 CU YDS
EXPORTED MATERIAL TO BE DISPOSED OF AT AN APPROVED LICENSED DISPOSAL FACILITY OR AT A SITE WITH AN APPROVED AND ACTIVE GRADING PERMIT.

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

GENERAL NOTES
1. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
2. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP.
3. MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.
4. SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
5. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
6. CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE CITY OF LAS VEGAS BUILDING DEPARTMENT.
7. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN PLACE DURING CONSTRUCTION. ENGINEER/OWNER SHALL BE NOTIFIED OF PRIOR DAMAGE TO EXISTING FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPLETING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMENCING.
8. NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY ZONES.

LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDELINES
(REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ.FT.))
1. THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OR CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN CLARK COUNTY TITLE 24.40 AND IN THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPs WEEKLY, AND WITHIN 24 HOURS AFTER A RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMPs SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

PRIVATE STREET NOTE
ALL PRIVATE STREETS ARE PUBLIC UTILITY EASEMENTS, PUBLIC SEWER EASEMENTS, AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA

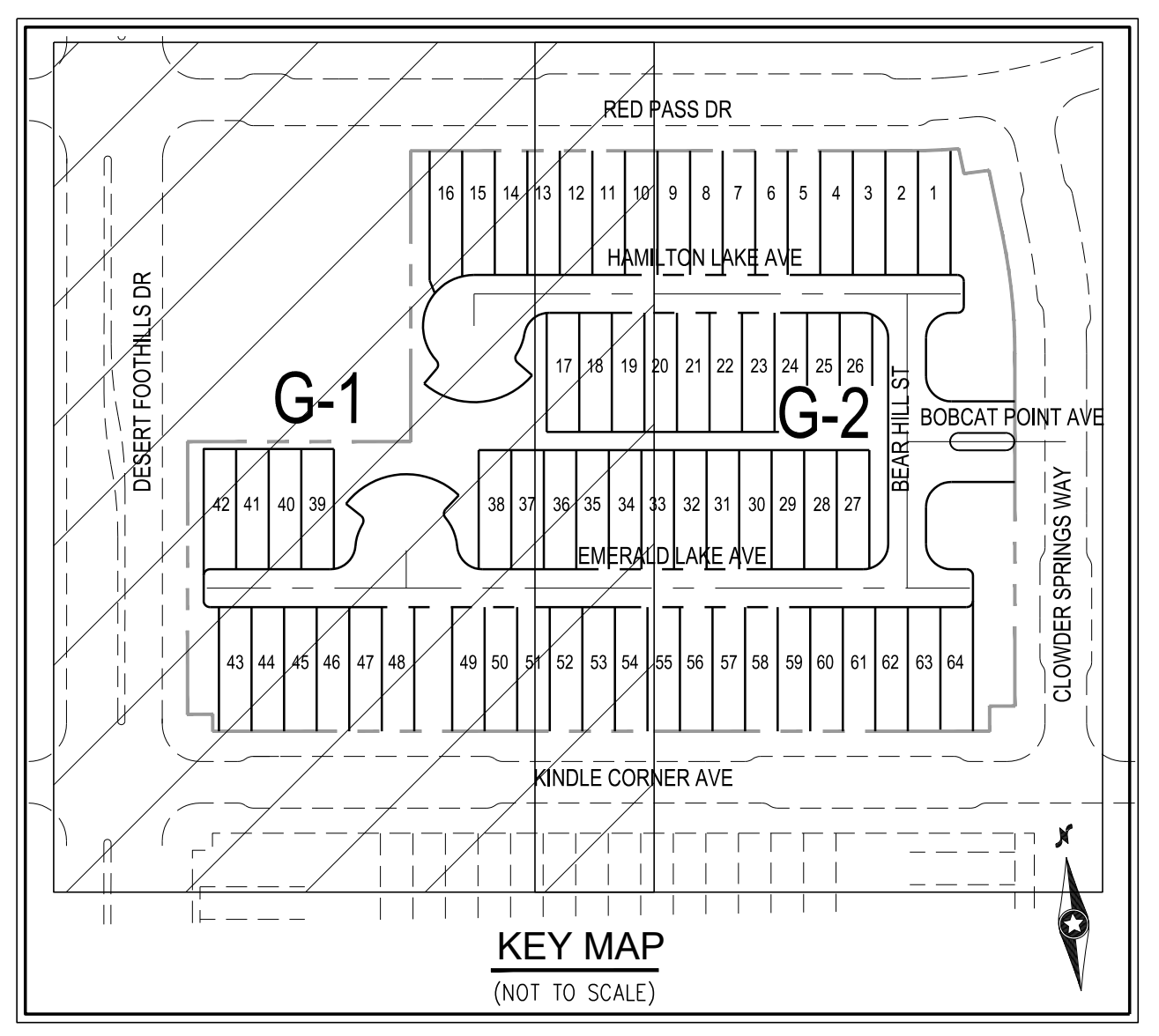
DRAINAGE EASEMENT NOTE
ALL DRAINAGE EASEMENTS ARE PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED

PUBLIC DRAINAGE EASEMENT NOTE
LOTS 5-60 REQUIRE PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA FOR CROSS-LOT DRAINAGE PIPE. SEE LOT GRADING DETAILS ON SHEETS D-3 & D-4 FOR THE PUBLIC DRAINAGE EASEMENT LOCATIONS.

FAST
Call before you UnderGround
1-702-432-5300
FREELWAY & ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T.)

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
CALL BEFORE YOU DIG OVERHEAD
1-702-227-2929

Call before you Dig
AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
811
OR
1-800-642-2444



- CONSTRUCTION NOTES**
- CONSTRUCT 2" AC PAVEMENT WITH 4" TYPE II AGGREGATE BASE
 - CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD NO. 216
 - CONSTRUCT "A" TYPE ISLAND CURB PER CCAUSD NO. 219
 - CONSTRUCT 30" ROLL CURB AND GUTTER PER CCAUSD NO. 217.1
 - CONSTRUCT 5" TRANSITION FROM ROLL CURB TO "L" TYPE CURB PER DETAIL 22 SHEET D-2
 - CONSTRUCT 3" CROSS GUTTER PER DETAIL 24 SHEET D-2
 - CONSTRUCT 8" CROSS GUTTER PER CCAUSD NO. 228
 - CONSTRUCT 4" WIDE SIDEWALK PER CCAUSD NO. 234 (4" THICK W/ 5" TYPE II AGGREGATE BASE)
 - CONSTRUCT 4" WIDE SIDEWALK PER CCAUSD NO. 234 (5" THICK W/ 5" TYPE II AGGREGATE BASE)
 - CONSTRUCT 5" WIDE SIDEWALK PER CCAUSD NO. 234 (5" THICK W/ 5" TYPE II AGGREGATE BASE)
 - CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES PER CCAUSD NO. 235, CASE I
 - CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD NO. 235, CASE II
 - SAWCUT AND MATCH EXISTING IMPROVEMENTS PER CCAUSD NO. 503 & 500.2
 - CONSTRUCT 4" WIDE MEDIAN OPENING
 - INSTALL SIDEWALK UNDERDRAIN PER CCAUSD NO. 236
 - INSTALL VILLAGE GUARDRAIL (TUBULAR STEEL) PER DETAIL 21 ON SHEET D-2
 - INSTALL 12"x12" INLET NYLOPLAST GRATE YARD DRAIN OR APPROVED EQUIVALENT (SEE SHEETS D-3 & D-4 FOR LOT DRAINAGE DETAILS)
 - INSTALL 6" 40-PVC DRAINAGE PIPE @ 1.0% SLOPE (SEE SHEETS D-3 & D-4 FOR LOT DRAINAGE DETAILS)
- STORM DRAIN NOTES**
- INSTALL 12" RCP STORM DRAIN
 - INSTALL 18" RCP STORM DRAIN
 - INSTALL 24" RCP STORM DRAIN
 - INSTALL JENSEN PRECAST 16"x16" W DRAIN (1616-HDI) (DETAIL 23, SHEET D-2) & STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
 - INSTALL 5.0' TYPE "CM2" DROP INLET PER CCAUSD NO. 412.1 & 421 & STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
 - INSTALL 12.5' TYPE "CM2" DROP INLET PER CCAUSD NO. 412.1 & 421 & STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
 - INSTALL 60" TYPE I SD MANHOLE PER CCAUSD NO. 401 & 405.2
 - CUT BACK EXISTING 24" RCP STORM DRAIN AND INSTALL 60" TYPE I SD MANHOLE PER CCAUSD NO. 401 & 405.2

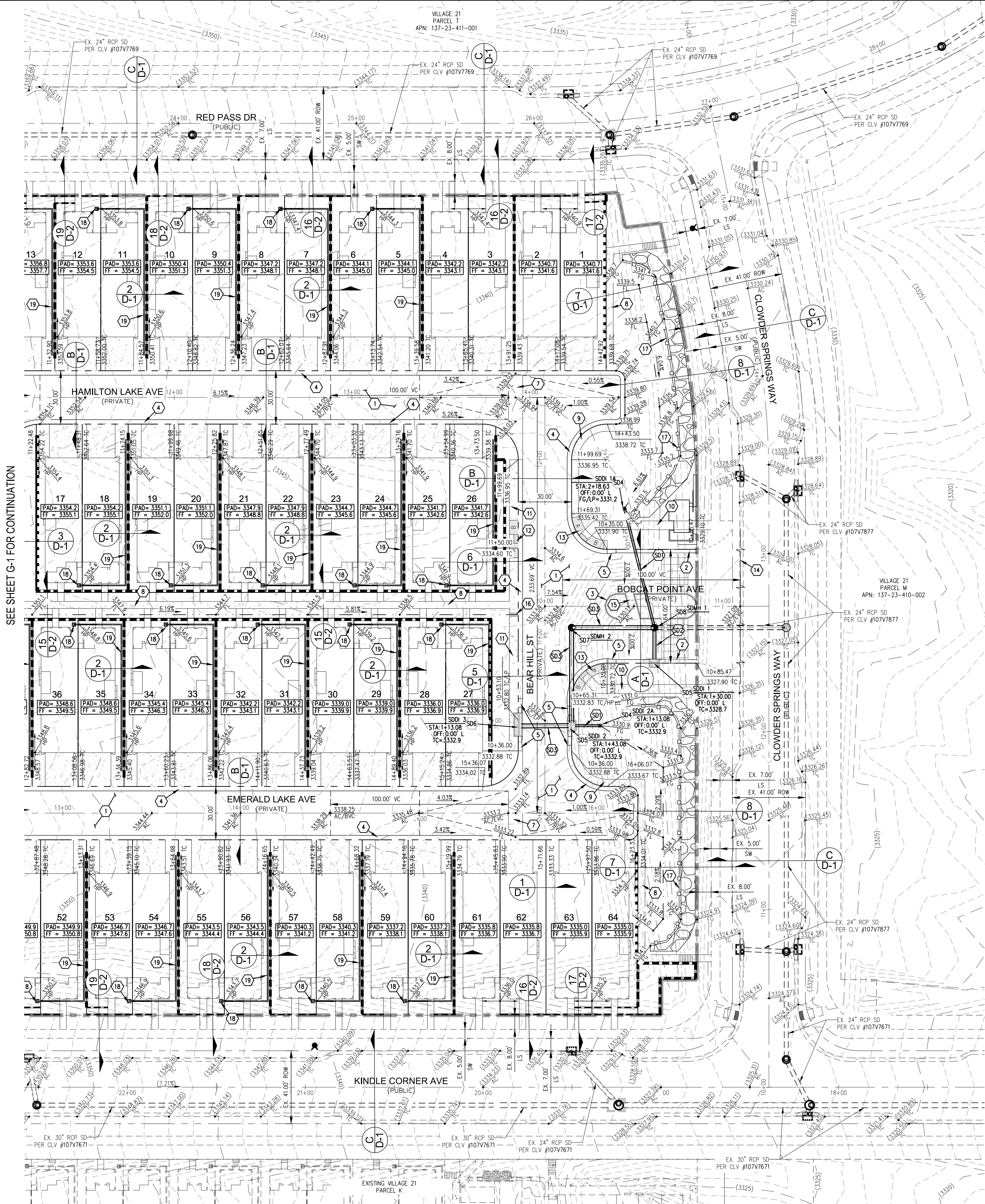
FLOOD ZONE
THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X, UNSHADED (AREA OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN), PER FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C2150E, UPDATED SEPTEMBER 27, 2002 AND REVISED TO REFLECT LOMR EFFECTIVE FEBRUARY 5, 2018.

FLOOD CERTIFICATION
I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY 22222222 ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.
KEVIN M. BROSS, P.E. 24572 DATE

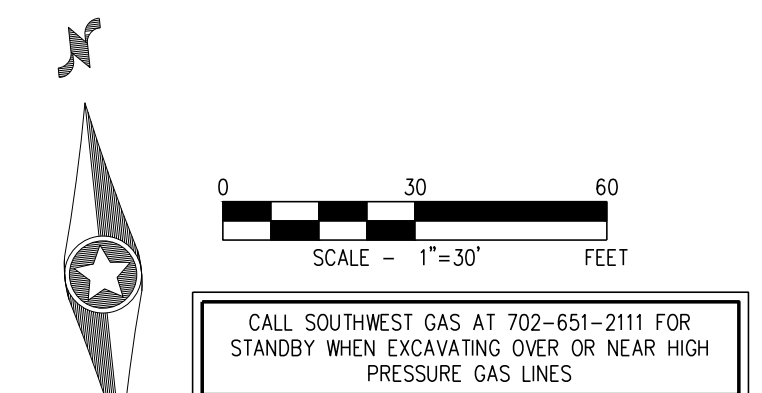
Westwood
5740 S. Anville Street
Suite 216
Las Vegas, NV 89118
Phone (702) 284-5300
Fax (702) 284-5399
westwoodps.com
Westwood Professional Services, Inc.

RICHMOND
AMERICAN HOMES
MORO PONTE
GRADING PLAN I

CITY OF LAS VEGAS, NV
DATE: 1/13/21
DRAFTER: HAA
DESIGNER: HAA
CHECKED: KMB
PROJECT NO. RAH2007
1/13/2021
G-1
SHEET 4 OF 12



SEE SHEET G-1 FOR CONTINUATION



DRAINAGE IMPROVEMENT QUANTITIES		
1.	3" WIDE CONCRETE VALLEY GUTTER	SF 460
2.	8" WIDE CONCRETE VALLEY GUTTER	SF 785
3.	12"x12" INLET NYLOPLAST GRATE YARD DRAIN	EA 28
4.	6" 40-PVC DRAINAGE PIPE	LF 3,060
5.	60" TYPE III STORM DRAIN MANHOLE	EA 2
6.	5.0' TYPE "CM2" DROP INLET	EA 2
7.	12.5' TYPE "CM2" DROP INLET	EA 1
8.	16"x16" JENSEN PRECAST DROP INLET	EA 2
9.	12" RCP CLASS III STORM DRAIN	LF 86
10.	18" RCP CLASS III STORM DRAIN	LF 20
11.	24" RCP CLASS III STORM DRAIN	LF 132
11.	NDOT TYPE II DROP INLET	EA 1

SURVEY NOTE
OWNER RESPONSIBLE TO PROVIDE SURVEY MONUMENTATION AS SHOWN AND TO REPLACE ALL SURVEY MONUMENTATION DAMAGED, DISTURBED, DESTROYED, OR OBLISCURED DURING CONSTRUCTION.

SOILS REPORT
SOILS REPORT BY ANGLE ENGINEERING
PROJECT NO. 26233-1 DATED 8/17/20
EARTHWORKS
EARTHWORK QUANTITIES (RAW):
CUT= 15,721 CU YDS
FILL= 9,129 CU YDS
EXPORTED MATERIAL TO BE DISPOSED OF AT AN APPROVED LICENSED DISPOSAL FACILITY OR AT A SITE WITH AN APPROVED AND ACTIVE GRADING PERMIT.

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

GENERAL NOTES
1. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
2. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP.
3. MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.
4. SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
5. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
6. CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE CITY OF LAS VEGAS BUILDING DEPARTMENT.
7. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN PLACE DURING CONSTRUCTION. ENGINEER/OWNER SHALL BE NOTIFIED OF PRIOR DAMAGE TO EXISTING FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPLETING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMENCING.
8. NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY ZONES.

LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDELINES
(REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ.FT.))
1. THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OR CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN CLARK COUNTY TITLE 24.40 AND IN THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPs WEEKLY, AND WITHIN 24 HOURS AFTER A RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMPs SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

PRIVATE STREET NOTE
ALL PRIVATE STREETS ARE PUBLIC UTILITY EASEMENTS, PUBLIC SEWER EASEMENTS, AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA

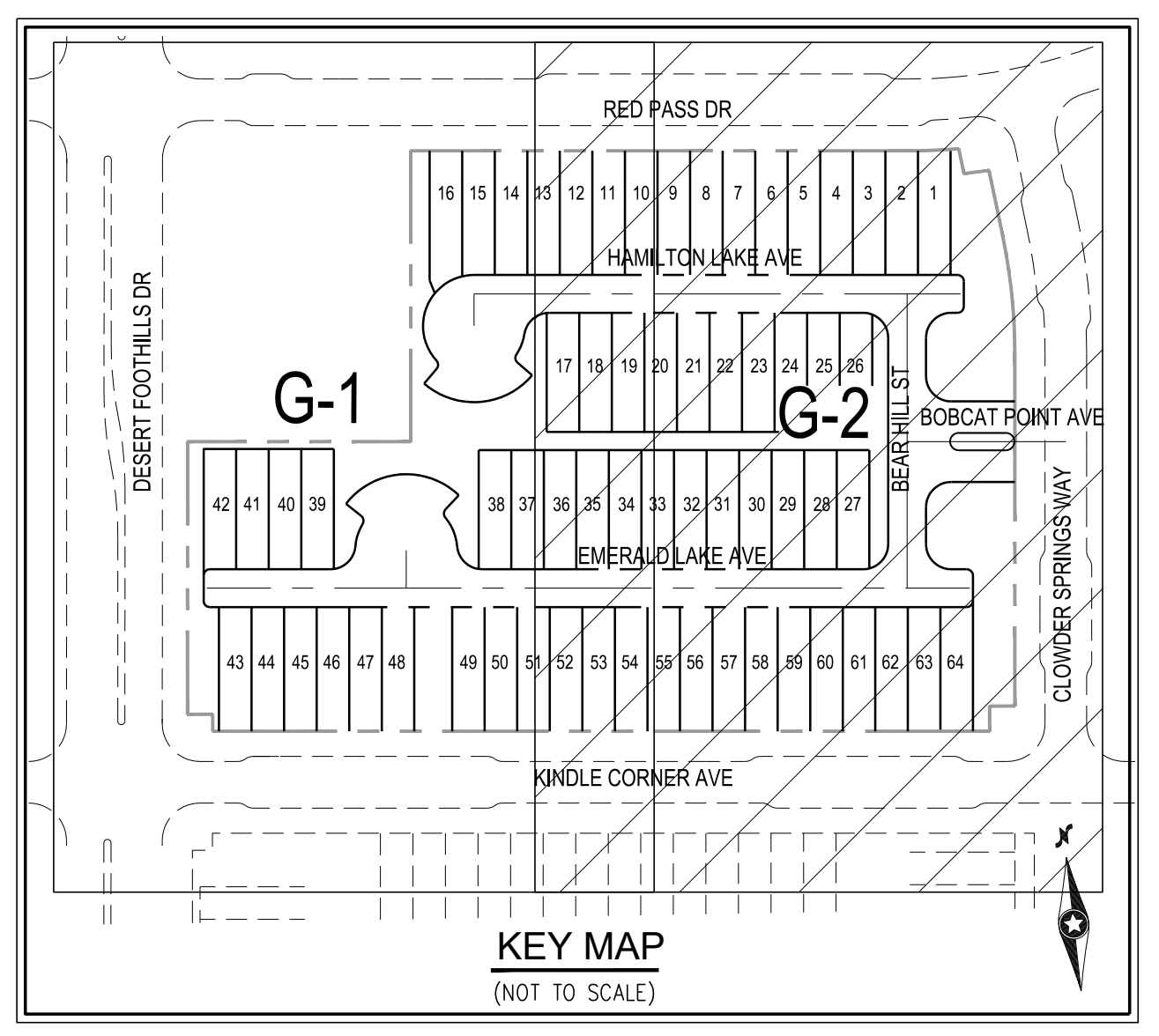
DRAINAGE EASEMENT NOTE
ALL DRAINAGE EASEMENTS ARE PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED

PUBLIC DRAINAGE EASEMENT NOTE
LOTS 5-60 REQUIRE PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA FOR CROSS-LOT DRAINAGE PIPE. SEE LOT GRADING DETAILS ON SHEETS D-3 & D-4 FOR THE PUBLIC DRAINAGE EASEMENT LOCATIONS.

FAST
Call before you UnderGround
1-702-432-5300
FREELWAY & ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T.)

