

DS #: 5223

APN: 137-26-112-002

PROJECT: Skimmerlin Village 21 Parcel J

SUBMITTAL: 1st

SCANNED BY/DATE:

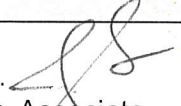
CHECKED BY/DATE:



CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM

DATE:
December 26, 2019

TO:
Land Development Services
Department of Building & Safety

FROM:
Jennifer Shinn, P.E. 
Flood Control, Engr. Associate
Department of Public Works

SUBJECT: Drainage Study for:

Summerlin Village 21 Parcel J

COPIES TO:
Slater Hanifan Group

Cross Streets: Carriage Hill Drive and Kindle Corner Way

KB Home

File Number: F:\Depot\DSMemos\DS05223A.doc

Bart Anderson, P.E., DevCo

Parcel Number: 137-26-112-002

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	11/25/2019	12/12/2019	See Comments Below	\$400.00	3656311: \$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.

** MAINTAIN DOE LINEWORK FROM VTN @ EX INTERCEPT*

The following are comments pertaining to the subject site specific drainage study and grading plans:

1. Provide a copy of the zoning/planning conditions associated with this site with the next submittal to verify compliance with conditions. *Flood Control* will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the *City Council*). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and resubmitted.
2. 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 sheets 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.
3. The R-curb height is 4.5" which equals 0.38' (from flowline to top of curb). As a general rule in Summerlin, the 100-year flow in the streets cannot overtop the street curb. The Table of 100-Year Hydraulic Sections in Exhibit E revealed that a few Sections will experience over the curb flood flow. The engineer/developer shall use bigger storm drains to reduce the 100-year flow depth to top of curb at most. If an agreement has been made with Summerlin to not comply with this rule provide signed documentation. *LETTER REQUESTED*
4. The report states that the Garage Finished Floors meet the twice the depth of flow above the adjacent TC criteria. Some discrepancies are found. For example Lot 111 has an adjacent

4' CURESS TO SD ; SD 3' CURESS TO LIP (8)

upstream TC of 3292.81 with a GFF of 3292.60 and a flow depth of 0.23, with a roll curb height the GFF shall be a minimum of 3292.89.

TABLE A-LOOK AGAIN → GFF CHECK TABLE
TCs SPECIFICALLY TAKEN @ GARAGE NOT HEIGHT SIDE OF LOT.

5. Per Exhibit EX-F the FL used in the calculations appears to be from the downstream point of the garage. For example on Lot 111 the FL in the table is shown as 3292.10, but should be 3292.43. Revise the GFF calculations to reflect the plans accordingly.
6. All Public Drainage Easements Drainage Easements to be Privately Maintained need to be shown on the associated cross sections. For example on Sheet G1 Section 21 D-2 a drainage easement is called out on the plans, but not shown in the cross section.
7. The locations where stormwater will surface flow between private lots is to be designated as a Public Drainage Easement. For example, Lots 61 through 64 flow does appear to be conveyed through the back of the properties allowing flow between private residences will require a Public Drainage Easement.
8. Storm drain shall not be placed underneath sidewalk. Relocate the storm drain to be in the street away from the curb and gutter.
9. SSDI #2 encroaches onto Lots 15 and 16. Relocate the drop inlet or provide a common element in order for the drop inlet to be within a public drainage easement.
10. The ponding depth for the Emergency Overflow is limited to 12". *gradely revised* ✓
11. Provide an exhibit with the location of all proposed drainage easements.
12. The worksheets for street section calculations do not follow a logical order in the report. For instance, calculations for section J5 is presented prior to sections J1 to J4, and section I2 is reported before section I1. For ease of review sort cross sections in the report in the same order as the table provided on Exhibit E. *Noted*
13. The calculations provided for cross section H3 uses a flow value of 5 cfs, while the proposed drainage map Exhibit E shows 4 cfs. Revise accordingly.
14. In the proposed drainage map (Exhibit E), the ultimate conditions emergency overflow hydraulic summary table is duplicated. The data associated with the Emergency Overflow 1 (EO1) is different between the two tables, and one provides the depth and velocity values for the EO1 using a weir width of 15 feet which does not meet the street width at that section.
15. In Standard Form 6, the upstream and downstream inverts for the lateral storm line from inlet P4 does not match the inverts shown in sheet SD-3. In the sheet SD-3, the inverts are D/S = 3273.84 and U/S = 3274.07. Revise accordingly.
16. In Standard Form 6, lateral flows from inlets P4 and P6 are reported as non-pressurized. However, lateral storm lines from P4 and P6 are likely to be pressurized, based on the HGL shown in sheets SD-3 and SD-1, respectively. Standard Form 6 is not intended to analyze pressurized flows. *Add normal depth calcs.* (16)
17. Label the existing storm drain with the CLV Drawing Number(s)—not application numbers.

★ Check w/ Albert on SSDI easement vs. C.E on private property. *P.D.*

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/JKS

T/R/S: T20S/R59E/S26
AREA K-26

TECHNICAL DRAINAGE STUDY

Summerlin Village 21 Parcel J (Aka: Ascent)

City of Las Vegas, Nevada

Job No.: KBH1913.000

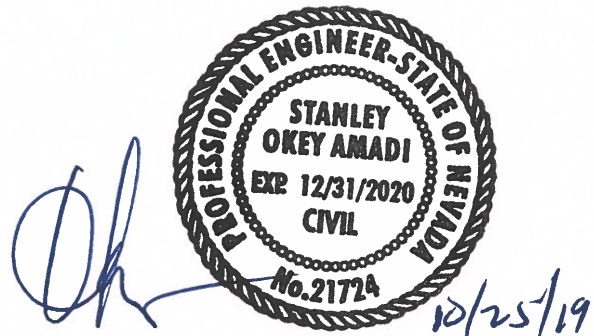
Date: October 2019

Prepared By:

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

Prepared For:

KB Home
5795 Badura Avenue, Ste 180
Las Vegas, NV 89118
Phone: 702-266-8400 • Fax: 702-266-8623



Stanley Okey Amadi, P.E., CFM
NV Professional Engineer No. 21724

Assisted by: Caitlyn Alcantara, E.I.



KBH1913-000

October 18, 2019

Albert Sung, P.E.– Flood Control Project Engineer
City of Las Vegas Department of Public Works
333 N. Rancho Drive
Las Vegas, Nevada 89106

Subject: Technical Drainage Study for Summerlin Village 21 Parcel J

Mr. Sung:

This letter certifies that all items provided on the *Technical Drainage Study for Summerlin Village 21 Parcel J* submittal CD match the paper version bound into the study.

Respectfully Submitted,
SLATER HANIFAN GROUP, A Westwood Team

Stanley Okey Amadi, P.E., CFM
Project Manager – Flood Control Division

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Summerlin Village 21 Parcel J Date: October 2019
Location of Development: a) Descriptive (Cross Streets): North/South: Carriage Hill Drive
East/West: Kindle Corner Way
b) Section: 26 Township: 20 S Range: 59 E
c) APN: 137-26-112-002

Name of Owner: Owner: Hughes Howard Company LLC Developer: KB Home
Telephone No.: 702-266-8400 Fax No.: 702-266-8623 E-mail Address: pchao@kbhome.com
Address: 5795 Badura Avenue, Suite 180 Las Vegas NV 89118

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: Slater Hanifan Group, A Westwood Team
Address: 5740 S. Arville #216 Las Vegas NV 89118

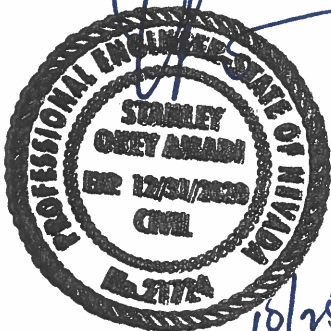
Type of Land Development/Land Disturbance Process:

☐ 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: 11.74 acres Being Developed/Disturbed: 11.74 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

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Project will discharge flows to storm drain stub
Carriage Hill Drive.

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



Engineer's Seal

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

***Newly Required Field**

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

Local Entity File No.	Revision	Date

REFERENCE:

STANDARD FORM 1

Updated 05/01/2008



CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 5/18/11)

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

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

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

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

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

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

II. GRADING PLAN INFORMATION		
Yes	No	
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.
-	N/A	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: Summerlin Village 21 Parcel J		Map ID:	
Firm Name: Slater Hanifan Group, A Westwood Team		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: KB Home			
Address: 5795 Badura Avenue, Suite 180			
City: Las Vegas		State: NV	Zip: 89118
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	
☒	☐	Design Manual Standard Form 1 with the engineer's seal and signature.
☒	☐	Design Manual Standard Form 4 .
☒	☐	2 copies of the 24" x 36" Drainage Plan.
☐	☒ N/A	A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge.

II. MAPS AND EXHIBITS

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

REFERENCE:	STANDARD FORM 2
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HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS (Continued)

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

III. DRAINAGE PLAN

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

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
-	N/A	Streets with off-set crowns.
X	-	Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.
X	-	Property lines.
X	-	Right-of-way lines and widths, existing and proposed.
X	-	Existing improvements and their elevations.
X	-	Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.
X	-	Concentration points and drainage flow direction with Q_{100} and V_{100} and D_{100} in streets.
X	-	Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
X	-	Location and cross-section of street capacity calculations.
X	-	Cross-sectional detail for channels, including cutoff wall locations.
X	-	Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations.
X	-	Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
-	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	
<u>-</u>	<u>N/A</u>	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.
<u>X</u>	<u>-</u>	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.
<u>X</u>	<u>-</u>	Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.
<u>-</u>	<u>N/A</u>	Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required).

IV. HYDROLOGIC ANALYSIS

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

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
<u>-</u>	<u>N/A</u>	Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
<u>X</u>	<u>-</u>	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.
<u>X</u>	<u>-</u>	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.
<u>-</u>	<u>N/A</u>	Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
<u>-</u>	<u>N/A</u>	Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.
<u>X</u>	<u>-</u>	Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, whichever is greater.
<u>-</u>	<u>N/A</u>	A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. • Field survey data. • Input and output information. • Plotted cross-sections based on survey with proper encroachments. • A map showing the location of the cross-sections. • Analysis of both sub and super-critical flow segments. • A summary table and a discussion of the results in the text of the report.
<u>X</u>	<u>-</u>	Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
<u>X</u>	<u>-</u>	Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.
<u>X</u>	<u>-</u>	The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.
<u>-</u>	<u>N/A</u>	Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:

STANDARD FORM 2

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1 INTRODUCTION

1.1 Project Overview & Study Purpose

KB Home is proposing a single-family residential development on approximately 11.74 acres, located south of the undeveloped roadway alignment of Kindle Corner Avenue, and west of undeveloped roadway alignment of Carriage Hill 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 *Summerlin Village 21 Parcel J (Aka: Ascent)* (hereinafter referred to as the Project Site). Please note that the project site will be constructed in a single phase.

The purpose of this study is to provide a detailed hydrologic and hydraulic analyses for the site and to substantiate the hydraulic design in order to protect the property from onsite and offsite runoff in accordance with local storm water management criteria. It is also the purpose of this study to show conformance with the drainage patterns established and master planned by prior approved drainage studies. This study also provides an inventory of the existing drainage facilities in the vicinity of the site, as well as recommends the site-specific facilities necessary to control runoff impacting the project sites.

1.2 Site Description

The project site is identified by Assessor's Parcel Number (APN) 137-26-112-002 within Township 20 South, Range 59 East, and Sections 26. The project site is bound by Carriage Hill Drive to the east, Kindle Corner Avenue alignment to the north and undeveloped property to the south and west. The adjacent western parcel is currently under review by the City of Las Vegas for the Moro Rock residential subdivision development by Richmond American Homes. 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 project site currently consists of existing desert shrub, generally draining in an easterly direction. The project site proposes 137 attached single-family residential lots with a typical lot size of 2,500 square feet. The tentative map has been reviewed by staff with recommendation for approval. Notice of Final Action is still pending and will be provided prior to the approval of the drainage study.

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 the overall drainage patterns and the 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.

1.3 FEMA Flood Zone Designation

The project site is located on Flood Insurance Rate Map (FIRM) Panel 32003C2150E, dated September 27, 2002. 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.

1.4 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 - Carriage Hill Branch (APCH) is the closest regional facility adjacent to the site. This facility is located east of the project site and is identified as a Category B Proposed Facility. The facility is adjacent to the project site within Carriage Hill Drive and accepts flows from the project site. Refer to Exhibit C2 in Appendix A for the facility inventory summary table.

1.5 CCRFCD Hydrology 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 MPU subbasin SWFH-13. This subbasin appears to drain south into subbasin SWFH-14; however, the APCH facility has provided the required stub for drainage of the subbasin. Exhibit C3 identifying the project site on the MPU figure has been included in Appendix A for reference.

1.6 Referenced Studies

The following approved studies and improvement plans have been reviewed and deemed acceptable for reference in the preparation of this study. Slater Hanifan Group concurs with the referenced and adopted hydrologic and hydraulic analyses from the studies and the results established therein.

1. *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; Reference 4), 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.
2. *Update #1 to the Technical Drainage Study for Summerlin West Village 21 – Kindle Corner Avenue Improvements (Formerly Street B) - Carriage Hill Drive to Desert Foothills Drive)* (hereinafter referred to as the Kindle Corner Study, DS 5086; Reference 5), prepared by VTN Nevada. The Kindle Corner Study addressed the street improvements and utilities in the street adjacent to the site including the existing storm drain and inlets. The study has been referenced to adopt the street flows and street section of Kindle Corner Avenue utilized in the street flow depth calculation for flood protection of the site. Relevant reference material from the study has been included in Appendix F.
3. *Technical Drainage Study for Summerlin Village 21 Carriage Hill Drive (Redpoint Drive to Summerlin Parkway)* (hereinafter referred to as the Carriage Hill Study, DS 5064; Reference 6), prepared by VTN Nevada. The Carriage Hill Study addressed the street improvements and utilities in the street adjacent to the site including the existing 34"x53" HERCP storm drain stub for the project site to tie into. Relevant reference material from the study has been included in Appendix G.
4. *Technical Drainage Study for Summerlin Village 21 Parcel K (Aka: Moro Rock)* (hereinafter referred to as the Parcel K Study, DS 5182; Reference 7), prepared by Slater Hanifan Group, A Westwood Team. The Parcel K Study is currently under review and is designed to discharge minor onsite flows into Kindle Corner Avenue which was not planned by the Master Study. The study has been referenced to adopt and incorporate

the flows into the street section computation for Kindle Corner Avenue adjacent to the site. Relevant reference material from the study has been included in Appendix H.

2 METHODOLOGY

2.1 Compliance

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

2.2 Hydrologic Modeling

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 the FlowMaster Version 8i software by Bentley Systems. In accordance with the CCRFCD Manual, the depth times velocity factor ($D \times V$) for street flow for the 10-year storm event must be less than or equal to 6, with a maximum depth of 1-ft. The depth times velocity factor ($D \times V$) for street flows during the 100-year storm event must be less than or equal to 8, with a maximum depth of 2-ft.

Note that per coordination with Summerlin Planning and Review, the flow depths along the interior streets will be allowed to exceed curb height due to the narrow street widths and to avoid unnecessary utility conflicts or inadequate clearances.

Curb Inlets: Curb 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 existing storm drain stub has been performed utilizing the WSPGW software by the Los Angeles Department of Public Works. The CCRFCD Standard Form 6 (SF-6) spreadsheet is utilized for the assessment of lateral losses in one segment storm drain laterals. As outlined in the CCRFCD Manual, storm drain facilities are required to maintain the hydraulic gradient line (HGL) a minimum 1-ft below above finished grade and limit the flow velocities in the facility to less than 25 ft/s.

Drainage Easements: The product type proposed with this project warrants the need for cross-lot drainage which requires drainage easements thru the downstream lots. Normal depth computations thru the easements have been analyzed utilizing the FlowMaster Version 8i software by Bentley Systems. Per the coordination between SHG, KB Home and CLV flood control staff, the finished floor elevations of the buildings adjacent to the easements will be set at a minimum of 6" above the water surface elevation in the easement.

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 DEVELOPED DRAINAGE CONDITION

4.1 Definition of Developed Condition

The developed condition considers that the site and the entire Summerlin Village 21 including the roadway and drainage infrastructures are fully installed and operational. Therefore, no offsite flows will directly impact or convey thru the site.

4.2 Discussion of Developed Condition

The developed condition hydrologic analysis of the site has been referenced from the Master Study. The site was analyzed as drainage basin J which generates a 100-year peak flow of 42 cfs and is planned to surface flow to the southeast corner of the site and be captured by a proposed storm drain stub that ties into the regional system Carriage Hill Drive. Based on the onsite drainage area and the referenced peak flow, prorated subbasins have been established by this study to estimate design discharges utilized in sizing facilities and swale hydraulic sections as well as street flow computations and finished floor evaluations.

Note that the existing storm drain stub at the southeast corner of the site was designed to capture the entire 100-year flow generated by the site. However, based on the site plan and proposed grading, subbasins J (k & i) which generates a combined prorated 100-year flow of 5 cfs will drain away from the site into the perimeter streets as opposed to the storm drain stub as master planned. Hence the total onsite flows (37 cfs) conveyed to the storm drain stub will be reduced by 5 cfs.

The discharge to the adjacent streets is considered insignificant and is currently being coordinated with The Howard Hughes Corporation for an update to the Master Study if deemed necessary. Note that the upstream flows in the arroyo will be cut-off and captured by the upstream regional facilities in Desert Foothills Drive; therefore, the flows within the portion of the arroyo adjacent to the site will be insignificant comprising mainly of the flows generated by the arroyo. Refer to Exhibit E provided in Appendix A for the Developed Condition Drainage Map depicting the prorated onsite sub-basins and a summary table of the street flow calculations.

5 Hydraulic Computations

5.1 Summary of Developed Condition Street Flows

The 100-year street flow summary table has been included on Exhibit E, and the supporting FlowMaster street flow computations have been included in Appendix B for reference. The

surface flows in the adjacent perimeter streets of Kindle Corner and Carriage Hill Drive have been referenced from the Carriage Hill Study and utilized for the supporting street hydraulic computations. Note that the Master Study has planned stubs for all parcel to discharge directly into mainline storm drain facilities. Thus, the surface flows in the perimeter streets will only comprise of the runoff generated by the respective rights-of-way in addition to the flows from the prorated subbasins that sheet flows into the perimeter streets.

Review of the street flow summary table shows that the criteria set forth in Section 2.3 of this report are satisfied. Note that only the 100-year street flow computations have been performed since the 100-year flows are shown to also satisfy the 10-year criteria.

5.2 Summary of Recommended Facilities

The entire site was master planned to discharge into a storm drain stub located at the southeast corner of site. A sump inlet and four (4) on-grade inlets have been proposed to capture the onsite flows and discharge thru the existing stub. The on-grade inlets are located upstream and have been sized to maximize the capture capacity in order to reduce bypass surface flows. The sump inlet has is sized by limiting the depth of ponding required to capture the flows at the top-of-curb for a total depth of 8.0-inches. Note that inclusive of the local depression typical with construction of Type CM2 inlets, the depth at top-of-curb is an average of 8.0-inches (0.67-ft) above the grate and 10-inches above the flow line. The drop inlet sizing computations are provided in Appendix C for reference.

The WSPGW software has been utilized for the analysis of the mainline storm drain. The starting HGL is referenced from the connecting stub per the analysis provided by the Carriage Hill Study. The Standard Form 6 (SF-6) lateral loss computations are also utilized to evaluate the drop inlet laterals to ensure that there are adequate capacities to convey the captured flows. The WSPGW model and SF-6 calculations show that the mainline storm drain and drop inlet laterals will adequately convey the design flows and will maintain the HGLs at more than 1-ft below the finished grade elevations. Please refer to Appendix C for the WSPGW and SF-6 output files. Refer to Exhibit E for an illustration of the existing storm drain system and proposed drop inlet connection. The proposed inlets and storm drain system meet applicable criteria as described in Section 2.3 of this report.

Note also that the site entrance off of Kindle Corner Avenue has been designed to include a driveway hump elevated at a minimum of 6-inches above the water surface elevation in the street.

5.3 Summary of Drainage Easements

The proposed product type intended for development of the site includes townhome style buildings with multiple lots on the same pad. This product type results in cross-lot drainage condition which requires drainage easements thru the downstream lots to provide legal drainage paths between the parcels. Per our coordination with CLV staff, 5-ft wide public drainage easements to be privately maintained by the Home Owners Association (HOA) will be acceptable. The easements do not need to be concrete lined nor include a concrete valley gutter. In order to estimate the localized flows within each cross-lot drainage easement, the highest area (0.223 ac) of the pad with the most number (five) of lots have been utilized to estimate the prorated flow for the easements. The flow-area ratio for the site is estimated to be approximately of 3.6 cfs/ac (i.e. 42/11.83 cfs/ac). Thus, a maximum 100-year flow of approximately one-half of 0.806 cfs (say 0.41 cfs) will be conveyed thru the easements since

the ridgeline of the building roof is anticipated across the middle of the buildings. The easements will comprise of a typical lot swale section (V-ditch with 3:1 SS) at a minimum longitudinal slope of 1%. Based on the prorated flow, a normal depth computation is provided to represent all the easements. Please refer to Appendix B for the Typical Cross-lot Drainage Easement normal depth calculation. The computation is considered conservative since the flow is estimated from the pad that contains the greatest number of lots and the hydraulic section utilizes the minimum longitudinal slope as all the easement sections are the same representative of a typical lot swale. The finished floor elevations have been designed to maintain a minimum of 6" above the water surface elevation within the drainage easements as requested by CLV staff.

5.4 Summary of Proposed Finished Floors

The proposed finished floors have been designed to be flood protected based on the following CCRFCD and CLV criteria:

- The proposed finished floors have been elevated at more than twice the 100-year depth of flow in the adjacent streets measured at the high side of the lots.
- The finished floors have been elevated a vertical distance of at least 6-inches above the adjacent to-of-curb, measured at the high side of the lot.
- The finished floors have also been flood protected and/or elevated above twice the depth of flow in the adjacent perimeter streets.
- Some of the proposed product type comprises of multiple lots on one pad which requires cross-lot drainage; therefore, 5-ft wide public drainage easements have been designated where applicable. The pertinent finished floors adjacent to drainage easements have been elevated to a minimum of 6" above the water surface elevation in the drainage easement.

Additional analysis for the garage finished floor elevations have also been provided. Majority of the garage finished floor elevations have been elevated to more than 6" above the water surface elevation measured at the high side of the driveways. Sixty-one (61) lots were determined to not be able to meet this criteria due to the short (5-ft) driveways which results in significant driveway slopes in excess of 20%. However, all the garage finished floors have been shown to meet the criteria of being above twice the 100-year flow depth and are therefore considered adequately flood protected. The hydraulic evaluation of proposed finished floors, utilizing the applicable flow depths established by this study, has been included in Appendix D. In order to avoid clutter on the grading plans, a Garage Finished Floor (GFF) and Driveway Slope Analysis Exhibit (EXH-F) has been provided in Appendix A to depict the driveway slopes and the elevations utilized for the garage finished floor analysis at the upstream side of the driveways.

6 CONCLUSIONS & RECOMMENDATIONS

1. The proposed improvements are not located within a FEMA designated SFHA.
2. The project site is bordered by the proposed CCRFCD Angel Park – Carriage Hill Branch (APCH) facility. Therefore, CCRFCD concurrence is anticipated for this study.

3. The project site design is in compliance with Master Study which has established the ultimate built-out condition drainage patterns and allowable flow rates. Minor deviation from the Master Study with regard to drainage into Kindle Corner Avenue and Carriage Hill Drive have been noted and will be address in an update to the Master Study.
4. The proposed street flows and drainage facilities have been designed to satisfy both the CLV and CCRFCD design criteria.
5. The proposed finished floor elevations will be adequately protected from flows due to a 100-year storm event meeting criteria against design flows and potential overflow conditions. All the proposed finished floor elevations have been designed to meet the local City of Las Vegas as well as the CCRFCD flood protection criteria.
6. The project's grading plan and detail sheets included in the last appendices of this study support the drainage patterns, conclusions and/or recommendations detailed in this study.

7 REFERENCES

1. *Las Vegas Valley Flood Control Master Plan Update*. Atkins, October 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, Natural Resources Conservation Services, 2019.
4. *Technical Drainage Study Update #1 for the Flood Control Master Plan Update – Summerlin West Planning Area*, by VTN Nevada, October 2018.
5. *Technical Drainage Study for Summerlin Village 21 – Street B Improvements (Carriage Hill Drive to Desert Foothills Drive)*, by VTN Nevada, January 2019.
6. *Technical Drainage Study for Summerlin Village 21 Carriage Hill Drive (Redpoint Drive to Summerlin Parkway)*, by VTN Nevada, November 2018.
7. *Technical Drainage Study for Summerlin Village 21 Parcel K (Aka: Moro Rock)*, By SHG, August 2019.

LIST OF APPENDICES

Appendix A Drainage Exhibits

- Exhibit A – Location Map
- Exhibit B – FEMA FIRM Panel Map
- Exhibit C1 – CCRFCD MPU Facilities Map
- Exhibit C2 – CCRFCD MPU Facility Inventory
- Exhibit C3 – CCRFCD MPU Hydrology Map
- Exhibit D – Soils Map
- Exhibit E – Proposed Condition Drainage Map

Appendix B FlowMaster Hydraulic Computations

- Interior Street Sections
- Perimeter Street Sections
- Other Sections

Appendix C Drop Inlet & Storm Drain Computations

- Drop Inlet Computations
- WSPGW Model
- Standard Form 6 (SF-6) Calculations
- Inlet Control Nomographs

Appendix D Finished Floor Analyses

Appendix E Reference Material

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

- Approval Letters
- Hydrologic Computations
- Drainage Exhibits

Appendix F Reference Material

Update #1 to the Technical Drainage Study for Summerlin West Village 21 – Kindle Corner Avenue Improvements (Formerly Street B) - Carriage Hill Drive to Desert Foothills Drive, by VTN Nevada (DS 5086)

- Approval Letters
- Street Hydraulic Sections
- Drainage Exhibit

Appendix G Reference Material

Technical Drainage Study for Summerlin Village 21 Carriage Hill Drive (Redpoint Drive to Summerlin Parkway), by VTN Nevada (DS 5064)

- Approval Letters
- Storm Drain Hydraulic Computations
- Street Hydraulic Sections
- Drainage Exhibits
- Improvement Plans

Appendix H Reference Material

Technical Drainage Study for Summerlin Village 21 Parcel K (Aka Moro Rock), by SHG (DS 5182)

Technical Drainage Study – Summerlin Village 21 Parcel J - Ascent

- Approval Letter
- Street Hydraulic Sections
- Drainage Exhibit

Appendix I Typical Lot Plan Details

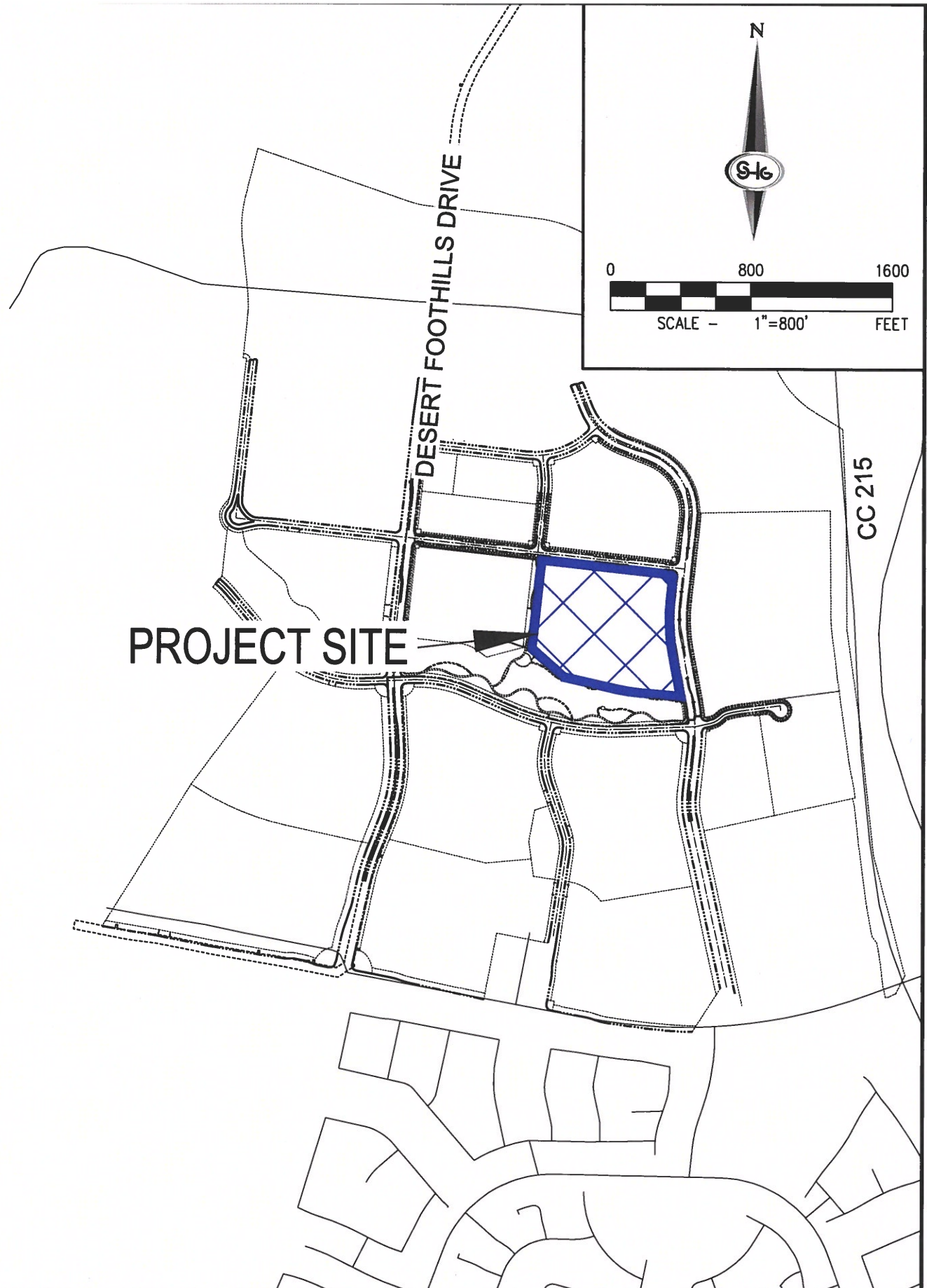
Appendix J THHC (Summerlin) Approval Letter

Appendix K CD of Electronic Files & Improvement Plans

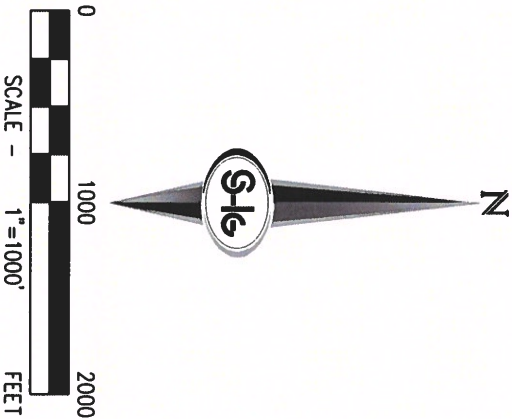
APPENDIX A

Drainage Exhibits

j:\kbh1913-000 summerlin village 21 parcel \drainage\technical study\figures\kbh1913 tds exhibits a-c.dwg 10/25/2019 10:03 AM Gabby Squillante



 SLATER HANIFAN GROUP a Westwood team 5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118 PHONE (702) 284-5300 FAX (702) 284-5399	RICHMOND AMERICAN HOMES		DATE: OCT 2019	PROJECT NO.
	SUMMERLIN VILLAGE 21 PARCEL J		DRAFTER: DCH	KBH1913.000
	LOCATION MAP		DESIGNER: DCH	EXHIBIT A
			CHECKED: CAA	SHEET 1 OF 1

[illegible]

RICHMOND AMERICAN HOMES
SUMMERLIN VILLAGE 21 PARCEL J
MPU FACILITY MAP

DATE:	OCT 2019
DRAFTER:	DCH
DESIGNER:	DCH
CHECKED:	CAA
PROJECT NO.	KBH1913.000
EXHIBIT C1	
SHEET 1 OF 1	

ID/ Mile	Status	Facility Description	Length (ft)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Triangular Area (sq-ft)	Channel Slope (%)
APAD	E	ANGEL PARK - ALTAIR BRANCH	1194	2260	CSWA-1	GWMA	6.86	5.28
0203	E	2.7 X 6.6 RC3	360	2337	SWMB-3	GWMA	6.73	3.40
APBE	E	ANGEL PARK - BELTWAY BRANCH	1556	3365	CSWBH-15	GWMA	3.39	1.81
0202	E	CONC CHNL 20W 7.21 SS	1533	3066	CSWBH-15	GWMA	3.59	2.27
0061	E	E X 8 3/8C @ FAH HILLS	777	1046	CSWBH-15	GWMA	0.89	2.32
0084	E	CONC CHNL 10W 5.21 SS	1465	1046	CSWBH-15	GWMA	0.89	1.88
0122	E	CONC CHNL 10W 4.21 SS	1635	1046	CSWBH-15	GWMA	0.89	0.80
0154	E	E X 8 3/8C	3012	791	CSWBH-12	GWMA	0.41	1.30
0249	P	E X 8 3/8C	2836	603	CSWBH-11	GWMA	0.31	3.00
APCH	E	ANGEL PARK - CARBIDGE HILL BRANCH	192	339	CSWBH-14	GWMA	0.21	0.87
0000	P	E X 8 3/8C	1665	339	CSWBH-14	GWMA	0.21	2.00
0001	P	867 RCP	2038	228	SWMH-13	GWMA	0.10	1.38
APD2	E	ANGEL PARK - DESERT FOOTHILLS 1 BRANCH	883	671	SWMA-2	GWMA	0.68	1.08
0002	E	7 X 6 3/8 RC3						
APDF	P	ANGEL PARK - DESERT FOOTHILLS BRANCH	1736	428	CSWBH-19	GWMA	0.60	3.55
0000	P	10 X 6 RC3	1813	593	CSWBH-19	GWMA	1.80	2.00
0026	P	E X 8 3/8C	1922	486	CSWBH-4	GWMA	1.52	4.40
0073	P	E X 4 3/8C	1078	141	GRD2	GWMA	1.29	6.00
0123	P	427 RCP						
0125	P	130 ACFT GRAND PARK DETENTION BASIN	2677	653	CSWBH-3	GWMA	0.66	3.80
0127	P	E X 8 3/8C	2197	539	SWMH-1	GWMA	0.37	5.10
0128	P	E X 4 3/8C						
APFH	E	ANGEL PARK - FAH HILLS BRANCH	1070	264	CSWBH-14	GWMA	1.51	3.50
0000	E	2.8 X 6 RC3	260	2149	CSWBH-19	GWMA	1.30	4.19
0019	E	2.8 X 6 RC3	1857	2149	CSWBH-19	GWMA	1.30	5.10
0024	E	16 X 8 RCP	1435	839	CSWBH-7	GWMA	0.90	2.00
0061	E	E X 8 3/8C	2846	839	CSWBH-7	GWMA	0.90	2.00
0089	E	E X 8 3/8C	2497	459	SWMH-4	GWMA	0.26	5.50
0144	P	E X 4 3/8C						
APWG	E	DETENTION BASIN 35	8626		SUBIN3	GWMA	6.73	5.20
0000	E	396 ACFT DETENTION BASIN 35	2102	3634	CCDBS-7	GWMA	4.13	5.20
0008	P	CONC CHNL 30W 4.50 21 SS	4180	3695	CPB5H-7	GWMA	7.60	6.80
0009	P	CONC CHNL 30W 4.71 11 SS	1000	3634	CCDBS-7	GWMA	4.13	1.30
0047	E	DIVERSION BASIN WITH GARDEN BANK PROTECTION	284	3634	CCDBS-7	GWMA	4.13	1.30
0065	P	CONC CHNL 30W 4.21 SS	8622	1684	CCB5H-4	GWMA	0.81	6.80
0067	P	CONC CHNL 30W 3.21 SS	9075	2606	CCB5H-7	GWMA	3.31	7.00
0089	P	CONC CHNL 106W 30.21 SS	6685	1997	THS-1	GWMA	6.84	7.50
0172	P	CONC CHNL 30W 3.71 11 SS	8622	1728	CCB5H-5	GWMA	1.30	2.30
0213	P	CONC CHNL 30W 3.21 SS						
APSP	E	ANGEL PARK - SUMMERLIN PARKWAY	1680	834	C11B-1	GWMA	0.84	1.10
0153	E	CONC CHNL 10W 6.21 SS						
0003	E	GWMA LONE MOUNTAIN 8VMT 3 BELTWAY	1370	381	SW2A-1	GWMA	0.18	4.50
0005	F	867 RCP						
000E	E	GWMA LONE MOUNTAIN SYST. BELTWAY	30	164	CS122	GWMA	0.67	5.67
0000	E	20 X 10 RCP @ ACCESS RD	1100	164	CS122	GWMA	0.67	6.50
0001	E	CONC CHNL 20W 5.21 SS	2143	164	CS122	GWMA	0.67	6.50
0021	E	CONC CHNL 11W 6.80 01 SS	487	164	CS122	GWMA	0.67	3.83
0049	E	CONC CHNL 15W 7.50 01 SS	944	164	CS122	GWMA	0.67	0.78
0065	E	CONC CHNL 17W 7.50 01 SS	400	792	SW2A-2	GWMA	0.49	0.50
0088	E	2.10 X 8 RCP @ LAKE LAUD	827	792	SW2A-2	GWMA	0.49	0.50
0099	E	CONC CHNL 20W 4.21 SS	1021	792	SW2A-2	GWMA	0.49	0.50
0108	E	CONC CHNL 20W 6.21 SS	538	792	SW2A-2	GWMA	0.49	0.50
0127	E	CONC CHNL 20W 6.21 SS	1590	792	SW2A-2	GWMA	0.49	1.02
0139	E	CONC CHNL 10W 4.50 21 SS						
0243	E	GWMA LONE MOUNTAIN SYST. BRANCH 3	3037	3277	C-CULTR	GWMA	7.31	2.75
0010	E	CONC CHNL 20W 10.01 SS	100	3277	C-CULTR	GWMA	7.31	3.50
0049	E	TRANSITION STRUCTURE	360	2171	CRCS122	GWMA	4.89	2.44
0077	E	20 X 8 RCP @ CL-1 SHADOWS	1228	271	CRCS122	GWMA	4.89	6.11

ID/ Mile	Status	Facility Description	Length (ft)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Triangular Area (sq-ft)	Channel Slope (%)
0043	E	GWMA LONE MOUNTAIN SYST. BRANCH 3	206	271	CRCS122	GWMA	4.89	5.67
0100	E	CONC CHNL 20W 10.01 SS	670	695	DE-28	GWMA	4.31	0.29
0115	E	867 RCP OUTLET	3615	3615	VAL2EN	GWMA	4.31	6.50
0128	E	396 ACFT VALLEE DE DETENTION BASIN	2730	3615	VAL2EN	GWMA	4.31	3.81
0188	E	CONC CHNL 20W 6.01 SS	583	3615	VAL2EN	GWMA	4.31	0.88
0197	E	14 X 14 RCP	880	3615	VAL2EN	GWMA	4.31	0.57
0214	E	106 X 12 RCP	174	3615	VAL2EN	GWMA	4.31	0.57
0216	P	CONC CHNL 20W 4.21 SS	4050	3024	CS122-1	GWMA	4.02	0.88
0289	P	CONC CHNL 20W 3.50 21 SS	6215	2281	33	GWMA	2.44	7.85
0290	E	106 X 12 RCP	4950	410	SW2B-1	GWMA	1.59	22.50
0370	E	NATURAL WASH BRN	7000	2281	33	GWMA	2.44	8.50
0004	E	GWMA LONE MOUNTAIN SYST. BRANCH 4	554	2243	CULTR	GWMA	2.33	2.50
0009	E	14 X 8 RCP	800	2243	CULTR	GWMA	2.33	4.74
0010	E	2.2 X 8 RC3	300	2243	CULTR	GWMA	2.33	2.00
0025	E	SOIL CEMENT CHNL 42W 6.34 1 SS	700	2243	CULTR	GWMA	2.33	1.00

*The HEC-1 node shown identifies the controlling concentration point for the associated facility and is located upstream of this facility due to decreasing peak flow with increasing tributary area caused by storm distribution transitions, depth area reduction factors, or attenuation of flow from routing.
**As-built or design slopes were used when available. All other slopes are based on existing topography. The user should verify the facility slope listed prior to performing any facility specific analysis.
* For parallel facilities, the existing facility flow equals its normal depth capacity, and the proposed parallel facility flow equals the remaining flow (i.e. HEC-1 Node flow - existing facility normal depth capacity + proposed parallel facility flow).



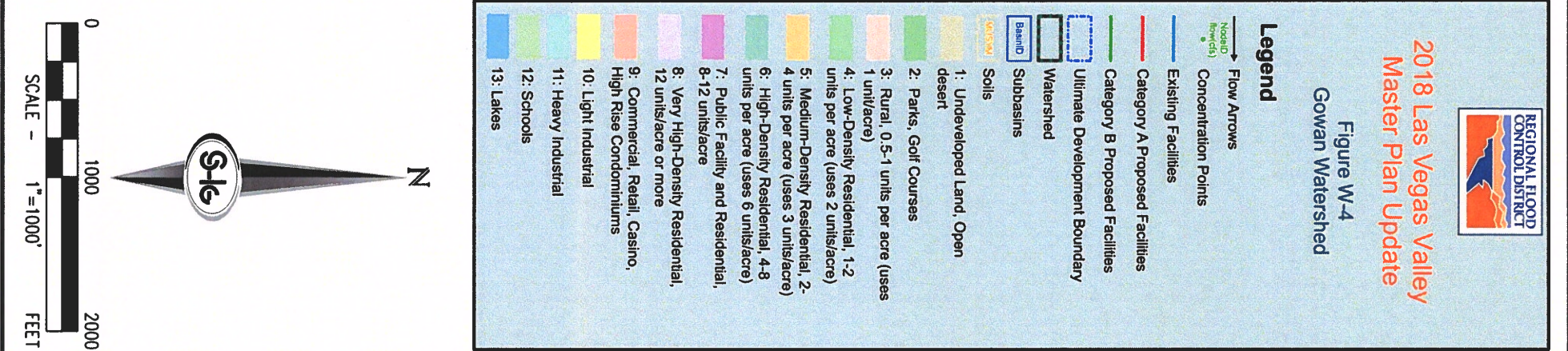
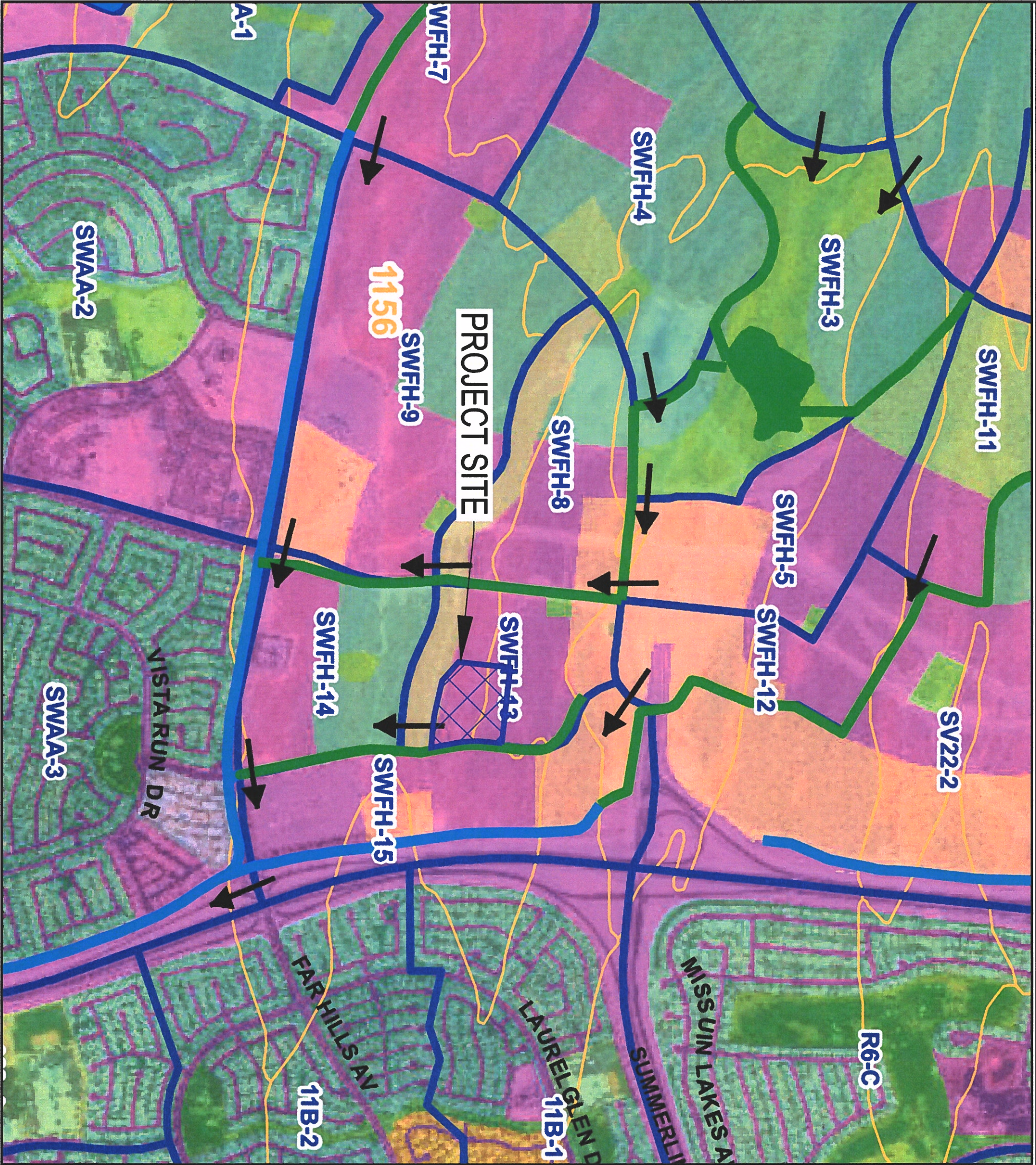
2018 LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE
FACILITY INVENTORY
FIGURE F-22

ID (Facility Identifier) _____
Parent Stream Name _____
Stream Name _____
Distance Above Confluence with Parent Stream (Miles) _____
Miles in Hundreds _____

Existing Facility _____
Proposed or Modified Facility _____
Contingency Level _____
Category A _____
Category B _____
Bottom Width _____
Depth _____
Side Slope, H:V _____
SS

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





RICHMOND AMERICAN HOMES		SUMMERLIN VILLAGE 21 PARCEL J		WATERSHED MAP		SLATER HANIFAN GROUP	
DATE: OCT 2019		DRAFTER: DCH		DESIGNER: DCH		CHECKED: CAA	
PROJECT NO. KBH1913.000		EXHIBIT C3		SHEET 1 OF 1		5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118	
						PHONE (702) 284-5300	

j:\kbh1913-000 summerlin village 21 parcel j\drainage\technical study\figures\kbh1913 tds exhibits d soils map.dwg 10/25/2019 9:55 AM Gabby Squillante



S-I-G **SLATER HANIFAN GROUP**
a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

RICHMOND AMERICAN HOMES
SUMMERLIN VILLAGE 21 PARCEL J
SOILS MAP

DATE: OCT 2019	PROJECT NO. KBH1913.000
DRAFTER: DCH	
DESIGNER: DCH	EXHIBIT D
CHECKED: CAA	SHEET 1 OF 1

APPENDIX B

FlowMaster Hydraulic Computations

Interior Street Sections

Worksheet for A1 MIN (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 5.90 %
Discharge 2.00 ft³/s
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 0.26 ft
Elevation Range 0.00 to 0.42 ft
Flow Area 0.47 ft²
Wetted Perimeter 6.25 ft
Hydraulic Radius 0.08 ft

Worksheet for A1 MIN (Half Street)

Results

Top Width	6.11	ft
Normal Depth	0.26	ft
Critical Depth	0.33	ft
Critical Slope	0.00720	ft/ft
Velocity	4.24	ft/s
Velocity Head	0.28	ft
Specific Energy	0.54	ft
Froude Number	2.69	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.26	ft
Critical Depth	0.33	ft
Channel Slope	5.90	%
Critical Slope	0.00720	ft/ft

Cross Section for A1 MIN (Half Street)

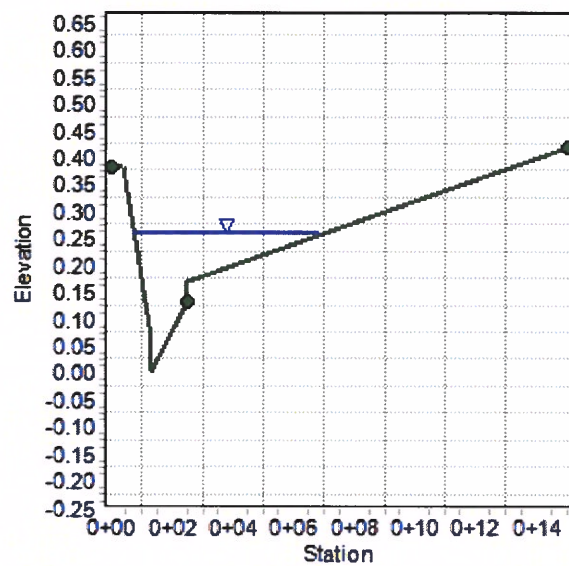
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.90	%
Normal Depth	0.26	ft
Discharge	2.00	ft ³ /s

Cross Section Image



Worksheet for A1 MAX (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 6.88 %
Discharge 2.00 ft³/s
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 0.25 ft
Elevation Range 0.00 to 0.42 ft
Flow Area 0.44 ft²
Wetted Perimeter 5.98 ft
Hydraulic Radius 0.07 ft

Worksheet for A1 MAX (Half Street)

Results

Top Width	5.84	ft
Normal Depth	0.25	ft
Critical Depth	0.33	ft
Critical Slope	0.00717	ft/ft
Velocity	4.53	ft/s
Velocity Head	0.32	ft
Specific Energy	0.57	ft
Froude Number	2.91	
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	0.33	ft
Channel Slope	6.88	%
Critical Slope	0.00717	ft/ft

Cross Section for A1 MAX (Half Street)

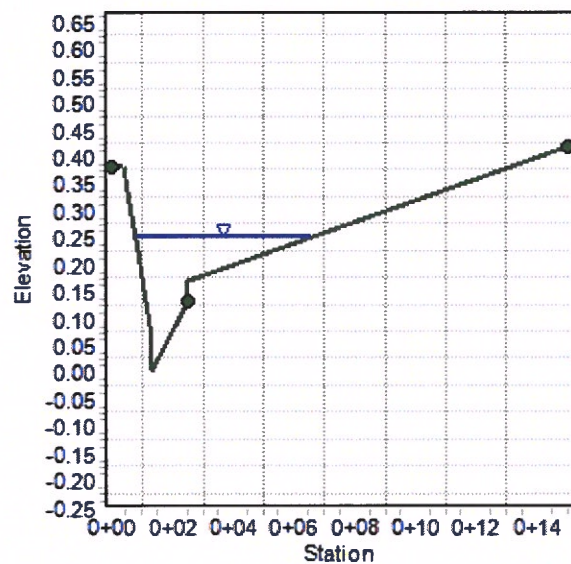
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.88	%
Normal Depth	0.25	ft
Discharge	2.00	ft ³ /s

Cross Section Image



Worksheet for A2 MIN (Half Street)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.15	%
Discharge	5.00	ft ³ /s
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	0.40	ft
Elevation Range	0.00 to 0.42	ft
Flow Area	1.87	ft ²
Wetted Perimeter	14.06	ft
Hydraulic Radius	0.13	ft

Worksheet for A2 MIN (Half Street)

Results

Top Width	13.88	ft
Normal Depth	0.40	ft
Critical Depth	0.43	ft
Critical Slope	0.00668	ft/ft
Velocity	2.68	ft/s
Velocity Head	0.11	ft
Specific Energy	0.51	ft
Froude Number	1.29	
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	0.40	ft
Critical Depth	0.43	ft
Channel Slope	1.15	%
Critical Slope	0.00668	ft/ft

Cross Section for A2 MIN (Half Street)

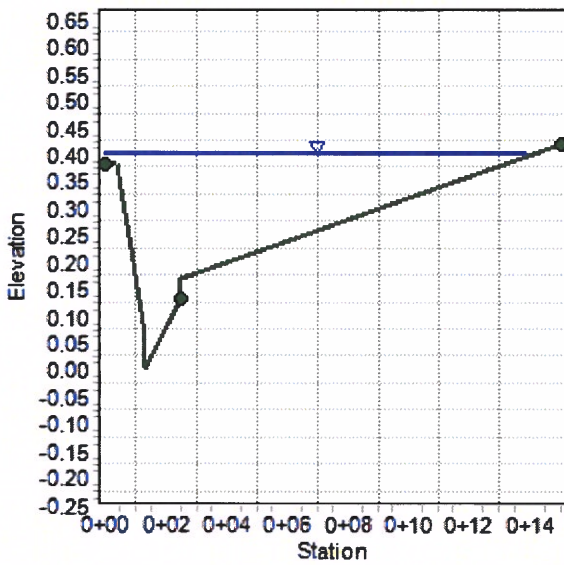
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.15	%
Normal Depth	0.40	ft
Discharge	5.00	ft ³ /s

Cross Section Image



Worksheet for A2 MAX (Half Street)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.88	%
Discharge	5.00	ft³/s
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	0.32	ft
Elevation Range	0.00 to 0.42	ft
Flow Area	0.93	ft²
Wetted Perimeter	9.41	ft
Hydraulic Radius	0.10	ft

Worksheet for A2 MAX (Half Street)

Results

Top Width	9.26	ft
Normal Depth	0.32	ft
Critical Depth	0.43	ft
Critical Slope	0.00660	ft/ft
Velocity	5.39	ft/s
Velocity Head	0.45	ft
Specific Energy	0.77	ft
Froude Number	3.00	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.32	ft
Critical Depth	0.43	ft
Channel Slope	6.88	%
Critical Slope	0.00660	ft/ft

Cross Section for A2 MAX (Half Street)

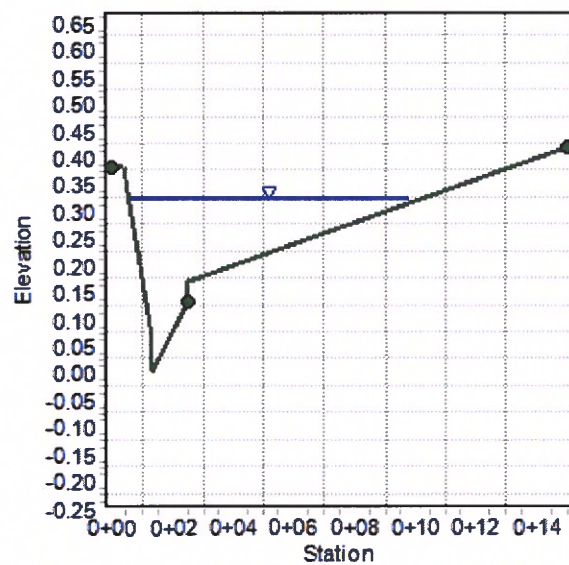
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.88	%
Normal Depth	0.32	ft
Discharge	5.00	ft ³ /s

Cross Section Image



Worksheet for A3 MIN (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.90 %
Discharge 5.00 ft³/s
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 0.37 ft
Elevation Range 0.00 to 0.42 ft
Flow Area 1.52 ft²
Wetted Perimeter 12.37 ft
Hydraulic Radius 0.12 ft

Worksheet for A3 MIN (Half Street)

Results

Top Width	12.21	ft
Normal Depth	0.37	ft
Critical Depth	0.43	ft
Critical Slope	0.00670	ft/ft
Velocity	3.28	ft/s
Velocity Head	0.17	ft
Specific Energy	0.54	ft
Froude Number	1.64	
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	0.37	ft
Critical Depth	0.43	ft
Channel Slope	1.90	%
Critical Slope	0.00670	ft/ft

Cross Section for A3 MIN (Half Street)

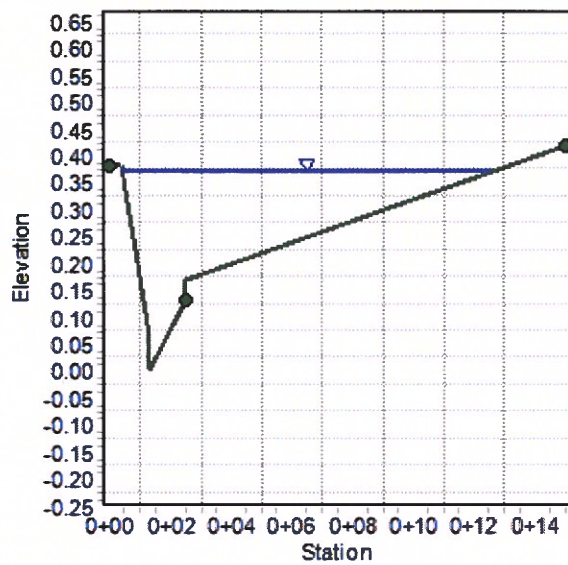
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.90	%
Normal Depth	0.37	ft
Discharge	5.00	ft ³ /s

Cross Section Image



Worksheet for A3 MAX (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.71 %
Discharge 5.00 ft³/s
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
Elevation Range 0.00 to 0.42 ft
Flow Area 1.33 ft²
Wetted Perimeter 11.48 ft
Hydraulic Radius 0.12 ft

Worksheet for A3 MAX (Half Street)

Results

Top Width	11.32	ft
Normal Depth	0.36	ft
Critical Depth	0.43	ft
Critical Slope	0.00667	ft/ft
Velocity	3.76	ft/s
Velocity Head	0.22	ft
Specific Energy	0.58	ft
Froude Number	1.94	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.36	ft
Critical Depth	0.43	ft
Channel Slope	2.71	%
Critical Slope	0.00667	ft/ft

Cross Section for A3 MAX (Half Street)

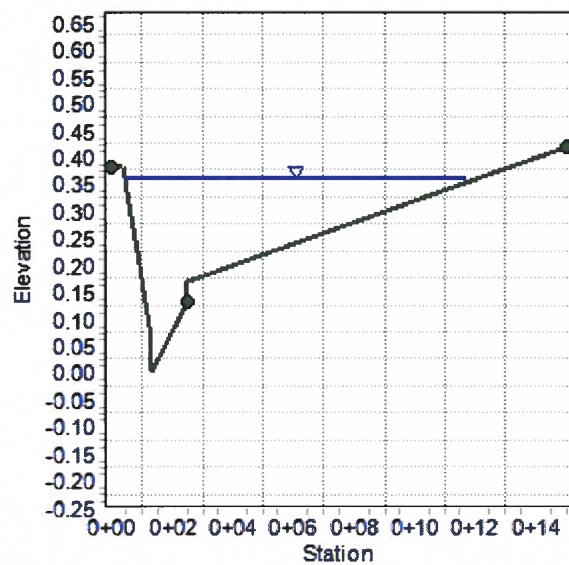
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.71	%
Normal Depth	0.36	ft
Discharge	5.00	ft ³ /s

Cross Section Image



Worksheet for B1 MIN (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.90 %
Discharge 2.00 ft³/s
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 0.30 ft
Elevation Range 0.00 to 0.42 ft
Flow Area 0.75 ft²
Wetted Perimeter 8.29 ft
Hydraulic Radius 0.09 ft

Worksheet for B1 MIN (Half Street)

Results

Top Width	8.15	ft
Normal Depth	0.30	ft
Critical Depth	0.33	ft
Critical Slope	0.00736	ft/ft
Velocity	2.68	ft/s
Velocity Head	0.11	ft
Specific Energy	0.41	ft
Froude Number	1.56	
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	0.33	ft
Channel Slope	1.90	%
Critical Slope	0.00736	ft/ft

Cross Section for B1 MIN (Half Street)

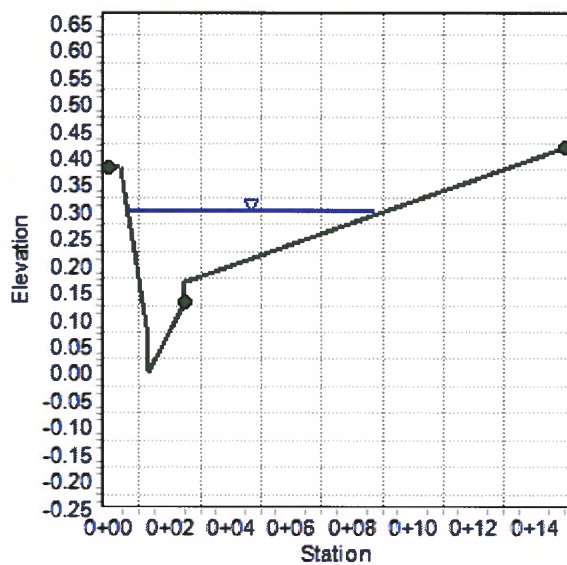
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.90	%
Normal Depth	0.30	ft
Discharge	2.00	ft ³ /s

Cross Section Image



Project Description

Solve For	Normal Depth
-----------	--------------

Input Data

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

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	0.29	ft
Elevation Range	0.00 to 0.42	ft
Flow Area	0.67	ft²
Wetted Perimeter	7.76	ft
Hydraulic Radius	0.09	ft

Worksheet for B1 MAX (Half Street)

Results

Top Width	7.61	ft
Normal Depth	0.29	ft
Critical Depth	0.33	ft
Critical Slope	0.00733	ft/ft
Velocity	3.00	ft/s
Velocity Head	0.14	ft
Specific Energy	0.43	ft
Froude Number	1.79	
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	0.33	ft
Channel Slope	2.53	%
Critical Slope	0.00733	ft/ft

Cross Section for B1 MAX (Half Street)

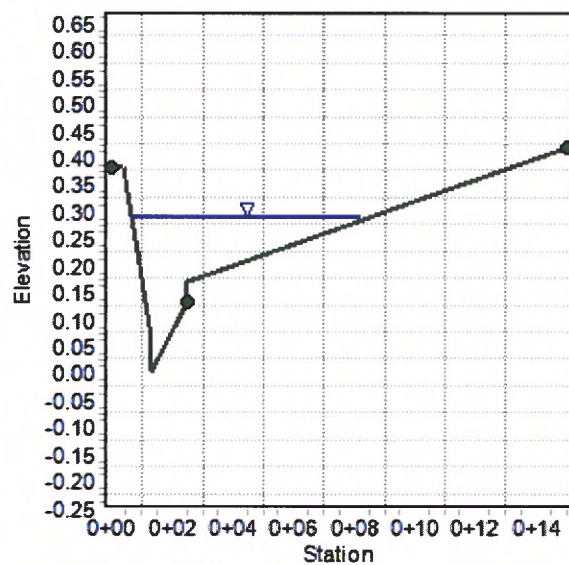
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.53	%
Normal Depth	0.29	ft
Discharge	2.00	ft ³ /s

Cross Section Image



Worksheet for C MIN (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.90 %
Discharge 2.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+01.50	0.13
0+01.50	0.17
0+15.00	0.44

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+01.50, 0.13)	0.013
(0+01.50, 0.13)	(0+15.00, 0.44)	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 0.31 ft
Elevation Range 0.00 to 0.50 ft
Flow Area 0.76 ft²
Wetted Perimeter 8.51 ft
Hydraulic Radius 0.09 ft
Top Width 8.15 ft

Worksheet for C MIN (Half Street)

Results

Normal Depth	0.31	ft
Critical Depth	0.35	ft
Critical Slope	0.00781	ft/ft
Velocity	2.63	ft/s
Velocity Head	0.11	ft
Specific Energy	0.42	ft
Froude Number	1.52	
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	0.35	ft
Channel Slope	1.90	%
Critical Slope	0.00781	ft/ft

Cross Section for C MIN (Half Street)

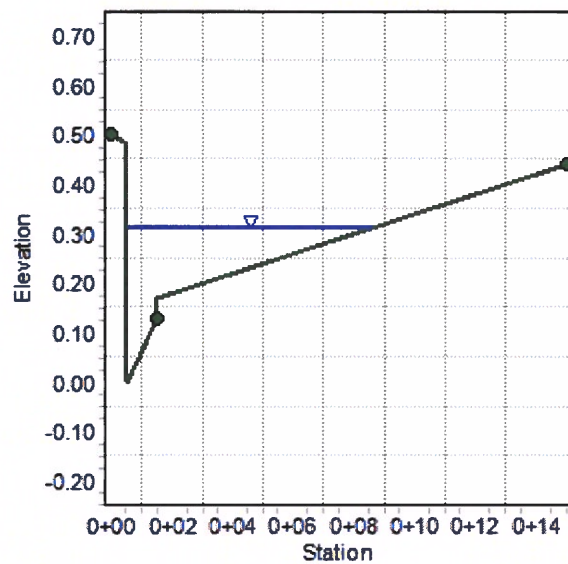
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.90	%
Normal Depth	0.31	ft
Discharge	2.00	ft ³ /s

Cross Section Image



Worksheet for C MAX (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 6.88 %
Discharge 2.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+01.50	0.13
0+01.50	0.17
0+15.00	0.44

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+01.50, 0.13)	0.013
(0+01.50, 0.13)	(0+15.00, 0.44)	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 0.27 ft
Elevation Range 0.00 to 0.50 ft
Flow Area 0.46 ft²
Wetted Perimeter 6.34 ft
Hydraulic Radius 0.07 ft
Top Width 6.03 ft

Worksheet for C MAX (Half Street)

Results

Normal Depth	0.27	ft
Critical Depth	0.35	ft
Critical Slope	0.00768	ft/ft
Velocity	4.37	ft/s
Velocity Head	0.30	ft
Specific Energy	0.57	ft
Froude Number	2.79	
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	0.35	ft
Channel Slope	6.88	%
Critical Slope	0.00768	ft/ft

Cross Section for C MAX (Half Street)

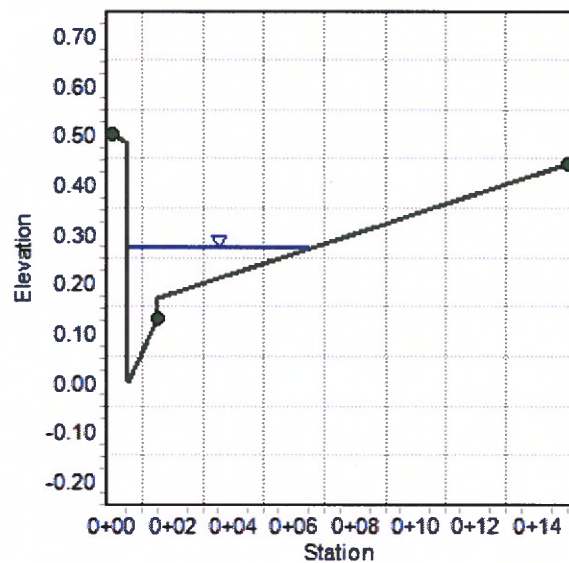
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.88	%
Normal Depth	0.27	ft
Discharge	2.00	ft ³ /s

Cross Section Image



Project Description

Solve For	Normal Depth
-----------	--------------

Input Data

Discharge 2.00 ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+01.50	0.13
0+01.50	0.17
0+15.00	0.44

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+01.50, 0.13)	0.013
(0+01.50, 0.13)	(0+15.00, 0.44)	0.016

Options

Closed Channel Weighting Method	Pavlovskii's Method
$W_{\text{CC}} = \frac{1}{N} \sum_{i=1}^N \frac{1}{\sqrt{1 + \frac{1}{\lambda} \left(\frac{1}{\sigma_i^2} - \frac{1}{\sigma_{\text{max}}^2} \right)}}$	$W_{\text{P}} = \frac{1}{N} \sum_{i=1}^N \frac{1}{\sqrt{1 + \frac{1}{\lambda} \left(\frac{1}{\sigma_i^2} - \frac{1}{\sigma_{\text{max}}^2} \right)}}$

Results

Top Width 8.15 ft

Worksheet for D MIN (Half Street)

Results

Normal Depth	0.31	ft
Critical Depth	0.35	ft
Critical Slope	0.00781	ft/ft
Velocity	2.63	ft/s
Velocity Head	0.11	ft
Specific Energy	0.42	ft
Froude Number	1.52	
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	0.35	ft
Channel Slope	1.90	%
Critical Slope	0.00781	ft/ft

