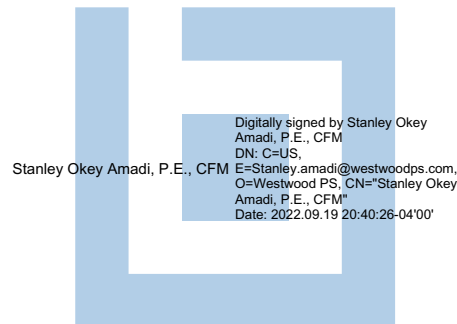




TECHINICAL DRAINAGE STUDY

Summerlin Parcel STU

SEPTEMBER 2022

PREPARED FOR:

KB Home

Las Vegas, NV

PREPARED BY:

Westwood

Summerlin Parcel STU

Technical Drainage Study

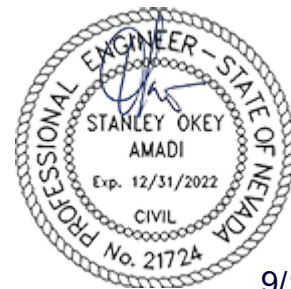
City of Las Vegas, NV

Prepared For:

KB Home
5655 Badura Avenue
Las Vegas, Nevada 89118
Phone: 702-266-8500
Fax: 702-266-8623

Prepared By:

Westwood Professional Services
5725 W. Badura Avenue, Suite 100
Las Vegas, NV 89118
Phone: (702) 284-5300



9/19/22

Project Number: KBH2204.000
Date: September 2022

Stanley Okey Amadi, P.E., CFM
NV Professional Engineer No. 21724
Assisted by: Jonathan S. Rocha, E.I.

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HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Summerlin Village 22 Parcel STU - Quail Cove Date: September 2022
 Location of Development: a) Descriptive (Cross Streets): North/South: Desert Foothills Drive
 East/West: Kindle Rise Way
 b) Section: 23 Township: 20 South Range: 59 East
 c) APN: 137-23-213-002, -003, -004

Name of Owner: KB Home
 Telephone No.: 702-266-8500 Fax No.: 702-266-8623 E-mail Address: pchao@kbhome.com
 Address: 5655 Badura Ave 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: Westwood Professional Services
 Address: 5725 W. Badura Ave, #100 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: +/- 13.9 ac Being Developed/Disturbed: +/- 13.9 ac

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.): Residential

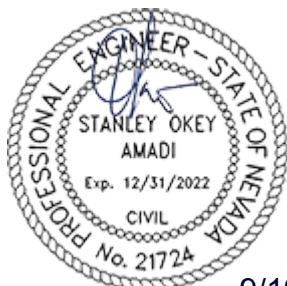
5. Approximate upstream land area which drains to the subject site: 0 ac

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

Master Drainage Study for Summerlin West Village 22 (DS 5005) and Updates

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: east into Desert Foothills Drive

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



9/19/22

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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Summerlin Village 22 Parcel STU - Quail Court Map ID:

Firm Name: Westwood Professional Services

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

Address: 5725 W. Badura Ave, #100

City: Las Vegas

State: NV

Zip: 89118

Phone Number: (702) 284-5300

Fax Number: (702) 284-5399

Property Owner: KB Home

Address: 5655 Badura Ave

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

II. MAPS AND EXHIBITS

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

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS (Continued)

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

III. DRAINAGE PLAN

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

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
-	N/A	Streets with off-set crowns.
X	-	Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.
X	-	Property lines.
X	-	Right-of-way lines and widths, existing and proposed.
X	-	Existing improvements and their elevations.
X	-	Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.
X	-	Concentration points and drainage flow direction with Q_{100} and V_{100} and D_{100} in streets.
X	-	Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
X	-	Location and cross-section of street capacity calculations.
-	N/A	Cross-sectional detail for channels, including cutoff wall locations.
X	-	Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations.
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>-</u>	<u>N/A</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>X</u>	<u>-</u>	Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated.
<u>X</u>	<u>-</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>X</u>	<u>-</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>X</u>	<u>-</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	
-	N/A	Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
X	-	Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q_{100} and Q_{10} flows representing the worst case for interior and all perimeter streets. $Q_{100} d \times v \leq 8$. $Q_{10} d \times v \leq 6$ and 12 foot dry lane for rights-of-way ≥ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
X	-	A summary table of interior and exterior street capacity calculations showing the street name, Q_{100} flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
-	N/A	Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
X	-	Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.
X	-	Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, whichever is greater.
-	N/A	A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. • Field survey data. • Input and output information. • Plotted cross-sections based on survey with proper encroachments. • A map showing the location of the cross-sections. • Analysis of both sub and super-critical flow segments. • A summary table and a discussion of the results in the text of the report.
X	-	Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
X	-	Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.
X	-	The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.
-	N/A	Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:

STANDARD FORM 2



CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 5/18/11)

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

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

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

I. GENERAL REQUIREMENT

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

II. GRADING PLAN INFORMATION

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

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

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

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

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

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

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

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

KBH2204.000

September 14, 2022

Peter Jackson, P.E., CFM
City of Las Vegas
495 S. Main Street
Las Vegas, NV 89101

Subject: Technical Drainage Study for Summerlin Village 22 Parcel STU

Dear Mr. Jackson

This letter certifies that all items provided on the electronic submittal CD matches the Technical Drainage Study for Summerlin Village 22 Parcel STU – Quail Cove bound paper version.

Please contact me if you have any questions.

Respectfully Submitted,

WESTWOOD PROFESSIONAL SERVICES

A handwritten signature in black ink, appearing to read 'Jonathan Rocha', written in a cursive style.

Jonathan Rocha
Graduate Engineer – Water Resources Department

2. List of Appendices

Appendix A	Drainage Exhibits • Exhibit A – Location Map • Exhibit B – FEMA FIRM Map • Exhibit C1 – CCRFCD MPU Facilities Map • Exhibit C2 - CCRFCD MPU Facilities Inventory • Exhibit C3 – CCRFCD MPU Hydrologic Map • Exhibit D – Proposed Condition Drainage Map
Appendix B	Hydrologic Analyses • CN Computation & Soils Data • Lag Time Computations (Standard Form 4) • Proposed Condition HEC-1 Model
Appendix C	Hydraulic Analyses • Perimeter Street Flow Computations • Interior Street Flow Computations • Ditch Computation • Emergency Overflow Computations • Inlet Sizing Computations • Inlet Control Nomographs • WSPG Model – Desert Foothills Drive DFD2 • WSPG Model – Whistling Kite LAT7-KITE • WSPG Model – Ashy Storm LAT6-DI2 • WSPG Model – Ashy Storm LAT6-DI3 • WSPG Model – Entryway LAT6-ENTRY
Appendix D	Finished Floor Analyses
Appendix E	Reference Material Update #2 to the Master Conceptual Drainage Study for Summerlin West Village 22 (DS 5005) • Approval Letters • Referenced Drainage Exhibits • Referenced Hydrology • Referenced Plan Sheets
Appendix F	Reference Material Technical Drainage Study for Summerlin West Village 22 desert Foothills Drive – From Sunset Run Drive to Fleet Wing Avenue (DS 5344) • Approval Letters • Referenced Drainage Exhibits • Referenced Hydraulics • Referenced Plan Sheets

Appendix G	Reference Material Technical Drainage Study for Summerlin Village 22 Kettle Ridge Drive– From Sunset Run Drive to Kindle Rise Way (DS 5349) • Approval Letters • Referenced Drainage Exhibits • Referenced Hydrology • Referenced Hydraulics • Referenced Plan Sheets
Appendix H	Entitlement Documents
Appendix I	Improvement Plans

1.0 Introduction

1.1 Project Overview

KB Home is proposing a residential development on approximately 14 acres, located south of, Kindle Rise Way and west of Desert Foothills Drive, within the Summerlin Village 22 Master Planned Community in the City of Las Vegas, Nevada. The project site is identified on the included improvement plans as Summerlin Village 22 Parcel STU also known as Quail Cove (hereinafter referred to as the project site). The proposed improvements include single-family lots as well as interior roadways, utilities, and drainage facilities. Please note that the project site will be constructed in a single phase.

1.2 Study Purpose

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

1.3 Site Description

The project site consists of APNs 137-23-213-002, -003 and -004 within Township 20 South, Range 59 East, and Section 23. The project site is bound by Desert Foothills Drive to the east, Kindle Rise Way to the north and Kettle Ridge Drive to the west and Flight Range Avenue to the south. The location of the project site, relative to the surrounding streets, is identified on the Location Map (Exhibit A), included in Appendix A for reference.

The current condition of the project site is undeveloped and mass graded, generally draining in an easterly direction. Note that an existing channel is located onsite to partially drain surface runoff south. The project site proposes 144 single-family special development (SFSD) lots as designated per Summerlin Village 22 Master Plan landuse category. The zoning and planning conditions for the project site are currently under review.

The project site is within the Summerlin West Village 22 Master Plan area and was most recently addressed in the Update #2 to the Master Conceptual Drainage Study for Summerlin West Village 22. This master study established the overall drainage patterns and drainage infrastructure required for the Village 22 area. It is assumed that the 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.

The entitlement application for the project site has been submitted and the approved Notice of Final Actions (NOFA) are included in Appendix H.

1.4 FEMA Flood Zone Designation

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

1.5 CCRFCD Facility Information

The project site has been identified on the current 2018 CCRFCD MPU Figure F-22, which is included as Exhibit C1 in Appendix A for reference. Per the 2018 CCRFCD MPU (Reference 1), the Angel Park - Beltway Branch (APBE 0154) is the closest regional facility adjacent to the site. This facility is located north of the project site along Kindle Rise Way and is identified as a Category B Proposed Facility. The facility is adjacent to the project site with no direct impact from the project site but provides flood protection to the site. Refer to Exhibit C2 for the facility inventory summary table.

1.6 CCRFCD Watershed Information

Figure W-4, from the 2018 Las Vegas Valley Flood Control Master Plan Update (MPU, Reference 1), shows that the project site lies within the MPU subbasin SWFH-11. This subbasin appears to drain easterly and ultimately south into subbasin SWFH-15. Exhibit C3 identifying the project site on the MPU figure has been included in Appendix A for reference.

1.7 Referenced Documents

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

- Master Conceptual Drainage Study Update #2 for Summerlin West Village 22 (hereinafter referred to as the Master Study, DS 5005), prepared by VTN Nevada. The Master Study has been utilized to establish the conceptual drainage pattern by the developed site as well as the flows conveyed within the adjacent perimeter street. Note that hydrology was not referenced from the Master Study and was reanalyzed for updated soils data, site area discrepancy, curve number, and lag time computations. Relevant reference material from the Master Study has been included in Appendix E.
- Technical Drainage Study for Summerlin West Village 22 Desert Foothills Drive –from Sunset Run Drive to Fleet Wing Avenue (hereinafter referred to as the Desert Foothills Infrastructure Study, DS 5344), prepared by Atkins Global. The Desert Foothills Infrastructure Study addressed the street, storm drain and utilities in the street adjacent to the project site. The study was referenced for street sections for finished floor analyses and storm drain models which have been revised with the project site onsite improvements. Relevant reference material from the Master Study has been included in Appendix F.
- Technical Drainage Study for Summerlin West Village 22 Kettle Ridge Drive – From Sunset Run Drive to Kindle Rise Way, (hereinafter referred to as the Kettle Ridge Infrastructure Study, DS 5349), prepared by Atkins Global. The study was referenced for street sections for finished floor analyses. Relevant reference material from the Master Study has been included in Appendix G.