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
CALL BEFORE YOU DIG
OVERHEAD
1-702-227-2929

Call before you Dig
AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
811
OR
1-800-642-2444



- CONSTRUCTION NOTES**
- CONSTRUCT 2" AC PAVEMENT WITH 4" TYPE II AGGREGATE BASE
 - CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD NO. 216
 - CONSTRUCT "A" TYPE ISLAND CURB PER CCAUSD NO. 219
 - CONSTRUCT 30" ROLL CURB AND GUTTER PER CCAUSD NO. 217.1
 - CONSTRUCT 5" TRANSITION FROM ROLL CURB TO "L" TYPE CURB PER DETAIL 22 SHEET D-2
 - CONSTRUCT 3" CROSS GUTTER PER DETAIL 24 SHEET D-2
 - CONSTRUCT 8" CROSS GUTTER PER CCAUSD NO. 228
 - CONSTRUCT 4" WIDE SIDEWALK PER CCAUSD NO. 234 (4" THICK W/ 5" TYPE II AGGREGATE BASE)
 - CONSTRUCT 4" WIDE SIDEWALK PER CCAUSD NO. 234 (5" THICK W/ 5" TYPE II AGGREGATE BASE)
 - CONSTRUCT 5" WIDE SIDEWALK PER CCAUSD NO. 234 (5" THICK W/ 5" TYPE II AGGREGATE BASE)
 - CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES PER CCAUSD NO. 235, CASE I
 - CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD NO. 235, CASE II
 - SAWCUT AND MATCH EXISTING IMPROVEMENTS PER CCAUSD NO. 503 & 500.2
 - CONSTRUCT 4" WIDE MEDIAN OPENING
 - INSTALL SIDEWALK UNDERDRAIN PER CCAUSD NO. 236
 - INSTALL VILLAGE GUARDRAIL (TUBULAR STEEL) PER DETAIL 21 ON SHEET D-2
 - INSTALL 12"x12" INLET NYLOPLAST GRATE YARD DRAIN OR APPROVED EQUIVALENT (SEE SHEETS D-3 & D-4 FOR LOT DRAINAGE DETAILS)
 - INSTALL 6" 40-PVC DRAINAGE PIPE @ 1.0% SLOPE (SEE SHEETS D-3 & D-4 FOR LOT DRAINAGE DETAILS)

- STORM DRAIN NOTES**
- INSTALL 12" RCP STORM DRAIN
 - INSTALL 18" RCP STORM DRAIN
 - INSTALL 24" RCP STORM DRAIN
 - INSTALL JENSEN PRECAST 16"x16" W DROP INLET (1616-HDI) (DETAIL 23, SHEET D-2) & STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
 - INSTALL 5.0' TYPE "CM2" DROP INLET PER CCAUSD NO. 412.1 & 421 & STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
 - INSTALL 12.5' TYPE "CM2" DROP INLET PER CCAUSD NO. 412.1 & 421 & STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
 - INSTALL 60" TYPE I SD MANHOLE PER CCAUSD NO. 401 & 405.2
 - CUT BACK EXISTING 24" RCP STORM DRAIN AND INSTALL 60" TYPE I SD MANHOLE PER CCAUSD NO. 401 & 405.2

FLOOD ZONE
THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X, UNSHADED (AREA OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN), PER FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C2150E, UPDATED SEPTEMBER 27, 2002 AND REVISED TO REFLECT LOWR EFFECTIVE FEBRUARY 5, 2018.

FLOOD CERTIFICATION
I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY 22222222 ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.
KEVIN M. BROSS, P.E. 24572 DATE

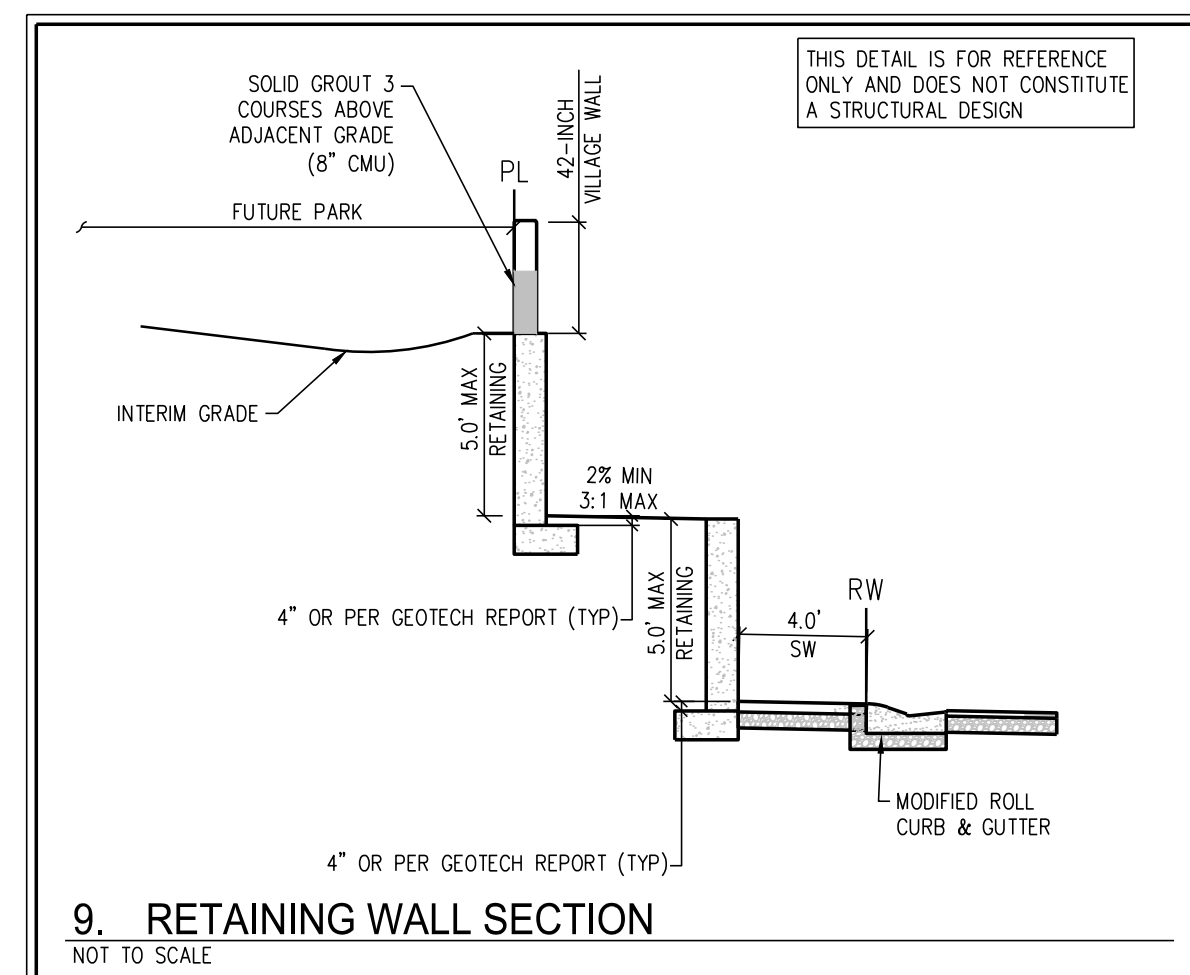
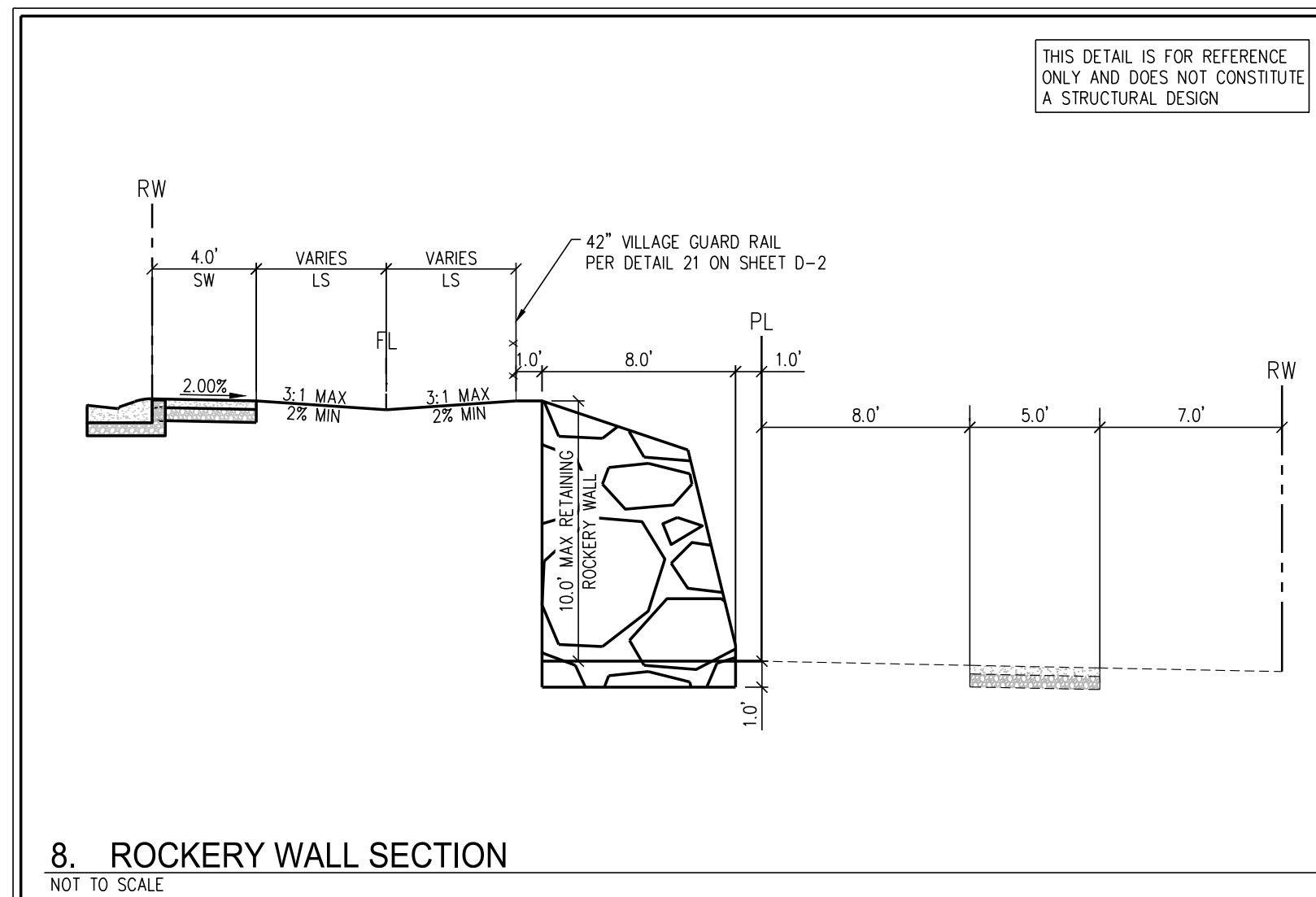
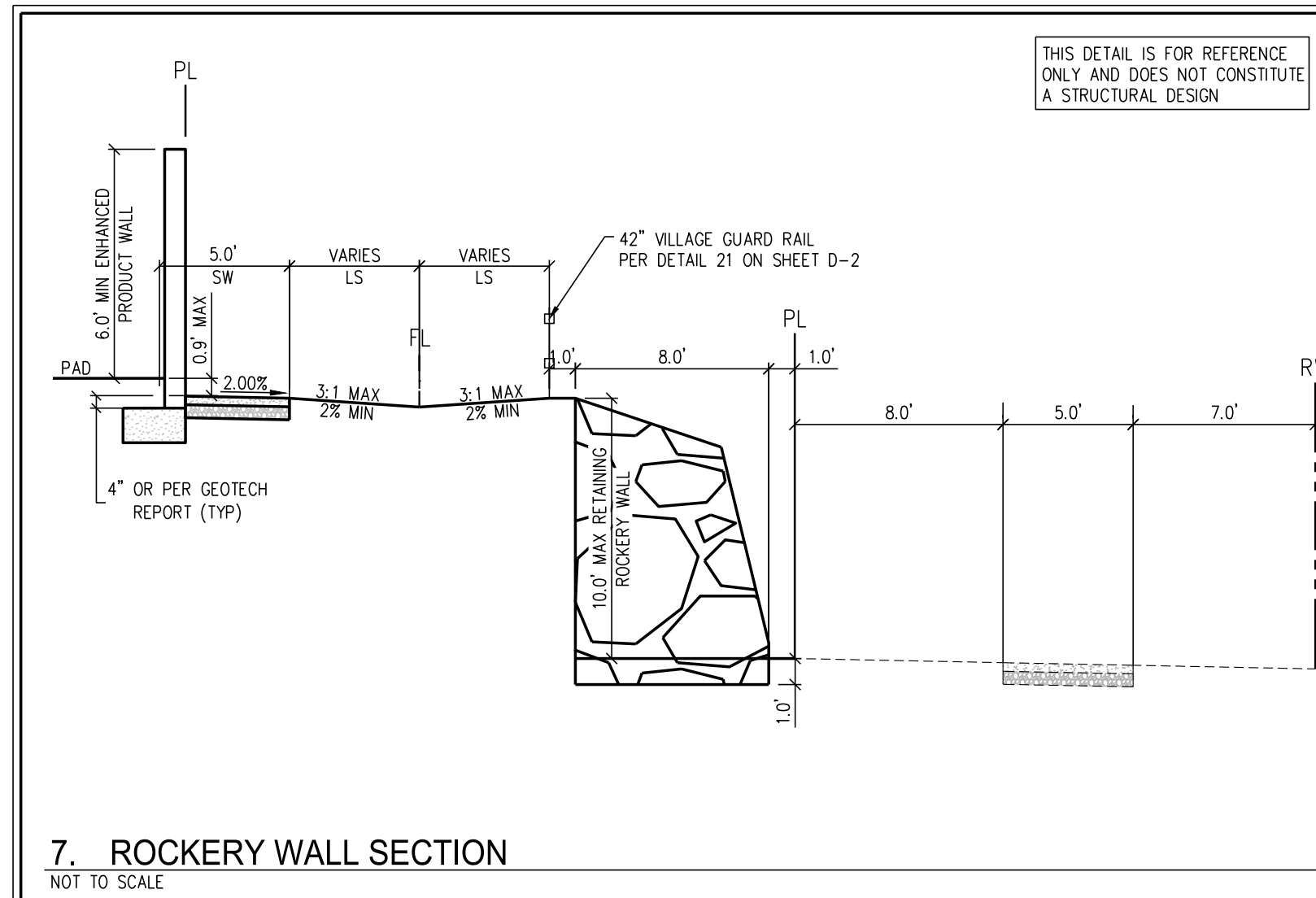
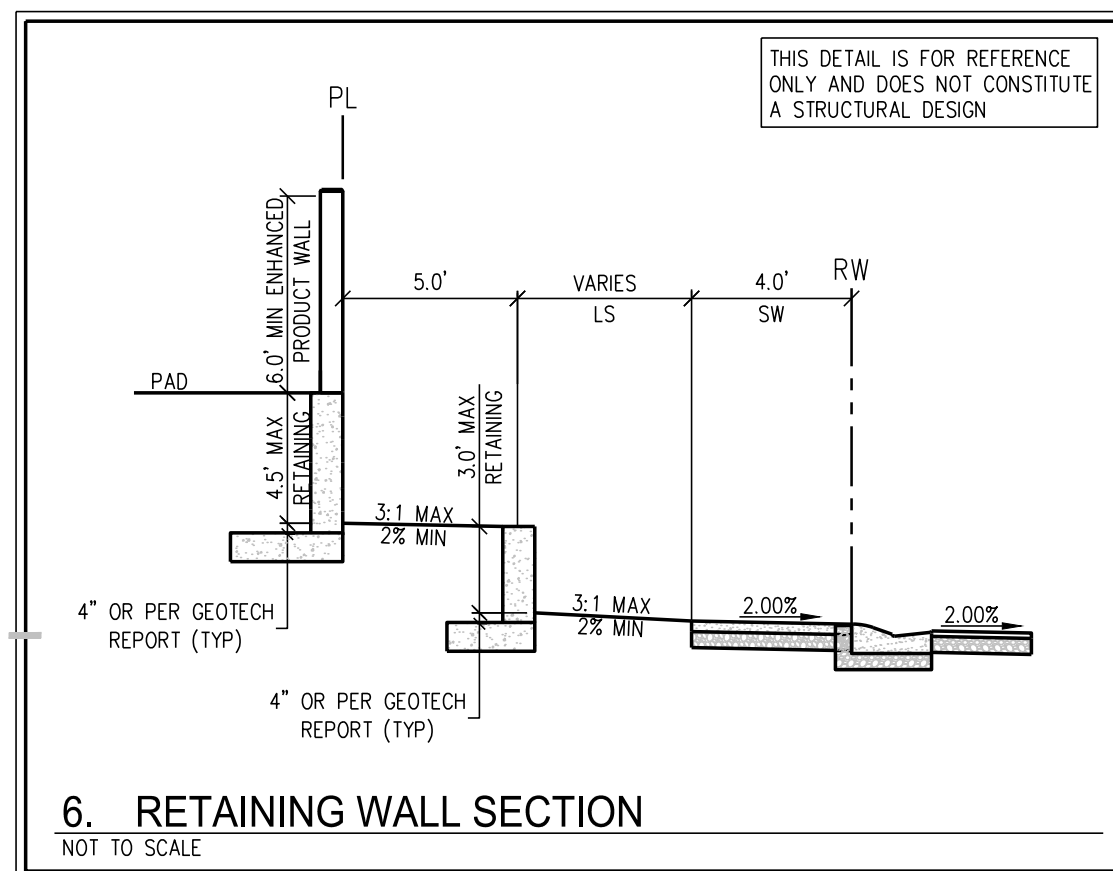
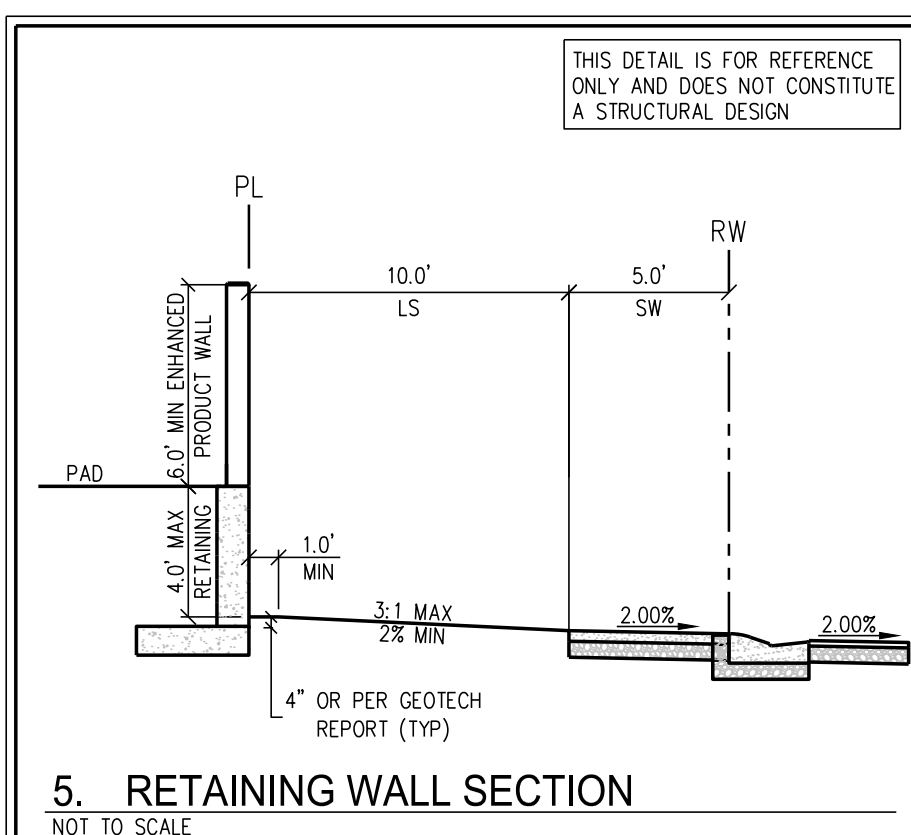
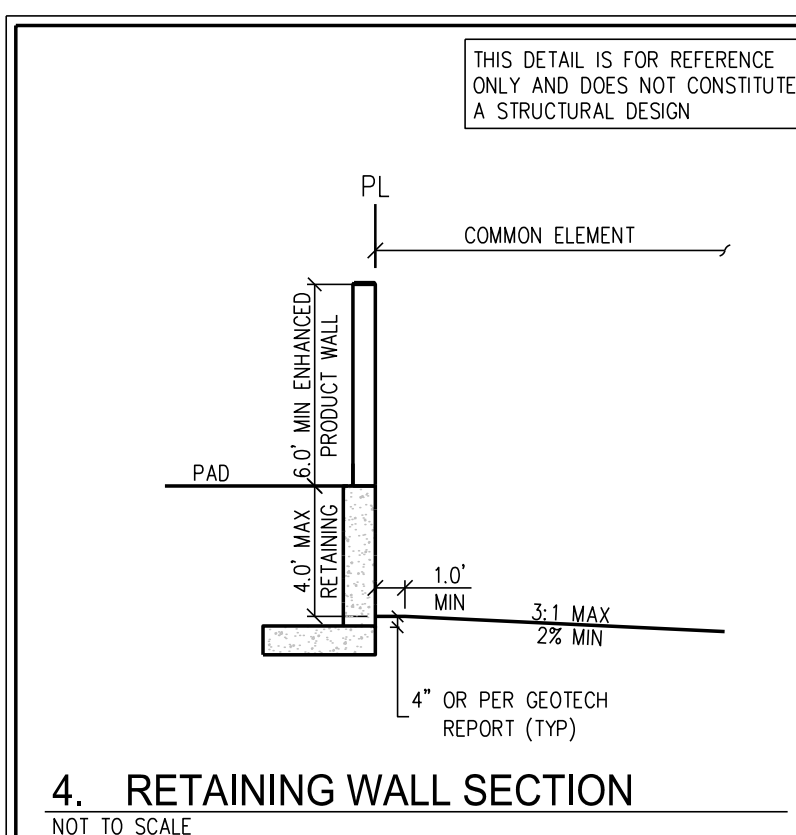
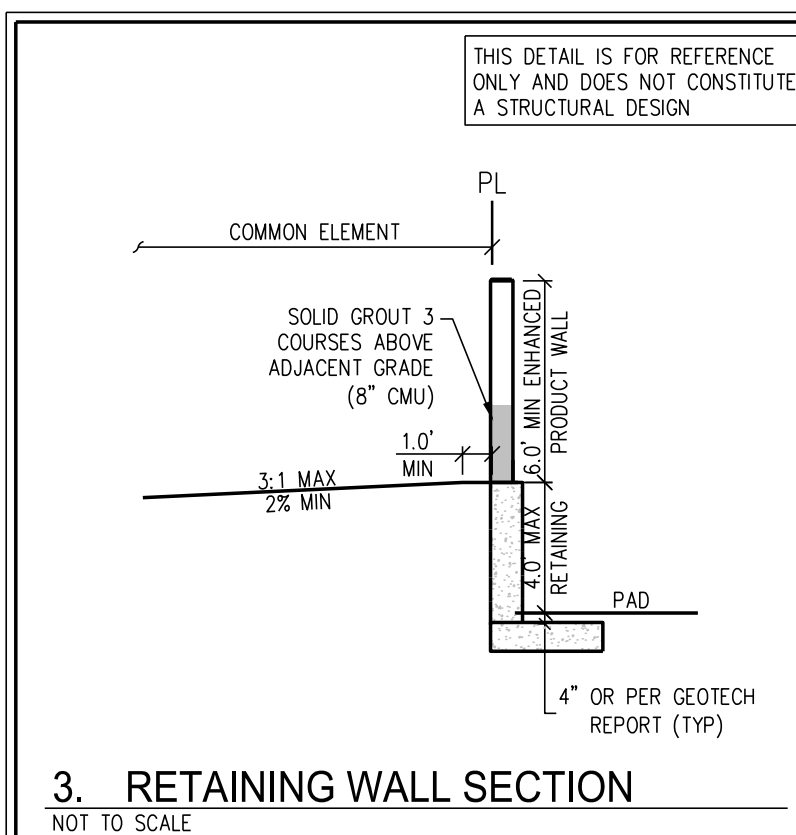
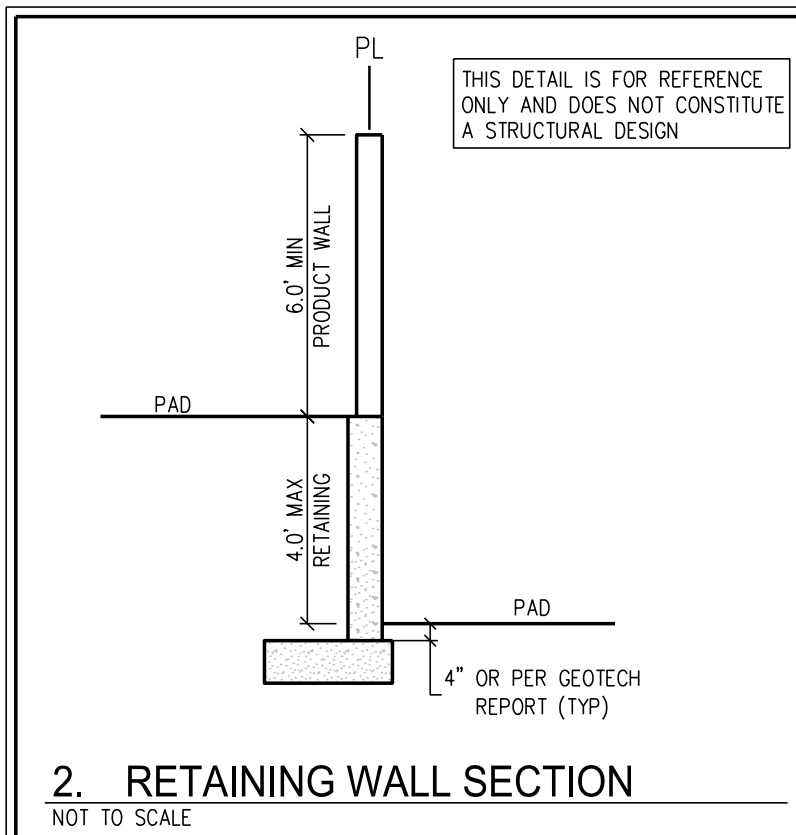
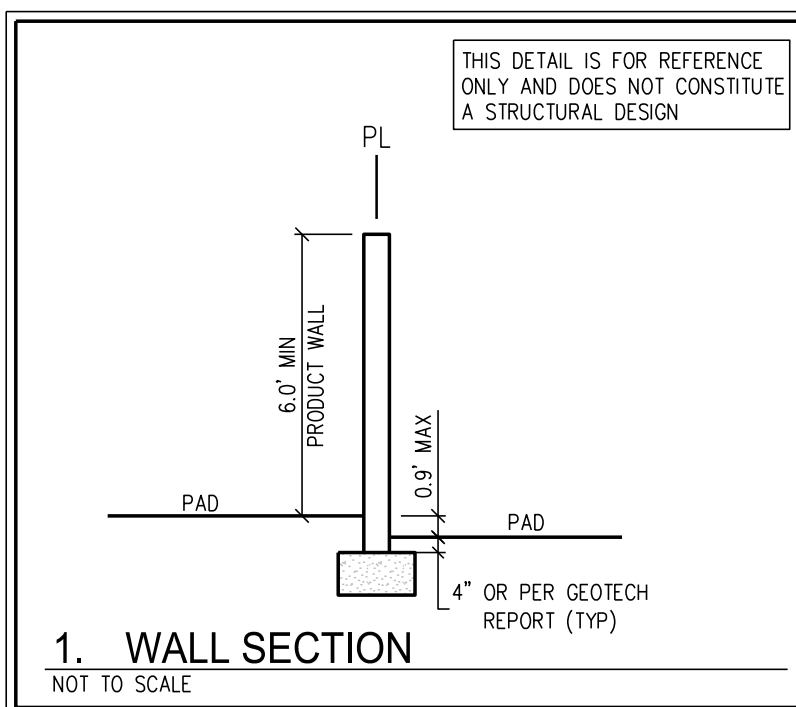
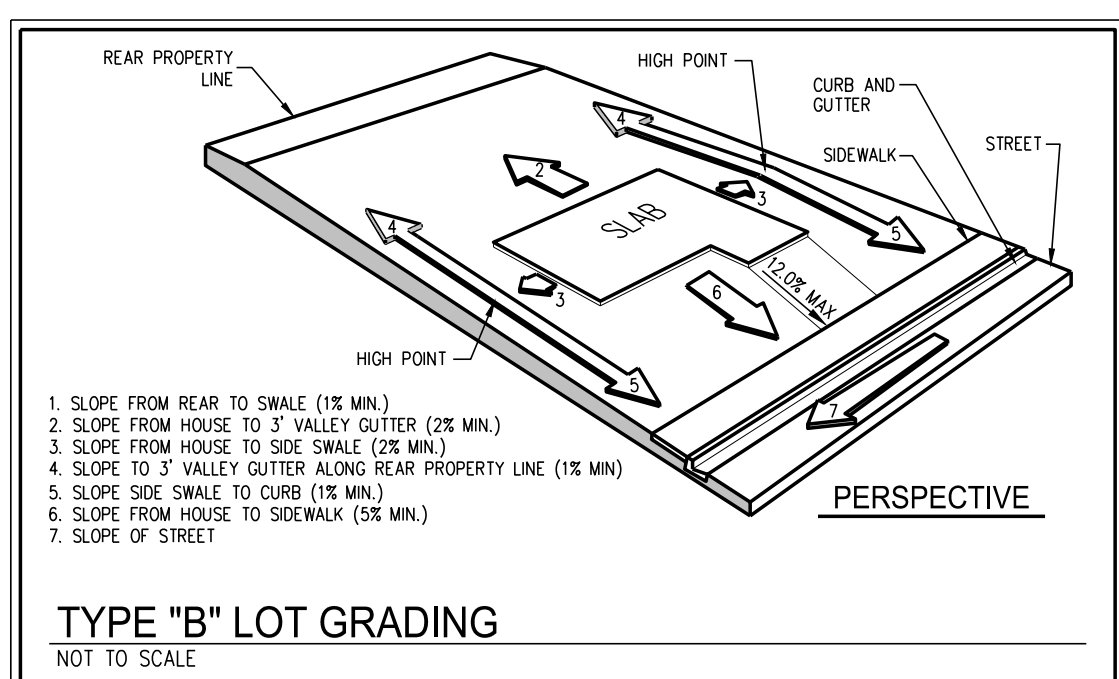
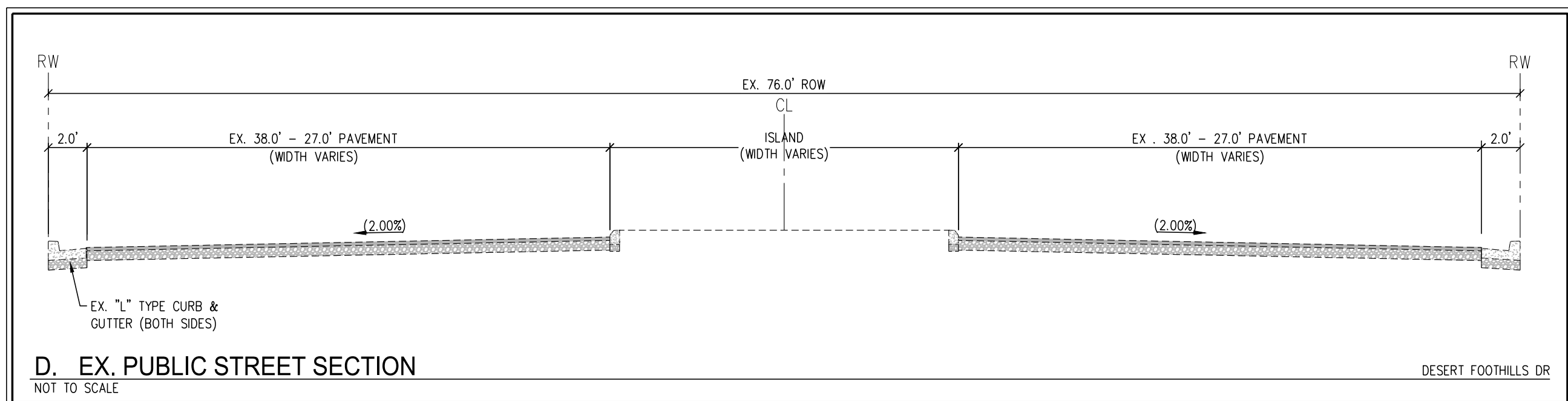
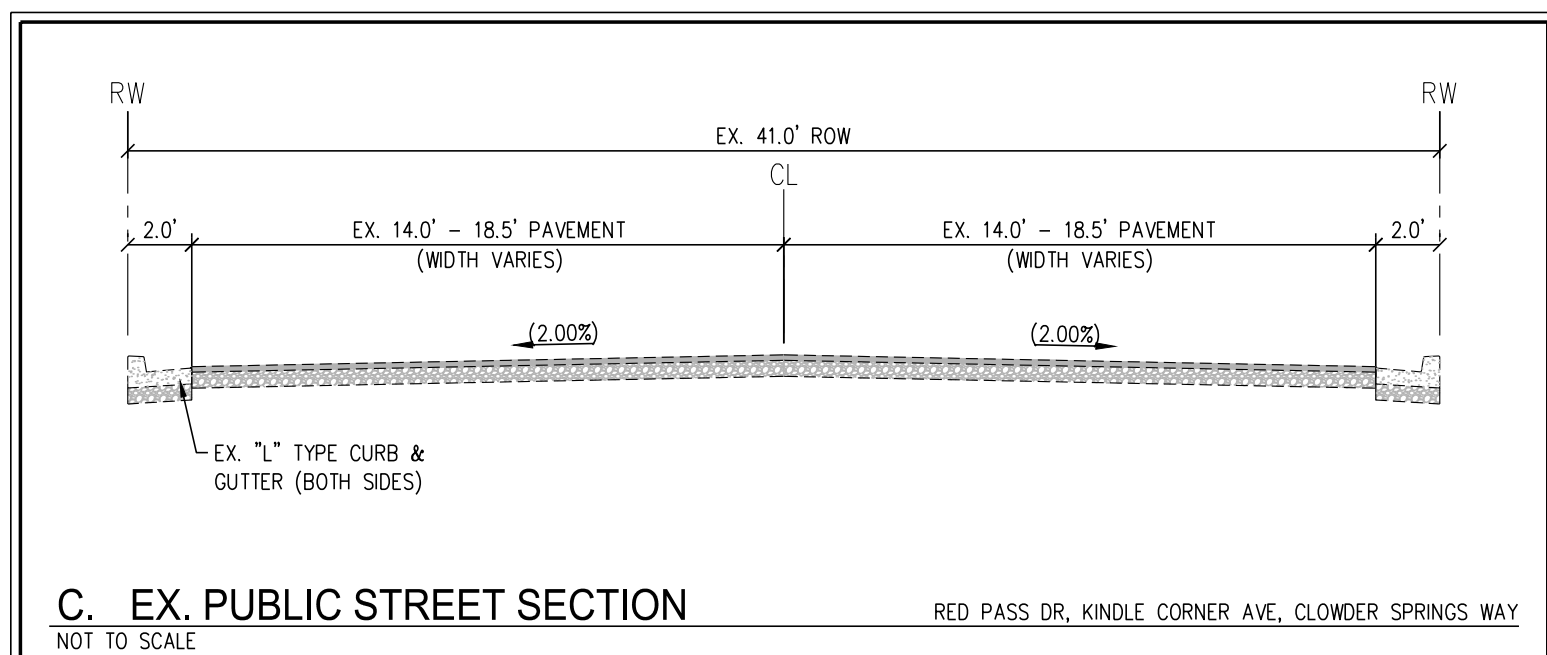
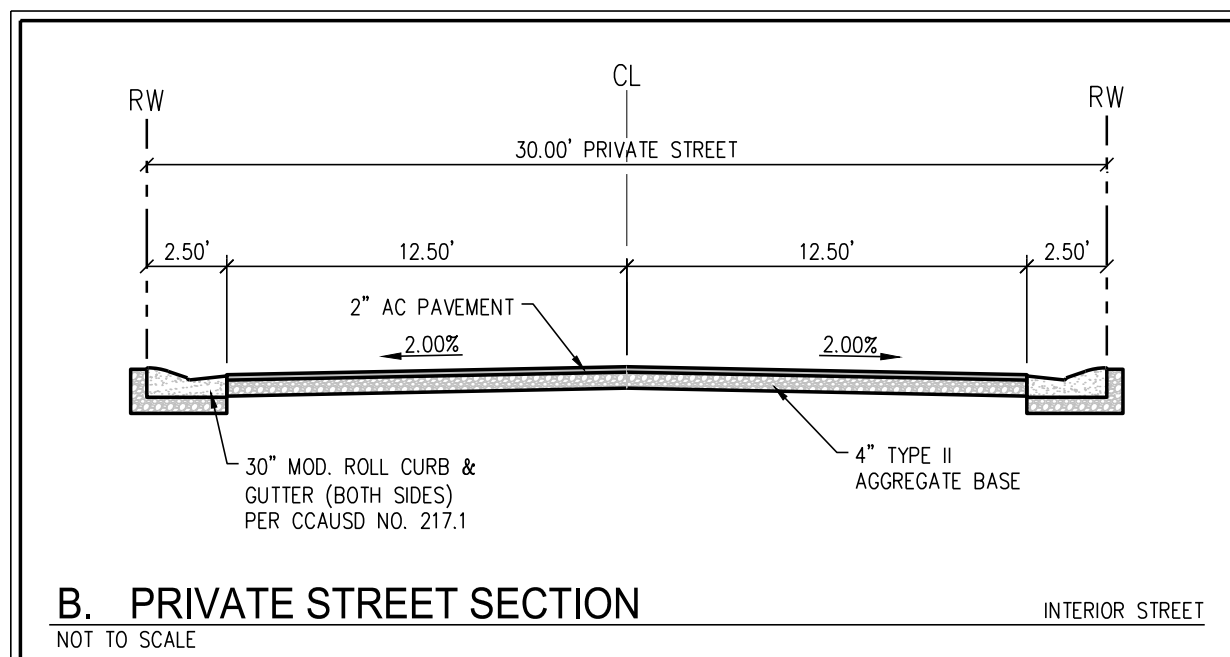
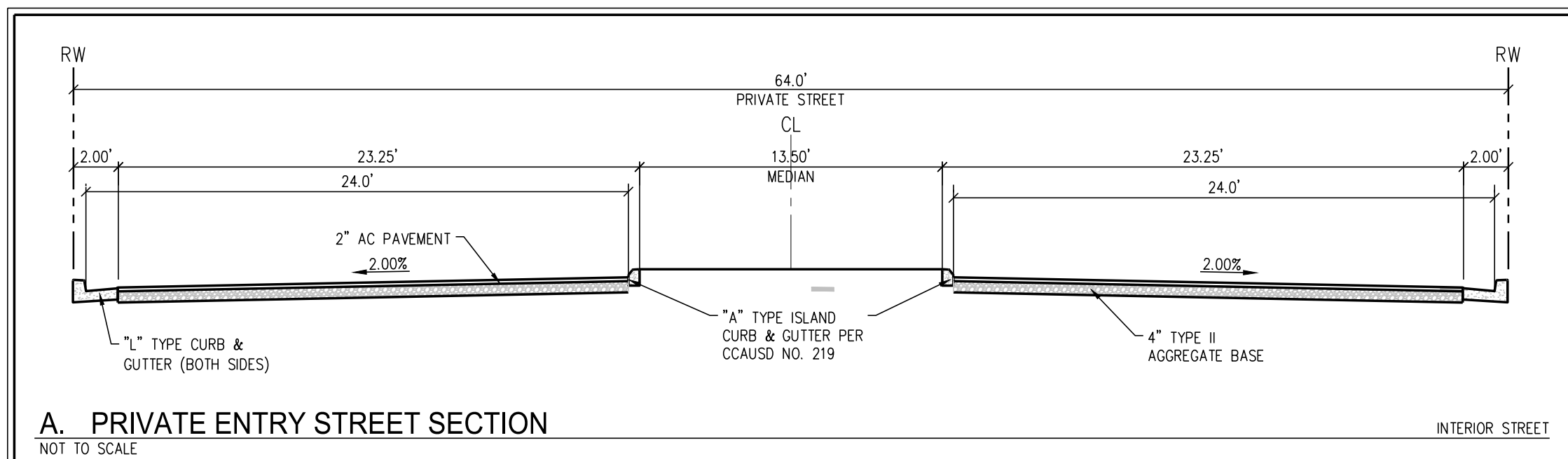
Westwood
5740 S. Anville Street
Suite 216
Las Vegas, NV 89118
Phone (702) 284-5300
Fax (702) 284-5399
westwoodps.com
Westwood Professional Services, Inc.