Cross Section for D MIN (Half Street)

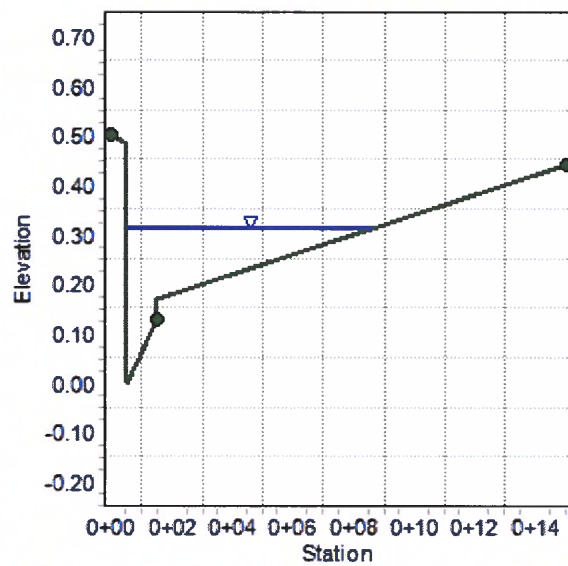
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.90	%
Normal Depth	0.31	ft
Discharge	2.00	ft ³ /s

Cross Section Image



Project Description

Solve For Normal Depth

Input Data

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+01.50	0.13
0+01.50	0.17
0+15.00	0.44

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+01.50, 0.13)	0.013
(0+01.50, 0.13)	(0+15.00, 0.44)	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	0.30	ft
Elevation Range	0.00 to 0.50	ft
Flow Area	0.69	ft²
Wetted Perimeter	8.06	ft
Hydraulic Radius	0.09	ft
Top Width	7.70	ft

Worksheet for D MAX (Half Street)

Results

Normal Depth	0.30	ft
Critical Depth	0.35	ft
Critical Slope	0.00779	ft/ft
Velocity	2.90	ft/s
Velocity Head	0.13	ft
Specific Energy	0.44	ft
Froude Number	1.71	
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	0.35	ft
Channel Slope	2.46	%
Critical Slope	0.00779	ft/ft

Cross Section for D MAX (Half Street)

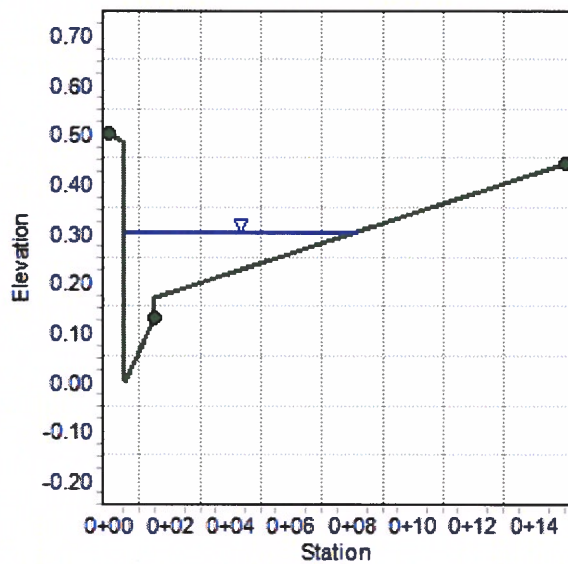
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.46	%
Normal Depth	0.30	ft
Discharge	2.00	ft ³ /s

Cross Section Image



Worksheet for FACILITY P3 (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.90 %
Discharge 2.00 ft³/s
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+13.00	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+13.00, 0.38)	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 0.30 ft
Elevation Range 0.00 to 0.38 ft
Flow Area 0.75 ft²
Wetted Perimeter 8.29 ft
Hydraulic Radius 0.09 ft

Worksheet for FACILITY P3 (Half Street)

Results

Top Width	8.15	ft
Normal Depth	0.30	ft
Critical Depth	0.33	ft
Critical Slope	0.00736	ft/ft
Velocity	2.68	ft/s
Velocity Head	0.11	ft
Specific Energy	0.41	ft
Froude Number	1.56	
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	0.33	ft
Channel Slope	1.90	%
Critical Slope	0.00736	ft/ft

Cross Section for FACILITY P3 (Half Street)

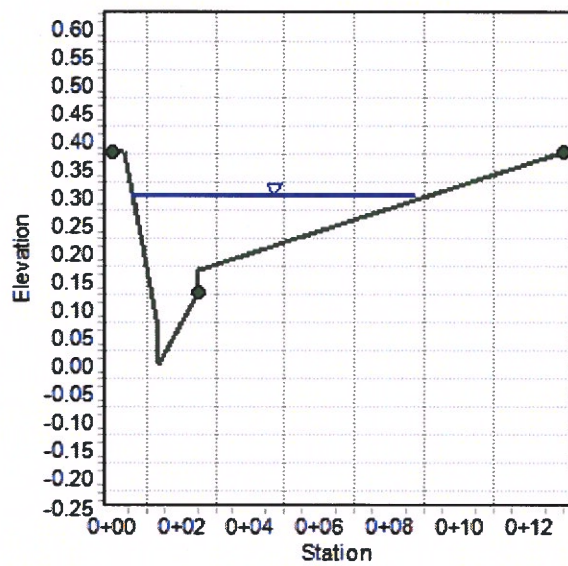
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.90	%
Normal Depth	0.30	ft
Discharge	2.00	ft ³ /s

Cross Section Image



Worksheet for E1 (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 6.39 %
Discharge 1.00 ft³/s
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+13.00	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+13.00, 0.38)	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 0.21 ft
Elevation Range 0.00 to 0.38 ft
Flow Area 0.24 ft²
Wetted Perimeter 3.73 ft
Hydraulic Radius 0.06 ft

Worksheet for E1 (Half Street)

Results

Top Width	3.60	ft
Normal Depth	0.21	ft
Critical Depth	0.28	ft
Critical Slope	0.00736	ft/ft
Velocity	4.13	ft/s
Velocity Head	0.26	ft
Specific Energy	0.47	ft
Froude Number	2.81	
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	0.21	ft
Critical Depth	0.28	ft
Channel Slope	6.39	%
Critical Slope	0.00736	ft/ft

Cross Section for E1 (Half Street)

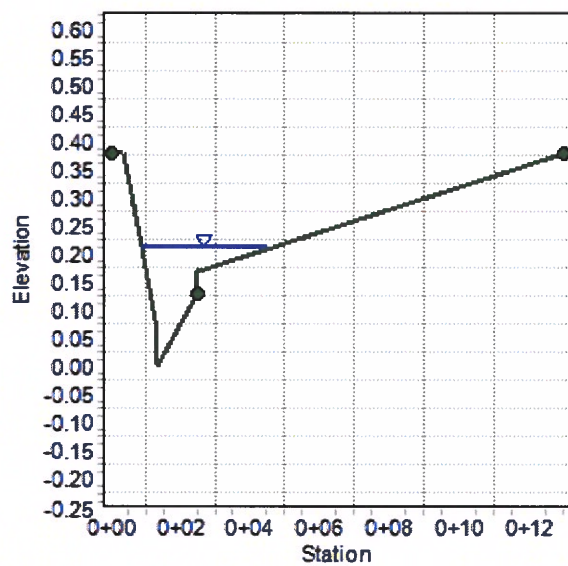
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.39	%
Normal Depth	0.21	ft
Discharge	1.00	ft ³ /s

Cross Section Image



Worksheet for E2 MIN (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 6.40 %
Discharge 2.00 ft³/s
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 0.25 ft
Elevation Range 0.00 to 0.42 ft
Flow Area 0.46 ft²
Wetted Perimeter 6.10 ft
Hydraulic Radius 0.07 ft

Worksheet for E2 MIN (Half Street)

Results

Top Width	5.96	ft
Normal Depth	0.25	ft
Critical Depth	0.33	ft
Critical Slope	0.00719	ft/ft
Velocity	4.39	ft/s
Velocity Head	0.30	ft
Specific Energy	0.55	ft
Froude Number	2.80	
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	0.33	ft
Channel Slope	6.40	%
Critical Slope	0.00719	ft/ft

Cross Section for E2 MIN (Half Street)

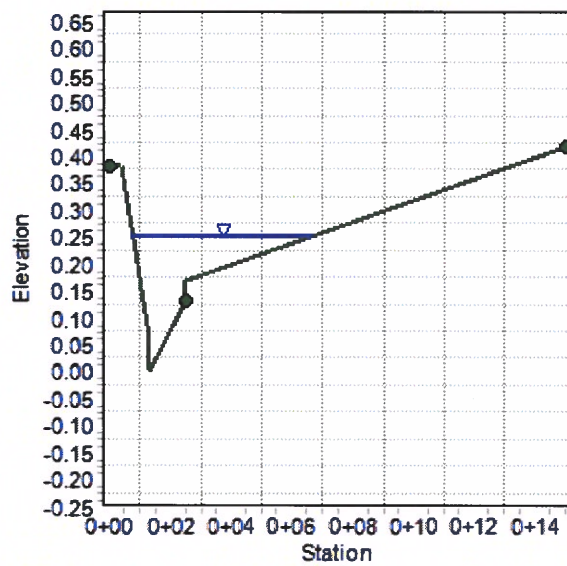
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.40	%
Normal Depth	0.25	ft
Discharge	2.00	ft ³ /s

Cross Section Image



Worksheet for E2 MAX (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 6.81 %
Discharge 2.00 ft³/s
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 0.25 ft
Elevation Range 0.00 to 0.42 ft
Flow Area 0.44 ft²
Wetted Perimeter 6.00 ft
Hydraulic Radius 0.07 ft

Worksheet for E2 MAX (Half Street)

Results

Top Width	5.86	ft
Normal Depth	0.25	ft
Critical Depth	0.33	ft
Critical Slope	0.00717	ft/ft
Velocity	4.51	ft/s
Velocity Head	0.32	ft
Specific Energy	0.57	ft
Froude Number	2.89	
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	0.33	ft
Channel Slope	6.81	%
Critical Slope	0.00717	ft/ft

Cross Section for E2 MAX (Half Street)

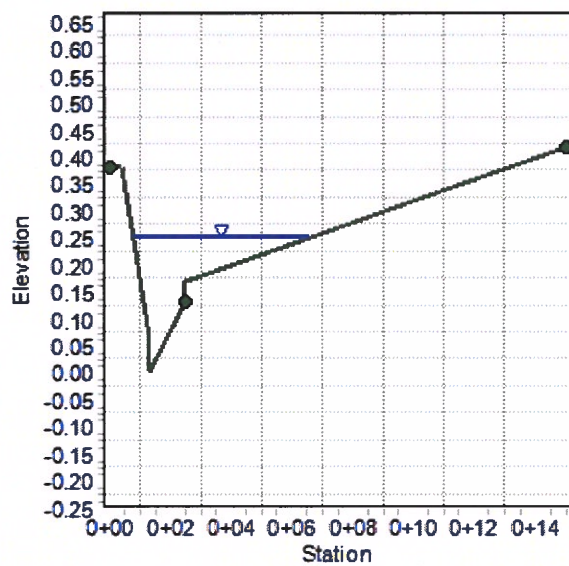
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.81	%
Normal Depth	0.25	ft
Discharge	2.00	ft ³ /s

Cross Section Image



Worksheet for E3 MIN (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 5.50 %
Discharge 3.00 ft³/s
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+13.00	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+13.00, 0.38)	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 0.29 ft
Elevation Range 0.00 to 0.38 ft
Flow Area 0.68 ft²
Wetted Perimeter 7.83 ft
Hydraulic Radius 0.09 ft

Worksheet for E3 MIN (Half Street)

Results

Top Width	7.68	ft
Normal Depth	0.29	ft
Critical Depth	0.37	ft
Critical Slope	0.00696	ft/ft
Velocity	4.44	ft/s
Velocity Head	0.31	ft
Specific Energy	0.59	ft
Froude Number	2.64	
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	0.37	ft
Channel Slope	5.50	%
Critical Slope	0.00696	ft/ft

Cross Section for E3 MIN (Half Street)

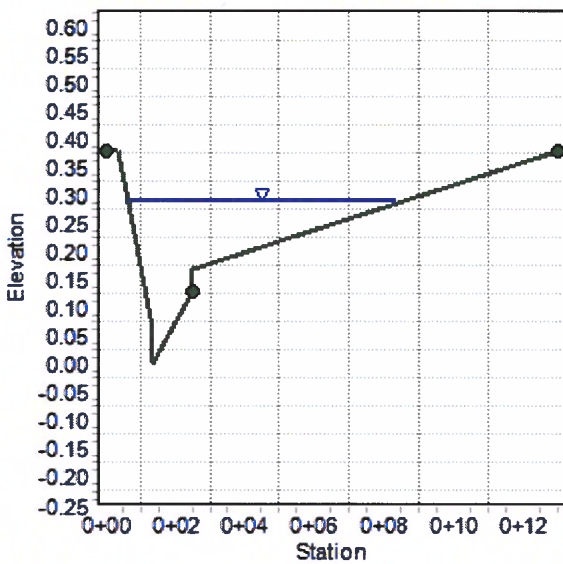
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.50	%
Normal Depth	0.29	ft
Discharge	3.00	ft ³ /s

Cross Section Image



Worksheet for E3 MAX (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 6.40 %
Discharge 3.00 ft³/s
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+13.00	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+13.00, 0.38)	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 0.28 ft
Elevation Range 0.00 to 0.38 ft
Flow Area 0.63 ft²
Wetted Perimeter 7.52 ft
Hydraulic Radius 0.08 ft

Worksheet for E3 MAX (Half Street)

Results

Top Width	7.38	ft
Normal Depth	0.28	ft
Critical Depth	0.37	ft
Critical Slope	0.00694	ft/ft
Velocity	4.74	ft/s
Velocity Head	0.35	ft
Specific Energy	0.63	ft
Froude Number	2.85	
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	0.37	ft
Channel Slope	6.40	%
Critical Slope	0.00694	ft/ft

Worksheet for F1 MIN (Half Street)

Results

Top Width	7.71	ft
Normal Depth	0.29	ft
Critical Depth	0.28	ft
Critical Slope	0.00799	ft/ft
Velocity	1.47	ft/s
Velocity Head	0.03	ft
Specific Energy	0.32	ft
Froude Number	0.87	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.29	ft
Critical Depth	0.28	ft
Channel Slope	0.60	%
Critical Slope	0.00799	ft/ft

Worksheet for F1 MAX (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.55 %
Discharge 1.00 ft³/s
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 0.26 ft
Elevation Range 0.00 to 0.42 ft
Flow Area 0.46 ft²
Wetted Perimeter 6.16 ft
Hydraulic Radius 0.07 ft

Worksheet for F1 MAX (Half Street)

Results

Top Width	6.02	ft
Normal Depth	0.26	ft
Critical Depth	0.28	ft
Critical Slope	0.00783	ft/ft
Velocity	2.17	ft/s
Velocity Head	0.07	ft
Specific Energy	0.33	ft
Froude Number	1.38	
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	0.26	ft
Critical Depth	0.28	ft
Channel Slope	1.55	%
Critical Slope	0.00783	ft/ft

Cross Section for F1 MAX (Half Street)

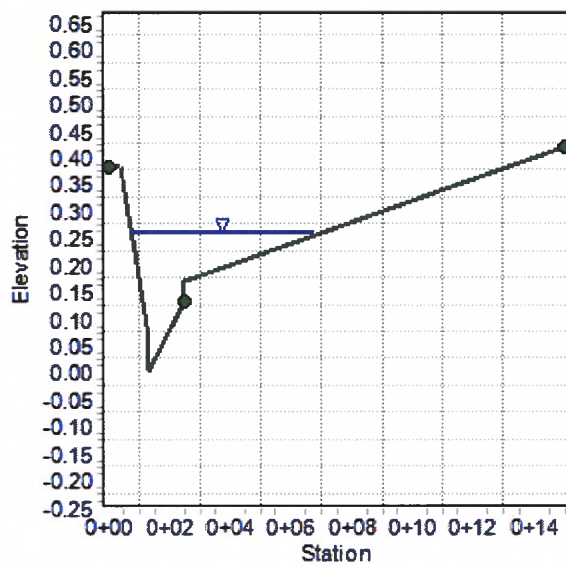
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.55	%
Normal Depth	0.26	ft
Discharge	1.00	ft ³ /s

Cross Section Image



Worksheet for F2 MIN (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.60 %
Discharge 2.00 ft³/s
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 0.34 ft
Elevation Range 0.00 to 0.42 ft
Flow Area 1.17 ft²
Wetted Perimeter 10.72 ft
Hydraulic Radius 0.11 ft

Worksheet for F2 MIN (Half Street)

Results

Top Width	10.56	ft
Normal Depth	0.34	ft
Critical Depth	0.33	ft
Critical Slope	0.00747	ft/ft
Velocity	1.71	ft/s
Velocity Head	0.05	ft
Specific Energy	0.39	ft
Froude Number	0.90	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.34	ft
Critical Depth	0.33	ft
Channel Slope	0.60	%
Critical Slope	0.00747	ft/ft

Project Description

Manning Formula

Normal Depth

2.00 ft³/s

Worksheet for F2 MAX (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 6.52 %
Discharge 2.00 ft³/s

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 0.25 ft
Elevation Range 0.00 to 0.42 ft
Flow Area 0.45 ft²
Wetted Perimeter 6.07 ft
Hydraulic Radius 0.07 ft

Worksheet for F2 MAX (Half Street)

Results

Top Width	5.93	ft
Normal Depth	0.25	ft
Critical Depth	0.33	ft
Critical Slope	0.00718	ft/ft
Velocity	4.43	ft/s
Velocity Head	0.30	ft
Specific Energy	0.56	ft
Froude Number	2.83	
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	0.33	ft
Channel Slope	6.52	%
Critical Slope	0.00718	ft/ft

Cross Section for F2 MAX (Half Street)

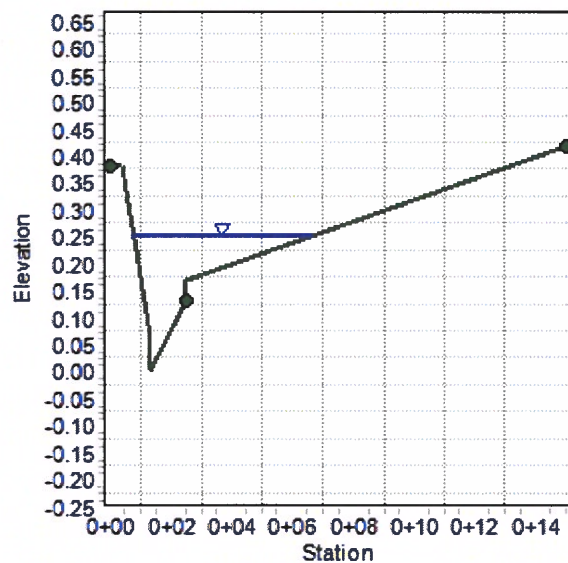
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.52	%
Normal Depth	0.25	ft
Discharge	2.00	ft ³ /s

Cross Section Image



Worksheet for G1 (Half Street)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.52	%
Discharge	9.00	ft³/s

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	0.37	ft
Elevation Range	0.00 to 0.42	ft
Flow Area	1.49	ft²
Wetted Perimeter	12.22	ft
Hydraulic Radius	0.12	ft

Worksheet for G1 (Half Street)

Results

Top Width	12.06	ft
Normal Depth	0.37	ft
Critical Depth	0.50	ft
Critical Slope	0.00595	ft/ft
Velocity	6.04	ft/s
Velocity Head	0.57	ft
Specific Energy	0.94	ft
Froude Number	3.03	
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	0.37	ft
Critical Depth	0.50	ft
Channel Slope	6.52	%
Critical Slope	0.00595	ft/ft

Cross Section for G1 (Half Street)

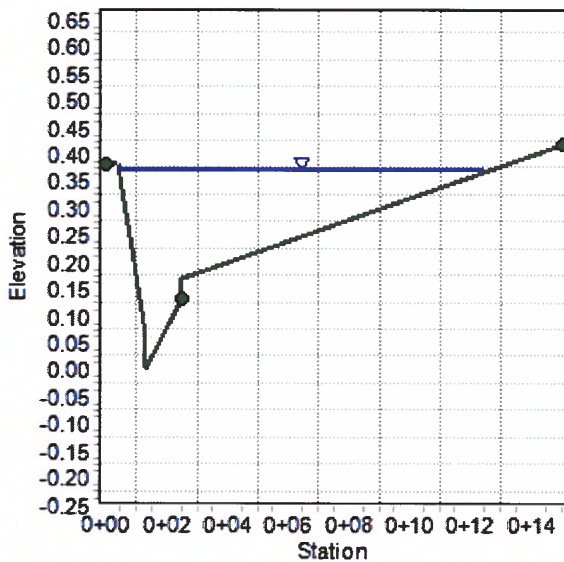
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.52 %
Normal Depth	0.37 ft
Discharge	9.00 ft ³ /s

Cross Section Image



Project Description

Input Data

Station (ft)

Elevation (ft)

Roughness Segment Definitions

Start Station

Ending Station

Roughness Coefficient

Options

Results

Bentley Systems, Inc. Haestad Methods Solution Center Bentley FlowMaster V8i (SELECTseries 1) [08.11.01.03]

Worksheet for G2 (Half Street)

Results

Top Width	14.74	ft
Normal Depth	0.41	ft
Critical Depth	0.57	ft
Critical Slope	0.00547	ft/ft
Velocity	6.63	ft/s
Velocity Head	0.68	ft
Specific Energy	1.10	ft
Froude Number	3.09	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.41	ft
Critical Depth	0.57	ft
Channel Slope	6.52	%
Critical Slope	0.00547	ft/ft

Cross Section for G2 (Half Street)

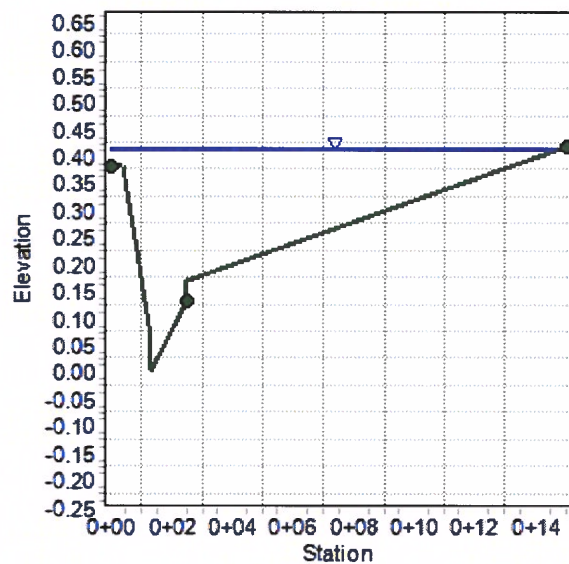
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.52	%
Normal Depth	0.41	ft
Discharge	14.00	ft ³ /s

Cross Section Image



Worksheet for J5 (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.24 %
Discharge 9.00 ft³/s
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 0.42 ft
Elevation Range 0.00 to 0.42 ft
Flow Area 2.25 ft²
Wetted Perimeter 15.21 ft
Hydraulic Radius 0.15 ft

Worksheet for J5 (Half Street)

Results

Top Width	15.00	ft
Normal Depth	0.42	ft
Critical Depth	0.50	ft
Critical Slope	0.00596	ft/ft
Velocity	4.01	ft/s
Velocity Head	0.25	ft
Specific Energy	0.67	ft
Froude Number	1.82	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.42	ft
Critical Depth	0.50	ft
Channel Slope	2.24	%
Critical Slope	0.00596	ft/ft

Cross Section for J5 (Half Street)

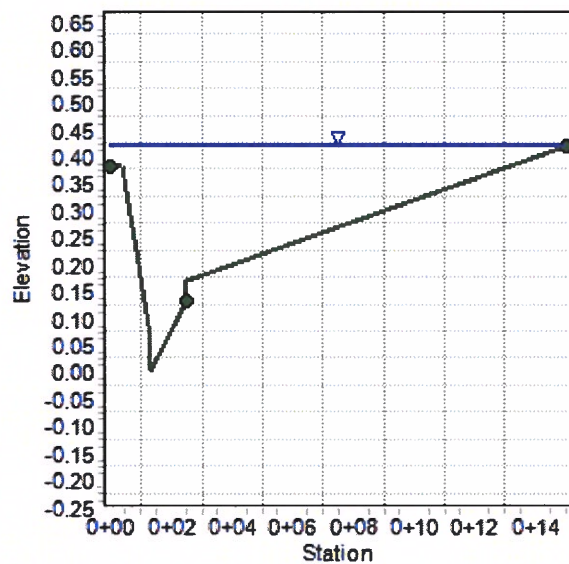
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.24	%
Normal Depth	0.42	ft
Discharge	9.00	ft ³ /s

Cross Section Image



Worksheet for H1 MIN (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.50 %
Discharge 1.00 ft³/s
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 0.26 ft
Elevation Range 0.00 to 0.42 ft
Flow Area 0.47 ft²
Wetted Perimeter 6.22 ft
Hydraulic Radius 0.08 ft

Worksheet for H1 MIN (Half Street)

Results

Top Width	6.08	ft
Normal Depth	0.26	ft
Critical Depth	0.28	ft
Critical Slope	0.00784	ft/ft
Velocity	2.14	ft/s
Velocity Head	0.07	ft
Specific Energy	0.33	ft
Froude Number	1.36	
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	0.26	ft
Critical Depth	0.28	ft
Channel Slope	1.50	%
Critical Slope	0.00784	ft/ft

Cross Section for H1 MIN (Half Street)

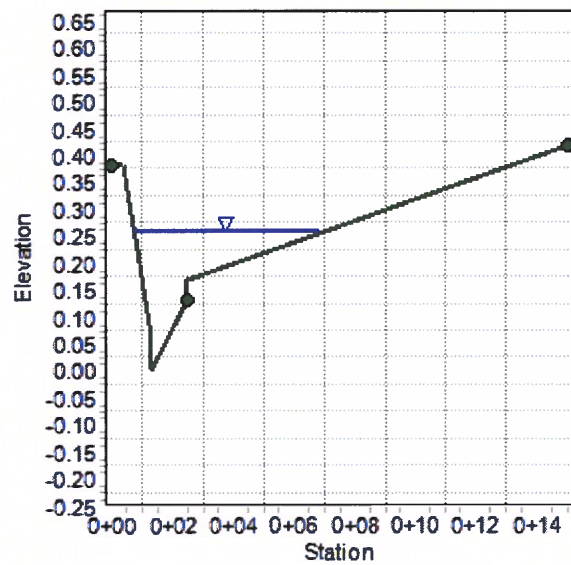
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.50	%
Normal Depth	0.26	ft
Discharge	1.00	ft ³ /s

Cross Section Image



Worksheet for H1 MAX (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.78 %
Discharge 1.00 ft³/s
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 0.25 ft
Elevation Range 0.00 to 0.42 ft
Flow Area 0.44 ft²
Wetted Perimeter 5.92 ft
Hydraulic Radius 0.07 ft

Worksheet for H1 MAX (Half Street)

Results

Top Width	5.78	ft
Normal Depth	0.25	ft
Critical Depth	0.28	ft
Critical Slope	0.00780	ft/ft
Velocity	2.30	ft/s
Velocity Head	0.08	ft
Specific Energy	0.33	ft
Froude Number	1.48	
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	1.78	%
Critical Slope	0.00780	ft/ft

Cross Section for H1 MAX (Half Street)

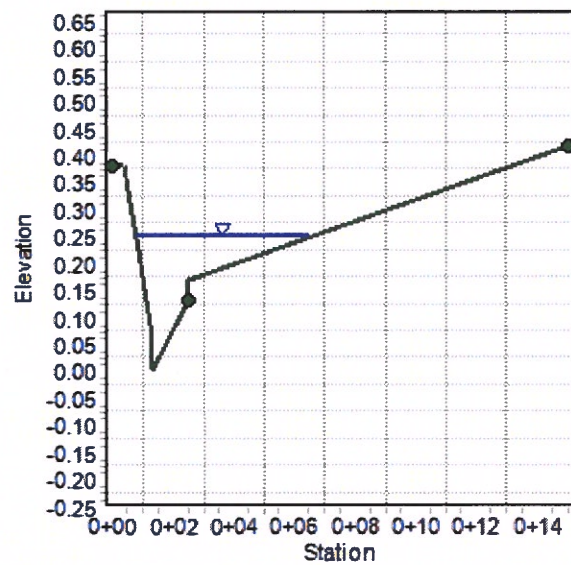
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.78	%
Normal Depth	0.25	ft
Discharge	1.00	ft ³ /s

Cross Section Image



Worksheet for H2 MIN (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.50 %
Discharge 1.00 ft³/s
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 0.26 ft
Elevation Range 0.00 to 0.42 ft
Flow Area 0.47 ft²
Wetted Perimeter 6.22 ft
Hydraulic Radius 0.08 ft

Worksheet for H2 MIN (Half Street)

Results

Top Width	6.08	ft
Normal Depth	0.26	ft
Critical Depth	0.28	ft
Critical Slope	0.00784	ft/ft
Velocity	2.14	ft/s
Velocity Head	0.07	ft
Specific Energy	0.33	ft
Froude Number	1.36	
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	0.26	ft
Critical Depth	0.28	ft
Channel Slope	1.50	%
Critical Slope	0.00784	ft/ft

Cross Section for H2 MIN (Half Street)

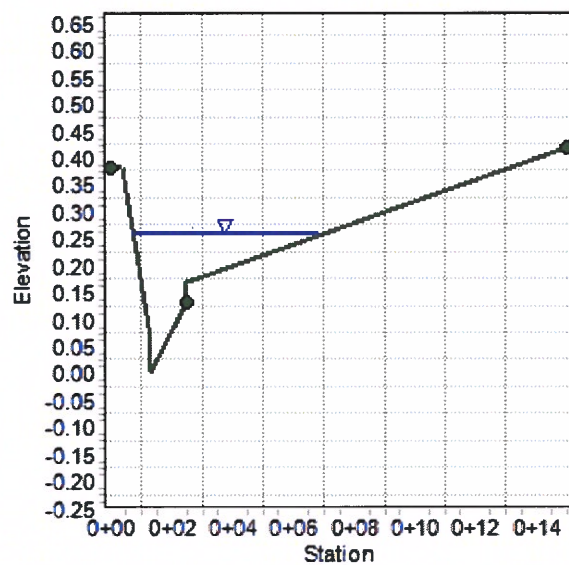
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.50	%
Normal Depth	0.26	ft
Discharge	1.00	ft ³ /s

Cross Section Image



Worksheet for H2 MAX (Half Street)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.78	%
Discharge	1.00	ft³/s
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	0.25	ft
Elevation Range	0.00 to 0.42	ft
Flow Area	0.44	ft²
Wetted Perimeter	5.92	ft
Hydraulic Radius	0.07	ft

Worksheet for H2 MAX (Half Street)

Results

Top Width	5.78	ft
Normal Depth	0.25	ft
Critical Depth	0.28	ft
Critical Slope	0.00780	ft/ft
Velocity	2.30	ft/s
Velocity Head	0.08	ft
Specific Energy	0.33	ft
Froude Number	1.48	
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	1.78	%
Critical Slope	0.00780	ft/ft

Cross Section for H2 MAX (Half Street)

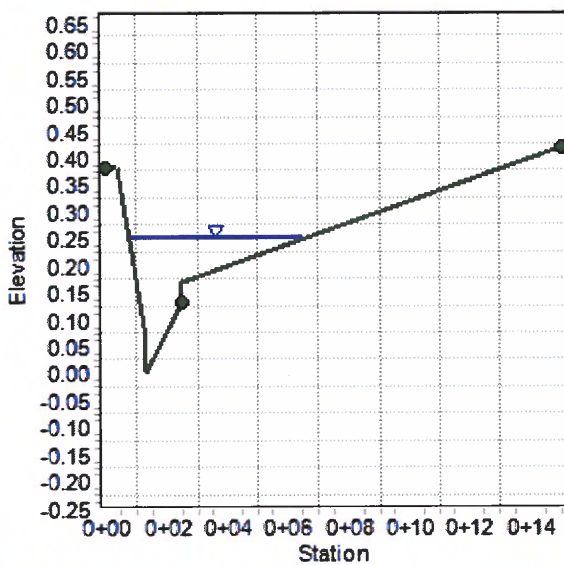
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.78	%
Normal Depth	0.25	ft
Discharge	1.00	ft ³ /s

Cross Section Image



Worksheet for H3 MIN (Full Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.50 %
Discharge 5.00 ft³/s
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

Worksheet for H3 MIN (Full Street)

Results

Normal Depth		0.32	ft
Elevation Range	0.00 to 0.42	ft	
Flow Area		1.96	ft ²
Wetted Perimeter		19.39	ft
Hydraulic Radius		0.10	ft
Top Width		19.09	ft
Normal Depth		0.32	ft
Critical Depth		0.35	ft
Critical Slope		0.00722	ft/ft
Velocity		2.55	ft/s
Velocity Head		0.10	ft
Specific Energy		0.42	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	0.32	ft
Critical Depth	0.35	ft
Channel Slope	1.50	%
Critical Slope	0.00722	ft/ft

Cross Section for H3 MIN (Full Street)

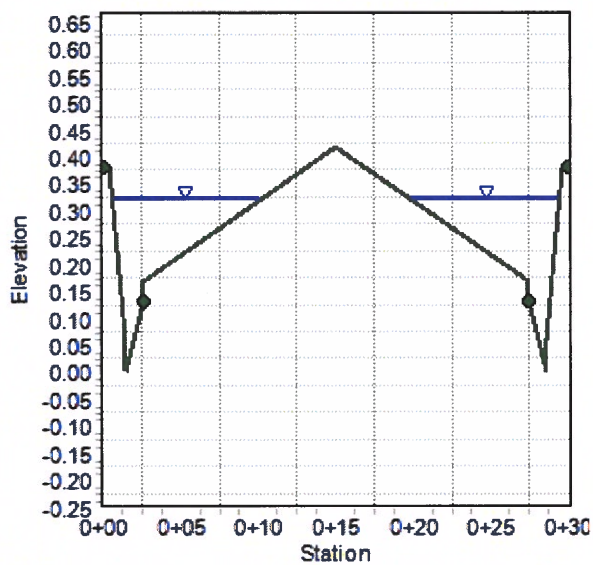
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.50	%
Normal Depth	0.32	ft
Discharge	5.00	ft ³ /s

Cross Section Image



Worksheet for H3 MAX (Full Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.17 %
Discharge 5.00 ft³/s
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

Worksheet for H3 MAX (Full Street)

Results

Normal Depth		0.31	ft
Elevation Range	0.00 to 0.42 ft		
Flow Area		1.69	ft ²
Wetted Perimeter		17.81	ft
Hydraulic Radius		0.09	ft
Top Width		17.51	ft
Normal Depth		0.31	ft
Critical Depth		0.35	ft
Critical Slope		0.00719	ft/ft
Velocity		2.97	ft/s
Velocity Head		0.14	ft
Specific Energy		0.44	ft
Froude Number		1.69	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.31	ft
Critical Depth	0.35	ft
Channel Slope	2.17	%
Critical Slope	0.00719	ft/ft

Cross Section for H3 MAX (Full Street)

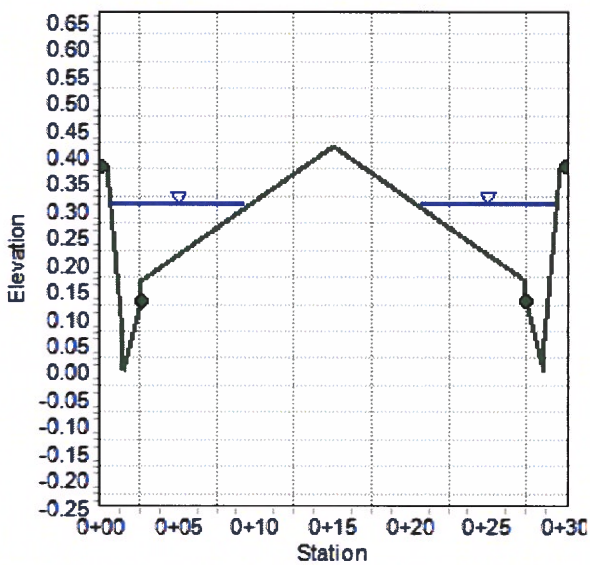
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.17	%
Normal Depth	0.31	ft
Discharge	5.00	ft ³ /s

Cross Section Image



Worksheet for I2 MIN (Full Street)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.10	%
Discharge	5.00	ft³/s
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

Worksheet for I2 MIN (Full Street)

Results

Normal Depth		0.29	ft
Elevation Range	0.00 to 0.42 ft		
Flow Area		1.46	ft ²
Wetted Perimeter		16.41	ft
Hydraulic Radius		0.09	ft
Top Width		16.12	ft
Normal Depth		0.29	ft
Critical Depth		0.35	ft
Critical Slope		0.00715	ft/ft
Velocity		3.41	ft/s
Velocity Head		0.18	ft
Specific Energy		0.47	ft
Froude Number		2.00	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.29	ft
Critical Depth	0.35	ft
Channel Slope	3.10	%
Critical Slope	0.00715	ft/ft

Cross Section for I2 MIN (Full Street)

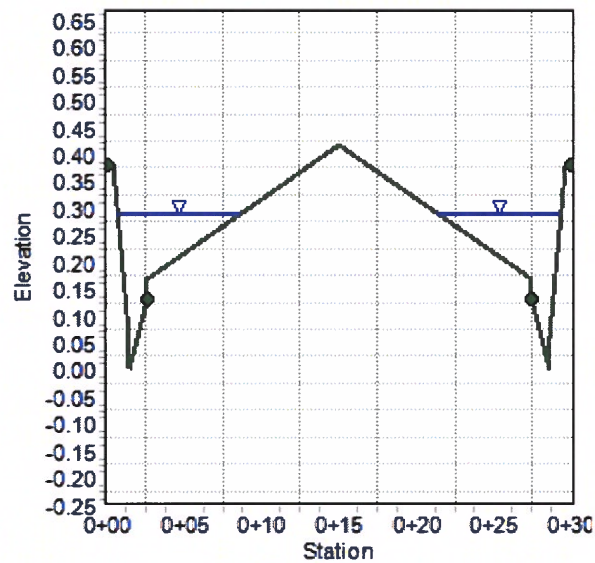
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.10	%
Normal Depth	0.29	ft
Discharge	5.00	ft ³ /s

Cross Section Image



Worksheet for I2 MAX (Full Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 3.47 %
Discharge 5.00 ft³/s
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

Worksheet for I2 MAX (Full Street)

Results

Normal Depth		0.29	ft
Elevation Range	0.00 to 0.42 ft		
Flow Area		1.41	ft ²
Wetted Perimeter		16.02	ft
Hydraulic Radius		0.09	ft
Top Width		15.73	ft
Normal Depth		0.29	ft
Critical Depth		0.35	ft
Critical Slope		0.00714	ft/ft
Velocity		3.56	ft/s
Velocity Head		0.20	ft
Specific Energy		0.49	ft
Froude Number		2.10	
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	0.35	ft
Channel Slope	3.47	%
Critical Slope	0.00714	ft/ft

Cross Section for I2 MAX (Full Street)

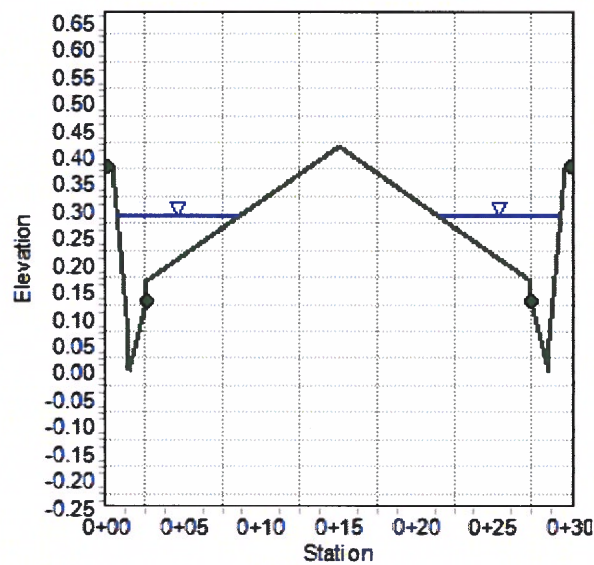
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.47	%
Normal Depth	0.29	ft
Discharge	5.00	ft ³ /s

Cross Section Image



Worksheet for J1 MIN (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.60 %
Discharge 3.00 ft³/s
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	0.38 ft
Elevation Range	0.00 to 0.42 ft
Flow Area	1.61 ft²
Wetted Perimeter	12.73 ft
Hydraulic Radius	0.13 ft

Worksheet for J1 MIN (Half Street)

Results

Top Width	12.57	ft
Normal Depth	0.38	ft
Critical Depth	0.37	ft
Critical Slope	0.00715	ft/ft
Velocity	1.86	ft/s
Velocity Head	0.05	ft
Specific Energy	0.43	ft
Froude Number	0.92	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.38	ft
Critical Depth	0.37	ft
Channel Slope	0.60	%
Critical Slope	0.00715	ft/ft

Cross Section for J1 MIN (Half Street)

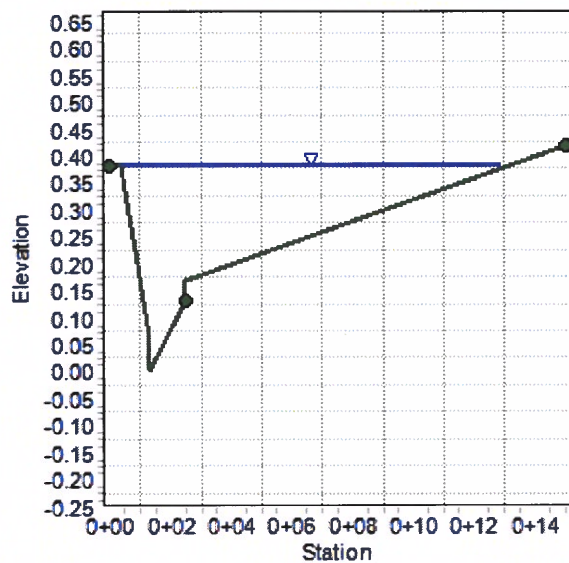
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.60	%
Normal Depth	0.38	ft
Discharge	3.00	ft ³ /s

Cross Section Image



Worksheet for J1 MAX (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.55 %
Discharge 3.00 ft³/s
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 0.34 ft
Elevation Range 0.00 to 0.42 ft
Flow Area 1.11 ft²
Wetted Perimeter 10.43 ft
Hydraulic Radius 0.11 ft

Worksheet for J1 MAX (Half Street)

Results

Top Width	10.27	ft
Normal Depth	0.34	ft
Critical Depth	0.37	ft
Critical Slope	0.00708	ft/ft
Velocity	2.69	ft/s
Velocity Head	0.11	ft
Specific Energy	0.45	ft
Froude Number	1.44	
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	0.37	ft
Channel Slope	1.55	%
Critical Slope	0.00708	ft/ft

Cross Section for J1 MAX (Half Street)

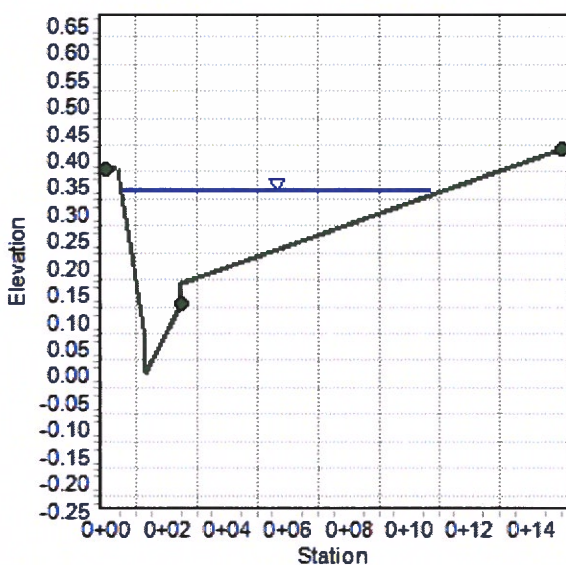
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.55	%
Normal Depth	0.34	ft
Discharge	3.00	ft ³ /s

Cross Section Image



Project Description

Solve For	Normal Depth
-----------	--------------

Channel Slope	0.60	%
Discharge	6.00	ft ³ /s

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

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

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

Normal Depth	0.45	ft
Elevation Range	0.00 to 0.42	ft
Flow Area	2.62	ft²
Wetted Perimeter	15.26	ft
Hydraulic Radius	0.17	ft

Worksheet for J2 MIN (Half Street)

Results

Top Width	15.00	ft
Normal Depth	0.45	ft
Critical Depth	0.44	ft
Critical Slope	0.00647	ft/ft
Velocity	2.29	ft/s
Velocity Head	0.08	ft
Specific Energy	0.53	ft
Froude Number	0.97	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.45	ft
Critical Depth	0.44	ft
Channel Slope	0.60	%
Critical Slope	0.00647	ft/ft

Cross Section for J2 MIN (Half Street)

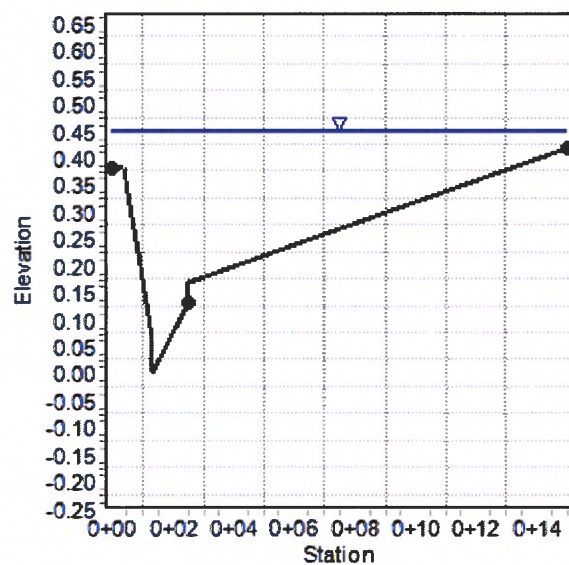
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.60	%
Normal Depth	0.45	ft
Discharge	6.00	ft ³ /s

Cross Section Image



Worksheet for J2 MAX (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 6.52 %
Discharge 6.00 ft³/s
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 0.33 ft
Elevation Range 0.00 to 0.42 ft
Flow Area 1.09 ft²
Wetted Perimeter 10.29 ft
Hydraulic Radius 0.11 ft

Worksheet for J2 MAX (Half Street)

Results

Top Width	10.14	ft
Normal Depth	0.33	ft
Critical Depth	0.44	ft
Critical Slope	0.00639	ft/ft
Velocity	5.51	ft/s
Velocity Head	0.47	ft
Specific Energy	0.81	ft
Froude Number	2.97	
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	6.52	%
Critical Slope	0.00639	ft/ft

Cross Section for J2 MAX (Half Street)

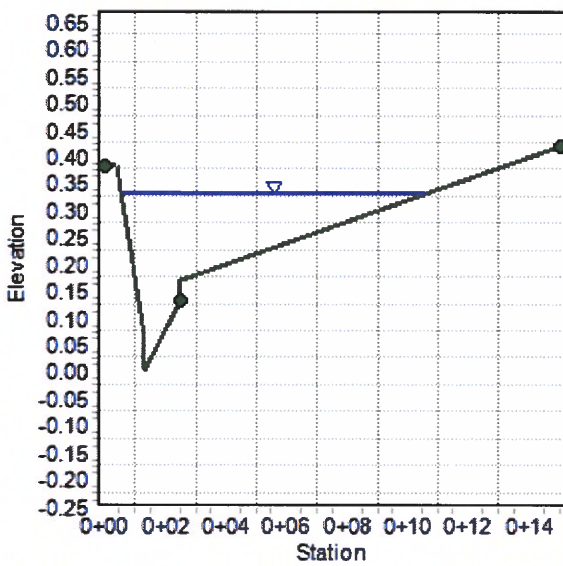
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.52	%
Normal Depth	0.33	ft
Discharge	6.00	ft ³ /s

Cross Section Image



Worksheet for J3 MIN (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.24 %
Discharge 9.00 ft³/s
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 0.42 ft
Elevation Range 0.00 to 0.42 ft
Flow Area 2.25 ft²
Wetted Perimeter 15.21 ft
Hydraulic Radius 0.15 ft

Worksheet for J3 MIN (Half Street)

Results

Top Width	15.00	ft
Normal Depth	0.42	ft
Critical Depth	0.50	ft
Critical Slope	0.00596	ft/ft
Velocity	4.01	ft/s
Velocity Head	0.25	ft
Specific Energy	0.67	ft
Froude Number	1.82	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.42	ft
Critical Depth	0.50	ft
Channel Slope	2.24	%
Critical Slope	0.00596	ft/ft

Cross Section for J3 MIN (Half Street)

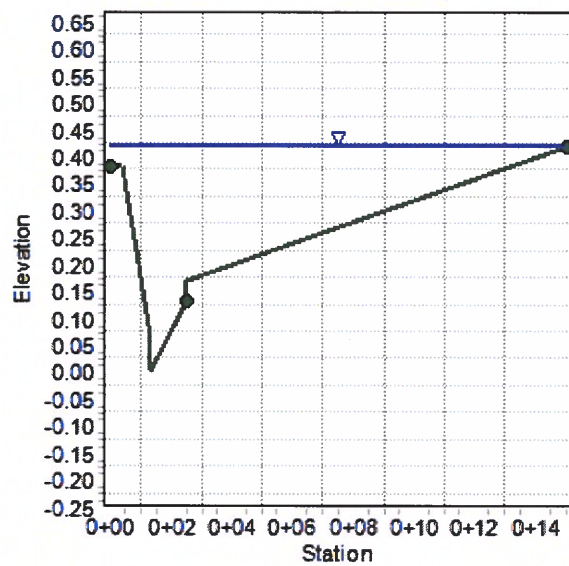
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.24	%
Normal Depth	0.42	ft
Discharge	9.00	ft ³ /s

Cross Section Image



Worksheet for J3 MAX (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 6.52 %
Discharge 9.00 ft³/s
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	0.37 ft
Elevation Range	0.00 to 0.42 ft
Flow Area	1.49 ft ²
Wetted Perimeter	12.22 ft
Hydraulic Radius	0.12 ft

Worksheet for J3 MAX (Half Street)

Results

Top Width	12.06	ft
Normal Depth	0.37	ft
Critical Depth	0.50	ft
Critical Slope	0.00595	ft/ft
Velocity	6.04	ft/s
Velocity Head	0.57	ft
Specific Energy	0.94	ft
Froude Number	3.03	
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	0.37	ft
Critical Depth	0.50	ft
Channel Slope	6.52	%
Critical Slope	0.00595	ft/ft

Cross Section for J3 MAX (Half Street)

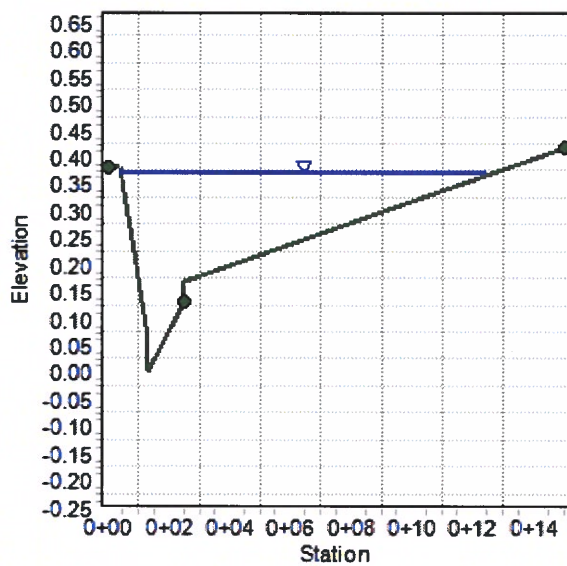
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.52	%
Normal Depth	0.37	ft
Discharge	9.00	ft ³ /s

Cross Section Image



Worksheet for J4 (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.24 %
Discharge 11.00 ft³/s
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 0.44 ft
Elevation Range 0.00 to 0.42 ft
Flow Area 2.54 ft²
Wetted Perimeter 15.25 ft
Hydraulic Radius 0.17 ft

Worksheet for J4 (Half Street)

Results

Top Width	15.00	ft
Normal Depth	0.44	ft
Critical Depth	0.53	ft
Critical Slope	0.00573	ft/ft
Velocity	4.34	ft/s
Velocity Head	0.29	ft
Specific Energy	0.74	ft
Froude Number	1.86	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.44	ft
Critical Depth	0.53	ft
Channel Slope	2.24	%
Critical Slope	0.00573	ft/ft

Cross Section for J4 (Half Street)

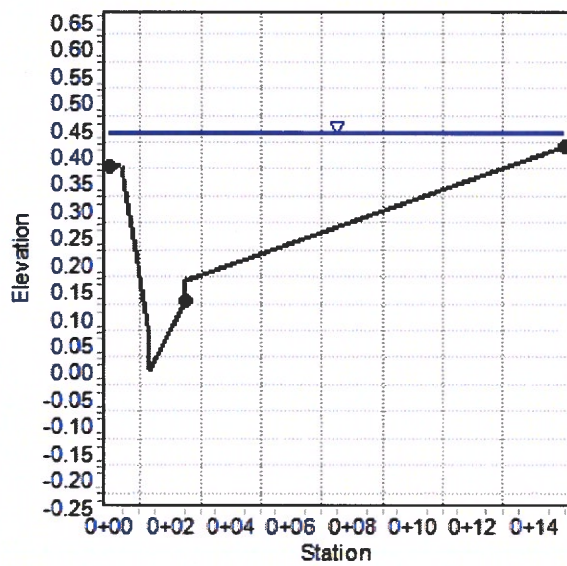
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.24	%
Normal Depth	0.44	ft
Discharge	11.00	ft ³ /s

Cross Section Image



Worksheet for I1 MIN (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 3.10 %
Discharge 1.00 ft³/s
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	0.23 ft
Elevation Range	0.00 to 0.42 ft
Flow Area	0.34 ft²
Wetted Perimeter	4.99 ft
Hydraulic Radius	0.07 ft

Worksheet for I1 MIN (Half Street)

Results

Top Width	4.86	ft
Normal Depth	0.23	ft
Critical Depth	0.28	ft
Critical Slope	0.00766	ft/ft
Velocity	2.92	ft/s
Velocity Head	0.13	ft
Specific Energy	0.37	ft
Froude Number	1.94	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.23	ft
Critical Depth	0.28	ft
Channel Slope	3.10	%
Critical Slope	0.00766	ft/ft

Cross Section for I1 MIN (Half Street)

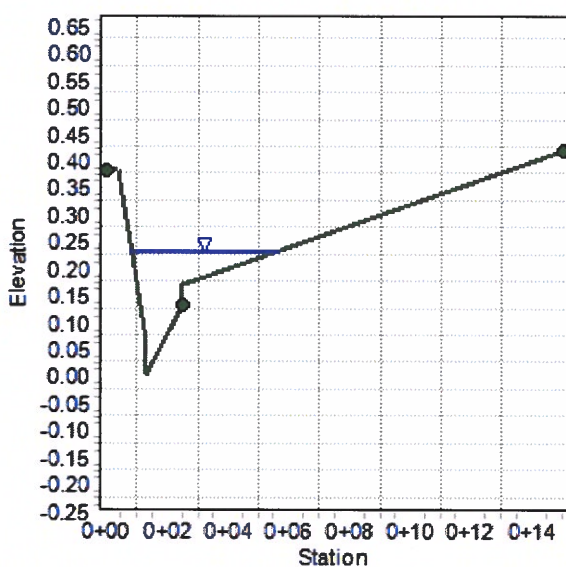
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.10	%
Normal Depth	0.23	ft
Discharge	1.00	ft ³ /s

Cross Section Image



Worksheet for I1 MAX (Half Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 6.40 %
Discharge 1.00 ft³/s
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 0.21 ft
Elevation Range 0.00 to 0.42 ft
Flow Area 0.24 ft²
Wetted Perimeter 3.73 ft
Hydraulic Radius 0.06 ft

Worksheet for I1 MAX (Half Street)

Results

Top Width	3.60	ft
Normal Depth	0.21	ft
Critical Depth	0.28	ft
Critical Slope	0.00736	ft/ft
Velocity	4.14	ft/s
Velocity Head	0.27	ft
Specific Energy	0.48	ft
Froude Number	2.81	
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	0.21	ft
Critical Depth	0.28	ft
Channel Slope	6.40	%
Critical Slope	0.00736	ft/ft

Cross Section for I1 MAX (Half Street)

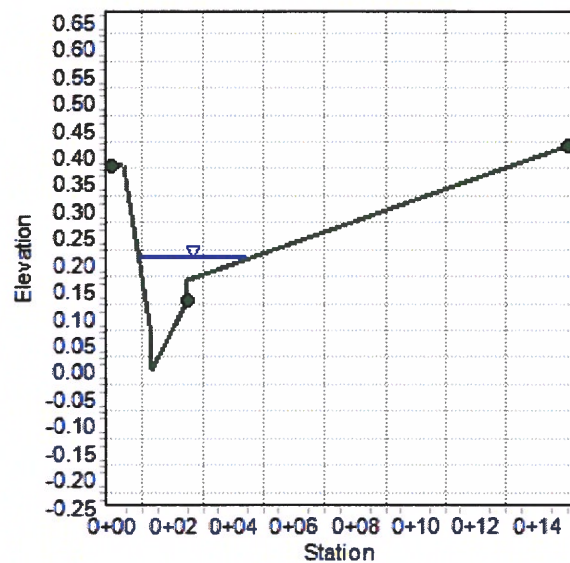
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.40	%
Normal Depth	0.21	ft
Discharge	1.00	ft ³ /s

Cross Section Image



Perimeter Street Sections

Worksheet for KC MIN (Full Street)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.00 %
Discharge 9.00 ft³/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 Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Worksheet for KC MIN (Full Street)

Results

Normal Depth	0.36	ft
Elevation Range	0.00 to 0.50	ft
Flow Area	2.76	ft ²
Wetted Perimeter	23.12	ft
Hydraulic Radius	0.12	ft
Top Width	22.29	ft
Normal Depth	0.36	ft
Critical Depth	0.42	ft
Critical Slope	0.00696	ft/ft
Velocity	3.27	ft/s
Velocity Head	0.17	ft
Specific Energy	0.53	ft
Froude Number	1.64	
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	0.42	ft
Channel Slope	2.00	%
Critical Slope	0.00696	ft/ft

Cross Section for KC MIN (Full Street)

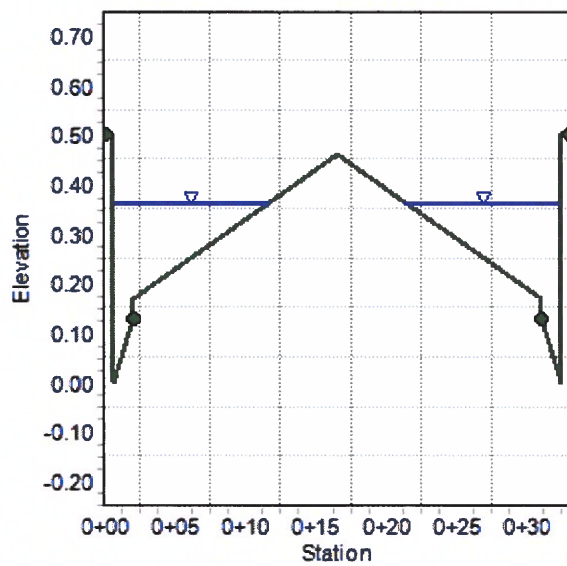
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.00	%
Normal Depth	0.36	ft
Discharge	9.00	ft ³ /s

Cross Section Image



Project Description

Manning Formula

Normal Depth

7.21 %

9.00 ft³/s

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 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

Pavlovskii's Method

Pavlovskii's Method

Pavlovskii's Method

Worksheet for KC MAX (Full Street)

Results

Normal Depth		0.31	ft
Elevation Range	0.00 to 0.50 ft		
Flow Area		1.66	ft ²
Wetted Perimeter		17.38	ft
Hydraulic Radius		0.10	ft
Top Width		16.67	ft
Normal Depth		0.31	ft
Critical Depth		0.42	ft
Critical Slope		0.00684	ft/ft
Velocity		5.42	ft/s
Velocity Head		0.46	ft
Specific Energy		0.76	ft
Froude Number		3.03	
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	7.21	%
Critical Slope	0.00684	ft/ft

Cross Section for KC MAX (Full Street)

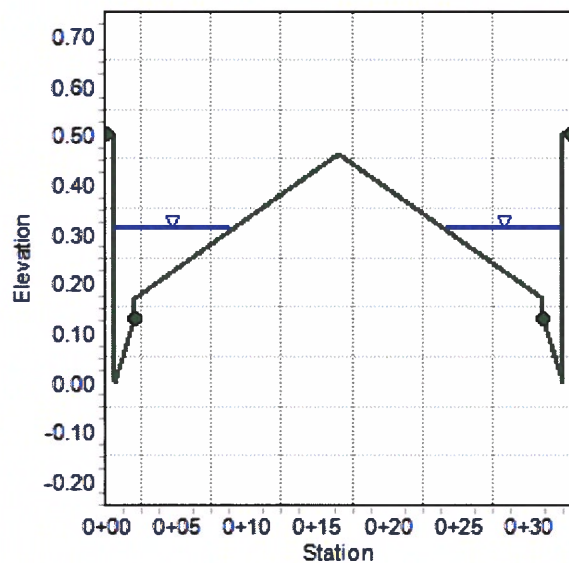
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	7.21	%
Normal Depth	0.31	ft
Discharge	9.00	ft ³ /s

Cross Section Image



Project Description

Manning Formula

Normal Depth

Channel Slope

1.65 %

14.00 ft³/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+29.67	0.72
0+29.67	1.22
0+38.00	1.39
0+46.33	1.22
0+46.33	0.72
0+74.00	0.17
0+74.00	0.13
0+75.50	0.00
0+75.50	0.50
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+29.67, 0.72)	0.016
(0+29.67, 0.72)	(0+46.33, 0.72)	0.013
(0+46.33, 0.72)	(0+74.00, 0.13)	0.016
(0+74.00, 0.13)	(0+76.00, 0.50)	0.013

Worksheet for CH (Full Street)

Options

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

Results

Normal Depth		0.42	ft
Elevation Range	0.00 to 1.39 ft		
Flow Area		4.17	ft²
Wetted Perimeter		28.94	ft
Hydraulic Radius		0.14	ft
Top Width		28.01	ft
Normal Depth		0.42	ft
Critical Depth		0.47	ft
Critical Slope		0.00663	ft/ft
Velocity		3.36	ft/s
Velocity Head		0.18	ft
Specific Energy		0.59	ft
Froude Number		1.53	
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	0.42	ft
Critical Depth	0.47	ft
Channel Slope	1.65	%
Critical Slope	0.00663	ft/ft

Cross Section for CH (Full Street)

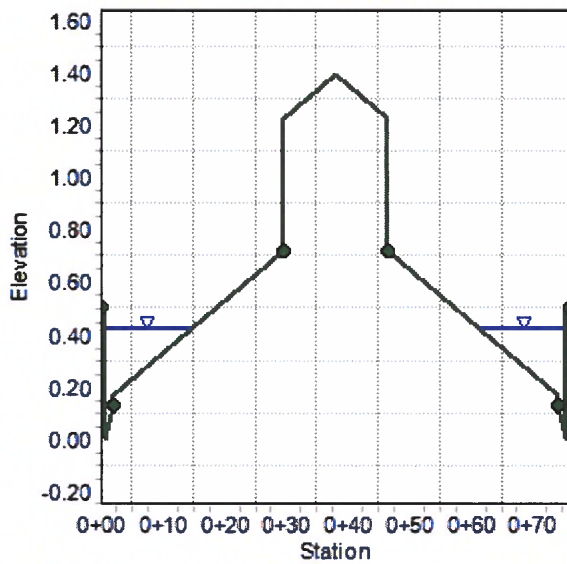
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.65	%
Normal Depth	0.42	ft
Discharge	14.00	ft ³ /s

Cross Section Image



Other Sections

Worksheet for E01: Emergency Overflow

Project Description

Solve For Headwater Elevation

Input Data

Discharge		3.00	ft ³ /s
Crest Elevation		0.00	ft
Tailwater Elevation		0.00	ft
Crest Surface Type	Paved		
Crest Breadth		0.50	ft
Crest Length		26.00	ft

Results

Headwater Elevation	0.11	ft
Headwater Height Above Crest	0.11	ft
Tailwater Height Above Crest	0.00	ft
Weir Coefficient	3.07	US
Submergence Factor	1.00	
Adjusted Weir Coefficient	3.07	US
Flow Area	2.92	ft ²
Velocity	1.03	ft/s
Wetted Perimeter	26.22	ft
Top Width	26.00	ft

Cross Section for E01: Emergency Overflow

Project Description

Solve For Headwater Elevation

Input Data

Discharge		3.00	ft ³ /s
Headwater Elevation		0.11	ft
Crest Elevation		0.00	ft
Tailwater Elevation		0.00	ft
Crest Surface Type	Paved		
Crest Breadth		0.50	ft
Crest Length		26.00	ft

Cross Section Image



V: 1
H: 1

Worksheet for E02: Emergency Overflow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.90	%
Discharge	5.00	ft ³ /s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+01.50	0.13
0+01.50	0.17
0+15.00	0.44

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+01.50, 0.13)	0.013
(0+01.50, 0.13)	(0+15.00, 0.44)	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	0.39	ft
Elevation Range	0.00 to 0.50	ft
Flow Area	1.54	ft ²
Wetted Perimeter	12.47	ft
Hydraulic Radius	0.12	ft
Top Width	12.03	ft

Worksheet for E02: Emergency Overflow

Results

Normal Depth	0.39	ft
Critical Depth	0.44	ft
Critical Slope	0.00699	ft/ft
Velocity	3.24	ft/s
Velocity Head	0.16	ft
Specific Energy	0.55	ft
Froude Number	1.60	
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	0.39	ft
Critical Depth	0.44	ft
Channel Slope	1.90	%
Critical Slope	0.00699	ft/ft

Cross Section for E02: Emergency Overflow

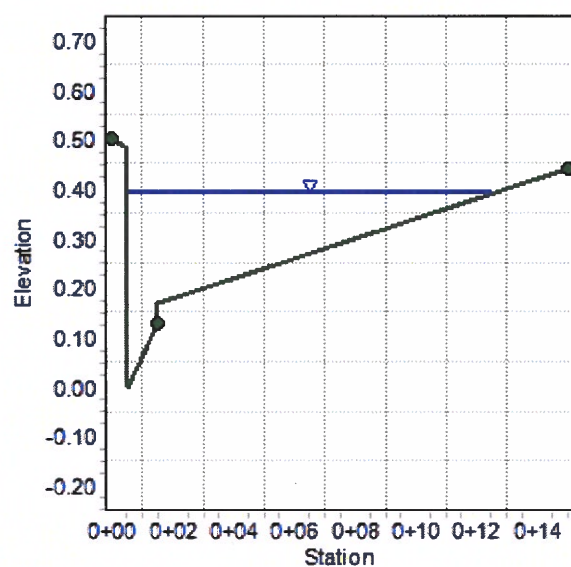
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.90	%
Normal Depth	0.39	ft
Discharge	5.00	ft ³ /s

Cross Section Image



Worksheet for E03: Emergency Overflow

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.90 %
Discharge 5.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+01.50	0.13
0+01.50	0.17
0+15.00	0.44

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+01.50, 0.13)	0.013
(0+01.50, 0.13)	(0+15.00, 0.44)	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 0.39 ft
Elevation Range 0.00 to 0.50 ft
Flow Area 1.54 ft²
Wetted Perimeter 12.47 ft
Hydraulic Radius 0.12 ft
Top Width 12.03 ft

Worksheet for E03: Emergency Overflow

Results

Normal Depth	0.39	ft
Critical Depth	0.44	ft
Critical Slope	0.00699	ft/ft
Velocity	3.24	ft/s
Velocity Head	0.16	ft
Specific Energy	0.55	ft
Froude Number	1.60	
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	0.39	ft
Critical Depth	0.44	ft
Channel Slope	1.90	%
Critical Slope	0.00699	ft/ft