2.0 Methodology

2.1 Compliance

The methodologies utilized in the preparation of this study are in compliance with the Clark County Regional Flood Control District's Hydrologic Criteria and Drainage Design Manual (hereinafter referred to as the CCRFCD Manual, adopted in 1999, Reference 2).

2.2 Hydrologic Modeling

Hydrology has not been referenced from the Master Study due to the following: the project site was analyzed with a smaller area in the Master Study and has been revised the per parcel acreage of the combined Parcels S, T, and U. Soils data revised per hydrologic soil group (HSG) composition for soil types within the project boundary. Curve Number and lag time computations revised per soil type data. The proposed land use is the same as master planned and analyzed by the Master Study.

The revised hydrologic computations are included in Appendix B. The referenced hydrologic computations and data have been included in Appendix E.

2.3 Hydraulic Modeling

Street Flow: Street flows have been analyzed utilizing FlowMaster Connect Edition Update 3. In accordance with Section 304.4 of the CCRFCD Manual, the depth times velocity factor ($D \times V$) for street flow for the minor 10-year storm event must be less than or equal to 6, with a maximum depth of 1-ft. The depth times velocity factor ($D \times V$) for street flow for the major 100-year storm event must be less than or equal to 8, with a maximum depth of 2-ft.

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

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

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

Ditches and Swales: The hydraulic computations for recommended ditches and swales have been performed utilizing the FlowMaster Connect Edition Update 3 by Bentley Systems. Where applicable, erosion prevention measures have been recommended.

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

Storm Drains: The hydraulic analysis for the proposed storm drain has been performed utilizing the Water Surface and Pressure Gradient (WSPG) Hydraulic Analysis System software by the Los Angeles County Department of Public Works. As outlined in Section 800 of the CCRFCD Manual, storm drain facilities are designed to maintain its hydraulic gradient line (HGL)

a minimum of 1-ft below above finished grade and rim elevations and limit the flow velocities in the facility to less than 25 ft/s.

3.0 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 ultimate 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.

4.0 Proposed Drainage Condition

4.1 Definition of Proposed Condition

The proposed condition considers that the site and the surrounding roadway and drainage infrastructures are fully installed and operational. Therefore, no offsite flows will directly impact or convey thru the site and the proposed condition assumes fully developed improvements matching the ultimate drainage condition.

4.2 Discussion of Proposed Condition

The proposed condition hydrologic analysis of the site has been conceptually analyzed from the Master Study. The site was analyzed as drainage basins S, T & U and is planned to surface flow east and be collected by storm drain stubs within Flight Range Avenue and Desert Foothills Drive.

The drainage patterns proposed by this project site drains in an easterly direction to Desert Foothills Drive to be collected by the provided storm drain stubs. The onsite basin has been prorated into several sub-basins for the purpose of street flows, inlet computations, and finished floor evaluations.

The existing storm drain stub within Flight Range Avenue was not utilized as the ultimate development drainage pattern of draining the southwest portion to the stub would not be feasible based on existing topography. The surface runoff flows planned to be collected by the existing stub would be minor or negligible for storm drain collection. Due to the flows being routed to the existing storm drain in Desert Foothills Drive, thereby increasing the tributary to the stubs, the storm drain computations have been revised and further discussion is included in Section 6 of this report.

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

4.3 Summary of Proposed Condition Flows

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

5.0 Street Improvements

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

Interior Section(s): Interior sections were created with both minimum and maximum applicable slopes for a conservative estimate of flow depth and velocity at the given section if applicable. Note, only 100-yr street section assessments are performed since the application of 100-yr flow rate show compliance of 10-year criteria.

Perimeter Section(s): Conservative street sections have been provided for the adjacent perimeter streets; Kindle Rise Way and Flight Range Avenue are analyzed as Sections KRW1 and FRA1, respectively. These hydraulic sections have been included in Appendix C.

The surface flows in the adjacent perimeter streets for Kettle Ridge Drive and Desert Foothills Drive have been referenced from the respective drainage studies and utilized for the supporting street hydraulic computations. Refer to the respective appendices for the relevant reference material for street flow depth computations.

6.0 Drainage Facilities

The Master Study provided three lateral stubs for the project site in the conceptual analysis. The stubs were installed with the street infrastructure improvements for Flight Range Avenue and Desert Foothills Drive. As previously discussed, the existing storm drain stub in Flight Range Avenue was not utilized since the portion of the site that would impact and be intercepted by the storm drain is small and would generate minor flows.

The existing storm drain stubs provided along Desert Foothills Drive have been modelled in WSPGW as LAT6 and LAT7 models, located along the northeast and eastern portion of the site. Due to the updated hydrologic analysis resulting from the acreage difference, the storm drain for Desert Foothills Drive was reanalyzed to verify the capacity of the DFD2 WSPGW Model. The LAT6 and LAT7 models were extended to analyze the proposed storm drain improvements and WSPGW models have been included in Appendix C.

The LAT6 model has been divided into 3 branches: LAT6-DI2, LAT6-DI3 and LAT6-ENTRY. Each branch is provided for the drop inlet facilities SDDI#2 thru SDDI#4. The LAT7 model is provided for facility SDDI#1. A berm was added to prevent flow discharge at the terminus of Ashy Storm Avenue and is elevated to the specific energy height of the street computation of the southern half of roadway, Section H4-S. The berm also provides additional head and ensures that the drop inlet in sump collects the entire flows within the ponded area.

Refer to Appendix C for drop inlet computations and storm drain WSPGW models. A summary table of the recommended facilities have been provided on Exhibit E included in Appendix A.

The emergency overflow condition considers the scenario when drop inlets in sump condition are considered fully clogged. This scenario applies to Facility SDDI#2 and the emergency overflow path for the drop inlet continues to drain in an easterly direction towards the berm, located at the

terminus of Ashy Storm Avenue, and discharge surface runoff into Desert Foothills Drive. Section EO1 and EO2 are provided for analysis of the surface flow and weir flow depth computations for flood protection of the adjacent finished floors. Section EO1 is modelled for the weir at the drop inlet location, and Section EO2 is modelled for the weir over the berm to spread flows towards Desert Foothills Drive.

The location and summary of the emergency overflow section has been provided on Exhibit E included in Appendix A and computations in Appendix C.

A ditch computation has been provided to analyze the flows impacting common element F. The computation illustrates that the flow is contained when utilizing the most conservative side slopes. The location and summary of the proposed ditch section (Section V1) has been provided on Exhibit E included in Appendix A and the computations is included in Appendix C.

7.0 Finished Floor Elevations

Finished floor elevations for the proposed lots per the City of Las Vegas criteria are determined to be a vertical distance above the gutter flow line of twice the 100-year depth of flow in the street, measured on the high side of the lot, and 6-inches above the top of curb at the high side of the lot, whichever is higher.

Lots adjacent to drainage easements are assessed with the drainage easement's weir and normal depth. Lots adjacent to flows turning 90 degrees are assessed with the specific energy of the approaching flows.

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

Note that solid grout protection is provided with 1 course (8" minimum thickness) at locations where building pads are below adjacent common element grades without concentrated flows that will require flood protection., the 1 course protection was necessary to limit the amount of steps required to access the residences within from the common elements especially where flowlines are fronting the lots. As the standard 3 courses would require excessive amount of steps and limit accessibility to each residence. Finished grading and retaining walls have been provided to ensure the 1 course meets applicable flood protection criteria.

8.0 Conclusions & Recommendations

1. This project site is in compliance with the applicable drainage laws as recognized by the state of Nevada and with the CCRFCD Manual.
2. The project site is not located within a FEMA designated Special Flood Hazard Area (SFHA). The project site and the proposed improvements are located within a FEMA Flood Zone "X" (unshaded). Therefore, FEMA notification will not be required.
3. The project site is adjacent to an existing/planned CCRFCD regional facility. Therefore, concurrence from CCRFCD is anticipated.

4. The perimeter and interior roadways have been designed to meet all the CCRFCD Manual criteria as discussed in Section 2.3.
5. Finished floor elevations for the proposed lots are determined to be a vertical distance above the gutter flow line of twice the depth of flow in the street measured on the high side of the lot, and 6-inches above the top of curb at the high side of the lot, whichever is higher.
6. The improvement plans for this project have been included in the last appendix of this study. These improvement plans support the drainage patterns and conclusions detailed in this study.