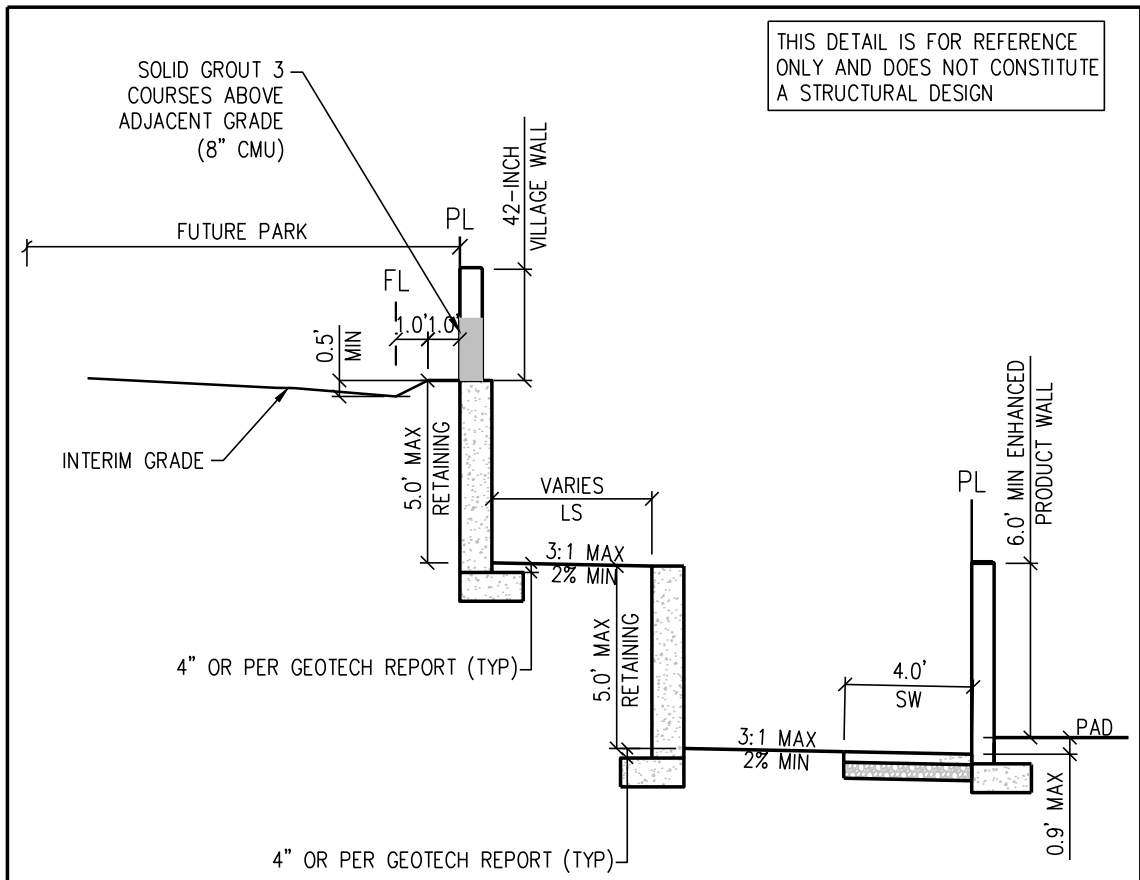
DATE: 1/13/21
BY: HAA
APP: KMB
DESCRIPTION: MORO PONTE GRADING PLAN II
NO. 1/13/2021