Cross Section for E03: Emergency Overflow

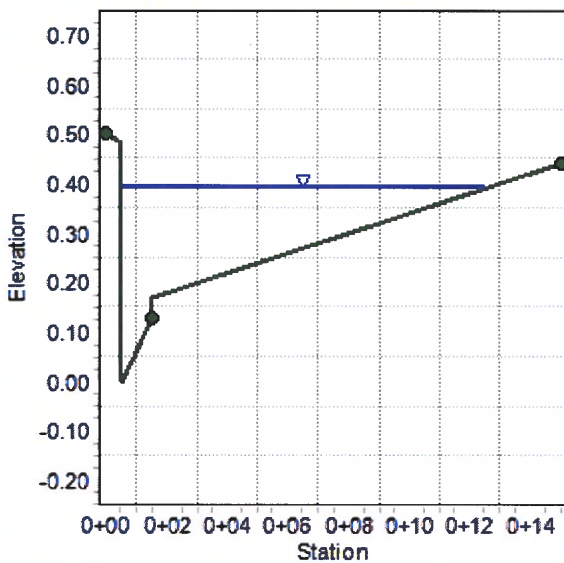
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.90	%
Normal Depth	0.39	ft
Discharge	5.00	ft ³ /s

Cross Section Image



Worksheet for E04: Emergency Overflow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.24	%
Discharge	23.00	ft³/s
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

Worksheet for E04: Emergency Overflow

Results

Normal Depth		0.45	ft
Elevation Range	0.00 to 0.42 ft		
Flow Area		5.21	ft ²
Wetted Perimeter		30.46	ft
Hydraulic Radius		0.17	ft
Top Width		30.00	ft
Normal Depth		0.45	ft
Critical Depth		0.54	ft
Critical Slope		0.00563	ft/ft
Velocity		4.42	ft/s
Velocity Head		0.30	ft
Specific Energy		0.75	ft
Froude Number		1.87	
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	0.54	ft
Channel Slope	2.24	%
Critical Slope	0.00563	ft/ft

Cross Section for E04: Emergency Overflow

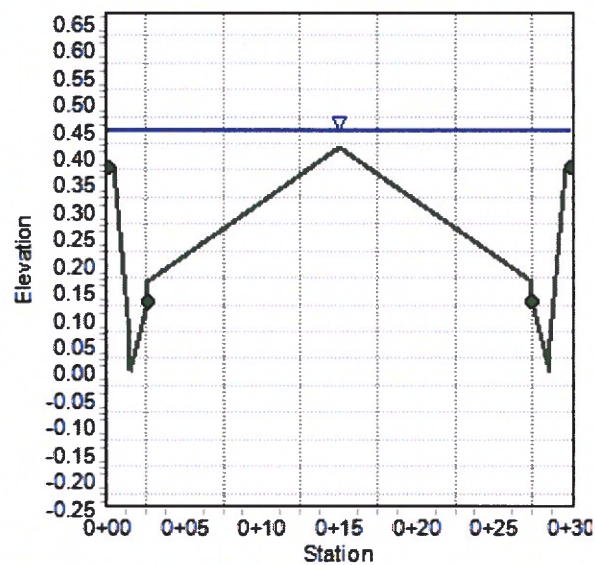
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.24	%
Normal Depth	0.45	ft
Discharge	23.00	ft ³ /s

Cross Section Image



Worksheet for E05: Emergency Overflow

Project Description

Solve For Headwater Elevation

Input Data

Discharge		23.00	ft³/s
Crest Elevation		0.00	ft
Tailwater Elevation		0.00	ft
Crest Surface Type	Paved		
Crest Breadth		0.50	ft
Crest Length		30.00	ft

Results

Headwater Elevation	0.40	ft
Headwater Height Above Crest	0.40	ft
Tailwater Height Above Crest	0.00	ft
Weir Coefficient	3.09	US
Submergence Factor	1.00	
Adjusted Weir Coefficient	3.09	US
Flow Area	11.85	ft²
Velocity	1.94	ft/s
Wetted Perimeter	30.79	ft
Top Width	30.00	ft

Cross Section for E05: Emergency Overflow

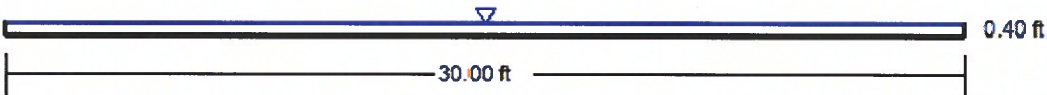
Project Description

Solve For Headwater Elevation

Input Data

Discharge		23.00	ft ³ /s
Headwater Elevation		0.40	ft
Crest Elevation		0.00	ft
Tailwater Elevation		0.00	ft
Crest Surface Type	Paved		
Crest Breadth		0.50	ft
Crest Length		30.00	ft

Cross Section Image



V: 1
H: 1

Worksheet for Typical Cross Lot DE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025
Channel Slope	1.00 %
Left Side Slope	3.00 ft/ft (H:V)
Right Side Slope	3.00 ft/ft (H:V)
Discharge	0.41 ft ³ /s

Results

Normal Depth	0.29 ft
Flow Area	0.25 ft ²
Wetted Perimeter	1.84 ft
Hydraulic Radius	0.14 ft
Top Width	1.75 ft
Critical Depth	0.26 ft
Critical Slope	0.01935 ft/ft
Velocity	1.59 ft/s
Velocity Head	0.04 ft
Specific Energy	0.33 ft
Froude Number	0.73
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.29 ft
Critical Depth	0.26 ft
Channel Slope	1.00 %
Critical Slope	0.01935 ft/ft

Cross Section for Typical Cross Lot DE

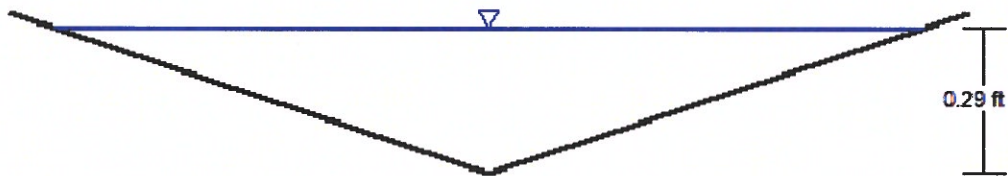
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025
Channel Slope	1.00 %
Normal Depth	0.29 ft
Left Side Slope	3.00 ft/ft (H:V)
Right Side Slope	3.00 ft/ft (H:V)
Discharge	0.41 ft ³ /s

Cross Section Image



V: 1
H: 1

APPENDIX C

Drop Inlet & Storm Drain Computations

Drop Inlets Computations

Curb Inlet Sizing Computation			 SLATER HANIFAN GROUP a Westwood team	
Project Name & Number:		KBH1913: SUMMERLIN V21 PARCEL J		
Date:		10/24/2019		
By:		CAA		
Notes:				
Facility ID:		Facility P1		
Drainage Condition		Proposed		
Source of Flow		Q100 = Basin J*(e1+e2+e3)		
Design Flow (cfs)		3.0		
Inlet Type:		Type CM2 (Sump)		
Inlet Length:		5.-ft		
Number of Grates:		1		
Input:		Variable:	Input:	
Depth at Inlet (ft)		D	0.67	
Grate Width (ft)		W	1.50	
Length of Grate (ft)		L _g	2.3	
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. Grate Open Area/Adj. Eff. Length) use weir, else orifice	weir	
Intercepted Flow (cfs)		weir: W _g *(Adj. Eff. Weir Length)*D ^{1.5} orifice: O _c *(Adj. Grate Open Area)*(64.4*D) ^{0.5}	4.3	
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	orifice	
Intercepted Flow (cfs)		weir: W _c *(Adj. Eff. Weir Length)*D ^{1.5} orifice: O _c *(Adj. Curb Open Area)*(64.4*(D-H/2)) ^{0.5}	4.92	
Output (Total):		Equation:	Output (Total):	
Capacity Intercepted Flow (cfs)		Intercepted (Grate) + Intercepted (Curb)	9.2	

Curb Inlet Sizing Computation



Project Name & Number: KBH1913: SUMMERLIN V21 PARCEL J
 Date: 10/24/2019
 By: CAA

Notes:

Facility ID: Facility P3
 Drainage Condition: Proposed
 Source of Flow: Q100 = Basin J*(c)
 Inlet Type: Type CM2 (Continuous Grade)
 Inlet Length: 5.-ft
 Number of Grates: 1

Input:

Variable:

Input:

Street Flow (cfs)	Q	2.0
Longitudinal Slope (ft/ft)	S _o	0.0190
Manning's Coefficient	n	0.016
Street Flow Velocity (fps)	V	2.63
Street Flow Depth (ft)	D	0.31
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	2.0
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}	1.0
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	1.00
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)	3.99
¹ E - Grate Flow Ratio	Frontal Flow/Side Flow	0.47
² Q _w - Frontal Flow (cfs)	Q _w = Q[1-(1-(W/T)) ^{2.67}]	0.93
¹ Q _s - Side Flow (cfs)	Q _s = Q-Q _w	1.1
T - Side Flow Spread (ft)	(D-D _g)/S _x	7.17
¹ R _s - Side Flow Factor	1/(1+(0.15*V ^{1.8})/(S _x *L _{ge} ^{2.3}))	0.02
¹ Q _{gi} - Intercepted Flow (cfs)	(R _f *E+R _s *(1-E))*Q	1.0

Output (Curb):

Equation:

Output (Curb):

¹ S _e - Equivalent Cross Slope (ft/ft)	S _x +S _q *E	0.072
Q _{sx} - Remaining Flow After Grate Interception (cfs)	Q-Q _{gi}	1.044
S _g - Gutter Cross Slope (ft/ft)	D _g /W	0.111
¹ L _i - Effective Interception Length (ft)	0.60*Q _{sx} ^{0.42} *S _o ^{0.30} *(1/n*S _e) ^{0.6}	10.81
¹ Q _{ci} - Intercepted Flow (cfs)	(1-(1-L _{ce} /L _i) ^{1.8})*Q _{sx} or Q _{sx} if L _i is less than L _{ce}	0.4

Output (Combination):

Equation:

Output (Combination):

Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	1
Bypass Flow (cfs)	Street Flow - Total Intercepted Flow	1

¹ Formula referenced from the CCRFCD Manual

² Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

Curb Inlet Sizing Computation



Project Name & Number: KBH1913: SUMMERLIN V21 PARCEL J
 Date: 10/24/2019
 By: CAA

Notes:

Facility ID: Facility P4
 Drainage Condition: Proposed
 Source of Flow: Q100 = Basin J*(a1+a2)
 Inlet Type: Type CM2 (Continuous Grade)
 Inlet Length: 10.-ft
 Number of Grates: 3

Input:

Variable:

Input:

Street Flow (cfs)	Q	5.0
Longitudinal Slope (ft/ft)	S _o	0.0190
Manning's Coefficient	n	0.016
Street Flow Velocity (fps)	V	3.28
Street Flow Depth (ft)	D	0.37
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	7.0
Length of Curb Opening (ft)	L _c	9.50
Clogging Factor - Grate (%)	CF _g	50%
Clogging Factor - Curb (%)	CF _c	50%
Effective Grate Length (ft)	L _{ge}	3.5
Effective Curb Opening Length (ft)	L _{ce}	4.75

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	1.00
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)	7.66
¹ E - Grate Flow Ratio	Frontal Flow/Side Flow	0.35
² Q _w - Frontal Flow (cfs)	Q _w = Q[1-(1-(W/T)) ^{2.67}]	1.74
¹ Q _s - Side Flow (cfs)	Q _s = Q-Q _w	3.3
T - Side Flow Spread (ft)	(D-D _g)/S _x	10.17
¹ R _s - Side Flow Factor	1/(1+(0.15*V ^{1.8})/(S _x *L _{ge} ^{2.3}))	0.22
¹ Q _{gi} - Intercepted Flow (cfs)	(R _f *E+R _s *(1-E))*Q	2.5

Output (Curb):

Equation:

Output (Curb):

¹ S _e - Equivalent Cross Slope (ft/ft)	S _x +S _g *E	0.059
Q _{sx} - Remaining Flow After Grate Interception (cfs)	Q-Q _{gi}	2.550
S _g - Gutter Cross Slope (ft/ft)	D _g /W	0.111
¹ L _i - Effective Interception Length (ft)	0.60*Q _{sx} ^{0.42} *S _o ^{0.30} *(1/n*S _e) ^{0.6}	17.76
¹ Q _{ci} - Intercepted Flow (cfs)	(1-(1-L _{ce} /L _i) ^{1.85})*Q _{sx} or Q _{sx} if L _i is less than L _{ce}	1.1

Output (Combination):

Equation:

Output (Combination):

Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	4
Bypass Flow (cfs)	Street Flow - Total Intercepted Flow	1

¹ Formula referenced from the CCRFCD Manual

² Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

Curb Inlet Sizing Computation



Project Name & Number: KBH1913: SUMMERLIN V21 PARCEL J
 Date: 10/24/2019
 By: CAA

Notes:

Facility ID: Facility P6
 Drainage Condition: Proposed
 Source of Flow: Q100 = Basin J*(f1+f2+g+h1+h2+h3+i1+i2)
 Inlet Type: Type CM2 (Continuous Grade)
 Inlet Length: 17.5-ft
 Number of Grates: 6

Input:

Variable:

Input:

Street Flow (cfs)	Q	14.0
Longitudinal Slope (ft/ft)	S _o	0.0652
Manning's Coefficient	n	0.016
Street Flow Velocity (fps)	V	6.63
Street Flow Depth (ft)	D	0.41
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	14.5
Length of Curb Opening (ft)	L _c	17.00
Clogging Factor - Grate (%)	CF _g	50%
Clogging Factor - Curb (%)	CF _c	50%
Effective Grate Length (ft)	L _{ge}	7.3
Effective Curb Opening Length (ft)	L _{ce}	8.50

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	1.00
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)	23.77
¹ E - Grate Flow Ratio	Frontal Flow/Side Flow	0.30
² Q _w - Frontal Flow (cfs)	Q _w = Q[1-(1-(W/T)) ^{2.67}]	4.15
¹ Q _s - Side Flow (cfs)	Q _s = Q-Q _w	9.9
T - Side Flow Spread (ft)	(D-D _g)/S _x	12.17
¹ R _s - Side Flow Factor	1/(1+(0.15*V ^{1.8})/(S _x *L _{ge} ^{2.3}))	0.30
¹ Q _{gi} - Intercepted Flow (cfs)	(R _f *E+R _s *(1-E))*Q	7.1

Output (Curb):

Equation:

Output (Curb):

¹ S _e - Equivalent Cross Slope (ft/ft)	S _x +S _g *E	0.053
Q _{sx} - Remaining Flow After Grate Interception (cfs)	Q-Q _{gi}	6.930
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}	41.58
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}	2.3

Output (Combination):

Equation:

Output (Combination):

Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	9
Bypass Flow (cfs)	Street Flow - Total Intercepted Flow	5

¹ Formula referenced from the CCRFCD Manual

² Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

Curb Inlet Sizing Computation



Project Name & Number: KBH1913: SUMMERLIN V21 PARCEL J
 Date: 10/24/2019
 By: CAA

Notes:

Facility ID: Facility P8
 Drainage Condition: Proposed
 Source of Flow: Q100 = Subbasin *J(b+d+j1+j2+j3+j4) + Facility P3 Bypass + Facility P4 Bypass + Facility P6 Bypass)
 Design Flow (cfs): 20.0
 Inlet Type: Type CM2 (Sump)
 Inlet Length: 12.5-ft
 Number of Grates: 4

Input:

Variable:

Input:

Depth at Inlet (ft)	D	0.67
Grate Width (ft)	W	1.50
Length of Grate (ft)	L _g	9.8
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. Grate Open Area / Adj. Eff. Length) use weir, else orifice	weir
Intercepted Flow (cfs)	weir: $W_g * (Adj. Eff. Weir Length) * D^{1.5}$ orifice: $O_c * (Adj. Grate Open Area) * (64.4 * D)^{0.5}$	10.4

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: $W_c * (Adj. Eff. Weir Length) * D^{1.5}$ orifice: $O_c * (Adj. Curb Open Area) * (64.4 * (D - H/2))^{0.5}$	13.13

Output (Total):

Equation:

Output (Total):

Capacity Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	23.5
---------------------------------	--	------

WSPGW Model

Ultimate Condition WSPG Summary							
Mainline in Parcel J from Facility P1 to Connection to Existing Stub							
WSPG Station	Storm Drain Dimension	Invert Elevation (ft)	Q ₁₀₀ (cfs)	WSE (ft)	Velocity (ft/s)	FG Elevation	HGL Check ¹
1000.00	42" RCP	3254.82	37.00	3265.43	3.85	3270.00	Existing 53"x34" HERCP OK
1063.70	42" RCP	3257.92	37.00	3265.52	3.85	3273.30	OK
1063.70	18" RCP	3259.26	17.00	3264.75	9.62	3273.30	Junction with Facility P8 OK
1183.12	18" RCP	3268.29	17.00	3269.73	9.75	3276.10	Junction with Facility P6 OK
1183.12	18" RCP	3268.29	8.00	3271.25	4.53	3276.10	OK
1453.56	18" RCP	3273.79	8.00	3274.89	5.78	3280.17	Wall Entrance OK
1453.56	4' x 7.7' RCB	3273.79	8.00	3275.70	1.05	3280.17	OK
1456.06	4' x 7.7' RCB	3273.84	8.00	3275.70	1.08	3280.17	Junction with Facility P4 through Facility P3 OK
1456.06	4' x 7.7' RCB	3273.84	3.00	3275.73	0.40	3280.17	OK
1458.56	18" RCP	3273.89	3.00	3275.73	0.41	3280.17	Wall Exit OK
1458.56	18" RCP	3273.89	3.00	3275.73	1.70	3280.17	OK
1496.77	18" RCP	3274.59	3.00	3274.83	16.19	3281.83	OK
1525.57	18" RCP	3282.71	3.00	3283.37	4.02	3286.98	Facility P1 OK
1525.57	18" RCP	3282.71	3.00	3283.37	4.02	3286.98	OK

1 - 'HGL Check' reflects the minimum 1'-ft below finished grade.

SDJ.WSW

T1 KBH1913: SUMMERLIN V21 PARCEL J

T2 PARCEL J STORM DRAIN (SDJ): REFERENCED STARTING HGL FROM CARRIAGE HILL STUDY

T3 FROM FACILITY P1 TO CONNECTION TO EXISTING

SO	1000.0003254.820	42				3265.430				
R	1063.7003257.920	42	.013					5.0	1	
JX	1063.7003259.260	18 18	.013	20.0		3257.920		-58.0		
R	1183.1203268.290	18	.013						90.0	1
JX	1183.1203268.290	18 18	.013	9.0		3268.290		18.0		
R	1453.5603273.789	18	.013						8.0	
WE	1453.5603273.789	1	.013							
R	1456.0603273.840	1	.013							
JX	1456.0603273.840	1 1 18	.013	1.0	4.0	3273.8403274.340	90.0	90.0		
R	1458.5603273.886	1	.013							
WX	1458.5603273.886	18	.013							
R	1496.7703274.590	18	.013						-59.0	1
R	1525.5703282.710	18	.013							
SH	1525.5703282.710	18								
CD	1 3 0	0.000	7.700	4.000	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	42 4 1	0.000	3.500	0.000	0.000	0.000	0.0000.00	0.00		
Q			3.000							

FILE: SDJ.WSW SDJ.EDT
 W S P G W - EDIT LISTING - Version 14.10 Date:10-24-2019 Time: 3:43: 1
 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	1	3	0	.000	7.700	4.000	.000	.000	.00										
CD	18	4	1		1.500														
CD	24	4	1		2.000														
CD	42	4	1		3.500														

W S P G W
 WATER SURFACE PROFILE - TITLE CARD LISTING PAGE NO 1
 HEADING LINE NO 1 IS -
 KBH1913: SUMMERLIN V21 PARCEL J
 HEADING LINE NO 2 IS -
 PARCEL J STORM DRAIN (SDJ): REFERENCED STARTING HGL FROM CARRIAGE HILL STU
 HEADING LINE NO 3 IS -
 FROM FACILITY P1 TO CONNECTION TO EXISTING

W S P G W
 WATER SURFACE PROFILE - ELEMENT CARD LISTING PAGE NO 2

ELEMENT NO	IS A	STATION	INVERT	SECT	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4	MAN H
1	IS A SYSTEM OUTLET	1000.000	3254.820	42								
2	IS A REACH	1063.700	3257.920	42	.013							
3	IS A JUNCTION	1063.700	3259.260	18	.013	20.000	.000	3257.920	.000	-58.000	.000	
4	IS A REACH	1183.120	3268.290	18	.013							
5	IS A JUNCTION	1183.120	3268.290	18	.013	9.000	.000	3268.290	.000	18.000	.000	

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
 THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

ELEMENT NO	IS A	STATION	INVERT	SECT	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4	MAN H
6	IS A REACH	1453.560	3273.789	18	.013							
7	IS A WALL ENTRANCE	1453.560	3273.789	1	.013							
8	IS A REACH	1456.060	3273.840	1	.013							
9	IS A JUNCTION	1456.060	3273.840	1	.013	1.000	4.000	3273.840	3274.340	90.000	90.000	

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
 THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
 W S P G W
 WATER SURFACE PROFILE - ELEMENT CARD LISTING PAGE NO 3

ELEMENT NO	IS A	STATION	INVERT	SECT	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4	MAN H
10	IS A REACH	1458.560	3273.886	1	.013							
11	IS A WALL EXIT	1458.560	3273.886	18								
12	IS A REACH	1496.770	3274.590	18	.013							
13	IS A REACH	1525.570	3282.710	18	.013							
14	IS A SYSTEM HEADWORKS	1525.570	3282.710	18								

WATER SURFACE PROFILE LISTING
KBH1913: SUMMERLIN V21 PARCEL J
PARCEL J STORM DRAIN (SDJ): REFERENCED STARTING HGL FROM CARRIAGE HILL S
TU FROM FACILITY P1 TO CONNECTION TO EXISTING

Date:10-24-2019 Time: 3:43: 3

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	3254.820	10.610	3265.430	37.00	3.85	.23	3265.66	.00	1.89	.00	3.500	.000	.00	1 .0
63.700	.0487					.0014	.09	10.61	.00	.97	.013	.00	.00	PIPE
1063.700	3257.920	7.600	3265.520	37.00	3.85	.23	3265.75	.00	1.89	.00	3.500	.000	.00	1 .0
JUNCT STR	.0000					.0138	.00	7.60	.00	.013	.00	.00	.00	PIPE
1063.700	3259.260	5.490	3264.750	17.00	9.62	1.44	3266.19	.00	1.44	.00	1.500	.000	.00	1 .0
61.490	.0756					.0262	1.61	5.49	.00	.83	.013	.00	.00	PIPE
1125.190	3263.910	2.777	3266.687	17.00	9.62	1.44	3268.12	.00	1.44	.00	1.500	.000	.00	1 .0
HYDRAULIC JUMP														
1125.190	3263.910	.883	3264.792	17.00	15.71	3.83	3268.63	.00	1.44	1.48	1.500	.000	.00	1 .0
15.418	.0756					.0580	.89	.88	3.23	.83	.013	.00	.00	PIPE
1140.609	3265.075	.919	3265.994	17.00	14.98	3.48	3269.48	.00	1.44	1.46	1.500	.000	.00	1 .0
11.500	.0756					.0514	.59	.92	3.00	.83	.013	.00	.00	PIPE
1152.108	3265.945	.957	3266.902	17.00	14.28	3.17	3270.07	.00	1.44	1.44	1.500	.000	.00	1 .0
8.237	.0756					.0456	.38	.96	2.77	.83	.013	.00	.00	PIPE
1160.345	3266.568	.998	3267.566	17.00	13.62	2.88	3270.45	.00	1.44	1.42	1.500	.000	.00	1 .0
6.225	.0756					.0405	.25	1.00	2.56	.83	.013	.00	.00	PIPE
1166.570	3267.039	1.041	3268.080	17.00	12.98	2.62	3270.70	.00	1.44	1.38	1.500	.000	.00	1 .0
4.843	.0756					.0362	.18	1.04	2.35	.83	.013	.00	.00	PIPE

KBH1913: SUMMERLIN V21 PARCEL J
PARCEL J STORM DRAIN (SDJ): REFERENCED STARTING HGL FROM CARRIAGE HILL S
TU FROM FACILITY P1 TO CONNECTION TO EXISTING

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
1171.413	3267.405	1.088	3268.493	17.00	12.38	2.38	3270.87	.00	1.44	1.34	1.500	.000	.00	1 .0
3.818	.0756					.0324	.12	1.09	2.15	.83	.013	.00	.00	PIPE
1175.232	3267.694	1.139	3268.833	17.00	11.80	2.16	3271.00	.00	1.44	1.28	1.500	.000	.00	1 .0
3.016	.0756					.0291	.09	1.14	1.96	.83	.013	.00	.00	PIPE
1178.248	3267.922	1.196	3269.117	17.00	11.26	1.97	3271.08	.00	1.44	1.21	1.500	.000	.00	1 .0
2.336	.0756					.0264	.06	1.20	1.77	.83	.013	.00	.00	PIPE
1180.584	3268.098	1.260	3269.358	17.00	10.73	1.79	3271.15	.00	1.44	1.10	1.500	.000	.00	1 .0
1.694	.0756					.0242	.04	1.26	1.58	.83	.013	.00	.00	PIPE
1182.278	3268.226	1.335	3269.561	17.00	10.23	1.63	3271.19	.00	1.44	.94	1.500	.000	.00	1 .0
.842	.0756					.0230	.02	1.34	1.36	.83	.013	.00	.00	PIPE
1183.120	3268.290	1.440	3269.729	17.00	9.75	1.48	3271.21	.00	1.44	.59	1.500	.000	.00	1 .0
JUNCT STR	.0000					.0143	.00	1.44	1.00	.013	.00	.00	.00	PIPE
1183.120	3268.290	2.961	3271.251	8.00	4.53	.32	3271.57	.00	1.10	.00	1.500	.000	.00	1 .0
101.098	.0203					.0057	.58	2.96	.00	.78	.013	.00	.00	PIPE

SDJ.OUT

1284.218	3270.346	1.500	3271.846	8.00	4.53	.32	3272.16	.00	1.10	.00	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.042	.0203					.0057	.00	1.50	.00	.78	.013	.00	.00	PIPE	
1284.260	3270.347	1.500	3271.847	8.00	4.53	.32	3272.16	.00	1.10	.00	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

HYDRAULIC JUMP

FILE: SDJ.WSW

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WATER SURFACE PROFILE LISTING

Date:10-24-2019 Time: 3:43: 3

KBH1913: SUMMERLIN V21 PARCEL J

PARCEL J STORM DRAIN (SDJ): REFERENCED STARTING HGL FROM CARRIAGE HILL S

TU FROM FACILITY P1 TO CONNECTION TO EXISTING

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
1284.260	3270.347	.780	3271.127	8.00	8.62	1.15	3272.28	.00	1.10	1.50	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
36.716	.0203					.0203	.75	.78	1.93	.78	.013	.00	.00	PIPE
1320.976	3271.093	.780	3271.873	8.00	8.62	1.15	3273.03	.00	1.10	1.50	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
62.502	.0203					.0199	1.24	.78	1.93	.78	.013	.00	.00	PIPE
1383.479	3272.364	.790	3273.154	8.00	8.48	1.12	3274.27	.00	1.10	1.50	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
35.262	.0203					.0183	.65	.79	1.88	.78	.013	.00	.00	PIPE
1418.740	3273.081	.821	3273.902	8.00	8.08	1.01	3274.92	.00	1.10	1.49	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
14.389	.0203					.0162	.23	.82	1.75	.78	.013	.00	.00	PIPE
1433.130	3273.374	.853	3274.227	8.00	7.71	.92	3275.15	.00	1.10	1.49	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
8.214	.0203					.0143	.12	.85	1.62	.78	.013	.00	.00	PIPE
1441.344	3273.541	.888	3274.428	8.00	7.35	.84	3275.27	.00	1.10	1.47	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
5.202	.0203					.0126	.07	.89	1.51	.78	.013	.00	.00	PIPE
1446.547	3273.646	.924	3274.570	8.00	7.01	.76	3275.33	.00	1.10	1.46	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3.371	.0203					.0112	.04	.92	1.40	.78	.013	.00	.00	PIPE
1449.917	3273.715	.962	3274.677	8.00	6.68	.69	3275.37	.00	1.10	1.44	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.116	.0203					.0099	.02	.96	1.29	.78	.013	.00	.00	PIPE
1452.033	3273.758	1.003	3274.761	8.00	6.37	.63	3275.39	.00	1.10	1.41	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.163	.0203					.0088	.01	1.00	1.19	.78	.013	.00	.00	PIPE

FILE: SDJ.WSW

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Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING

Date:10-24-2019 Time: 3:43: 3

KBH1913: SUMMERLIN V21 PARCEL J

PARCEL J STORM DRAIN (SDJ): REFERENCED STARTING HGL FROM CARRIAGE HILL S

TU FROM FACILITY P1 TO CONNECTION TO EXISTING

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
1453.196	3273.782	1.047	3274.829	8.00	6.07	.57	3275.40	.00	1.10	1.38	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.364	.0203					.0079	.00	1.05	1.09	.78	.013	.00	.00	PIPE
1453.560	3273.789	1.096	3274.885	8.00	5.78	.52	3275.40	.00	1.10	1.33	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
WALL ENTRANCE														
1453.560	3273.789	1.912	3275.701	8.00	1.05	.02	3275.72	.00	.50	4.00	7.700	4.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.500	.0204					.0001	.00	1.91	.13	.30	.013	.00	.00	BOX
1456.060	3273.840	1.860	3275.700	8.00	1.08	.02	3275.72	.00	.50	4.00	7.700	4.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0000					.0001	.00	1.86	.14		.013	.00	.00	BOX
1456.060	3273.840	1.890	3275.730	3.00	.40	.00	3275.73	.00	.26	4.00	7.700	4.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.500	.0184					.0000	.00	1.89	.05	.17	.013	.00	.00	BOX
1458.560	3273.886	1.845	3275.731	3.00	.41	.00	3275.73	.00	.26	4.00	7.700	4.000	.00	0 .0

SDJ.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
1458.560	3273.886	1.845	3275.731	3.00	1.70	.04	3275.78	.00	.66	.00	1.500	.000	.00	1 .0
20.175	.0184					.0008	.02	1.85	.00	.47	.013	.00	.00	PIPE
1478.735	3274.258	1.500	3275.758	3.00	1.70	.04	3275.80	.00	.66	.00	1.500	.000	.00	1 .0
7.561	.0184					.0008	.01	1.50	.00	.47	.013	.00	.00	PIPE
1486.296	3274.397	1.361	3275.758	3.00	1.78	.05	3275.81	.00	.66	.87	1.500	.000	.00	1 .0
1.221	.0184					.0007	.00	1.36	.23	.47	.013	.00	.00	PIPE

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WATER SURFACE PROFILE LISTING

KBH1913: SUMMERLIN V21 PARCEL J
 PARCEL J STORM DRAIN (SDJ): REFERENCED STARTING HGL FROM CARRIAGE HILL S
 TU FROM FACILITY P1 TO CONNECTION TO EXISTING

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
1487.517	3274.420	1.361	3275.781	3.00	1.78	.05	3275.83	.00	.66	.87	1.500	.000	.00	1 .0
HYDRAULIC JUMP														
1487.517	3274.420	.286	3274.706	3.00	12.76	2.53	3277.23	.00	.66	1.18	1.500	.000	.00	1 .0
.075	.0184					.1288	.01	.29	5.04	.47	.013	.00	.00	PIPE
1487.592	3274.421	.286	3274.707	3.00	12.76	2.53	3277.23	.00	.66	1.18	1.500	.000	.00	1 .0
2.034	.0184					.1381	.28	.29	5.03	.47	.013	.00	.00	PIPE
1489.626	3274.458	.277	3274.735	3.00	13.38	2.78	3277.51	.00	.66	1.16	1.500	.000	.00	1 .0
1.926	.0184					.1581	.30	.28	5.37	.47	.013	.00	.00	PIPE
1491.552	3274.494	.268	3274.762	3.00	14.03	3.06	3277.82	.00	.66	1.15	1.500	.000	.00	1 .0
1.828	.0184					.1810	.33	.27	5.73	.47	.013	.00	.00	PIPE
1493.379	3274.528	.259	3274.787	3.00	14.72	3.36	3278.15	.00	.66	1.13	1.500	.000	.00	1 .0
1.737	.0184					.2072	.36	.26	6.12	.47	.013	.00	.00	PIPE
1495.116	3274.560	.251	3274.810	3.00	15.44	3.70	3278.51	.00	.66	1.12	1.500	.000	.00	1 .0
1.654	.0184					.2372	.39	.25	6.53	.47	.013	.00	.00	PIPE
1496.770	3274.590	.243	3274.832	3.00	16.19	4.07	3278.90	.00	.66	1.10	1.500	.000	.00	1 .0
2.681	.2819					.2500	.67	.24	6.96	.24	.013	.00	.00	PIPE
1499.451	3275.346	.244	3275.590	3.00	16.04	3.99	3279.58	.00	.66	1.11	1.500	.000	.00	1 .0
6.967	.2819					.2310	1.61	.24	6.88	.24	.013	.00	.00	PIPE

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Program Package Serial Number: 7189 Date:10-24-2019 Time: 3:43: 3

WATER SURFACE PROFILE LISTING

KBH1913: SUMMERLIN V21 PARCEL J
 PARCEL J STORM DRAIN (SDJ): REFERENCED STARTING HGL FROM CARRIAGE HILL S
 TU FROM FACILITY P1 TO CONNECTION TO EXISTING

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
1506.418	3277.310	.252	3277.562	3.00	15.29	3.63	3281.19	.00	.66	1.12	1.500	.000	.00	1 .0
4.010	.2819					.2017	.81	.25	6.44	.24	.013	.00	.00	PIPE
1510.428	3278.440	.261	3278.701	3.00	14.58	3.30	3282.00	.00	.66	1.14	1.500	.000	.00	1 .0
2.754	.2819					.1762	.49	.26	6.04	.24	.013	.00	.00	PIPE
1513.182	3279.217	.270	3279.486	3.00	13.90	3.00	3282.49	.00	.66	1.15	1.500	.000	.00	1 .0
2.059	.2819					.1539	.32	.27	5.66	.24	.013	.00	.00	PIPE
1515.241	3279.797	.279	3280.076	3.00	13.25	2.73	3282.80	.00	.66	1.17	1.500	.000	.00	1 .0

SDJ.OUT

1.618	.2819					.1344	.22	.28	5.30	.24	.013	.00	.00	PIPE
1516.859	3280.253	.288	3280.542	3.00	12.64	2.48	3283.02	.00	.66	1.18	1.500	.000	.00	1 .0
1.311	.2819					.1175	.15	.29	4.97	.24	.013	.00	.00	PIPE
1518.170	3280.623	.298	3280.921	3.00	12.05	2.25	3283.18	.00	.66	1.20	1.500	.000	.00	1 .0
1.087	.2819					.1027	.11	.30	4.66	.24	.013	.00	.00	PIPE
1519.257	3280.929	.308	3281.237	3.00	11.49	2.05	3283.29	.00	.66	1.21	1.500	.000	.00	1 .0
.915	.2819					.0897	.08	.31	4.36	.24	.013	.00	.00	PIPE
1520.172	3281.188	.318	3281.506	3.00	10.95	1.86	3283.37	.00	.66	1.23	1.500	.000	.00	1 .0
.779	.2819					.0784	.06	.32	4.09	.24	.013	.00	.00	PIPE
1520.951	3281.407	.329	3281.736	3.00	10.44	1.69	3283.43	.00	.66	1.24	1.500	.000	.00	1 .0
.669	.2819					.0685	.05	.33	3.83	.24	.013	.00	.00	PIPE

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Program Package Serial Number: 7189
WATER SURFACE PROFILE LISTING
Date: 10-24-2019 Time: 3:43: 3

KBH1913: SUMMERLIN V21 PARCEL J
PARCEL J STORM DRAIN (SDJ): REFERENCED STARTING HGL FROM CARRIAGE HILL S
TU FROM FACILITY P1 TO CONNECTION TO EXISTING

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/ 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
1521.619	3281.596	.340	3281.936	3.00	9.96	1.54	3283.48	.00	.66	1.26	1.500	.000	.00	1 .0
.578	.2819					.0599	.03	.34	3.58	.24	.013	.00	.00	PIPE
1522.198	3281.759	.352	3282.111	3.00	9.49	1.40	3283.51	.00	.66	1.27	1.500	.000	.00	1 .0
.502	.2819					.0524	.03	.35	3.36	.24	.013	.00	.00	PIPE
1522.699	3281.900	.364	3282.264	3.00	9.05	1.27	3283.54	.00	.66	1.29	1.500	.000	.00	1 .0
.437	.2819					.0458	.02	.36	3.14	.24	.013	.00	.00	PIPE
1523.136	3282.023	.377	3282.400	3.00	8.63	1.16	3283.56	.00	.66	1.30	1.500	.000	.00	1 .0
.381	.2819					.0401	.02	.38	2.94	.24	.013	.00	.00	PIPE
1523.518	3282.131	.390	3282.521	3.00	8.23	1.05	3283.57	.00	.66	1.32	1.500	.000	.00	1 .0
.333	.2819					.0350	.01	.39	2.75	.24	.013	.00	.00	PIPE
1523.850	3282.225	.403	3282.628	3.00	7.85	.96	3283.58	.00	.66	1.33	1.500	.000	.00	1 .0
.291	.2819					.0307	.01	.40	2.58	.24	.013	.00	.00	PIPE
1524.141	3282.307	.417	3282.724	3.00	7.48	.87	3283.59	.00	.66	1.34	1.500	.000	.00	1 .0
.253	.2819					.0268	.01	.42	2.41	.24	.013	.00	.00	PIPE
1524.394	3282.378	.431	3282.810	3.00	7.13	.79	3283.60	.00	.66	1.36	1.500	.000	.00	1 .0
.219	.2819					.0235	.01	.43	2.26	.24	.013	.00	.00	PIPE
1524.613	3282.440	.447	3282.886	3.00	6.80	.72	3283.60	.00	.66	1.37	1.500	.000	.00	1 .0
.190	.2819					.0206	.00	.45	2.11	.24	.013	.00	.00	PIPE

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Program Package Serial Number: 7189
WATER SURFACE PROFILE LISTING
Date: 10-24-2019 Time: 3:43: 3

KBH1913: SUMMERLIN V21 PARCEL J
PARCEL J STORM DRAIN (SDJ): REFERENCED STARTING HGL FROM CARRIAGE HILL S
TU FROM FACILITY P1 TO CONNECTION TO EXISTING

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/ 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
1524.803	3282.494	.462	3282.956	3.00	6.48	.65	3283.61	.00	.66	1.39	1.500	.000	.00	1 .0
.164	.2819					.0180	.00	.46	1.98	.24	.013	.00	.00	PIPE
1524.967	3282.540	.478	3283.018	3.00	6.18	.59	3283.61	.00	.66	1.40	1.500	.000	.00	1 .0
.139	.2819					.0158	.00	.48	1.85	.24	.013	.00	.00	PIPE

SDJ.OUT

1525.106	3282.579	.495	3283.074	3.00	5.90	.54	3283.61	.00	.66	1.41	1.500	.000	.00	1	.0
.118	.2819	-	-	-	-	.0138	.00	.50	1.73	.24	.013	.00	.00	PIPE	
1525.224	3282.612	.513	3283.125	3.00	5.62	.49	3283.62	.00	.66	1.42	1.500	.000	.00	1	.0
.098	.2819	-	-	-	-	.0121	.00	.51	1.62	.24	.013	.00	.00	PIPE	
1525.322	3282.640	.531	3283.171	3.00	5.36	.45	3283.62	.00	.66	1.43	1.500	.000	.00	1	.0
.079	.2819	-	-	-	-	.0106	.00	.53	1.51	.24	.013	.00	.00	PIPE	
1525.401	3282.662	.550	3283.212	3.00	5.11	.41	3283.62	.00	.66	1.45	1.500	.000	.00	1	.0
.063	.2819	-	-	-	-	.0093	.00	.55	1.41	.24	.013	.00	.00	PIPE	
1525.464	3282.680	.570	3283.250	3.00	4.87	.37	3283.62	.00	.66	1.46	1.500	.000	.00	1	.0
.047	.2819	-	-	-	-	.0082	.00	.57	1.32	.24	.013	.00	.00	PIPE	
1525.511	3282.693	.590	3283.284	3.00	4.65	.34	3283.62	.00	.66	1.47	1.500	.000	.00	1	.0
.033	.2819	-	-	-	-	.0072	.00	.59	1.23	.24	.013	.00	.00	PIPE	
1525.544	3282.703	.612	3283.314	3.00	4.43	.30	3283.62	.00	.66	1.47	1.500	.000	.00	1	.0
.020	.2819	-	-	-	-	.0063	.00	.61	1.15	.24	.013	.00	.00	PIPE	

FILE: SDJ.WSW W S P G W - CIVILDESIGN Version 14.08
 Program Package Serial Number: 7189
 WATER SURFACE PROFILE LISTING
 Date:10-24-2019 Time: 3:43: 3
 KBH1913: SUMMERLIN V21 PARCEL J
 PARCEL J STORM DRAIN (SDJ): REFERENCED STARTING HGL FROM CARRIAGE HILL S
 TU FROM FACILITY P1 TO CONNECTION TO EXISTING

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top	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	
1525.563	3282.708	.634	3283.342	3.00	4.22	.28	3283.62	.00	.66	1.48	1.500	.000	.00	1
.006	.2819	-	-	-	.0055	.00	.63	1.07	.24	.013	.00	.00	PIPE	
1525.570	3282.710	.658	3283.368	3.00	4.02	.25	3283.62	.00	.66	1.49	1.500	.000	.00	1
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

KBH1913: SUMMERLIN V21 PARCEL J

PARCEL J STORM DRAIN (SDJ): REFERENCED STARTING HGL FROM CARRIAGE HILL S

TU FROM FACILITY P1 TO CONNECTION TO EXISTING

1000.00	.I	C	H	W	R
1003.58	.				
1007.15	.				
1010.73	.				
1014.30	.				
1017.88	.				
1021.45	.				
1025.03	.				
1028.60	.				

1032.18	.					SDJ.OUT	.
1035.75	.						.
1039.33	.						.
1042.90	.						.
1046.48	.						.
1050.05	.						.
1053.63	.						.
1057.20	.						.
1060.78	.						.
1064.36	.	I	C	H		WE	. DX
1067.93	.		I	H		W E	. R
1071.51	.						.
1075.08	.						.
1078.66	.						.
1082.23	.						.
1085.81	.						.
1089.38	.						.
1092.96	.						.
1096.53	.						.
1100.11	.						.
1103.68	.						.
1107.26	.						.
1110.83	.						.
1114.41	.						.
1117.99	.						.
1121.56	.						.
1125.14	.						.
1128.71	.			I	CH	W E	. R
1132.29	.			I	W CH	E	. R
1135.86	.						.

SDJ.OUT

1139.44	.				.
1143.01	.	I	WH	E	. R
1146.59	.				.
1150.16	.				.
1153.74	.	I	WH	E	. R
1157.31	.				.
1160.89	.	I	WCH	E	. R
1164.46	.				.
1168.04	.	I	WH	E	. R
1171.61	.	I	WH	E	. R
1175.19	.				.
1178.77	.	I	WH	E	. R
1182.34	.	I	WH	E	. R
1185.92	.	I	WH	E	. R
1189.49	.	I	H	E	. R
1193.07	.	I	H	E	. JX
1196.64	.	I	CH	WE	. R
1200.22	.				.
1203.79	.				.
1207.37	.				.
1210.94	.				.
1214.52	.				.
1218.09	.				.
1221.67	.				.
1225.24	.				.
1228.82	.				.
1232.39	.				.
1235.97	.				.
1239.55	.				.
1243.12	.				.

SDJ.OUT

1246.70	.	.
1250.27	.	.
1253.85	.	.
1257.42	.	.
1261.00	.	.
1264.57	.	.
1268.15	.	.
1271.72	.	.
1275.30	.	.
1278.87	.	.
1282.45	.	.
1286.02	I CH E	. R
1289.60	I CH E	. R
1293.18	I WCH E	. R
1296.75	.	.
1300.33	.	.
1303.90	.	.
1307.48	.	.
1311.05	.	.
1314.63	.	.
1318.20	.	.
1321.78	I WCHE	. R
1325.35	.	.
1328.93	.	.
1332.50	.	.
1336.08	.	.
1339.65	.	.
1343.23	.	.
1346.80	.	.

1350.38	.	SDJ.OUT	.
1353.96	.		.
1357.53	.		.
1361.11	.		.
1364.68	.		.
1368.26	.		.
1371.83	.		.
1375.41	.		.
1378.98	.		.
1382.56	.		.
1386.13	.	I WCH E	. R
1389.71	.		.
1393.28	.		.
1396.86	.		.
1400.43	.		.
1404.01	.		.
1407.58	.		.
1411.16	.		.
1414.74	.		.
1418.31	.		.
1421.89	.	I WC HE	. R
1425.46	.		.
1429.04	.		.
1432.61	.		.
1436.19	.	I W HE	. R
1439.76	.		.
1443.34	.	I WCHE	. R
1446.91	.	I W H	. R
1450.49	.	I WCH	. R
1454.06	.	I WCH	. R

SDJ.OUT

1457.64	.	I	WHE	.	R
1461.21	.	I	YYYWHE	.	WE
1464.79	.	I	C	W	H
				.	R
1468.36	.	I	C	W	H
				.	JX
1471.94	.	I	C	W	H
				.	R
1475.52	.	I	CCCCCCCCCCCCCCCCCCCC		WX
1479.09	.	I	C	H	W
				.	R
1482.67	.	I	C	H	
				.	R
1486.24	.				
				.	
1489.82	.	I	C	H	
				.	R
1493.39	.	I	C	H	
				.	R
1496.97	.	I	W	C	H
				E	
				.	R
1500.54	.	I	W	C	H
				E	
				.	R
1504.12	.	I	W	C	H
				E	
				.	R
1507.69	.	I	W	C	H
				E	
				.	R
1511.27	.	W	C	H	E
				.	R
1514.84	.	I	W	C	H
				E	
				.	R
1518.42	.	I	W	C	H
				E	
				.	R
1521.99	.	I	W	C	H
				E	
				.	R
1525.57	.			I	W
				C	H
				E	
				.	R

3254.820 3257.759 3260.698 3263.637 3266.576 3269.515 3272.454 3275.393 3278.332 3281.271 3284.210

NOTES

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

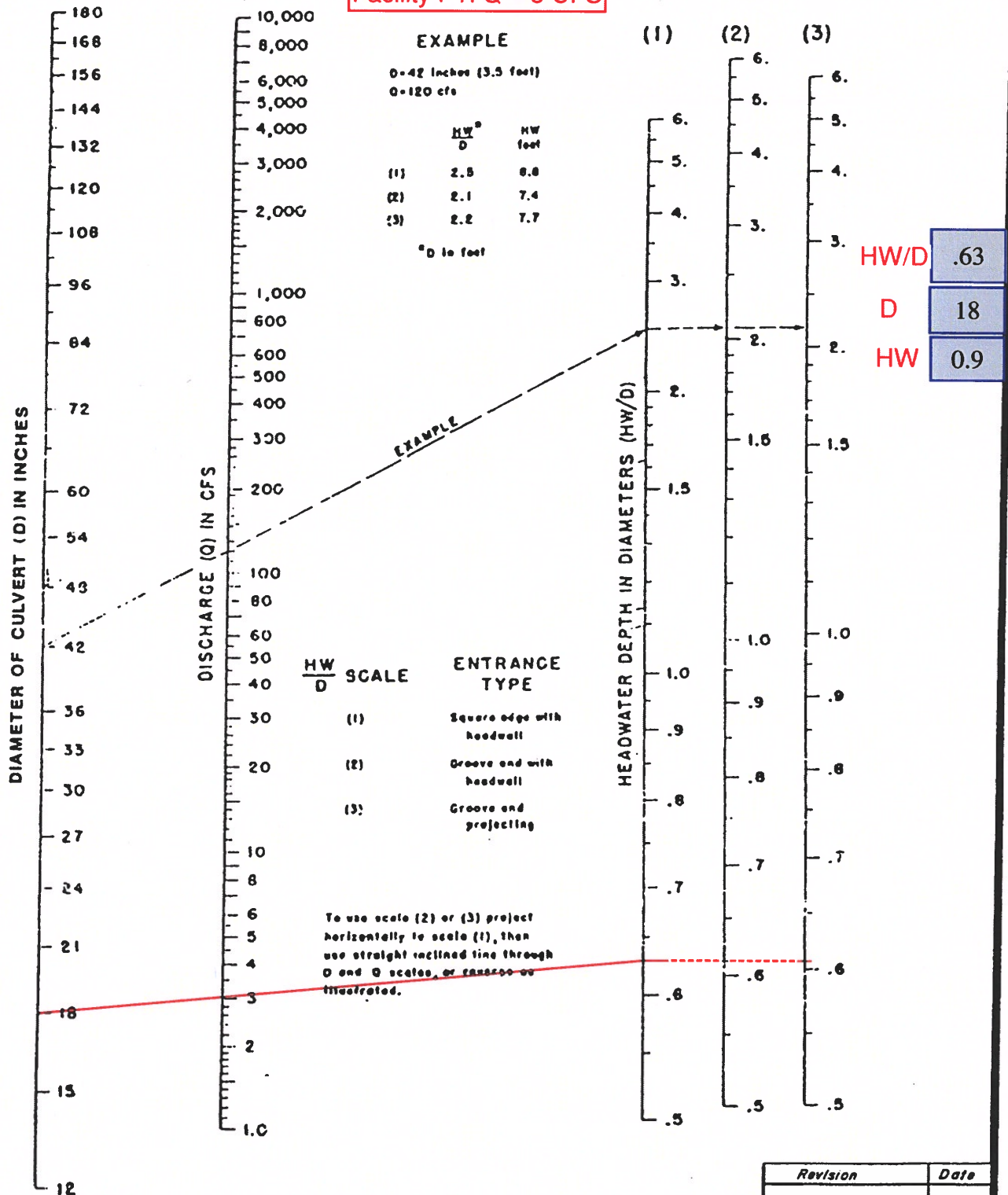
Standard Form 6 (SF-6) Calculations

Inlet Control Nomographs

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

Facility P1: Q = 3 CFS



Revision	Date

WRC
ENGINEERING

REFERENCE:

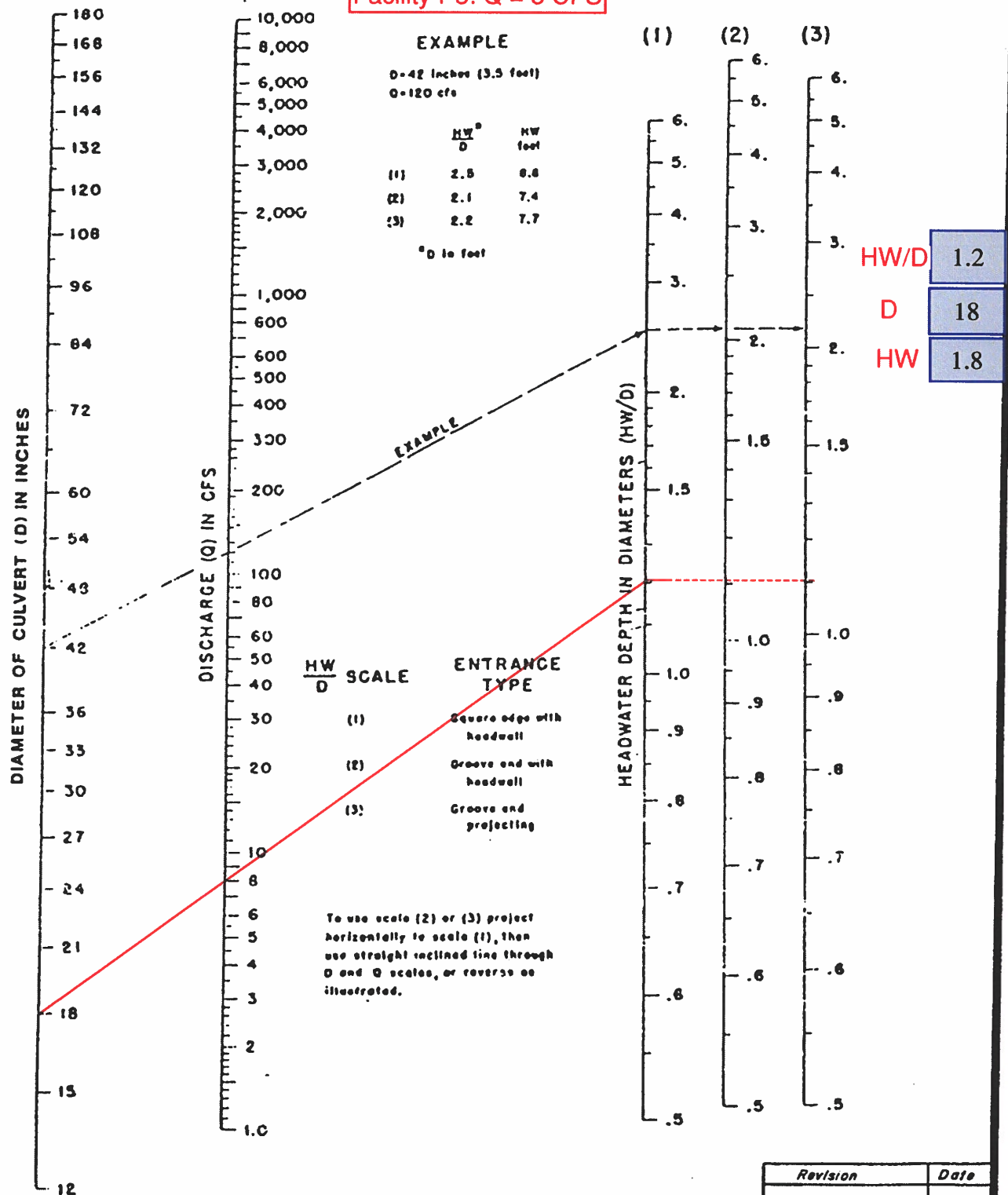
USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

Facility P3: Q = 8 CFS



Revision	Date

WRC
ENGINEERING

REFERENCE:

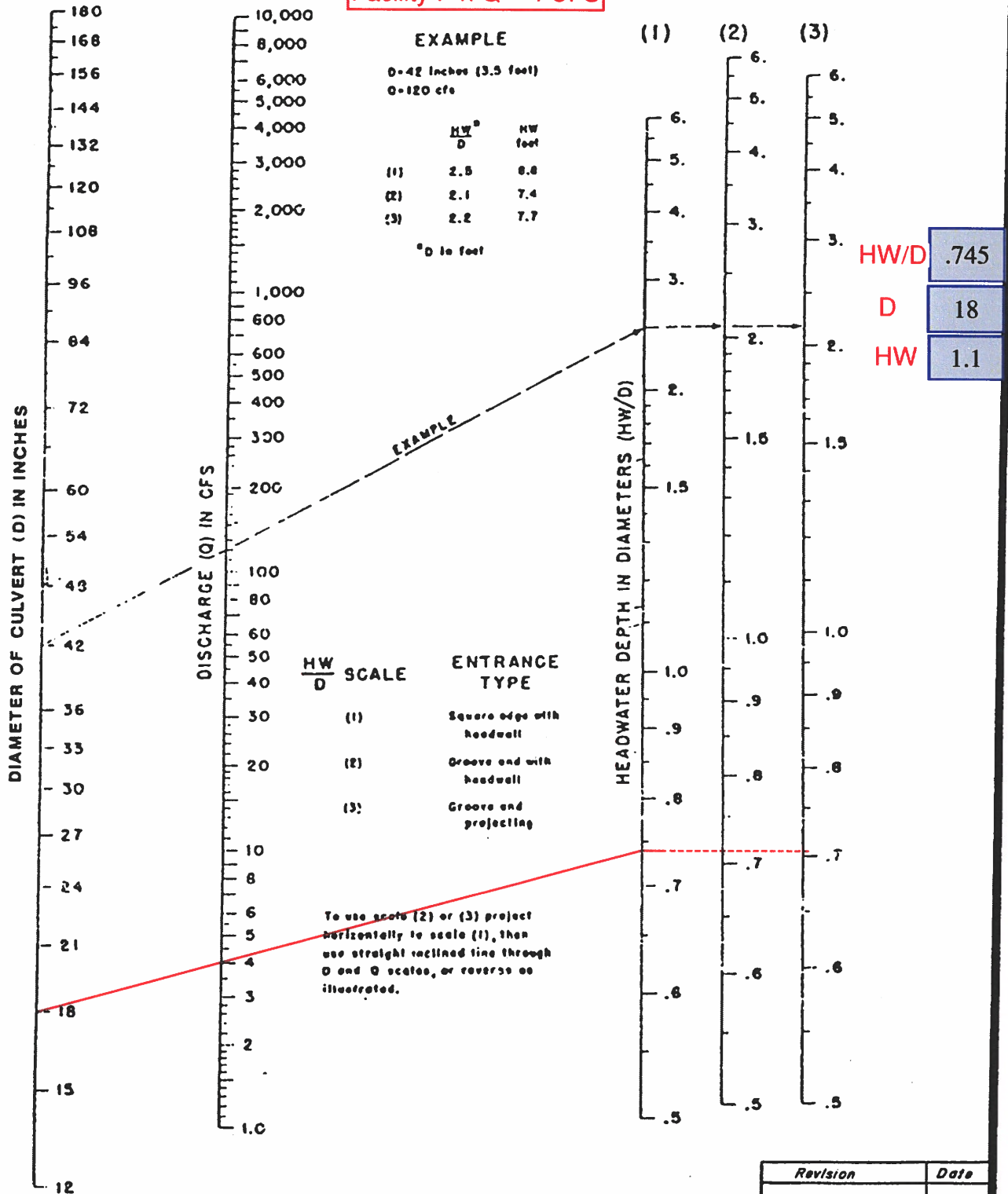
USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

Facility P4: Q = 4 CFS



Revision	Date

WRC
ENGINEERING

REFERENCE:

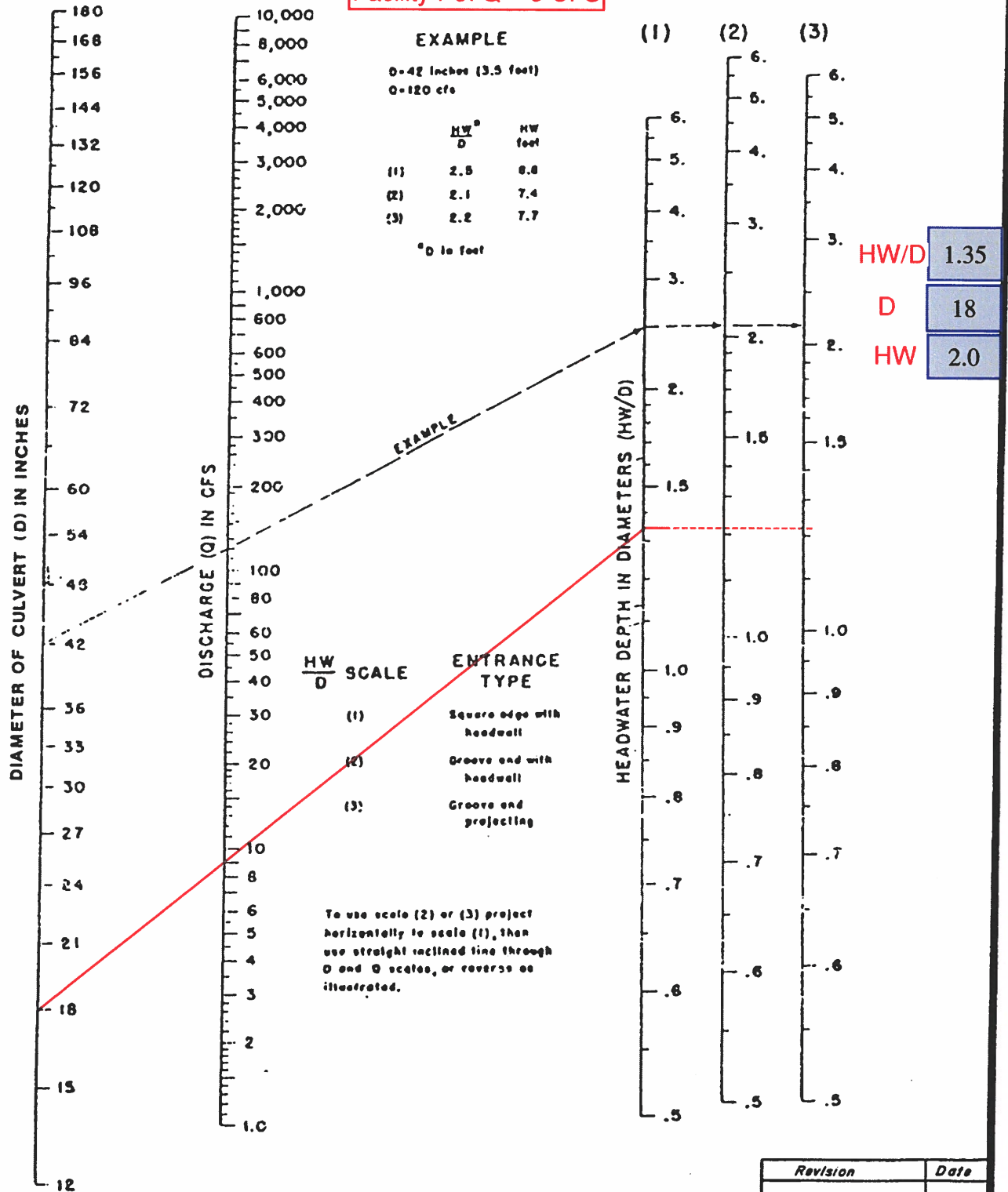
USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

Facility P6: Q = 9 CFS



Revision	Date

WRC
ENGINEERING

REFERENCE:

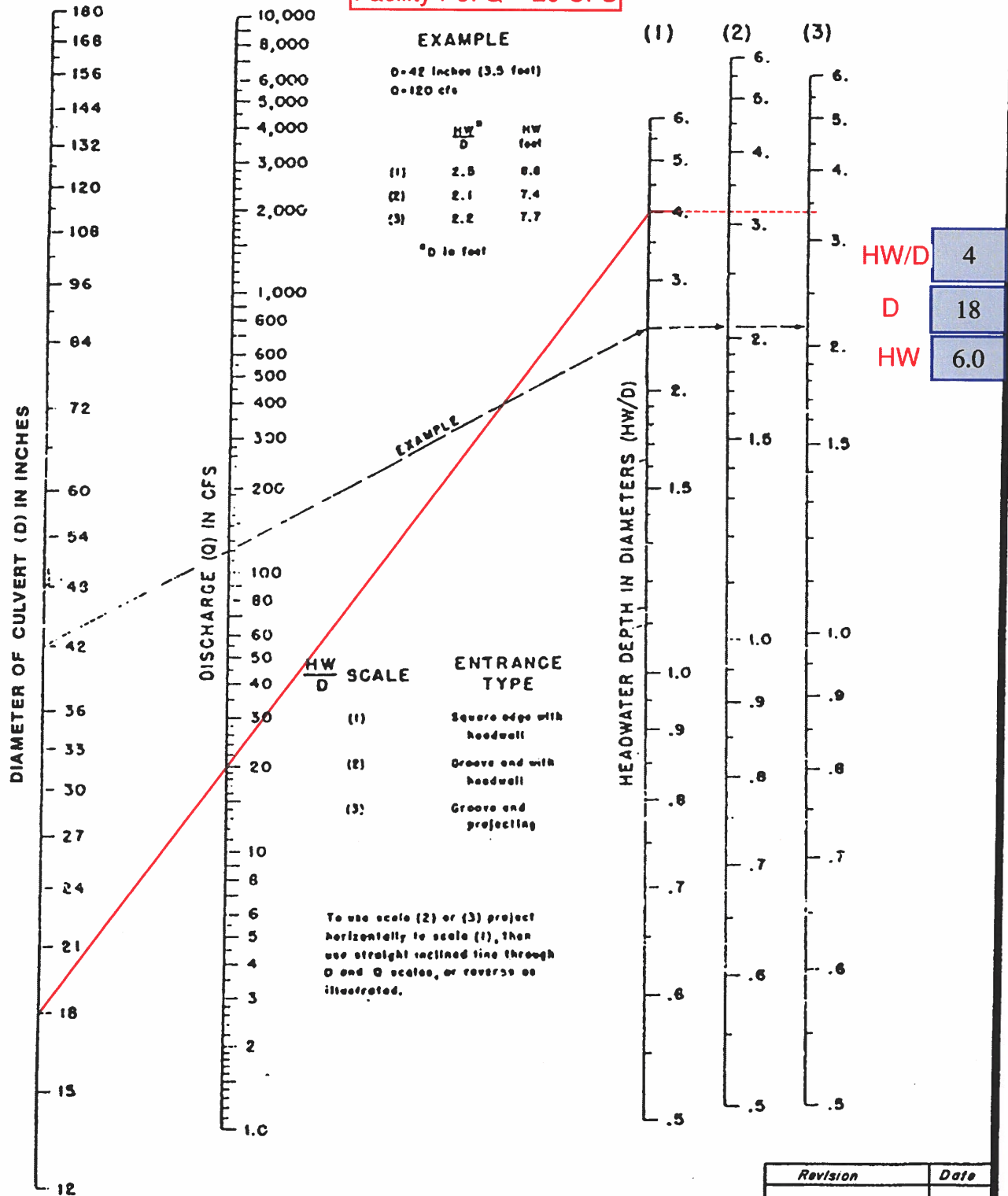
USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

Facility P8: Q = 20 CFS



Revision	Date

WRC
ENGINEERING

REFERENCE:

USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

APPENDIX D

Finished Floor Analyses

KBH1913: SUMMERLIN VILLAGE 21 PARCEL J - TDS FINISH FLOOR - CITY OF LAS VEGAS JURISDICTION										
INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C ¹ (ft)	F/L ² (ft)	D ₁₀₀ (ft)	Flowline F.F. _{min} ³ (ft)	T/C + 6" F.F. _{min} ⁴ (ft)	F.F.-Design (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
1	A2x	3293.18	3292.80	0.32	3293.44	3293.68	3294.3	OK	OK	
2	A2m	3291.18	3290.80	0.4	3291.60	3291.68	3292.8	OK	OK	
3	A2m	3289.77	3289.39	0.4	3290.19	3290.27	3291.3	OK	OK	
4	A2m	3288.38	3288.00	0.4	3288.80	3288.88	3289.5	OK	OK	
5	A2m	3287.26	3286.88	0.4	3287.68	3287.76	3289.5	OK	OK	
6	A2m	3286.54	3286.16	0.4	3286.96	3287.04	3289.5	OK	OK	
7	A2m	3285.91	3285.53	0.4	3286.33	3286.41	3287.6	OK	OK	
8	A2m	3285.40	3285.02	0.4	3285.82	3285.90	3287.6	OK	OK	
9	A2m	3285.26	3284.88	0.4	3285.68	3285.76	3287.6	OK	OK	
10	A3x	3284.60	3284.22	0.36	3284.94	3285.10	3285.6	OK	OK	
11	A3x	3283.87	3283.49	0.36	3284.21	3284.37	3285.6	OK	OK	
12	A3x	3283.24	3282.86	0.36	3283.58	3283.74	3284.1	OK	OK	
13	A3m	3282.63	3282.25	0.37	3282.99	3283.13	3284.1	OK	OK	
14	A3m	3282.18	3281.80	0.37	3282.54	3282.68	3284.1	OK	OK	
15	A3m	3281.72	3281.34	0.37	3282.08	3282.22	3282.6	OK	OK	
16	B1m	3281.02	3280.64	0.3	3281.24	3281.52	3282.3	OK	OK	
17	B1m	3280.26	3279.88	0.3	3280.48	3280.76	3282.3	OK	OK	
18	B1m	3279.80	3279.42	0.3	3280.02	3280.30	3280.8	OK	OK	
19	B1m	3279.35	3278.97	0.3	3279.57	3279.85	3280.8	OK	OK	
20	B1m	3278.89	3278.51	0.3	3279.11	3279.39	3280.8	OK	OK	
21	B1m	3278.34	3277.96	0.3	3278.56	3278.84	3279.7	OK	OK	
22	B1x	3277.75	3277.37	0.29	3277.95	3278.25	3279.7	OK	OK	
23	B1x	3277.17	3276.79	0.29	3277.37	3277.67	3278.2	OK	OK	
24	B1x	3276.59	3276.21	0.29	3276.79	3277.09	3278.2	OK	OK	
25	B1x	3276.01	3275.63	0.29	3276.21	3276.51	3278.2	OK	OK	
26	J4	3273.92	3273.54	0.44	3274.42	3274.42	3277.9	OK	OK	
27	J4	3274.31	3273.93	0.44	3274.81	3274.81	3277.9	OK	OK	
28	J4	3274.70	3274.32	0.44	3275.20	3275.20	3277.9	OK	OK	
29	J4	3275.31	3274.93	0.44	3275.81	3275.81	3277.9	OK	OK	
30	J4	3276.25	3275.87	0.44	3276.75	3276.75	3277.9	OK	OK	
31	J4	3277.46	3277.08	0.44	3277.96	3277.96	3278.8	OK	OK	
32	J3m	3278.62	3278.24	0.42	3279.08	3279.12	3280.3	OK	OK	
33	J3m	3280.09	3279.71	0.42	3280.55	3280.59	3281.8	OK	OK	
34	J3m	3281.90	3281.52	0.42	3282.36	3282.40	3283.3	OK	OK	
35	J3x	3285.16	3284.78	0.37	3285.52	3285.66	3287.0	OK	OK	
36	J3x	3286.72	3286.34	0.37	3287.08	3287.22	3288.5	OK	OK	
37	J3x	3288.29	3287.91	0.37	3288.65	3288.79	3290.0	OK	OK	
38	J3x	3290.10	3289.72	0.37	3290.46	3290.60	3291.5	OK	OK	
39	J3x	3291.99	3291.61	0.37	3292.35	3292.49	3293.8	OK	OK	
40	J3x	3293.56	3293.18	0.37	3293.92	3294.06	3295.3	OK	OK	
41	J3x	3295.45	3295.07	0.37	3295.81	3295.95	3296.8	OK	OK	
42	J3x	3297.34	3296.96	0.37	3297.70	3297.84	3299.3	OK	OK	
43	J3x	3298.90	3298.52	0.37	3299.26	3299.40	3300.8	OK	OK	
44	J3x	3300.47	3300.09	0.37	3300.83	3300.97	3302.3	OK	OK	
45	J3x	3302.03	3301.65	0.37	3302.39	3302.53	3303.8	OK	OK	
46	J2x	3303.86	3303.48	0.33	3304.14	3304.36	3305.3	OK	OK	
47	J2x	3306.72	3306.34	0.33	3307.00	3307.22	3308.5	OK	OK	
48	J2x	3308.23	3307.85	0.33	3308.51	3308.73	3310.0	OK	OK	
49	J2x	3310.12	3309.74	0.33	3310.40	3310.62	3311.5	OK	OK	
50	J2m	3311.84	3311.46	0.45	3312.36	3312.34	3314.0	OK	OK	
51	J2m	3313.02	3312.64	0.45	3313.54	3313.52	3314.0	OK	OK	
52	J2m	3314.09	3313.71	0.45	3314.61	3314.59	3315.5	OK	OK	
53	J1m	3315.08	3314.70	0.38	3315.46	3315.58	3317.5	OK	OK	
54	J1m	3315.41	3315.03	0.38	3315.79	3315.91	3317.5	OK	OK	
55	J1m	3315.56	3315.18	0.38	3315.94	3316.06	3317.5	OK	OK	
56	J1m	3315.73	3315.35	0.38	3316.11	3316.23	3317.5	OK	OK	
57	J1m	3315.91	3315.53	0.38	3316.29	3316.41	3318.5	OK	OK	
58	J1m	3316.05	3315.67	0.38	3316.43	3316.55	3318.5	OK	OK	
59	J1m	3316.20	3315.82	0.38	3316.58	3316.70	3318.5	OK	OK	
60	J1m	3316.37	3315.99	0.38	3316.75	3316.87	3318.5	OK	OK	
61	J1m	3316.54	3316.16	0.38	3316.92	3317.04	3319.3	OK	OK	
62	J1x	3317.23	3316.85	0.34	3317.53	3317.73	3319.3	OK	OK	

KBH1913: SUMMERLIN VILLAGE 21 PARCEL J - TDS FINISH FLOOR - CITY OF LAS VEGAS JURISDICTION										
INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C ¹ (ft)	F/L ² (ft)	D ₁₀₀ (ft)	Flowline F.F. _{min} ³ (ft)	T/C + 6" F.F. _{min} ⁴ (ft)	F.F. _{Design} (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
63	J1x	3317.91	3317.53	0.34	3318.21	3318.41	3319.3	OK	OK	
64	J1x	3319.01	3318.63	0.34	3319.31	3319.51	3320.8	OK	OK	
65	A1m	3323.13	3322.75	0.26	3323.27	3323.63	3324.5	OK	OK	
66	A1m	3321.69	3321.31	0.26	3321.83	3322.19	3323.0	OK	OK	
67	A1m	3320.28	3319.90	0.26	3320.42	3320.78	3321.5	OK	OK	
68	A1x	3318.70	3318.32	0.25	3318.82	3319.20	3320.0	OK	OK	
69	A1x	3316.71	3316.33	0.25	3316.83	3317.21	3318.0	OK	OK	
70	A1x	3314.71	3314.33	0.25	3314.83	3315.21	3316.5	OK	OK	
71	A1x	3313.06	3312.68	0.25	3313.18	3313.56	3315.0	OK	OK	
72	A1x	3309.69	3309.31	0.25	3309.81	3310.19	3310.8	OK	OK	
73	A1x	3307.69	3307.31	0.25	3307.81	3308.19	3309.3	OK	OK	
74	A1x	3306.04	3305.66	0.25	3306.16	3306.54	3307.8	OK	OK	
75	A1x	3304.39	3304.01	0.25	3304.51	3304.89	3306.3	OK	OK	
76	E2x	3305.33	3304.95	0.25	3305.45	3305.83	3306.4	OK	OK	
77	E2x	3306.99	3306.61	0.25	3307.11	3307.49	3307.9	OK	OK	
78	E1	3308.55	3308.17	0.21	3308.59	3309.05	3309.4	OK	OK	
79	E1	3310.09	3309.71	0.21	3310.13	3310.59	3310.9	OK	OK	
80	E1	3311.59	3311.21	0.21	3311.63	3312.09	3312.4	OK	OK	
81	F1x	3317.05	3316.67	0.26	3317.19	3317.55	3318.7	OK	OK	
82	F1x	3316.81	3316.43	0.26	3316.95	3317.31	3318.7	OK	OK	
83	F1m	3316.61	3316.23	0.29	3316.81	3317.11	3318.7	OK	OK	
84	F1m	3316.45	3316.07	0.29	3316.65	3316.95	3318.7	OK	OK	
85	F2m	3316.30	3315.92	0.34	3316.60	3316.80	3318.7	OK	OK	
86	F2m	3316.13	3315.75	0.34	3316.43	3316.63	3317.7	OK	OK	
87	F2m	3315.96	3315.58	0.34	3316.26	3316.46	3317.7	OK	OK	
88	F2m	3315.81	3315.43	0.34	3316.11	3316.31	3317.7	OK	OK	
89	F2m	3315.67	3315.29	0.34	3315.97	3316.17	3317.7	OK	OK	
90	F2m	3315.52	3315.14	0.34	3315.82	3316.02	3317.7	OK	OK	
91	F2m	3315.35	3314.97	0.34	3315.65	3315.85	3317.7	OK	OK	
92	H3x	3302.11	3301.73	0.31	3302.35	3302.61	3304.2	OK	OK	
93	H3x	3302.29	3301.91	0.31	3302.53	3302.79	3304.2	OK	OK	
94	H3m	3302.65	3302.27	0.32	3302.91	3303.15	3304.2	OK	OK	
95	H1m	3303.08	3302.70	0.26	3303.22	3303.58	3305.4	OK	OK	
96	H1m	3303.44	3303.06	0.26	3303.58	3303.94	3305.4	OK	OK	
97	H1m	3303.89	3303.51	0.26	3304.03	3304.39	3305.4	OK	OK	
98	H1x	3304.75	3304.37	0.25	3304.87	3305.25	3306.2	OK	OK	
99	H1x	3305.74	3305.36	0.25	3305.86	3306.24	3307.2	OK	OK	
100	H1x	3306.64	3306.26	0.25	3306.76	3307.14	3308.2	OK	OK	
101	H2x	3304.48	3304.10	0.25	3304.60	3304.98	3305.9	OK	OK	
102	H2x	3304.40	3304.02	0.25	3304.52	3304.90	3305.9	OK	OK	
103	H2x	3304.15	3303.77	0.25	3304.27	3304.65	3305.9	OK	OK	
104	H2m	3303.89	3303.51	0.26	3304.03	3304.39	3305.9	OK	OK	
105	H2m	3303.52	3303.14	0.26	3303.66	3304.02	3305.9	OK	OK	
106	H3m	3303.08	3302.70	0.32	3303.34	3303.58	3304.5	OK	OK	
107	H3m	3302.58	3302.20	0.32	3302.84	3303.08	3304.5	OK	OK	
108	H3x	3302.11	3301.73	0.31	3302.35	3302.61	3303.3	OK	OK	
109	H3x	3301.48	3301.10	0.31	3301.72	3301.98	3303.0	OK	OK	
110	H3x	3300.84	3300.46	0.31	3301.08	3301.34	3303.0	OK	OK	
111	I1m	3292.81	3292.43	0.23	3292.89	3293.31	3294.2	OK	OK	
112	I1m	3291.43	3291.05	0.23	3291.51	3291.93	3293.2	OK	OK	
113	I1m	3290.28	3289.90	0.23	3290.36	3290.78	3292.2	OK	OK	
114	I2m	3289.29	3288.91	0.29	3289.49	3289.79	3291.2	OK	OK	
115	I2m	3288.55	3288.17	0.29	3288.75	3289.05	3290.2	OK	OK	
116	I2m	3287.65	3287.27	0.29	3287.85	3288.15	3289.2	OK	OK	
117	I2m	3286.75	3286.37	0.29	3286.95	3287.25	3287.7	OK	OK	
118	I2m	3286.01	3285.63	0.29	3286.21	3286.51	3287.7	OK	OK	
119	I2m	3285.26	3284.88	0.29	3285.46	3285.76	3286.2	OK	OK	
120	I2x	3284.70	3284.32	0.29	3284.90	3285.20	3286.2	OK	OK	
121	I2x	3283.43	3283.05	0.29	3283.63	3283.93	3285.4	OK	OK	
122	I2x	3284.38	3284.00	0.29	3284.58	3284.88	3285.4	OK	OK	
123	I2m	3285.39	3285.01	0.29	3285.59	3285.89	3286.9	OK	OK	
124	I2m	3286.29	3285.91	0.29	3286.49	3286.79	3288.2	OK	OK	

KBH1913: SUMMERLIN VILLAGE 21 PARCEL J - TDS FINISH FLOOR - CITY OF LAS VEGAS JURISDICTION										
INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C ¹ (ft)	F/L ² (ft)	D ₁₀₀ (ft)	Flowline F.F. _{min} ³ (ft)	T/C + 6" F.F. _{min} ⁴ (ft)	F.F. _{Design} (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
125	I2m	3287.04	3286.66	0.29	3287.24	3287.54	3289.2	OK	OK	
126	I2m	3287.78	3287.40	0.29	3287.98	3288.28	3289.2	OK	OK	
127	I2m	3288.68	3288.30	0.29	3288.88	3289.18	3290.2	OK	OK	
128	I2m	3289.58	3289.20	0.29	3289.78	3290.08	3291.4	OK	OK	
129	I2x	3290.40	3290.02	0.29	3290.60	3290.90	3291.4	OK	OK	
130	I2x	3291.40	3291.02	0.29	3291.60	3291.90	3292.9	OK	OK	
131	E3m	3289.12	3288.74	0.29	3289.32	3289.62	3290.0	OK	OK	
132	E3m	3290.50	3290.12	0.29	3290.70	3291.00	3291.5	OK	OK	
133	E3m	3292.14	3291.76	0.29	3292.34	3292.64	3293.0	OK	OK	
134	E3m	3293.72	3293.34	0.29	3293.92	3294.22	3294.9	OK	OK	
135	E3m	3295.13	3294.75	0.29	3295.33	3295.63	3296.4	OK	OK	
136	E3x	3296.66	3296.28	0.28	3296.84	3297.16	3297.9	OK	OK	
137	E2x	3298.52	3298.14	0.25	3298.64	3299.02	3299.4	OK	OK	
Where: 1: Top of Curb at High Side of Lot 2: TC-0.38 (For Roll Curb), TC-0.5 (For L Curb) 3: Minimum Allowable Finished Floor Elevation above flowline elevation @ high side of lot = (2 x D ₁₀₀) + F/L 4: City of Las Vegas minimum allowable finished floor elevation = T.C. @ high side of lot + 6-inches 5: These lots have an adjacent solid grouted wall that protects the FF. City of Las Vegas Finished Floor Criteria: -The finished floor shall be set a vertical distance above the gutter flowline of at least twice the depth of flow in the gutter flowline up to a maximum of 18 inches above the WSEL in the street. -The finished floor shall be set a vertical distance of at least 6-inches above the highest adjacent top of curb.										

KBH1913: SUMMERLIN VILLAGE 21 PARCEL J - TDS
FINISH FLOOR ANALYSIS - Garage Finished Floors

INPUT INFORMATION				FINISHED FLOORS					NOTES
Building Number	Hydraulic Section Utilized	F/L ¹ (ft)	D ₁₀₀ (ft)	6" + Depth F.F. _{min} ⁴ (ft)	2 x Depth F.F. _{min} ⁴ (ft)	F.F. _{Design} (ft)	6" + Depth Check	2 x Depth Check	See References on Last Sheet
1	A2x	3292.32	0.32	3293.14	3292.96	3293.80	OK	OK	
2	A2m	3290.39	0.4	3291.29	3291.19	3291.80	OK	OK	
3	A2m	3289.29	0.4	3290.19	3290.09	3290.80	OK	OK	
4	A2m	3287.54	0.4	3288.44	3288.34	3289.00	OK	OK	
5	A2m	3286.81	0.4	3287.71	3287.61	3288.50	OK	OK	
6	A2m	3286.01	0.4	3286.91	3286.81	3288.00	OK	OK	
7	A2m	3285.31	0.4	3286.21	3286.11	3287.10	OK	OK	
8	A2m	3285.01	0.4	3285.91	3285.81	3287.10	OK	OK	
9	A2m	3284.84	0.4	3285.74	3285.64	3287.10	OK	OK	
10	A3x	3284.06	0.36	3284.92	3284.78	3284.80	CHECK	OK	
11	A3x	3283.33	0.36	3284.19	3284.05	3284.10	CHECK	OK	
12	A3x	3282.81	0.36	3283.67	3283.53	3283.60	CHECK	OK	
13	A3m	3282.14	0.37	3283.01	3282.88	3282.90	CHECK	OK	
14	A3m	3281.76	0.37	3282.63	3282.50	3282.60	CHECK	OK	
15	A3m	3281.23	0.37	3282.10	3281.97	3282.10	OK	OK	
16	B1m	3280.31	0.3	3281.11	3280.91	3281.00	CHECK	OK	
17	B1m	3279.77	0.3	3280.57	3280.37	3280.40	CHECK	OK	
18	B1m	3279.39	0.3	3280.19	3279.99	3280.00	CHECK	OK	
19	B1m	3278.85	0.3	3279.65	3279.45	3279.50	CHECK	OK	
20	B1m	3278.47	0.3	3279.27	3279.07	3279.10	CHECK	OK	
21	B1m	3277.75	0.3	3278.55	3278.35	3278.40	CHECK	OK	
22	B1x	3277.33	0.29	3278.12	3277.91	3278.10	CHECK	OK	
23	B1x	3276.64	0.29	3277.43	3277.22	3277.30	CHECK	OK	
24	B1x	3276.16	0.29	3276.95	3276.74	3276.80	CHECK	OK	
25	B1x	3275.49	0.29	3276.28	3276.07	3276.20	CHECK	OK	
26	J4	3273.44	0.44	3274.38	3274.32	3275.90	OK	OK	
27	J4	3273.90	0.44	3274.84	3274.78	3275.90	OK	OK	
28	J4	3274.22	0.44	3275.16	3275.10	3276.40	OK	OK	
29	J4	3274.87	0.44	3275.81	3275.75	3276.90	OK	OK	
30	J4	3275.51	0.44	3276.45	3276.39	3277.40	OK	OK	
31	J4	3276.75	0.44	3277.69	3277.63	3278.30	OK	OK	
32	J3m	3278.14	0.42	3279.06	3278.98	3279.80	OK	OK	
33	J3m	3279.28	0.42	3280.20	3280.12	3280.80	OK	OK	
34	J3m	3281.06	0.42	3281.98	3281.90	3282.80	OK	OK	
35	J3x	3284.39	0.37	3285.26	3285.13	3286.00	OK	OK	
36	J3x	3286.21	0.37	3287.08	3286.95	3287.50	OK	OK	
37	J3x	3287.52	0.37	3288.39	3288.26	3289.00	OK	OK	
38	J3x	3289.27	0.37	3290.14	3290.01	3290.50	OK	OK	
39	J3x	3291.48	0.37	3292.35	3292.22	3292.80	OK	OK	
40	J3x	3292.79	0.37	3293.66	3293.53	3294.30	OK	OK	
41	J3x	3294.61	0.37	3295.48	3295.35	3295.80	OK	OK	
42	J3x	3296.83	0.37	3297.70	3297.57	3298.30	OK	OK	
43	J3x	3298.13	0.37	3299.00	3298.87	3299.30	OK	OK	
44	J3x	3299.96	0.37	3300.83	3300.70	3301.30	OK	OK	
45	J3x	3301.26	0.37	3302.13	3302.00	3302.80	OK	OK	
46	J2x	3303.04	0.33	3303.87	3303.70	3304.30	OK	OK	
47	J2x	3306.00	0.33	3306.83	3306.66	3307.50	OK	OK	
48	J2x	3307.72	0.33	3308.55	3308.38	3309.00	OK	OK	
49	J2x	3309.02	0.33	3309.85	3309.68	3310.50	OK	OK	
50	J2m	3311.35	0.45	3312.30	3312.25	3312.50	OK	OK	
51	J2m	3312.37	0.45	3313.32	3313.27	3313.50	OK	OK	
52	J2m	3313.52	0.45	3314.47	3314.42	3315.00	OK	OK	
53	J1m	3314.59	0.38	3315.47	3315.35	3315.50	OK	OK	
54	J1m	3315.01	0.38	3315.89	3315.77	3315.80	CHECK	OK	
55	J1m	3315.14	0.38	3316.02	3315.90	3316.00	CHECK	OK	
56	J1m	3315.31	0.38	3316.19	3316.07	3316.10	CHECK	OK	
57	J1m	3315.49	0.38	3316.37	3316.25	3316.50	OK	OK	
58	J1m	3315.66	0.38	3316.54	3316.42	3316.50	CHECK	OK	
59	J1m	3315.78	0.38	3316.66	3316.54	3316.60	CHECK	OK	
60	J1m	3315.95	0.38	3316.83	3316.71	3316.80	CHECK	OK	
61	J1m	3316.13	0.38	3317.01	3316.89	3317.30	OK	OK	
62	J1x	3316.79	0.34	3317.63	3317.47	3317.80	OK	OK	
63	J1x	3317.36	0.34	3318.20	3318.04	3318.30	OK	OK	
64	J1x	3318.16	0.34	3319.00	3318.84	3318.90	CHECK	OK	
65	A1m	3322.61	0.26	3323.37	3323.13	3324.00	OK	OK	
66	A1m	3320.96	0.26	3321.72	3321.48	3322.00	OK	OK	
67	A1m	3319.78	0.26	3320.54	3320.30	3320.59	OK	OK	
68	A1x	3317.91	0.25	3318.66	3318.41	3319.00	OK	OK	
69	A1x	3315.57	0.25	3316.32	3316.07	3317.00	OK	OK	
70	A1x	3314.19	0.25	3314.94	3314.69	3315.50	OK	OK	
71	A1x	3312.27	0.25	3313.02	3312.77	3313.50	OK	OK	
72	A1x	3308.83	0.25	3309.58	3309.33	3310.30	OK	OK	

KBH1913: SUMMERLIN VILLAGE 21 PARCEL J - TDS
FINISH FLOOR ANALYSIS - Garage Finished Floors

INPUT INFORMATION				FINISHED FLOORS					NOTES
Building Number	Hydraulic Section Utilized	F/L ¹ (ft)	D ₁₀₀ (ft)	6" + Depth F.F. _{min} ⁴ (ft)	2 x Depth F.F. _{min} ⁴ (ft)	F.F. _{Design} (ft)	6" + Depth Check	2 x Depth Check	See References on Last Sheet
73	A1x	3306.90	0.25	3307.65	3307.40	3308.30	OK	OK	
74	A1x	3305.53	0.25	3306.28	3306.03	3306.80	OK	OK	
75	A1x	3303.60	0.25	3304.35	3304.10	3304.80	OK	OK	
76	E2x	3304.57	0.25	3305.32	3305.07	3305.90	OK	OK	
77	E2x	3306.47	0.25	3307.22	3306.97	3307.40	OK	OK	
78	E1	3307.75	0.21	3308.46	3308.17	3308.90	OK	OK	
79	E1	3309.54	0.21	3310.25	3309.96	3310.40	OK	OK	
80	E1	3310.82	0.21	3311.53	3311.24	3311.90	OK	OK	
81	F1x	3316.61	0.26	3317.37	3317.13	3317.20	CHECK	OK	
82	F1x	3316.38	0.26	3317.14	3316.90	3317.10	CHECK	OK	
83	F1m	3316.21	0.29	3317.00	3316.79	3316.90	CHECK	OK	
84	F1m	3316.03	0.29	3316.82	3316.61	3316.90	OK	OK	
85	F2m	3315.91	0.34	3316.75	3316.59	3316.90	OK	OK	
86	F2m	3315.71	0.34	3316.55	3316.39	3316.40	CHECK	OK	
87	F2m	3315.54	0.34	3316.38	3316.22	3316.30	CHECK	OK	
88	F2m	3315.42	0.34	3316.26	3316.10	3316.30	OK	OK	
89	F2m	3315.25	0.34	3316.09	3315.93	3316.00	CHECK	OK	
90	F2m	3315.13	0.34	3315.97	3315.81	3315.90	CHECK	OK	
91	F2m	3314.89	0.34	3315.73	3315.57	3315.70	CHECK	OK	
92	H3x	3301.68	0.31	3302.49	3302.30	3302.70	OK	OK	
93	H3x	3301.89	0.31	3302.70	3302.51	3302.70	OK	OK	
94	H3m	3302.10	0.32	3302.92	3302.74	3302.80	CHECK	OK	
95	H1m	3302.61	0.26	3303.37	3303.13	3303.40	OK	OK	
96	H1m	3303.03	0.26	3303.79	3303.55	3303.90	OK	OK	
97	H1m	3303.33	0.26	3304.09	3303.85	3303.90	CHECK	OK	
98	H1x	3304.31	0.25	3305.06	3304.81	3304.90	CHECK	OK	
99	H1x	3304.91	0.25	3305.66	3305.41	3305.60	CHECK	OK	
100	H1x	3305.75	0.25	3306.50	3306.25	3306.40	CHECK	OK	
101	H2x	3304.25	0.25	3305.00	3304.75	3304.90	CHECK	OK	
102	H2x	3303.95	0.25	3304.70	3304.45	3304.90	OK	OK	
103	H2x	3303.73	0.25	3304.48	3304.23	3304.70	OK	OK	
104	H2m	3303.41	0.26	3304.17	3303.93	3304.00	CHECK	OK	
105	H2m	3303.11	0.26	3303.87	3303.63	3303.90	OK	OK	
106	H3m	3302.47	0.32	3303.29	3303.11	3303.20	CHECK	OK	
107	H3m	3302.17	0.32	3302.99	3302.81	3303.00	OK	OK	
108	H3x	3301.57	0.31	3302.38	3302.19	3302.30	CHECK	OK	
109	H3x	3301.04	0.31	3301.85	3301.66	3301.80	CHECK	OK	
110	H3x	3300.30	0.31	3301.11	3300.92	3301.00	CHECK	OK	
111	I1m	3292.10	0.23	3292.83	3292.56	3292.60	CHECK	OK	
112	I1m	3290.76	0.23	3291.49	3291.22	3291.30	CHECK	OK	
113	I1m	3289.81	0.23	3290.54	3290.27	3290.30	CHECK	OK	
114	I2m	3288.72	0.29	3289.51	3289.30	3289.30	CHECK	OK	
115	I2m	3288.11	0.29	3288.90	3288.69	3288.70	CHECK	OK	
116	I2m	3286.93	0.29	3287.72	3287.51	3287.60	CHECK	OK	
117	I2m	3286.31	0.29	3287.10	3286.89	3286.90	CHECK	OK	
118	I2m	3285.44	0.29	3286.23	3286.02	3286.10	CHECK	OK	
119	I2m	3284.82	0.29	3285.61	3285.40	3285.40	CHECK	OK	
120	I2x	3284.21	0.29	3285.00	3284.79	3284.90	CHECK	OK	
121	I2x	3282.82	0.29	3283.61	3283.40	3283.40	CHECK	OK	
122	I2x	3283.92	0.29	3284.71	3284.50	3284.50	CHECK	OK	
123	I2m	3284.67	0.29	3285.46	3285.25	3285.30	CHECK	OK	
124	I2m	3285.73	0.29	3286.52	3286.31	3286.40	CHECK	OK	
125	I2m	3286.59	0.29	3287.38	3287.17	3287.20	CHECK	OK	
126	I2m	3287.21	0.29	3288.00	3287.79	3287.80	CHECK	OK	
127	I2m	3288.08	0.29	3288.87	3288.66	3288.70	CHECK	OK	
128	I2m	3289.14	0.29	3289.93	3289.72	3289.80	CHECK	OK	
129	I2x	3289.82	0.29	3290.61	3290.40	3290.40	CHECK	OK	
130	I2x	3290.78	0.29	3291.57	3291.36	3291.40	CHECK	OK	
131	E3m	3288.83	0.29	3289.62	3289.41	3289.50	CHECK	OK	
132	E3m	3290.20	0.29	3290.99	3290.78	3291.00	OK	OK	
133	E3m	3291.18	0.29	3291.97	3291.76	3292.50	OK	OK	
134	E3m	3292.96	0.29	3293.75	3293.54	3294.40	OK	OK	
135	E3m	3294.62	0.29	3295.41	3295.20	3295.90	OK	OK	
136	E3x	3295.90	0.28	3296.68	3296.46	3297.40	OK	OK	
137	E2x	3297.69	0.25	3298.44	3298.19	3298.90	OK	OK	

Where:

1: TC-0.38 (For Roll Curb), TC-0.5 (For L Curb)

2: Minimum Allowable Finished Floor Elevation above flowline elevation @ high side of lot = (2 x D₁₀₀) + F/L

City of Henderson Finished Floor Criteria:

-The finished floor shall be set a vertical distance above the gutter flowline of at least twice the depth of flow in the gutter flowline up to a maximum of 18 inches above the WSEL in the street.

KBH1913: SUMMERLIN VILLAGE 21 PARCEL J - TDS
CITY OF LAS VEGAS JURISDICTION
CROSS LOT DRAINAGE EASEMENT CHECK

Lot Number	Hydraulic Section Utilized	Flowline (ft)	F.L. + Flow Depth + 6" F.F. Min (ft)	Flowline Check
26	DE	3275.5	3276.29	OK
27	DE	3275.7	3276.49	OK
28	DE	3275.9	3276.69	OK
29	DE	3276.2	3276.99	OK
31	DE	3278.0	3278.79	OK
32	DE	3279.5	3280.29	OK
33	DE	3281.0	3281.79	OK
35	DE	3286.2	3286.99	OK
36	DE	3287.7	3288.49	OK
37	DE	3289.2	3289.99	OK
39	DE	3293.0	3293.79	OK
40	DE	3294.5	3295.29	OK
42	DE	3298.5	3299.29	OK
43	DE	3300.0	3300.79	OK
44	DE	3301.5	3302.29	OK
45	DE	3303.0	3303.79	OK
47	DE	3307.7	3308.49	OK
48	DE	3309.2	3309.99	OK
50	DE	3312.8	3313.55	OK
51	DE	3313.2	3313.99	OK
53	DE	3315.8	3316.59	OK
54	DE	3316.0	3316.79	OK
55	DE	3316.2	3316.99	OK
57	DE	3316.9	3317.69	OK
58	DE	3317.1	3317.89	OK
59	DE	3317.3	3318.09	OK
61	DE	3317.9	3318.71	OK
62	DE	3318.2	3318.95	OK
63	DE	3318.4	3319.19	OK
76	DE	3305.2	3305.99	OK
77	DE	3306.7	3307.49	OK
78	DE	3308.2	3308.99	OK
79	DE	3309.7	3310.49	OK
82	DE	3317.7	3318.49	OK
83	DE	3317.5	3318.29	OK
84	DE	3317.3	3318.09	OK
85	DE	3317.1	3317.89	OK
87	DE	3316.5	3317.29	OK
88	DE	3316.3	3317.09	OK
89	DE	3316.1	3316.89	OK
90	DE	3315.9	3316.69	OK
91	DE	3315.7	3316.49	OK
92	DE	3303.0	3303.79	OK
93	DE	3302.8	3303.59	OK
95	DE	3303.8	3304.59	OK
96	DE	3304.2	3304.99	OK
98	DE	3305.0	3305.79	OK
99	DE	3306.0	3306.79	OK

KBH1913: SUMMERLIN VILLAGE 21 PARCEL J - TDS
CITY OF LAS VEGAS JURISDICTION
CROSS LOT DRAINAGE EASEMENT CHECK

Lot Number	Hydraulic Section Utilized	Flowline (ft)	F.L. + Flow Depth + 6" F.F. Min (ft)	Flowline Check
102	DE	3304.9	3305.69	OK
103	DE	3304.6	3305.39	OK
104	DE	3304.3	3305.09	OK
105	DE	3304.1	3304.89	OK
107	DE	3303.3	3304.09	OK
108	DE	3301.9	3302.69	OK
109	DE	3301.6	3302.39	OK
110	DE	3301.2	3301.99	OK
113	DE	3291.4	3292.19	OK
114	DE	3290.4	3291.19	OK
115	DE	3289.4	3290.19	OK
117	DE	3286.9	3287.69	OK
118	DE	3286.6	3287.39	OK
119	DE	3285.4	3286.19	OK
120	DE	3285.1	3285.89	OK
121	DE	3284.4	3285.19	OK
122	DE	3284.6	3285.39	OK
124	DE	3286.1	3286.89	OK
125	DE	3286.4	3287.19	OK
126	DE	3287.7	3288.45	OK
128	DE	3289.8	3290.59	OK
129	DE	3290.0	3290.79	OK
131	DE	3289.2	3289.99	OK
132	DE	3290.3	3291.09	OK
134	DE	3293.7	3294.49	OK
135	DE	3295.2	3295.99	OK
136	DE	3296.7	3297.49	OK

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	Kindle Corner Ave	3293.04	3292.54	KC	0.36	3293.26	3294.3	OK	No
2	Kindle Corner Ave	3291.05	3290.55	KC	0.36	3291.27	3292.8	OK	No
3	Kindle Corner Ave	3289.74	3289.24	KC	0.36	3289.96	3291.3	OK	No
4	Kindle Corner Ave	3287.95	3287.45	KC	0.36	3288.17	3289.5	OK	No
5	Kindle Corner Ave	3286.03	3285.53	KC	0.36	3286.25	3289.5	OK	No
6	Kindle Corner Ave	3284.78	3284.28	KC	0.36	3285.00	3289.5	OK	No
7	Kindle Corner Ave	3283.02	3282.52	KC	0.36	3283.24	3287.6	OK	No
8	Kindle Corner Ave	3282.04	3281.54	KC	0.36	3282.26	3287.6	OK	No
9	Kindle Corner Ave	3281.02	3280.52	KC	0.36	3281.24	3287.6	OK	No
9	Carriage Hill Drive	3278.00	3277.50	CH	0.42	3278.34	3287.6	OK	No
10	Alpine Cove Ave	3284.78	3284.40	A2m	0.40	3285.20	3285.6	OK	No
10	Carriage Hill Drive	3276.07	3275.57	CH	0.42	3276.41	3285.6	OK	No
11	Carriage Hill Drive	3275.98	3275.48	CH	0.42	3276.32	3285.6	OK	No
12	Carriage Hill Drive	3275.08	3274.58	CH	0.42	3275.42	3284.1	OK	No
13	Carriage Hill Drive	3275.03	3274.53	CH	0.42	3275.37	3284.1	OK	No
14	Carriage Hill Drive	3274.76	3274.26	CH	0.42	3275.10	3284.1	OK	No
15	Carriage Hill Drive	3274.08	3273.58	CH	0.42	3274.42	3282.6	OK	No
16	Carriage Hill Drive	3273.99	3273.49	CH	0.42	3274.33	3282.3	OK	No
17	Carriage Hill Drive	3273.09	3272.59	CH	0.42	3273.43	3282.3	OK	No
18	Carriage Hill Drive	3273.05	3272.55	CH	0.42	3273.39	3280.8	OK	No
19	Carriage Hill Drive	3272.73	3272.23	CH	0.42	3273.07	3280.8	OK	No
20	Carriage Hill Drive	3272.07	3271.57	CH	0.42	3272.41	3280.8	OK	No
21	Carriage Hill Drive	3271.99	3271.49	CH	0.42	3272.33	3279.7	OK	No
22	Carriage Hill Drive	3271.08	3270.58	CH	0.42	3271.42	3279.7	OK	No
23	Carriage Hill Drive	3271.05	3270.55	CH	0.42	3271.39	3278.2	OK	No
24	Carriage Hill Drive	3270.63	3270.13	CH	0.42	3270.97	3278.2	OK	No
25	Carriage Hill Drive	3270.06	3269.56	CH	0.42	3270.40	3278.2	OK	No
25	Cedar Shore Ave	3273.10	3272.72	J5	0.42	3273.56	3278.2	OK	No
26	Carriage Hill Drive	3269.86	3269.36	CH	0.42	3270.20	3277.9	OK	No
64	Alpine Cove Ave	3323.13	3322.75	J1m	0.38	3323.51	3320.8	CHECK	Yes
65	Kindle Corner Ave	3322.77	3322.27	KC	0.36	3322.99	3324.5	OK	No
66	Kindle Corner Ave	3321.01	3320.51	KC	0.36	3321.23	3323.0	OK	No
67	Kindle Corner Ave	3319.03	3318.53	KC	0.36	3319.25	3321.5	OK	No
68	Kindle Corner Ave	3317.41	3316.91	KC	0.36	3317.63	3320.0	OK	No
69	Kindle Corner Ave	3315.60	3315.10	KC	0.36	3315.82	3318.0	OK	No
70	Kindle Corner Ave	3313.79	3313.29	KC	0.36	3314.01	3316.5	OK	No
71	Kindle Corner Ave	3312.04	3311.54	KC	0.36	3312.26	3315.0	OK	No
72	Kindle Corner Ave	3309.01	3308.51	KC	0.36	3309.23	3310.8	OK	No
73	Kindle Corner Ave	3307.02	3306.52	KC	0.36	3307.24	3309.3	OK	No
74	Kindle Corner Ave	3305.26	3304.76	KC	0.36	3305.48	3307.8	OK	No
75	Kindle Corner Ave	3304.00	3303.50	KC	0.36	3304.22	3306.3	OK	No
76	Alpine Cove Ave	3303.28	3302.78	C	0.31	3303.40	3306.4	OK	No
77	Alpine Cove Ave	3304.93	3304.43	C	0.31	3305.05	3307.9	OK	No
78	Alpine Cove Ave	3306.59	3306.09	C	0.31	3306.71	3309.4	OK	No
79	Alpine Cove Ave	3308.24	3307.74	C	0.31	3308.36	3310.9	OK	No
80	Alpine Cove Ave	3310.23	3309.73	C	0.31	3310.35	3312.4	OK	No
81	Alpine Cove Ave	3315.80	3315.30	C	0.31	3315.92	3318.7	OK	No
91	Cedar Shore Ave	3313.98	3313.60	G1	0.37	3314.34	3317.7	OK	No
92	Cedar Shore Ave	3307.16	3306.78	G1	0.37	3307.52	3304.2	CHECK	Yes
100	Delano Canyon Ave	3311.59	3311.21	H1m	0.26	3311.73	3308.2	CHECK	Yes
101	Delano Canyon Ave	3303.95	3303.57	I1m	0.23	3304.03	3305.9	OK	No
110	Cedar Shore Ave	3299.10	3298.72	G1	0.37	3299.46	3303.0	OK	No
111	Delano Canyon Ave	3298.52	3298.14	I1m	0.23	3298.60	3294.2	CHECK	Yes
120	Cedar Shore Ave	3288.62	3288.24	G1	0.37	3288.98	3286.2	CHECK	Yes
121	Cedar Shore Ave	3281.12	3280.74	G1	0.37	3281.48	3285.4	OK	No
121	Mahogany Ridge St	3277.14	3276.64	D	0.31	3277.26	3285.4	OK	No
122	Mahogany Ridge St	3277.73	3277.23	D	0.31	3277.85	3285.4	OK	No
123	Mahogany Ridge St	3278.35	3277.85	D	0.31	3278.47	3286.9	OK	No
124	Mahogany Ridge St	3278.90	3278.40	D	0.31	3279.02	3288.2	OK	No
125	Mahogany Ridge St	3279.36	3278.86	D	0.31	3279.48	3289.2	OK	No
126	Mahogany Ridge St	3279.81	3279.31	D	0.31	3279.93	3289.2	OK	No
127	Mahogany Ridge St	3280.36	3279.86	D	0.31	3280.48	3290.2	OK	No
128	Mahogany Ridge St	3280.90	3280.40	D	0.31	3281.02	3291.4	OK	No
129	Mahogany Ridge St	3281.32	3280.82	D	0.31	3281.44	3291.4	OK	No
130	Mahogany Ridge St	3281.88	3281.38	D	0.31	3282.00	3292.9	OK	No
130	Delano Canyon Ave	3288.75	3288.37	E3m	0.29	3288.95	3292.9	OK	No

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
131	Mahogany Ridge St	3284.95	3284.45	D	0.31	3285.07	3290.0	OK	No
131	Alpine Cove Ave	3287.12	3286.62	C	0.31	3287.24	3290.0	OK	No
132	Alpine Cove Ave	3287.96	3287.46	C	0.31	3288.08	3291.5	OK	No
133	Alpine Cove Ave	3289.24	3288.74	C	0.31	3289.36	3293.0	OK	No
134	Alpine Cove Ave	3290.78	3290.28	C	0.31	3290.90	3294.9	OK	No
135	Alpine Cove Ave	3292.41	3291.91	C	0.31	3292.53	3296.4	OK	No
136	Alpine Cove Ave	3294.06	3293.56	C	0.31	3294.18	3297.9	OK	No
137	Alpine Cove Ave	3296.06	3295.56	C	0.31	3296.18	3299.4	OK	No

Supplemental Finish Floor Checks

Specific Energy Check							
Lot Number	High TC ¹	High FL ²	Section	Specific Energy ³	Min FF ⁴	Design FF	Check
29	3275.31	3274.93	B1	0.43	3275.36	3277.90	OK
30	3276.25	3275.87	D	0.44	3276.31	3277.90	OK
34	3281.9	3281.52	I2	0.49	3282.01	3283.30	OK
35	3285.16	3284.78	I2	0.49	3285.27	3287.00	OK
44	3300.47	3300.09	H3	0.44	3300.53	3302.30	OK
45	3302.03	3301.65	H3	0.44	3302.09	3303.80	OK
52	3314.09	3313.71	J1	0.45	3314.16	3315.50	OK

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

4: Min FF is the High FL plus the specific energy depth.

Emergency Overflow Finish Floor Checks

Hydraulic Section / Drainage Easements Check - Emergency Overflow							
Lot Number	High TC/FL ¹	Section	Flow Depth ²	Min FF ³	Design FF	Check	Solid Grout
14	3282.18	EO2	0.39	3282.57	3284.10	OK	No
15	3281.72	EO2	0.39	3282.11	3282.60	OK	No
16	3281.02	EO2	0.39	3281.41	3282.30	OK	No
17	3280.26	EO2	0.39	3280.65	3282.30	OK	No
18	3279.80	EO2	0.39	3280.19	3280.80	OK	No
19	3279.35	EO2	0.39	3279.74	3280.80	OK	No
20	3278.89	EO2	0.39	3279.28	3280.80	OK	No
21	3278.34	EO3	0.39	3278.73	3279.70	OK	No
22	3277.75	EO3	0.39	3278.14	3279.70	OK	No
23	3277.17	EO3	0.39	3277.56	3278.20	OK	No
24	3276.59	EO3	0.39	3276.98	3278.20	OK	No
25	3276.01	EO5	0.40	3276.41	3278.20	OK	No
26	3273.92	EO5	0.40	3274.32	3277.90	OK	No
27	3274.31	EO4	0.45	3274.76	3277.90	OK	No
28	3274.70	EO4	0.45	3275.15	3277.90	OK	No
29	3275.31	EO4	0.45	3275.76	3277.90	OK	No
30	3276.25	EO4	0.45	3276.70	3277.90	OK	No
121	3276.59	EO3	0.39	3276.98	3285.40	OK	No
122	3277.75	EO3	0.39	3278.14	3285.40	OK	No
123	3278.34	EO3	0.39	3278.73	3286.90	OK	No
124	3278.89	EO2	0.39	3279.28	3288.20	OK	No
125	3279.35	EO2	0.39	3279.74	3289.20	OK	No
126	3279.80	EO2	0.39	3280.19	3289.20	OK	No
127	3280.26	EO2	0.39	3280.65	3290.20	OK	No
128	3281.02	EO2	0.39	3281.41	3291.40	OK	No
129	3281.11	EO2	0.39	3281.50	3291.40	OK	No
130	3292.20	EO1	0.11	3292.31	3292.90	OK	No
131	3281.72	EO1	0.11	3281.83	3290.00	OK	No

1: High TC/FL is at the high side of the drainage easement flowline or the highest TC adjacent to the easement if flow is weiring over the curb.

2: Flow depth is either normal depth or weir depth (whichever is higher) of the emergency overflow.

3: Min FF is the High TC/FL plus the emergency overflow depth.

APPENDIX E

Reference Material

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

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



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		CCRFGD
Zoning Action:			CCPW
FEMA Flood Zone	YES	X	NO
Proposed Storm Drain	YES	X	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 & CCRFGD	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 & CCRFGD	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).

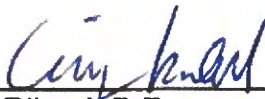
The County concurs with the acceptance of this Drainage Study by the City of Las Vegas. Please note that the County's review of this development is limited to drainage issues significant to Clark County unincorporated areas.

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.

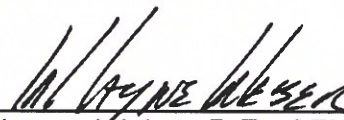
Additional Conditions:

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

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City of Las Vegas

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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) (RFCD 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.

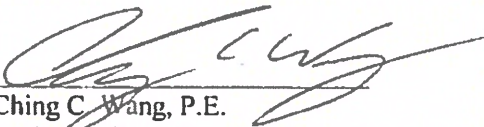
District concurs with acceptance of this Technical Drainage Study by City of Las Vegas Department of Public Works.

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
PA\Letters and Memos\Local Drainage\I and Development & Drainage\2019\1-19-11232 doc

Hydrologic Computations

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**

$$Velocity = CS^{1/2}$$

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	

Project Site Basin

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-J - 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-LVWVD - 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

DEVELOPMENT: Village 21		CALCULATED BY: GB		V1 applies to the first 500 feet of travel distance V2 applies to the remaining travel distance		Existing: V1 = 1.48 * S ^{1/2} V2 = 2.94 * S ^{1/2}		Developed V1 = 202 * S ^{1/2} V2 = 306 * S ^{1/2}		$T_i = \frac{1.8(11 - k)L^{1/2}}{S^{1/3}}$ $T_c = 0.0132C_n - 0.39$ $T_i = \frac{L}{60V}$ $T_c = T_i + T_r$	
W.O. #	7809										

SUB-BASIN DATA				INITIAL/OVERLAND TIME (Ti)			TRAVEL TIME (Tt)				Tc CHECK (URBANIZED BASINS)			REMARKS	
DESIG.	Cn	K	AREA Ac.	AREA MI ²	LENGTH Ft	SLOPE %	Ti Min.	LENGTH Ft	SLOPE %	V1 fps	V2 fps	Tt Min.	Tc Min.	FINAL Tc	LAG TIME Hr.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9a)	(9b)	(10)	(11)	(12)	(13)	(14)	(15)
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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	0.049

Project Site Basin

STANDARD FORM 4										$T_i = \frac{1.8(1.1 - k)L^{1/2}}{S^{1/3}}$ $T_c = 0.0132C_n - 0.39$ $T_i = \frac{L}{60V}$ $T_c = T_i + T_i$									
DEVELOPMENT: Village 21										V1 applies to the first 500 feet of travel distance V2 applies to the remaining travel distance									
W.O. #		7809		CALCULATED BY:		GB		Existing: $V1 = 1.48 \cdot S^{1/2}$ $V2 = 294 \cdot S^{1/2}$ Developed: $V1 = 202 \cdot S^{1/2}$ $V2 = 306 \cdot S^{1/2}$											
DESIG.		Cn		K		SUB-BASIN DATA		INITIAL/OVERLAND TIME (Ti)		TRAVEL TIME (Tt)		Tc CHECK (URBANIZED BASINS)		FINAL		LAG		REMARKS	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9a)	(9b)	(10)	(11)	(12)	Tc	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			TLAG=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	8.82	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			TLAG=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			TLAG=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			TLAG=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			TLAG=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


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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 27DEC18 TIME 16:51:33
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*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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

1 HEC-1 INPUT PAGE 1

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

*DIAGRAM

*** FREE ***

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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	RFCF 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-FOXN
184      BA      0.0050
185      PB      3.40
186      LS      0    98.0
187      UD      0.179
      *

188      KK      CFOXN
189      KM      COMBINE V25-B, AND V25-FOXN
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      KKR25-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-FOXES, V25-C, CFOXES, V25-COS2, STA1, AND CFOXES
 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 DUMMY5
 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 DESS
 256 BA 0.0091
 257 PB 3.38
 258 LS 0 98.0
 259 UD 0.108
 *

260 KK CDESS
 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	
	*		

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	

Project Site Basin

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      3.35
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
LINE (V) ROUTING      (--->) DIVERSION OR PUMP FLOW

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

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			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	.	.	V25-B	
183	.	.	V25-FOX5	
188	.	.	CFOX5.....	
191	.	.	V25-C	
196	.	.	V	
199	.	.	V	
204	.	.	RV25-C	
207	.	.	V25-COS2	
213	.	.	V	
216	.	.	V	
219	.	.	RCSTA1	
225	.	.	V25-E	
228	.	.	V	
234	.	.	V	
239	.	.	RV25-E	
242	.	.	V25-COS3	
245	.	.		
250	.	.		
255	.	.		
260	.	.		
263	.	.		
268	.	.		
273	.	.		
278	.	.		
283	.	.		
286	.	.		
289	.	.		
294	.	.		
299	.	.		