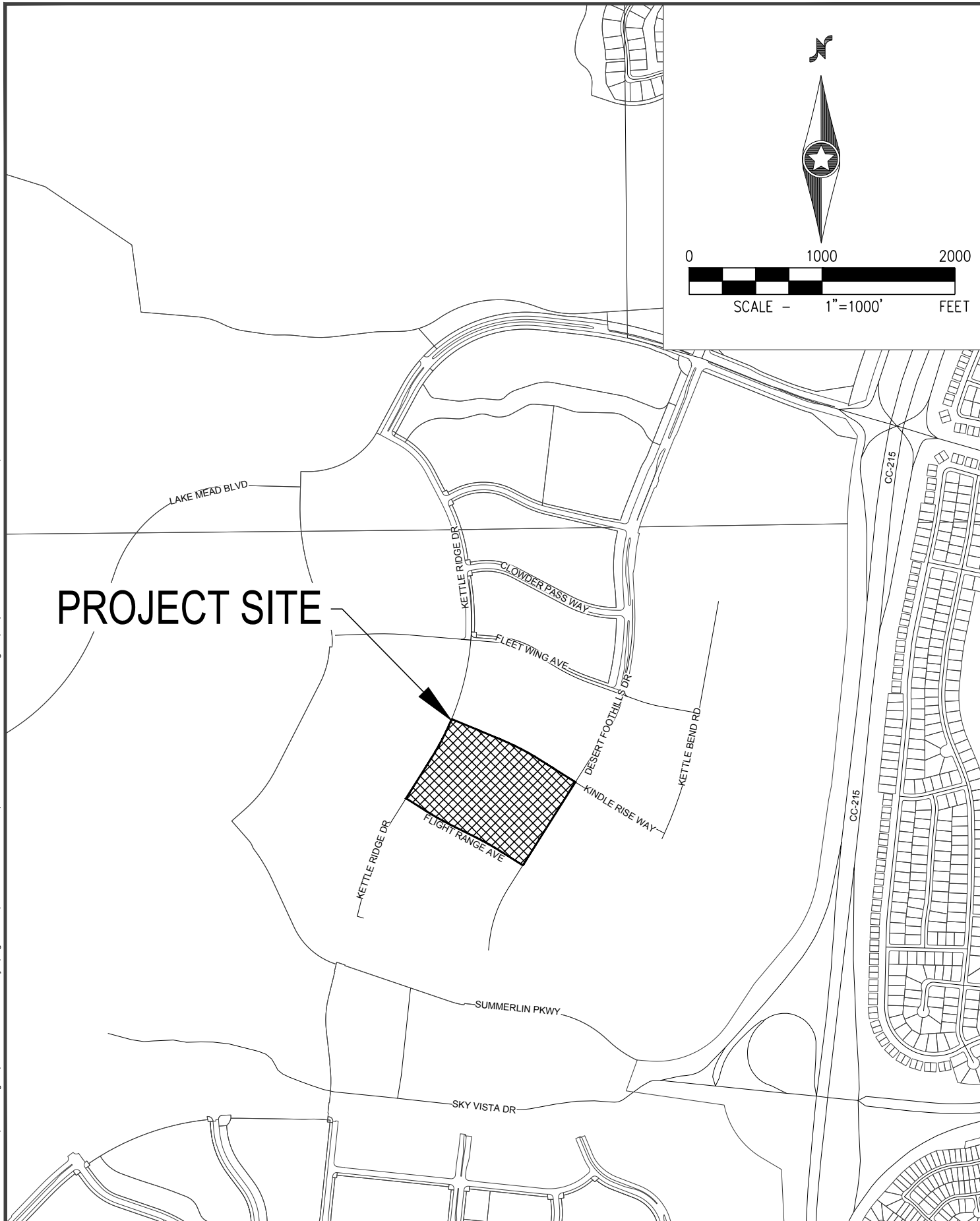
9.0 References

1. Las Vegas Valley Flood Control Master Plan Update. Atkins, 2018.
2. Hydrologic Criteria and Drainage Design Manual. Clark County Regional Flood Control District, 1999.
3. Soil Survey of Las Vegas Valley Area, Nevada. U.S. Department of Agriculture, National Resources Conservation Service, Accessed August 2022.
4. Master Conceptual Drainage Study Update #2 for Summerlin West Village 22, VTN Nevada, January 2020.
5. Technical Drainage Study for Summerlin West Village 22 Desert Foothills Drive –from Sunset Run Drive to Fleet Wing Avenue, June 2021.
6. Technical Drainage Study for Summerlin West Village 22 Kettle Ridge Drive – From Sunset Run Drive to Kindle Rise Way, July 2021.

APPENDIX A

Drainage Exhibits

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Westwood

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Las Vegas, NV 89118

westwoodps.com

Westwood Professional Services, Inc.

KB HOME

SUMMERLIN VILLAGE 22 PARCEL STU
VICINITY MAP

DATE: SEPT 2022

DRAFTER: CRW

DESIGNER: JSR

CHECKED: SOA

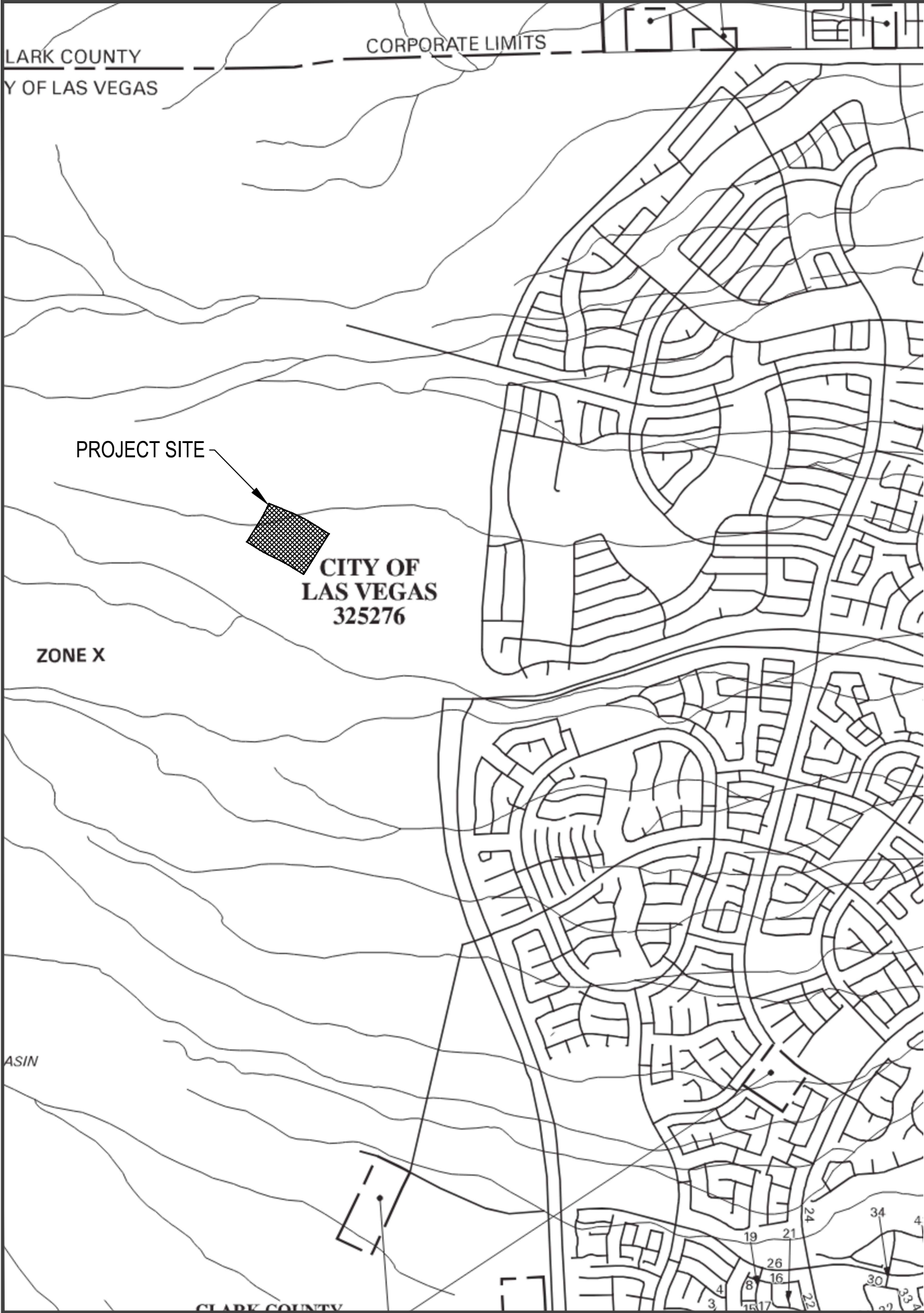
PROJECT NO.

KBH2204.000

EXHIBIT A

SHEET 1 OF 1

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NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2150 E

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY,
NEVADA AND
INCORPORATED AREAS

PANEL 2150 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LAS VEGAS, CITY OF CLARK COUNTY	325276	2150	E
UNINCORPORATED AREAS	320003	2150	E

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



MAP NUMBER

32003C2150 E

MAP REVISED:

SEPTEMBER 27, 2002

Federal Emergency Management Agency

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA
And Incorporated Areas

PANEL 2150 OF 4090

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
LAS VEGAS, CITY OF	325276	2150	E
UNINCORPORATED AREAS CLARK COUNTY	320003	2150	E



REVISED TO
REFLECT LOMR
EFFECTIVE: February 5, 2018

VERSION NUMBER

1.1.1.0

MAP NUMBER

32003C2150E

EFFECTIVE DATE

SEPTEMBER 27, 2002

LEGEND



SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD EVENT

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

ZONE A

No base flood elevations determined.

ZONE AE

Base flood elevations determined.

ZONE AH

Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.

ZONE AO

Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR

Area of special flood hazard formerly protected from the 1% annual chance flood event by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood event.

ZONE A99

Area to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no base flood elevations determined.

ZONE V

Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.

ZONE VE

Coastal flood zone with velocity hazard (wave action); base flood elevations determined.



FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.



OTHER FLOOD AREAS

ZONE X

Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.



OTHER AREAS

ZONE X

Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D

Areas in which flood hazards are undetermined, but possible.



COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.



OTHERWISE PROTECTED AREAS (OPAs)



Floodplain Boundary



Floodway Boundary



Zone D Boundary



Coastal Barrier Boundary



Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or velocities.



Base Flood Elevation line and value; elevation in feet*



Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988



Cross Section Line



Transect Line

97°07'30", 32°22'30"

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

4276000M

1000-meter Universal Transverse Mercator grid values, zone 11

600000 FT

5000-foot grid ticks

DX5510

Bench mark (see explanation in Notes to Users section of this FIRM panel).

• M1.5

River Mile

Westwood

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APP

DATE

BY

DATE

DESCRIPTION

NO.

KB HOME

SUMMERLIN VILLAGE 22 PARCEL STU

FEMA FIRM PANEL MAP

DATE:

SEPT 2022

DRAFTER:

CRW

DESIGNER:

JSR

CHECKED:

SOA

PROJECT NO.

KBH2204.000

EXHIBIT B

SHEET 1 OF 1

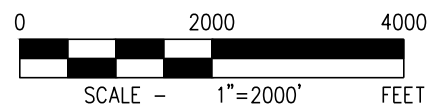


LEGEND

 Ultimate Development Boundary

- Remove & Replace/Parallel Facilities**

Category A	Category B
 Channel	 Channel
 Stormdrain	 Stormdrain
 Crossing	 Crossing



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Las Vegas, NV 89118
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KB HOME
SUMMERLIN VILLAGE 22 PARCEL STU 2018 CCRFCD MPU FACILITIES MAP