RICHMOND
AMERICAN HOMES
MORO PONTE
GRADING PLAN II
SHEET 5 OF 12

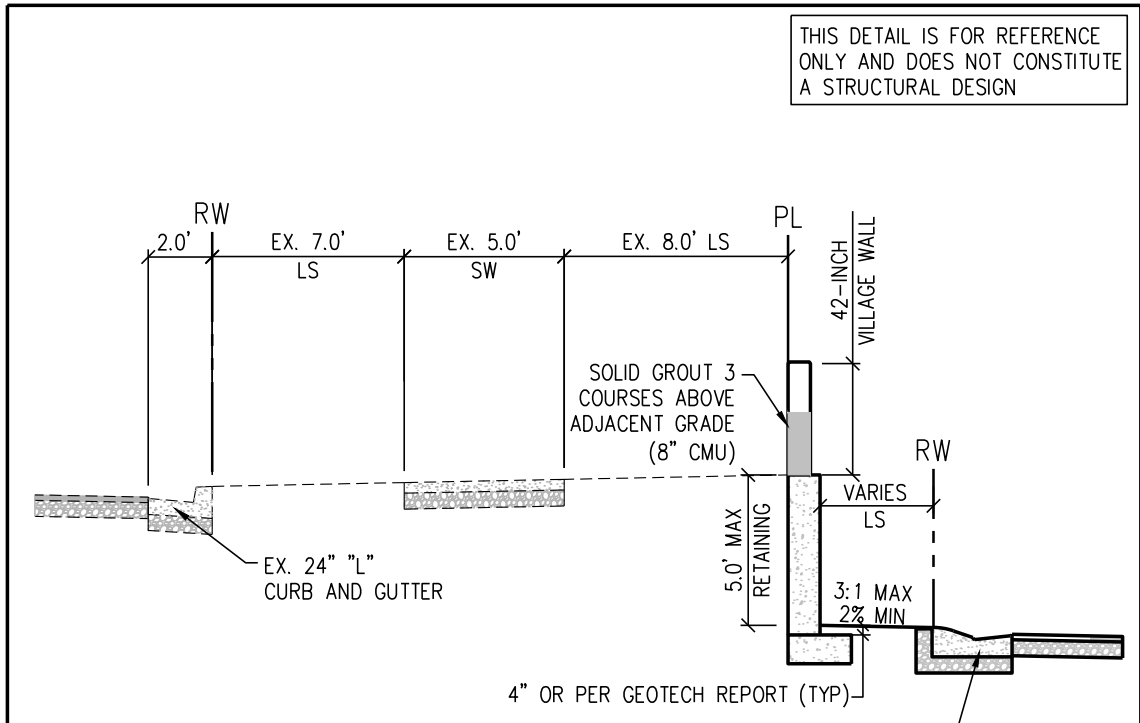
DATE: 1/13/21
DRAFTER: HAA
DESIGNER: HAA
CHECKED: KMB
PROJECT NO. RAH2007

KEVIN M. BROSS
P.E. 24572
CIVIL
Exp. 12/31/2022
1/13/2021

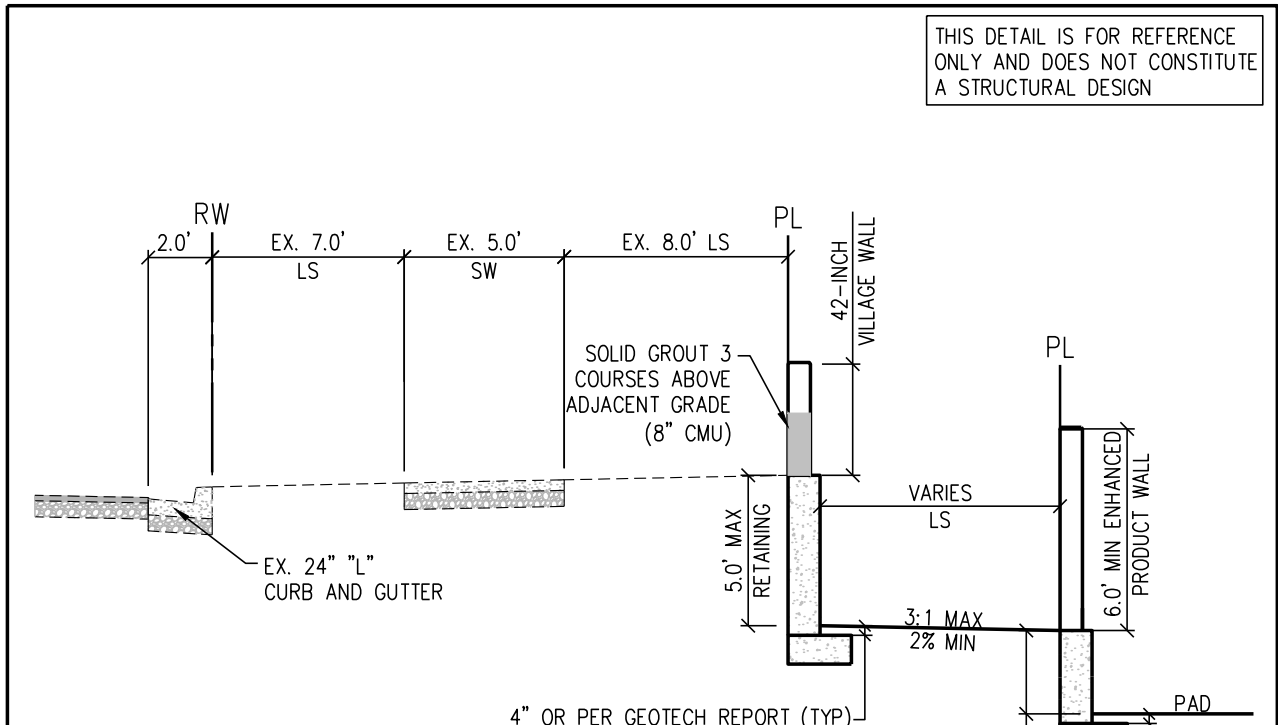




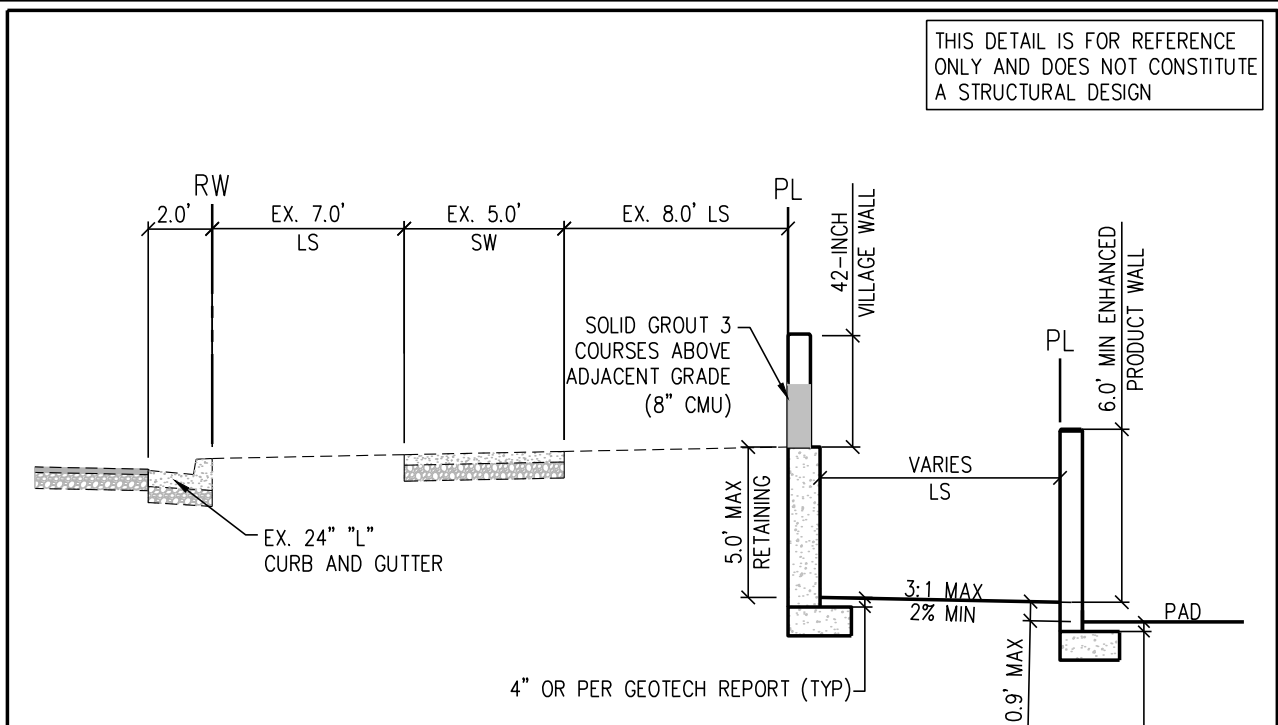
10. WALL SECTION
NOT TO SCALE



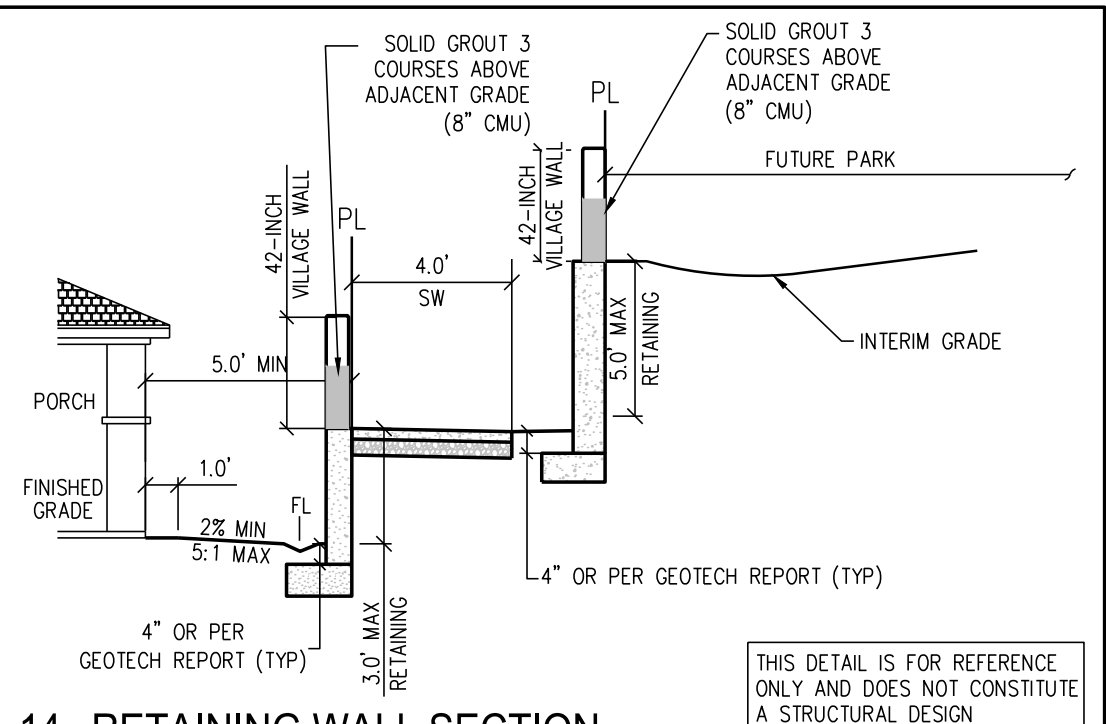
11. RETAINING WALL SECTION
NOT TO SCALE



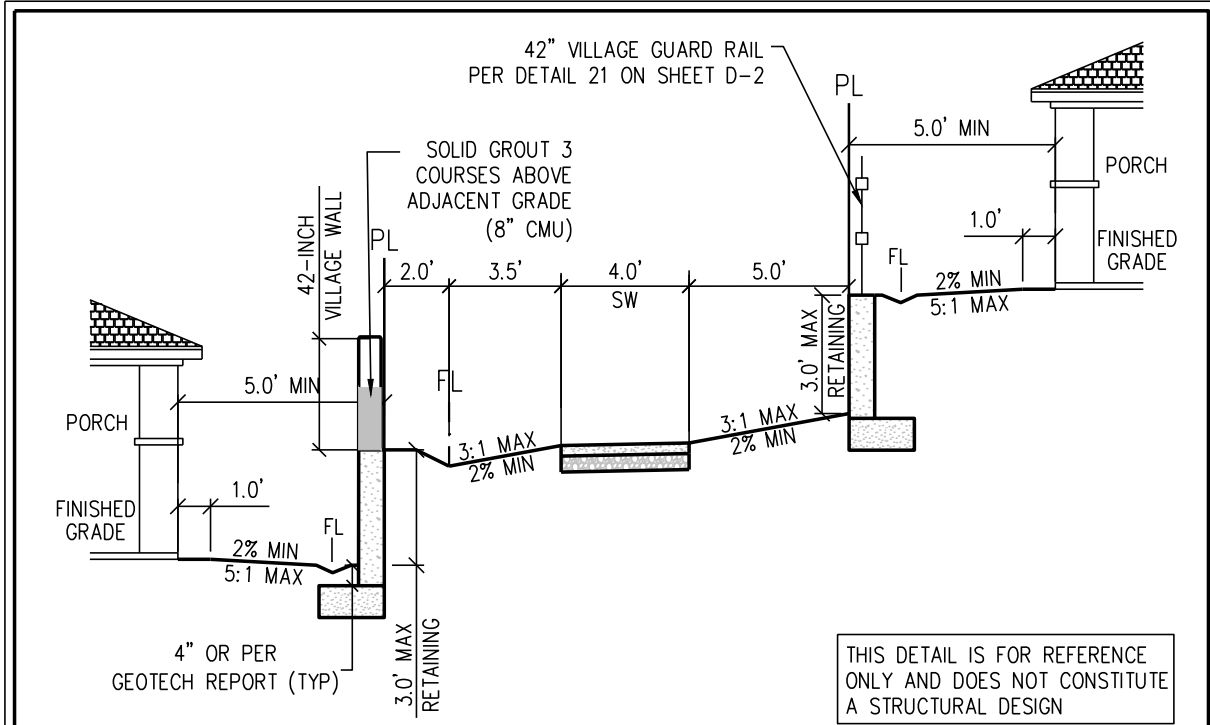
12. RETAINING WALL SECTION
NOT TO SCALE



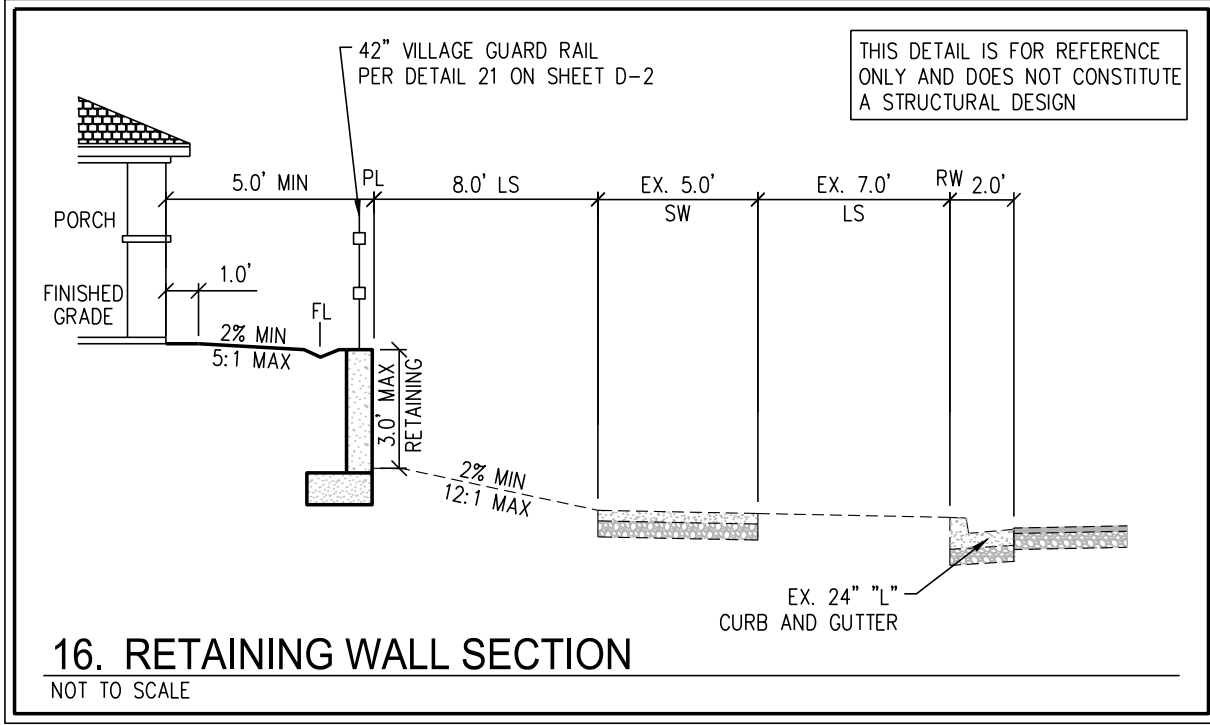
13. RETAINING WALL SECTION
NOT TO SCALE



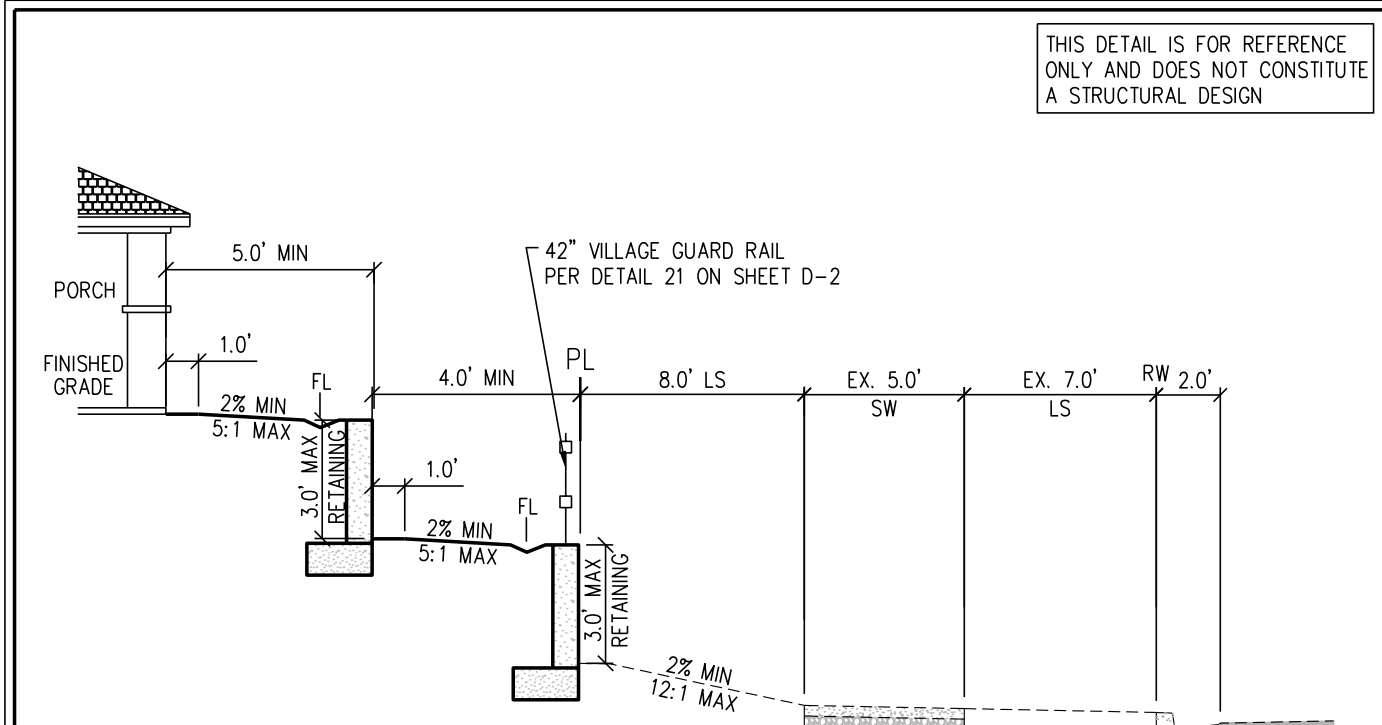
14. RETAINING WALL SECTION
NOT TO SCALE



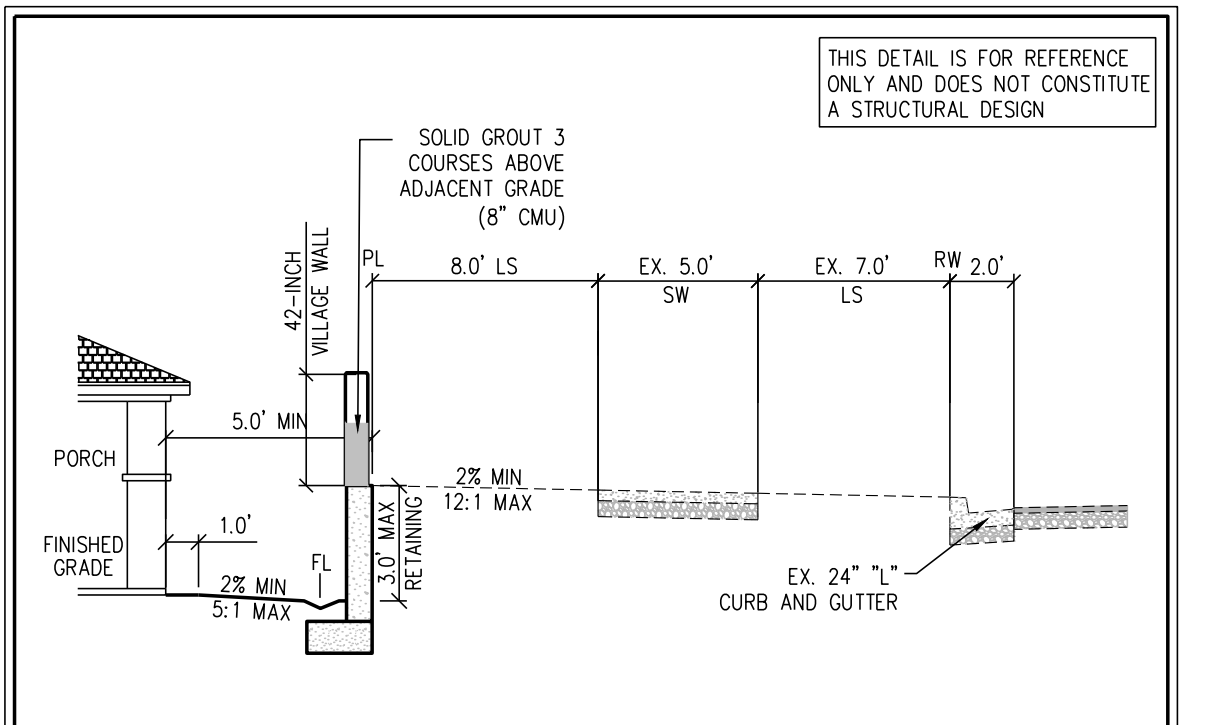
15. PASEO SECTION
NOT TO SCALE



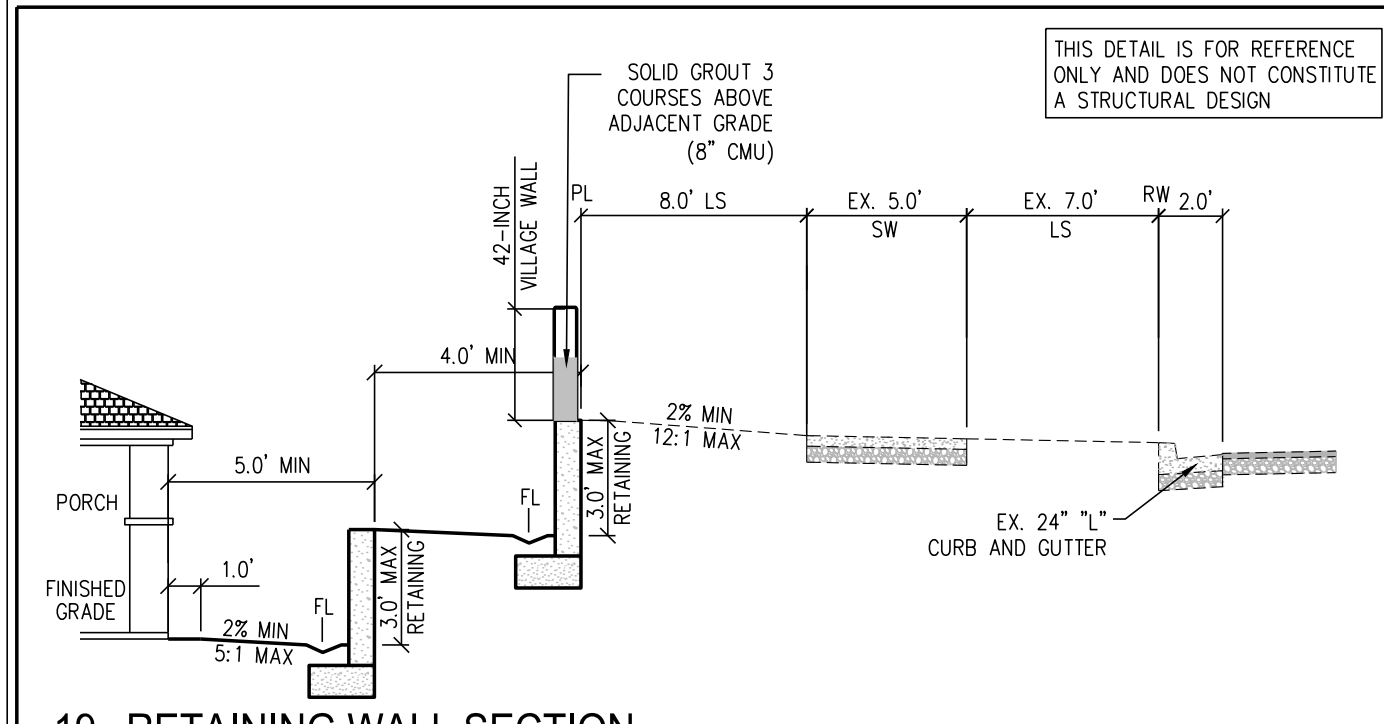
16. RETAINING WALL SECTION
NOT TO SCALE



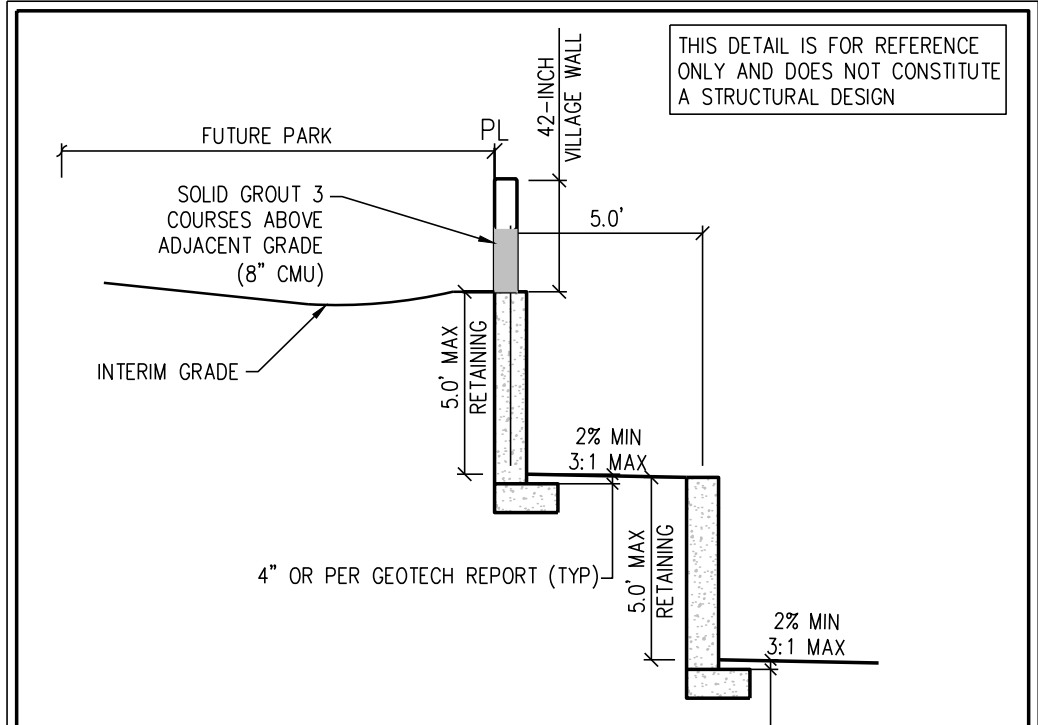
17. RETAINING WALL SECTION
NOT TO SCALE



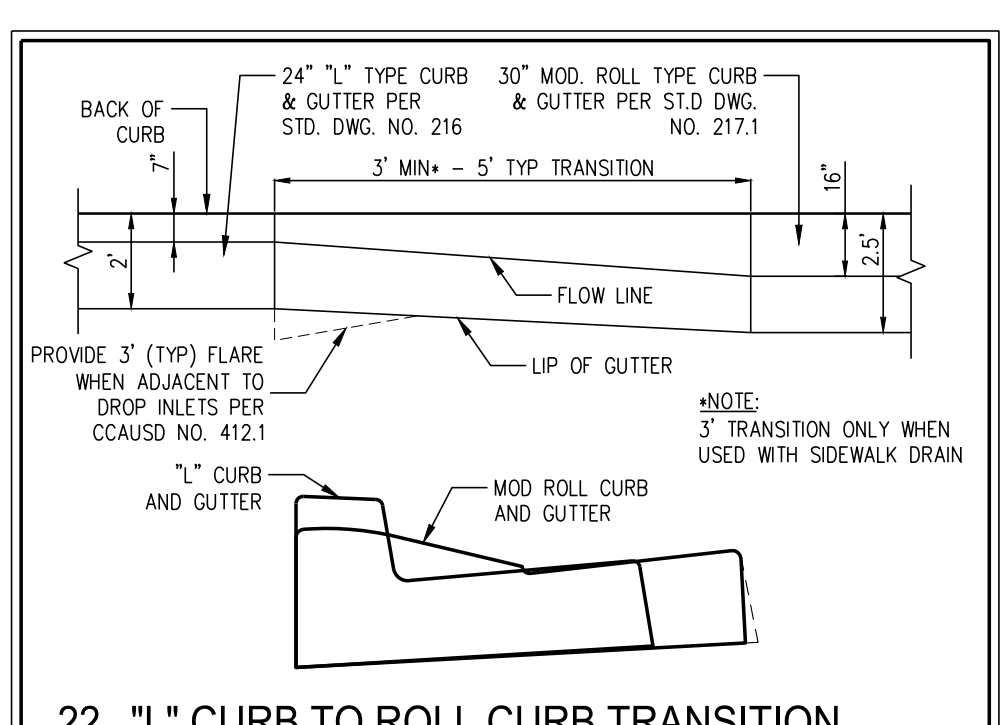
18. RETAINING WALL SECTION
NOT TO SCALE



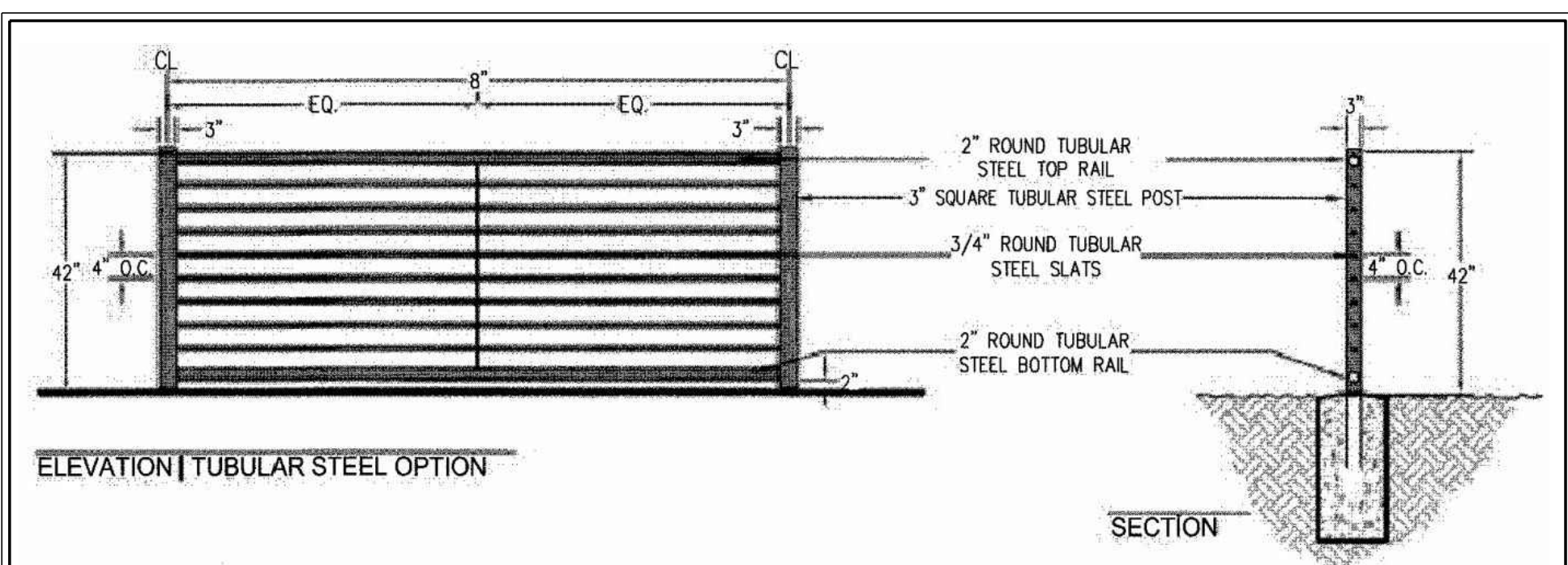
19. RETAINING WALL SECTION
NOT TO SCALE



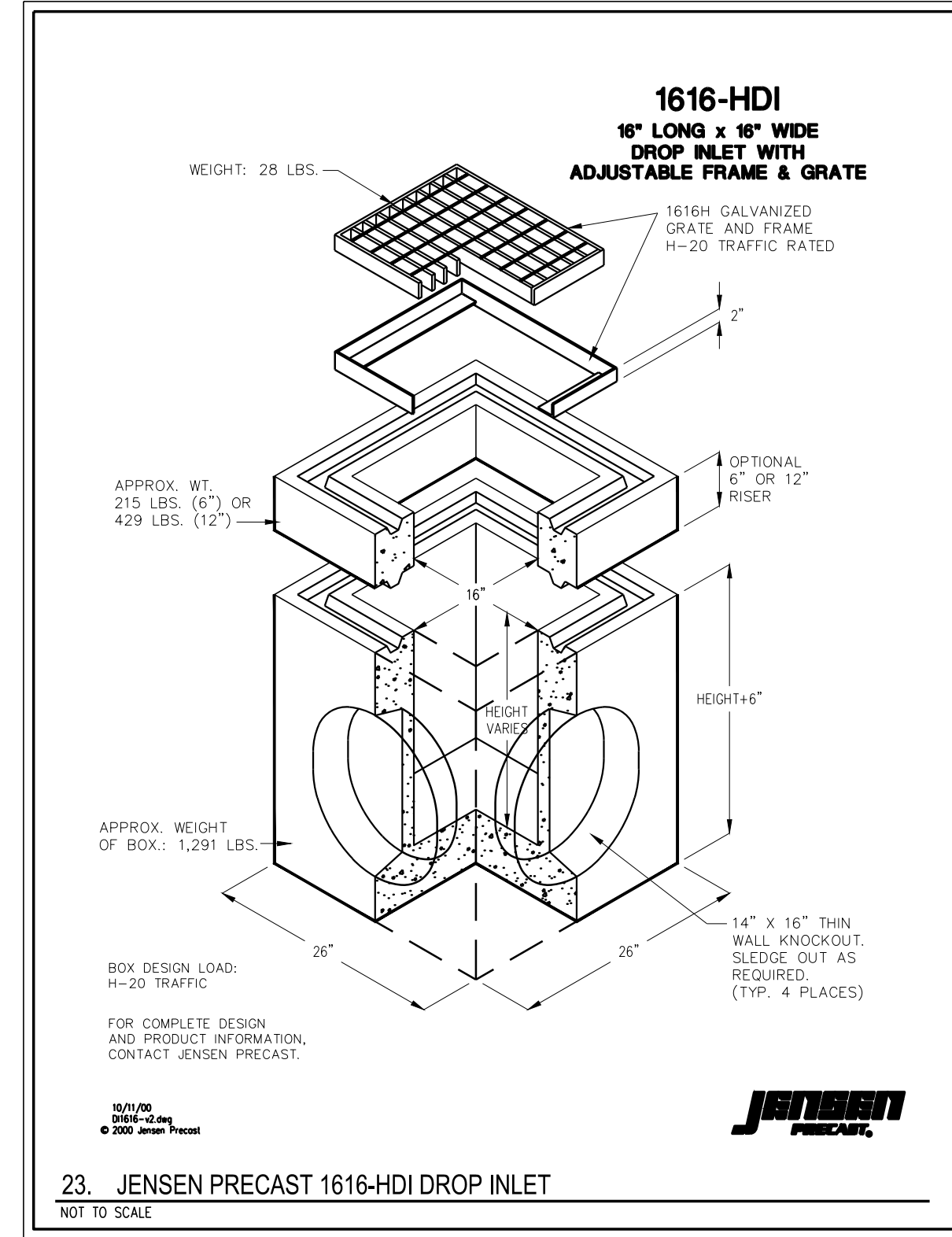
20. RETAINING WALL SECTION
NOT TO SCALE



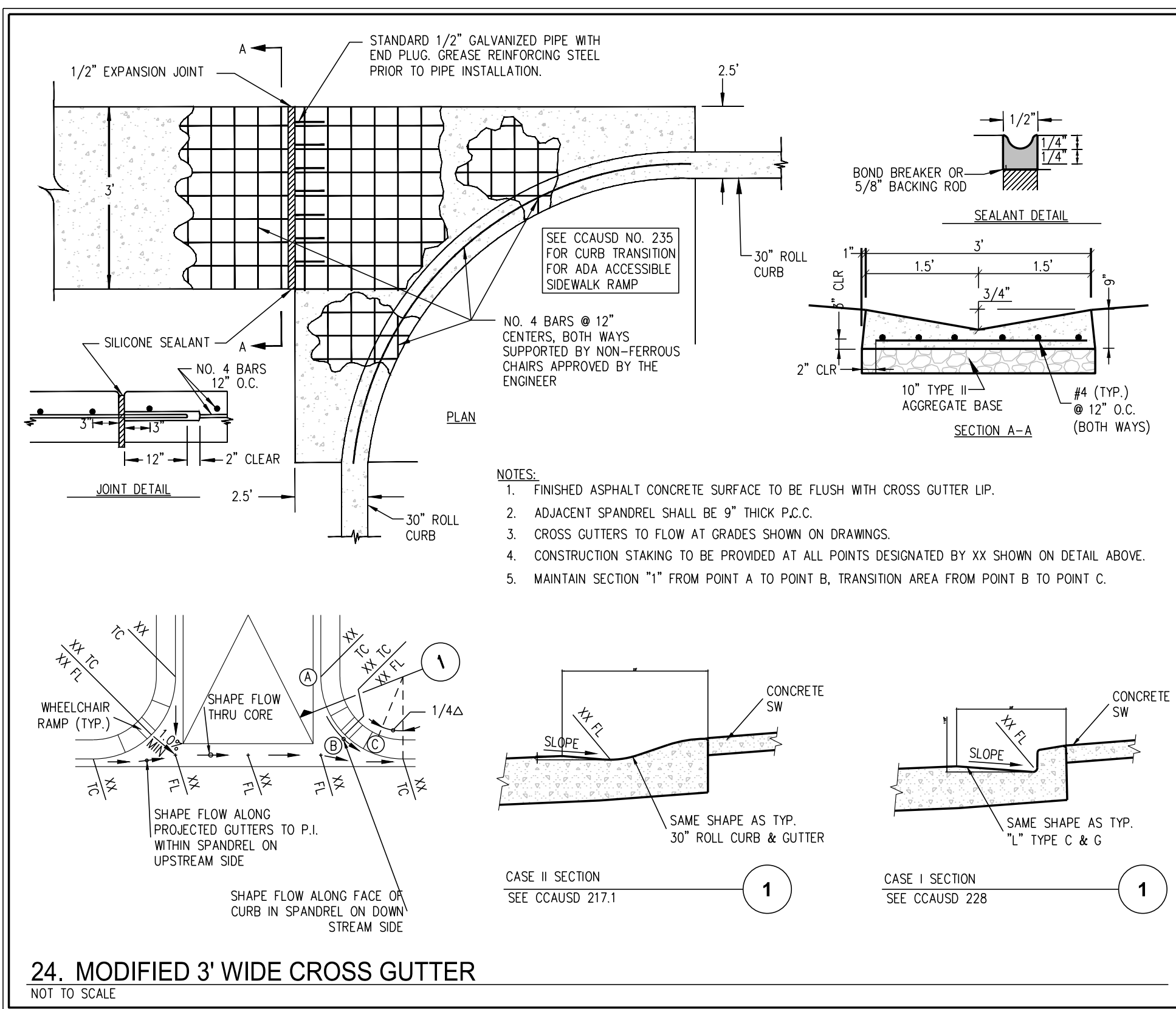
22. "L" CURB TO ROLL CURB TRANSITION
NOT TO SCALE



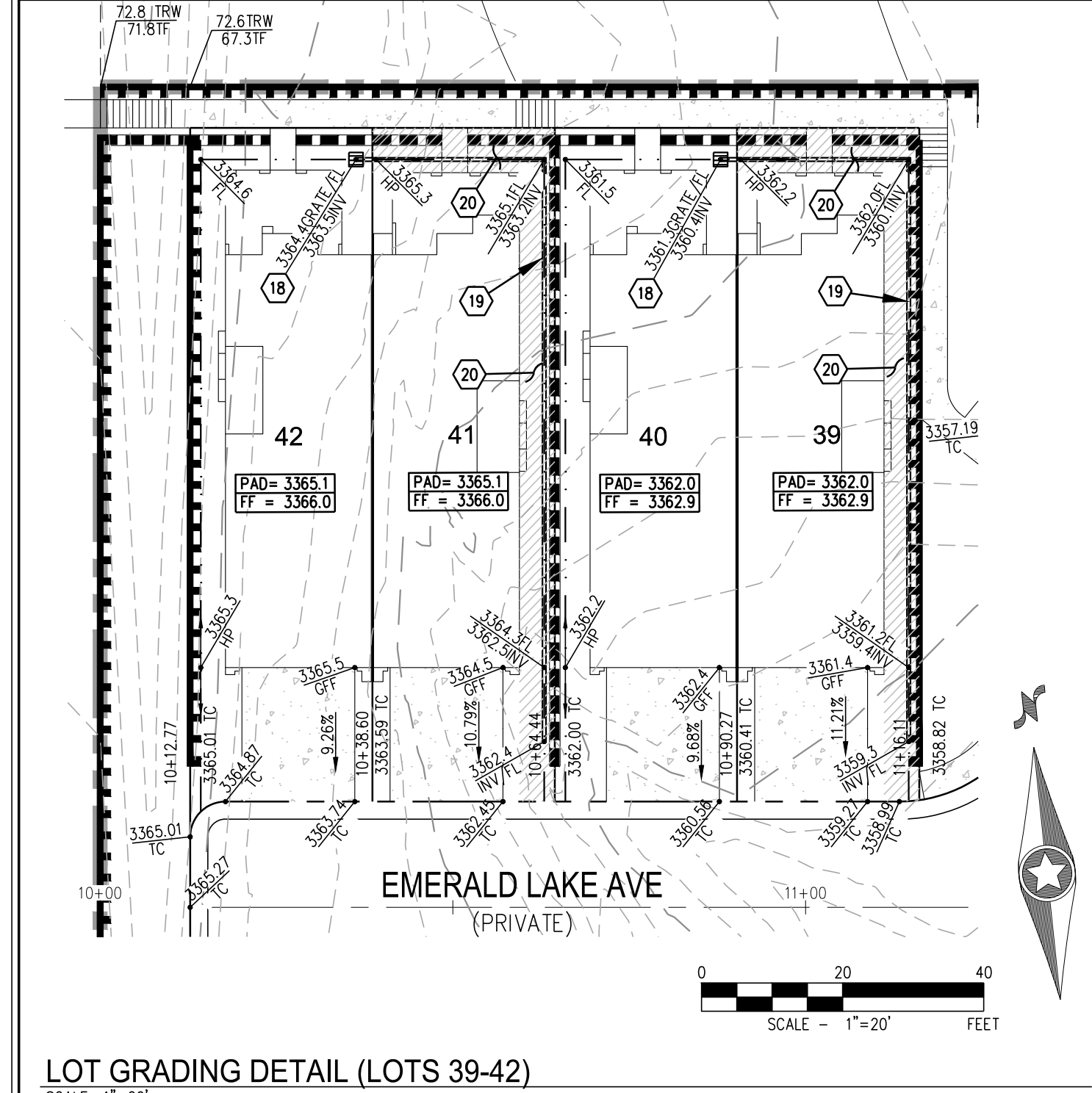
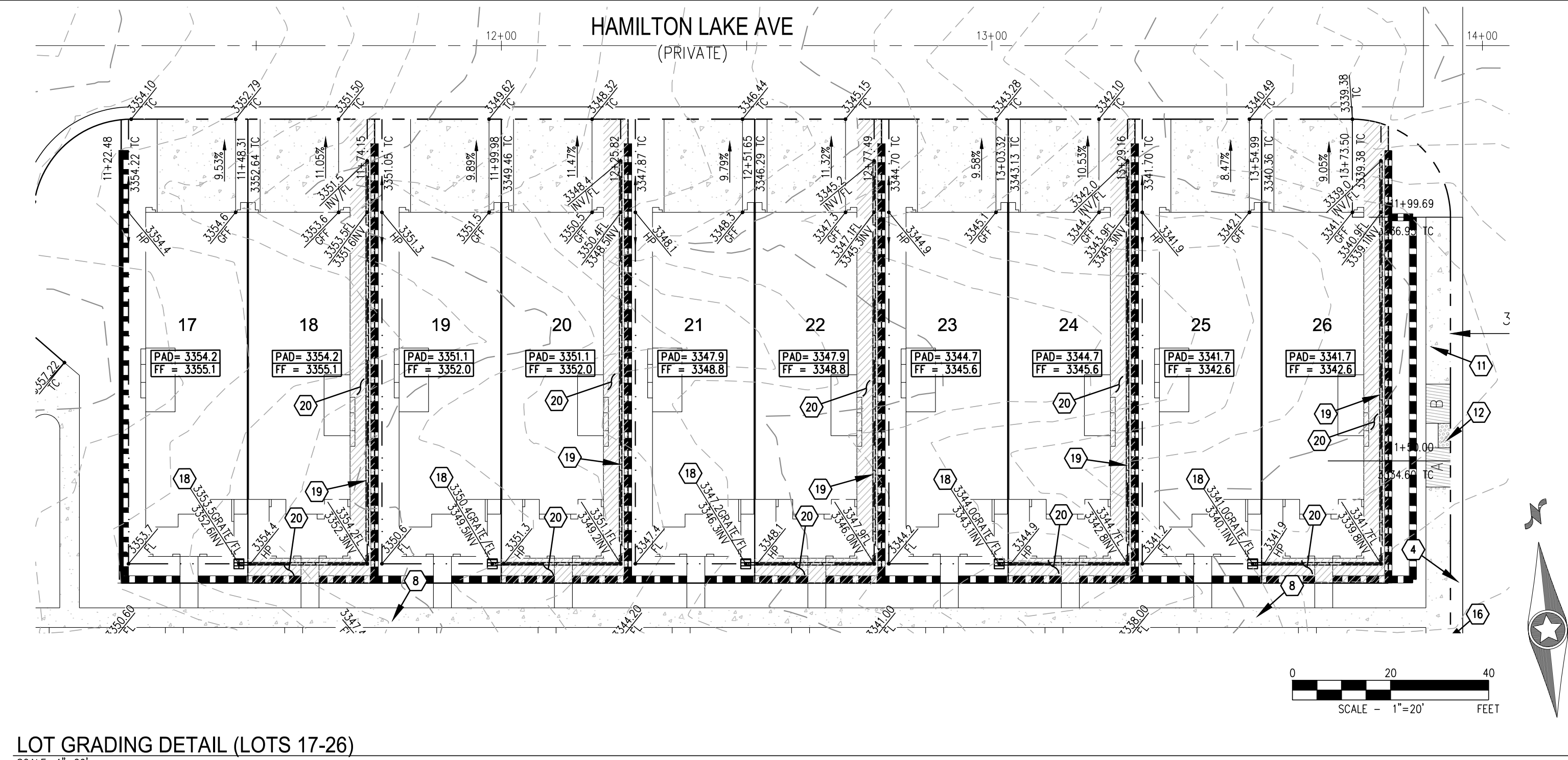
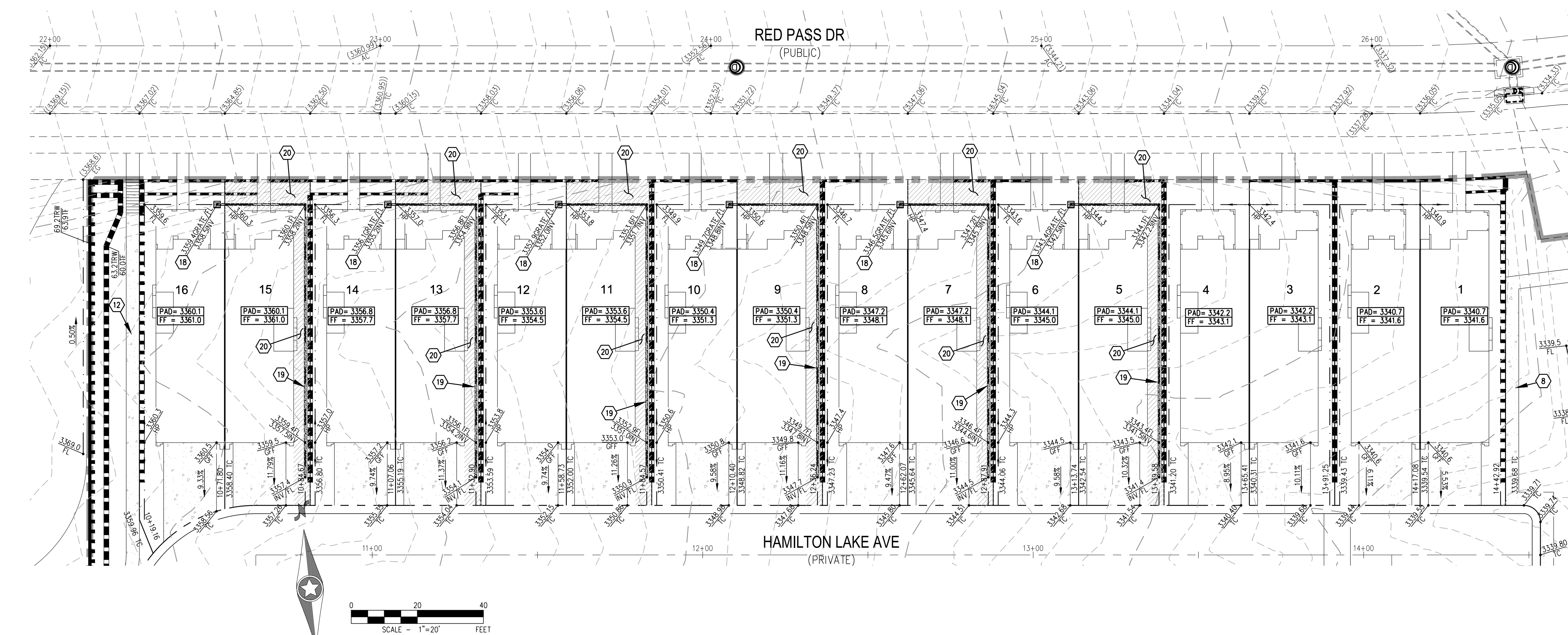
21. VILLAGE GUARDRAIL (TUBULAR STEEL OPTION)
NOT TO SCALE



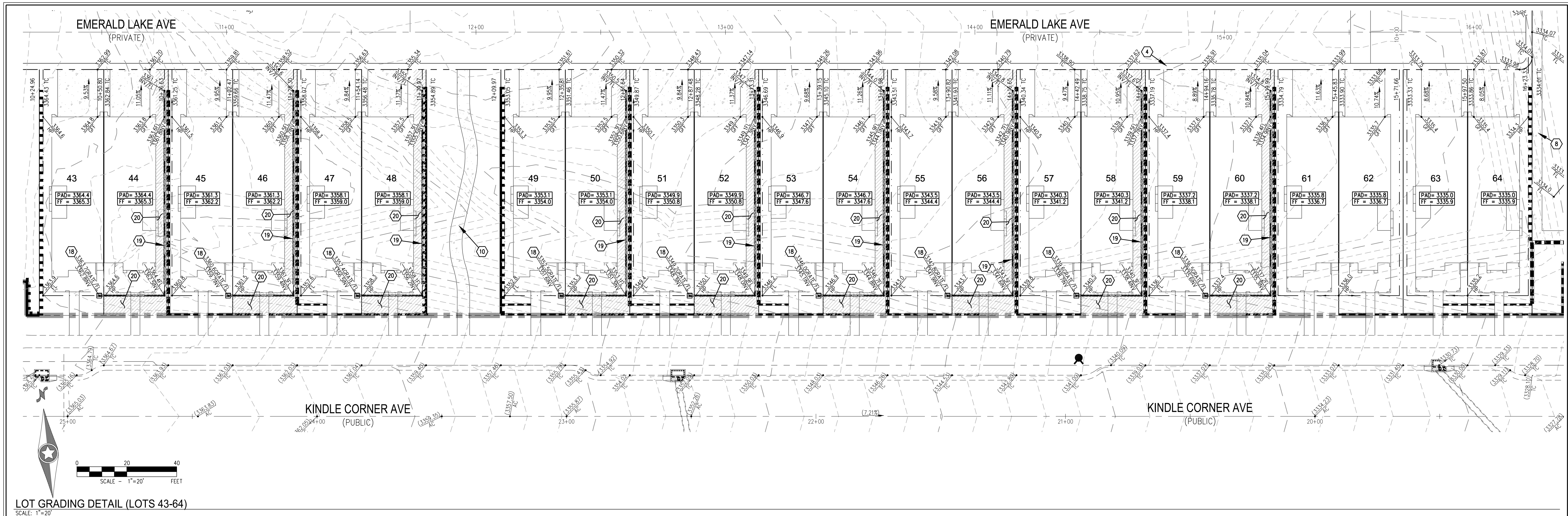
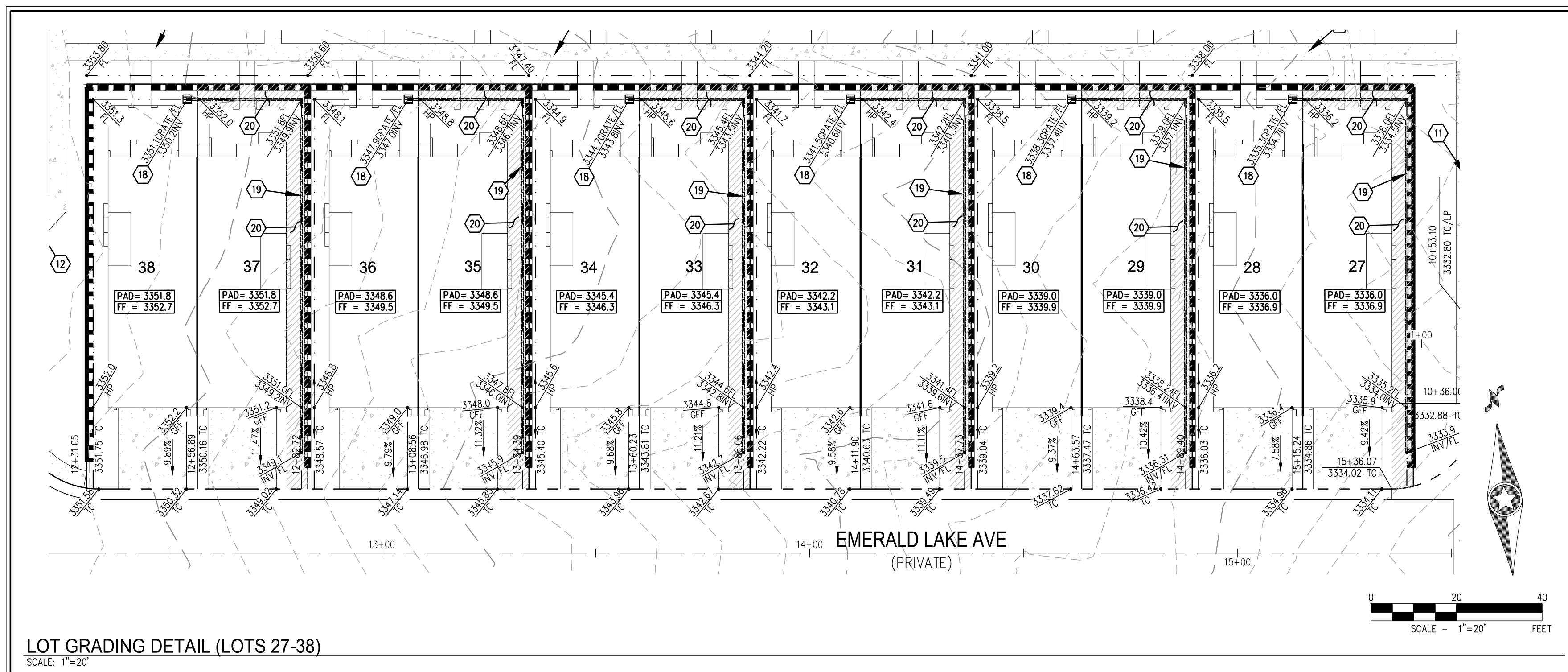
23. JENSEN PRECAST 1616-HDI DROP INLET
NOT TO SCALE



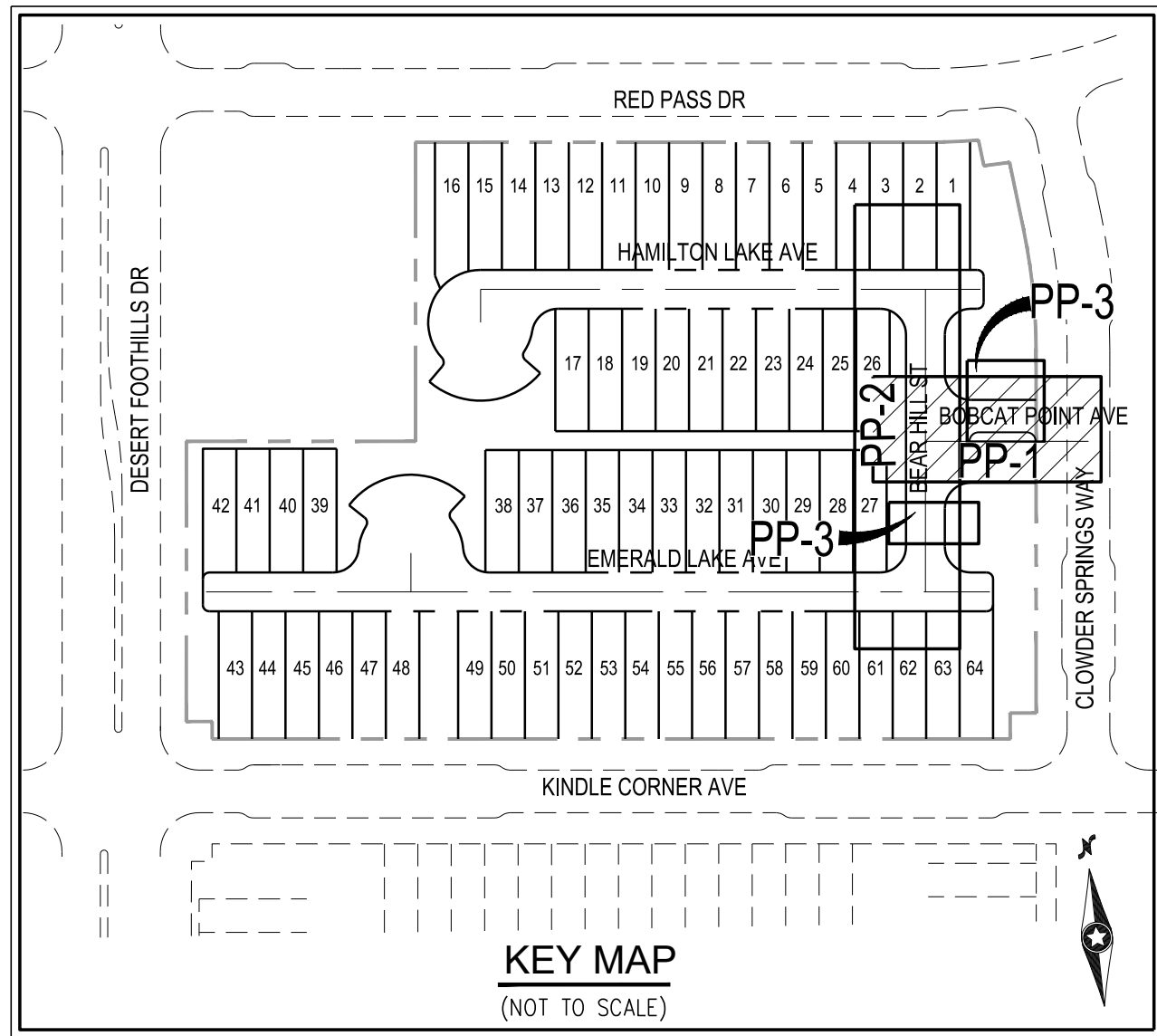
24. MODIFIED 3' WIDE CROSS GUTTER
NOT TO SCALE



- ## CONSTRUCTION NOTES
- 4) CONSTRUCT 30" ROLL CURB AND GUTTER PER CCAUSD NO. 217.1
 - 8) CONSTRUCT 4" WIDE SIDEWALK PER CCAUSD NO. 234 (4" THICK W/ 5" TYPE II AGGREGATE BASE)
 - 11) CONSTRUCT 5" WIDE SIDEWALK PER CCAUSD NO. 234 (5" THICK W/ 5" TYPE II AGGREGATE BASE)
 - 12) CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES PER CCAUSD NO. 235, CASE 1
 - 18) INSTALL 12"x12" INLET MYOLOPLAST GRATE YARD DRAIN OR APPROVED EQUIVALENT (SEE SHEETS D-3 & D-4 FOR LOT DRAINAGE DETAILS)
 - 19) INSTALL 6" 40-PPC DRAINAGE PIPE @ 1.0% SLOPE (SEE SHEETS D-3 & D-4 FOR LOT DRAINAGE DETAILS)