					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	.	


```

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-FOXS	.00	1	FLOW TIME	11. 3.58
2 COMBINED AT					
+	CFOXs	.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	5.
				TIME	3.58
ROUTED TO					
+	RV25-COS	.00	1	FLOW	5.
				TIME	3.67
HYDROGRAPH AT					
+	STA1	.00	1	FLOW	13.
				TIME	3.50
5 COMBINED AT					
+	CSTA1	.11	1	FLOW	238.
				TIME	3.50
ROUTED TO					
+	RCSTA1	.11	1	FLOW	217.
				TIME	3.58
HYDROGRAPH AT					
+	V25-E	.03	1	FLOW	65.
				TIME	3.50
ROUTED TO					
+	RV25-E	.03	1	FLOW	59.
				TIME	3.58
HYDROGRAPH AT					
+	V25-COS3	.00	1	FLOW	8.
				TIME	3.50
HYDROGRAPH AT					
+	ST2	.00	1	FLOW	12.
				TIME	3.50
4 COMBINED AT					
+	CST2	.15	1	FLOW	291.
				TIME	3.58
2 COMBINED AT					
+	DUMMY5	.23	1	FLOW	461.
				TIME	3.50
HYDROGRAPH AT					
+	F	.03	1	FLOW	65.
				TIME	3.50
HYDROGRAPH AT					
+	E	.03	1	FLOW	78.
				TIME	3.50
HYDROGRAPH AT					
+	DESS	.01	1	FLOW	22.
				TIME	3.50
4 COMBINED AT					
+	CDESS	.29	1	FLOW	624.
				TIME	3.50
HYDROGRAPH AT					
+	C	.02	1	FLOW	54.
				TIME	3.50
HYDROGRAPH AT					
+	NP-1	.00	1	FLOW	4.
				TIME	3.50
HYDROGRAPH AT					
+	ST7	.00	1	FLOW	9.
				TIME	3.50
HYDROGRAPH AT					
+	D	.02	1	FLOW	56.
				TIME	3.50
4 COMBINED AT					
+	CST7	.05	1	FLOW	124.
				TIME	3.50
2 COMBINED AT					
+	DUMMY7	.35	1	FLOW	748.
				TIME	3.50
HYDROGRAPH AT					
+	W	.01	1	FLOW	31.
				TIME	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	13.
				TIME	3.50
4 COMBINED AT					
+	CCARR2	.12	1	FLOW	286.
				TIME	3.50
HYDROGRAPH AT					
+	B	.02	1	FLOW	54.
				TIME	3.50
HYDROGRAPH AT					
+	A	.02	1	FLOW	51.
				TIME	3.50
HYDROGRAPH AT					
+	CARR3	.01	1	FLOW	19.
				TIME	3.50
4 COMBINED AT					
+	CCARR3	.17	1	FLOW	410.
				TIME	3.50
3 COMBINED AT					
+	DUMMY13	.56	1	FLOW	1271.
				TIME	3.50
HYDROGRAPH AT					
+	V	.01	1	FLOW	29.
				TIME	3.50
HYDROGRAPH AT					
+	SUMM4	.01	1	FLOW	21.
				TIME	3.50
2 COMBINED AT					
+	CSUMM4	.02	1	FLOW	50.
				TIME	3.50
HYDROGRAPH AT					
+	DC-2	.00	1	FLOW	5.
				TIME	3.50
HYDROGRAPH AT					
+	U	.03	1	FLOW	73.
				TIME	3.50
HYDROGRAPH AT					
+	I	.03	1	FLOW	61.
				TIME	3.50
HYDROGRAPH AT					
+	STA	.00	1	FLOW	5.
				TIME	3.50
HYDROGRAPH AT					
+	G	.01	1	FLOW	19.
				TIME	3.50
HYDROGRAPH AT					
+	H	.01	1	FLOW	21.
				TIME	3.50
2 COMBINED AT					
+	CGH	.02	1	FLOW	39.
				TIME	3.50
HYDROGRAPH AT					
+	DC-1	.01	1	FLOW	23.
				TIME	3.58
HYDROGRAPH AT					
+	NVE	.03	1	FLOW	75.
				TIME	3.50
8 COMBINED AT					
+	CDC1	.15	1	FLOW	326.
				TIME	3.50
2 COMBINED AT					
+	CFAR	.71	1	FLOW	1598.
				TIME	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			
						DT	PEAK	TIME TO PEAK	VOLUME
		(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 ***

Drainage Exhibits

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

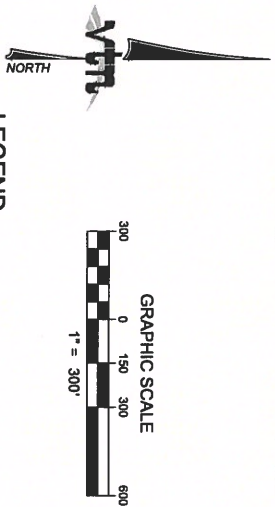
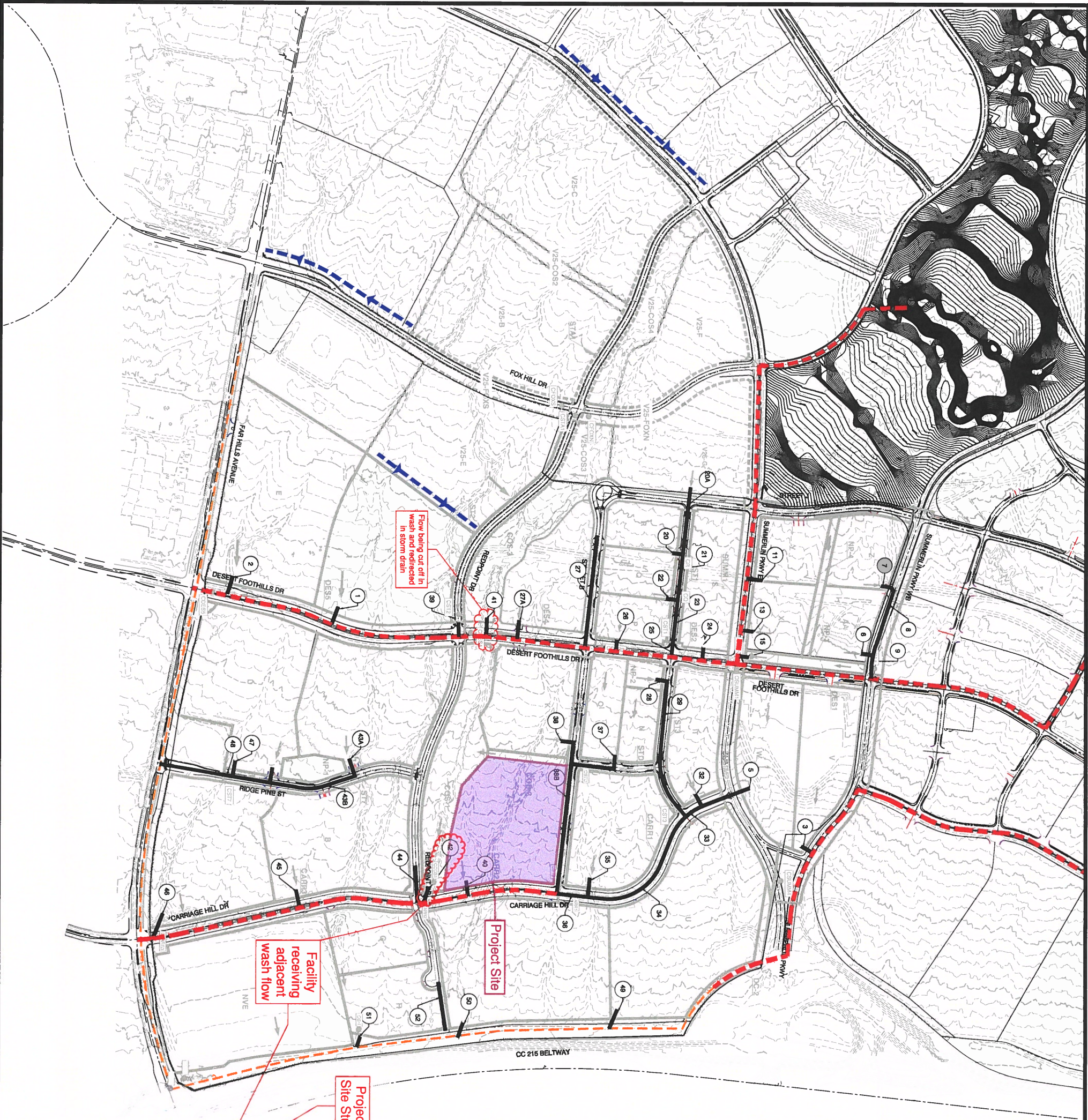
SUMMERLIN WEST PLANNING AREA *Las Vegas, Nevada*

W.O. # 7809

Prepared for:
Howard Hughes Corp.

Submitted to:
Public Works Department
City of Las Vegas





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 (%)	CH20 ULT. (cfs)	Previous	Updated	Tributary Basin/CP	Previous	Updated	Facility	Technical Drainage Study
1	9.0%	59	59	F	E	30" RCP	36" RCP	Reference 1	Reference 1
2	8.8%	77	78	E	E	30" RCP	36" RCP		
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	C2A4	Z	24" RCP	24" RCP		
9	4.2%	35	18	CNP-4A	C4A	24" RCP	24" RCP		
11	1.0%	15	16	V	V	24" RCP	24" RCP		
13	3.3%	14	16	X	X	24" RCP	24" RCP		
15	0.5%	4	7	NP-3	CNP-3	24" RCP	24" RCP		
20A	5.4%	n/a	45	n/a	V25-F	n/a	24" 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	88	CQR	CQ	24" RCP	35" RCP		
24	10.0%	25	24	S	S	24" RCP	30" RCP		Reference 6
25	8.0%	54	74	CS11	CS11	30" RCP	35" RCP		Reference 6
26	10.0%	11	11	P	P	24" RCP	30" RCP		Reference 6
27	10.0%	n/a	17	n/a	DE53	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		Reference 7
29	5.0%	3	11	NP-2	CS13	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	35" RCP		Reference 7
35	5.0%	32	32	M	M	30" RCP	35" 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	35" RCP		Reference 7
38B	4.0%	108	89	CS14	CS1B	35" RCP	35" RCP		Reference 7
39	6.1%	n/a	360	n/a	CS12	n/a	54" RCP		Reference 7
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	59	C	C, NP-1	35" RCP	42" RCP		Reference 3
43B	1.3%	58	59	C, NP-1, STB	C, NP-1	35" RCP	42" RCP		Reference 3
44	5.6%	12	13	STB	STB	24" RCP	24" RCP		Reference 4
45	6.0%	46	54	B	B	30" RCP	35" RCP		Reference 4
46	6.0%	47	51	A	A	30" RCP	35" RCP		Reference 2
47A	n/a	n/a	56	D	For Flexibility	30" RCP	35" RCP		Reference 3
47	4.0%	53	56	D	D	30" RCP	35" RCP		Reference 3
48	1.3%	108	124	CS17	CS17	42" RCP	54" RCP		Reference 3
49	6.0%	74	73	U	U	35" RCP	42" RCP		
50	2.0%	60	61	I	I	35" RCP	42" RCP		
51	0.9%	43	39	G, H	COH	24" RCP	Riprap Chit		Reference 5
52	n/a	n/a	5	n/a	STA	n/a	24" RCP		

- 1- Desert Foothills (Far Hills to Road)
- 2- Carriage Hill (Far Hills to Street A)
- 3- Ridge Pine Street (Far Hills to Desert Foothills)
- 4- Ridge Pine Street (Carriage Hill to Desert Foothills)
- 5- Street A (Carriage Hill to Desert Foothills)
- 6- Desert Foothills (Roadpoint to Summerlin Parkway)
- 7- Carriage Hill (Roadpoint to Summerlin Parkway)

V21 MDS UP#1 ADD#1

DRAWN BY:
JVA/GSB
NOV 2018

DESIGNED BY:
JVA/GSB
NOV 2018

CHECKED BY:

PROJECT NO:
7609

SCALE:
1"=300'

HORIZ. VERT.

2018 UPDATE TO SUMMERLIN WEST PLANNING AREA

A.6.7 VILLAGE 21 LOCAL FLOOD CONTROL FACILITIES MAP

THE HOWARD HUGHES CORPORATION
1881 WEST CHARLSTON BLVD, 3RD FLOOR
LAS VEGAS, NEVADA 89115

2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PH: (702) 873-7560 FAX (702) 362-2587 WEB WWW.VTNV.COM
CONSULTING ENGINEERS • PLANNERS • LAND SURVEYORS

REV	DATE	BY	REVISION

SHEET
A.6.7
OF
SHEETS

DRAWING NO

H:\7609\Drainage\7_UP1 ADD1\A Figures\A.6.7 Village 21 Local Flood Control Facilities Map\A.6.7 Village 21 Local Flood Control Facilities Map.dwg

APPENDIX F

Reference Material

*Update #1 to the Technical Drainage Study for Summerlin West Village
21 – Kindle Corner Avenue Improvements (Formerly Street B) –
Carriage Hill Drive to Desert Foothills Drive
by VTN Nevada (DS 5086)*

Approval Letters

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 11, 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 B
IMPROVEMENTS
(DS5086B) (RFCD No. 19-11235)**

Dear Mr. Kwon:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated January 16, 2019, and Addendum No. 1 dated March 4, 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 19, 2019.

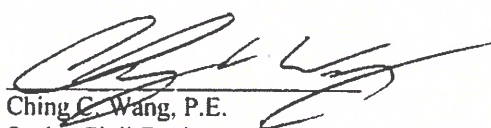
District concurs with acceptance of this Technical Drainage Study by City of Las Vegas Department of Public Works.

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\19-11235 doc

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM		DATE: 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 Village 21 - Street B Improvements (Carriage Hill Drive to Desert Foothills Drive)	
Cross Streets:	Carriage Hill Drive to West Beltway 215	COPIES TO: VTN Nevada
File Number:	F:\Depot\DSMemos\DS5086C.doc	Howard Hughes Company, LLC
Parcel Number:	137-26-101-001	Bart Anderson, P.E., DevCo
Zoning Action:	TMP-73332	CCRFC
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	1/16/2019	1/29/2019 & 2/4/2019	Not Approved	\$400.00	502381: \$400
2 nd Submittal	3/5/2019	3/19/2019	Conditional Approval	\$400.00	503550: \$400
CCRFC	4/11/2019	4/17/2019	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.

- 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
WSP/AYS

T/R/S: T20S/R59E/26

AREA K-26

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		June 5, 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 V21 – Kindle Corner Ave. Improvements (formerly Street B - Carriage Hill Dr. to Desert Foothills Dr.)	
Cross Streets:	Carriage Hill Drive to West Beltway 215	COPIES TO: VTN Nevada
File Number:	F:\Depot\DSMemos\DS5086D.doc	Howard Hughes Company, LLC
Parcel Number:	137-26-101-001	Bart Anderson, P.E., DevCo
Zoning Action:	TMP-73332	CCRFC
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	1/16/2019	1/29/2019 & 2/4/2019	Not Approved	\$400.00	502381: \$400
2 nd Submittal	3/5/2019	3/19/2019	Conditional Approval	\$400.00	503550: \$400
CCRFC	4/11/2019	4/17/2019	Concurrence Recv'd	N/C	N/C
3 rd Submittal	5/14/2019	6/4/2019	See Comments Below	\$100.00	3131647: \$100
TOTAL FEES (LDDRS):				\$900.00	----

REMARKS:

3rd Submittal: Update #1

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.

1. 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

WSP/AYS

T/R/S: T20S/R59E/26

AREA K-26

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM		DATE: June 25, 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 V21 – Kindle Corner Ave. Improvements (formerly Street B - Carriage Hill Dr. to Desert Foothills Dr.)	
Cross Streets:	Carriage Hill Drive to West Beltway 215	COPIES TO: VTN Nevada
File Number:	F:\Depot\DSMemos\DS5086E.doc	Howard Hughes Company, LLC
Parcel Number:	137-26-101-001	Bart Anderson, P.E., DevCo
Zoning Action:	TMP-73332	CCRFGD
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	1/16/2019	1/29/2019 & 2/4/2019	Not Approved	\$400.00	502381: \$400
2 nd Submittal	3/5/2019	3/19/2019	Conditional Approval	\$400.00	503550: \$400
CCRFGD	4/11/2019	4/17/2019	Concurrence Recv'd	N/C	N/C
3 rd Submittal	5/14/2019	6/4/2019	Approved	\$100.00	3131647: \$100
4 th Submittal	6/20/2019	6/25/2019	See Comments Below	\$100.00	3460977: \$100
TOTAL FEES (LDDRS):				\$1,000.00	----

REMARKS:

4th Submittal: Update #2 to relocate the storm drain mainline from directly under the curb to about 6' away from the curb

3rd Submittal: Update #1

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.

1. 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

WSP/AYS

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

Street Hydraulic Sections

Update #1 to the Technical Drainage Study for

Summerlin West Village 21 Kindle Corner Avenue Improvements (formerly Street B) - Carriage Hill Drive to Desert Foothills Drive *Las Vegas, Nevada*

Prepared for:

Howard Hughes Company, LLC

Submitted to:

City of Las Vegas
Public Works



STREET NORMAL DEPTH CALCULATIONS

Worksheet for Min Cross Sections 1-4

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope
Discharge
Section Definitions

**Referenced
Geometry and
Slope**

2.00 %
3.00 ft³/s

Contributing flow has
changed due to site plan
changes by both Parcel K
and Parcel J allowing a
portion of flow to drain to
Kindle Corner Ave

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 Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Worksheet for Min Cross Sections 1-4

Results

Normal Depth		0.27	ft
Elevation Range	0.00 to 0.50 ft		
Flow Area		1.15	ft²
Wetted Perimeter		13.88	ft
Hydraulic Radius		0.08	ft
Top Width		13.24	ft
Normal Depth		0.27	ft
Critical Depth		0.31	ft
Critical Slope		0.00776	ft/ft
Velocity		2.62	ft/s
Velocity Head		0.11	ft
Specific Energy		0.38	ft
Froude Number		1.57	
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	0.31	ft
Channel Slope	2.00	%
Critical Slope	0.00776	ft/ft

Cross Section for Min Cross Sections 1-4

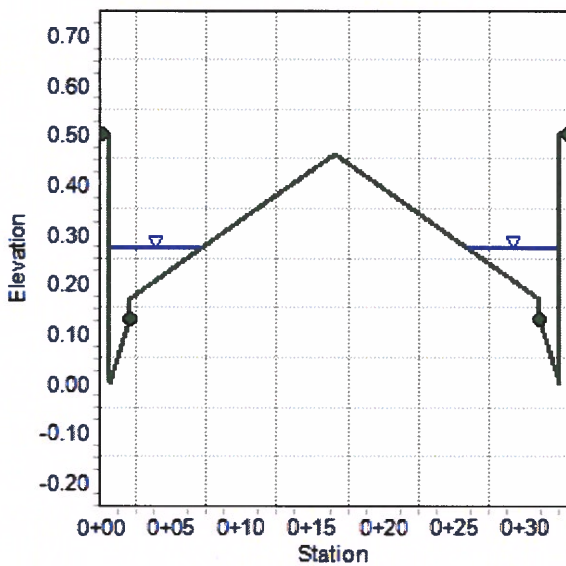
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.00	%
Normal Depth	0.27	ft
Discharge	3.00	ft ³ /s

Cross Section Image



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

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

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

Worksheet for Max Cross Sections 1-4

Results

Normal Depth		0.23	ft
Elevation Range	0.00 to 0.50 ft		
Flow Area		0.66	ft ²
Wetted Perimeter		9.41	ft
Hydraulic Radius		0.07	ft
Top Width		8.86	ft
Normal Depth		0.23	ft
Critical Depth		0.31	ft
Critical Slope		0.00743	ft/ft
Velocity		4.53	ft/s
Velocity Head		0.32	ft
Specific Energy		0.55	ft
Froude Number		2.92	
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	0.23	ft
Critical Depth	0.31	ft
Channel Slope	7.21	%
Critical Slope	0.00743	ft/ft

Cross Section for Max Cross Sections 1-4

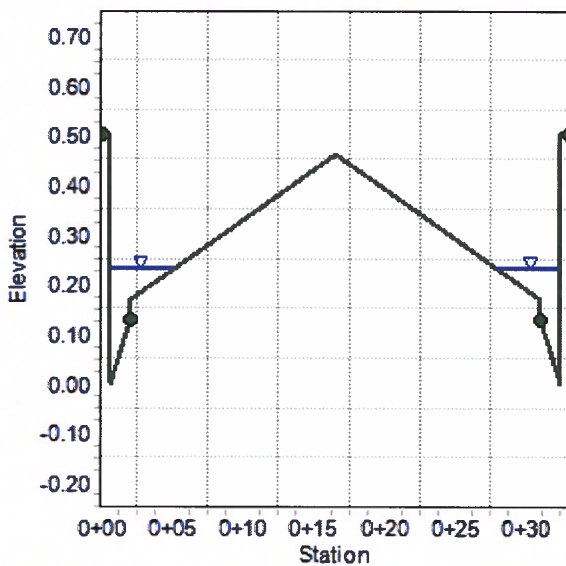
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	7.21	%
Normal Depth	0.23	ft
Discharge	3.00	ft ³ /s

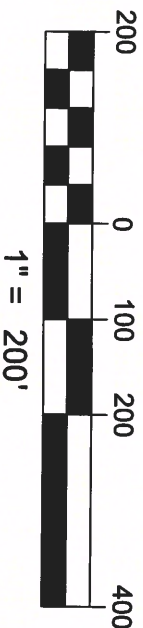
Cross Section Image



Drainage Exhibit



GRAPHIC SCALE



LEGEND

- CONCENTRATION POINT
- BASIN BOUNDARY
- BASIN DESIGNATION
- ST7
- FLOW ARROW
- CROSS SECTION

ULTIMATE CONDITION HEC-1 SUMMARY TABLE		
BASIN ID	AREA (ac)	Q100 (CFS)
N	2.54	9
O	3.43	13
CNO	-	22
STD	0.88	4
CSTD	-	26
K	8.01	29
STB	2.68	12
CSTB	-	66

*All basins referenced from the Carriage Hill Study

ULTIMATE CONDITION STREET FLOW ANALYSIS SUMMARY						
Street	Q100	Slope	Velocity	Depth	V x D	Tributary
Section	(cfs)		(ft/s)	(ft)		Basin
Min 1-4	3	2.00%	2.62	0.27	0.71	1/4STB
Max 1-4	3	7.21%	4.53	0.23	1.04	1/4STB

All sections analyzed as one section since they have all the same contributing flow.

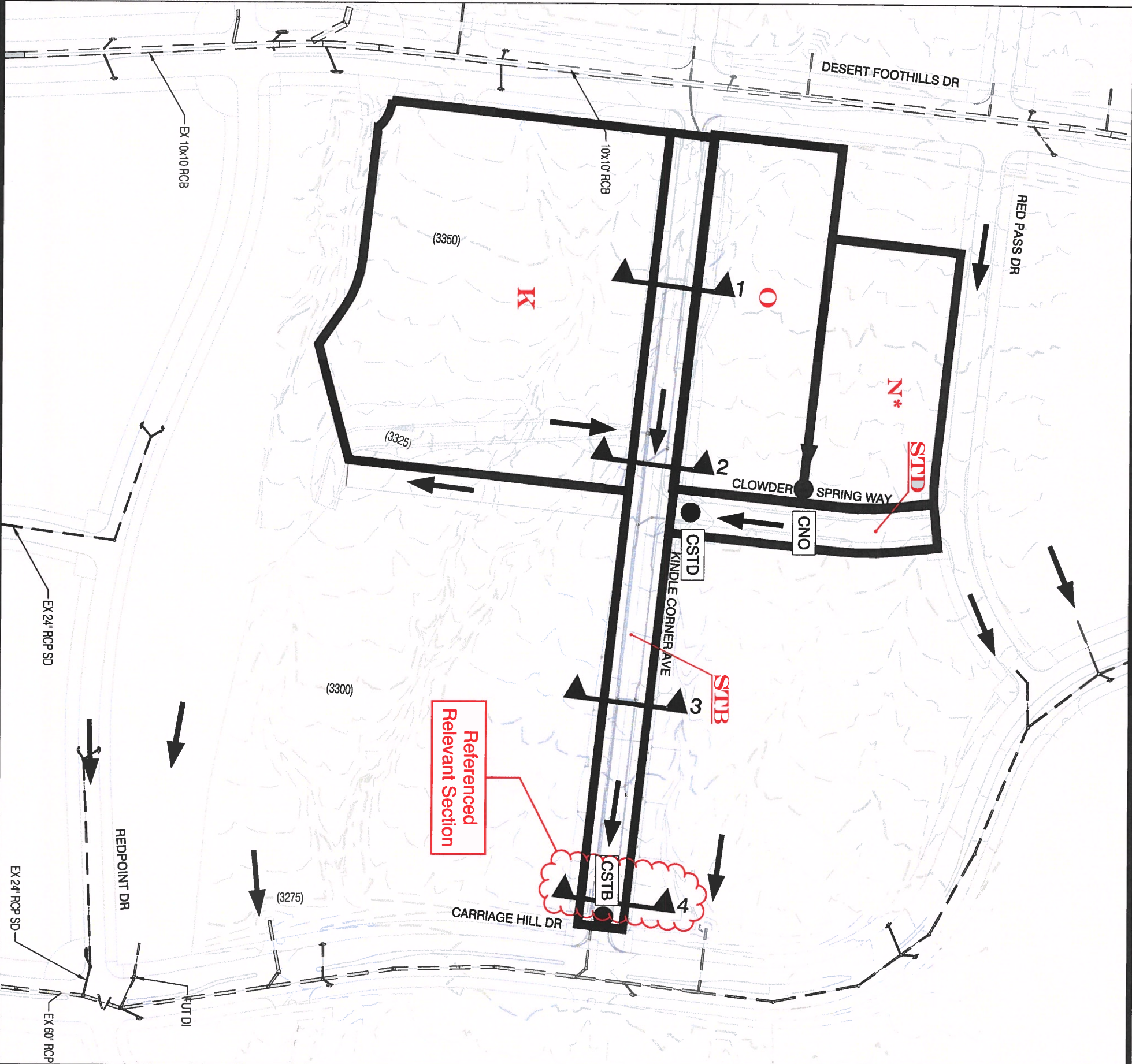


FIGURE 8: ULTIMATE CONDITION BASIN MAP
SUMMERLIN VILLAGE 21 KINDLE CORNER
DESERT FOOTHILLS TO CARRIAGE HILL

APPENDIX G

Reference Material

*Technical Drainage Study for Summerlin Village 21 Carriage Hill Drive
(Redpoint Drive to Summerlin Parkway)*
by VTN Nevada (DS 5064)

Approval Letters

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		February 14, 2019
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	COPIES TO:	
Drainage Study for:	VTN Nevada	
Summerlin West Village 21 - Carriage Hill Drive (Redpoint Drive to Summerlin Parkway)		
Cross Streets:	Carriage Hill Drive and Summerlin Parkway	The Howard Hughes Company LLC
File Number:	F:\Depot\DSMemos\DS5064B.doc	Bart Anderson, P.E., DevCo
Parcel Number:	137-26-101-001	CCRFC
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	11/13/2018 & 11/28/2018	12/6/2018	Not Approved	\$400.00	500783: \$400
2 nd Submittal	1/31/2019	2/14/2019	See Comments Below	\$400.00	502868: \$400
TOTAL FEES (LDDRS):				\$800.00	

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

1. **This drainage study is acceptable in concept;** however, *City of Las Vegas* will not formally accept the study until the *Clark County Regional Flood Control District (CCRFC)* has issued a letter of concurrence. The engineer should contact the CCRFC to confirm that they have begun their review.
2. The project proposes to build temporary drainage facilities including drainage berms/swales along the west side of the proposed *Carriage Hill Drive*. Prior to final plan 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 of Las Vegas Flood Control* for approval. Once the drainage study is conditionally approved, the engineer 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 offsite berms / channels are no longer necessary and can be removed.

1. **Second Request:** Grading Plan 3 (Sheet GR3): Provide a drop inlet on the west side of SDMH #19.
2. **Second Request:** Grading Plan 5 (Sheet GR5): Provide a drop inlet on the west side of SDMH #28.
3. Since the street and the associated storm drain facilities will eventually be accepted by the ***City of Las Vegas***, the engineer/developer must coordinate with *City of Las Vegas Streets & Sanitation Department* for their review and approval prior to the final acceptance of the subject improvement plans.
4. All offsite interim flood control facilities such as but not limited to berms/ditches and temporary sump are privately owned and to be privately maintained by the Howard Hughes Company.
5. Add a note in all pertinent sheets for the construction of all storm drain drop inlets per USDCCA Drawing No. 421 (*Stormwater Quality Management Stamp and Sign Detail*).

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

END OF REMARKS
WSP/AYS

T/R/S: T20S/R59E/S26
AREA K-26

REGIONAL FLOOD CONTROL DISTRICT



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

BOARD OF DIRECTORS

Lawrence L. Brown, III
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City of Las Vegas

Isaac Barron
City of North Las Vegas

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Dr. Lois Tarkanian
City of Las Vegas

Mayor Rodney Woodbury
City of Boulder City

March 21, 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 -
CARRIAGE HILL DRIVE (REDPOINT DR
TO SUMMERLIN PKWY)
(DS5064B) (RFCD No. 19-11221)**

Dear Mr. Kwon:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated October 31, 2018, and Addendum No. 1 dated January 30, 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 February 14, 2019.

District concurs with acceptance of this Technical Drainage Study by City of Las Vegas Department of Public Works with the following condition(s):

Per District's Uniform Regulations for the Control of Drainage, Section VIII.D.13, the Lead Entity shall provide As-Built plans or record drawings to the District after completion and final inspection of such privately installed flood control facilities that have regional flood control significance.

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.



Mr. Oh Sang Kwon, P.E.

March 20, 2019

Page 2

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.-19-11221as_built.doc

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		April 4, 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 - Carriage Hill Drive – Update #1 (Redpoint Drive to Summerlin Parkway)	
Cross Streets:	Carriage Hill Drive and Summerlin Parkway	COPIES TO:
File Number:	F:\Depot\DSMemos\DS5064C.doc	VTN Nevada
Parcel Number:	137-26-101-001	The Howard Hughes Company LLC
Zoning Action:		Bart Anderson, P.E., DevCo
FEMA Flood Zone	YES	NO ☒
Proposed Storm Drain	YES ☒	NO
		CCRFCD

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	11/13/2018 & 11/28/2018	12/6/2018	Not Approved	\$400.00	500783: \$400
2 nd Submittal	1/31/2019	2/14/2019	Conditional Approval	\$400.00	502868: \$400
3 rd Submittal & CCRFCD	3/14/2019 & 3/21/2019	4/4/2019	Concurrence Recv'd	\$100.00	503994: \$100
			TOTAL FEES (LDDRS):	\$900.00	----

REMARKS:

3rd Submittal: Update #1 to upsize a 24"-lateral at Station 28+49.39 to a 30"-RCP

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

☒	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.

- The project proposes to build temporary drainage facilities including drainage berms/swales along the west side of the proposed *Carriage Hill Drive*. Prior to final plan 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 of Las Vegas Flood Control* for approval. Once the drainage study is conditionally approved, the engineer 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 offsite berms / channels are no longer necessary and can be removed.

1. Since the street and the associated storm drain facilities will eventually be accepted by the **City of Las Vegas**, the engineer/developer must coordinate with *City of Las Vegas Streets & Sanitation Department* for their review and approval prior to the final acceptance of the subject improvement plans.
2. All offsite interim flood control facilities such as but not limited to berms/ditches and temporary sump are privately owned and to be privately maintained by the *Howard Hughes Company*.
3. Add a note in all pertinent sheets for the construction of all storm drain drop inlets per USDCCA Drawing No. 421 (*Stormwater Quality Management Stamp and Sign Detail*).

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: T20S/R59E/S26
AREA K-26

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		August 14, 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 - Carriage Hill Drive – Update #2 (Redpoint Drive to Summerlin Parkway)	
Cross Streets:	Carriage Hill Drive and Summerlin Parkway	COPIES TO:
File Number:	F:\Depot\DSMemos\DS5064D.doc	VTN Nevada
Parcel Number:	137-26-101-001	The Howard Hughes Company LLC
Zoning Action:		Bart Anderson, P.E., DevCo
FEMA Flood Zone	YES	CCRFCD
	NO	
Proposed Storm Drain	YES X	
	NO	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	11/13/2018 & 11/28/2018	12/6/2018	Not Approved	\$400.00	500783: \$400
2 nd Submittal	1/31/2019	2/14/2019	Conditional Approval	\$400.00	502868: \$400
3 rd Submittal & CCRFCD	3/14/2019 & 3/21/2019	4/4/2019	Concurrence Recv'd	\$100.00	503994: \$100
4 th Submittal	8/1/2019	8/14/2019	See Comments Below	\$100.00	3511198: \$100
TOTAL FEES (LDDRS):				\$1,000.00	----

REMARKS:

Land Development: The special structural design and calculations for the Modified Type A D.I. must be approved prior to the Improvement Plans Approval

4th Submittal: Update #2 to revise a DI from Type CM to Type A (mod.) and Two laterals material

3rd Submittal: Update #1 to upsize a 24"-lateral at Station 28+49.39 to a 30"-RCP

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 following conditions are repeated until they are complete:

- The project proposes to build temporary drainage facilities including drainage berms/swales along the west side of the proposed *Carriage Hill Drive*. Prior to final plan 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 of Las Vegas Flood Control* for approval. Once the drainage study is conditionally approved, the engineer 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 offsite berms / channels are no longer necessary and can be removed.

2. Since the street and the associated storm drain facilities will eventually be accepted by the **City of Las Vegas**, the engineer/developer must coordinate with *City of Las Vegas Streets & Sanitation Department* for their review and approval prior to the final acceptance of the subject improvement plans.
3. All offsite interim flood control facilities such as but not limited to berms/ditches and temporary sump are privately owned and to be privately maintained by the *Howard Hughes Company*.
4. Add a note in all pertinent sheets for the construction of all storm drain drop inlets per USDCCA Drawing No. 421 (*Stormwater Quality Management Stamp and Sign Detail*).

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: T20S/R59E/S26
AREA K-26

Storm Drain Hydraulic Computations

Addendum #1 to the Technical Drainage Study for

Summerlin West Village 21 Carriage Hill Drive (Redpoint Drive to Summerlin Parkway) *Las Vegas, Nevada*

Prepared for:

Howard Hughes Company, LLC

Submitted to:

City of Las Vegas
Public Works



T1 Summerlin West Village 21

T2 Carriage Hill Drive (Redpoint Drive to Summerlin Parkway)

T3 MAINLINE - ULTIMATE CONDITION

SO	1000.00	3251.510	7	.013			3260.203		
R	1070.41	3252.710	7	.013				-33.00	
JX	1070.41	3252.710	7	2	1.013	26.00	2.00	3252.710	83.0 4.0
R	1340.10	3254.319	7	.013					
JX	1340.10	3254.319	7	4	.013	42.00		3254.319	45.0
R	1439.10	3255.774	7	.013					
JX	1439.10	3255.774	7	1	1.013	2.50	2.50	3255.774	82.0 47.0
R	1566.31	3257.644	7	.013					7.00
R	1748.61	3260.324	7	.013					8.00
R	1897.59	3262.514	7	.013					
JX	1897.59	3262.514	7	3	.013	68.50		3262.514	46.0
R	1983.87	3263.782	5	.013					
JX	1983.87	3263.782	5	1	.013	2.50		3263.782	45.0
R	2118.21	3265.757	5	.013					
JX	2118.21	3265.757	5	3	.013	32.00		3265.757	90.0
R	2252.85	3270.039	2	.013					-18.00
R	2409.89	3275.032	2	.013					-25.00
R	2503.88	3278.026	2	.013					
JX	2503.88	3278.026	2	1	1.013	3.00	3.00	3278.026	62.0 34.0
R	2567.14	3281.442	2	.013					-25.00
R	2732.11	3290.350	2	.013					-6.00
R	2979.62	3303.716	2	.013					30.00
JX	2979.62	3303.716	2	1	.013	11.00		3303.716	23.0
R	3140.80	3315.998	2	.013					15.00
JX	3140.80	3315.998	2	1	.013	1.00	23.00	3315.998	61.0 75.0
R	3329.48	3317.885	2	.013					
SH	3329.48	3317.885	2	.013					
CD	1	4	0	0.00	2.00	0.00	0.00	0.00	
CD	2	4	0	0.00	2.50	0.00	0.00	0.00	
CD	3	4	0	0.00	3.00	0.00	0.00	0.00	
CD	4	4	0	0.00	3.50	0.00	0.00	0.00	
CD	5	4	0	0.00	4.00	0.00	0.00	0.00	
CD	6	4	0	0.00	4.50	0.00	0.00	0.00	
CD	7	4	0	0.00	5.00	0.00	0.00	0.00	
Q									31.000

Project Site Lateral

Summerlin West Village 21
Carriage Hill Drive (Redpoint Drive to Summerlin Parkway)
MAINLINE - ULTIMATE CONDITION

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	3251.510	8.693	3260.203	250.00	12.73	2.52	3262.72	.00	4.42	.00	5.000	.000	.00	0 .0
70.410	.0170					.0092	.65	8.69	.00	3.19	.013	.00	.00	PIPE
1070.410	3252.710	8.416	3261.126	250.00	12.73	2.52	3263.64	.00	4.42	.00	5.000	.000	.00	0 .0
JUNCT STR	.0000					.0082	.00	8.42	.00	.013	.00	.00	.00	PIPE
1070.410	3252.710	9.452	3262.162	222.00	11.31	1.98	3264.15	.00	4.22	.00	5.000	.000	.00	0 .0
269.690	.0060					.0073	1.96	9.45	.00	5.00	.013	.00	.00	PIPE
1340.100	3254.319	9.802	3264.121	222.00	11.31	1.98	3266.11	.00	4.22	.00	5.000	.000	.00	0 .0
JUNCT STR	.0000					.0060	.00	9.80	.00	.013	.00	.00	.00	PIPE
1340.100	3254.319	10.957	3265.276	180.00	9.17	1.30	3266.58	.00	3.84	.00	5.000	.000	.00	0 .0
99.000	.0147					.0048	.47	10.96	.00	2.70	.013	.00	.00	PIPE
1439.100	3255.774	9.975	3265.749	180.00	9.17	1.30	3267.05	.00	3.84	.00	5.000	.000	.00	0 .0
JUNCT STR	.0000					.0046	.00	9.98	.00	.013	.00	.00	.00	PIPE
1439.100	3255.774	10.116	3265.890	175.00	8.91	1.23	3267.12	.00	3.79	.00	5.000	.000	.00	0 .0
127.210	.0147					.0045	.57	10.12	.00	2.66	.013	.00	.00	PIPE
1566.310	3257.644	8.848	3266.492	175.00	8.91	1.23	3267.73	.00	3.79	.00	5.000	.000	.00	0 .0
182.300	.0147					.0045	.82	8.85	.00	2.66	.013	.00	.00	PIPE
1748.610	3260.324	7.024	3267.348	175.00	8.91	1.23	3268.58	.00	3.79	.00	5.000	.000	.00	0 .0
148.980	.0147					.0045	.67	7.02	.00	2.66	.013	.00	.00	PIPE

Project Site Lateral
Mainline HGL

Summerlin West Village 21
Carriage Hill Drive (Redpoint Drive to Summerlin Parkway)
MAINLINE - ULTIMATE CONDITION

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
1897.590	3262.514	5.507	3268.021	175.00	8.91	1.23	3269.25	.00	3.79	.00	5.000	.000	.00	0 .0
JUNCT STR	.0000					.0031	.00	5.51	.00	.013	.00	.00	.00	PIPE
1897.590	3262.514	6.331	3268.845	106.50	8.48	1.12	3269.96	.00	3.12	.00	4.000	.000	.00	0 .0
86.280	.0147					.0055	.47	6.33	.00	2.26	.013	.00	.00	PIPE
1983.870	3263.782	5.537	3269.319	106.50	8.48	1.12	3270.43	.00	3.12	.00	4.000	.000	.00	0 .0
JUNCT STR	.0000					.0054	.00	5.54	.00	.013	.00	.00	.00	PIPE
1983.870	3263.782	5.637	3269.419	104.00	8.28	1.06	3270.48	.00	3.09	.00	4.000	.000	.00	0 .0
134.340	.0147					.0052	.70	5.64	.00	2.23	.013	.00	.00	PIPE
2118.210	3265.757	4.366	3270.123	104.00	8.28	1.06	3271.19	.00	3.09	.00	4.000	.000	.00	0 .0
JUNCT STR	.0000					.0039	.00	4.37	.00	.013	.00	.00	.00	PIPE
2118.210	3265.757	5.474	3271.231	72.00	14.67	3.34	3274.57	.00	2.45	.00	2.500	.000	.00	0 .0
134.640	.0318					.0308	4.15	5.47	.00	2.01	.013	.00	.00	PIPE
2252.850	3270.039	5.539	3275.578	72.00	14.67	3.34	3278.92	.00	2.45	.00	2.500	.000	.00	0 .0
157.040	.0318					.0308	4.84	5.54	.00	2.01	.013	.00	.00	PIPE

CARR-SUM-ULT.OUT

2409.890	3275.032	5.660	3280.692	72.00	14.67	3.34	3284.03	.00	2.45	.00	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
93.990	.0319					.0308	2.90	5.66	.00	2.01	.013	.00	.00	PIPE	
2503.880	3278.026	5.563	3283.588	72.00	14.67	3.34	3286.93	.00	2.45	.00	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0000					.0284	.00	5.56	.00		.013	.00	.00	PIPE	

▲ FILE: CARR-SUM-ULT.WSW W S P G W - CIVILDESIGN Version 14.05 PAGE 3

Program Package Serial Number: 1513

WATER SURFACE PROFILE LISTING

Date: 1-17-2019 Time: 2:54:21

Summerlin West Village 21

Carriage Hill Drive (Redpoint Drive to Summerlin Parkway)

MAINLINE - ULTIMATE CONDITION

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
2503.880	3278.026	6.606	3284.632	66.00	13.45	2.81	3287.44	.00	2.43	.00	2.500	.000	.00	0 .0
63.260	.0540					.0259	1.64	6.61	.00	1.53	.013	.00	.00	PIPE
2567.140	3281.442	5.060	3286.501	66.00	13.45	2.81	3289.31	.00	2.43	.00	2.500	.000	.00	0 .0
9.121	.0540					.0259	.24	5.06	.00	1.53	.013	.00	.00	PIPE
2576.261	3281.934	4.807	3286.741	66.00	13.45	2.81	3289.55	.00	2.43	.00	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
HYDRAULIC JUMP														
2576.261	3281.934	1.531	3283.465	66.00	20.95	6.82	3290.28	.00	2.43	2.44	2.500	.000	.00	0 .0
155.849	.0540					.0537	8.37	1.53	3.25	1.53	.013	.00	.00	PIPE
2732.110	3290.350	1.535	3291.885	66.00	20.88	6.77	3298.66	.00	2.43	2.43	2.500	.000	.00	0 .0
152.133	.0540					.0510	7.76	1.53	3.23	1.53	.013	.00	.00	PIPE
2884.244	3298.565	1.585	3300.151	66.00	20.10	6.27	3306.43	.00	2.43	2.41	2.500	.000	.00	0 .0
61.691	.0540					.0458	2.83	1.59	3.03	1.53	.013	.00	.00	PIPE
2945.935	3301.897	1.652	3303.549	66.00	19.17	5.70	3309.25	.00	2.43	2.37	2.500	.000	.00	0 .0
33.686	.0540					.0408	1.37	1.65	2.80	1.53	.013	.00	.00	PIPE
2979.620	3303.716	1.725	3305.441	66.00	18.27	5.19	3310.63	.00	2.43	2.31	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0000					.0532	.00	1.72	2.58		.013	.00	.00	PIPE
2979.620	3303.716	1.271	3304.987	55.00	21.94	7.47	3312.46	.00	2.35	2.50	2.500	.000	.00	0 .0
35.924	.0762					.0655	2.35	1.27	3.86	1.23	.013	.00	.00	PIPE

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WATER SURFACE PROFILE LISTING

Date: 1-17-2019 Time: 2:54:21

Summerlin West Village 21

Carriage Hill Drive (Redpoint Drive to Summerlin Parkway)

MAINLINE - ULTIMATE CONDITION

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
3015.544	3306.454	1.299	3307.753	55.00	21.33	7.06	3314.81	.00	2.35	2.50	2.500	.000	.00	0 .0
34.956	.0762					.0593	2.07	1.30	3.70	1.23	.013	.00	.00	PIPE
3050.500	3309.117	1.350	3310.467	55.00	20.33	6.42	3316.89	.00	2.35	2.49	2.500	.000	.00	0 .0
22.218	.0762					.0523	1.16	1.35	3.44	1.23	.013	.00	.00	PIPE
3072.719	3310.810	1.403	3312.213	55.00	19.39	5.84	3318.05	.00	2.35	2.48	2.500	.000	.00	0 .0
15.820	.0762					.0462	.73	1.40	3.20	1.23	.013	.00	.00	PIPE
3088.538	3312.016	1.459	3313.475	55.00	18.48	5.31	3318.78	.00	2.35	2.46	2.500	.000	.00	0 .0
11.975	.0762					.0409	.49	1.46	2.96	1.23	.013	.00	.00	PIPE
3100.514	3312.928	1.518	3314.447	55.00	17.62	4.82	3319.27	.00	2.35	2.44	2.500	.000	.00	0 .0
9.380	.0762					.0362	.34	1.52	2.75	1.23	.013	.00	.00	PIPE
3109.894	3313.643	1.581	3315.224	55.00	16.80	4.38	3319.61	.00	2.35	2.41	2.500	.000	.00	0 .0

CARR-SUMM-ULT.OUT

-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
 7.518 .0762 .0321 .24 1.58 2.54 1.23 .013 .00 .00 PIPE
 3117.412 3314.216 1.648 3315.864 55.00 16.02 3.99 3319.85 .00 2.35 2.37 2.500 .000 .00 0 .0
 -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
 6.111 .0762 .0285 .17 1.65 2.35 1.23 .013 .00 .00 PIPE
 3123.522 3314.682 1.719 3316.401 55.00 15.28 3.62 3320.02 .00 2.35 2.32 2.500 .000 .00 0 .0
 -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
 4.970 .0762 .0254 .13 1.72 2.16 1.23 .013 .00 .00 PIPE
 3128.493 3315.060 1.796 3316.856 55.00 14.57 3.29 3320.15 .00 2.35 2.25 2.500 .000 .00 0 .0
 -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
 4.030 .0762 .0227 .09 1.80 1.98 1.23 .013 .00 .00 PIPE
 ▲ FILE: CARR-SUMM-ULT.WSW W S P G W - CIVILDESIGN Version 14.05 PAGE 5
 Program Package Serial Number: 1513
 WATER SURFACE PROFILE LISTING

Date: 1-17-2019 Time: 2:54:21

Summerlin West Village 21

Carriage Hill Drive (Redpoint Drive to Summerlin Parkway)

MAINLINE - ULTIMATE CONDITION

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth |
| Elev | (FT) | Elev | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip |
L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch |
*****
3132.522 3315.367 1.880 3317.248 55.00 13.89 2.99 3320.24 .00 2.35 2.16 2.500 .000 .00 0 .0
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
3.231 .0762 .0204 .07 1.88 1.81 1.23 .013 .00 .00 PIPE
3135.754 3315.614 1.972 3317.586 55.00 13.24 2.72 3320.31 .00 2.35 2.04 2.500 .000 .00 0 .0
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
2.503 .0762 .0185 .05 1.97 1.64 1.23 .013 .00 .00 PIPE
3138.257 3315.804 2.075 3317.880 55.00 12.63 2.48 3320.35 .00 2.35 1.88 2.500 .000 .00 0 .0
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
1.754 .0762 .0169 .03 2.08 1.46 1.23 .013 .00 .00 PIPE
3140.010 3315.938 2.196 3318.134 55.00 12.04 2.25 3320.38 .00 2.35 1.63 2.500 .000 .00 0 .0
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
.790 .0762 .0159 .01 2.20 1.27 1.23 .013 .00 .00 PIPE
3140.800 3315.998 2.354 3318.352 55.00 11.47 2.04 3320.40 .00 2.35 1.17 2.500 .000 .00 0 .0
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
JUNCT STR .0000 .0106 .00 2.35 1.00 .013 .00 .00 PIPE
3140.800 3315.998 5.140 3321.138 31.00 6.32 .62 3321.76 .00 1.90 .00 2.500 .000 .00 0 .0
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
188.680 .0100 .0057 1.08 5.14 .00 1.62 .013 .00 .00 PIPE
3329.480 3317.885 4.331 3322.216 31.00 6.32 .62 3322.83 .00 1.90 .00 2.500 .000 .00 0 .0
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-

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T1 Summerlin West Village 21

T2 Carriage Hill Drive (Redpoint Drive to Summerlin Parkway)

T3 MAINLINE - INTERIM CONDITION

SO	1000.00	3251.510	7	.013			3260.203		
R	1070.41	3252.710	7	.013				-33.00	
JX	1070.41	3252.710	7	2	1.013	23.00	2.00	3252.7103252.710	83.0 4.0
R	1340.10	3254.319	7	.013					
JX	1340.10	3254.319	7	4	.013	73.00		3254.319	45.0
R	1439.10	3255.774	7	.013					
JX	1439.10	3255.774	7	1	1.013	2.50	2.50	3255.7743255.774	82.0 47.0
R	1566.31	3257.644	7	.013					7.00
R	1748.61	3260.324	7	.013					8.00
R	1897.59	3262.514	7	.013					
R	1983.87	3263.782	5	.013					
JX	1983.87	3263.782	5	1	.013	2.50		3265.782	45.0
R	2118.21	3265.757	5	.013					
JX	2118.21	3265.757	5	3	.013	61.00		3265.757	90.0
R	2252.85	3270.039	2	.013					-18.00
R	2409.89	3275.032	2	.013					-25.00
R	2503.88	3278.026	2	.013					
JX	2503.88	3278.026	2	1	1.013	3.00	3.00	3278.0263278.026	62.0 34.0
R	2567.14	3281.442	2	.013					-25.00
R	2732.11	3290.350	2	.013					-6.00
R	2979.62	3303.716	2	.013					30.00
R	3140.80	3315.998	2	.013					90.00
JX	3140.80	3315.998	2	1	.013	1.00		3315.998	61.0
R	3243.46	3320.078	2	.013					
SH	3243.46	3320.078	2	.013					
CD	1	4	0	0.00	2.00	0.00	0.00	0.00	
CD	2	4	0	0.00	2.50	0.00	0.00	0.00	
CD	3	4	0	0.00	3.00	0.00	0.00	0.00	
CD	4	4	0	0.00	3.50	0.00	0.00	0.00	
CD	5	4	0	0.00	4.00	0.00	0.00	0.00	
CD	6	4	0	0.00	4.50	0.00	0.00	0.00	
CD	7	4	0	0.00	5.00	0.00	0.00	0.00	
Q									10.000

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/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	3251.510	8.693	3260.203	183.50	9.35	1.36	3261.56	.00	3.88	.00	5.000	.000	.00	0 .0
70.410	.0170					.0050	.35	8.69	.00	2.62	.013	.00	.00	PIPE
1070.410	3252.710	7.990	3260.700	183.50	9.35	1.36	3262.06	.00	3.88	.00	5.000	.000	.00	0 .0
JUNCT STR	.0000					.0043	.00	7.99	.00	.013	.00	.00	.00	PIPE
1070.410	3252.710	8.656	3261.366	158.50	8.07	1.01	3262.38	.00	3.61	.00	5.000	.000	.00	0 .0
269.690	.0060					.0037	1.00	8.66	.00	3.35	.013	.00	.00	PIPE
1340.100	3254.319	8.046	3262.365	158.50	8.07	1.01	3263.38	.00	3.61	.00	5.000	.000	.00	0 .0
JUNCT STR	.0000					.0024	.00	8.05	.00	.013	.00	.00	.00	PIPE
1340.100	3254.319	8.861	3263.180	85.50	4.35	.29	3263.47	.00	2.62	.00	5.000	.000	.00	0 .0
99.000	.0147					.0011	.11	8.86	.00	1.78	.013	.00	.00	PIPE
1439.100	3255.774	7.513	3263.287	85.50	4.35	.29	3263.58	.00	2.62	.00	5.000	.000	.00	0 .0
JUNCT STR	.0000					.0010	.00	7.51	.00	.013	.00	.00	.00	PIPE
1439.100	3255.774	7.577	3263.351	80.50	4.10	.26	3263.61	.00	2.54	.00	5.000	.000	.00	0 .0
127.210	.0147					.0010	.12	7.58	.00	1.72	.013	.00	.00	PIPE
1566.310	3257.644	5.835	3263.479	80.50	4.10	.26	3263.74	.00	2.54	.00	5.000	.000	.00	0 .0
61.220	.0147					.0009	.06	5.83	.00	1.72	.013	.00	.00	PIPE
1627.530	3258.544	5.000	3263.544	80.50	4.10	.26	3263.80	.00	2.54	.00	5.000	.000	.00	0 .0
31.627	.0147					.0009	.03	5.00	.00	1.72	.013	.00	.00	PIPE

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/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
1659.157	3259.009	4.536	3263.545	80.50	4.30	.29	3263.83	.00	2.54	2.90	5.000	.000	.00	0 .0
17.367	.0147					.0009	.02	4.54	.30	1.72	.013	.00	.00	PIPE
1676.524	3259.264	4.267	3263.531	80.50	4.51	.32	3263.85	.00	2.54	3.54	5.000	.000	.00	0 .0
13.834	.0147					.0009	.01	4.27	.35	1.72	.013	.00	.00	PIPE
1690.359	3259.468	4.045	3263.513	80.50	4.73	.35	3263.86	.00	2.54	3.93	5.000	.000	.00	0 .0
11.723	.0147					.0010	.01	4.05	.40	1.72	.013	.00	.00	PIPE
1702.082	3259.640	3.850	3263.490	80.50	4.96	.38	3263.87	.00	2.54	4.21	5.000	.000	.00	0 .0
10.089	.0147					.0011	.01	3.85	.45	1.72	.013	.00	.00	PIPE
1712.171	3259.788	3.675	3263.463	80.50	5.20	.42	3263.88	.00	2.54	4.41	5.000	.000	.00	0 .0
5.849	.0147					.0012	.01	3.68	.49	1.72	.013	.00	.00	PIPE
1718.020	3259.874	3.570	3263.444	80.50	5.37	.45	3263.89	.00	2.54	4.52	5.000	.000	.00	0 .0
HYDRAULIC JUMP														
1718.020	3259.874	1.757	3261.631	80.50	13.07	2.65	3264.29	.00	2.54	4.77	5.000	.000	.00	0 .0
30.590	.0147					.0135	.41	1.76	2.03	1.72	.013	.00	.00	PIPE

CARR-SUMM-INT.OUT

1748.610	3260.324	1.764	3262.088	80.50	13.00	2.62	3264.71	.00	2.54	4.78	5.000	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
81.562	.0147					.0126	1.03	1.76	2.01	1.72	.013	.00	.00	PIPE	
1830.172	3261.523	1.826	3263.349	80.50	12.40	2.39	3265.74	.00	2.54	4.81	5.000	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
41.724	.0147					.0111	.46	1.83	1.88	1.72	.013	.00	.00	PIPE	

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 WATER SURFACE PROFILE LISTING

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Summerlin West Village 21
 Carriage Hill Drive (Redpoint Drive to Summerlin Parkway)
 MAINLINE - INTERIM CONDITION

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
1871.896	3262.136	1.891	3264.027	80.50	11.83	2.17	3266.20	.00	2.54	4.85	5.000	.000	.00	0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
25.694	.0147					.0097	.25	1.89	1.76	1.72	.013	.00	.00	PIPE
1897.590	3262.514	1.960	3264.474	80.50	13.15	2.68	3267.16	.00	2.72	4.00	4.000	.000	.00	0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
7.062	.0147					.0134	.09	1.96	1.87	1.91	.013	.00	.00	PIPE
1904.652	3262.618	1.963	3264.581	80.50	13.12	2.67	3267.25	.00	2.72	4.00	4.000	.000	.00	0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
79.218	.0147					.0126	1.00	1.96	1.87	1.91	.013	.00	.00	PIPE
1983.870	3263.782	2.038	3265.820	80.50	12.51	2.43	3268.25	.00	2.72	4.00	4.000	.000	.00	0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0000					.0122	.00	2.04	1.74		.013	.00	.00	PIPE
1983.870	3263.782	1.962	3265.744	78.00	12.73	2.51	3268.26	.00	2.67	4.00	4.000	.000	.00	0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
49.313	.0147					.0119	.59	1.96	1.81	1.88	.013	.00	.00	PIPE
2033.183	3264.507	2.027	3266.534	78.00	12.20	2.31	3268.85	.00	2.67	4.00	4.000	.000	.00	0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
32.252	.0147					.0106	.34	2.03	1.70	1.88	.013	.00	.00	PIPE
2065.435	3264.981	2.105	3267.086	78.00	11.64	2.10	3269.19	.00	2.67	3.99	4.000	.000	.00	0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
20.378	.0147					.0093	.19	2.11	1.58	1.88	.013	.00	.00	PIPE
2085.813	3265.281	2.187	3267.468	78.00	11.09	1.91	3269.38	.00	2.67	3.98	4.000	.000	.00	0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
13.597	.0147					.0082	.11	2.19	1.47	1.88	.013	.00	.00	PIPE
2099.410	3265.481	2.273	3267.754	78.00	10.58	1.74	3269.49	.00	2.67	3.96	4.000	.000	.00	0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
9.029	.0147					.0073	.07	2.27	1.37	1.88	.013	.00	.00	PIPE

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Summerlin West Village 21
 Carriage Hill Drive (Redpoint Drive to Summerlin Parkway)
 MAINLINE - INTERIM CONDITION

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
2108.439	3265.614	2.364	3267.978	78.00	10.09	1.58	3269.56	.00	2.67	3.93	4.000	.000	.00	0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
5.644	.0147					.0064	.04	2.36	1.27	1.88	.013	.00	.00	PIPE
2114.083	3265.697	2.461	3268.158	78.00	9.62	1.44	3269.59	.00	2.67	3.89	4.000	.000	.00	0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3.175	.0147					.0057	.02	2.46	1.17	1.88	.013	.00	.00	PIPE
2117.258	3265.743	2.563	3268.306	78.00	9.17	1.31	3269.61	.00	2.67	3.84	4.000	.000	.00	0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.952	.0147					.0051	.00	2.56	1.09	1.88	.013	.00	.00	PIPE
2118.210	3265.757	2.674	3268.431	78.00	8.74	1.19	3269.62	.00	2.67	3.77	4.000	.000	.00	0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0000					.0025	.00	2.67	1.00		.013	.00	.00	PIPE
2118.210	3265.757	4.577	3270.334	17.00	3.46	.19	3270.52	.00	1.39	.00	2.500	.000	.00	0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
69.405	.0318					.0017	.12	4.58	.00	.82	.013	.00	.00	PIPE
2187.615	3267.964	2.500	3270.464	17.00	3.46	.19	3270.65	.00	1.39	.00	2.500	.000	.00	0

CARR-SUMM-INT.OUT															
7.027	.0318					.0016	.01	2.50	.00	.82	.013	.00	.00	PIPE	
2194.642	3268.188	2.268	3270.456	17.00	3.63	.20	3270.66	.00	1.39	1.45	2.500	.000	.00	0	.0
.389	.0318					.0015	.00	2.27	.36	.82	.013	.00	.00	PIPE	
2195.031	3268.200	2.255	3270.455	17.00	3.65	.21	3270.66	.00	1.39	1.49	2.500	.000	.00	0	.0
HYDRAULIC JUMP															
2195.031	3268.200	.820	3269.020	17.00	12.14	2.29	3271.31	.00	1.39	2.35	2.500	.000	.00	0	.0
57.819	.0318					.0318	1.84	.82	2.77	.82	.013	.00	.00	PIPE	

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Summerlin West Village 21

Carriage Hill Drive (Redpoint Drive to Summerlin Parkway)

MAINLINE - INTERIM CONDITION

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
2252.850	3270.039	.820	3270.859	17.00	12.14	2.29	3273.15	.00	1.39	2.35	2.500	.000	.00	0
66.311	.0318					.0318	2.11	.82	2.77	.82	.013	.00	.00	PIPE
2319.161	3272.147	.820	3272.967	17.00	12.14	2.29	3275.25	.00	1.39	2.35	2.500	.000	.00	0
90.729	.0318					.0302	2.74	.82	2.77	.82	.013	.00	.00	PIPE
2409.890	3275.032	.842	3275.875	17.00	11.69	2.12	3278.00	.00	1.39	2.36	2.500	.000	.00	0
29.830	.0319					.0272	.81	.84	2.63	.82	.013	.00	.00	PIPE
2439.720	3275.983	.867	3276.850	17.00	11.24	1.96	3278.81	.00	1.39	2.38	2.500	.000	.00	0
18.966	.0319					.0241	.46	.87	2.48	.82	.013	.00	.00	PIPE
2458.686	3276.587	.898	3277.485	17.00	10.71	1.78	3279.27	.00	1.39	2.40	2.500	.000	.00	0
12.114	.0319					.0211	.26	.90	2.32	.82	.013	.00	.00	PIPE
2470.800	3276.972	.930	3277.903	17.00	10.21	1.62	3279.52	.00	1.39	2.42	2.500	.000	.00	0
8.570	.0319					.0185	.16	.93	2.17	.82	.013	.00	.00	PIPE
2479.370	3277.245	.963	3278.208	17.00	9.74	1.47	3279.68	.00	1.39	2.43	2.500	.000	.00	0
6.335	.0319					.0162	.10	.96	2.03	.82	.013	.00	.00	PIPE
2485.705	3277.447	.998	3278.445	17.00	9.29	1.34	3279.78	.00	1.39	2.45	2.500	.000	.00	0
4.816	.0319					.0143	.07	1.00	1.89	.82	.013	.00	.00	PIPE
2490.521	3277.601	1.035	3278.636	17.00	8.85	1.22	3279.85	.00	1.39	2.46	2.500	.000	.00	0
3.759	.0319					.0125	.05	1.04	1.77	.82	.013	.00	.00	PIPE

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Summerlin West Village 21

Carriage Hill Drive (Redpoint Drive to Summerlin Parkway)

MAINLINE - INTERIM CONDITION

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
2494.280	3277.720	1.073	3278.793	17.00	8.44	1.11	3279.90	.00	1.39	2.47	2.500	.000	.00	0
2.954	.0319					.0110	.03	1.07	1.65	.82	.013	.00	.00	PIPE
2497.234	3277.814	1.112	3278.926	17.00	8.05	1.01	3279.93	.00	1.39	2.48	2.500	.000	.00	0
2.229	.0319					.0097	.02	1.11	1.54	.82	.013	.00	.00	PIPE
2499.463	3277.885	1.154	3279.039	17.00	7.67	.91	3279.95	.00	1.39	2.49	2.500	.000	.00	0
1.719	.0319					.0085	.01	1.15	1.43	.82	.013	.00	.00	PIPE
2501.182	3277.940	1.197	3279.137	17.00	7.32	.83	3279.97	.00	1.39	2.50	2.500	.000	.00	0

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1.255	.0319					.0075	.01	1.20	1.34	.82	.013	.00	.00	PIPE
2502.437	3277.980	1.242	3279.222	17.00	6.98	.76	3279.98	.00	1.39	2.50	2.500	.000	.00	0 .0
.820	.0319					.0066	.01	1.24	1.25	.82	.013	.00	.00	PIPE
2503.256	3278.006	1.290	3279.296	17.00	6.65	.69	3279.98	.00	1.39	2.50	2.500	.000	.00	0 .0
.479	.0319					.0058	.00	1.29	1.16	.82	.013	.00	.00	PIPE
2503.735	3278.021	1.340	3279.361	17.00	6.34	.62	3279.99	.00	1.39	2.49	2.500	.000	.00	0 .0
.145	.0319					.0051	.00	1.34	1.08	.82	.013	.00	.00	PIPE
2503.880	3278.026	1.394	3279.420	17.00	6.04	.57	3279.99	.00	1.39	2.48	2.500	.000	.00	0 .0
JUNCT STR	.0000					.0028	.00	1.39	1.00		.013	.00	.00	PIPE
2503.880	3278.026	2.011	3280.037	11.00	2.60	.10	3280.14	.00	1.11	1.98	2.500	.000	.00	0 .0
.622	.0540					.0008	.00	2.01	.31	.57	.013	.00	.00	PIPE

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Summerlin West Village 21

Carriage Hill Drive (Redpoint Drive to Summerlin Parkway)

MAINLINE - INTERIM CONDITION

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/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
2504.502	3278.060	1.974	3280.033	11.00	2.65	.11	3280.14	.00	1.11	2.04	2.500	.000	.00	0 .0
HYDRAULIC JUMP														
2504.502	3278.060	.573	3278.633	11.00	12.95	2.60	3281.24	.00	1.11	2.10	2.500	.000	.00	0 .0
62.638	.0540					.0540	3.38	.57	3.59	.57	.013	.00	.00	PIPE
2567.140	3281.442	.573	3282.015	11.00	12.95	2.60	3284.62	.00	1.11	2.10	2.500	.000	.00	0 .0
164.970	.0540					.0540	8.91	.57	3.59	.57	.013	.00	.00	PIPE
2732.110	3290.350	.573	3290.923	11.00	12.95	2.60	3293.53	.00	1.11	2.10	2.500	.000	.00	0 .0
138.014	.0540					.0540	7.45	.57	3.59	.57	.013	.00	.00	PIPE
2870.124	3297.803	.573	3298.376	11.00	12.95	2.60	3300.98	.00	1.11	2.10	2.500	.000	.00	0 .0
62.586	.0540					.0561	3.51	.57	3.59	.57	.013	.00	.00	PIPE
2932.710	3301.183	.562	3301.745	11.00	13.30	2.75	3304.49	.00	1.11	2.09	2.500	.000	.00	0 .0
30.583	.0540					.0624	1.91	.56	3.72	.57	.013	.00	.00	PIPE
2963.292	3302.834	.544	3303.378	11.00	13.95	3.02	3306.40	.00	1.11	2.06	2.500	.000	.00	0 .0
16.328	.0540					.0714	1.17	.54	3.97	.57	.013	.00	.00	PIPE
2979.620	3303.716	.526	3304.243	11.00	14.63	3.32	3307.56	.00	1.11	2.04	2.500	.000	.00	0 .0
9.098	.0762					.0762	.69	.53	4.24	.53	.013	.00	.00	PIPE
2988.718	3304.410	.526	3304.936	11.00	14.63	3.32	3308.26	.00	1.11	2.04	2.500	.000	.00	0 .0
59.363	.0762					.0754	4.48	.53	4.24	.53	.013	.00	.00	PIPE

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Summerlin West Village 21

Carriage Hill Drive (Redpoint Drive to Summerlin Parkway)

MAINLINE - INTERIM CONDITION

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/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
3048.081	3308.933	.529	3309.462	11.00	14.51	3.27	3312.73	.00	1.11	2.04	2.500	.000	.00	0 .0
44.207	.0762					.0699	3.09	.53	4.20	.53	.013	.00	.00	PIPE
3092.288	3312.302	.547	3312.849	11.00	13.84	2.97	3315.82	.00	1.11	2.07	2.500	.000	.00	0 .0
16.665	.0762					.0611	1.02	.55	3.93	.53	.013	.00	.00	PIPE

CARR-SUM-INT.OUT

3108.953	3313.572	.565	3314.137	11.00	13.20	2.70	3316.84	.00	1.11	2.09	2.500	.000	.00	0	.00
9.891	.0762	-	-	-	-	.0534	.53	.57	3.68	.53	.013	.00	.00	PIPE	
3118.844	3314.325	.585	3314.910	11.00	12.58	2.46	3317.37	.00	1.11	2.12	2.500	.000	.00	0	.00
6.893	.0762	-	-	-	-	.0467	.32	.59	3.45	.53	.013	.00	.00	PIPE	
3125.737	3314.850	.605	3315.455	11.00	12.00	2.23	3317.69	.00	1.11	2.14	2.500	.000	.00	0	.00
5.174	.0762	-	-	-	-	.0408	.21	.61	3.23	.53	.013	.00	.00	PIPE	
3130.911	3315.245	.625	3315.870	11.00	11.44	2.03	3317.90	.00	1.11	2.17	2.500	.000	.00	0	.00
4.014	.0762	-	-	-	-	.0357	.14	.63	3.02	.53	.013	.00	.00	PIPE	
3134.926	3315.551	.647	3316.198	11.00	10.91	1.85	3318.04	.00	1.11	2.19	2.500	.000	.00	0	.00
3.243	.0762	-	-	-	-	.0312	.10	.65	2.83	.53	.013	.00	.00	PIPE	
3138.168	3315.798	.669	3316.467	11.00	10.40	1.68	3318.15	.00	1.11	2.21	2.500	.000	.00	0	.00
2.632	.0762	-	-	-	-	.0273	.07	.67	2.65	.53	.013	.00	.00	PIPE	
3140.800	3315.998	.693	3316.691	11.00	9.91	1.53	3318.22	.00	1.11	2.24	2.500	.000	.00	0	.00
JUNCT STR	.0000	-	-	-	-	.0320	.00	.69	2.48	.013	.00	.00	.00	PIPE	

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Program Package Serial Number: 1513

WATER SURFACE PROFILE LISTING

Date: 1-30-2019 Time: 8:31:53

Summerlin West Village 21

Carriage Hill Drive (Redpoint Drive to Summerlin Parkway)

MAINLINE - INTERIM CONDITION

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
3140.800	3315.998	.595	3316.593	10.00	11.16	1.94	3318.53	.00	1.06	2.13	2.500	.000	.00	0
32.978	.0397	-	-	-	-	.0371	1.22	.60	3.03	.59	.013	.00	.00	PIPE
3173.778	3317.309	.606	3317.915	10.00	10.88	1.84	3319.75	.00	1.06	2.14	2.500	.000	.00	0
23.668	.0397	-	-	-	-	.0335	.79	.61	2.93	.59	.013	.00	.00	PIPE
3197.446	3318.249	.626	3318.875	10.00	10.38	1.67	3320.55	.00	1.06	2.17	2.500	.000	.00	0
12.461	.0397	-	-	-	-	.0293	.37	.63	2.74	.59	.013	.00	.00	PIPE
3209.907	3318.744	.648	3319.393	10.00	9.89	1.52	3320.91	.00	1.06	2.19	2.500	.000	.00	0
8.238	.0397	-	-	-	-	.0256	.21	.65	2.57	.59	.013	.00	.00	PIPE
3218.144	3319.072	.670	3319.742	10.00	9.43	1.38	3321.12	.00	1.06	2.21	2.500	.000	.00	0
5.871	.0397	-	-	-	-	.0224	.13	.67	2.40	.59	.013	.00	.00	PIPE
3224.015	3319.305	.694	3319.999	10.00	8.99	1.26	3321.26	.00	1.06	2.24	2.500	.000	.00	0
4.486	.0397	-	-	-	-	.0196	.09	.69	2.25	.59	.013	.00	.00	PIPE
3228.501	3319.483	.718	3320.201	10.00	8.57	1.14	3321.34	.00	1.06	2.26	2.500	.000	.00	0
3.494	.0397	-	-	-	-	.0172	.06	.72	2.10	.59	.013	.00	.00	PIPE
3231.995	3319.622	.743	3320.365	10.00	8.18	1.04	3321.40	.00	1.06	2.29	2.500	.000	.00	0
2.768	.0397	-	-	-	-	.0150	.04	.74	1.97	.59	.013	.00	.00	PIPE
3234.764	3319.732	.769	3320.501	10.00	7.80	.94	3321.45	.00	1.06	2.31	2.500	.000	.00	0
2.213	.0397	-	-	-	-	.0132	.03	.77	1.84	.59	.013	.00	.00	PIPE

FILE: CARR-SUM-INT.WSW

W S P G W - CIVILDESIGN Version 14.05

PAGE 10

Program Package Serial Number: 1513

WATER SURFACE PROFILE LISTING

Date: 1-30-2019 Time: 8:31:53

Summerlin West Village 21

Carriage Hill Drive (Redpoint Drive to Summerlin Parkway)

MAINLINE - INTERIM CONDITION

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

CARR-SUM-INT.OUT														
3236.976	3319.820	.796	3320.616	10.00	7.43	.86	3321.47	.00	1.06	2.33	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.772	.0397					.0115	.02	.80	1.72	.59	.013	.00	.00	PIPE
3238.749	3319.891	.824	3320.715	10.00	7.09	.78	3321.49	.00	1.06	2.35	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.414	.0397					.0101	.01	.82	1.61	.59	.013	.00	.00	PIPE
3240.162	3319.947	.853	3320.800	10.00	6.76	.71	3321.51	.00	1.06	2.37	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.115	.0397					.0089	.01	.85	1.51	.59	.013	.00	.00	PIPE
3241.277	3319.991	.883	3320.874	10.00	6.44	.64	3321.52	.00	1.06	2.39	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.831	.0397					.0078	.01	.88	1.41	.59	.013	.00	.00	PIPE
3242.109	3320.024	.915	3320.939	10.00	6.14	.59	3321.53	.00	1.06	2.41	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.615	.0397					.0068	.00	.92	1.32	.59	.013	.00	.00	PIPE
3242.724	3320.049	.948	3320.997	10.00	5.86	.53	3321.53	.00	1.06	2.43	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.427	.0397					.0060	.00	.95	1.23	.59	.013	.00	.00	PIPE
3243.151	3320.066	.982	3321.048	10.00	5.58	.48	3321.53	.00	1.06	2.44	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.232	.0397					.0052	.00	.98	1.15	.59	.013	.00	.00	PIPE
3243.383	3320.075	1.018	3321.093	10.00	5.32	.44	3321.53	.00	1.06	2.46	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.077	.0397					.0046	.00	1.02	1.07	.59	.013	.00	.00	PIPE
3243.460	3320.078	1.056	3321.134	10.00	5.07	.40	3321.53	.00	1.06	2.47	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(D+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
3265.28	3254.32	10.96	1.98	3.5	2.740	3265.278	0.28	3265.54

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

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

STANDARD FORM 6

DEVELOPMENT: Carriage Hill (Redpoint to Summerlin Pkwy)

CALCULATED BY: JYA WGS 7851-3.5

STORM DRAIN SEGMENT: Lateral 5

DESCRIPTION: 100-Year Ultimate Condition

Phi Index

n Value	Phi
0.013	0.004925

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

"Equivalent Round Size of 53"x34" HERPC																													
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 (ft/s)	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+33.14	3.5	3254.32	3255.21	33.14	10.20	0.00492	42.9	2.67	4.12	0.28	0.00155	0.00155	0.05						0.05	3265.59	3265.33	Yes	3258.97	3265.59	3265.33	
2	MH	10+33.14	10+33.14	3.5	3255.21	3255.21	0.00	10.20	0.00492	42.0	N/A	4.12	0.28	0.00155	0.00155	0.00		0.10				0.10	3265.69	3265.43	Yes	3258.97	3265.69	3265.43	
3	PIPE	10+33.14	11+28.84	3.5	3255.21	3258.71	85.50	10.20	0.00492	42.0	3.75	4.12	0.28	0.00155	0.00155	0.14						0.14	3265.64	3265.57	Yes	3262.47	3265.64	3265.57	
4	STUB	11+28.84	11+28.84	3.5	3258.71	3258.71	0.00	10.20	0.00492	42.0	N/A	4.12	0.28	0.00155	0.00155	0.00						0.00	3265.64	3265.57				3265.57	

Manholes/Transition Losses

Segment Number	Straight Through Manhole				Junction Manhole				Bend Losses				Inlet Losses			
	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	45	0.385	0.283	0.101												
3																
4																

HGL Criteria Check			
Segment Description	TMH Elevation	Cover (ft)	Criteria Met?
PIPE			
MH	3269.959	4.530	Yes
PIPE			
STUB	3273.5	7.927	Yes

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

Starting
Downstream HGL
for Proposed SD
System

1/31/2019

Standard Form 6 - Ultimate Condition.xls

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 73 cfs

Maximum Flow: 73 cfs

Table 1 - Summary of Culvert Flows at Crossing: Lateral 5

Headwater Elevation (ft)	Total Discharge (cfs)	Lateral 5 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
3263.70	0.00	0.00	0.00	1
3263.71	7.30	7.30	0.00	1
3263.76	14.60	14.60	0.00	1
3263.84	21.90	21.90	0.00	1
3263.96	29.20	29.20	0.00	1
3264.11	36.50	36.50	0.00	1
3264.29	43.80	43.80	0.00	1
3264.50	51.10	51.10	0.00	1
3264.75	58.40	58.40	0.00	1
3265.03	65.70	65.70	0.00	1
3265.34	73.00	73.00	0.00	1
3273.50	176.80	176.80	0.00	Overtopping

Rating Curve Plot for Crossing: Lateral 5

Total Rating Curve

Crossing: Lateral 5

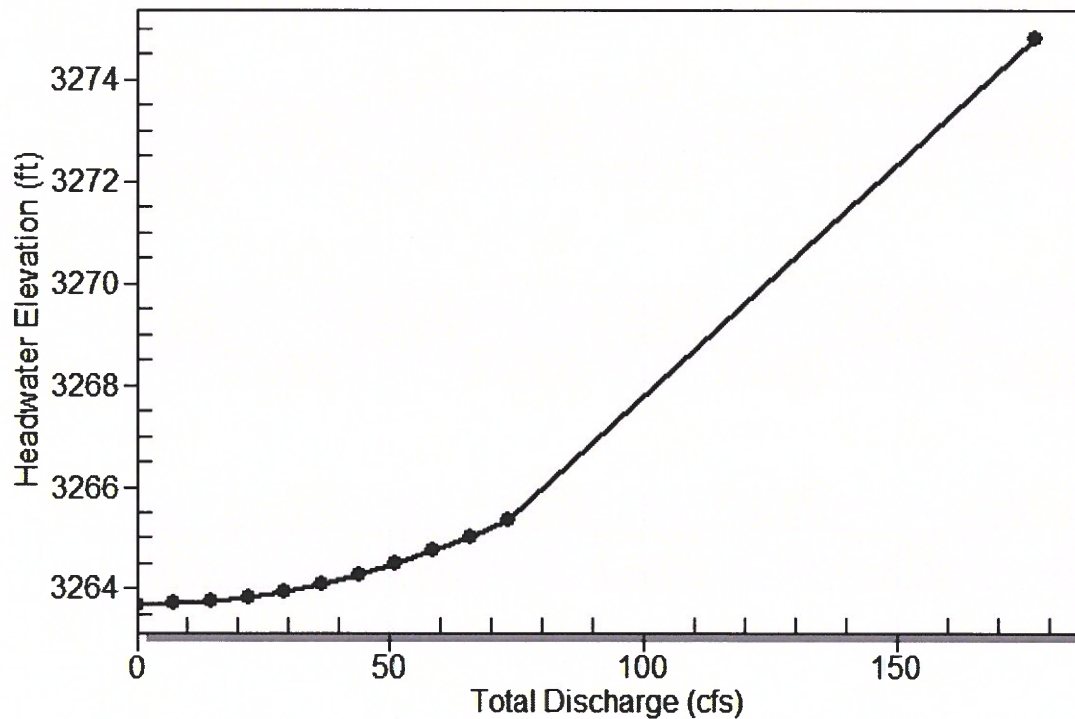


Table 2 - Culvert Summary Table: Lateral 5

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	3263.70	0.000	4.330	0-NF	0.000	0.000	2.833	8.880	0.000	0.000
7.30	7.30	3263.71	0.862	4.341	4-FFf	0.343	0.658	2.833	8.880	0.718	0.000
14.60	14.60	3263.76	1.252	4.390	4-FFf	0.475	0.944	2.833	8.880	1.435	0.000
21.90	21.90	3263.84	1.592	4.472	4-FFf	0.579	1.178	2.833	8.880	2.153	0.000
29.20	29.20	3263.96	1.915	4.587	4-FFf	0.666	1.377	2.833	8.880	2.871	0.000
36.50	36.50	3264.11	2.219	4.735	4-FFf	0.745	1.545	2.833	8.880	3.589	0.000
43.80	43.80	3264.29	2.517	4.916	4-FFf	0.816	1.708	2.833	8.880	4.306	0.000
51.10	51.10	3264.50	2.823	5.130	4-FFf	0.884	1.854	2.833	8.880	5.024	0.000
58.40	58.40	3264.75	3.147	5.376	4-FFf	0.947	1.993	2.833	8.880	5.742	0.000
65.70	65.70	3265.03	3.497	5.655	4-FFf	1.008	2.119	2.833	8.880	6.460	0.000
73.00	73.00	3265.34	3.880	5.967	4-FFf	1.066	2.235	2.833	8.880	7.177	0.000

Straight Culvert

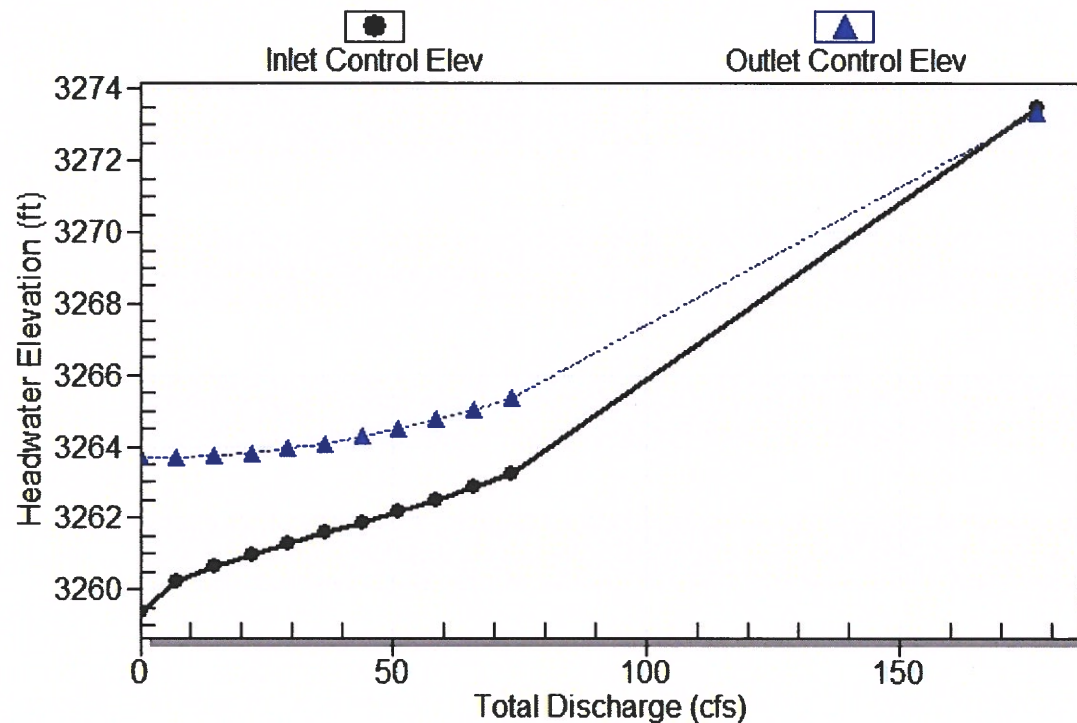
Inlet Elevation (invert): 3259.37 ft, Outlet Elevation (invert): 3254.82 ft

Culvert Length: 93.61 ft, Culvert Slope: 0.0487

Culvert Performance Curve Plot: Lateral 5

Performance Curve

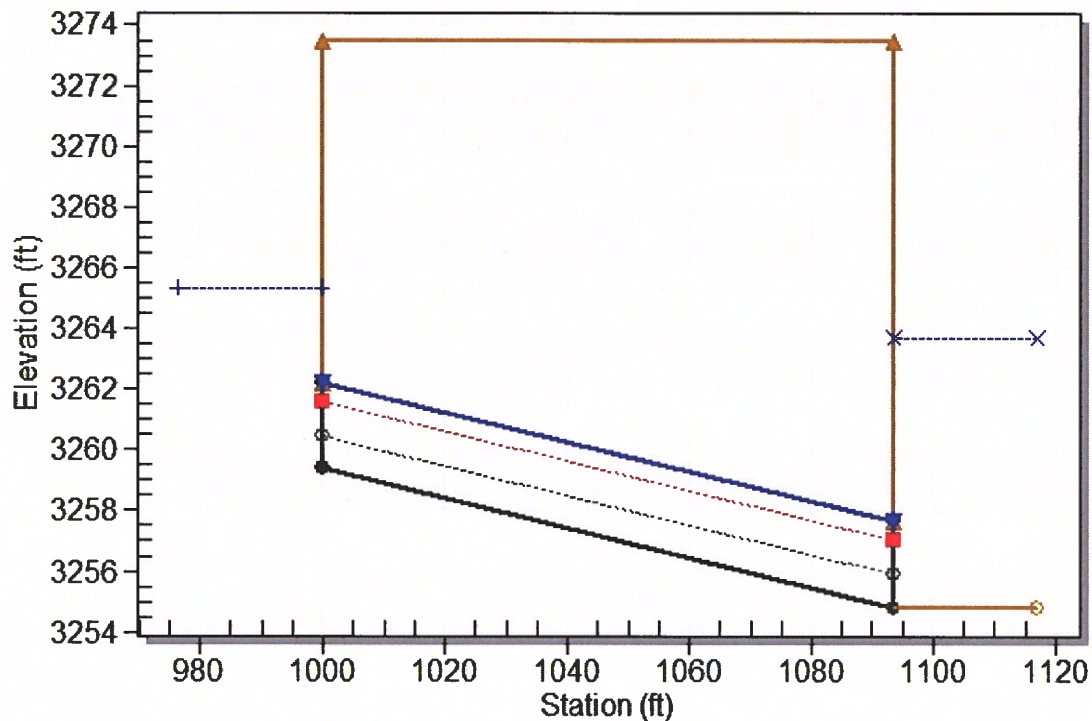
Culvert: Lateral 5



Water Surface Profile Plot for Culvert: Lateral 5

Crossing - Lateral 5, Design Discharge - 73.0 cfs

Culvert - Lateral 5, Culvert Discharge - 73.0 cfs



Site Data - Lateral 5

Site Data Option: Culvert Invert Data

Inlet Station: 1000.00 ft

Inlet Elevation: 3259.37 ft

Outlet Station: 1093.50 ft

Outlet Elevation: 3254.82 ft

Number of Barrels: 1

Culvert Data Summary - Lateral 5

Barrel Shape: Elliptical

Barrel Span: 53.00 in

Barrel Rise: 34.00 in

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0130

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: Lateral 5)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
0.00	3263.70	8.88
7.30	3263.70	8.88
14.60	3263.70	8.88
21.90	3263.70	8.88
29.20	3263.70	8.88
36.50	3263.70	8.88
43.80	3263.70	8.88
51.10	3263.70	8.88
58.40	3263.70	8.88
65.70	3263.70	8.88
73.00	3263.70	8.88

Tailwater Channel Data - Lateral 5

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 3263.70 ft

Roadway Data for Crossing: Lateral 5

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 93.50 ft

Crest Elevation: 3273.50 ft

Roadway Surface: Paved

Roadway Top Width: 93.50 ft

Street Hydraulic Sections

Technical Drainage Study for

Summerlin West Village 21

Carriage Hill Drive

(Redpoint Drive to Summerlin Parkway)

Las Vegas, Nevada

Prepared for:

Howard Hughes Company, LLC

Submitted to:

City of Las Vegas

Public Works



STREET NORMAL DEPTH CALCULATIONS

Worksheet for Section 4

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope
Discharge
Section Definitions

Referenced
Geometry and
Slope

1.65 %
6.00 ft³/s

Contributing flow has changed due to site plan changes by both Parcel K and Parcel J allowing a portion of flow to drain to Kindle Corner Ave and Carriage Hill Drive. Eight (8) additional cfs are contributing to the section. 3 additional cfs from Parcel K and 5 additional cfs from Parcel J (Subbasins *J(k+1)).

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+29.67	0.72
0+29.67	1.22
0+38.00	1.39
0+46.33	1.22
0+46.33	0.72
0+74.00	0.17
0+74.00	0.13
0+75.50	0.00
0+75.50	0.50
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+29.67, 0.72)	0.016
(0+29.67, 0.72)	(0+46.33, 0.72)	0.013
(0+46.33, 0.72)	(0+74.00, 0.13)	0.016
(0+74.00, 0.13)	(0+76.00, 0.50)	0.013

Worksheet for Section 4

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
Elevation Range	0.00 to 1.39	ft	
Flow Area		2.16	ft ²
Wetted Perimeter		20.29	ft
Hydraulic Radius		0.11	ft
Top Width		19.52	ft
Normal Depth		0.33	ft
Critical Depth		0.37	ft
Critical Slope		0.00729	ft/ft
Velocity		2.77	ft/s
Velocity Head		0.12	ft
Specific Energy		0.45	ft
Froude Number		1.47	
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	0.37	ft
Channel Slope	1.65	%
Critical Slope	0.00729	ft/ft

Cross Section for Section 4

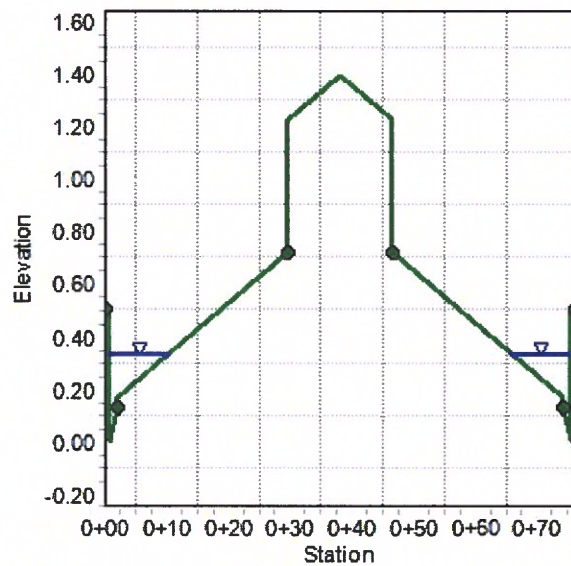
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.65	%
Normal Depth	0.33	ft
Discharge	6.00	ft ³ /s

Cross Section Image



Worksheet for Section 5

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.66 %
Discharge	4.00 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+29.67	0.72
0+29.67	1.22
0+38.00	1.39
0+46.33	1.22
0+46.33	0.72
0+74.00	0.17
0+74.00	0.13
0+75.50	0.00
0+75.50	0.50
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+29.67, 0.72)	0.016
(0+29.67, 0.72)	(0+46.33, 0.72)	0.013
(0+46.33, 0.72)	(0+74.00, 0.13)	0.016
(0+74.00, 0.13)	(0+76.00, 0.50)	0.013

Worksheet for Section 5

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	0.30	ft
Elevation Range	0.00 to 1.39	ft
Flow Area	1.57	ft ²
Wetted Perimeter	16.85	ft
Hydraulic Radius	0.09	ft
Top Width	16.15	ft
Normal Depth	0.30	ft
Critical Depth	0.33	ft
Critical Slope	0.00760	ft/ft
Velocity	2.55	ft/s
Velocity Head	0.10	ft
Specific Energy	0.40	ft
Froude Number	1.45	
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	0.33	ft
Channel Slope	1.66	%
Critical Slope	0.00760	ft/ft

Cross Section for Section 5

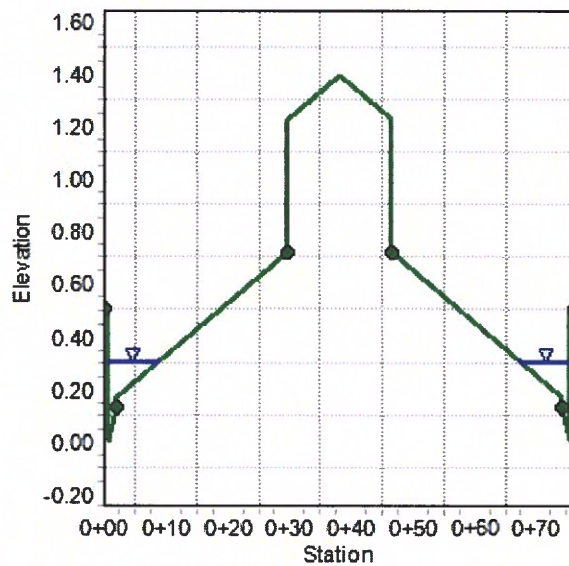
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.66	%
Normal Depth	0.30	ft
Discharge	4.00	ft ³ /s

Cross Section Image



Drainage Exhibits



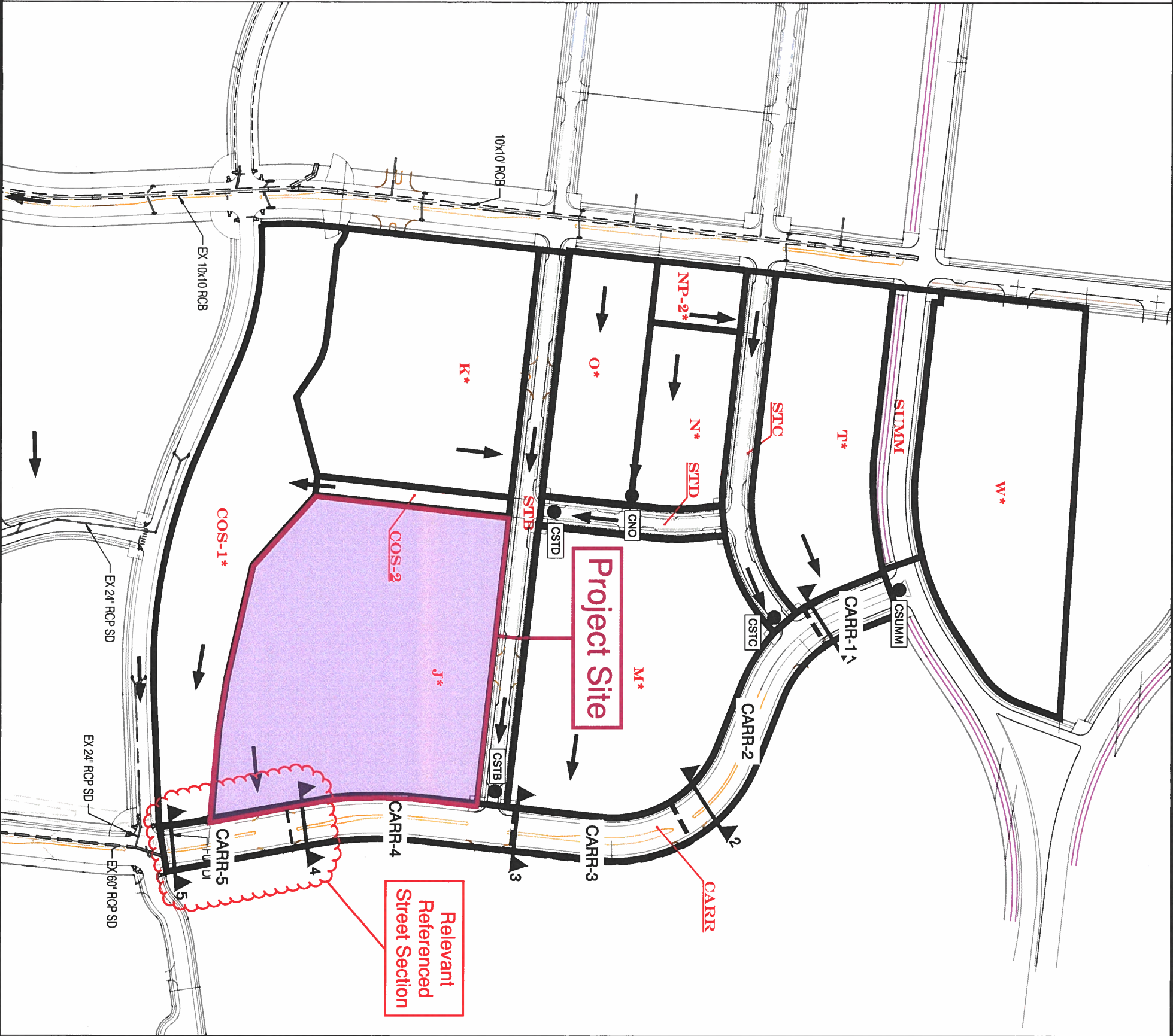
LEGEND

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

ULTIMATE CONDITION HEC-1 SUMMARY TABLE		
BASIN ID	AREA (ac)	Q100 (CFS)
W*	8.31	31
SUMM	1.84	8
CSUMM	-	40
T*	5.99	23
NP-2*	87	3
STC	1.68	7
CSTC	-	11
M*	9.11	32
N*	2.54	10
O*	3.43	13
CNO	-	22
STD	0.88	4
CSTD	-	26
K*	8.01	30
STB	2.68	12
CSTB	-	67
J*	11.83	42
COS-2	0.58	2
COS-1*	7.78	22
CCOS-1	-	24
CARR	5.78	22

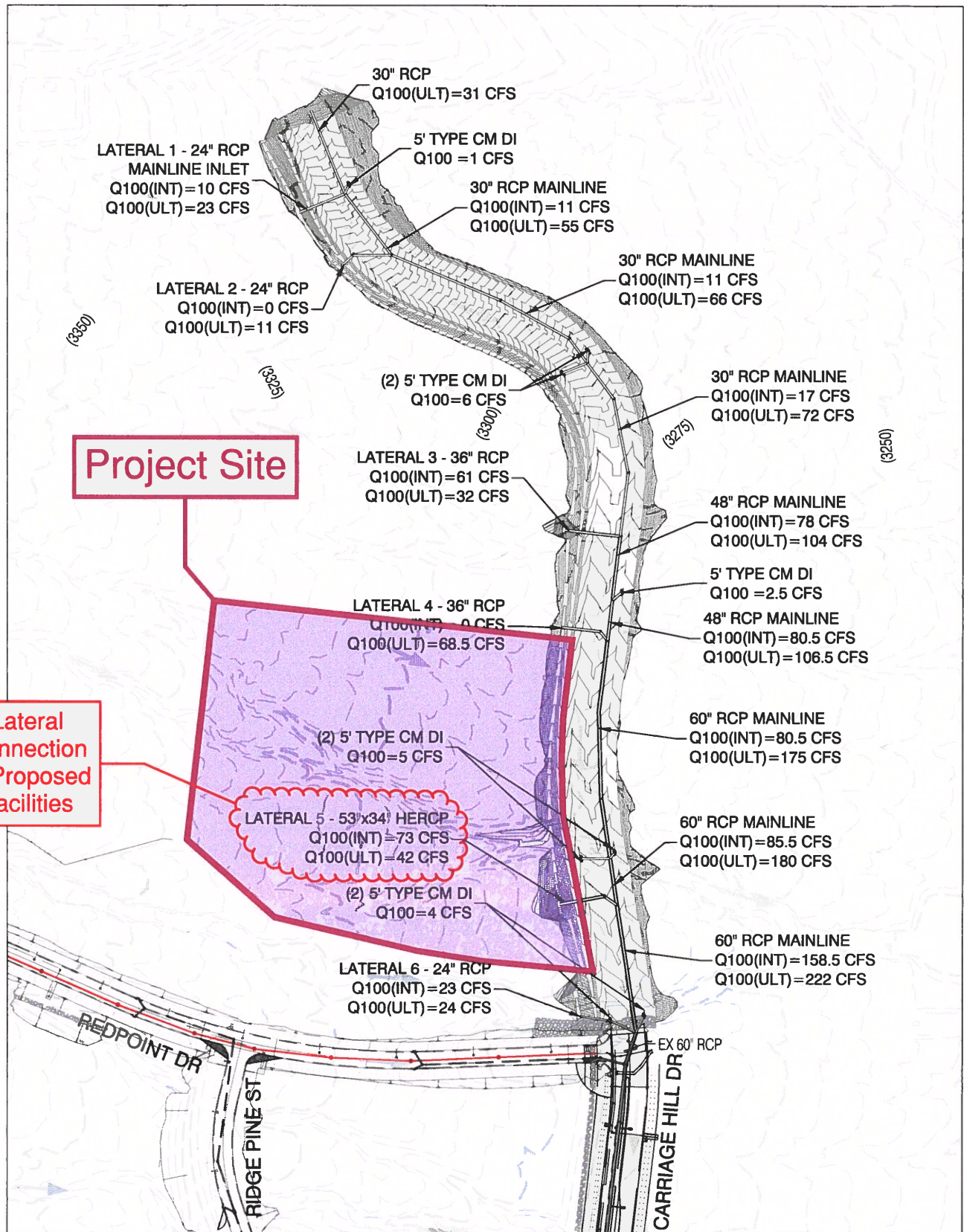
ULTIMATE CONDITION OFFSITE PRORATED SUBBASINS			
BASIN ID	AREA (ac)	Q100 (CFS)	
CARR	5.78	22	
SUBBASIN	AREA (ac)	Q100 (CFS)	
CARR-1	0.58	2	
CARR-2	1.51	6	
CARR-3	1.22	5	
CARR-4	1.56	6	
CARR-5	0.91	3	

ULTIMATE CONDITION STREET FLOW ANALYSIS SUMMARY				
Street Section	Q100 (cfs)	Slope	Velocity (ft/s)	Depth (ft)
1	2	5.31%	3.89	0.21
2	6	5.22%	4.38	0.29
3	5	1.65%	2.66	0.32
4	6	1.65%	2.77	0.33
5	4	1.66%	2.55	0.30



W.O.#:	7851-5.5
DATE:	09/2018
BY:	JYA
SCALE:	1" = 300'
SHEET	OF

FIGURE 8: ULTIMATE CONDITION BASIN MAP
SUMMERLIN VILLAGE 21 CARRIAGE HILL DRIVE
REDPOINT TO SUMMERLIN PARKWAY



H:\7851\Carriage Hill-Street A to Summerlin Pkwy\Drainage\1_TDS\A Figures\Figure 9 - Facility Map.dwg

Improvement Plans

SHEET INDEX

SHEET #	SHEET DESCRIPTION	STATION RANGE
1	CV COVER SHEET	
2	NT NOTE SHEET	
3	HC1 HORIZONTAL CONTROL 1	
4	HC2 HORIZONTAL CONTROL 2	
5	HC3 HORIZONTAL CONTROL 3	
6	HC4 HORIZONTAL CONTROL 4	
7	HC5 HORIZONTAL CONTROL 5	
8	MUTSS MASTER UTILITY SANITARY SEWER	
9	MUTSD MASTER UTILITY STORM DRAIN	
10	MARD MASTER UTILITY GRADING	
11	GR1 GRADING DRAINAGE PLAN 1	
12	GR2 GRADING DRAINAGE PLAN 2	
13	GR3 GRADING DRAINAGE PLAN 3	
14	GR4 GRADING DRAINAGE PLAN 4	
15	GR5 GRADING DRAINAGE PLAN 5	
16	DT1 DETAIL SHEET	
17	UT1 UTILITY PLAN & PROFILE 1	27+50 TO 32+100
18	UT2 UTILITY PLAN & PROFILE 2	32+00 TO 36+50
19	UT3 UTILITY PLAN & PROFILE 3	36+50 TO 41+00
20	UT4 UTILITY PLAN & PROFILE 4	41+00 TO 44+50
21	UT5 UTILITY PLAN & PROFILE 5	44+50 TO 49+50
22	UT6 UTILITY PLAN & PROFILE 6	49+00 TO 51+74
23	UT7 UTILITY PLAN & PROFILE 7	
24	UT8 UTILITY PLAN & PROFILE 8	
25	UT9 UTILITY PLAN & PROFILE 9	
26	UT10 UTILITY PLAN & PROFILE 10	
27	UT11 UTILITY PLAN & PROFILE 11	
28	UT12 UTILITY PLAN & PROFILE 12	
29	UT13 UTILITY PLAN & PROFILE 13	
30	UT14 UTILITY PLAN & PROFILE 14	
31	UT15 UTILITY PLAN & PROFILE 15	
32	UT16 UTILITY PLAN & PROFILE 16	
33	UT17 UTILITY PLAN & PROFILE 17	
34	UT18 UTILITY PLAN & PROFILE 18	
35	UT19 UTILITY PLAN & PROFILE 19	
36	UT20 UTILITY PLAN & PROFILE 20	
37	UT21 UTILITY PLAN & PROFILE 21	
38	UT22 UTILITY PLAN & PROFILE 22	
39	UT23 UTILITY PLAN & PROFILE 23	
40	TR1 TRAFFIC PLAN 1	
41	TR2 TRAFFIC PLAN 2	
42	TR3 TRAFFIC PLAN 3	
43	S1 DROP INLET DETAIL	
44	S2 DROP INLET DETAIL	

SUMMERLIN WEST VILLAGE 21

CARRIAGE HILL DRIVE

REDPOINT TO SKY VISTA

APN: 137-26-101-001

CITY OF LAS VEGAS

STATE OF NEVADA

DEVELOPED BY:

HOWARD HUGHES COMPANY, LLC

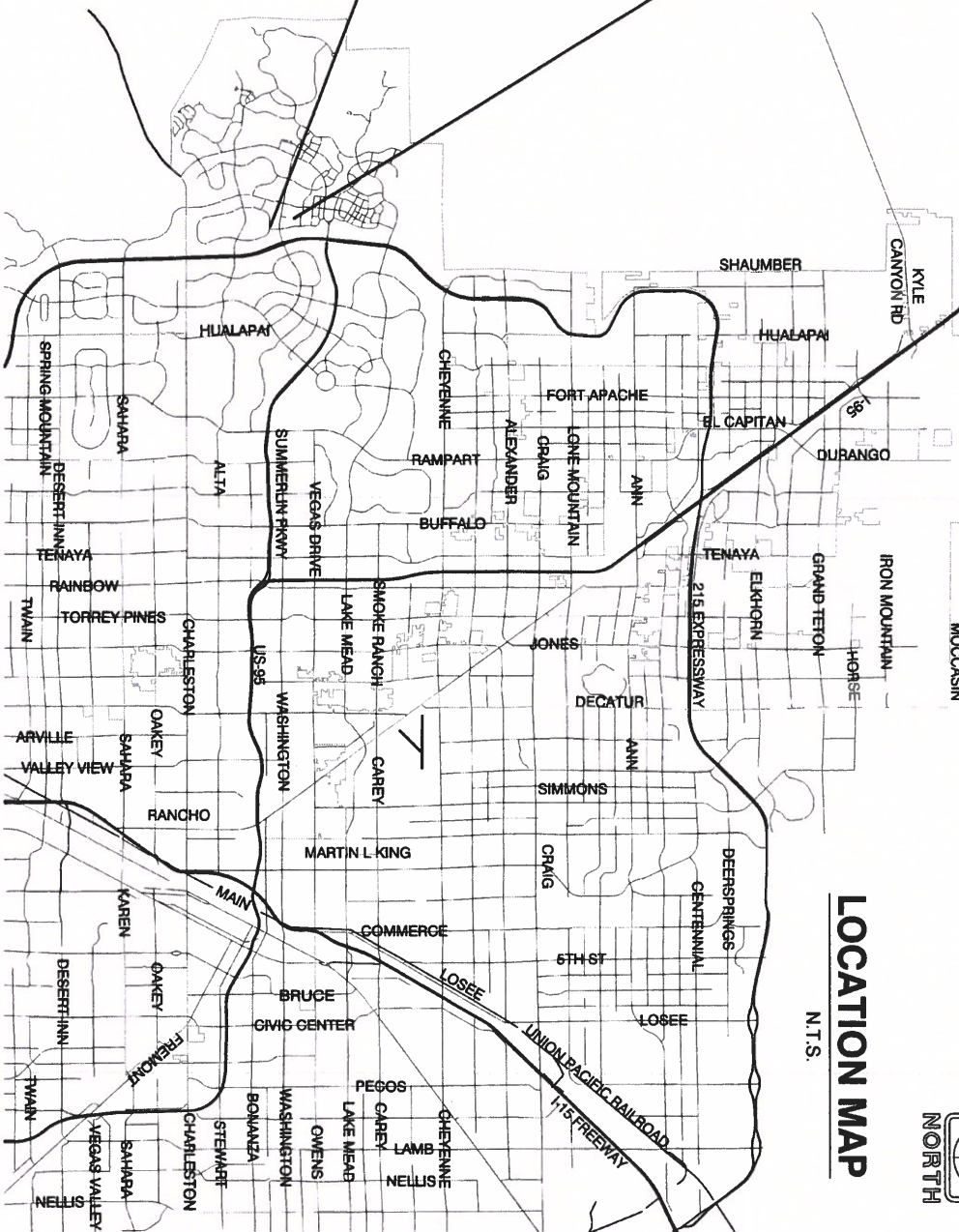
A DELAWARE LIMITED LIABILITY COMPANY

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

FUTURE S.I.D. PROJECT

LOCATION MAP

N.T.S.



BENCHMARK

PROJECT DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD83)
CITY OF LAS VEGAS BENCHMARK CROSS (REMOVED 2008)