DATE:	SEPT 2022
DRAFTER:	CRW
DESIGNER:	JSR
CHECKED:	SOA
PROJECT NO.	KBH2204.000
EXHIBIT C1	
SHEET 1 OF 1	

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ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
APAD								
0203	E	ANGEL PARK - ALTA DRIVE BRANCH	1104	2200	CSWAA-1	GOW3A	6.95	5.28
0225	E	2: 7' X 5.5' RCB	360	2137	SUM5DB	GOW3A	6.73	3.40
APBE								
0022	E	ANGEL PARK - BELTWAY BRANCH						
	E	CONC CHNL 20W 7'D 2:1 SS	1556	3366	CCSWFH15	GOW3A	3.39	1.81
0051	E	CONC CHNL 20W 7'D 2:1 SS	1563	3366	CCSWFH15	GOW3A	3.39	2.77
0081	E	8' X 8' RCBC @ FAR HILLS	777	1048	CSWFH-15	GOW3A	0.59	2.32
0094	E	CONC CHNL 10W 5'D 2:1 SS	1465	1048	CSWFH-15	GOW3A	0.59	1.88
0122	E	CONC CHNL 10W 4'D 2:1 SS	1685	1048	CSWFH-15	GOW3A	0.59	0.80
0154	P0	8' X 6' RCB	5012	781	CSWFH-12	GOW3A	0.41	1.30
0249	P0	8' X 5' RCB	2858	606	CSWFH-11	GOW3A	0.31	3.00
APCH								
0000	E	ANGEL PARK - CARRIAGE HILL BRANCH						
	E	8' X 6' RCB	152	399	CSWFH-14	GOW3A	0.21	0.87
0003	P0	72" RCP	1685	399	CSWFH-14	GOW3A	0.21	2.00
0031	P0	60" RCP	2008	206	SWFH-13	GOW3A	0.10	1.38
APD2								
0002	E	ANGEL PARK - DESERT FOOTHILLS 2 BRANCH						
	E	7' X 6' RCB	863	674	SWAA-2	GOW3A	0.68	1.08
APDF								
0000	P0	ANGEL PARK - DESERT FOOTHILLS BRANCH						
	P0	10' X 6' RCB	1788	1428	CSWFH-9	GOW3B	0.80	3.55
0026	P0	8' X 6' RCB	1813	968	CSWFH-8	GOW3A	1.80	2.00
0073	P0	8' X 4' RCB	1922	486	CSWFH-4	GOW3A	1.52	4.40
0123	P0	42" RCP	1076	141	GPDB	GOW3A	1.29	6.00
0125	P0	130 AC-FT GRAND PARK DETENTION BASIN		1543	CSWFH-3	GOW3A	1.29	
0127	P0	8' X 6' RCB	2977	853	SWFH-1	GOW3A	0.69	3.80
0128	P0	5' X 4' RCB	2197	509	SWFH-2	GOW3A	0.37	5.70
APFH								
0000	E	ANGEL PARK - FAR HILLS BRANCH						
	E	2: 8' X 8' RCB	1070	2494	CCSWFH14	GOW3B	1.51	3.50
0019	E	2: 8' X 8' RCB	250	2149	CCSWFH-9	GOW3B	1.30	4.19
0024	E	16' X 8' RCAP	1951	2149	CCSWFH-9	GOW3B	1.30	5.10
0061	E	8' X 6' RCB	1435	839	CSWFH-7	GOW3A	0.50	2.00
0089	E	8' X 6' RCB	2946	839	CSWFH-7	GOW3A	0.50	2.00
0144	P0	5' X 4' RCB	2497	456	SWFH-6	GOW3A	0.28	5.50
APM5								
0000	E	DETENTION BASIN #5		8856	SUM5IN	GOW3A	6.73	
0008	P0	384 AC-FT DETENTION BASIN #5	2102	3634	CCDB54-7	GOW3A	4.13	5.20
0009	P0	CONC CHNL 50W 4.5'D 2:1 SS	4180	3495	CDB55-7	GOW3A	2.60	5.80
0047	E	DIVERSION BERM WITH GABION BANK PROTECTION	1000	3634	CCDB54-7	GOW3A	4.13	1.30
0056	P0	CONC CHNL 80W 4'D 2:1 SS	264	3634	CCDB54-7	GOW3A	4.13	1.30
0057	P0	CONC CHNL 50W 3'D 2:1 SS	9922	1664	CDB54-4	GOW3A	0.81	6.80
0059	P0	CONC CHNL 100W 3'D 2:1 SS	9075	2605	CDB54-7	GOW3A	3.31	7.00
0212	P0	CONC CHNL 30W 3'D 2:1 SS	6695	1092	DB55-1	GOW3A	0.64	7.50
0213	P0	CONC CHNL 50W 3'D 2:1 SS	6522	1729	CDB55-5	GOW3A	1.30	7.30
APSP								
0183	E	ANGEL PARK - SUMMERLIN PARKWAY						
	E	CONC CHNL 10W 6'D 2:1 SS	1680	884	C11B-1	GOW3A	0.84	1.70
GOB3								
0000	E	GOWAN LONE MOUNTAIN SYST. 3 BELTWAY						
	E	66" RCP	1370	341	SV22-1	GOW3A	0.18	4.50
GOBE								
0000	E	GOWAN LONE MOUNTAIN SYST. BELTWAY						
	E	20' X 10' RCBC @ ACCESS RD	30	1044	CSV22	GOW3A	0.67	5.67
0001	E	CONC CHNL 20W 5'D 2:1 SS	1100	1044	CSV22	GOW3A	0.67	6.50
0021	E	CONC CHNL 11W 8.5'D 0:1 SS	2143	1044	CSV22	GOW3A	0.67	6.50
0058	E	CONC CHNL 15W 7.5'D 0:1 SS	487	1044	CSV22	GOW3A	0.67	3.93
0065	E	CONC CHNL 17W 7.5'D 0:1 SS	844	1044	CSV22	GOW3A	0.67	0.76
0088	E	2: 10' X 9' RCBC @ LAKE MEAD	400	782	SV22-2	GOW3A	0.49	0.50
0096	E	CONC CHNL 20W 9'D 2:1 SS	627	782	SV22-2	GOW3A	0.49	0.50
0108	E	CONC CHNL 20W 6'D 2:1 SS	1021	782	SV22-2	GOW3A	0.49	0.50
0127	E	CONC CHNL 20W 6'D 2:1 SS	638	782	SV22-2	GOW3A	0.49	0.50
0139	E	CONC CHNL 10W 5.5'D 2:1 SS	1500	782	SV22-2	GOW3A	0.49	1.02
GOL3								
0010	E	GOWAN LONE MOUNTAIN SYSTEM-BRANCH 3						
	E	CONC CHNL 20W 10'D 0:1 SS	3037	3277	CRCLMT1R	GOW3A	7.31	2.78
0068	E	TRANSITION STRUCTURE	100	3277	CRCLMT1R	GOW3A	7.31	3.50
0070	E	20' X 6' RCBC @ CLIFF SHADOWS	350	1271	CRCSV22	GOW3A	4.99	2.44
0077	E	CONC CHNL 20W 6'D 0:1 SS	1229	1271	CRCSV22	GOW3A	4.99	6.11

ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
GOL3								
0100	E	GOWAN LONE MOUNTAIN SYSTEM-BRANCH 3						
	E	CONC CHNL 20W 10'D 0:1 SS	200	1271	CRCSV22	GOW3A	4.99	5.67
0115	E	96" RCP OUTLET	670	666	DET26	GOW3A	4.31	0.29
0128	E	305 AC-FT VILLAGE 26 DETENTION BASIN		3615	VIL26IN	GOW3A	4.31	
0137	E	CONC CHNL 20W 7.5'D 0:1 SS	2720	3615	VIL26IN	GOW3A	4.31	6.50
0188	E	CONC CHNL 20W 8'D 0:1 SS	563	3615	VIL26IN	GOW3A	4.31	3.91
0197	E	14' X 14' RCB	890	3615	VIL26IN	GOW3A	4.31	0.88
0214	E	Dual 10' X 14' RCB	124	3615	VIL26IN	GOW3A	4.31	0.57
0216	P0	CONC CHNL 50W 4'D 2:1 SS	4060	3524	CSV26-1	GOW3A	4.02	6.08
0289	P0	CONC CHNL 50W 3.5'D 2:1 SS	6215	2281	30	GOW3A	2.44	7.95
0290	E	NATURAL WASH 363W	4850	1410	SV26-1	GOW3A	1.59	22.50
0370	E	NATURAL WASH 450W	7000	2281	30	GOW3A	2.44	8.50
GOL4								
0000	E	GOWAN LONE MOUNTAIN SYSTEM-BRANCH 4						
	E	14' X 8' RCB	554	2243	CLMT1R	GOW3A	2.33	2.50
0010	E	2: 9' X 8' RCB	820	2243	CLMT1R	GOW3A	2.33	4.74
0025	E	SOIL CEMENT CHNL 60"W 6'D 3-4:1 SS	320	2243	CLMT1R	GOW3A	2.33	2.00
0026	E	SOIL CEMENT CHNL 42"W 6'D 3-4:1 SS	700	2243	CLMT1R	GOW3A	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

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

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

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

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



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NO.	DESCRIPTION	DATE	BY	APP	DATE

KB HOME

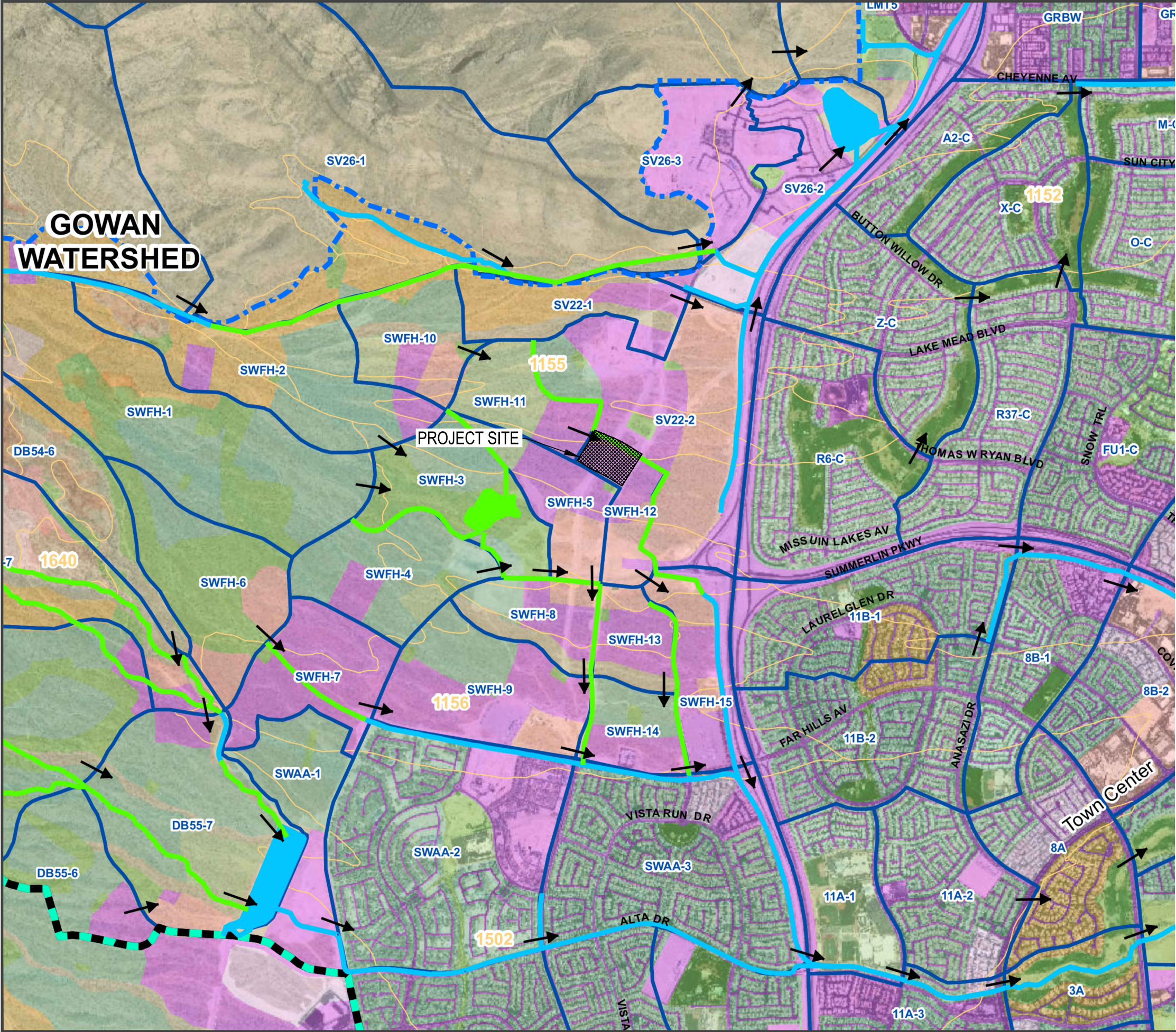
SUMMERLIN VILLAGE 22 PARCEL STU
2018 CCRFCD MPU-F TABLE

DATE: SEPT 2022
DRAFTER: CRW
DESIGNER: JSR
CHECKED: SOA

PROJECT NO.
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EXHIBIT C2
SHEET 1 OF 1