 - 20) PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED BY  
HOA FOR CROSS-LOT DRAINAGE PIPE.



- ## CONSTRUCTION NOTES
- 4 CONSTRUCT 30" ROLL CURB AND GUTTER PER CCAUSD NO. 217.1
 - 8 CONSTRUCT 4" WIDE SIDEWALK PER CCAUSD NO. 234 (4" THICK W/ 5" TYPE II AGGREGATE BASE)
 - 11 CONSTRUCT 5" WIDE SIDEWALK PER CCAUSD NO. 234 (5" THICK W/ 5" TYPE II AGGREGATE BASE)
 - 12 CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES PER CCAUSD NO. 235, CASE 1
 - 14 INSTALL 12"x12" INLET NYLOPLAST GRATE YARD DRAIN OR APPROVED EQUIVALENT (SEE SHEETS D-3 & D-4 FOR LOT DRAINAGE DETAILS)
 - 19 INSTALL 6" 40-PVC DRAINAGE PIPE @ 1.0% SLOPE (SEE SHEETS D-3 & D-4 FOR LOT DRAINAGE DETAILS)
 - 20 PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED BY HOA FOR CROSS-LOT DRAINAGE PIPE 



KEY MAP
(NOT TO SCALE)

CONSTRUCTION NOTES

- ⑦ CONSTRUCT 2" AC PAVEMENT WITH 4" TYPE II AGGREGATE BASE
- ⑧ CONSTRUCT 1" TYPE CURB AND GUTTER PER CCAUSD NO. 216
- ⑨ CONSTRUCT "A" TYPE ISLAND CURB PER CCAUSD NO. 219
- ⑩ CONSTRUCT 30" ROLL CURB AND GUTTER PER CCAUSD NO. 217.1
- ⑪ CONSTRUCT 5" TRANSITION FROM ROLL CURB TO 1" TYPE CURB PER DETAIL 22 SHEET D-2
- ⑫ CONSTRUCT 3" CROSS GUTTER PER DETAIL 24 SHEET D-2
- ⑬ CONSTRUCT 6" CROSS GUTTER PER CCAUSD NO. 228
- ⑭ CONSTRUCT 4" WIDE SIDEWALK PER CCAUSD NO. 234 (4" THICK W/ 5" TYPE II AGGREGATE BASE)
- ⑮ CONSTRUCT 6" WIDE SIDEWALK PER CCAUSD NO. 234 (5" THICK W/ 5" TYPE II AGGREGATE BASE)
- ⑯ CONSTRUCT 5" WIDE SIDEWALK PER CCAUSD NO. 234 (4" THICK W/ 5" TYPE II AGGREGATE BASE)
- ⑰ CONSTRUCT 5" WIDE SIDEWALK PER CCAUSD NO. 234 (5" THICK W/ 5" TYPE II AGGREGATE BASE)
- ⑱ CONSTRUCT SIDEWALK RAMP USING ARMOR TILE TRUNCATED DOMES PER CCAUSD NO. 235, CASE I
- ⑲ CONSTRUCT SIDEWALK RAMP USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD NO. 235, CASE II
- ⑳ SLOPE AND MATCH EXISTING IMPROVEMENTS PER CCAUSD NO. 503 & 500.2
- ㉑ CONSTRUCT 4" WIDE MEDIAN OPENING
- ㉒ INSTALL SIDEWALK UNDERDRAIN PER CCAUSD NO. 236
- ㉓ INSTALL SIDEWALK GROUNDRI (TUBULAR STEEL) PER DETAIL 21 ON SHEET D-2
- ㉔ INSTALL 12"X12" INLET NYLOPLAST GAGE YARD DRAIN OR APPROVED EQUIVALENT (SEE SHEETS D-3 & D-4 FOR 10' DRAINAGE DETAILS)
- ㉕ INSTALL 6" 40-PPVC DRAINAGE PIPE @ 1.0% SLOPE (SEE SHEETS D-3 & D-4 FOR 10' DRAINAGE DETAILS)

STORM DRAIN NOTES

SD1 INSTALL 12" RCP STORM DRAIN

- 502 INSTALL 12" RCP STORM DRAIN