NAD 83 DATUM: 368.574 METERS (1209.0 FEET)
NAD 83 DATUM: 368.574 METERS (1209.0 FEET)
NAD 83 DATUM: 368.574 METERS (1209.0 FEET)
NAD 83 DATUM: 368.574 METERS (1209.0 FEET)

BASIS OF BEARING

GRID NORTH AS DERIVED BY THE CENTRAL MERIDIAN OF THE NAD 83 ZONE 12N WITH THE STATE PLANE COORDINATE SYSTEM (NAD 83) AND 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
PROJECTION UNIT: (UNIT: LATITUDE OR GRID)
LONGITUDE OF CENTRAL MERIDIAN: 114°58'00" W
SPHERICAL EARTH: SPHEROID: GRS80
EASTING AT CENTRAL MERIDIAN: 300,000 M (984,266.000 FT/US)
SCALE FACTOR ON CENTRAL MERIDIAN: 1.000375 (99.9627)
NOTES:
1. ALL DISTANCES AND BEARINGS SHOWN HEREON ARE BASED ON THE BASIS OF BEARING.
2. GRID BEARINGS SHOWN HEREON (OR IMPLIED BY GRID COORDINATES) DO NOT EQUAL GEODETIC BEARINGS DUE TO EARTH'S CURVATURE.

THESE PLANS AND THE DESIGN CRITERIA CONTAINED WITHIN THESE PLANS ARE BASED UPON THE INFORMATION PRESENTED BY THE ENGINEER AND INTENDED SOLELY AS A GENERAL GUIDE FOR CONSTRUCTION. 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 ORDINANCES TO LAKE 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 PANDELA, P.E. # 90293

APPROVAL OF THESE PLANS BY THE CITY ENGINEER IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE REPORTED RIGHT-OF-WAY. ANY IMPROVEMENTS EXISTING IN THIS APPROVAL DOES NOT AUTOMATICALLY CONSTITUTE AN ENDORSEMENT OR GUARANTEE OF THE ACCURACY OF THE INFORMATION PROVIDED HEREON. THE ENGINEER SHALL BE RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION PROVIDED HEREON. THE ENGINEER SHALL BE RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION PROVIDED HEREON. THE ENGINEER SHALL BE RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION PROVIDED HEREON.

NA

DEPARTMENT OF PLANNING, CITY OF LAS VEGAS

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 AFFIRED CENTURY LINK NEVADA APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR UNKNOWN OR UNKNOWN CONSULTANTS WITH EXISTING OR PROPOSED IMPROVEMENTS. THE CONSULTANT SHALL BE RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION PROVIDED HEREON. THE CONSULTANT SHALL BE RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION PROVIDED HEREON. THE CONSULTANT SHALL BE RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION PROVIDED HEREON.

ANY ENERGY

DATE

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

COX COMMUNICATIONS LAS VEGAS, INC.

DATE

SOUTHWEST GAS CORPORATION

DATE

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

PROJECT NO: 138311 FIRST APPROVED DATE:

Shades: CV, NT, MUTSS, MUTSD, UT1, UT3, UT4, UT7-12, UT14-23

LYVWD APPROVAL IS VALID FOR ONE (1) YEAR FROM SIGNATURE DATE. IF CONSTRUCTION IS NOT STARTED, PLANS MUST BE RESUBMITTED FOR REVIEW AND APPROVAL.

KEVIN T. ORRICK, VICE PRESIDENT

DATE

HOWARD HUGHES COMPANY, LLC
A DELAWARE LIMITED LIABILITY COMPANY

DRAWN BY:	BCC	10/22/2018
DESIGNED BY:	DEH	10/22/2018
CHECKED BY:	WJM	05/08/2019
PROJECT NO:	7851	
SCALE:	N/A	HORIZ. VERT.

SUMMERLIN WEST VILLAGE 21
CARRIAGE HILL DRIVE
REDPOINT TO SKY VISTA

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

2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-8148
PH. (702) 673-7550 FAX (702) 362-2587 WEB WWW.VTNNV.COM
CONSULTING ENGINEERS • PLANNERS • LAND SURVEYORS

1 OF 44 SHEETS
DRAWING NO. 107/7873

PROFESSIONAL ENGINEER
STATE OF NEVADA
WILLIAM J. MEYER
PE 123116
CIVIL

13/1/19

[illegible]

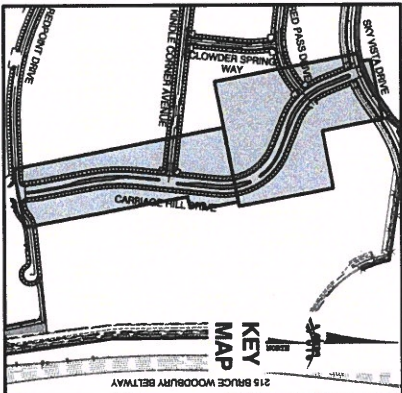
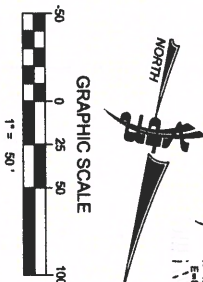
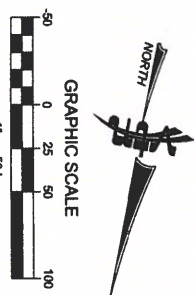
APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

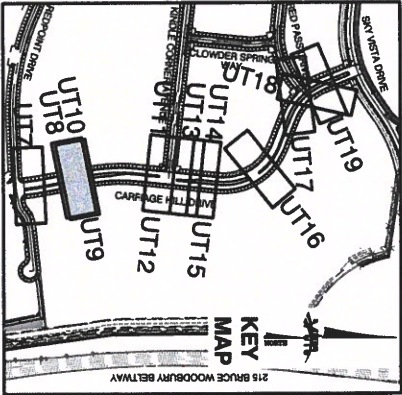
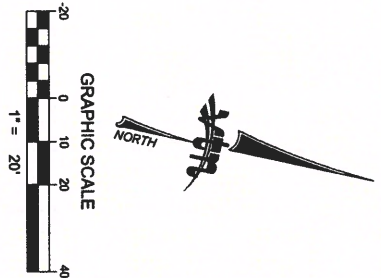
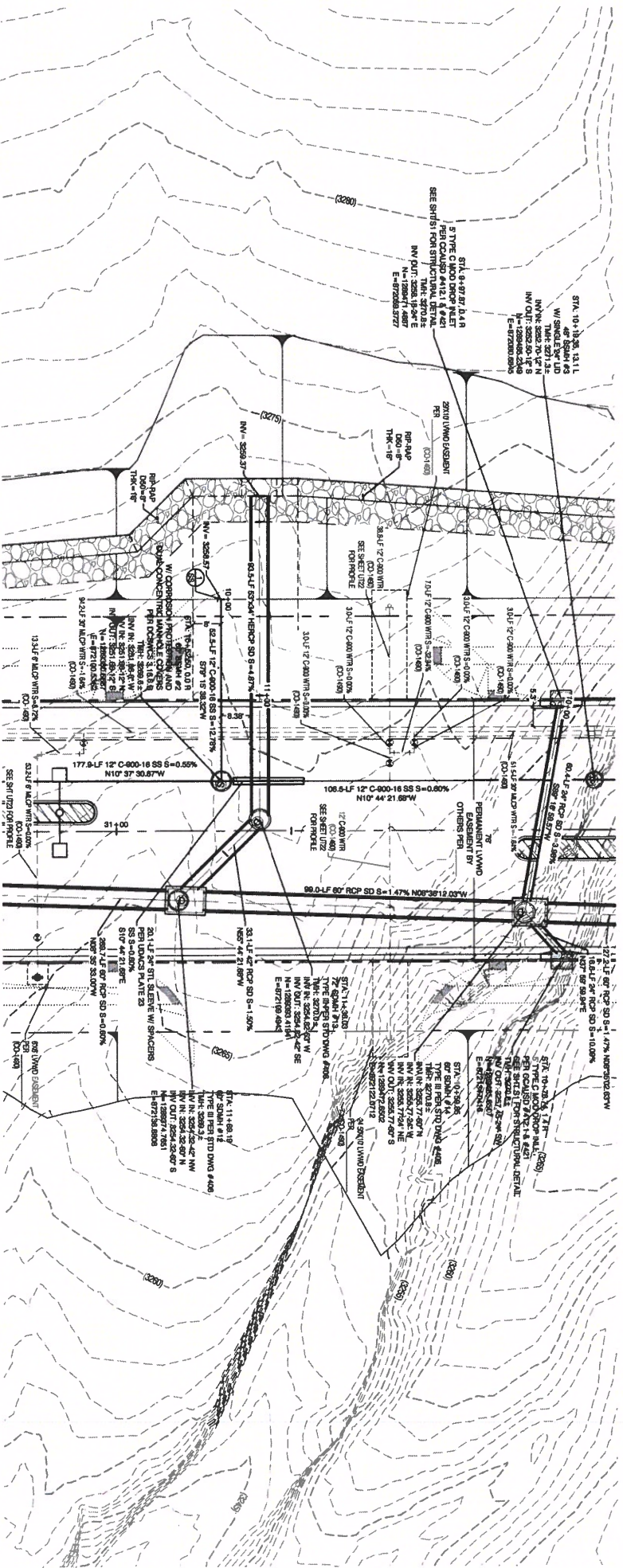
PROJECT NO: 136311 FIRST APPROVED DATE: _____

LYNWD APPROVAL IS VALID FOR ONE (1) YEAR FROM SIGNATURE DATE. IF CONSTRUCTION IS NOT STARTED, PLANS **MUST** BE RESUBMITTED FOR REVIEW AND APPROVAL.

[illegible]

10/22/2018		MASTER UTILITY STORM DRAIN	HOWARD HUGHES COMPANY, LLC A DELAWARE LIMITED LIABILITY COMPANY 10801 W CHARLESTON BLVE SUITE 300 LAS VEGAS, NEVADA 89135 702-791-4000		CITY OF LAS VEGAS
10/22/2018					
05/06/2019					
SCALE:	—	SUMMERLIN WEST VILLAGE 21 CARRIAGE HILL DRIVE REDPOINT TO SKY VISTA		2727 SOUTH RAINBOW BOULEVARD LAS VEGAS, NEVADA 89146-5148 PH: (702) 873-7500 FAX (702) 362-2597 WEB WWW.VTNN.COM CONSULTING ENGINEERS • PLANNERS • LAND SURVEYORS	
	N/A				

[illegible]



CONSTRUCTION NOTES			
SEWER	PUBLIC	PRIVATE	
STANDARD MANHOLE PER SD-4.8.18	10 EA.	0 EA.	
12\"/>	210 LF.	0 LF.	
12\"/>	2,250 LF.	0 LF.	
8\"/>	0 EA.	0 EA.	
12\"/>	0 EA.	0 EA.	
SEWER CAP	1 EA.	0 EA.	
12\"/>	0 EA.	0 EA.	
SEWER POINT OF CONNECTION			

Call before you Dig
utility 1-800-4-A-ROOT
Avoid cutting underground utility lines. Call before you dig.

1-702-227-2929

Call before you Dig

Underground

Call

1-800-227-2600

Call before you Dig

Underground

Call

WATER MAIN JOINT DEFLECTION PVC PIPE SHALL BE DEFLECTED AT THE JOINT ONLY. THE MAXIMUM ALLOWABLE DEFLECTION SHALL BE ONE (1) INCH PER FEET, PER JOINTS 2.00 FT. AND 2.00 FT. FOR CHANGES IN DIRECTION EXCEEDING THE MAXIMUM ALLOWABLE JOINT DEFLECTION. FITTINGS SHALL BE USED.	UTILITY CROSSING NOTE: ALL SEWER/STORM DRAIN CROSSING WATER LINES MUST CONFORM TO SECTION 22.0 OF UNIFORM DESIGN AND CONSTRUCTION SPECIFICATIONS FOR WATER MAINS (UDCS) FOR WATER AND STORM MAIN CROSSINGS AND CLEARANCES.	ENGINEER'S DISCLAIMER NOTE: UTILITY LOCATIONS SHOWN HERE ON ARE APPROXIMATE TO DATE. IF THERE IS A CHANGE IN THE LOCATION OF ANY UTILITY, THE ENGINEER SHALL BE NOTIFIED. THE ENGINEER SHALL BE RESPONSIBLE FOR THE LOCATION OF ALL EXISTING UNDERGROUND AND OVERHEAD UTILITIES AND NOTIFY THE DESIGN ENGINEER IMMEDIATELY. IF ANY NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HERE ON, THE ENGINEER ASSUMES NO LIABILITY FOR THE LOCATION OF ANY UTILITIES NOT SHOWN HERE ON.
WATER LINE MARKER BALLS NOTE INSTALL PRELINE MARKER BALLS IN TRENCH ABOVE EACH WATER MAIN ELBOW FITTING PER UDCS SECTION 2.08.	FIRE HYDRANT MARKER NOTES BLUE COLORED REFLECTIVE PAINTED PAVEMENT MARKERS ARE TO BE INSTALLED: 1. ON ROADWAYS WITH NO PARKING PERMITTED ON RIGHT-OF-WAY SIDE, LOCATE MARKER 8 FEET FROM FACE OF ROADWAY. 2. ON ROADWAYS WITH PARKING PERMITTED ON RIGHT-OF-WAY SIDE, LOCATE MARKER 16 FEET FROM FACE OF CURB ON RIGHT-OF-WAY SIDE.	LAS VEGAS FIRE & RESCUE APPROVAL APPROVAL OF THESE PLANS SHALL NOT BE CONSIDERED TO BE A COMMITMENT OR AN APPROVAL OF ANY VIOLATION OF ANY CITY ORDINANCE OR STATE LAW. THE CITY OF LAS VEGAS DOES NOT GUARANTEE THE ACCURACY OF THE INFORMATION PROVIDED HEREON.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
PROJECT NO: 138311 FIRST APPROVED DATE: _____
LWWD APPROVAL IS VALID FOR ONE (1) YEAR FROM SIGNATURE DATE. IF CONSTRUCTION IS NOT STARTED, PLANS MUST BE RESUBMITTED FOR REVIEW AND APPROVAL.

HOWARD HUGHES COMPANY, LLC
A DELAWARE LIMITED LIABILITY COMPANY
10801 W CHARLESTON BLVD SUITE 300
LAS VEGAS, NEVADA 89135
702-781-4000

CITY OF LAS VEGAS
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-6148
PH: (702) 873-7650 FAX: (702) 382-2597 WEB: WWW.VTNV.COM
CONSULTING ENGINEERS • PLANNERS • LAND SURVEYORS

UTILITY PLAN & PROFILE 9
SUMMERLIN WEST VILLAGE 21
CARRIAGE HILL DRIVE
REDPOINT TO SKY VISTA

DRAWN BY: BCC	10/22/2018
DESIGNED BY: DEH	10/22/2018
CHECKED BY: WJM	05/08/2019
PROJECT NO: 7881	SCALE: 1"=30' HORIZ. 1"=4' VERT.

WILLIAM J. MEYER
P.E.
11/15/2019
10/27/2019

UT9
25 OF 44 SHEETS
DRAWING NO. 115-02271
10/27/2019

PROFESSIONAL ENGINEER
STATE OF NEVADA
11/15/2019
10/27/2019

APPENDIX H

Reference Material

*Technical Drainage Study for Summerlin Village 21 Parcel K (Aka
Moro Rock)*

by SHG (DS 5182)

Approval Letter

TECHNICAL DRAINAGE STUDY

Summerlin Village 21 Parcel K (Aka: Moro Rock)

City of Las Vegas, Nevada

Job No.: RAH1908.000

Date: August 2019

Prepared By:

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

Prepared For:

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



Stanley Okey Amadi, P.E., CFM
NV Professional Engineer No. 21724

Assisted by: Caitlyn Alcantara, E.I.

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			DATE: October 24, 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 - Parcel K (aka Moro Rock)			COPIES TO: Slater Hanifan Group
Cross Streets:	SEC Desert Foothill Dr. & Kindle Corner Ave.		The Howard Hughes Corporation
File Number:	F:\Depot\DSMemos\DS5182B.doc		Bart Anderson, P.E., DevCo
Parcel Number:	137-26-112-003		CCRFCD
Zoning Action:	TMP-76950		
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	8/26/2019	9/20/2019	Not Approved	\$400.00	3542401: \$400
2 nd Submittal	10/14/2019	10/24/2019	See Comments Below	\$400.00	3609084: \$400
TOTAL FEES (LDDRS):				\$800.00	----

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

1. **This drainage study is acceptable in concept;** however, *City of Las Vegas* will not formally accept the study until the *Clark County Regional Flood Control District (CCRFCD)* has issued a letter of concurrence. The engineer should contact the CCRFCD to confirm that they have begun their review.

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* and *Kindle Corner Avenue*. No occupancy permit of the houses will be issued prior to the substantial buildout of the perimeter streets.
3. **Second Request: Exhibit E (Proposed Drainage Map):** *The proposed drainage pattern deviates from the approved Summerlin West Village 21 master drainage study. For example, Subbasin K*(h) of the southern portion of the subject development drains to the adjacent wash and Subbasin K*(i) of the northern portion drains individually through the sidewalk and common area to Kindle Corner Avenue directly. The master study of Village 21, however, proposed to drain the whole Parcel K to a stub at the northeast corner.*

The engineer of the subject drainage study must coordinate with VTN Nevada to amend the Village 21 master study or revise the subject drainage pattern to comply with the original approved pattern. This must be addressed and resolved in the next submittal.

The response was that VTN Nevada will submit an amendment to the Summerlin Village 21 Master Drainage Study to address the deviation of drainage pattern. The subject Improvement Plans will not be approved prior to the final approval of the Master Study Update.

4. **Second Request:** *The proposed drainage pattern will produce numerous point discharge to the wash to the south and to the amenity common area to the north creating erosion and maintenance problem in the future. Note that the wash and the common amenity zone are to be privately maintained by the Howard Hughes Company or the Summerlin Master Association. If the proposed drainage pattern is the final design, obtain acknowledgment and approval from Howard Hughes Company or the Summerlin Master Association prior to the final approval of the subject drainage study.*

The response was that the Tentative Map and the conceptual grading plan for the site were reviewed and approved by Summerlin prior to the drainage study submittal to the City. However, the attached copy of approval from Summerlin did not specifically address the issue of the extra maintenance because of the deviation from the approved master drainage study.

Obtain a letter of approval or acknowledgment specifically for the above commented issue from Summerlin prior to the final approval of the Improvement Plans.

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/26
AREA K-26

Street Hydraulic Sections

Worksheet for SECTION 1: KINDLE CORNER

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 6.56 %
Discharge 9.00 ft³/s
Section Definitions

Conservative section run by Parcel K does not account for flow collected by existing drop inlets along Kindle Corner. Section does account for additional flow added to Kindle Corner.

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+16.00	0.45
0+30.00	0.17
0+30.00	0.13
0+31.50	0.00
0+31.50	0.48
0+32.00	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+30.00, 0.13)	0.016
(0+30.00, 0.13)	(0+32.00, 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 SECTION 1: KINDLE CORNER

Results

Normal Depth	0.31	ft
Elevation Range	0.00 to 0.50 ft	
Flow Area	1.73	ft²
Wetted Perimeter	17.78	ft
Hydraulic Radius	0.10	ft
Top Width	17.07	ft
Normal Depth	0.31	ft
Critical Depth	0.42	ft
Critical Slope	0.00685	ft/ft
Velocity	5.21	ft/s
Velocity Head	0.42	ft
Specific Energy	0.73	ft
Froude Number	2.89	
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	6.56	%
Critical Slope	0.00685	ft/ft

Cross Section for SECTION 1: KINDLE CORNER

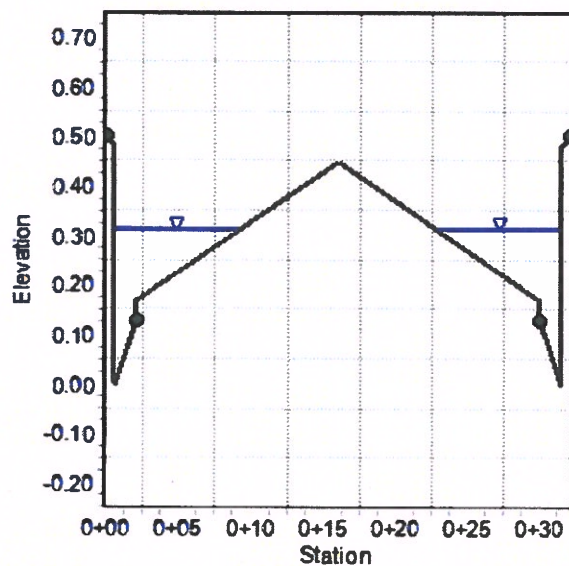
Project Description

Friction Method Manning Formula
Solve For Normal Depth

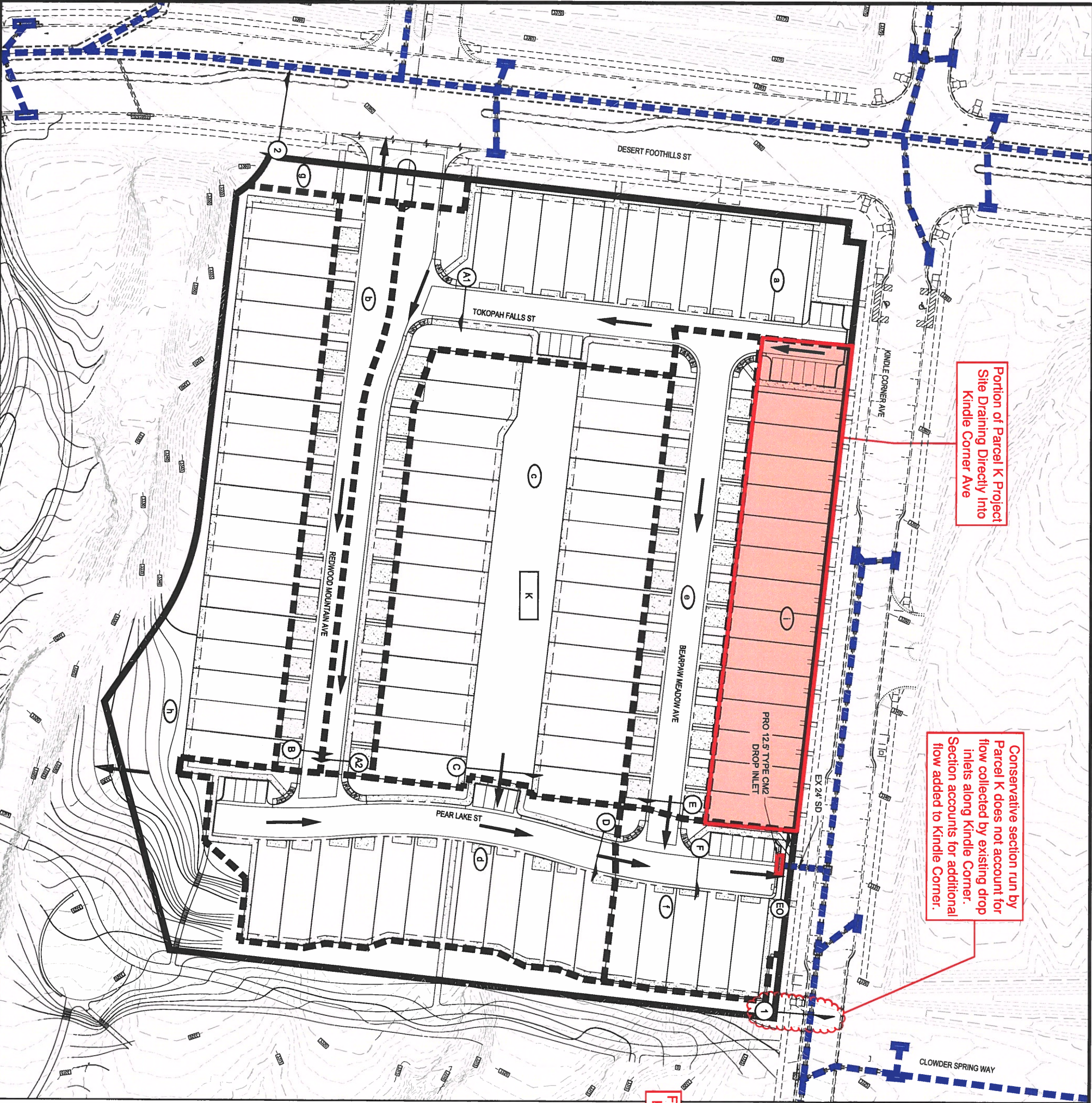
Input Data

Channel Slope 6.56 %
Normal Depth 0.31 ft
Discharge 9.00 ft³/s

Cross Section Image



Drainage Exhibit



Flow Contributing to
Kindle Corner Ave

Proposed Condition Flow Rate Summary				
Basin/Concentration Point ID	Area (cfs)	Q ₁₀₀ (cfs)	Q ₁₀ (cfs)	Q ₁ (cfs)
K	8.20	3.7	2.7	1.2
TSB	2.7	8.2	2.7	1.2
TCSA	2.8	1.2	2.8	1.2

REFERENCED FROM SUMMERLIN WEST STUDY

Proposed Flow Summary				
Basin ID	Q ₁₀₀ (cfs)	Area (acres)	Flow (cfs/acre)	100-yr Limit (cfs/acre)
K	30	8.20	3.7	3.7
Subbasin ID				
K'(a)	5	1.47	3.7	3.7
K'(b)	2	0.46	3.7	3.7
K'(c)	6	1.73	3.7	3.7
K'(d)	4	1.07	3.7	3.7
K'(e)	2	0.65	3.7	3.7
K'(f)	2	0.48	3.7	3.7
K'(g)	0	0.10	3.7	3.7
K'(h)	6	1.54	3.7	3.7
K'(i)	3	0.70	3.7	3.7
TOTAL	30	8.20	3.7	3.7

LEGEND

BASIN BOUNDARY

PRO-RATED SUBBASIN BOUNDARY

BASIN ID

PRO-RATED SUBBASIN ID

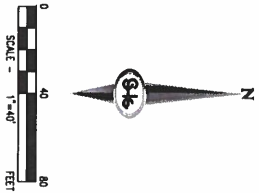
FLOW DIRECTION

FLOWMASTER SECTION

Proposed Condition 100-Year Street Flow Summary						
Section ID	Q ₁₀₀ (cfs)	Slope (%)	Depth (ft)	Velocity (ft/s)	Day	
A1	4.55	0.55	2.95	0.7		
(Q = Basin * K ₁)	0.60	0.55	1.95	0.9		
A2	5	6.15	0.32	4.18		
(Q = Basin * K ₂)	2.87	0.35	3.85	1.3		
B	2	2.87	0.28	3.17		
(Q = Basin * K ₃)	0.60	0.49	2.63	1.3		
D	17	0.60	0.21	4.05		
(Q = Basin * K ₄)	2	1.55	0.46	3.81		
E	21	0.60	0.52	2.87		
(Q = Basin * K ₅)	9	6.56	0.31	5.21		
(Q = 1/2 of Basin * K ₆)	6	1.50	0.41	3.13		
(Q = 1/2 of Basin * K ₇)						

Proposed Condition Onsite Hydraulic Section Summary				
Section ID	Q ₁₀₀ (cfs)	Section Description	Slope (%)	Depth (ft)
Section C	6.0	Paseo Section	2.90	0.49
(Q = Basin * K ₈)				

Ultimate Condition Drainage Easement Hydraulic Summary					
Section ID	Q ₁₀₀ (cfs)	Width (ft)	Type of Analysis	Depth (ft)	Velocity (ft/s)
EO	21	50	Normal Depth	0.17	2.53
(Q = Basin * K ₉)					



NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

SLATER HANIFAN GROUP
a Westwood team

5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

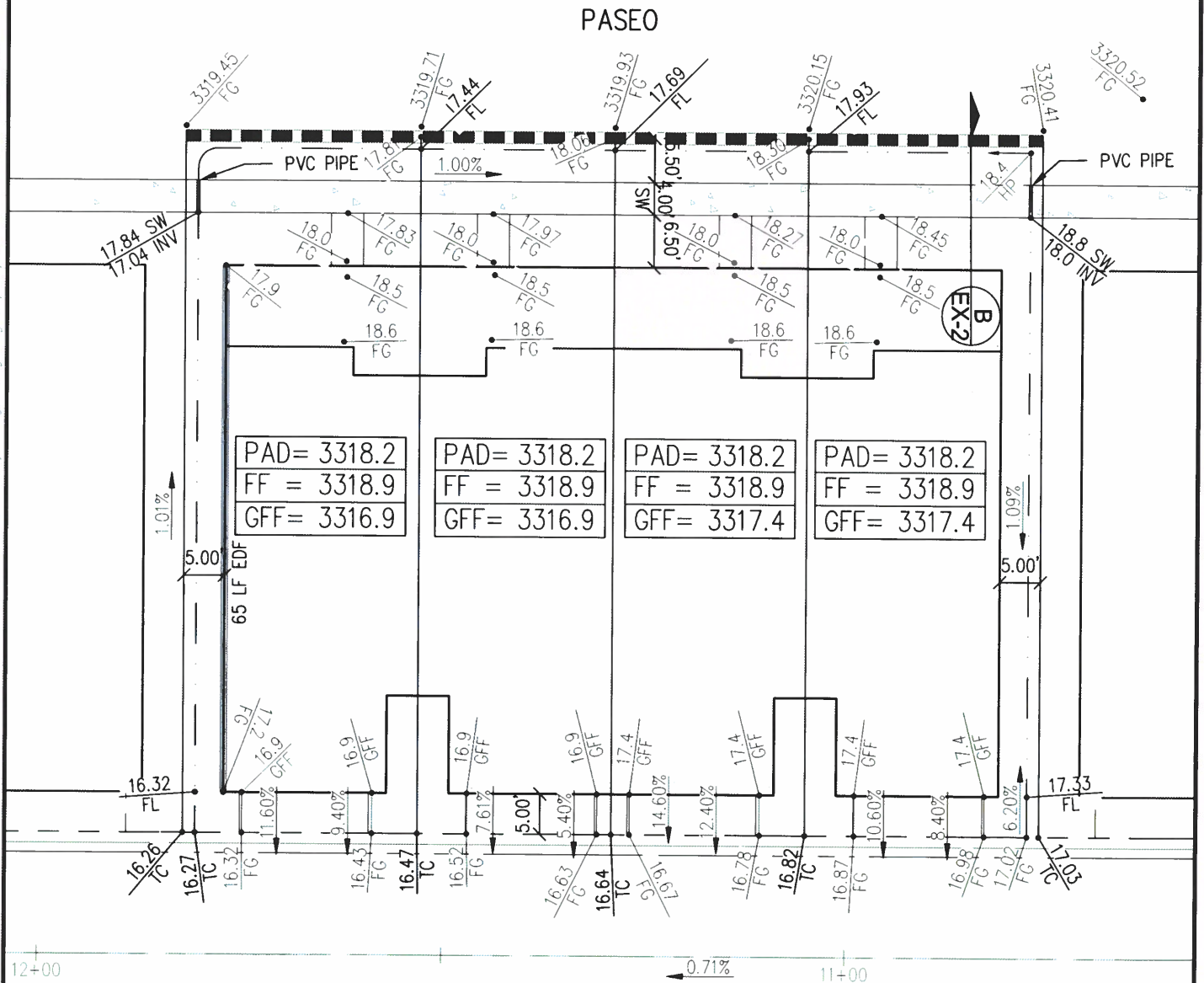
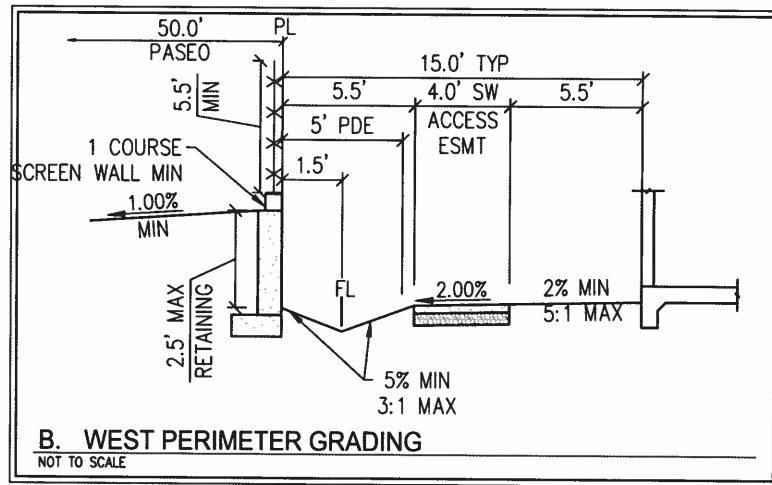
RICHMOND AMERICAN HOMES
SUMMERLIN VILLAGE 21 PARCEL K
PROPOSED DRAINAGE MAP

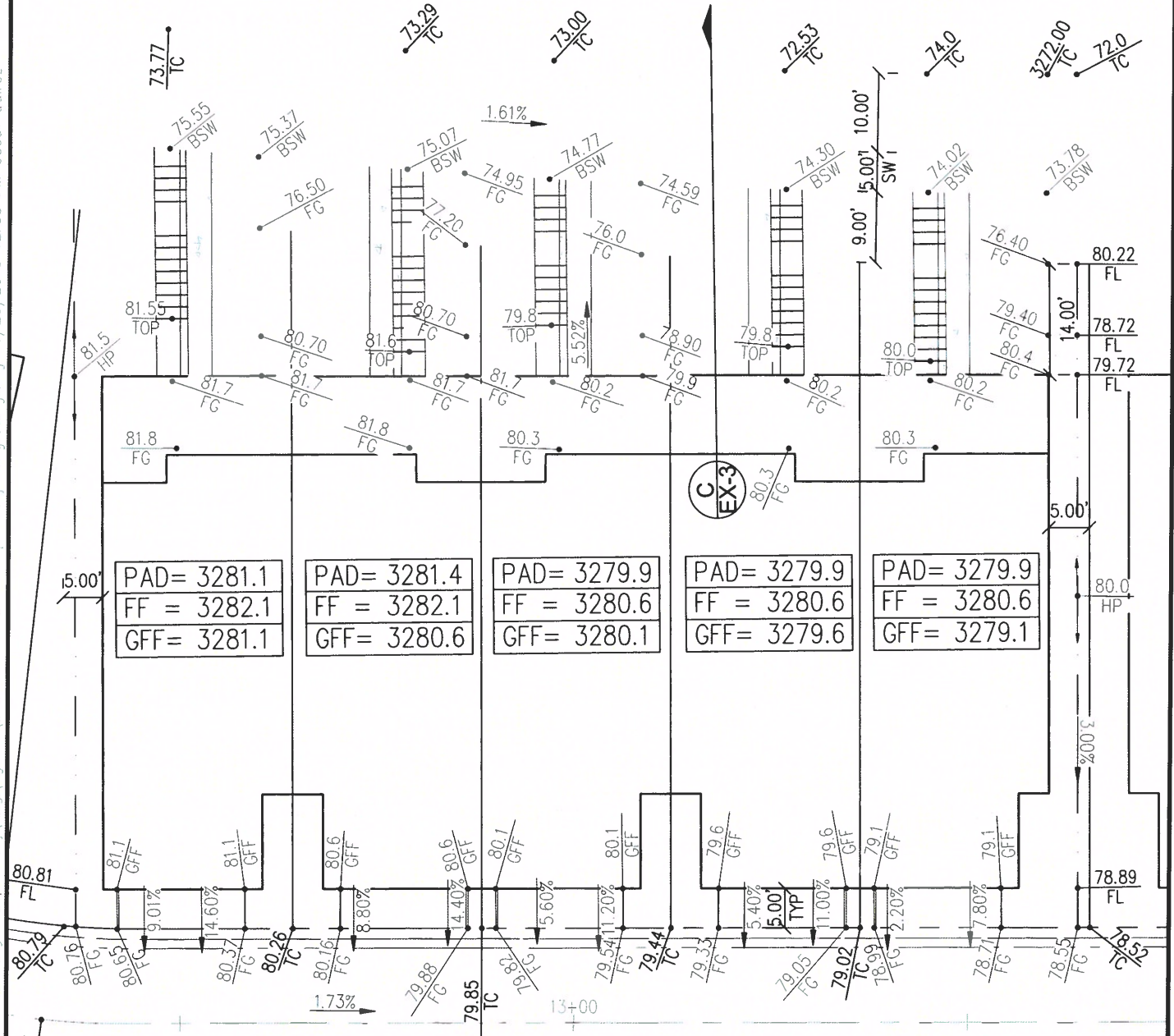
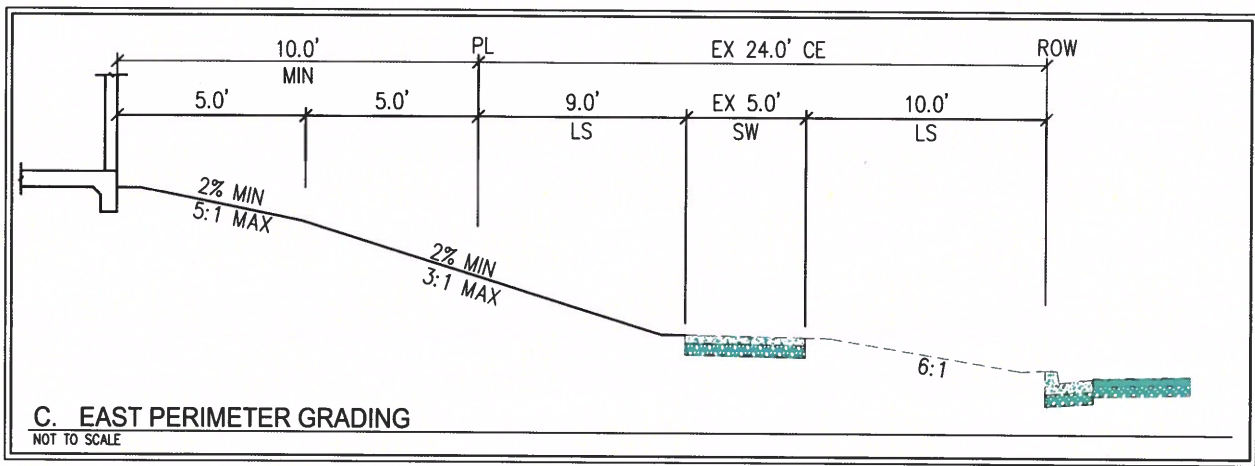
DATE: AUG 2019
DRAFTER: CAA
DESIGNER: CAA
CHECKED: SOA
PROJECT NO. RAH1908.000

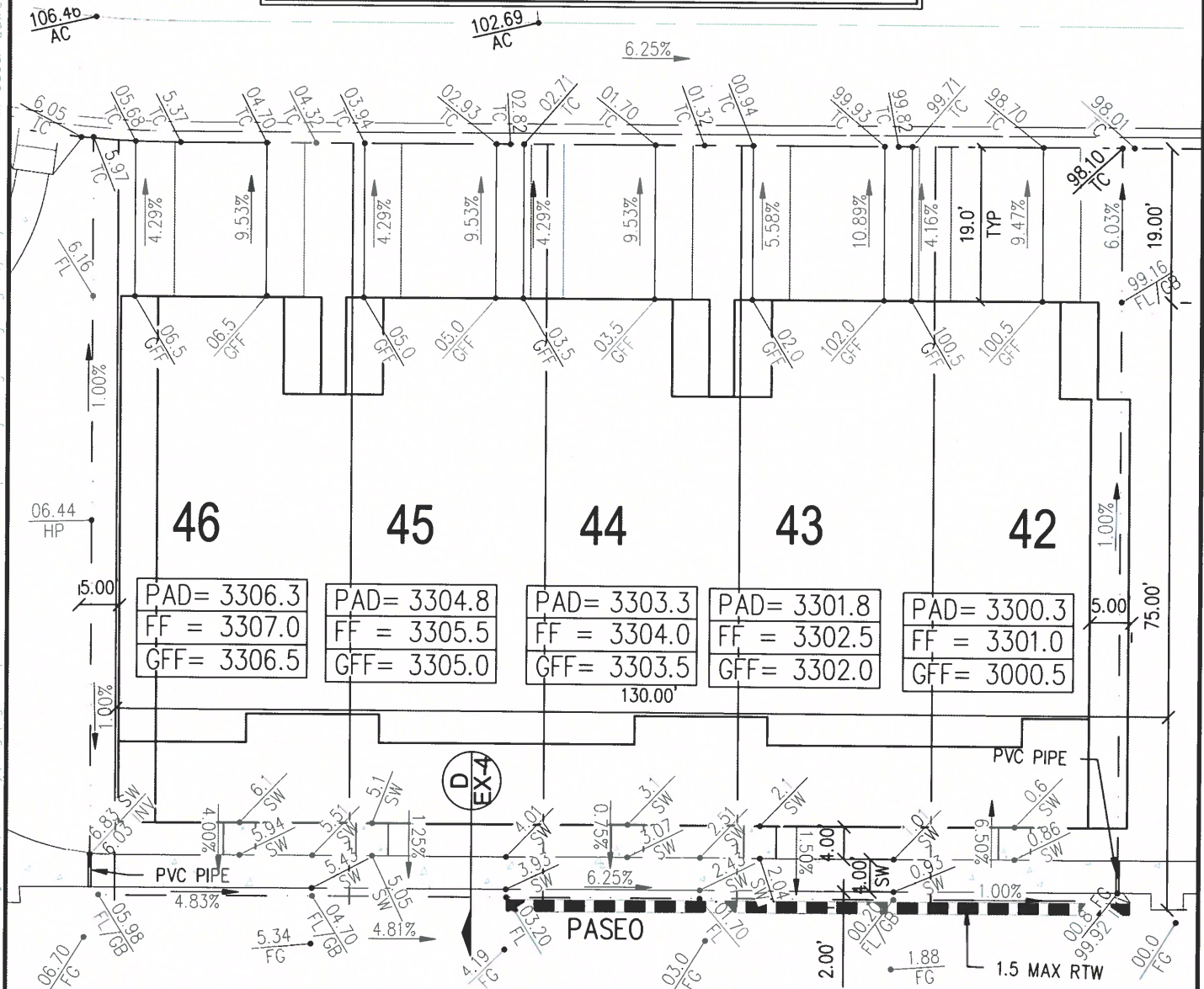
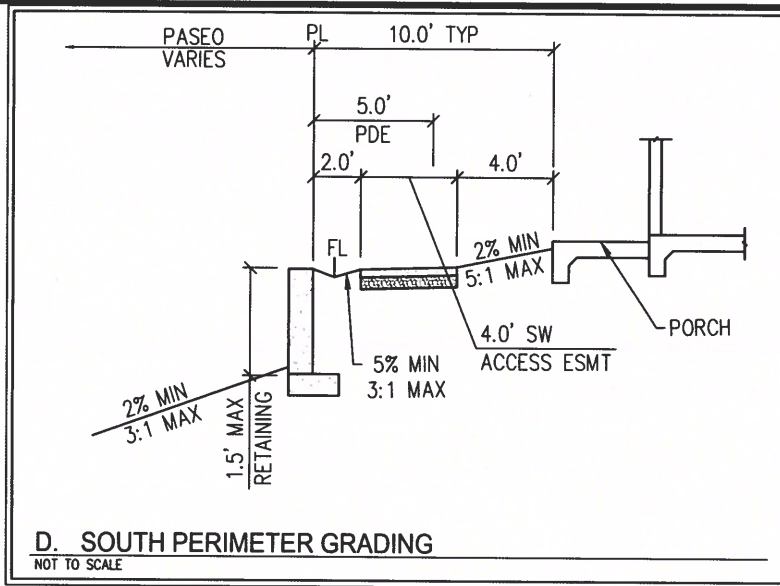
APPENDIX I

Typical Lot Plan Details









APPENDIX J

THHC (Summerlin) Approval Letter

Howard Hughes.



Chista Bilbrey
KB Home
5795 Badura Avenue #180
Las Vegas, NV 89118

November 8, 2019



Re: SDRC Parcel J Technical Drainage Study and Grading and Drainage Plans Review | Approved | Summerlin Village 21 (Redpoint)

Dear Christa –

The Summerlin Design Review Committee (SDRC) has reviewed the above-mentioned plans submittal dated 10/25/19, prepared by SHG a Westwood Team. The plans are *approved* with the following comment.

- The Technical Drainage Study has indicated that there are minor deviations from the Master Drainage Study regarding drainage directly into Kindle Corner Avenue and Carriage Hill Drive, and that these minor deviations will be addressed with an Update to The Master Drainage Study. KB Home is required to continue to coordinate as appropriate with the Master Developer to Update the Master Study prior to Improvement Plan approval.

Please contact us if you have any questions.

Sincerely,

Sharon D. Thompson
Design Review Coordinator, Summerlin

APPENDIX K

CD of Electronic Files & Improvement Plans

STORMWATER 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 YEAR REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATE 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 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 USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS AND ALL BUMPS 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 BUMPS 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.

BASIS OF BEARING

SOUTH 89°51'25" EAST BEING THE BEARING OF THE NORTH LINE OF SECTION 27, TOWNSHIP 20 SOUTH, RANGE 59 EAST, W.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY RECORDER'S OFFICE IN BOOK 158, PAGE 87 OF PLATS.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK NO. 5LV02604
A RIVET AND ROUND ALUMINUM PLATE IN THE TOP OF CURB AT THE NORTHWEST CORNER OF FAR HILLS ARE AND C215.
ELEVATION = 972.922 METERS (NAD83)
ELEVATION = 3191.99 US SURVEY FEET (NAD83)

LEGAL DESCRIPTION

LOT 17 AS SHOWN ON THE FINAL MAP OF "SUMMERLIN VILLAGE II" - UNIT 3701 FILED IN THE OFFICE OF THE CLARK COUNTY RECORDER IN BOOK 159, PAGE 50 OF PLATS, LYING WITHIN THE NORTHWEST QUARTER (NW 1/4) OF SECTION 26, TOWNSHIP 20 SOUTH, RANGE 59 EAST, W.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.
CONTAINING AN AREA OF 11.74 ACRES.

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 702-668-6107 48 HOURS PRIOR TO CONSTRUCTION.
4. IN THE EVENT OF NATURAL GAS CONTACT WITH PROPOSED UTILITIES AND STRUCTURES CONTACT 702-365-2089

CAUTION: HIGH PRESSURE GAS

CALL SOUTHWEST GAS AT 702-400-1789 FOR STANDBY WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES 48 HOURS PRIOR TO CONSTRUCTION

SOUTHWEST GAS APPROVAL

SOUTHWEST GAS CORPORATION DATE

2.2 CITY OF LAS VEGAS SEWER NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, AS AMENDED. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.
2. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS, ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEER.
3. CHISEL "S" OR "G" IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.
4. POLYVINYL (PVC) SEWER PIPE SHALL MEET ASTM D-3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND SAGDOLL 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 MAY 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.

LAS VEGAS VALLEY WATER DISTRICT (LVVWD) 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. FOLLOWING WATER PLAN APPROVAL, NOTICE SHALL BE GIVEN TO THE LVVMD COMMUNICATION SUPPORT CENTER (258-7171) TWO (2) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION FOR FUTURE INSPECTIONS. NOTICE MUST BE GIVEN BY 2:00 P.M. TO 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 ASSOCIATION, OR THE INDIVIDUAL PROPERTY OWNERS IF NO OWNER'S ASSOCIATION IS IN EXISTENCE, OR THE AGENCY HAVING JURISDICTION. DECORATIVE SURFACE MATERIALS PLACED WITHIN THE TEN FOOT EASEMENT ADJUTING A PUBLIC OR PRIVATE STREET, IF DISTURBED BY THE LVVMD DURING THE REPAIR OR OPERATION OF ITS FACILITIES, WILL BE REPLACED BY LVVMD WITH AN APPROPRIATELY SIZED PLANT 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 GRASS 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. & GUTTER 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 SOUTHWEST GEOTECHNICAL, PROJECT NO. 196230, DATED 06/07/19.
6. EARTHWORK QUANTITIES (RAW):
- CUT = 18,460 CUBIC YARDS
- FILL = 50,890 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 § 105.6.15
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 § 3310, § 3312
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 § 507.5.7.3
6. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TESTS WITH PRIOR FIRE PREVENTION APPROVAL. IFC § 106.3
7. ALL ON-SITE UNDERGROUND WATER MAINS AND MATERIALS SHALL BE U.L. LISTED, A.W.K.A APPROVED AND SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE. IFC § 507.2.1, NFPA 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 § 507.5.7.1
10. PRIOR TO THE FINAL ACCEPTANCE, 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 35,000 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 ALL-WEATHER DRIVING 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 ROADS SHALL NOT EXCEED 12% ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 6% FOR 25 FT 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 LINES 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. DESIGNED 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 MOW
26. ALL DEAD-END FIRE APPARATUS ROADS AND/OR FIRE LINES, 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 LINES. SIGNS TO BE PLACED ON BOTH SIDES OF AN ACCESS ROADWAY IF NEEDED TO PREVENT PARKING ON EITHER SIDE. SIGNS TO BE INSTALLED NO LESS THAN 10 FT OR LESS THAN 5 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 35,000 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

2.5 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 PORTABLE 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.

UTILITY LOCATION NOTE TO CONTRACTOR

EXISTING UTILITY LOCATIONS SHOWN HEREIN ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATIONS. CALL BEFORE YOU DIG: 1 (800) 227-2600; SOUTHWEST GAS CORPORATION: 702-400-1789 (STANDBY CONTACT NUMBER)

2.1 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 EDITION; THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST REVISED EDITION; AND THE "SUMMERLIN IMPROVEMENT STANDARDS" FOR WORK IN THE SUMMERLIN AREA, AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE DESIGNING 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 ON 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.
7. EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTRUDED-TYPE CURB.
8. AC PAVEMENT TO BE ONE-HALF INCH (1/2") ABOVE TOP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMP 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 SOUTHWEST GEOTECHNICAL, REPORT #196230, 06/07/19 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. 623.80 AND 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. WALL NOTES:
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 RIGIDS, 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 MOW 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 CERTAINIES OF ± 0.09 METERS (± 0.3 FEET) HORIZONTALLY AND VERTICALLY. A SEPARATION ELECTRONIC COMMA DELIMITED FILE FOR THE SANITARY SEWER AND STORM DRAIN COORDINATES SHALL ALSO ACCOMPANY THE SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S).
22. 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.

2.3 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 "SAFE ROUTE TO SCHOOL" IS ENCLOSED UPON BY A CONSTRUCTION WORK ZONE AND PUBLIC WORKS STAFF IDENTIFIES A NEED FOR STUDENTS TO BE ASSURED IN THE SAFE CROSSING THROUGH THAT WORK ZONE, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A QUALIFIED "CROSSING GUARD". THE GUARD SHALL BE PRESENT FOR THE FULL DURATION OF TIME THAT CHILDREN ARE LIKELY TO BE PRESENT.
5. IF THE IMPROVEMENTS NECESSITATE THE OBSTRUCTION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL OR REDUCTION OF ANY EXISTING TRAFFIC PAVEMENT MARKINGS, 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 BE FABRICATED WITH DAMINO GRADE, 4P CLASS 6 REFLECTIVE SHEETING OR APPROVED EQUAL. ALL NEW TRAFFIC SIGNS, EXCEPT STREET NAME AND SCHOOL SPEED LIMIT SIGNS, SHALL HAVE 3M SERIES 1160 OR APPROVED EQUIVALENT ANTI-GRAFFITI PROTECTIVE OVERLAY FILM. SCHOOL ZONE SIGNS SHALL HAVE 3M SERIES 1150 ANTI-GRAFFITI PROTECTIVE OVERLAY FILM. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CURRENT CITY STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.
7. WHEN A PROPOSED STREET LIGHT STANDARD IS LOCATED WITHIN FIVE (5') FEET OF ANY PROPOSED SIGN SHOWN ON THE PLANS TO BE MOUNTED ON A SIGNPOST, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGNPOST SHALL BE ELIMINATED.
8. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC onto the PORTIONS OF THE ROAD(S) BEING IMPROVED HERE UNDER, REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER OFF-SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.
9. STREET SIGNS AND STOP SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR PLACEMENT OF STREET NAME SIGNS.
10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO INSURE THE SAFETY OF THE PUBLIC IN OR AROUND THE WORK AREA. THE CONTRACTOR SHALL HAVE A CERTIFIED ATSSA TRAFFIC CONTROL TECHNICIAN OR MSA WORK ZONE SAFETY SPECIALIST SET UP, MAINTAIN AND/OR REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHT OF WAY.
11. WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE EXPEDITED TO COMPLETION SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO THE TRAVELING PUBLIC.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING CITIZENS AREA TRANSIT (C.A.T.) 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 OTHERWISE DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.
15. THE CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGHOUT THE PROJECT'S OFFSITE SURVEY REPORT TO INITIATING PAVING TO RECEIVE DIRECTION FOR ANY NECESSARY SURVEY 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 LINE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE CONSTRUCTED.

2.4 CITY OF LAS VEGAS STREETLIGHT NOTES

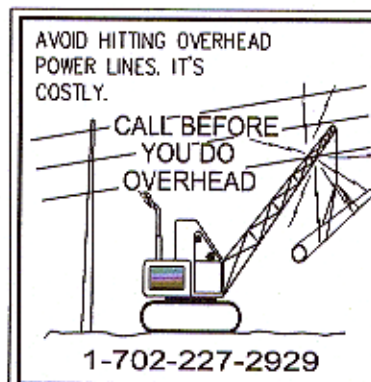
1. ALL STREET LIGHTING INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE STREET LIGHTING PLANS, THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", LATEST REVISION (USS), AND THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA" (USD), LATEST REVISION.
2. DESIGN PROFESSIONAL AND CONTRACTOR SHALL VERIFY CITY'S LATEST LIFT FIXTURE SPECIFICATIONS AND APPROVED FIXTURES PER CLV WEBSITE, UNDER BUILDING AND SAFETY FORMS, PRIOR TO ORDERING MATERIALS.
3. NO DEVIATION OF STREET LIGHT, PLANT BOX, CONDUITS ETC., LOCATIONS SHALL BE PERMITTED WITHOUT WRITTEN APPROVAL OF TRAFFIC AND CITY ENGINEER. ANY DEVIATION FROM THE PLAN LOCATION WILL REQUIRE COMPLIANCE WITH SECTION 623 OF THE USS.
4. ALL EXISTING STREET LIGHTING SHALL REMAIN OPERATIONAL DURING CONSTRUCTION IN ACCORDANCE WITH SECTION 623 G.0.301 OF THE USS.
5. ALL EMPTY CONDUIT SHALL HAVE AT LEAST ONE GREEN NO. 10 AWG WIRE INSTALLED AS TRACER WIRE IN ACCORDANCE WITH SECTION 623 G.0.2.01 OF THE USS PRIOR TO BACKFILLING AND FINAL INSPECTION.
6. ANY STRUCTURE SUCH AS BLOCK WALLS, CHAIN LINK FENCES, RETAINING WALLS, ETC., SHALL LEAVE A MINIMUM CLEARANCE IN ACCORDANCE WITH THE USD NO. 320A, WHEN POLE IS INSTALLED BEHIND SIDEWALK, AND SHALL AT NO TIME COMPLETELY ENCLOSE THE STREET LIGHTING POLE.
7. AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE TRAFFIC ENGINEERING DIVISION PRIOR TO ANY PRE-FINAL INSPECTION. THE AS-BUILT DRAWING NEEDS TO BE STAMPED AS-BUILT AND SIGNED BY THE PREPARER.
8. SERVICE POINT SHALL BE COORDINATED WITH MY ENERGY, AND WHEREVER POSSIBLE, BE LOCATED NEAR THE CENTER OF THE CIRCUIT. SERVICE POINTS SHALL BE SHOWN ON THE PLANS.
9. WHEREVER THERE IS AN OVERHEAD UTILITY THAT MAY CONFLICT WITH THE INSTALLATION OF STREET LIGHTING CIRCUITS AND/OR POLES, THESE CONFLICTS MUST BE RESOLVED BETWEEN THE DEVELOPER AND THE UTILITIES INVOLVED BEFORE STREETLIGHT BASES ARE INSTALLED, AT NO EXPENSE TO THE CITY OF LAS VEGAS.
10. THE CONTRACTOR SHALL FURNISH COMPLETE CONDUIT, WIRE, ETC. FROM SERVICE TO TRANSFORMERS AND CONTROL SYSTEMS IF REQUIRED ON THE PLANS.

DEVIATIONS FROM STANDARDS

- 8' DRIVEWAY FOR LOT 53 (PRJ#77153 SCD-77381)

APPROVED FOR CONSTRUCTION

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



DATE	BY</
------	------

ABBREVIATIONS

AC	ASPHALTIC CONCRETE OR ACRE	FL	FLOWLINE	PV	POINT OF VERTICAL INTERSECTION
AGG	AGGREGATE BASE	FT	FEET OR FOOT	QTY	QUANTITY
APN	ASSESSORS PARCEL NUMBER	FT	FOOT	R	RADIUS
APPROX OR ~	APPROXIMATE	GRD	GRADE OR GROUND	RCA	REINFORCED CONCRETE ARCH
AVENUE	AVENUE	GRB	GRADE BREAK OR GRADE CHANGE	RCB	REINFORCED CONCRETE BOX
Ø	AT	GV	GATE VALVE	RCD	REINFORCED CONCRETE PIPE
B	BEGIN CURVE OR BACK OF CURB	HDPE	HIGH DENSITY POLYETHYLENE	RCD	ROAD
BCK	BEHIND OF CURB RETURN	HDA	HOME OWNERS ASSOCIATION	RDMV	ROADWAY EASEMENT
BHW	BOTTOM OF HEADWALL	HORZ	HORIZONTAL	REQD	REQUIRED
BLDG	BUILDING	HP	HIGH POINT	REV	REVISION
BLVD	BOULEVARD	HWL	HIGH WATER LEVEL	RG	RIGHT
BND	BENDING	HWHL OR HW	HEADWALL	RH	RIGHT OF WAY
BVC	BEGIN VERTICAL CURVE	HYD	HYDRAULIC OR HYDRANT	R/R	R/R
BWV	BACK WATER VALVE	ID	INSIDE DIAMETER	R/R	RIGHT OF WAY
CC	CLARK COUNTY	IN	INCH	SCH	SLOPE
CLARK CO	CLARK COUNTY AREA UNIFORM STANDARD DRAWINGS	INT	INVERT	SCH	SCHEDULE
CCPW	CLARK COUNTY PUBLIC WORKS	INV	INVERT ELEVATION	SDH	STORM DRAIN
CCRFCD	CLARK COUNTY REGIONAL FLOOD DISTRICT	IP	IRON PIPE	SDMI	STORM DRAIN DROP INLET
CCLWD	CLARK COUNTY WATER RECLAMATION DISTRICT	IRR	IRRIGATION	SDH	STORM DRAIN MANHOLE
CE	CEMENT ELEMENT	IRG	IRRIG	SEC	SECTION
CLC/LC	CENTERLINE	LMC	LANDSCAPE MAINTENANCE CORPORATION	SECT	SQUARE FEET
CLM	CLEAR OR CLEARANCE	LP	LOW POINT	SH	SHEET
CLM	CONTROLLED LOW STRENGTH MATERIAL	LT OF L	LEFT	SLT	STREET LIGHT & TRAFFIC CONTROL ESMIT
CLM/C	CITY OF LAS VEGAS	LVMD	LAS VEGAS VALLEY WATER DISTRICT	SNWA	SOUTHERN NEVADA WATER AUTHORITY
CM&C	CEMENT MORTAR LINED AND COATED	LWL	LOW WATER LEVEL	ST	STREET
CMU	CONCRETE MASONRY UNIT	MAX	MAXIMUM	SSMH	SANITARY SEWER MANHOLE
CNVL	CITY OF NORTH LAS VEGAS	MECH	MECHANICAL	STA	STATION
CON	CITY OF HENDERSON	MH	MANHOLE	STD	STANDARD
CONC	CONCRETE	MIN	MINIMUM	STL	STEEL
CT	CURT	MISC	MISCELLANEOUS	STLT	STREET LIGHT
CU OR CU YD	CURB YARD	MUN	MUNICIPAL UTILITY EASEMENT	SWG	SEWER GAS
DCKWS	DESIGN AND CONSTRUCTION FOR WASTEWATER COLLECTION SYSTEMS	NDOT	NEVADA DEPARTMENT OF TRANSPORTATION	SWR OR SS	SANITARY SEWER
DE	DRAINAGE EASEMENT	NTE	NOT TO SCALE	SWY	SQUARE YARD
DET	DETAIL	NVE	NONEXCLUSIVE UTILITY EASEMENT	SY	SQUARE YARD
DIA	DIAMETER	NO	NO ENERGY	TAN	TANGENT
DIA, Ø	DIAMETER	ON	ON CENTER	TF	TOP OF CURB
DIP	DUCTILE IRON PIPE	OD	OUTSIDE DIAMETER OR OVERALL DIMENSION	TN	TOP OF FLOOR OR TOP OF FOOTING
DWG(S)	DRAWING	OFF	OFFSET	TO	TOP OF GRADE
DWY	DRIVEWAY	ORIG	ORIGINAL	THRU	THROUGH
E	EACH	PAE	PUBLIC OR PEDESTRIAN ASIDE EASEMENT	THW	TOP OF HEADWALL
EER	END CURB RETURN	PB	PULL BOX	TP	TOP OF PIPE
EG	EXISTING GROUND	PC	POINT OF CURVE	TPW	TOP OF WALL
ELEV	ELEVATION	PCC	POINT OF COMPOUND CURVE	TRW	TOP OF RETAINING WALL
ESMT	EDGE OF PAVEMENT	PDE	PUBLIC DRAINAGE EASEMENT	TSP	TOP OF SLOREN WALL
ERU	EQUIVALENT RESIDENTIAL UNIT	P OR PL	PROPERTY LINE	TSY	TYPICAL
EVC	END VERTICAL CURVE	PGB	POINT OF BEGINNING	UDACS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS
EX OR EXIST	EXISTING	PCC	POINT OF CURVATURE	UE	UTILITY EASEMENT
FC	FACE OF CURB	PDE	POINT OF ENDING	VERT	VERTICAL
FF	FINISHED FLOOR	PRC	POINT OF REVERSE CURVATURE	VCT	VALLEY CUTTER
FG	FINISHED GRADE	PRELIM	PRELIMINARY	W	WROUGHT IRON
FH	FINISHED GRADE, HIGH SIDE	PROP	PRESSURE REDUCING VALVE	WL	WATER LINE
FSL	FINISHED GRADE, LOW SIDE	PUE	PUBLIC UTILITY EASEMENT	WP	WATER PRESSURE ZONE
FR	FIRE HYDRANT	PT	POINT OF TANGENT OR POINT	WTR	WATER