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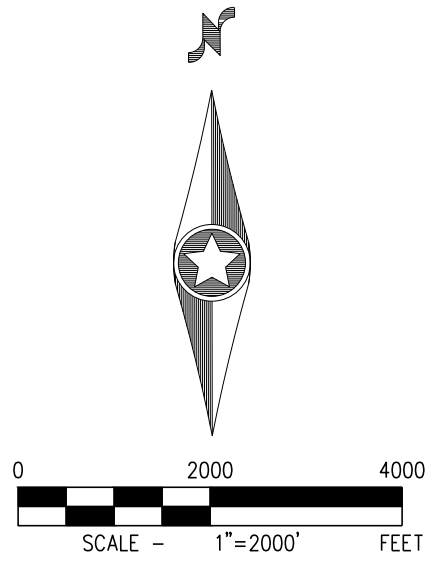


2018 Las Vegas Valley Master Plan Update

Figure W-4
Gowan Watershed

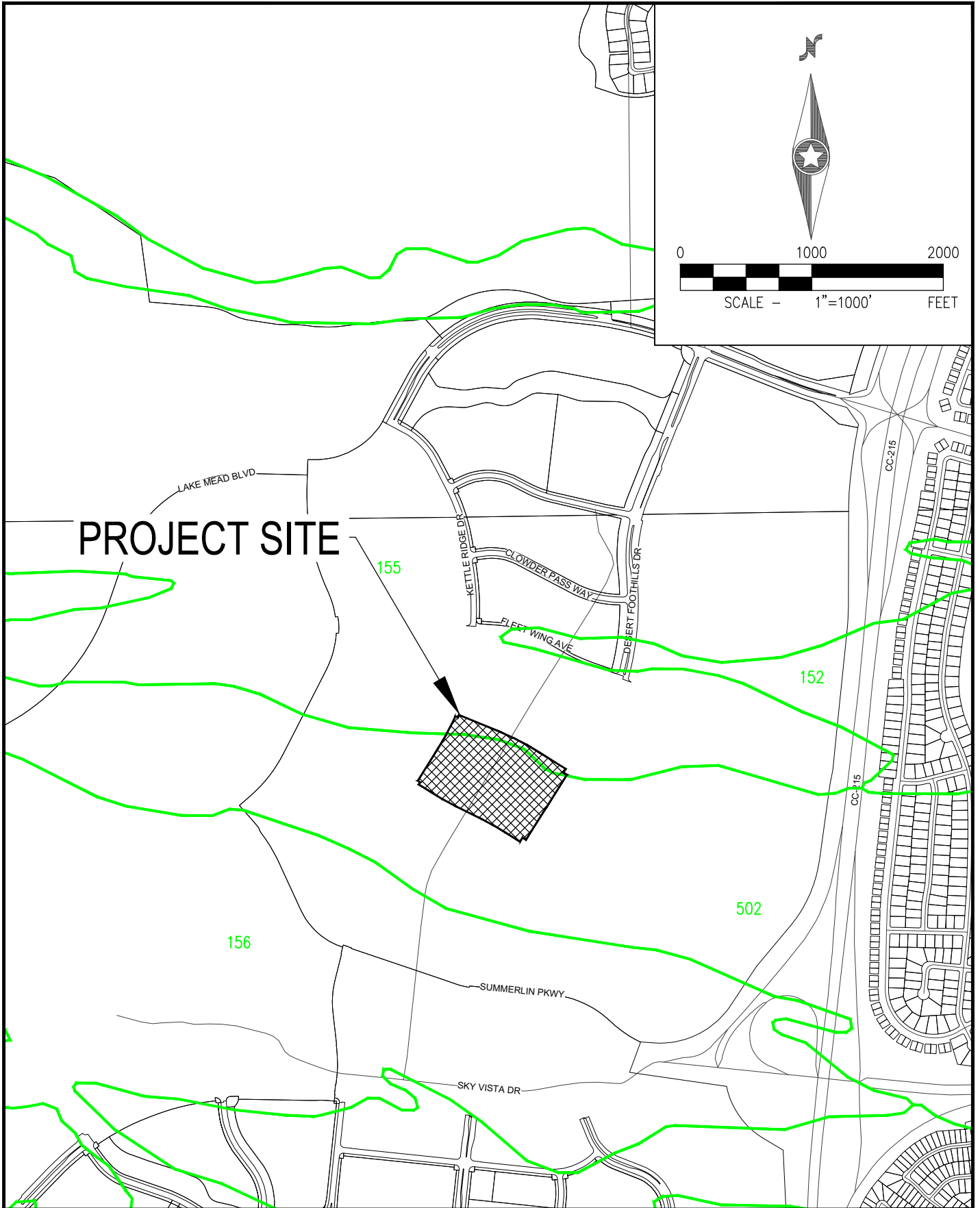
Legend

- Flow Arrows
- Concentration Points
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Ultimate Development Boundary
- Watershed
- Subbasins
- Soils
- 1: Undeveloped Land, Open desert
- 2: Parks, Golf Courses
- 3: Rural, 0.5-1 units per acre (uses 1 unit/acre)
- 4: Low-Density Residential, 1-2 units per acre (uses 2 units/acre)
- 5: Medium-Density Residential, 2-4 units per acre (uses 3 units/acre)
- 6: High-Density Residential, 4-8 units per acre (uses 6 units/acre)
- 7: Public Facility and Residential, 8-12 units/acre
- 8: Very High-Density Residential, 12 units/acre or more
- 9: Commercial, Retail, Casino, High Rise Condominiums
- 10: Light Industrial
- 11: Heavy Industrial
- 12: Schools
- 13: Lakes



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SUMMERLIN VILLAGE 22 PARCEL STU							
2018 CCRFCD MPU WATERSHED MAP							
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DRAFTER: CRW							
DESIGNER: JSR							
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EXHIBIT C3							
SHEET 1 OF 1							

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SUMMERLIN VILLAGE 22 PARCEL STU
SOILS MAP

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PROJECT NO.

KBH2204.000

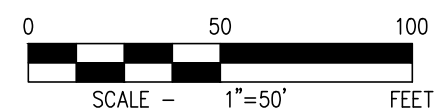
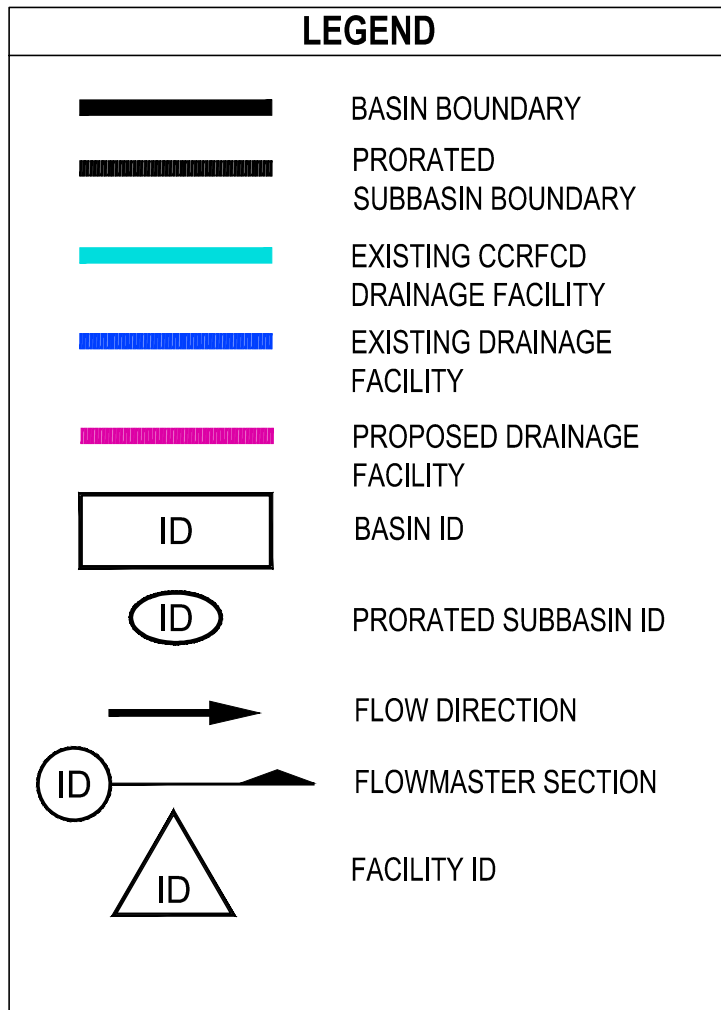
EXHIBIT D

SHEET 1 OF 1

CCRFGD FACILITY APBE 0249
6'X10' RCB
MPU = 606 CFS

CCRFGD FACILITY APBE 0154
6'X7' RCB
MPU = 781 CFS

CCRFGD FACILITY APBE 0154
6'X7' RCB
MPU = 781 CFS



Proposed Condition Flow Rate Summary

Basin/Concentration Point ID	Area (ac)	Q ₁₀₀ (cfs)
STU	14.0	39
STE2*	1.8	8
STP*	1.8	8

Subbasin Prorated Flow Rate Summary

Basin ID	Q ₁₀₀ (cfs)	Area (acres)	100-yr Unit Flow (cfs/acre)
STU	39	14.0	2.8

Subbasin ID	Q ₁₀₀ (cfs)	Area (acres)	100-yr Unit Flow (cfs/acre)
STU(a)	4	1.5	2.8
STU(b1)	6	2.1	2.8
STU(b2)	3.5	1.2	2.8
STU(b3)	1	0.4	2.8
STU(c)	4	1.4	2.8
STU(d1)	5	1.8	2.8
STU(d2)	1	0.4	2.8
STU(e)	4	1.4	2.8
STU(f1)	4	1.5	2.8
STU(f2)	2	0.8	2.8
STU(g1)	3.5	1.3	2.8
STU(g2)	1	0.4	2.8
TOTAL	39	14.0	