- 503 INSTALL 18" RCP STORM DRAIN
- 504 INSTALL 24" RCP STORM DRAIN
- 505 INSTALL JENSEN PRECAST 16"x16"x6" DROP INLET (1616-110) (DETAIL 23, SHEET D-2) TO STORM WATER QUALITY MANAGEMENT STAMP PER CAUSD NO. 421
- 506 INSTALL 5" TYPE "OM2" DROP INLET PER CAUSD NO. 412.1 & CAUSD NO. 421
- 507 INSTALL 12.5" TYPE "OM2" DROP INLET PER CAUSD NO. 412.1 & 421 & STORM WATER QUALITY MANAGEMENT STAMP PER CAUSD NO. 421
- 508 INSTALL 60" TYPE 1 SD MANHOLE PER CAUSD NO. 401 & 405.2
- 509 CUT BACK EXISTING 24" RCP STORM DRAIN AND INSTALL 60" TYPE 1 SD MANHOLE PER CAUSD NO. 401 & 405.2

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

1. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
2. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP.
3. MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.
4. SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
5. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
6. CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE CITY OF LAS VEGAS BUILDING DEPARTMENT.
7. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN PLACE DURING CONSTRUCTION. ENGINEER/OWNER SHALL BE NOTIFIED OF PRIOR DAMAGE TO EXISTING FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPAIRING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION. COMPLETION.
8. NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY ZONES.

(REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ.FT.))

1. THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES. MATERIALS IN THIS SITE DEVELOPER'S OR CONSTRUCTION PROJECT'S STOCKPILES SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN CLARK COUNTY TITLE 24.40 AND IN LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NW000000, SECTION III.A.2.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS, AND AREAS OF EROSION, VEHICLE ENTRANCE AND EXIT, AND OTHER SENSITIVE LOCATIONS, AND ALL BMPs WEEKLY, AND WITHIN 24 HOURS AFTER A RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NW000000, SECTION III.A.2.
5. ACCUMULATED SEDIMENT IN BMPs SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

ALL PRIVATE STREETS ARE PUBLIC UTILITY EASEMENTS, PUBLIC SEWER EASEMENTS, AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA

FAST
Call before you
UnderGround
1-702-432-5300
FREEWAY & ARTERIAL SYSTEM
OF TRANSPORTATION (F.A.S.T.)