		PVC	POLYVINYL CHLORIDE	WZ	WATER LINE

SPECIAL NOTE

IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED WHICH 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 OF LAS VEGAS DEPT. OF PUBLIC WORKS. TEMPORARY CONSTRUCTION ITEMS INCLUDE: PAVEMENT TRANSITIONS, PROTECTIVE DITCHES AND BERMS, ROAD SIGNS AND BARRICADES, ETC.

NOTICE TO CONTRACTOR

-QUANTITIES SHOWN ARE ESTIMATES ONLY AND ARE INTENDED TO ILLUSTRATE SCOPE OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE EXACT QUANTITIES INVOLVED.

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

LEGEND

EXISTING	PROPOSED	DESCRIPTION
		5' CONTOUR
		1" CONTOUR
		STRIPING
		SEWER MANHOLE
		CURB AND GUTTER
		8" PVC SS
		SANITARY SEWER PIPE AND FLOW ARROW
		8" PVC WTR
		WATER PIPE
		WATER GATE VALVE
		FIRE HYDRANT
		WATER BLOW-OFF
		WATER LATERAL W/ METER
		SANITARY SEWER LATERAL
		STREETLIGHT
		EDGE OF PAVEMENT
		TRAFFIC SIGN
		PAD ELEVATION
		FINISHED FLOOR ELEVATION
		ELEVATION
		RETAINING WALL
		STORM DRAIN W/ MANHOLE
		PROPOSED SCARP AREA
		DRIVEWAY
		PROPOSED RIP RAP
		SIGHT VISIBILITY ZONE PER STD DWG NO. 201.2
		HANDICAP RAMP

QUANTITIES

DRAINAGE			
1.	48" TYPE II STORM DRAIN MANHOLE	EA	2
2.	48" TYPE III STORM DRAIN MANHOLE	EA	1
3.	5.0' TYPE "CM2" DROP INLET	EA	2
4.	10.0' TYPE "CM2" DROP INLET	EA	1
5.	12.5' TYPE "CM2" DROP INLET	EA	1
6.	17.5' TYPE "CM2" DROP INLET	EA	1
7.	18" RCP CLASS IV STORM DRAIN	LF	560
8.	18" C900 PVC CLASS IV STORM DRAIN	LF	30
9.	2' WIDE CONCRETE VALLEY GUTTER	SF	36
10.	8' WIDE CONCRETE VALLEY GUTTER	SF	2,613
11.	SIDEWALK DRAIN	SF	5
12.			
13.			

SEWER SYSTEM

1.	4" PVC SEWER LATERAL (PRIVATE)	LF	--	--
2.	8" PVC SEWER PIPE (PUBLIC)	LF	--	--
3.	STANDARD 48" SEWER MANHOLE (PUBLIC)	EA	--	--
4.	8" SEWER PIPE CAP	EA	--	--
5.	BACK WATER VALVE	EA	--	--
6.	8" C-900 WATER QUALITY SEWER PIPE (PUBLIC)	EA	--	--
7.				

WATER SYSTEM

1.	FIRE HYDRANT ASSEMBLY W/6" GATE VALVE PER UDACS PLATE NO. 40	EA	--	--
2.	6" PVC WATER PIPE (CLASS 150)	LF	--	--
3.	8" PVC WATER PIPE (CLASS 150)	LF	--	--
4.	8" DIP WATER PIPE (CLASS 53)	LF	--	--
5.	8" GATE VALVE WITH VALVE BOX PER UDACS PLATE NO. 30 & 39	EA	--	--
6.	8" x 6" TEE PER UDACS PLATE NO. 31	EA	--	--
7.	8" x 8" TEE PER UDACS PLATE NO. 31	EA	--	--
8.	8" 5 DEGREE BEND WITH RESTRAINED JOINTS	EA	--	--
9.	8" 11 25 DEGREE BEND PER UDACS PLATE NO. 31	EA	--	--
10.	8" 22 5 DEGREE BEND PER UDACS PLATE NO. 31	EA	--	--
11.	8" 45 DEGREE BEND PER UDACS PLATE NO. 31	EA	--	--
12.	8" 90 DEGREE BEND PER UDACS PLATE NO. 31	EA	--	--
13.	CAP AND 2" BLOW-OFF ASSEMBLY W/CAP PER UDACS PLATE NO. 36	EA	--	--
14.	1" COPPER SERVICE W/ 3/4" METER PER UDACS PLATE NO. 2	EA	--	--
15.	1" COPPER SERVICE W/ 1" METER PER UDACS PLATE NO. 4	EA	--	--
16.	1" COPPER SERVICE W/ 3/4" METER & 1" RPPA PER UDACS PLATE NO. 4 & 8	EA	--	--

STREET IMPROVEMENTS

1. 2" A.C. PAVEMENT W/ 4" TYPE II OVER 6" TYPE I AGGREGATE BASE	SY	29.100	-
2. STANDARD 18" TYPE "L" ISLAND CURB & GUTTER W/6" TYPE I AGGREGATE BASE	LF	11.000	-
3. 6" TYPE "A" ISLAND CURB W/6" TYPE I AGGREGATE BASE	LF	620	-
4. STANDARD 30" TYPE "ROLL" CURB & GUTTER W/6" TYPE I AGGREGATE BASE	LF	5,000	-
5. 4' WIDE CONCRETE SIDEWALK W/4" TYPE II AGGREGATE BASE	SF	20,850	-
6. 5' WIDE CONCRETE SIDEWALK W/4" TYPE II AGGREGATE BASE	SF	5,070	-
7. STANDARD 24" TYPE "L" CURB & GUTTER W/6" TYPE I AGGREGATE BASE	LF	1,750	-

TRAFFIC SIGNALS

1.	30" STOP SIGN WITH POST (R1-1)	EA	--	--
2.	9" STREET NAME SIGN (D-3, BROWN W/ WHITE LETTERS)(6 POLES x 2 PER POLE=12)	EA	--	--
3.	BLUE COLORED REFLECTIVE RAISED PAVEMENT MARKER	EA	--	--
4.	CROSSWALK MARKINGS	LF	--	--
5.				
6.				
7.				
8.				

DRY UTILITIES

1.	100W H.P.S. LUMINAIRE STREET LIGHT W/DECORATIVE POLE	EA	-	-
2.	1-1/4" PVC STREET LIGHT CONDUIT WITH (2) #4 AND (1) #8 CONDUCTORS	LF	-	-
3.	NO. 3-1/2 PULL BOX W/METAL COVER	EA	-	-
4.	150 AMP SERVICE PEDESTAL (RR)	EA	-	-
5.	200 AMP SERVICE PEDESTAL (STLT)	EA	-	-
6.				

APPROVED FOR CONSTRUCTION

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

S-I **SLATER**
HANIFAN
GROUP
a Westwood team

5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

[illegible]

KB HOME

SUMMERLIN VILLAGE 21 PARCEL J - ASCENT

LEGEND, ABBREVIATIONS, AND QUANTITIES

S 26	
T 20	
R 59	

DATE: 11/25/19

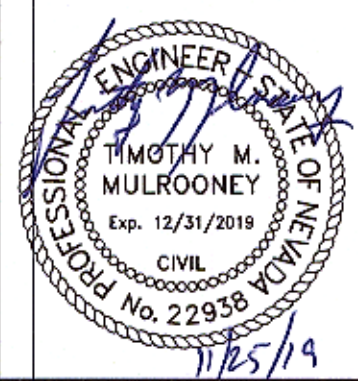
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DESIGNER: OQ

CHECKED: DSP

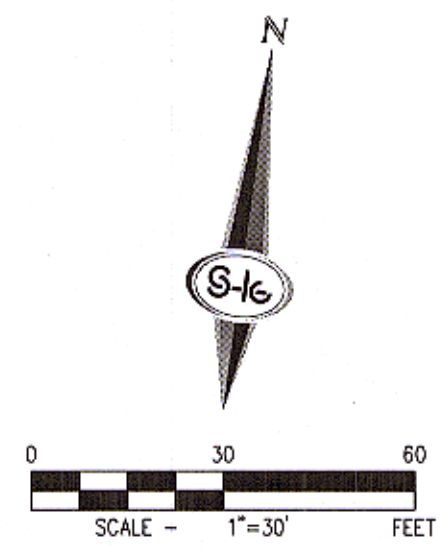
PROJECT NO.

KBH1913-000



C-3
SHEET 3 OF 13





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 SOUTHWEST GEOTECHNICAL PROJECT NO. 182267 DATED 7/12/18

EARTHWORKS
EARTHWORK QUANTITIES (RAW):
CUT= 23,900 CU YDS
FILL= 51,700 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.

DRAINAGE IMPROVEMENT QUANTITIES		
1. 48" TYPE II STORM DRAIN MANHOLE	EA	2
2. 48" TYPE III STORM DRAIN MANHOLE	EA	1
3. 5.0' TYPE "CM2" DROP INLET	EA	2
4. 10.0' TYPE "CM2" DROP INLET	EA	1
5. 12.5' TYPE "CM2" DROP INLET	EA	1
6. 17.5' TYPE "CM2" DROP INLET	EA	1
7. 18" RCP CLASS IV STORM DRAIN	LF	580
8. 8" WIDE CONCRETE VALLEY GUTTER	SF	2,613
9. SIDEWALK UNDER DRAIN	SF	5

ELEVATION NOTE
ADD 3300 TO SPOT GRADES RANGING FROM 00.00-50.00 AND ADD 3200 TO SPOT GRADES RANGING FROM 50.01-99.99 FOR ACTUAL ELEVATION (I.E. 01.00 REPRESENTS 3301.00 AND 99.00 REPRESENT 3299.00)

- GRADING NOTES**
- FINAL GRADES ADJACENT TO STRUCTURES SHALL BE IN CONFORMANCE WITH IBC 2012, SECTION 2304.11.2.2.
 - 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.

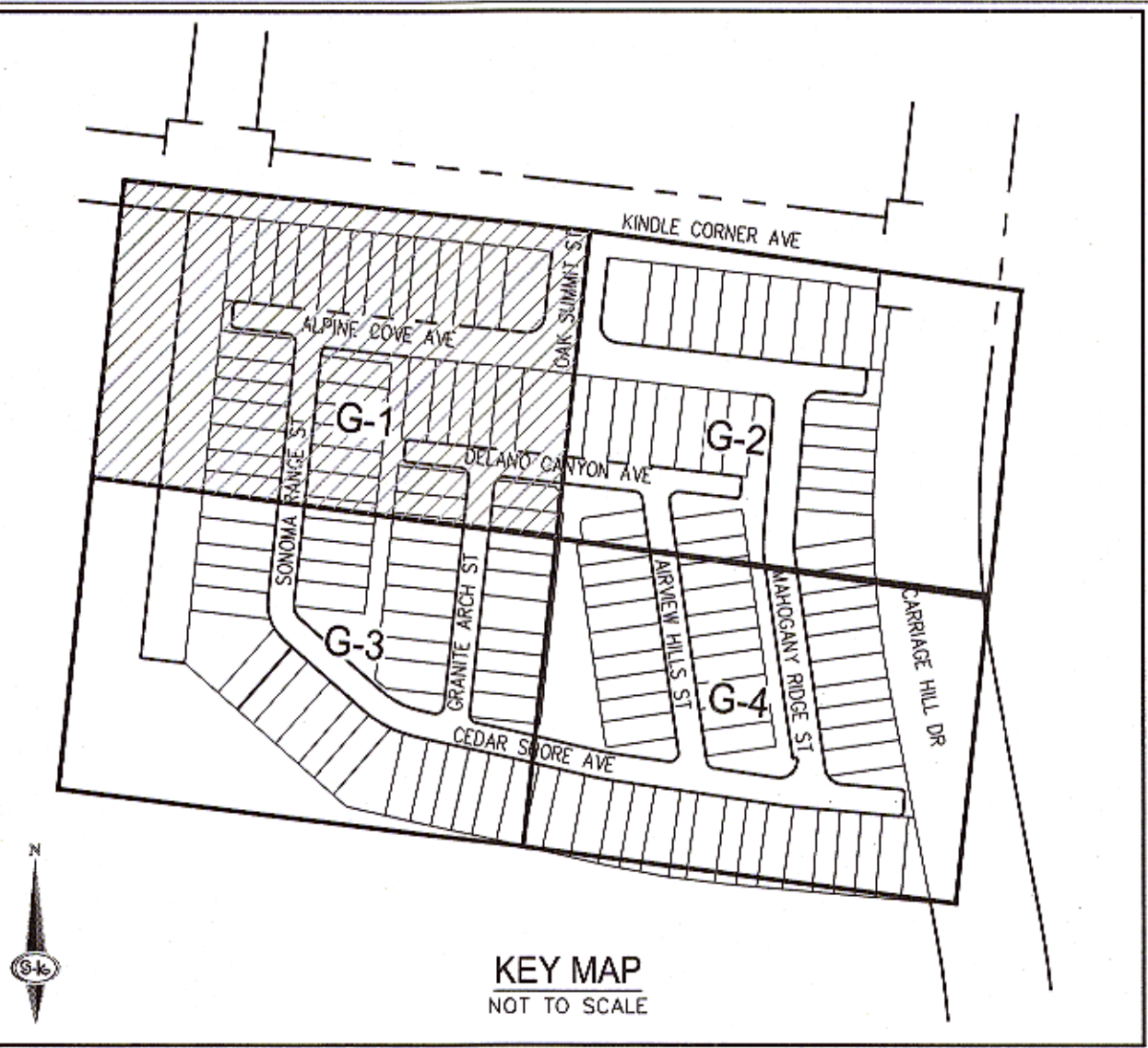
FLOOD ZONE
THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) 32032C2150E, DATED SEPTEMBER 27, 2002. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.

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 SAWHUT LINE TO PROPOSED EDGE OF PAYMENT 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.

BENCHMARK
CITY OF LAS VEGAS BENCHMARK 7LV09 345W6
RIVET AND ROUND PLATE IN THE TOP OF CURB AT THE SOUTHEAST CORNER OF DESERT MOON RD. AND SKY VISTA DR.
ELEVATION = 1011.422 METERS (NAVD '88)
ELEVATION = 3318.31 US SURVEY FEET (NAVD '88)

BASIS OF BEARINGS
NORTH 05°59'55" WEST, BEING THE BEARING OF THE WEST LINE OF SECTION 34, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY, NEVADA RECORDER'S OFFICE IN BOOK 135, PAGE 71 OF PLATS.



LEGAL DESCRIPTION
LYING WITHIN THE NORTH EAST QUARTER (NE 1/4) OF SECTION 33, TOWNSHIP 20 SOUTH, RANGE 59 EAST M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

EASEMENT NOTES

- ALL PRIVATE STREETS ARE P.U.E., PUBLIC SEWER EASEMENTS AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA.
- ALL COMMON ELEMENTS ARE PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA.

- CONSTRUCTION NOTES**
- SAW CUT AND MATCH EXISTING IMPROVEMENTS (3" AC/6" TYPE I OR SCARIFY NATIVE) PER CCAUSD NO 500.2. EXISTING STRIPING TO BE REPLACED.
 - INSTALL 2" ASPHALT PAVEMENT OVER 4" TYPE II AGGREGATE BASE.
 - INSTALL 80MM PAVERS WITH SOLDIER COURSE BANDING OR APPROVED EQUAL PER LANDSCAPE PLANS.
 - 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).
 - INSTALL MODIFIED ROLL TYPE CURB PER CCAUSD NO. 217.1
 - INSTALL "L" TYPE CURB PER CCAUSD NO 216
 - INSTALL "A" TYPE ISLAND CURB PER DETAIL 31, D-2
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 - CONSTRUCT 8" CROSS GUTTER PER CCAUSD NO. 228
 - CONSTRUCT 2" CROSS GUTTER PER DETAIL 27, SHEET D-2
 - INSTALL SIDEWALK UNDER DRAIN PER CCAUSD NO. 236
 - INSTALL STAIRS PER DETAIL 34, D-3
 - INSTALL 48" TYPE III SDMH CCAUSD NO. 401, 402 & 406
 - INSTALL 5" TYPE "CM2" DROP INLET PER CCAUSD NO. 412.1 AND STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
 - INSTALL 10' TYPE "CM2" DROP INLET PER CCAUSD NO. 412.1 AND STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
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 - 5" PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED BY HOA
 - "L" TYPE ISLAND CURB PER CCAUSD NO 219
 - CONSTRUCT STEP PER DETAIL 30, SHEET D-2
 - CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER DETAIL 39, D-3
 - CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER DETAIL 40, D-3
- SEE SHEET G-3 FOR LEGEND, ABBREVIATIONS, & QUANTITIES

FLOOD CERTIFICATION
I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.
TIM M. MULROONEY, P.E. 22938 DATE 11/25/19

SLATER
HANIFAN
GROUP

G-1

a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300
FAX (702) 284-5399

DATE: 11/25/19

DRAWN: PA

DESIGNER: OQ

CHECKED: DSP

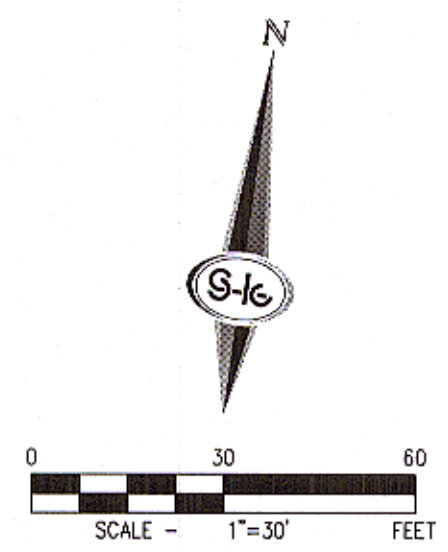
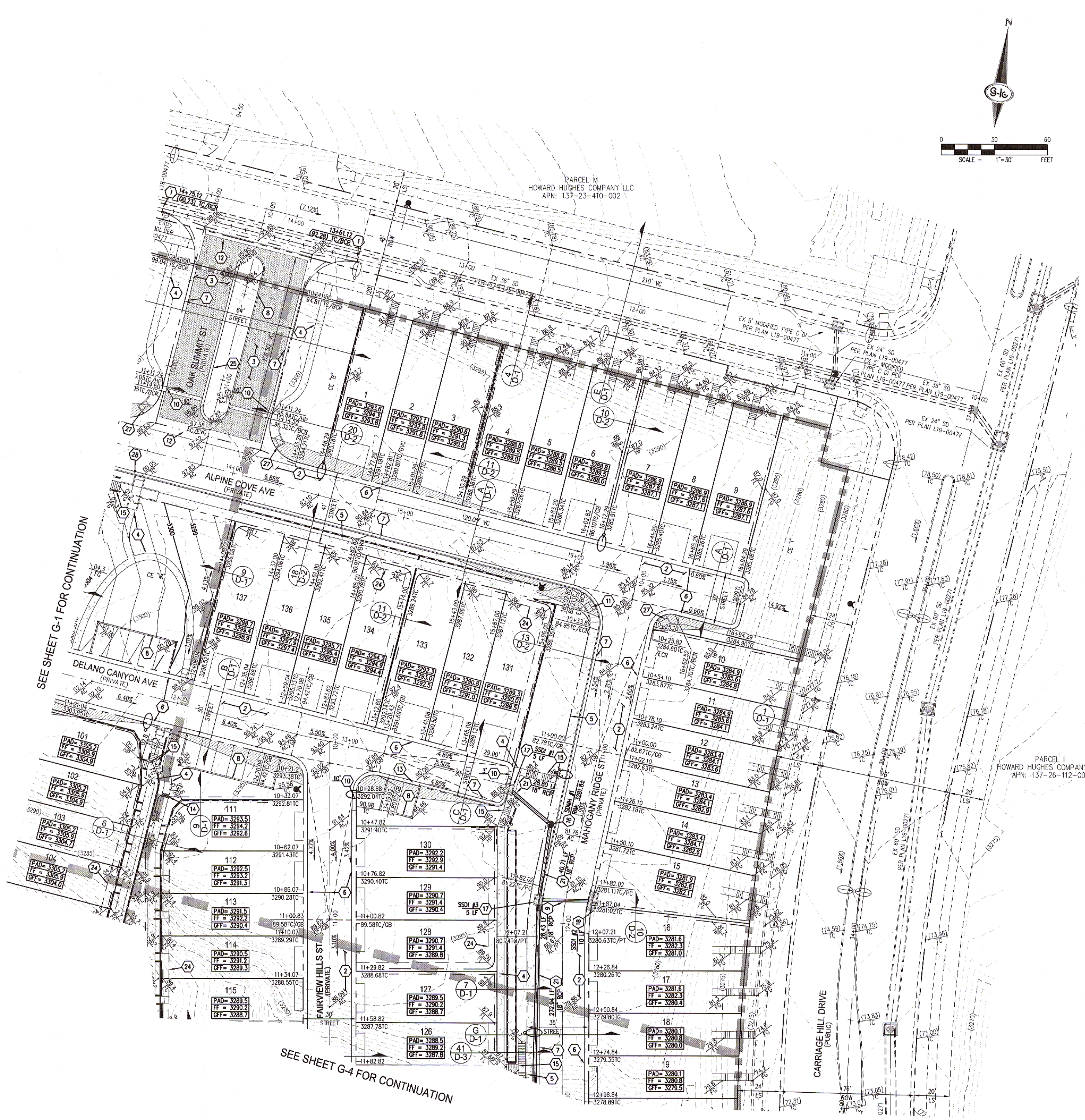
PROJECT NO.
KBH1913-000

G-1
SHEET 4 OF 13

KBHOME

SUMMERLIN VILLAGE 21 PARCEL J - ASCENT
GRADING PLAN I

3: kbh1913-000 summerlin village 21 parcel j - ascent 11/25/2019 11:07 AM Oscar Quiroz



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

SOILS REPORT
SOILS REPORT BY SOUTHWEST GEOTECHNICAL PROJECT NO. 182267 DATED 7/12/18

EARTHWORKS
EARTHWORK QUANTITIES (RAW):
CUT= 23,900 CU YDS
FILL= 51,700 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.

DRAINAGE IMPROVEMENT QUANTITIES

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2. 48" TYPE III STORM DRAIN MANHOLE	EA	1
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5. 12.5' TYPE "CM2" DROP INLET	EA	1
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8. 8" WIDE CONCRETE VALLEY GUTTER	SF	2,613
9. SIDEWALK UNDER DRAIN	SF	5

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 5. SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
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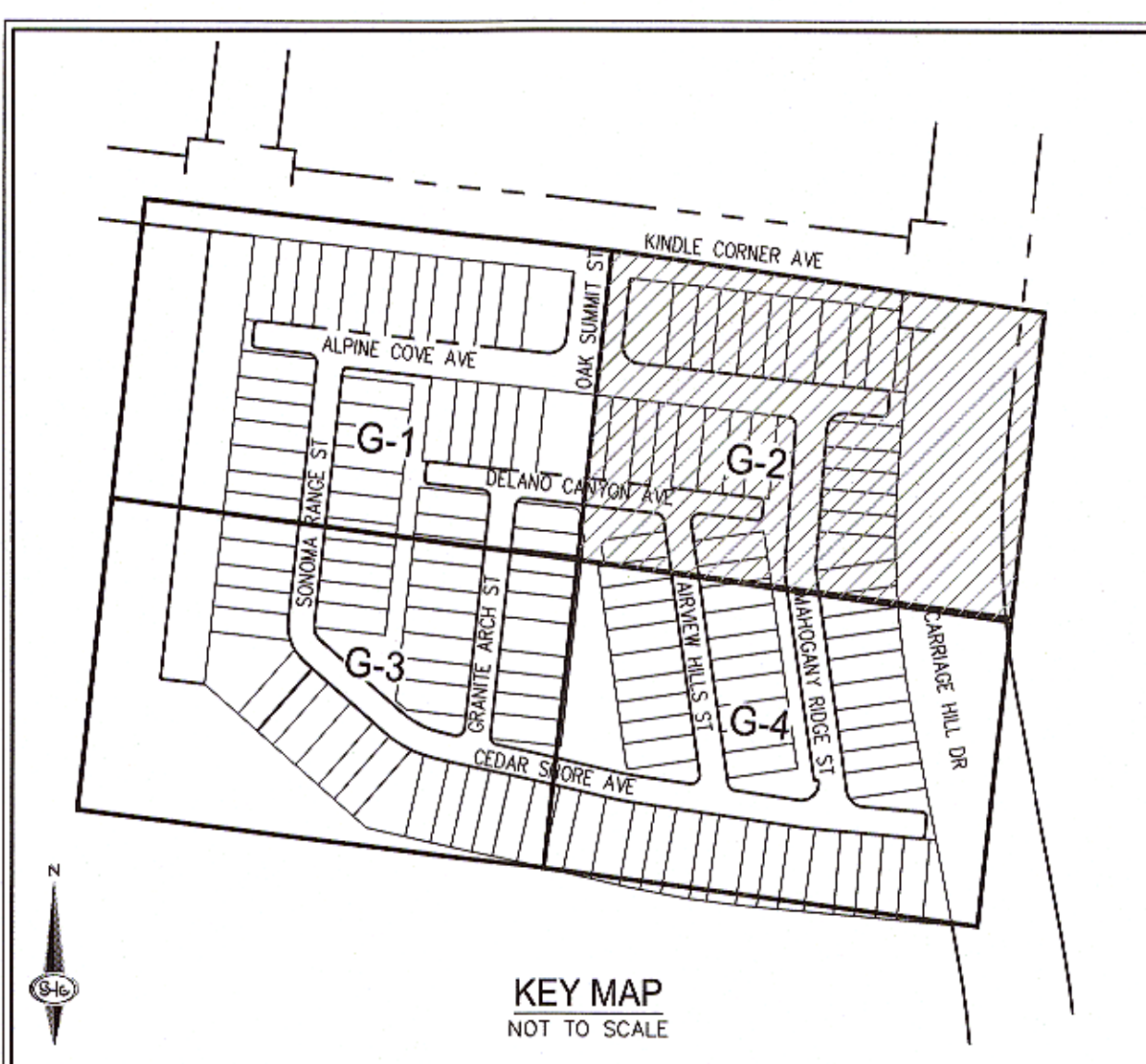
FLOOD ZONE
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DISCLAIMER NOTE

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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.

BENCHMARK
CITY OF LAS VEGAS BENCHMARK 7LV09 345W6
RIVET AND ROUND PLATE IN THE TOP OF CURB AT THE SOUTHEAST CORNER OF DESERT MOON RD. AND SKY VISTA DR.
ELEVATION = 1011.422 METERS (NAVD '88)
ELEVATION = 3318.31 US SURVEY FEET (NAVD '88)

BASIS OF BEARINGS
NORTH 05°59'55" WEST, BEING THE BEARING OF THE WEST LINE OF SECTION 34, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY, NEVADA RECORDER'S OFFICE IN BOOK 135, PAGE 71 OF PLATS.



LEGAL DESCRIPTION
LYING WITHIN THE NORTH EAST QUARTER (NE1/4) OF SECTION 33, TOWNSHIP 20 SOUTH, RANGE 59 EAST M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

EASEMENT NOTES

1. ALL PRIVATE STREETS ARE P.U.E., PUBLIC SEWER EASEMENTS AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA.
2. ALL COMMON ELEMENTS ARE PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA.

- CONSTRUCTION NOTES**
1. SAWCUT AND MATCH EXISTING IMPROVEMENTS (3" AC/6" TYPE I OR SCARIFY NATIVE) PER CCAUSD NO 500.2. EXISTING STRIPING TO BE REPLACED.
 2. INSTALL 2" ASPHALT PAVEMENT OVER 4" TYPE II AGGREGATE BASE.
 3. INSTALL 80MM PAVERS WITH SOLDIER COURSE BANDING OR APPROVED EQUAL PER LANDSCAPE PLANS.
 4. CONSTRUCT 4" WIDE SIDEWALK PER CCAUSD NO. 234 (5" THICK W/ 5" TYPE II AGGREGATE BASE).
 5. CONSTRUCT 5" WIDE SIDEWALK PER CCAUSD NO. 234 (5" THICK W/ 5" TYPE II AGGREGATE BASE).
 6. INSTALL MODIFIED ROLL TYPE CURB PER CCAUSD NO. 217.1.
 7. INSTALL "L" TYPE CURB PER CCAUSD NO 216.
 8. INSTALL "A" TYPE ISLAND CURB PER DETAIL 31, D-2.
 9. INSTALL C900 PVC STORM DRAIN PIPE (SIZE PER PLAN).
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 11. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD NO. 235.
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 13. CONSTRUCT 2" CROSS GUTTER PER DETAIL 27, SHEET D-2.
 14. INSTALL SIDEWALK UNDER DRAIN PER CCAUSD NO. 236.
 15. INSTALL STAIRS PER DETAIL 34, D-3.
 16. INSTALL 48" TYPE III SDMH CCAUSD NO. 401, 402 & 406.
 17. INSTALL 5" TYPE "CM2" DROP INLET PER CCAUSD NO. 412.1 AND STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421.
 18. INSTALL 10" TYPE "CM2" DROP INLET PER CCAUSD NO. 412.1 AND STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421.
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 24. 5" PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED BY HOA.
 25. "L" TYPE ISLAND CURB PER CCAUSD NO 219.
 26. CONSTRUCT STEP PER DETAIL 30, SHEET D-2.
 27. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER DETAIL 39, D-3.
 28. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER DETAIL 40, D-3.

FLOOD CERTIFICATION
I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY _____ ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.
TIM M. MULROONEY, P.E. 22938 _____ DATE _____

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

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
CALL BEFORE YOU DO OVERHEAD
Call 811
OR
1-702-227-2929

Call before you Dig
AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
Call 811
OR
1-800-227-2600

SLATER HANFAN GROUP
a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

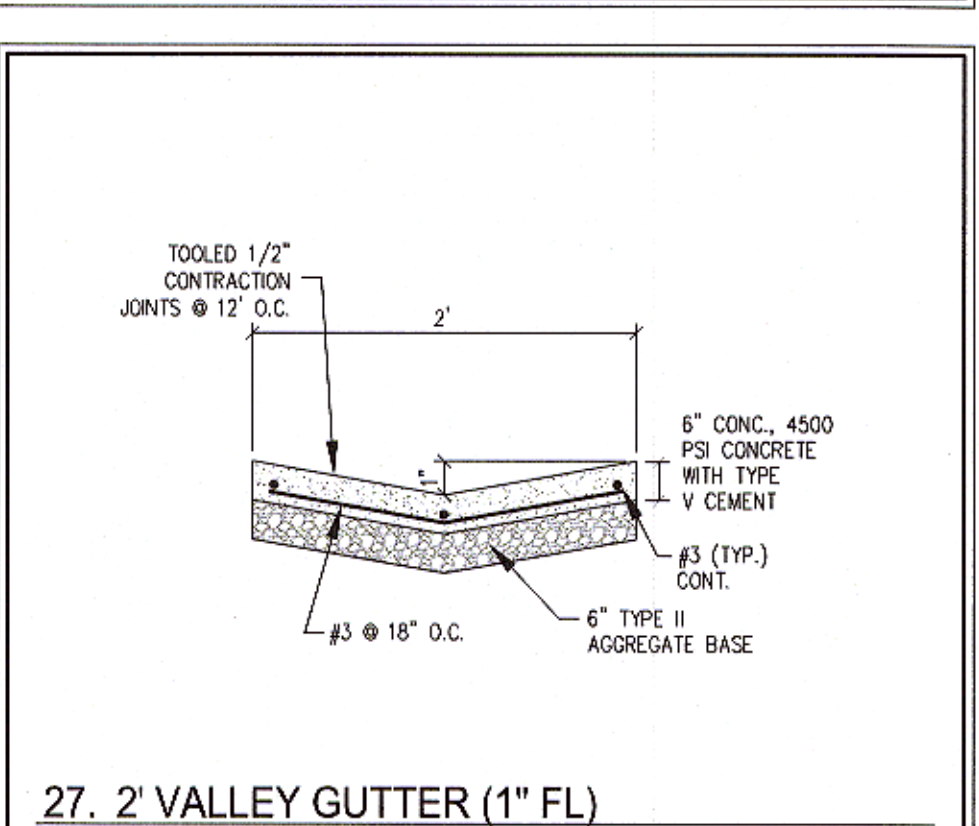
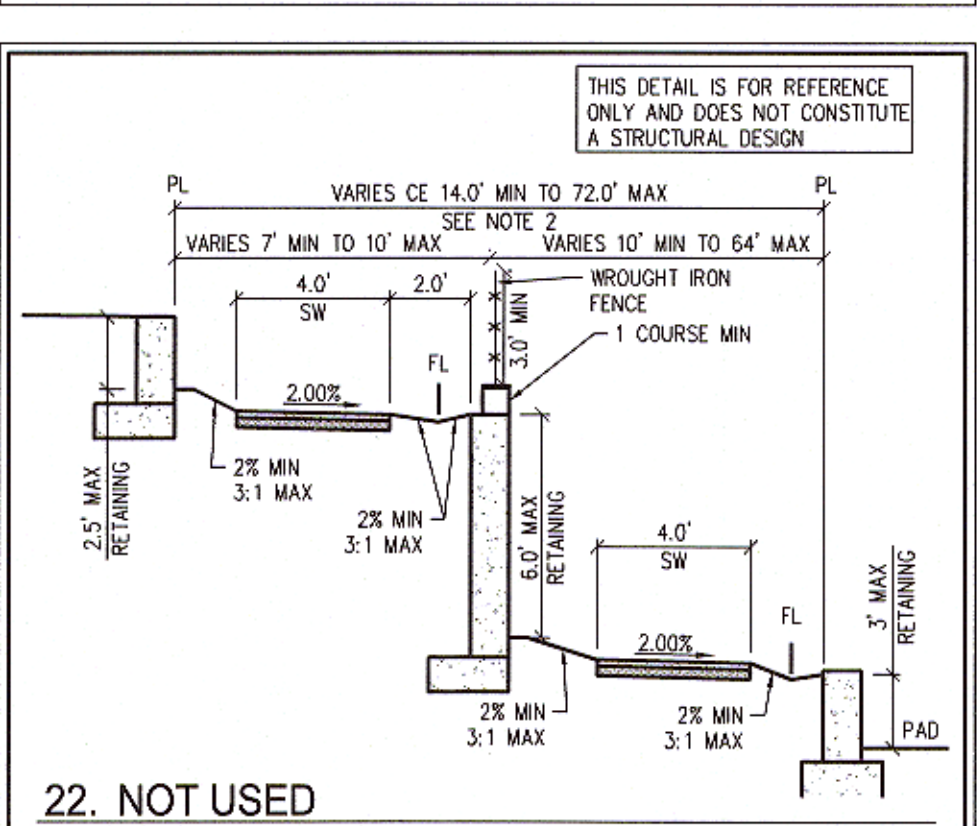
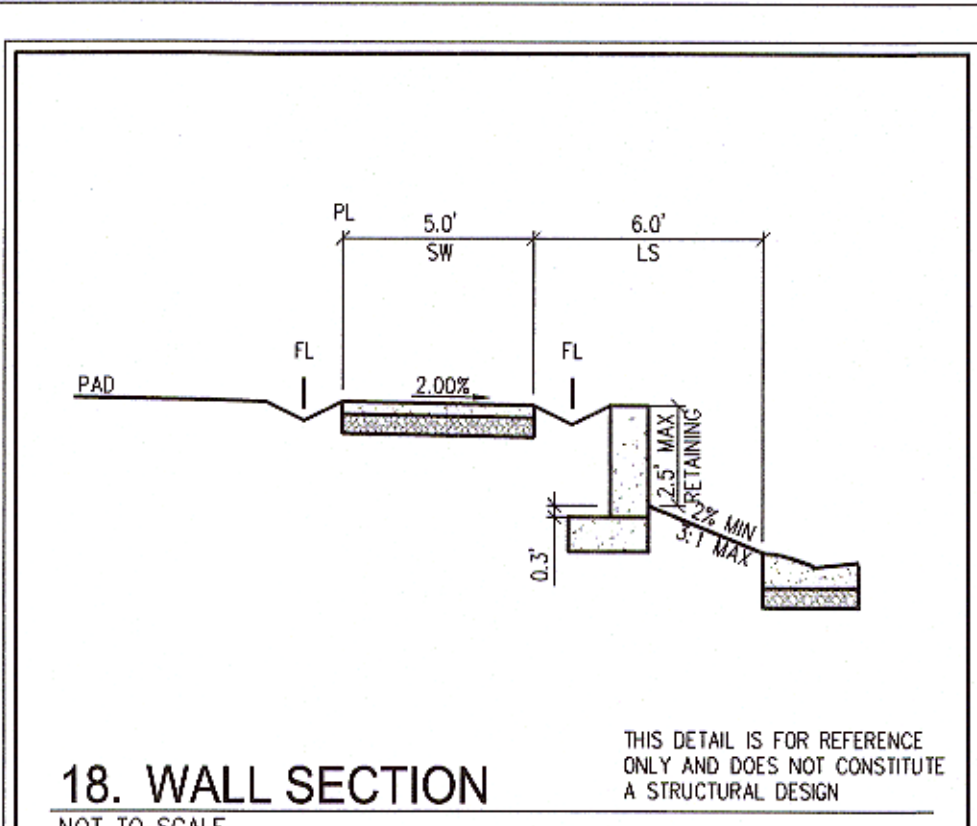
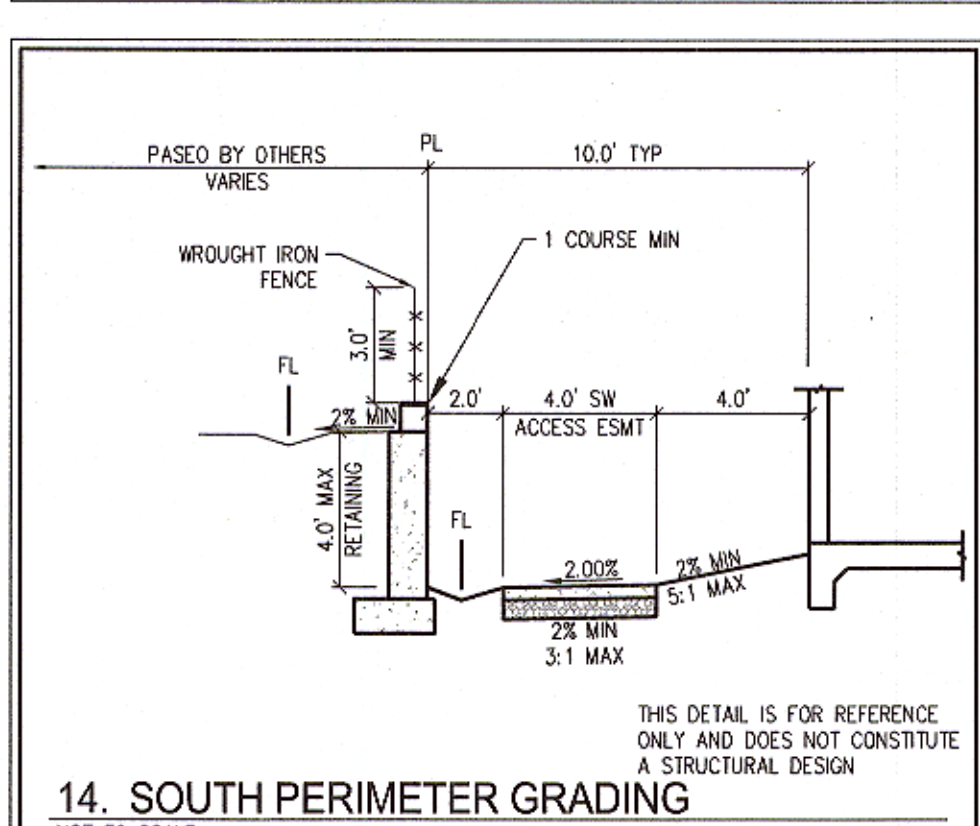
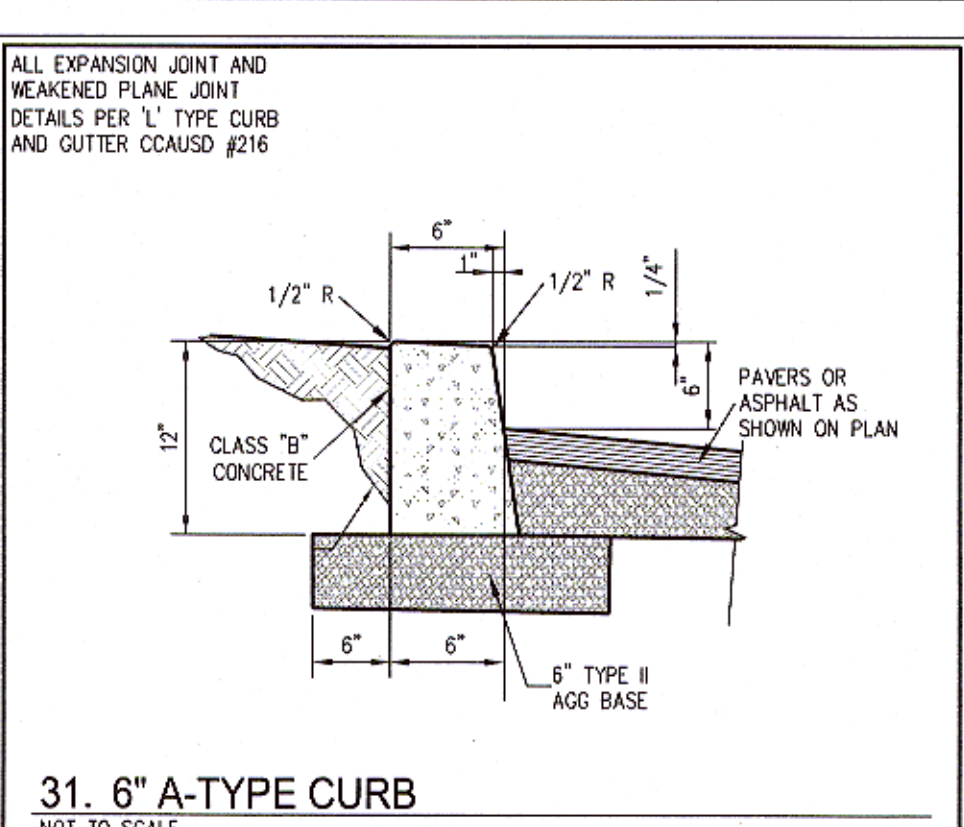
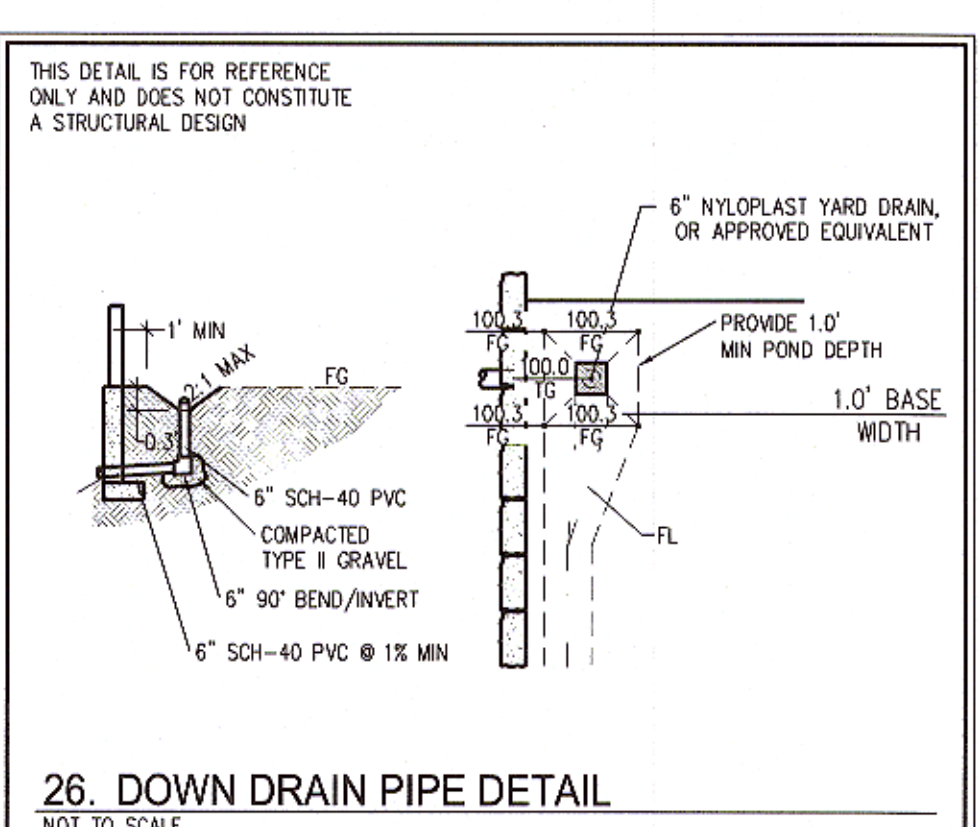
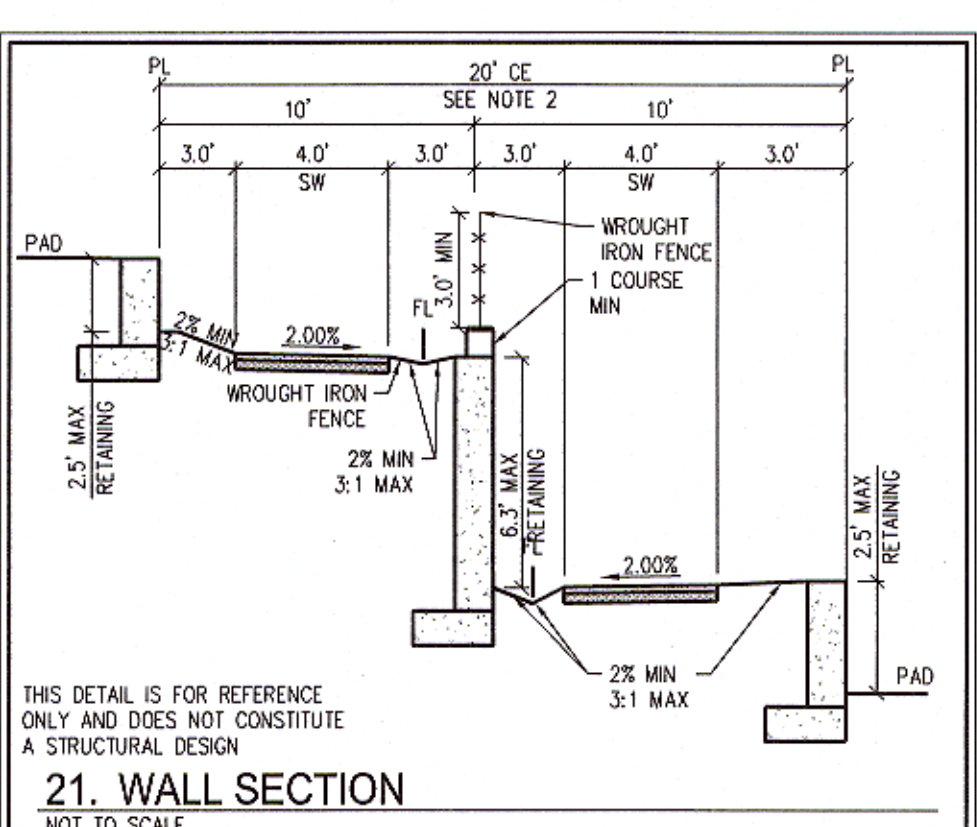
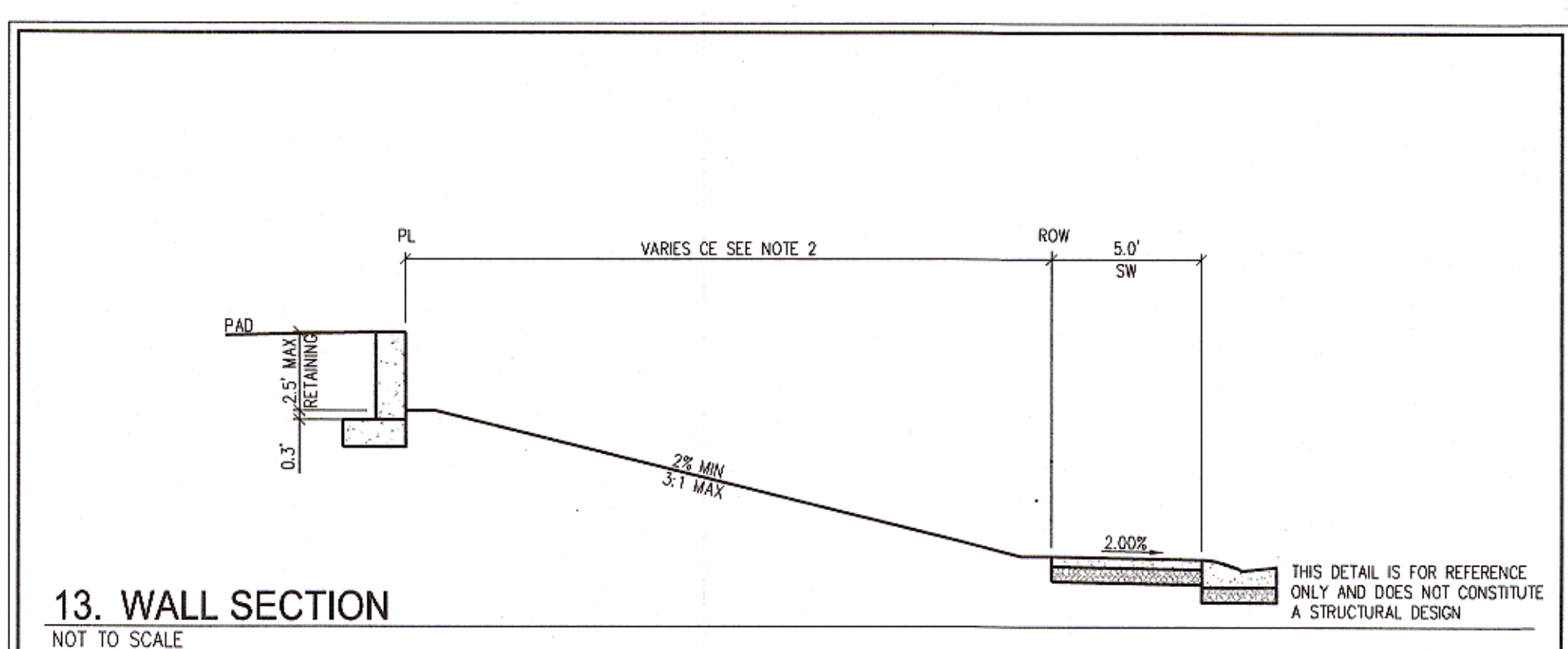
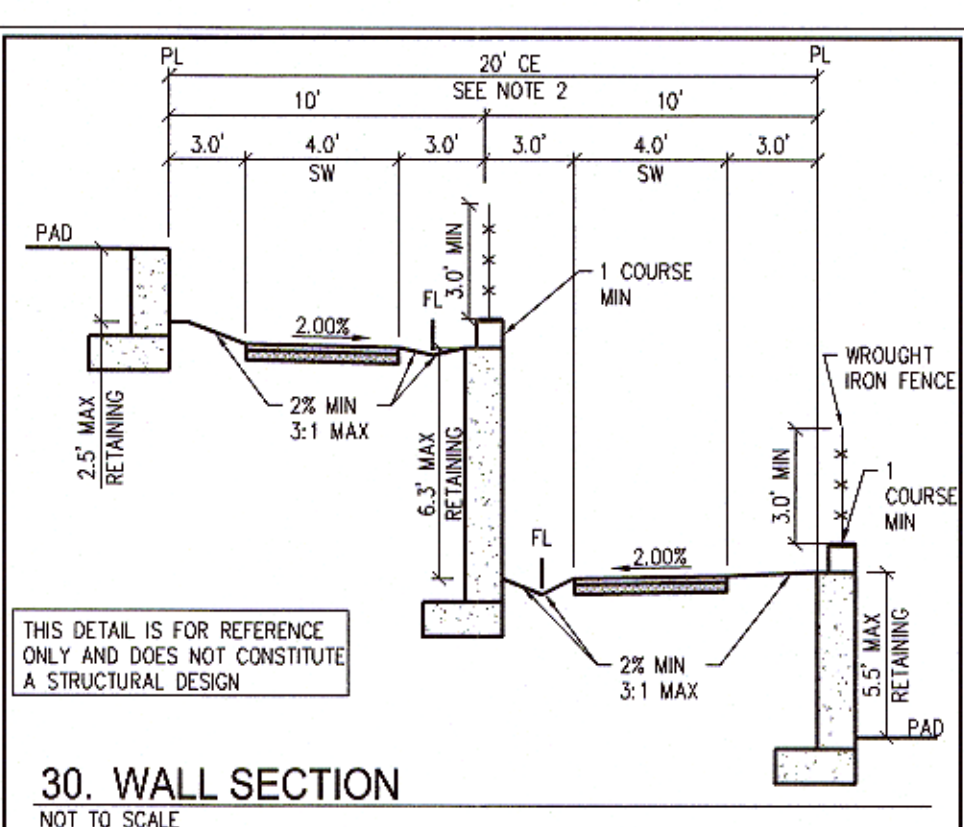
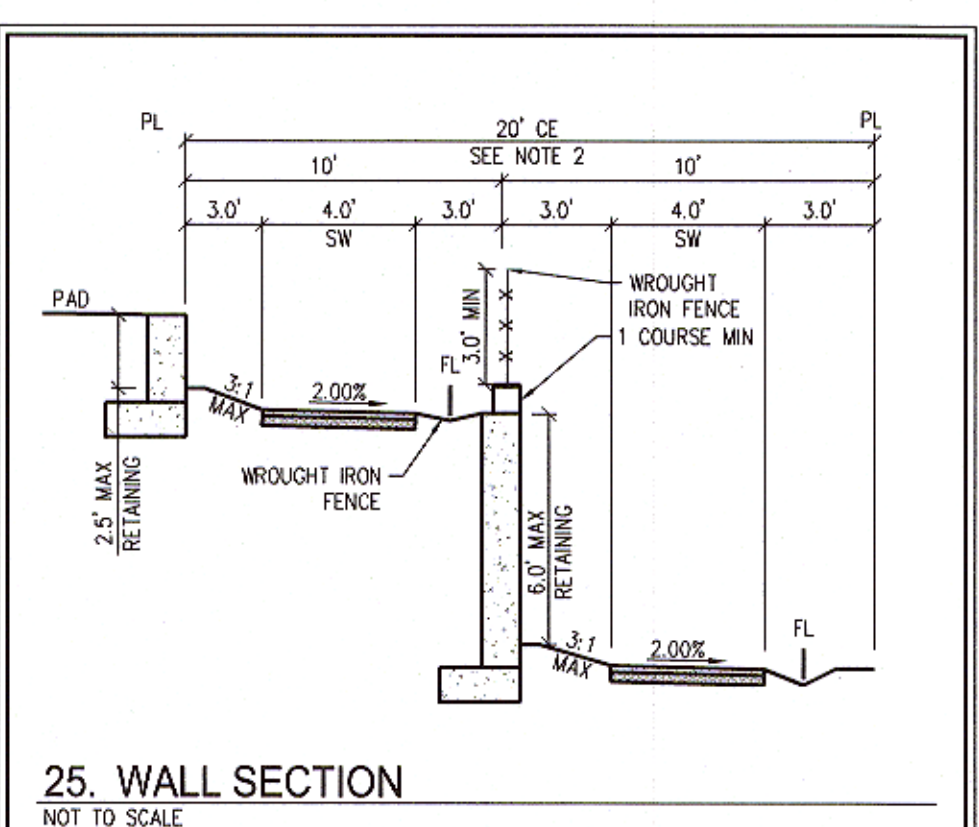
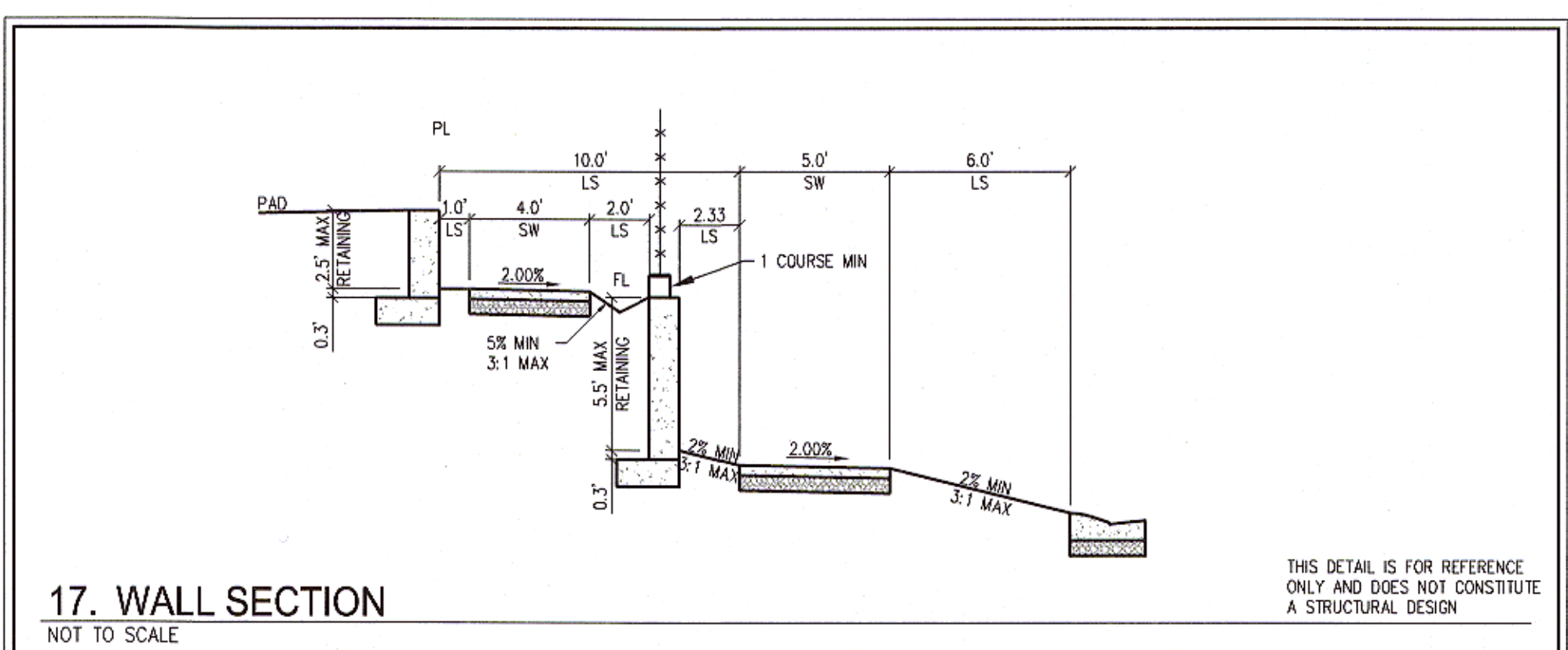
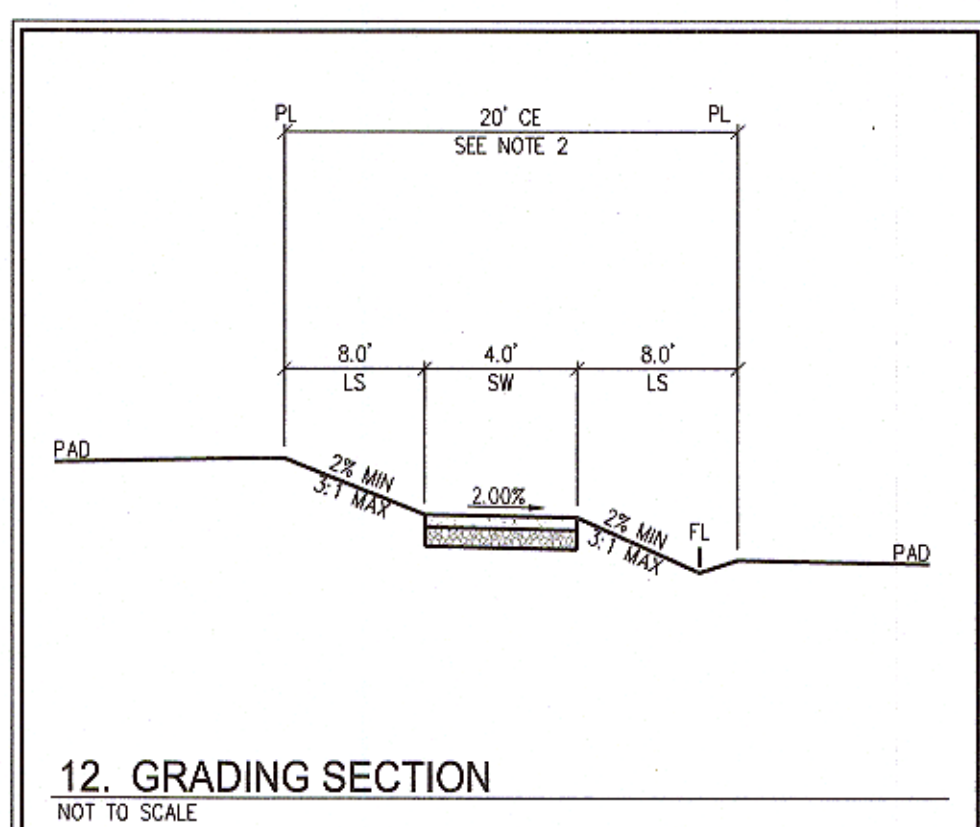
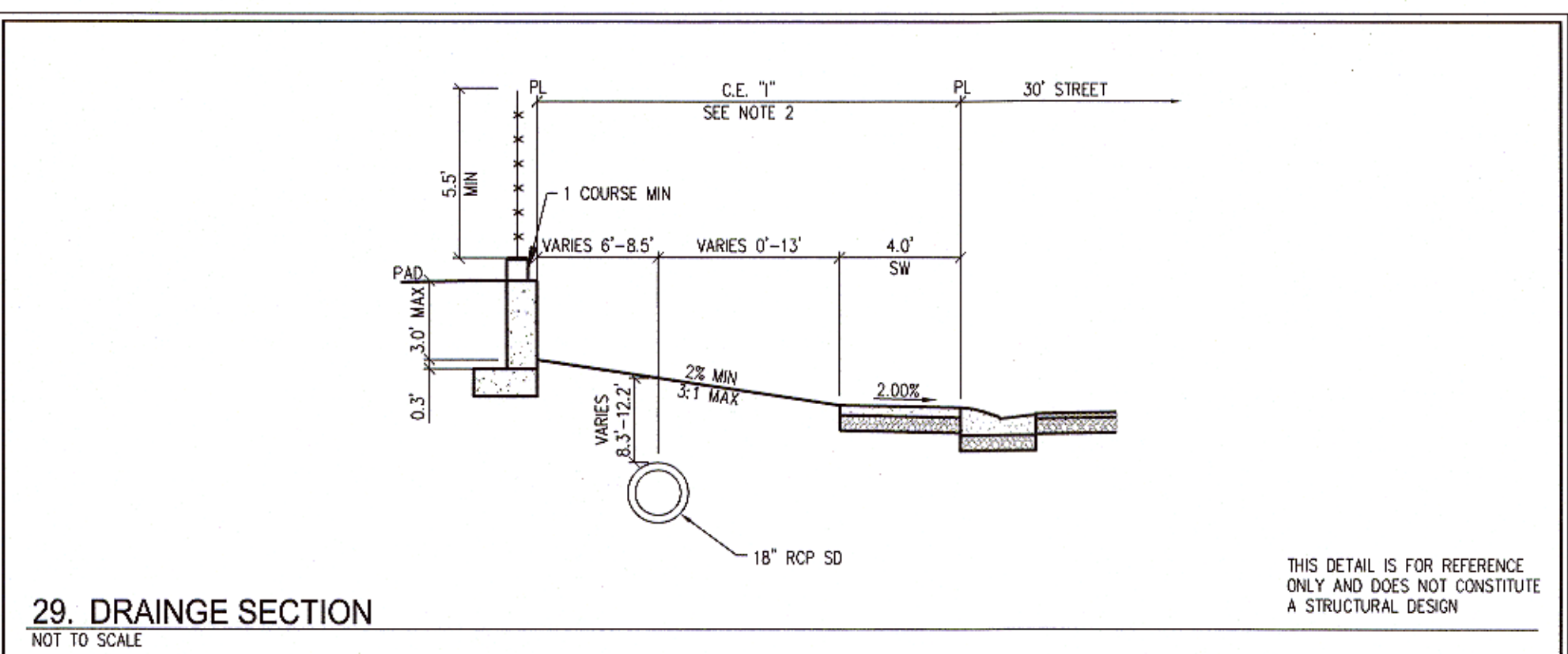
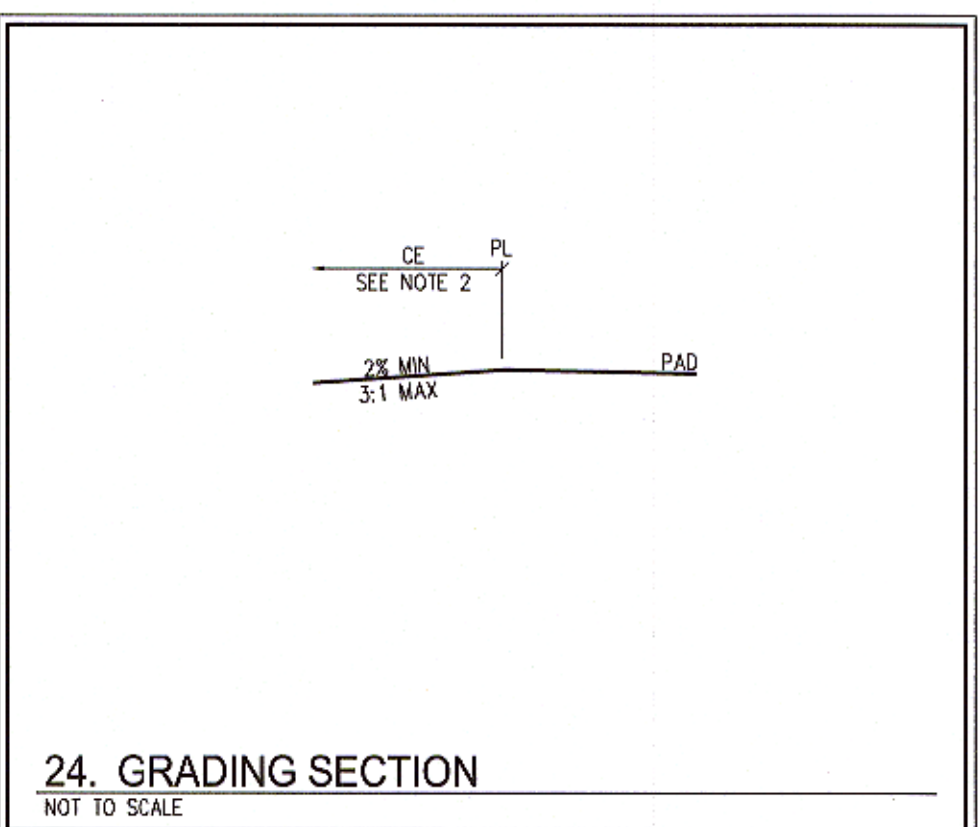
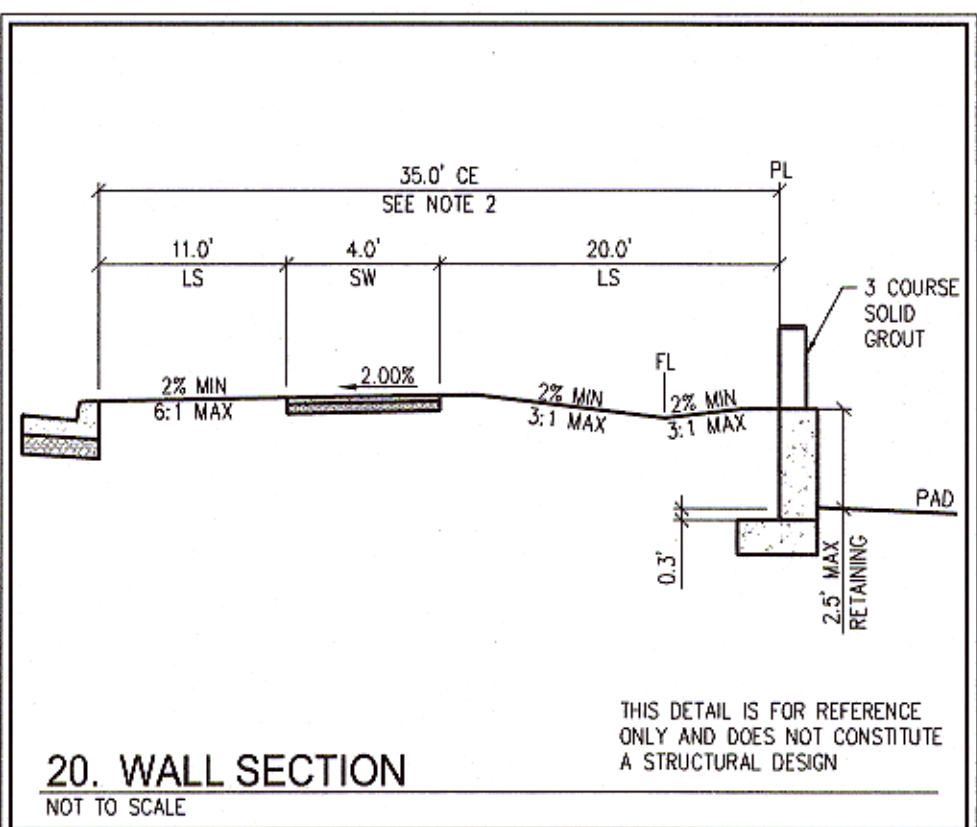
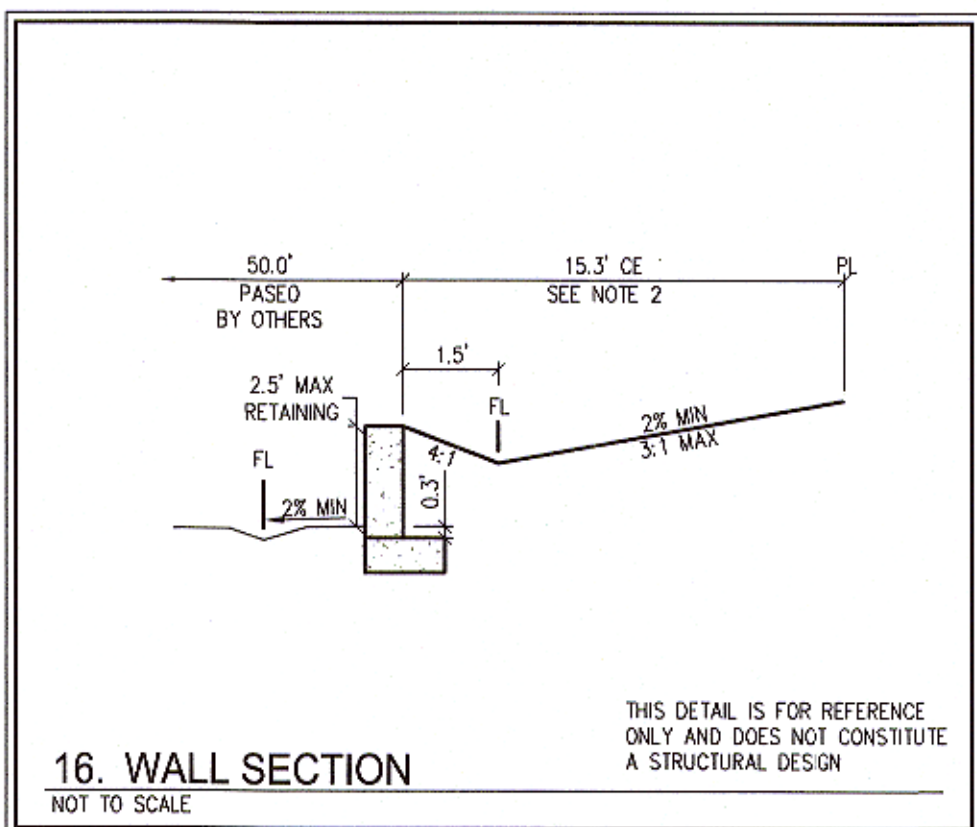
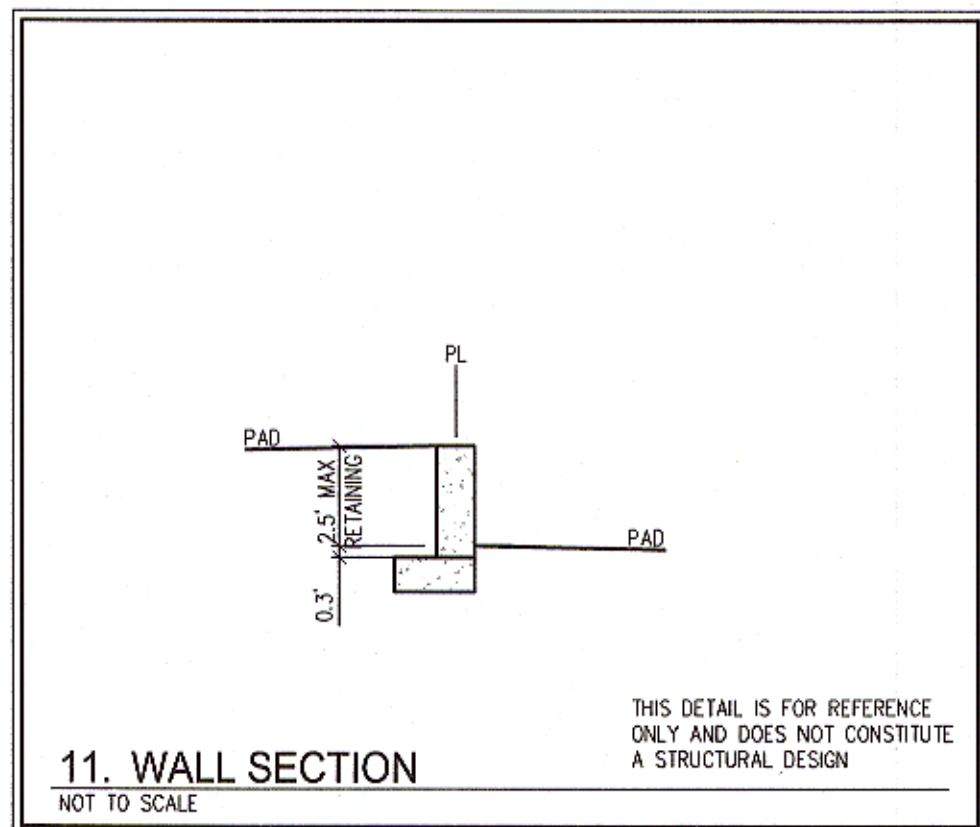
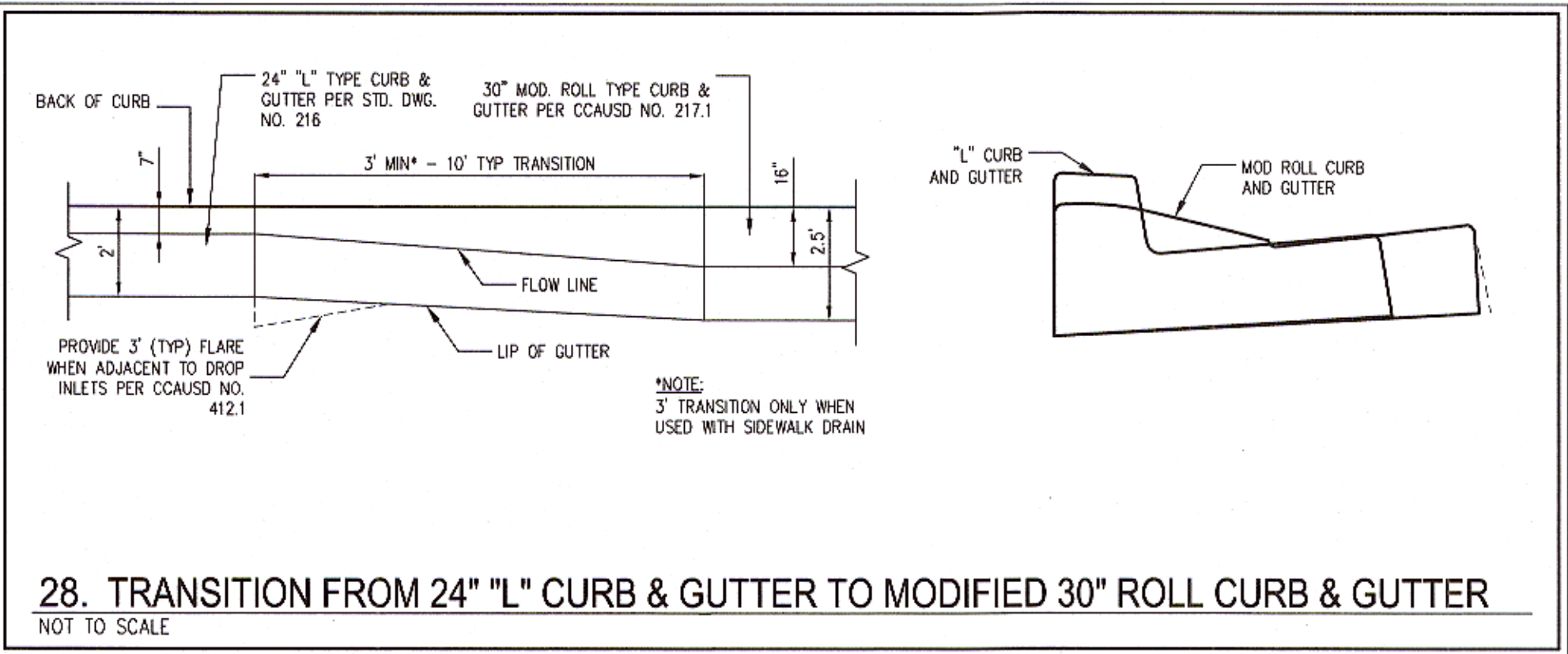
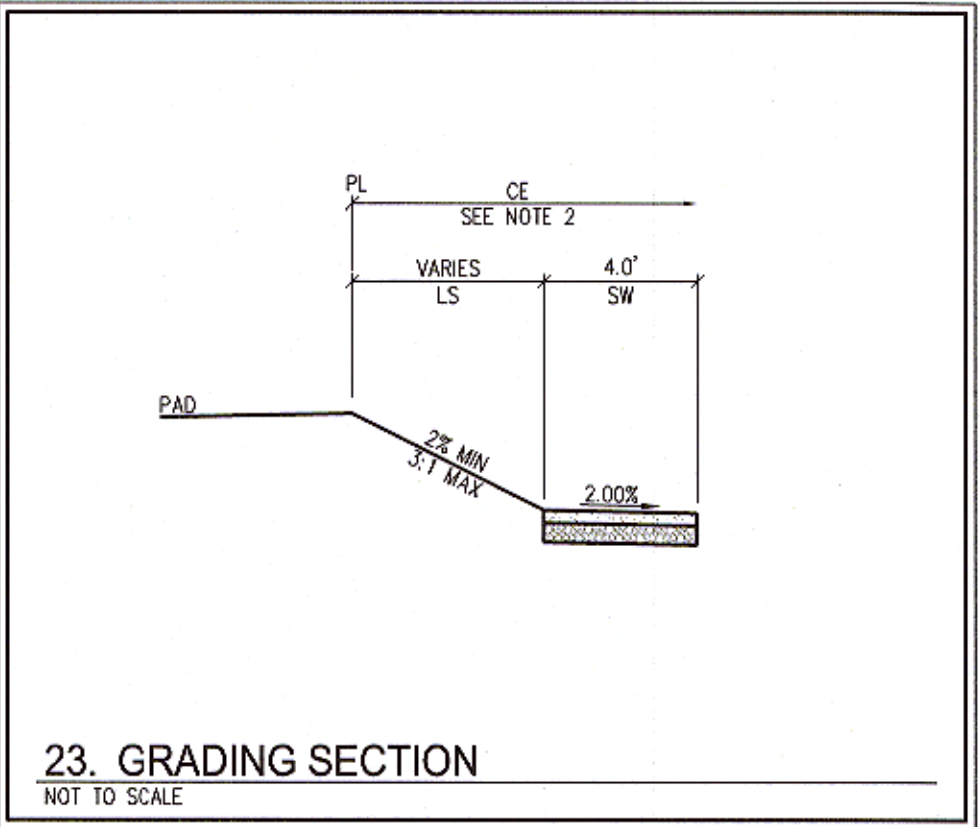
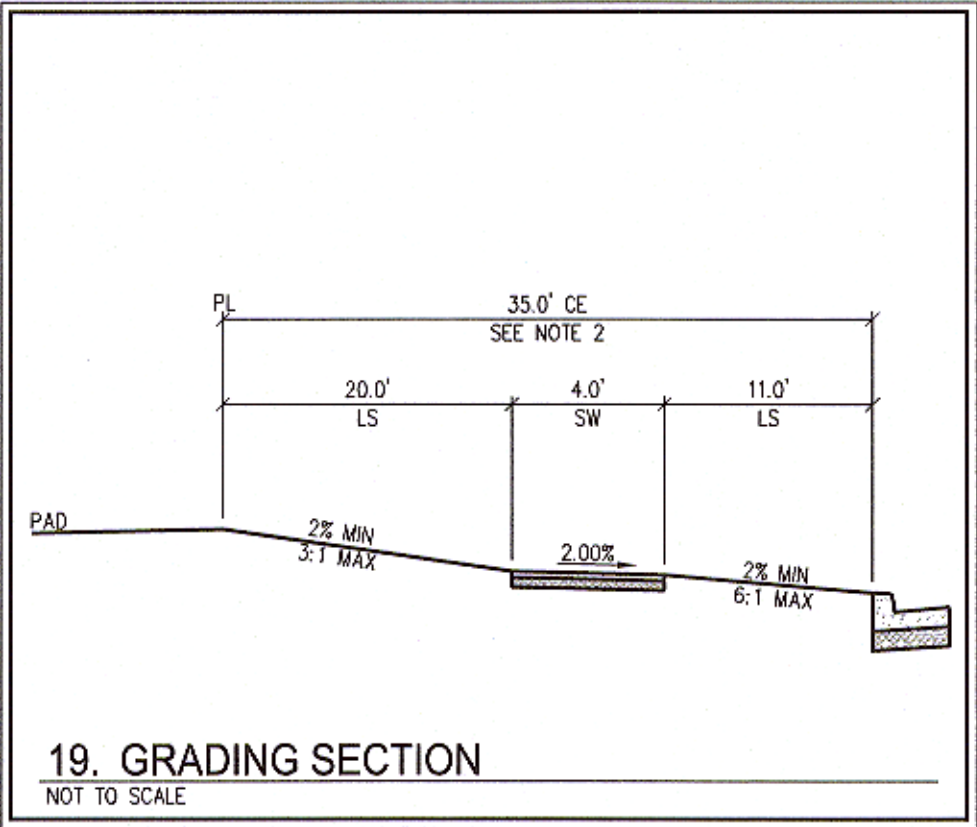
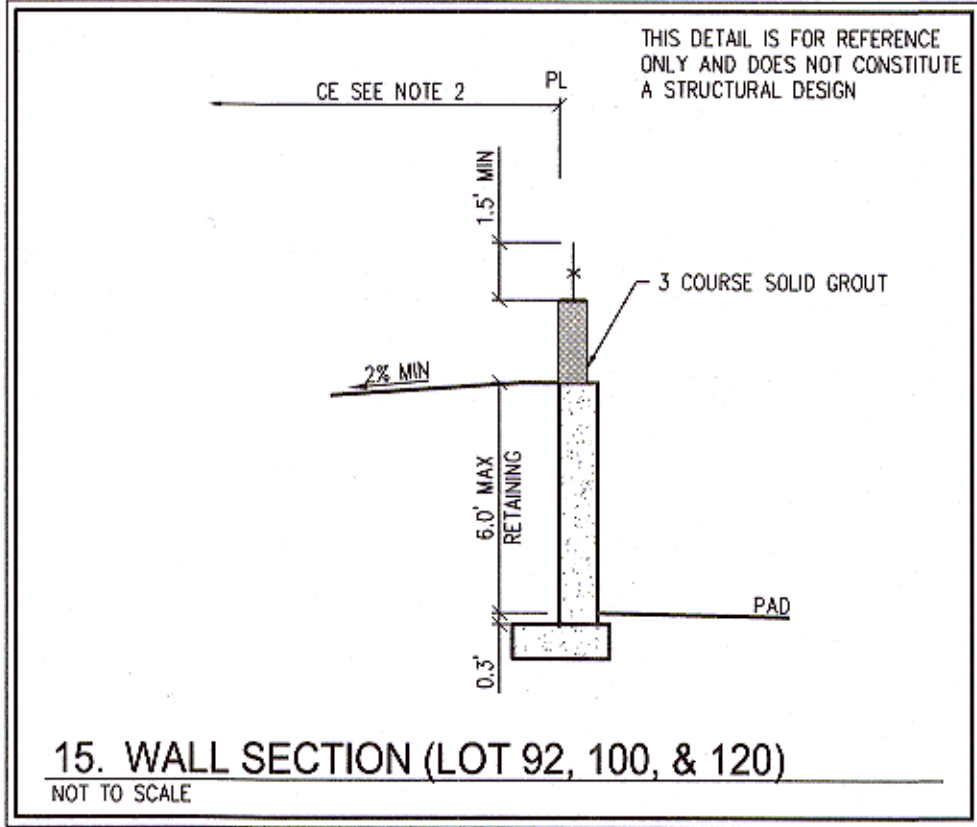
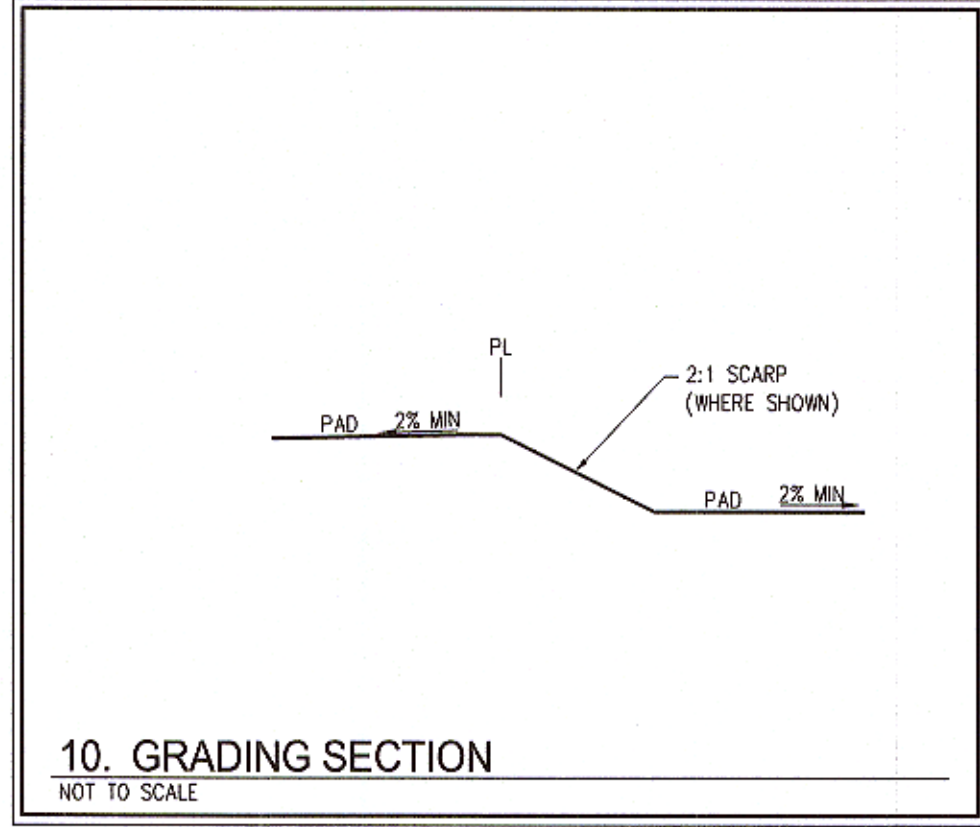
KBHOME

SUMMERLIN VILLAGE 21 PARCEL J - ASCENT
GRADING PLAN II

DATE: 11/25/19
DRAFTER: PA
DESIGNER: OO
CHECKED: DSP
PROJECT NO. KBH1913-000

G-2
SHEET 5 OF 13



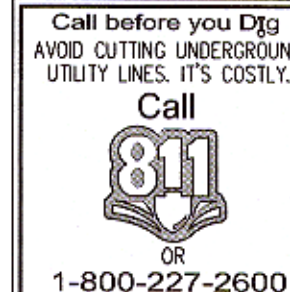
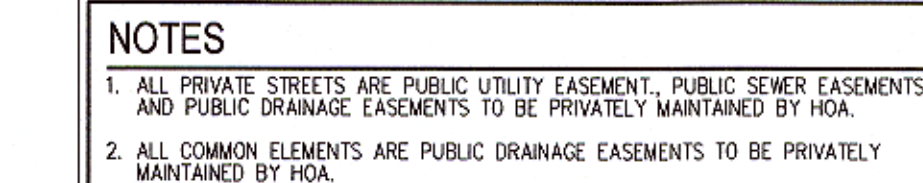
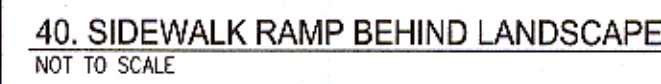
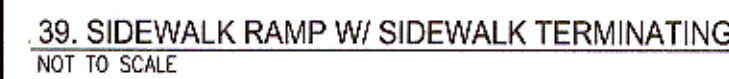
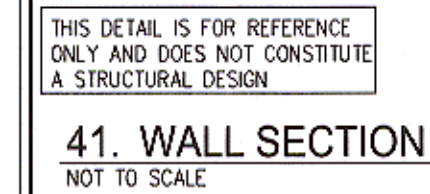


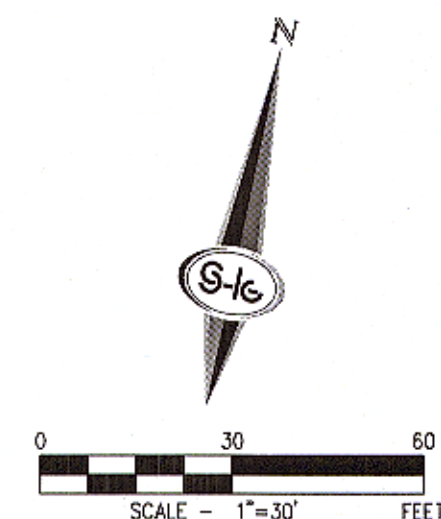
NOTES

- ALL PRIVATE STREETS ARE PUBLIC UTILITY EASEMENTS. PUBLIC SEWER EASEMENTS AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA.
- ALL COMMON ELEMENTS ARE PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA.

Call before you dig
Underground
1-702-432-5300
FREEMAN & ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T.)

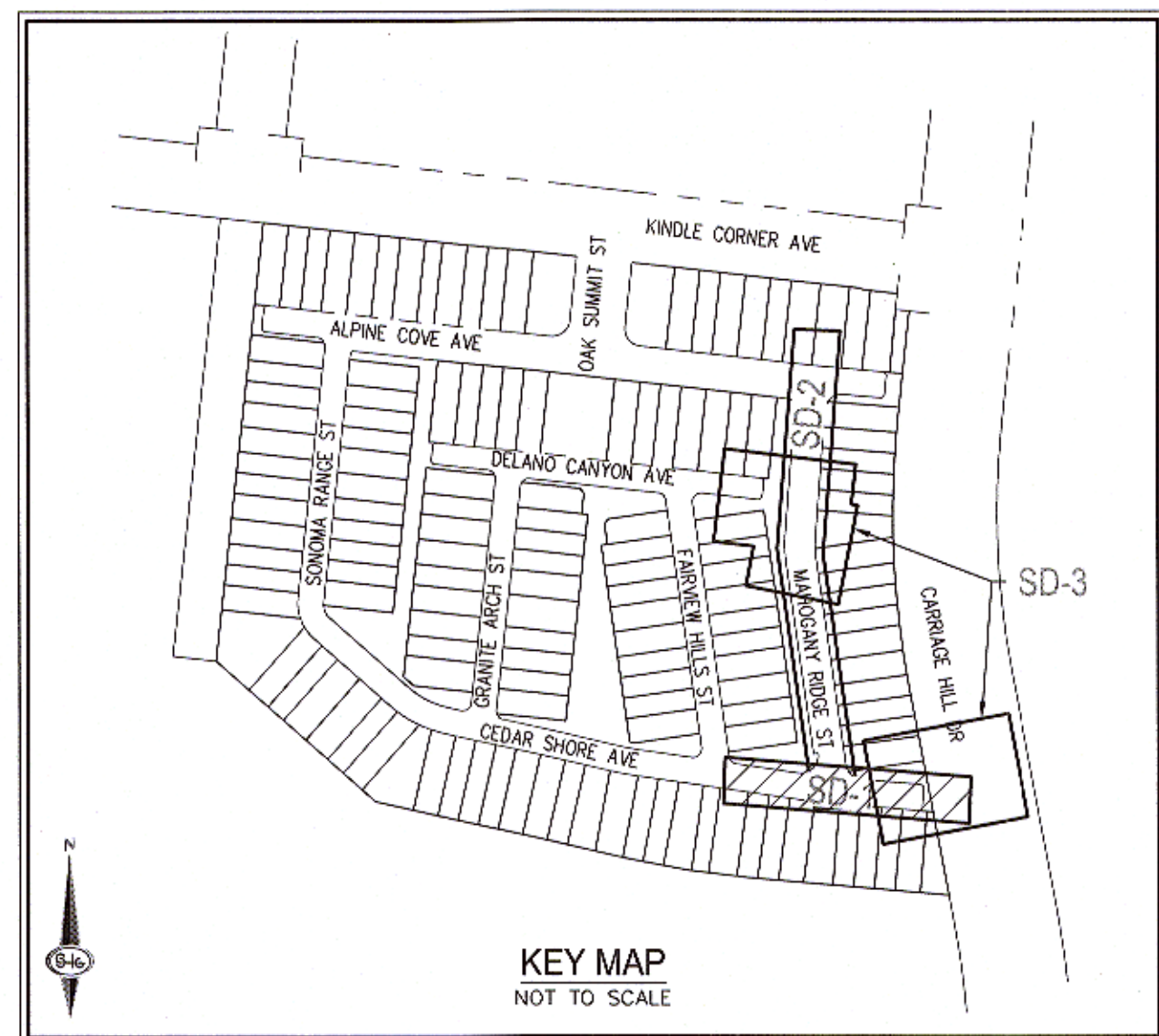
Call before you dig
AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
Call 811
1-800-227-2600





SURVEY NOTE

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



SLATER
HANIFAN
GROUP
a Westwood team

5740 S. ARVILLE STREET #216 LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

[illegible]

NT
22+00

KBHOME
SUMMERLIN VILLAGE 21 PARCELS
PLAN & PROFILE CEDAR SHORE AREA

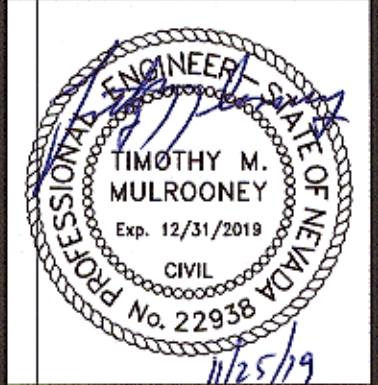
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DATE:	11/25/2019
DRAFTER:	RA

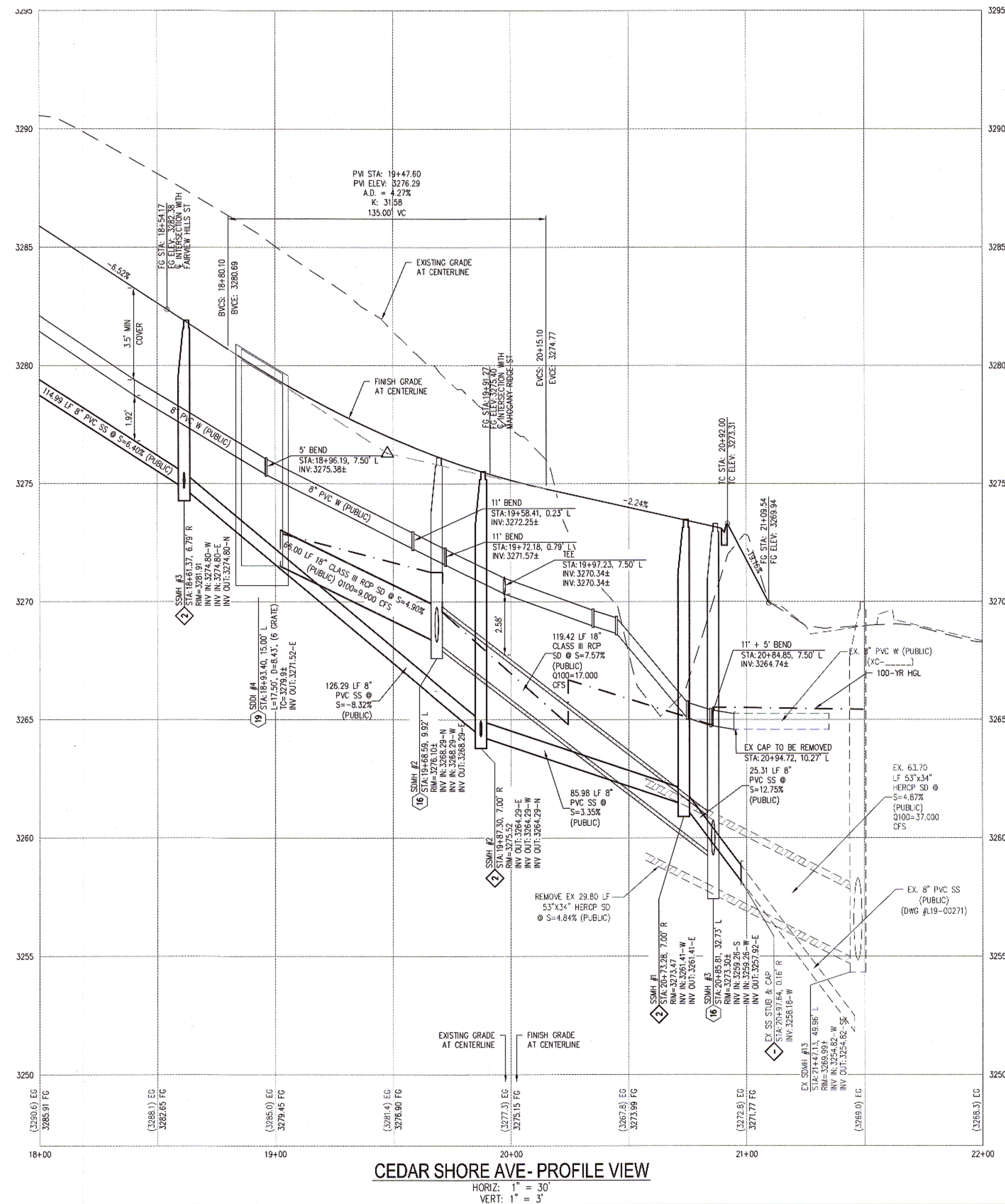
DESIGNER: OQ

CHECKED: DSP

PROJECT NO.
KBH1913-000



SD-1
SHEET 11 OF 13



ELEVATION NOTE

ADD 3300 TO SPOT GRADES RANGING FROM 00.00-50.00 & ADD 3200 TO SPOT GRADES RANGING FROM 50.01-99.99 FOR ACTUAL ELEVATION (I.E. 01.00 REPRESENTS 3301.00 AND 99.00 REPRESENT 3299.00)

LEGAL DESCRIPTION

LYING WITHIN THE NORTH EAST QUARTER (NE1/4) OF SECTION 33, TOWNSHIP 20 SOUTH, RANGE 59 EAST M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

EASEMENT NOTES

1. ALL PRIVATE STREETS ARE P.U.E., PUBLIC SEWER EASEMENTS AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA.
2. ALL COMMON ELEMENTS ARE PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA.

SEWER NOTES

1. INSTALL 8" PVC SANITARY SEWER PER DCSWCS SD-15 & SD-17
2. INSTALL 48" DIAMETER SANITARY SEWER MANHOLE WITH PRECAST BASE PER DCSWCS SD-1A, SD-1B, SD-4, SD-9, AND SINGLE LID (24")
3. MANHOLE SHALL BE CORROSION PROTECTED WITH FIELD APPLIED COATING PER DCSWCS SECTION 3.16.68

SEE SHEET C-3 FOR QUANTITIES AND ABBREVIATIONS
PROTECT IN PLACE AND ADJUST LVMVD EXISTING
FACILITIES TO FINISHED GRADE PER UDACS. ALL LVMVD
FACILITIES SHALL BE ACCESSIBLE AT ALL TIMES.

GRADING NOTES

1. FINAL GRADES ADJUSTED TO STRUCTURES SHALL BE IN CONFORMANCE WITH IBC 2012, SECTION 2304.1.1.2.2.
2. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
3. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SHIPP.
4. MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.
5. SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
6. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
7. CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE CITY OF LAS VEGAS BUILDING DEPARTMENT.
8. 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 REPAIRING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMENCING.
9. 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 EXIST) WITHIN THE SIGHT VISIBILITY ZONES.

FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) 32003C2C2150E, DATED SEPTEMBER 27, 2002. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.

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 SHOWN HEREON ARE CORRECT. THE CONTRACTOR 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 CONCRETE CURB LINE. MINIMUM OF MAXIMUM CURB SLOPES DOES NOT MEET AGENCY STANDARDS THE CONTRACTOR SHALL NOTIFY THE ENGINEER.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK 7LV09 34SW6

RIVET AND ROUND PLATE IN THE TOP OF CURB AT THE SOUTHEAST CORNER OF DESERT MOON RD. AND SKY VISTA DR.

ELEVATION = 1011.422 METERS (NAVD '88)

ELEVATION = 3318.31 US SURVEY FEET (NAVD '88)

BASIS OF BEARINGS

NORTH 05°59'55" WEST, BEING THE BEARING OF THE WEST LINE OF SECTION 34, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY, NEVADA RECORDER'S OFFICE IN BOOK 135, PAGE 71 OF PLATS.

CONSTRUCTION NOTES

- 1 SAWCUT AND MATCH EXISTING IMPROVEMENTS (3" AC/6" TYPE I OR SCARIFY NATIVE) PER CCAUSD NO. 550.2. EXISTING STRIP TO BE REPLACED
- 2 INSTALL 2" ASPHALT PAVEMENT OVER 4" TYPE II AGGREGATE BASE
- 3 INSTALL ROMP BAYERS WITH SOLDIER COURSE BANDING OR APPROVED EQUIV FOR LANDSCAPE PLANS
- 4 CONSTRUCT 4' WIDE SIDEWALK PER CCAUSD NO. 234 (5" THICK W/ 5" TYPE II AGGREGATE BASE)
- 5 CONSTRUCT 5' WIDE SIDEWALK PER CCAUSD NO. 234 (5" THICK W/ 5" TYPE II AGGREGATE BASE)
- 6 INSTALL MODIFIED ROLL TYPE CURB PER CCAUSD NO. 217.1
- 7 INSTALL "L" TYPE CURB PER CCAUSD NO. 216
- 8 INSTALL "A" TYPE ISLAND CURB PER DETAIL 31, D-2
- 9 INSTALL C900 PVC STORM DRAIN PIPE (SIZE PER PLAN)
- 10 INSTALL "L" TYPE CURB TO MODIFIED ROLL CURB TRANSITION (LENGTH PER PLAN) PER DETAIL 28, SHEET D-2
- 11 CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOWNS OR EQUIVALENT PER CCAUSD NO. 235
- 12 CONSTRUCT 8" CROSS GUTTER PER CCAUSD NO. 228
- 13 CONSTRUCT 2" CROSS GUTTER PER DETAIL 27, SHEET D-2
- 14 INSTALL SIDEWALK UNDER DRAIN PER CCAUSD NO. 236
- 15 INSTALL STAIRS PER DETAIL 34, D-3
- 16 INSTALL 48" TYPE II SDMH CULVERT NO. 401, 402 & 406
- 17 INSTALL 5" TYPE "OM2" DROP INLET PER CCAUSD NO. 412.1 AND STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
- 18 INSTALL 10" TYPE "OM2" DROP INLET PER CCAUSD NO. 412.1 AND STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
- 19 INSTALL 17.5" TYPE "OM2" DROP INLET PER CCAUSD NO. 412.1 AND STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
- 20 INSTALL 42.5" TYPE "OM2" DROP INLET PER CCAUSD NO. 412.1 AND STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
- 21 INSTALL RCP STORM DRAIN PIPE (SIZE PER PLAN)
- 22 EXISTING 53"x34" HERCO STORM DRAIN PER L19-00271 TO BE REMOVED
- 23 INSTALL 48" TYPE II SDMH PER CCAUSD NO. 401, 402 & 405.2
- 24 5' PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED BY HOA
- 25 "L" TYPE ISLAND CURB PER CCAUSD NO. 219
- 26 CONSTRUCT STEP PER DETAIL 30, SHEET D-2
- 27 CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOWNS OR EQUIVALENT PER DETAIL 39, D-3
- 28 CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOWNS OR EQUIVALENT PER DETAIL 40, D-3

SEE SHEET C-3 FOR LEGEND, ABBREVIATIONS, & QUANTITIES

FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE
APPROVED TECHNICAL DRAINAGE STUDY _____ ON FILE AT
CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

TIM M. MULROONEY, P.E. 22938 _____ DATE _____

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

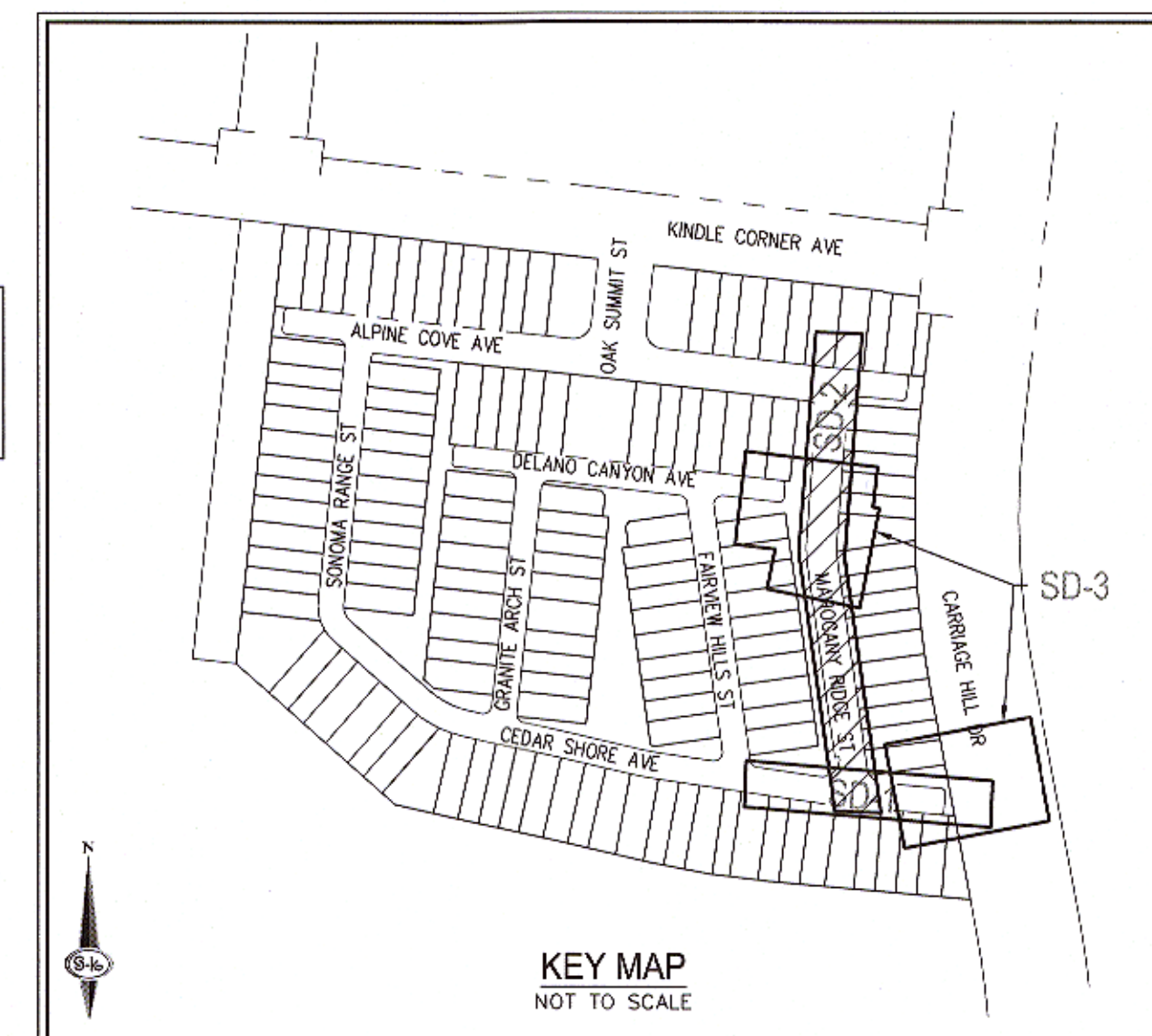
AVOID HITTING OVERHEAD
POWER LINES. IT'S
COSTLY.

CALL BEFORE
YOU DO
OVERHEAD

1-702-227-2929

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

OR
1-800-227-2600



LEGAL DESCRIPTION

LYING WITHIN THE NORTH EAST QUARTER (NE1/4) OF SECTION 33, TOWNSHIP 20 SOUTH, RANGE 59 EAST M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

CONSTRUCTION NOTES

- 1 SAUCUIT AND MATCH EXISTING IMPROVEMENTS (3" AC/6" TYPE I OR SCARIFY NAIVE) PER CAUSAD NO 500.2. EXISTING STRIPPING TO BE REPLACED
- 2 INSTALL 2" ASPHALT PAVEMENT OVER 4" TYPE II AGGREGATE BASE
- 3 INSTALL 80MM PAVERS WITH SOLDIER COURSE BANDING OR APPROVED EQUIV FOR LANDSCAPE PLANS
- 4 CONSTRUCT 4" WIDE SIDEWALK PER CAUSAD NO. 234 (5" THICK W/ 5" TYPE II AGGREGATE BASE)
- 5 CONSTRUCT 5" WIDE SIDEWALK PER CAUSAD NO. 234 (5" THICK W/ 5" TYPE II AGGREGATE BASE)
- 6 INSTALL MODIFIED ROLL TYPE CURB PER CAUSAD NO. 217.1
- 7 INSTALL "L" TYPE ISLAND CURB PER CAUSAD NO 216
- 8 INSTALL "A" TYPE CURB AND CURB PER DETAIL 31, D-2
- 9 INSTALL C900 PVC STORM DRAIN PIPE (SIZE PER PLAN)
- 10 INSTALL "L" TYPE CURB TO MODIFIED ROLL CURB TRANSITION (LENGTH PER PLAN) PER DETAIL 28, SHEET D-2
- 11 CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE, TRUNCATED DUMES OR EQUIVALENT PER CAUSAD NO. 235
- 12 CONSTRUCT 8" CROSS GUTTER PER CAUSAD NO. 228
- 13 CONSTRUCT 2" CROSS GUTTER PER DETAIL 27, SHEET D-2
- 14 INSTALL SIDEWALK UNDER DRAIN PER CAUSAD NO. 236
- 15 INSTALL STAIRS PER DETAIL 34, D-3
- 16 INSTALL 48" TYPE II SDMH CAUSAD NO. 401, 402 & 406
- 17 INSTALL 5" TYPE "CM2" DROP INLET PER CAUSAD NO. 412.1 AND STORM WATER QUALITY MANAGEMENT STAMP PER CAUSAD NO. 421
- 18 INSTALL 10" TYPE "CM2" DROP INLET PER CAUSAD NO. 412.1 AND STORM WATER QUALITY MANAGEMENT STAMP PER CAUSAD NO. 421
- 19 INSTALL 17.5" TYPE "CM2" DROP INLET PER CAUSAD NO. 412.1 AND STORM WATER QUALITY MANAGEMENT STAMP PER CAUSAD NO. 421
- 20 INSTALL 12.5" TYPE "CM2" DROP INLET PER CAUSAD NO. 412.1 AND STORM WATER QUALITY MANAGEMENT STAMP PER CAUSAD NO. 421
- 21 INSTALL RCP STORM DRAIN PIPE (SIZE PER PLAN)
- 22 EXISTING 53"x34" HERCOP STORM DRAIN PER L19-00271 TO BE REMOVED
- 23 INSTALL 48" TYPE II SDMH PER CAUSAD NO. 401, 402 & 406
- 24 S' PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED BY HOA
- 25 "L" TYPE ISLAND CURB PER CAUSAD NO 219
- 26 CONSTRUCT STEP PER DETAIL 30, SHEET D-2
- 27 CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE, TRUNCATED DUMES OR EQUIVALENT PER DETAIL 39, D-3
- 28 CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE, TRUNCATED DUMES OR EQUIVALENT PER DETAIL 40, D-3

SEE SHEET C-3 FOR LEGEND, ABBREVIATIONS, & QUANTITIES

SEWER NOTES

1. INSTALL 8" PVC SANITARY SEWER PER DCSWCS SD-15 & SD-17
2. INSTALL 48" DIAMETER SANITARY SEWER MANHOLE WITH PRECAST BASE PER DCSWCS SD-1A, SD-1B, SD-4, SD-9, AND SINGLE LID (24")
3. MANHOLE SHALL BE CORROSION PROTECTED WITH FIELD APPLIED COATING PER DCSWCS SECTION 3.16.BB

SEE SHEET C-3 FOR QUANTITIES AND ABBREVIATIONS
 PROTECT IN PLACE AND ADJUST LVWDV EXISTING
 FACILITIES TO FINISHED GRADE PER UOACS. ALL LVWDV
 FACILITIES SHALL BE ACCESSIBLE AT ALL TIMES.

GRADING NOTES

1. FINAL GRADES ADJACENT TO STRUCTURES SHALL BE IN CONFORMANCE WITH IBC 2012, SECTION 2304.11.2.2.
2. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
3. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP.
4. MAXIMUM/MINIMUM SLOPES AND MINIMUM STRIKE SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.
5. SEE DETAIL SHEET FOR STRIKE SECTIONS AND DETAILS.
6. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
7. CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE CITY OF LAS VEGAS BUILDING DEPARTMENT.
8. 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 PRICE DAMAGE TO EXISTING FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPLACING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMING.
9. 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.

FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) 320032C2150E, DATED SEPTEMBER 27, 2002. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.

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 AND EXISTING PAVEMENT SLOPES TO PROPOSED EDGE OF PAVEMENT. IF PROJECTED 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.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK 7LV09 34SW6

RIVET AND ROUND PLATE IN THE TOP OF CURB AT THE SOUTHEAST CORNER OF DESERT MOON RD. AND SKY VISTA DR.

ELEVATION = 1011.422 METERS (NAVD '88)

ELEVATION = 3318.31 US SURVEY FEET (NAVD '88)

BASIS OF BEARINGS

NORTH 05°59'55" WEST, BEING THE BEARING OF THE WEST LINE OF SECTION 34, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY, NEVADA RECORDER'S OFFICE IN BOOK 135, PAGE 71 OF PLATS.

FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE
APPROVED TECHNICAL DRAINAGE STUDY _____ ON FILE AT
CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

TIM M. MULROONEY, P.E. 22938 DATE _____

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

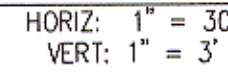
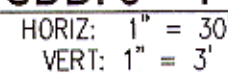
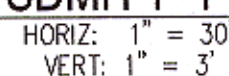
AVOID HITTING OVERHEAD
POWER LINES. IT'S
COSTLY.

CALL BEFORE
YOU DO
OVERHEAD

1-702-227-2929

Call before you Dig
AVOID CUTTING UNDERGROUND
UTILITY LINES. IT'S COSTLY.
Call
811
OR
1-800-227-2600





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



LYING WITHIN THE NORTH EAST QUARTER
(NE1/4) OF SECTION 33, TOWNSHIP 20 SOUTH
RANGE 59 EAST M.D.M., CITY OF LAS VEGAS
CLARK COUNTY, NEVADA.

1. ALL PRIVATE STREETS ARE P.U.E., PUBLIC SEWER EASEMENTS AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA.
2. ALL COMMON ELEMENTS ARE PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA.

ADD 3300 TO SPOT GRADES RANGING FROM
00.00-50.00 & ADD 3200 TO SPOT GRADES RANGING
FROM 50.01-99.99 FOR ACTUAL ELEVATION (I.E. 01.00
REPRESENTS 3301.00 AND 99.00 REPRESENT 3299.00)

- | | |
|---|--|
| 1 | INSTALL 8" PVC SANITARY SEWER PER DCSWCS
SD-15 & SD-17 |
| 2 | INSTALL 48" DIAMETER SANITARY SEWER
MANHOLE WITH PRECAST BASE PER DCSWCS
SD-1A, SD-1B, SD-4, SD-9, AND SINGLE LID
(24") |
| 3 | MANHOLE SHALL BE CORROSION PROTECTED
WITH FIELD APPLIED COATING PER DCSWCS
SECTION 3.16.BB |
| SEE SHEET C-3 FOR QUANTITIES AND ABBREVIATION;
PROTECT IN PLACE AND ADJUST LVVWD EXISTING
FACILITIES TO FINISHED GRADE PER UDACS. ALL LVVWD
FACILITIES SHALL BE ACCESSIBLE AT ALL TIMES. | |

1. FINAL GRADES ADJACENT TO STRUCTURES SHALL BE IN CONFORMANCE WITH IBC 2012, SECTION 2304.11.2.2.
2. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
3. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SMPPP.
4. MAXIMUM/MINIMUM SLOPES AND MINIMUM STRICTION SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.
5. SEE DETAIL SHEET FOR STRICTION SECTIONS AND DETAILS.
6. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
7. CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE CITY OF LAS VEGAS BUILDING DEPARTMENT.
8. 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/REPLENISHING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMENCING.
9. 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.

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) 320032C2150E, DATED SEPTEMBER 2, 2002. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.

1. EXISTING UTILITIES 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 IF 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 LINE OF CURB PRIOR TO SUBGRADE PREPARATION AND PRIOR TO PRODUCTION OF PROPOSED GRADING. THE CONTRACTOR SHALL VERIFY ALL GRADING DOES NOT MEET AGENCY STANDARDS. THE CONTRACTOR SHALL NOTIFY THE ENGINEER.

CITY OF LAS VEGAS BENCHMARK 7LV09 34SW6
RIVET AND ROUND PLATE IN THE TOP OF CURB AT THE SOUTHEAST CORNER OF DESER
MOON RD. AND SKY VISTA DR.
ELEVATION = 1011.422 METERS (NAVD '88)
ELEVATION = 3318.31 US SURVEY FEET (NAVD '88)

NORTH 05°59'55" WEST, BEING THE BEARING OF THE WEST LINE OF SECTION
TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY,
NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY, NEVADA
RECORDER'S OFFICE IN BOOK 135, PAGE 71 OF PLATS.



- 1 SAWCUT AND MATCH EXISTING IMPROVEMENTS ("3" AC/6" TYPE I OR SCARIFY NATIVE) PER CCAUSD NO 500.2. EXISTING STRIPING TO BE REPLACED
- 2 INSTALL 2" ASPHALT PAVEMENT OVER 4" TYPE II AGGREGATE BASE
- 3 INSTALL 80MM PAVERS WITH SOLIDER COURSE BANDING OR APPROVED EQUAL FOR LANDSCAPE PLANS
- 4 CONSTRUCT 4" WIDE SIDEWALK PER CCAUSD NO. 234 (5" THICK W/ 5" TYPE II AGGREGATE BASE)
- 5 CONSTRUCT 5" WIDE SIDEWALK PER CCAUSD NO. 234 (5" THICK W/ 5" TYPE II AGGREGATE BASE)
- 6 INSTALL MODIFIED ROLL TYPE CURB PER CCAUSD NO. 217
- 7 INSTALL "L" TYPE CURB PER CCAUSD NO 216
- 8 INSTALL "A" TYPE ISLAND CURB PER DETAIL 31, D-2
- 9 INSTALL C900 PVC STORM DRAIN PIPE (SIZE PER PLAN)
- 10 INSTALL TYPE CURB TO MODIFIED ROLL CURB TRANSITION (LENGTH PER PLAN) PER DETAIL 28, SHEET D-2
- 11 CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DUMES OR EQUIVALENT PER CCAUSD NO. 239
- 12 CONSTRUCT 8" CROSS GUTTER PER CCAUSD NO. 228
- 13 CONSTRUCT 2" CROSS GUTTER PER DETAIL 27, SHEET D-2
- 14 INSTALL SIDEWALK UNDER DRAIN PER CCAUSD NO. 236
- 15 INSTALL STAIRS PER DETAIL 34, D-3
- 16 INSTALL 48" TYPE III SDMH CCAUSD NO. 401, 402 & 405
- 17 INSTALL 5" TYPE "CM2" DROP INLET PER CCAUSD NO. 412.1 AND STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
- 18 INSTALL 10" TYPE "CM2" DROP INLET PER CCAUSD NO. 412.1 AND STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
- 19 INSTALL 17.5" TYPE "CM2" DROP INLET PER CCAUSD NO. 412.1 AND STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
- 20 INSTALL 12.5" TYPE "CM2" DROP INLET PER CCAUSD NO. 412.1 AND STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
- 21 INSTALL RCP STORM DRAIN PIPE (SIZE PER PLAN)
- 22 EXISTING 55"x34" HERCP STORM DRAIN PER L19-00271 BE REMOVED
- 23 INSTALL 48" TYPE II SDMH PER CCAUSD NO. 401, 402 & 405.2
- 24 S' PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED BY HOA
- 25 "L" TYPE ISLAND CURB PER CCAUSD NO 219
- 26 CONSTRUCT STEP PER DETAIL 30, SHEET D-2
- 27 CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DUMES OR EQUIVALENT PER DETAIL 39, D-3
- 28 CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DUMES OR EQUIVALENT PER DETAIL 40, D-3

S-I-G
SLATER
HANIFAN
GROUP
a Westwood team

200 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
FAX (702) 284-5399
TELEPHONE (702) 284-5300

[illegible]

CITY OF LAS VEGAS

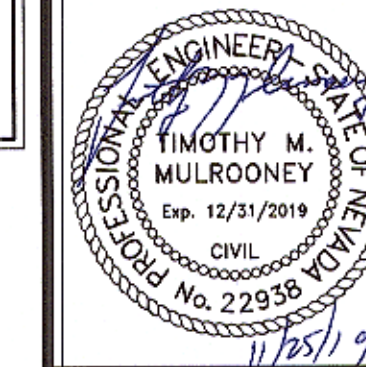
KB HOME
CITY

**SUMMERLIN VILLAGE 21 PARCEL J - ASCENT
PLAN & PROFILE - SDD1 1, 2, 3, & 5**

S26	
T20	
R59	

DATE:	11/25/19
DRAFTER:	PA
DESIGNER:	OQ
CHECKED:	DSP
PROJECT NO	

KBH1913-000



SD-3
SHEET 13 OF 13