100-Year Interior Street Flow Summary

Section ID	Q ₁₀₀ (cfs)	Slope (%)	Depth (ft)	Velocity (fps)	DxV
A1 Q = STU(a)	4	10.75	0.29	5.95	1.7
B1 Q = STU(b1)	6	4.90 VC	0.35	4.79	1.7
B2-S Q = STU(b1)	6	6.10 VC	0.34	5.21	1.8
B3-N Q = STU(b2)	3.5	8.50	0.32	5.94	1.9
C1 Q = STU(c)	4	7.51	0.29	5.01	1.5
D1 Q = STU(d1+d2)	6	5.65	0.31	4.63	1.4
D2 Q = STU(d2)	1	7.39	0.30	5.13	1.5
E1 Q = STU(e)	4	3.81	0.36	4.35	1.6
E2 Q = STU(f1)	10	5.93	0.34	5.16	1.8
F1 Q = STU(a+f1)	8	10.75	0.20	4.97	1.0
F2 Q = SDDI#1 Bypass + STU(f2)	4.5	2.09	0.44	3.89	1.7
G1 Q = STU(b2)	3.5	3.57	0.41	4.76	2.0
H1-S Q = STU(b1 + b3 + c)	11	3.55	0.39	4.38	1.7
H2-S Q = Bypass SDDI#3 + STU(g2)	4.5	2.36	0.35	3.39	1.2
H3-S Q = Bypass SDDI#3 + STU(d1 + d2 + e + g2)	17.5	2.4	VC	0.33	3.24
H4-N Q = STU(g1)	4	6.52	0.40	5.93	2.4
H4-S Q = Bypass SDDI#1 + #3 + STU(d1 + d2 + e + f2 + g2)	22	4.80	0.37	5.01	1.9
	4	8	0.29	5.16	1.5
	8	0.46	7.17	3.3	

- N - S denote north & south half street analyses.
VC denotes analyzed equivalent slope was taken with respect to vertical curve.

NOTES:
* REFERENCED FROM MASTER DRAINAGE STUDY SUMMERLIN WEST VILLAGE 22 (DS 5005)
** REFERENCED FROM TDS FOR DESERT FOOTHILLS DRIVE (DS 5344)
*** REFERENCED FROM TDS FOR KETTLE RIDGE DRIVE (DS 5349)

Emergency Overflow Hydraulic Summary

Section ID	Q ₁₀₀ (cfs)	Description	Slope (%)	Type of Analysis	Depth (ft)	Velocity (fps)
E01 Q = SDDI#2	25.5	Weir (over inlet)	0.50	Normal Depth	0.21	2.86
E02 Q = SDDI#2	25.5	Weir (over berm)	-	Weir	0.34	N/A

Recommended Flood Control Facility (Inlets & Laterals) Summary

Facility ID	Facility Description	Source of Flows	Approaching Flow (cfs) Q ₁₀₀	Facility Flow (cfs) Q ₁₀₀	Surface/Bypass Flow (cfs) Q ₁₀₀	Notes
SDDI4	Proposed 12.5-ft CM2 with 18" RCP Lateral	STU(b2)	3.5	3	0.5	Bypass to Kettle Rise Way
SDDI3	Proposed 12.5-ft CM2 with 18" RCP Lateral	STU(b1 + b3 + c)	11	4.5	6.5	Bypass to SDDI#3
SDDI2	Proposed 7.5-ft CM2 with 24" RCP Lateral	Bypass (D1#1 + D1#3) + STU(d1 + d2 + e + f2 + g1 + g2)	25.5	25.5	0	In Sump
SDDI1	Proposed 12.5-ft CM2 inlet with Proposed 18" RCP Lateral Stub	STU(a + f1)	8	5.5	2.5	Bypass to SDDI#2

100-Year Perimeter Street Flow Summary

Section ID	Q ₁₀₀ (cfs)	Slope (%)	Depth (ft)	Velocity (fps)	DxV
DFD3** Q = REF	4.13	0.97	0.26	2.13	0.6
DFD4** Q = REF	4.24	2.63	0.23	3.17	0.7
FRA1 Q = STE2*	8	6.00	0.31	4.76	1.5
KRW1 Q = STP*	8	6.00	0.31	4.76	1.5
ST1-C** Q = REF	3.2	6.80	0.24	4.72	1.1

Onsite Hydraulic Section Summary

Section ID	Q ₁₀₀ (cfs)	Section Description	Slope (%)	Depth (ft)	Velocity (fps)
Section V1 Q = Portion of Prorate STU(d1)	1.5	V-ditch	3.60	0.22	2.58

Recommended Flood Control Facilities (Mainline) Summary

Facility ID	Facility Description	Source of Flows	Q _{Design} (cfs)	Notes
A1	Proposed 18" RCP	SDDI#1	5.5	Connects to Ex. 30" RCP
B1	Proposed 18" RCP	SDDI (#4 + #5)	7.5	-
B2	Proposed 18" RCP	Facility B1 + SDDI#3	7.5	-
B3	Proposed 24" RCP	Facility B2 + SDDI#2	33.0	Connects to Ex. 30" RCP

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SUMMERLIN VILLAGE 22 PARCEL STU
DEVELOPED CONDITION DRAINAGE MAP

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PROJECT NO.
KBH2204.000

EXHIBIT E
SHEET 1 OF 1

APPENDIX B

Hydrologic Analyses

CN Computations & Soils Data



Soil Data & Curve Number Computation

Project Name & Number: KBH2204 Summerlin V22 Parcel STU

By: JSR

Date: 9/14/2022

Data:

Reference:

2018 MPU
NRCS Soil Data

Soil Type - Soil Survey Area & Version, Soil Description				A	B	C	D
LV	155	Las Vegas Valley (NV788)	Cave gravelly fine sandy loam, 4 to 15 percent slopes	0%	0%	0%	100%
LV	502	Las Vegas Valley (NV788)	Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes	60%	0%	0%	40%

Land Use	A	B	C	D
Single Family Special Development (SFHD)	80	87	90	92
95% Townhomes, 5% Commercial				

BASIN ID	STU		TOTAL AREA & COMPOSITE CURVE NUMBER:								13.96	86.0	
SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP PERCENTS				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
				A	B	C	D	A	B	C	D		
LV	155	12.1%	Single Family Special Development (SFHD)	0%	0%	0%	100%	80	87	90	92	1.69	11.2
LV	502	87.9%	Single Family Special Development (SFHD)	60%	0%	0%	40%	80	87	90	92	12.27	74.8
TOTAL		100.0%											



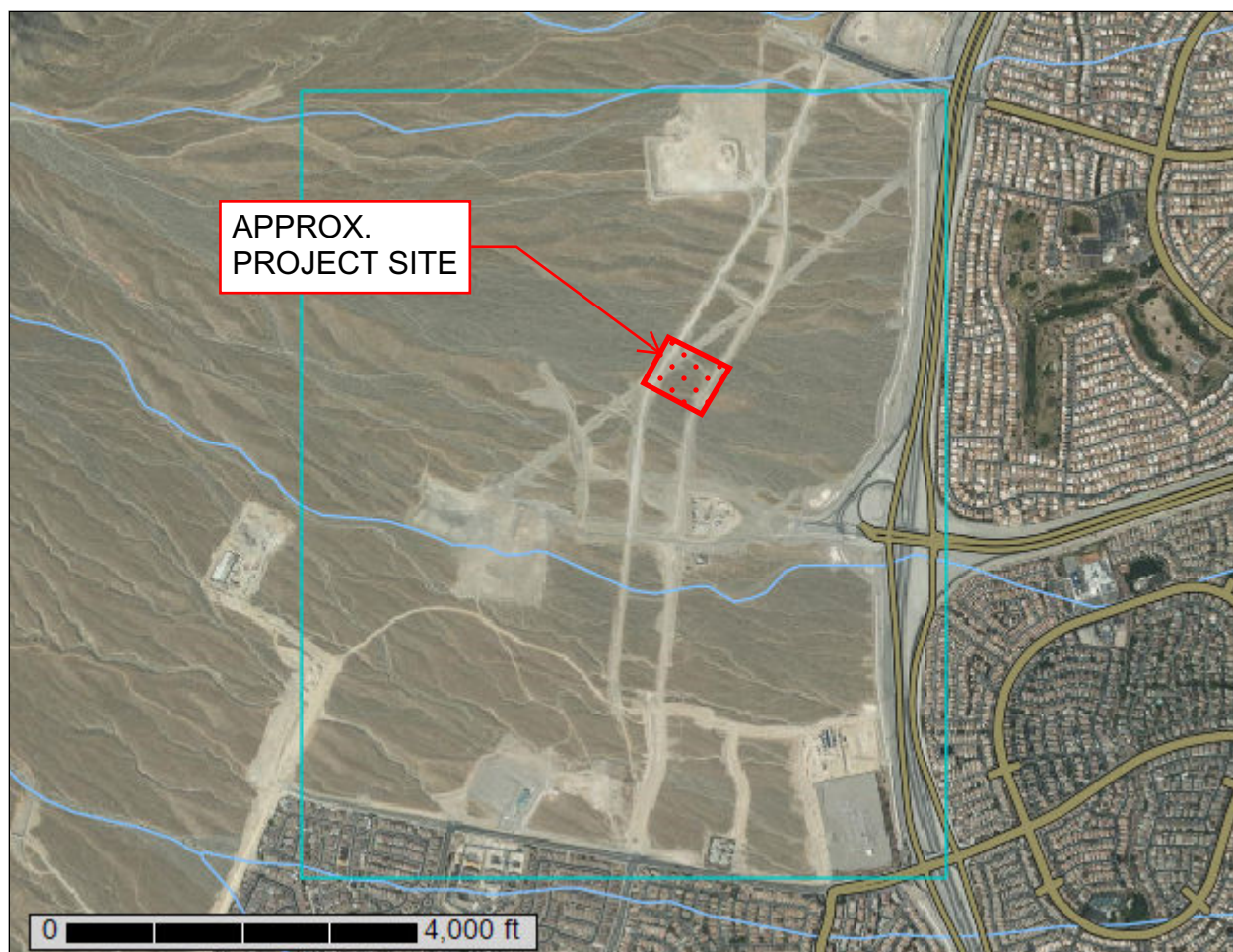
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Las Vegas Valley Area, Nevada, Part of Clark County