AVOID HITTING OVERHEAD
POWER LINES. IT'S
COSTLY.

**CALL BEFORE
YOU DO
OVERHEAD**

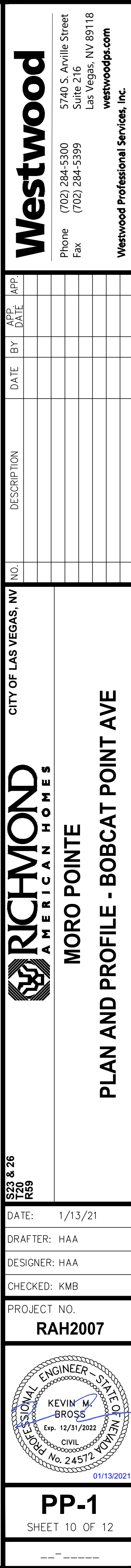
1-702-227-2929

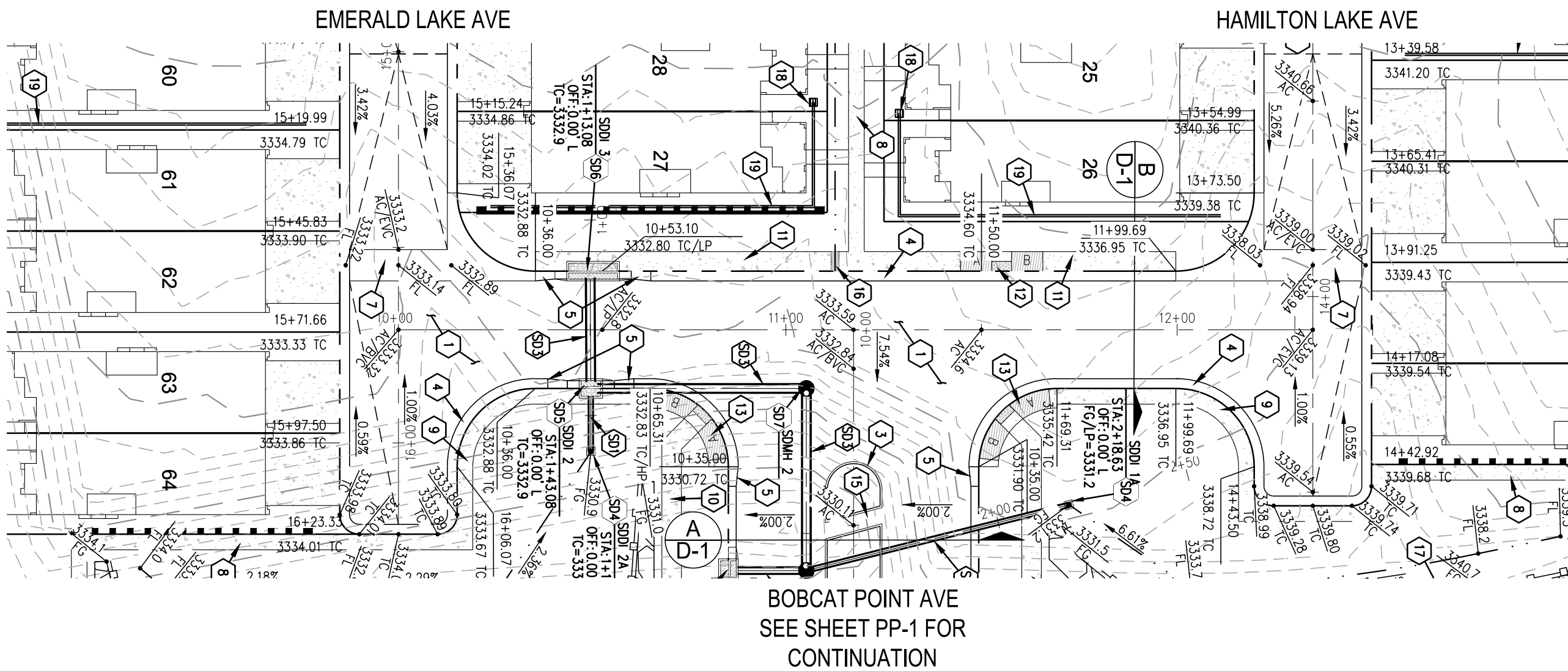
Call before you Dig
AVOID CUTTING UNDERGROUND
UTILITY LINES. IT'S COSTLY.

C 

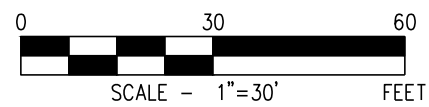
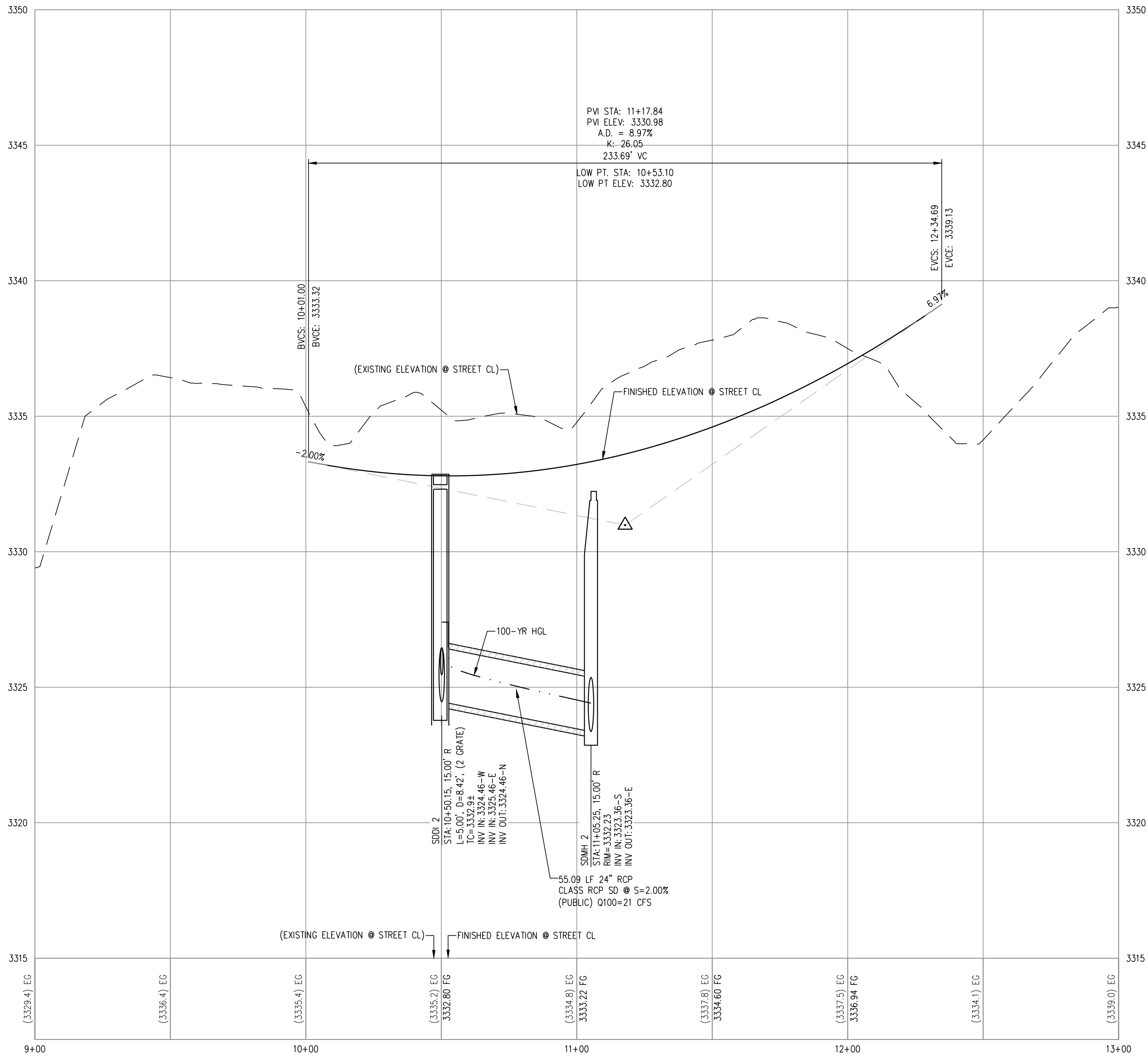
OR
1-800-642-2444

PUBLIC DRAINAGE EASEMENT NOTE
 LOTS 5-60 REQUIRE PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA FOR CROSS-LOT DRAINAGE PIPE. SEE LOT GRADING DETAILS ON SHEETS D-3 & D-4 FOR THE PUBLIC DRAINAGE EASEMENT LOCATIONS.





BEAR HILL ST - PLAN VIEW
(PRIVATE)



CALL SOUTHWEST GAS AT 702-651-2111 FOR
STANDBY WHEN EXCAVATING OVER OR NEAR HIGH
PRESSURE GAS LINES

DRAINAGE IMPROVEMENT QUANTITIES		
1. 3" WIDE CONCRETE VALLEY GUTTER	SF	460
2. 8" WIDE CONCRETE VALLEY GUTTER	SF	785
3. 12"x12" INLET NYLOPLAST GRATE YARD DRAIN	EA	28
4. 6" 40-PVC DRAINAGE PIPE	LF	3,060
5. 60" TYPE III STORM DRAIN MANHOLE	EA	2
6. 5.0' TYPE "CM2" DROP INLET	EA	2
7. 12.5' TYPE "CM2" DROP INLET	EA	1
8. 16"x16" JENSEN PRECAST DROP INLET	EA	2
9. 12" RCP CLASS III STORM DRAIN	LF	86
10. 18" RCP CLASS III STORM DRAIN	LF	20
11. 24" RCP CLASS III STORM DRAIN	LF	132
11. NDOT TYPE II DROP INLET	EA	1

SURVEY NOTE
OWNER RESPONSIBLE TO PROVIDE SURVEY MONUMENTATION AS
SHOWN AND TO REPLACE ALL SURVEY MONUMENTATION DAMAGED,
DISTURBED, DESTROYED, OR OBLISCURED DURING CONSTRUCTION.

SOILS REPORT
SOILS REPORT BY ANGLE ENGINEERING
PROJECT NO. 26233-1 DATED 8/17/20
EARTHWORKS
EARTHWORK QUANTITIES (RAW):
CUT= 15,721 CU YDS
FILL= 9,129 CU YDS
EXPORTED MATERIAL TO BE DISPOSED OF AT AN APPROVED LICENSED DISPOSAL
FACILITY OR AT A SITE WITH AN APPROVED AND ACTIVE GRADING PERMIT.

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

GENERAL NOTES
1. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE
ENGINEER.
2. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP.
3. MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH
REPORT.
4. SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
5. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
6. CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE CITY OF
LAS VEGAS BUILDING DEPARTMENT.
7. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES AND
NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN PLACE
DURING CONSTRUCTION. ENGINEER/OWNER SHALL BE NOTIFIED OF PRIOR DAMAGE TO EXISTING FACILITIES PRIOR
TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPLETING FACILITIES IF ENGINEER/OWNER
IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMENCING.
8. NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN
HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY
ZONES.

**LAS VEGAS VALLEY CONSTRUCTION SITE BMP
GUIDELINES**
(REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ.FT.))
1. THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE
ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN
DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF CLARK COUNTY AS A RESULT OF
CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH
MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER
AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT
MEET THE PERFORMANCE STANDARDS SPECIFIED IN CLARK COUNTY TITLE 24.40 AND IN THE LAS VEGAS
VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS
PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE
SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO THE NEVADA
STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR
STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT
LOCATIONS, AND ALL BMPs WEEKLY, AND WITHIN 24 HOURS AFTER A RAIN EVENT OF 0.5 INCHES OR MORE.
THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN
AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND
DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY
NVR100000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMPs SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF
EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE
REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

PRIVATE STREET NOTE
ALL PRIVATE STREETS ARE PUBLIC UTILITY EASEMENTS, PUBLIC SEWER EASEMENTS, AND PUBLIC DRAINAGE
EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA

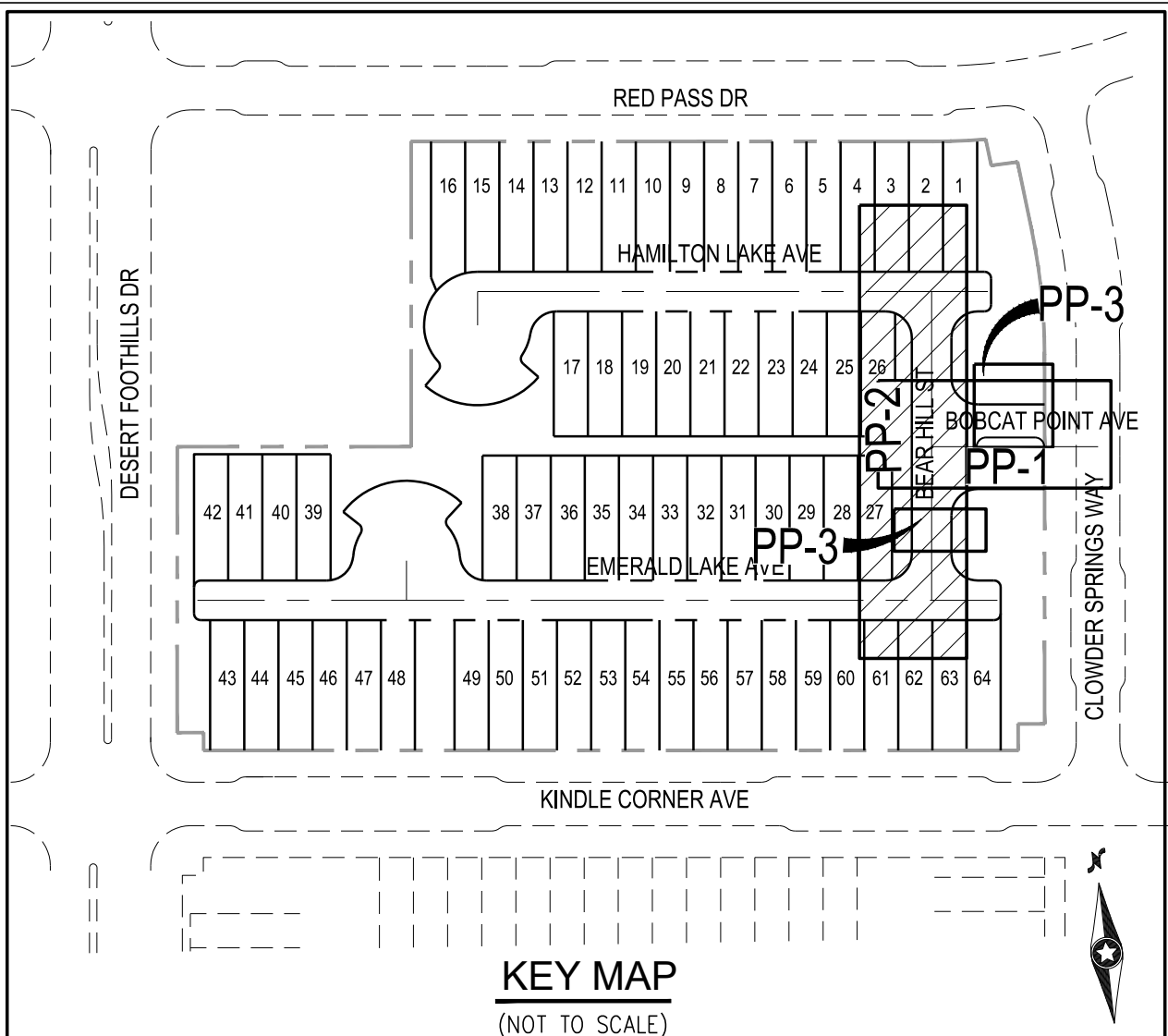
DRAINAGE EASEMENT NOTE
ALL DRAINAGE EASEMENTS ARE PUBLIC DRAINAGE
EASEMENTS TO BE PRIVATELY MAINTAINED

PUBLIC DRAINAGE EASEMENT NOTE
LOTS 5-60 REQUIRE PUBLIC DRAINAGE EASEMENTS TO BE
PRIVATELY MAINTAINED BY HOA FOR CROSS-LOT DRAINAGE
PIPE. SEE LOT GRADING DETAILS ON SHEETS D-3 & D-4 FOR
THE PUBLIC DRAINAGE EASEMENT LOCATIONS.

FAST
Call before you
UnderGround
1-702-432-5300
FREELWAY & ARTERIAL SYSTEM
OF TRANSPORTATION (F.A.S.T.)

AVOID HITTING OVERHEAD
POWER LINES. IT'S
COSTLY.
CALL BEFORE
YOU DO
OVERHEAD
1-702-227-2929

Call before you Dig
AVOID CUTTING UNDERGROUND
UTILITY LINES. IT'S COSTLY.
CROSS
811
OR
1-800-642-2444



KEY MAP
(NOT TO SCALE)

CONSTRUCTION NOTES
1) CONSTRUCT 2" AC PAVEMENT WITH 4" TYPE II AGGREGATE BASE
2) CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD NO. 216
3) CONSTRUCT "A" TYPE ISLAND CURB PER CCAUSD NO. 219
4) CONSTRUCT 30" ROLL CURB AND GUTTER PER CCAUSD NO. 217.1
5) CONSTRUCT 5" TRANSITION FROM ROLL CURB TO "L" TYPE CURB PER DETAIL
22 SHEET D-2
6) CONSTRUCT 3" CROSS GUTTER PER DETAIL 24 SHEET D-2
7) CONSTRUCT 8" CROSS GUTTER PER CCAUSD NO. 228
8) CONSTRUCT 4" WIDE SIDEWALK PER CCAUSD NO. 234 (4" THICK W/ 5" TYPE II
AGGREGATE BASE)
9) CONSTRUCT 4" WIDE SIDEWALK PER CCAUSD NO. 234 (5" THICK W/ 5" TYPE II
AGGREGATE BASE)
10) CONSTRUCT 5" WIDE SIDEWALK PER CCAUSD NO. 234 (4" THICK W/ 5" TYPE II
AGGREGATE BASE)
11) CONSTRUCT 5" WIDE SIDEWALK PER CCAUSD NO. 234 (5" THICK W/ 5" TYPE II
AGGREGATE BASE)
12) CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES PER
CCAUSD NO. 235, CASE I
13) CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR
EQUIVALENT PER CCAUSD NO. 235, CASE II
14) SAWCUT AND MATCH EXISTING IMPROVEMENTS PER CCAUSD NO. 503 & 500.2
15) CONSTRUCT 4" WIDE MEDIAN OPENING
16) INSTALL SIDEWALK UNDERDRAIN PER CCAUSD NO. 236
17) INSTALL VILLAGE GUARDRAIL (TUBULAR STEEL) PER DETAIL 21 ON SHEET D-2
18) INSTALL 12"x12" INLET NYLOPLAST GRATE YARD DRAIN OR APPROVED
EQUIVALENT (SEE SHEETS D-3 & D-4 FOR LOT DRAINAGE DETAILS)
19) INSTALL 6" 40-PVC DRAINAGE PIPE @ 1.0% SLOPE (SEE SHEETS D-3 & D-4
FOR LOT DRAINAGE DETAILS)

STORM DRAIN NOTES
500 INSTALL 12" RCP STORM DRAIN
502 INSTALL 18" RCP STORM DRAIN
504 INSTALL 24" RCP STORM DRAIN
506 INSTALL JENSEN PRECAST 16"x16" W DROP INLET (1616-HDI) (DETAIL 23,
SHEET D-2) & STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO.
421
508 INSTALL 5.0' TYPE "CM2" DROP INLET PER CCAUSD NO. 412.1 & 421 &
STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
510 INSTALL 12.5' TYPE "CM2" DROP INLET PER CCAUSD NO. 412.1 & 421 &
STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
512 INSTALL 60" TYPE I SD MANHOLE PER CCAUSD NO. 401 & 405.2
514 CUT BACK EXISTING 24" RCP STORM DRAIN AND INSTALL 60" TYPE I SD
MANHOLE PER CCAUSD NO. 401 & 405.2

Westwood
5740 S. Anville Street
Suite 216
Las Vegas, NV 89118
Phone (702) 284-5300
Fax (702) 284-5399
westwoodps.com
Westwood Professional Services, Inc.

DATE: 1/13/21
BY: HAA
APP: KMB
DATE: 1/13/21
BY: HAA
APP: KMB

DESCRIPTION
NO.