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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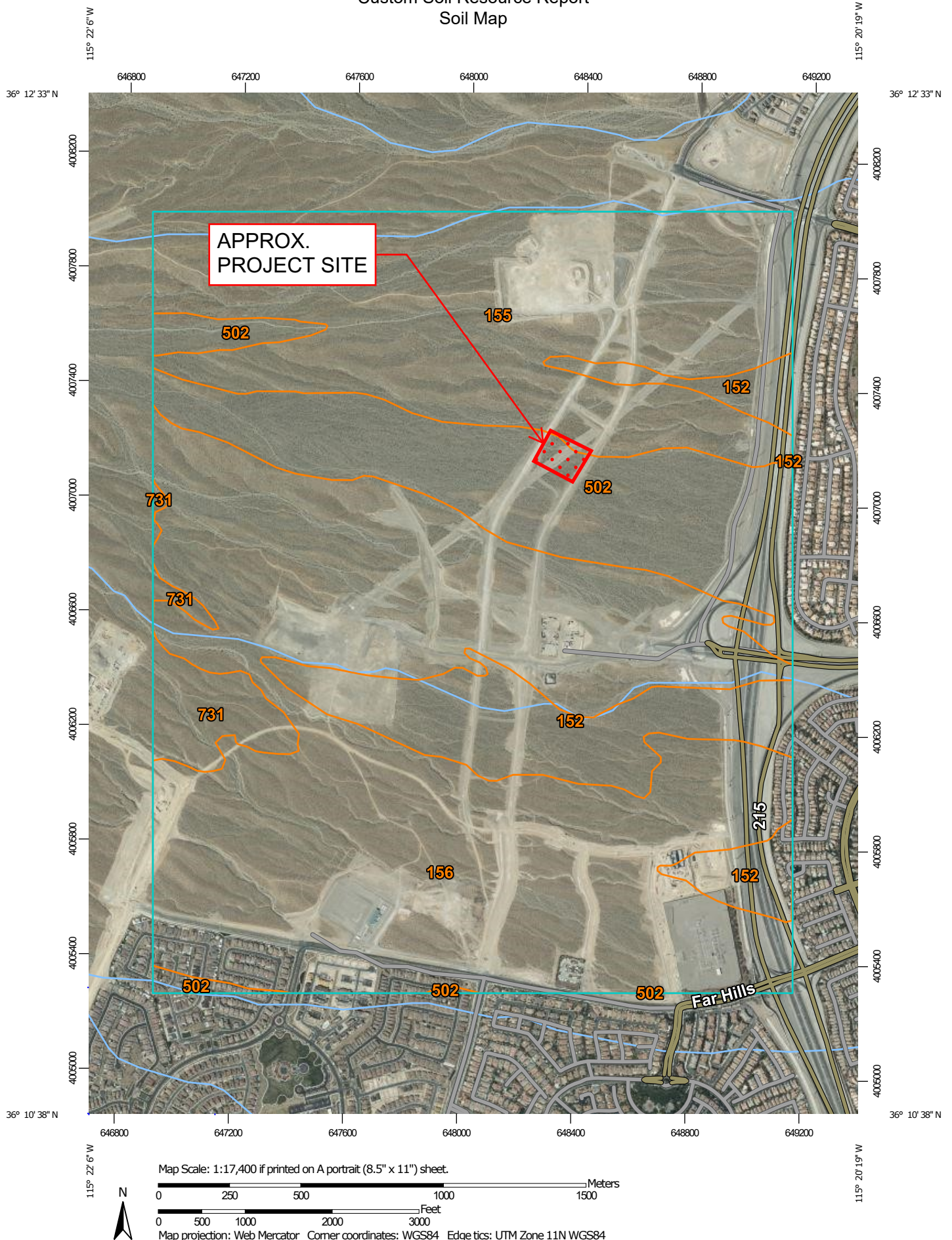
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Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

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

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County

Survey Area Data: Version 17, Sep 9, 2021

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

Date(s) aerial images were photographed: Apr 3, 2019—May 14, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
152	Cave gravelly fine sandy loam, 0 to 4 percent slopes	149.2	9.8%
155	Cave gravelly fine sandy loam, 4 to 15 percent slopes	374.3	24.7%
156	Vace-Wechech association	737.2	48.6%
502	Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes	215.7	14.2%
731	Purob-Irongold association	39.9	2.6%
Totals for Area of Interest		1,516.3	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

Custom Soil Resource Report

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Las Vegas Valley Area, Nevada, Part of Clark County

152—Cave gravelly fine sandy loam, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: hr9v
Elevation: 2,000 to 4,800 feet
Mean annual precipitation: 4 to 12 inches
Mean annual air temperature: 57 to 70 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Cave and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cave

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 12 inches: gravelly fine sandy loam
H2 - 12 to 36 inches: indurated
H3 - 36 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: 4 to 20 inches to petrocalcic
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 12.0
Available water supply, 0 to 60 inches: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R030XB005NV - Arid Active Alluvial Fans
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

155—Cave gravelly fine sandy loam, 4 to 15 percent slopes

Map Unit Setting

National map unit symbol: hr9w
Elevation: 2,000 to 4,800 feet
Mean annual precipitation: 4 to 12 inches
Mean annual air temperature: 57 to 70 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Cave and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cave

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 15 inches: gravelly fine sandy loam
H2 - 15 to 60 inches: indurated

Properties and qualities

Slope: 4 to 15 percent
Depth to restrictive feature: 4 to 20 inches to petrocalcic
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R030XB005NV - Arid Active Alluvial Fans
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

156—Vace-Wechech association

Map Unit Setting

National map unit symbol: 1tf5w
Elevation: 2,720 to 4,030 feet
Mean annual precipitation: 5 to 7 inches
Mean annual air temperature: 57 to 69 degrees F
Frost-free period: 180 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Vace and similar soils: 45 percent
Wechech and similar soils: 25 percent
Wechech, steep, and similar soils: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Vace

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Calcareous loess and mixed alluvium

Typical profile

H1 - 0 to 2 inches: gravelly fine sandy loam
H2 - 2 to 8 inches: loam
H3 - 8 to 60 inches: cemented material

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 4 to 14 inches to petrocalcic
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water supply, 0 to 60 inches: Very low (about 1.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R030XB005NV - Arid Active Alluvial Fans
Other vegetative classification: Limy 5-7 p.z. (030XB005NV_3)

Custom Soil Resource Report

Hydric soil rating: No

Description of Wechech

Setting

Landform: Fan remnants

Landform position (two-dimensional): Summit

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Alluvium derived from limestone and dolomite

Typical profile

H1 - 0 to 2 inches: very gravelly sandy loam

A2 - 2 to 7 inches: very gravelly sandy loam

H3 - 7 to 13 inches: very gravelly sandy loam

H4 - 13 to 60 inches: cemented material

Properties and qualities

Slope: 2 to 8 percent

Depth to restrictive feature: 8 to 14 inches to petrocalcic

Drainage class: Well drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 50 percent

Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Sodium adsorption ratio, maximum: 5.0

Available water supply, 0 to 60 inches: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D

Ecological site: R030XB005NV - Arid Active Alluvial Fans

Hydric soil rating: No

Description of Wechech, Steep

Setting

Landform: Fan remnants

Landform position (two-dimensional): Backslope

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Alluvium derived from limestone and dolomite

Typical profile

H1 - 0 to 2 inches: very gravelly sandy loam

A2 - 2 to 7 inches: very gravelly sandy loam

H3 - 7 to 13 inches: very gravelly sandy loam

H4 - 13 to 60 inches: cemented material

Properties and qualities

Slope: 8 to 30 percent

Depth to restrictive feature: 8 to 14 inches to petrocalcic

Drainage class: Well drained

Custom Soil Resource Report

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 50 percent

Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Sodium adsorption ratio, maximum: 5.0

Available water supply, 0 to 60 inches: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D

Ecological site: R030XB001NV - LIMY HILL 5-7 P.Z.

Hydric soil rating: No

Minor Components

Weiser

Percent of map unit: 8 percent

Landform: Fan remnants

Down-slope shape: Linear

Across-slope shape: Convex

Ecological site: R030XB075NV - GRAVELLY FAN 5-7 P.Z.

Other vegetative classification: Gravelly Fan 5-7 p.z. (030XB075NV_1)

Hydric soil rating: No

Irongold

Percent of map unit: 4 percent

Landform: Fan remnants

Landform position (two-dimensional): Shoulder

Down-slope shape: Linear

Across-slope shape: Convex

Ecological site: R030XB029NV - SHALLOW GRAVELLY LOAM 5-7 P.Z.

Other vegetative classification: Shallow Gravelly Loam 5-7 p.z. (030XB029NV_2)

Hydric soil rating: No

Commski

Percent of map unit: 2 percent

Landform: Fan remnants

Down-slope shape: Linear

Across-slope shape: Convex

Ecological site: R030XA066NV - CALCAREOUS LOAM 5-7 P.Z.

Other vegetative classification: Calcareous Loam 5-7 p.z. (030XA066NV_1)

Hydric soil rating: No

Threelakes

Percent of map unit: 1 percent

Landform: Drainageways

Down-slope shape: Linear

Across-slope shape: Concave

Ecological site: R030XB028NV - VALLEY WASH

Hydric soil rating: No

502—Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: hrcf
Elevation: 1,700 to 4,800 feet
Mean annual precipitation: 4 to 12 inches
Mean annual air temperature: 57 to 70 degrees F
Frost-free period: 180 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Canutio and similar soils: 55 percent
Cave and similar soils: 40 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canutio

Setting

Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 9 inches: gravelly fine sandy loam
H2 - 9 to 60 inches: stratified extremely gravelly loamy coarse sand to gravelly loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: A

Custom Soil Resource Report

Ecological site: R030XB038NV - GRAVELLY PEDIMENT 3-5 P.Z.
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

Description of Cave

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 16 inches: gravelly fine sandy loam
H2 - 16 to 30 inches: indurated
H3 - 30 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 4 to 20 inches to petrocalcic
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 12.0
Available water supply, 0 to 60 inches: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R030XB005NV - Arid Active Alluvial Fans
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

Minor Components

Arizo

Percent of map unit: 5 percent
Landform: Channels
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R030XB028NV - VALLEY WASH
Hydric soil rating: No

731—Purob-Irongold association

Map Unit Setting

National map unit symbol: 1tf74
Elevation: 3,410 to 6,660 feet
Mean annual precipitation: 5 to 10 inches
Mean annual air temperature: 51 to 63 degrees F
Frost-free period: 130 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Purob and similar soils: 60 percent
Irongold and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Purob

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from limestone

Typical profile

H1 - 0 to 3 inches: extremely gravelly loam
H2 - 3 to 8 inches: very gravelly loam
H3 - 8 to 19 inches: very gravelly loam
H4 - 19 to 60 inches: cemented material

Properties and qualities

Slope: 2 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.0 percent
Depth to restrictive feature: 14 to 20 inches to petrocalcic
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 80 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water supply, 0 to 60 inches: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s

Custom Soil Resource Report

Hydrologic Soil Group: D

Ecological site: R030XC007NV - SHALLOW GRAVELLY LOAM 7-9 P.Z.