CITY OF LAS VEGAS, NV

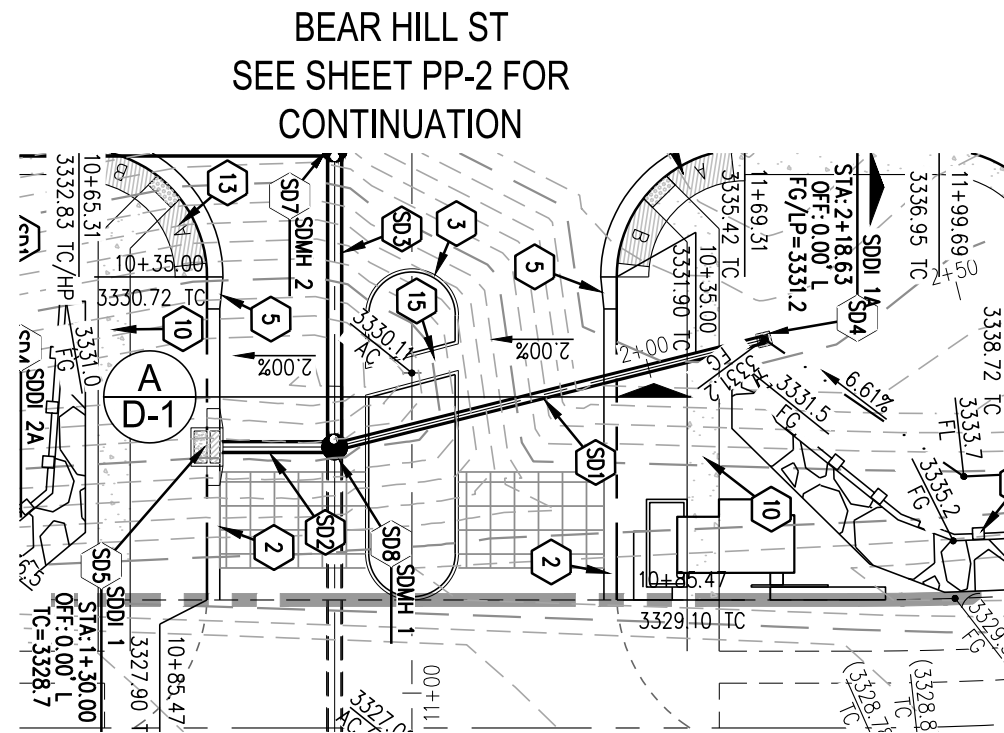
RICHMOND
AMERICAN HOMES
MORO POINTE
PLAN AND PROFILE - BEAR HILL ST

DATE: 1/13/21
DRAFTER: HAA
DESIGNER: HAA
CHECKED: KMB
PROJECT NO.
RAH2007

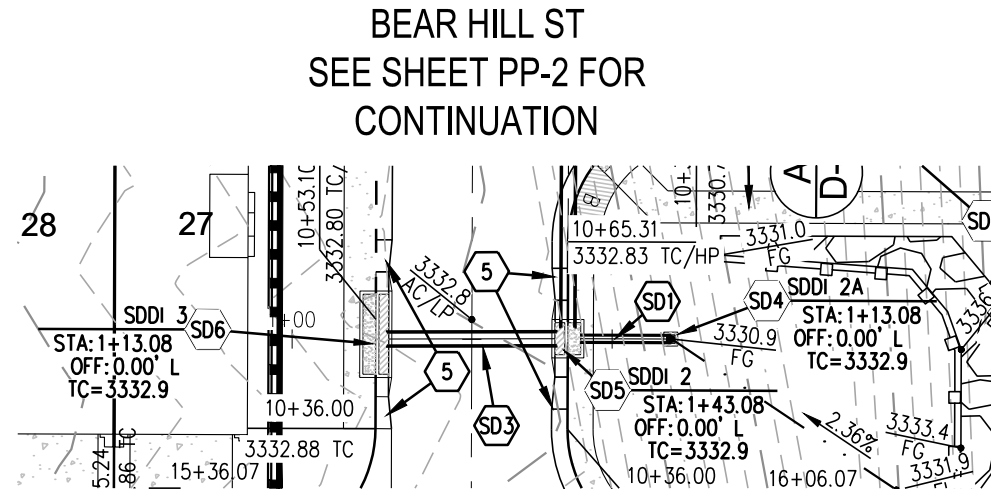
623 & 26
120
R59

PROFESSIONAL ENGINEER - STATE OF NEVADA
KEVIN M. GROSS
Exp. 12/31/2022
CIVIL
1/13/2021

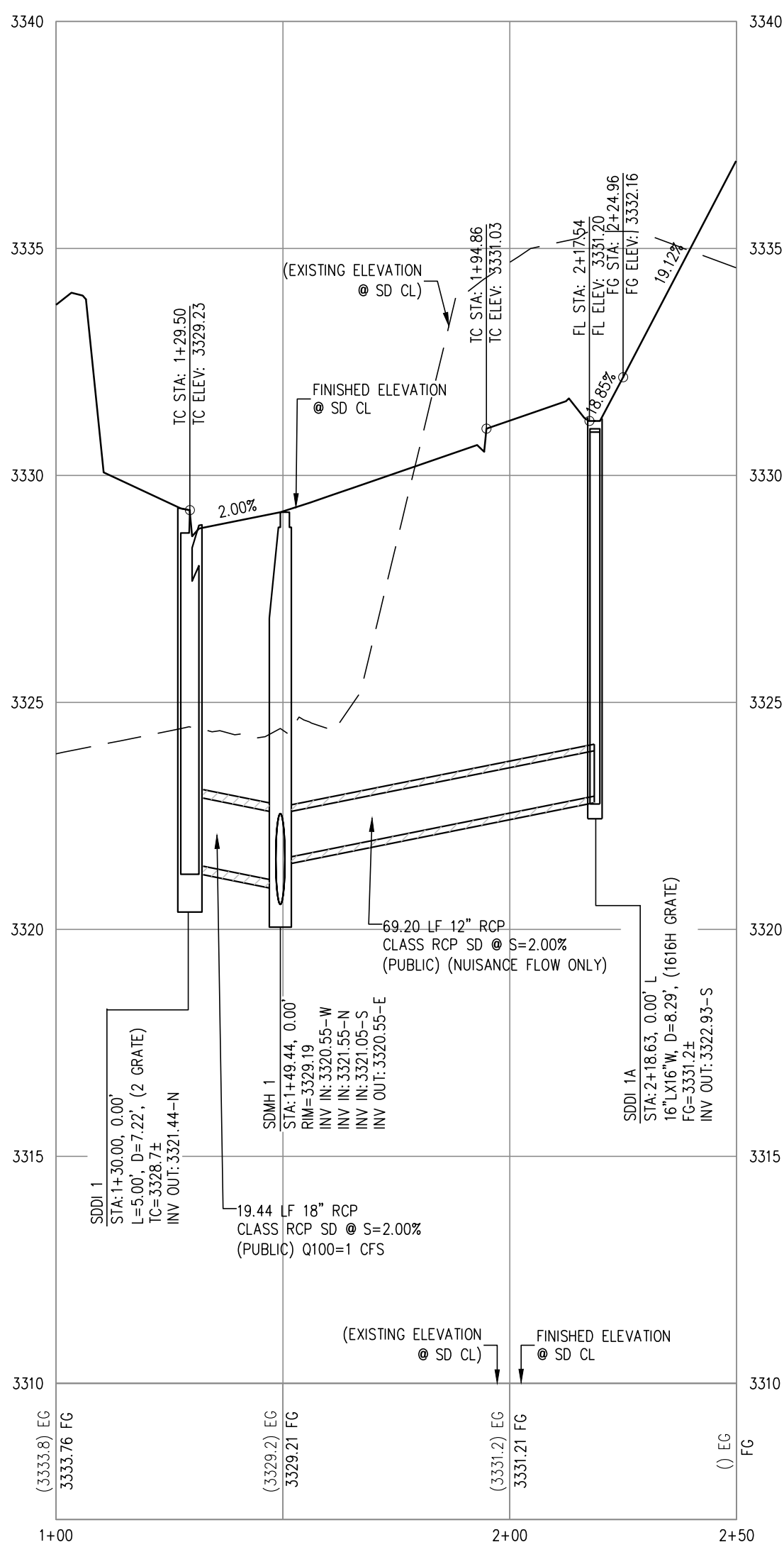
PP-2
SHEET 11 OF 12



SD LATERAL I - PLAN VIEW

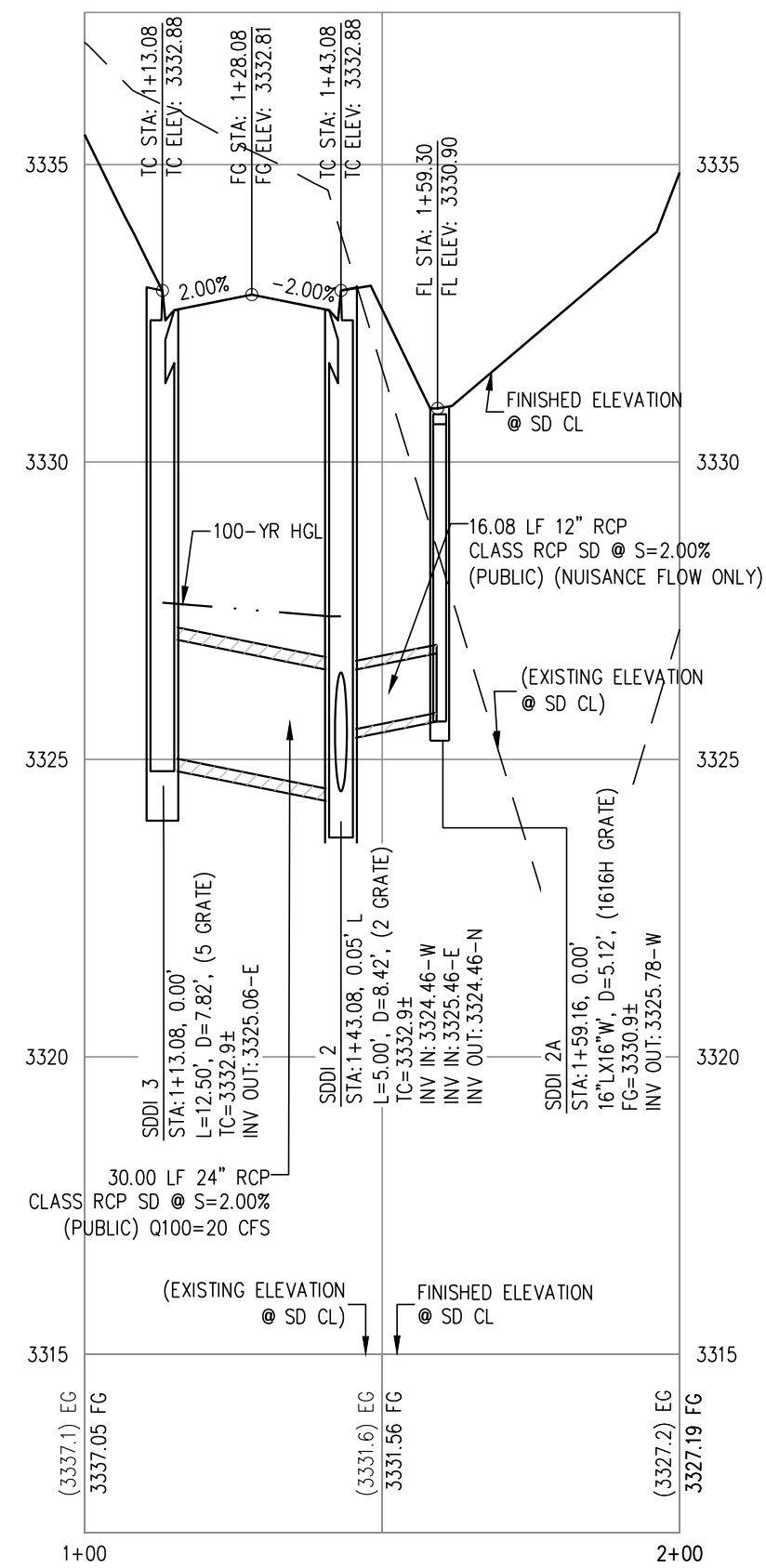


SD LATERAL II - PLAN VIEW



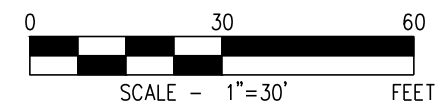
SD LATERAL I - PROFILE VIEW

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



SD LATERAL II - PROFILE VIEW

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



CALL SOUTHWEST GAS AT 702-651-2111 FOR
STANDBY WHEN EXCAVATING OVER OR NEAR HIGH
PRESSURE GAS LINES

DRAINAGE IMPROVEMENT QUANTITIES

1. 3" WIDE CONCRETE VALLEY GUTTER	SF	460
2. 8" WIDE CONCRETE VALLEY GUTTER	SF	785
3. 12"x12" INLET NYLOPLAST GRATE YARD DRAIN	EA	28
4. 6" 40-PVC DRAINAGE PIPE	LF	3,060
5. 60" TYPE III STORM DRAIN MANHOLE	EA	2
6. 5.0' TYPE "CM2" DROP INLET	EA	2
7. 12.5' TYPE "CM2" DROP INLET	EA	1
8. 16"x16" JENSEN PRECAST DROP INLET	EA	2
9. 12" RCP CLASS III STORM DRAIN	LF	86
10. 18" RCP CLASS III STORM DRAIN	LF	20
11. 24" RCP CLASS III STORM DRAIN	LF	132
11. NDOT TYPE II DROP INLET	EA	1

SURVEY NOTE

OWNER RESPONSIBLE TO PROVIDE SURVEY MONUMENTATION AS
SHOWN AND TO REPLACE ALL SURVEY MONUMENTATION DAMAGED,
DISTURBED, DESTROYED, OR OBLISCURED DURING CONSTRUCTION.

SOILS REPORT

SOILS REPORT BY ANGLE ENGINEERING
PROJECT NO. 26233-1 DATED 8/17/20

EARTHWORKS

EARTHWORK QUANTITIES (RAW):
CUT= 15,721 CU YDS
FILL= 9,129 CU YDS

EXPORTED MATERIAL TO BE DISPOSED OF AT AN APPROVED LICENSED DISPOSAL
FACILITY OR AT A SITE WITH AN APPROVED AND ACTIVE GRADING PERMIT.

DISCLAIMER NOTE

- 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.
- FOR ROADWAY WIDENING AND HALF STREET IMPROVEMENTS THE CONTRACTOR SHALL VERIFY CROSS SLOPES
FROM EXISTING PAVEMENT SAWCUT LINE TO PROPOSED EDGE OF PAVEMENT OR PROJECTED LIP OF CURB
PRIOR TO SUBGRADE PREPARATION AND CONSTRUCTION OF PROPOSED CURB LINE. IF MINIMUM OR MAXIMUM
CROSS SLOPES DO NOT MEET AGENCY STANDARDS THE CONTRACTOR SHALL NOTIFY THE ENGINEER.

GENERAL NOTES

- THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE
ENGINEER.
- ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP.
- MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH
REPORT.
- SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
- ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
- CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE CITY OF
LAS VEGAS BUILDING DEPARTMENT.
- CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES AND
NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN PLACE
DURING CONSTRUCTION. ENGINEER/OWNER SHALL BE NOTIFIED OF PRIOR DAMAGE TO EXISTING FACILITIES PRIOR
TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPLETING FACILITIES IF ENGINEER/OWNER
IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMENCING.
- NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN
HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY
ZONES.

LAS VEGAS VALLEY CONSTRUCTION SITE BMP
GUIDELINES

(REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ.FT.))

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

PRIVATE STREET NOTE

ALL PRIVATE STREETS ARE PUBLIC UTILITY EASEMENTS, PUBLIC SEWER EASEMENTS, AND PUBLIC DRAINAGE
EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA

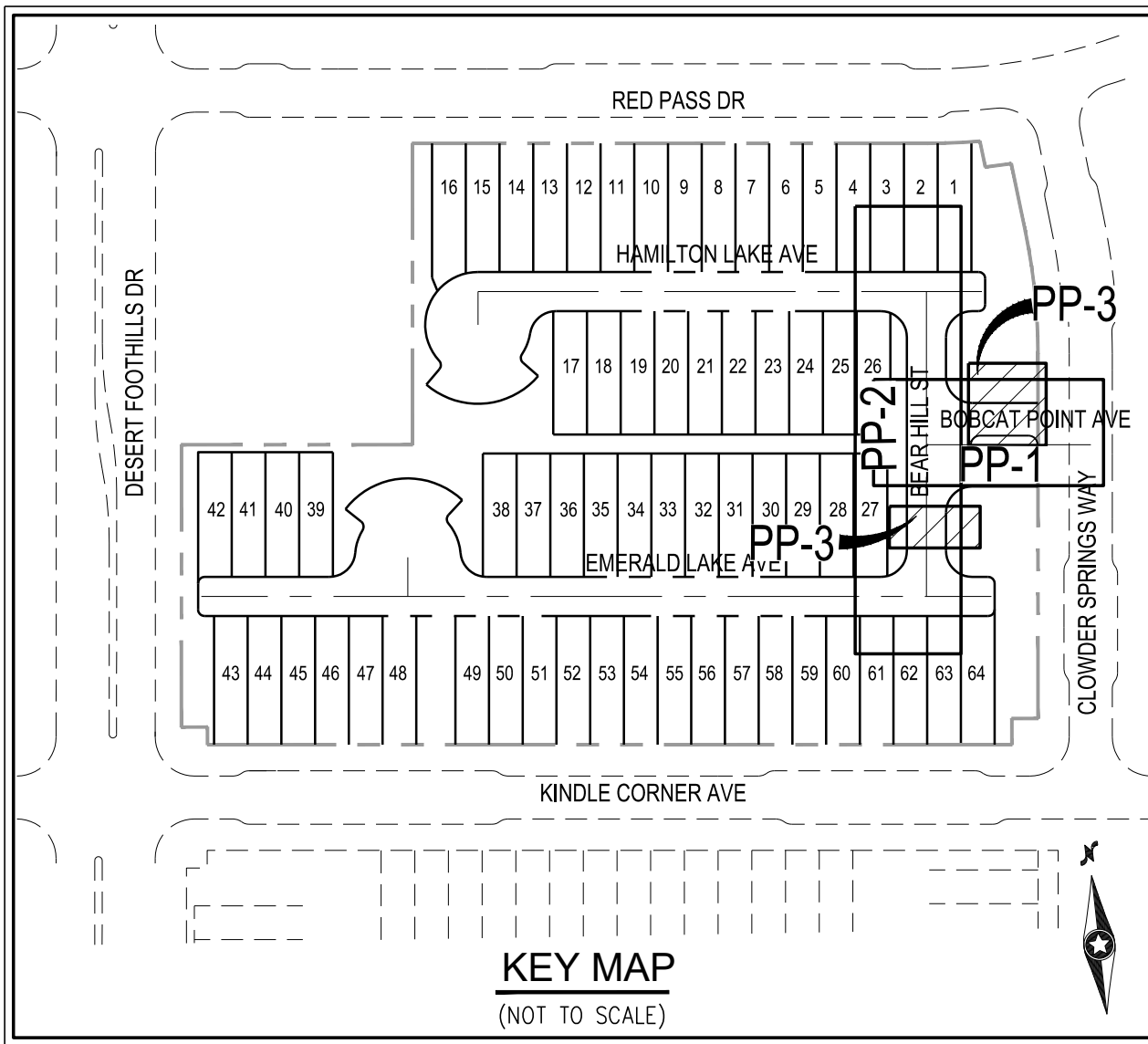
DRAINAGE EASEMENT NOTE
ALL DRAINAGE EASEMENTS ARE PUBLIC DRAINAGE
EASEMENTS TO BE PRIVATELY MAINTAINED

PUBLIC DRAINAGE EASEMENT NOTE
LOTS 5-60 REQUIRE PUBLIC DRAINAGE EASEMENTS TO BE
PRIVATELY MAINTAINED BY HOA FOR CROSS-LOT DRAINAGE
PIPE. SEE LOT GRADING DETAILS ON SHEETS D-3 & D-4 FOR
THE PUBLIC DRAINAGE EASEMENT LOCATIONS.

FAST
Call before you
UnderGround
1-702-432-5300
FREELWAY & ARTERIAL SYSTEM
OF TRANSPORTATION (F.A.S.T.)

AVOID HITTING OVERHEAD
POWER LINES. IT'S
COSTLY.
CALL BEFORE
YOU DO
OVERHEAD
1-702-227-2929

Call before you Dig
AVOID CUTTING UNDERGROUND
UTILITY LINES. IT'S COSTLY.
C
811
OR
1-800-642-2444



CONSTRUCTION NOTES

- CONSTRUCT 2" AC PAVEMENT WITH 4" TYPE II AGGREGATE BASE
- CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSO NO. 216
- CONSTRUCT "A" TYPE ISLAND CURB PER CCAUSO NO. 219
- CONSTRUCT 30" ROLL CURB AND GUTTER PER CCAUSO NO. 217.1
- CONSTRUCT 5" TRANSITION FROM ROLL CURB TO "L" TYPE CURB PER DETAIL
22 SHEET D-2
- CONSTRUCT 3" CROSS GUTTER PER DETAIL 24 SHEET D-2
- CONSTRUCT 8" CROSS GUTTER PER CCAUSO NO. 228
- CONSTRUCT 4" WIDE SIDEWALK PER CCAUSO NO. 234 (4" THICK W/ 5" TYPE II
AGGREGATE BASE)
- CONSTRUCT 4" WIDE SIDEWALK PER CCAUSO NO. 234 (5" THICK W/ 5" TYPE II
AGGREGATE BASE)
- CONSTRUCT 5" WIDE SIDEWALK PER CCAUSO NO. 234 (5" THICK W/ 5" TYPE II
AGGREGATE BASE)
- CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES PER
CCAUSO NO. 235, CASE I
- CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR
EQUIVALENT PER CCAUSO NO. 235, CASE II
- SAWCUT AND MATCH EXISTING IMPROVEMENTS PER CCAUSO NO. 503 & 500.2
- CONSTRUCT 4" WIDE MEDIAN OPENING
- INSTALL SIDEWALK UNDERDRAIN PER CCAUSO NO. 236
- INSTALL VILLAGE GUARDRAIL (TUBULAR STEEL) PER DETAIL 21 ON SHEET D-2
- INSTALL 12"x12" INLET NYLOPLAST GRATE YARD DRAIN OR APPROVED
EQUIVALENT (SEE SHEETS D-3 & D-4 FOR LOT DRAINAGE DETAILS)
- INSTALL 6" 40-PVC DRAINAGE PIPE @ 1.0% SLOPE (SEE SHEETS D-3 & D-4
FOR LOT DRAINAGE DETAILS)

STORM DRAIN NOTES

- INSTALL 12" RCP STORM DRAIN
- INSTALL 18" RCP STORM DRAIN
- INSTALL 24" RCP STORM DRAIN
- INSTALL JENSEN PRECAST 16"x16" W DROP INLET (1616-HDI) (DETAIL 23,
SHEET D-2) & STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSO NO. 421
- INSTALL 5.0' TYPE "CM2" DROP INLET PER CCAUSO NO. 412.1 & 421 &
STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSO NO. 421
- INSTALL 12.5' TYPE "CM2" DROP INLET PER CCAUSO NO. 412.1 & 421 &
STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSO NO. 421
- INSTALL 60" TYPE I SD MANHOLE PER CCAUSO NO. 401 & 405.2
- CUT BACK EXISTING 24" RCP STORM DRAIN AND INSTALL 60" TYPE I SD
MANHOLE PER CCAUSO NO. 401 & 405.2

Westwood

5740 S. Anville Street
Suite 216
Las Vegas, NV 89118
Phone (702) 284-5300
Fax (702) 284-5399
westwoodps.com
Westwood Professional Services, Inc.

DATE: 1/13/2021

DESCRIPTION:

NO.

CITY OF LAS VEGAS, NV

RICHMOND
AMERICAN HOMES

MORO PONTE

PLAN AND PROFILE - STORM DRAIN LATERALS

623 & 26
120
R59

DATE: 1/13/21

DRAFTER: HAA

DESIGNER: HAA

CHECKED: KMB

PROJECT NO.

RAH2007



PP-3

SHEET 12 OF 12