Hydric soil rating: No

Description of Irongold

Setting

Landform: Fan remnants

Landform position (two-dimensional): Summit

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: And/or alluvium derived from limestone

Typical profile

H1 - 0 to 1 inches: extremely gravelly loam

H2 - 1 to 7 inches: gravelly loam

H3 - 7 to 11 inches: very gravelly loam

H4 - 11 to 34 inches: cemented material

H5 - 34 to 60 inches: extremely gravelly loamy coarse sand

Properties and qualities

Slope: 2 to 8 percent

Surface area covered with cobbles, stones or boulders: 1.0 percent

Depth to restrictive feature: 10 to 14 inches to petrocalcic

Drainage class: Well drained

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 70 percent

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Sodium adsorption ratio, maximum: 5.0

Available water supply, 0 to 60 inches: Very low (about 1.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D

Ecological site: R030XB029NV - SHALLOW GRAVELLY LOAM 5-7 P.Z.

Hydric soil rating: No

Minor Components

Typic torriorthents

Percent of map unit: 5 percent

Landform: Inset fans

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: R030XC007NV - SHALLOW GRAVELLY LOAM 7-9 P.Z.

Hydric soil rating: No

Purob

Percent of map unit: 3 percent

Landform: Fan remnants

Down-slope shape: Linear

Custom Soil Resource Report

Across-slope shape: Convex
Ecological site: R030XC007NV - SHALLOW GRAVELLY LOAM 7-9 P.Z.
Hydric soil rating: No

Arizo

Percent of map unit: 3 percent
Landform: Drainageways
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R030XB051NV - UPLAND WASH
Hydric soil rating: No

Typic haplocalcids

Percent of map unit: 2 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R030XA006NV - SHALLOW LIMESTONE SLOPE 5-7 P.Z.
Hydric soil rating: No

Xeric haplocambids

Percent of map unit: 1 percent
Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R030XC012NV - GRAVELLY CALCAREOUS INSET FAN 9-11 P.Z.
Hydric soil rating: No

Aridic calcixerolls

Percent of map unit: 1 percent
Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R030XC011NV - GRAVELLY INSET FAN 7-9 P.Z.
Hydric soil rating: No

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Water Features

This folder contains tabular reports that present soil hydrology information. The reports (tables) include all selected map units and components for each map unit. Water Features include ponding frequency, flooding frequency, and depth to water table.

Hydrologic Soil Group and Surface Runoff

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

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

The four hydrologic soil groups are:

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

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

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

Custom Soil Resource Report

soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

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

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

Report—Hydrologic Soil Group and Surface Runoff

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

Hydrologic Soil Group and Surface Runoff—Las Vegas Valley Area, Nevada, Part of Clark County			
Map symbol and soil name	Pct. of map unit	Surface Runoff	Hydrologic Soil Group
152—Cave gravelly fine sandy loam, 0 to 4 percent slopes			
Cave	100	Very high	D
155—Cave gravelly fine sandy loam, 4 to 15 percent slopes			
Cave	100	Very high	D
156—Vace-Wechech association			
Vace	45	Very high	D
Wechech	25	Very high	D
Wechech, steep	15	Very high	D
Weiser	8	Low	B
Irongold	4	Very high	D
Commski	2	Very low	B
Threelakes	1	High	A
502—Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes			
Canutio	55	Low	A
Cave	40	Very high	D
Arizo	5	Very low	A

Custom Soil Resource Report

Hydrologic Soil Group and Surface Runoff—Las Vegas Valley Area, Nevada, Part of Clark County			
Map symbol and soil name	Pct. of map unit	Surface Runoff	Hydrologic Soil Group
731—Purob-Irongold association			
Purob	60	Very high	D
Irongold	25	High	D
Typic torriorthents	5	Low	A
Arizo	3	Very low	A
Purob	3	Very high	D
Typic haplocalcids	2	Medium	B
Aridic calcixerolls	1	Low	A
Xeric haplocambids	1	Low	A

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- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

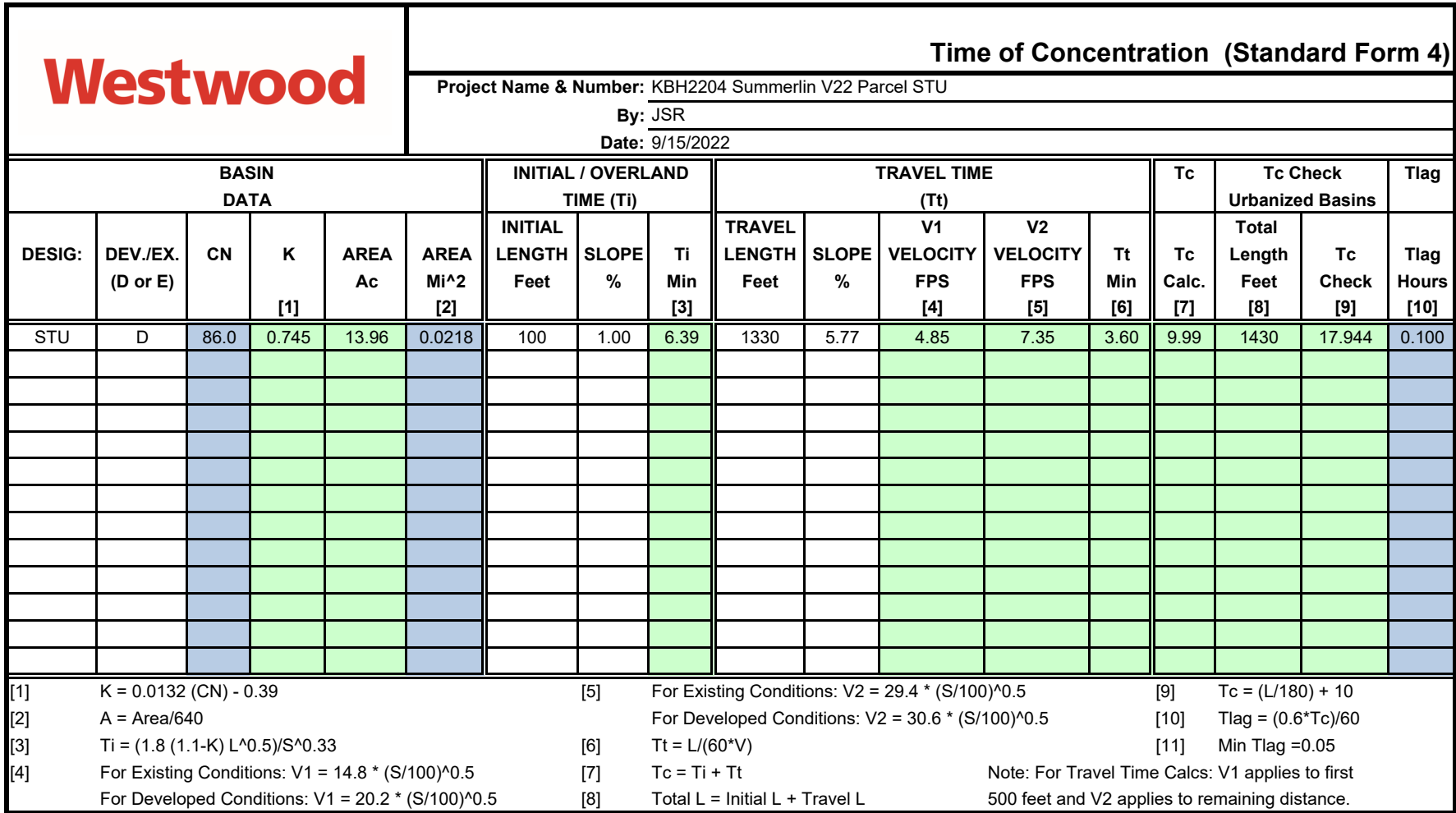
Custom Soil Resource Report

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Lag Time Computations (Standard Form 4)



Proposed Condition HEC-1 Model

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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 22AUG22 TIME 17:11:49
*
*****

PRO.OUT

*****
*
* 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

*** FREE ***

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*DIAGRAM
1 ID WESTWOOD PROFESSIONAL SERVICES
2 ID KB HOMES
3 ID SUMMERLIN VILLAGE 22 PARCEL STU
4 ID PROPOSED DRAINAGE CONDITION
5 ID
6 ID DRAINAGE CONDITION -- PROPOSED
7 ID RETURN PERIOD ----- 100 & 10-YEAR
8 ID DISTRIBUTION ----- 6-HOUR SDN3
9 ID PROJECT NO. ----- KBH2204.000
10 ID FILENAME ----- PRO.H1
11 ID DATE ----- SEPT 2022
12 ID MODELED BY ----- JSR
13 ID
14 ID RETURN PERIOD RATIO
15 ID 100-YR 1.00
16 ID 10-YR 0.57
17 ID
18 IT 5 0 0 300
19 IO 5 0 0
20 IN 5 0 0
21 JR PREC 1.00 0.57
*
22 KK STU
23 PB 3.40
24 PC 0 0.020 0.057 0.070 0.087 0.108 0.124 0.130 0.130 0.130
25 PC 0.130 0.130 0.130 0.133 0.140 0.142 0.148 0.158 0.172 0.181
26 PC 0.190 0.197 0.199 0.200 0.201 0.204 0.214 0.229 0.241 0.249
27 PC 0.251 0.256 0.270 0.278 0.281 0.283 0.295 0.322 0.352 0.409
28 PC 0.499 0.590 0.710 0.744 0.781 0.812 0.819 0.835 0.851 0.856
29 PC 0.860 0.868 0.876 0.888 0.910 0.926 0.937 0.950 0.970 0.976
30 PC 0.982 0.985 0.987 0.989 0.990 0.993 0.993 0.994 0.995 0.998
31 PC 0.998 0.999 1.000
32 BA .0218
33 LS 0 86.0
34 UD 0.100
*
35 ZZ

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1 SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

22 STU

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(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1*****

PRO.OUT

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*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*   JUN   1998                     *
*   VERSION 4.1                     *
* RUN DATE  22AUG22  TIME  17:11:49 *
*
*****
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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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WESTWOOD PROFESSIONAL SERVICES
KB HOMES
SUMMERLIN VILLAGE 22 PARCEL STU
PROPOSED DRAINAGE CONDITION

DRAINAGE CONDITION -- PROPOSED
RETURN PERIOD ----- 100 & 10-YEAR
DISTRIBUTION ----- 6-HOUR SDN3
PROJECT NO. ----- KBH2204.000
FILENAME ----- PRO.H1
DATE ----- SEPT 2022
MODELED BY ----- JSR

RETURN PERIOD	RATIO
100-YR	1.00
10-YR	0.57

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

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

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

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

JP MULTI-PLAN OPTION
 NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
 RATIOS OF PRECIPITATION
 1.00 .57

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	RATIO 2
				1.00	.57
HYDROGRAPH AT					
+	STU	.02	1 FLOW	39.	16.
			TIME	3.50	3.50

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

APPENDIX C

Hydraulic Analyses

Perimeter Street Flow Computations

Worksheet for FRA1

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	6.00 %
Discharge	8.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+26.50	0.66
0+51.00	0.17
0+51.00	0.13
0+52.50	0.00
0+52.50	0.48
0+53.00	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+53.00, 0.50)	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
Roughness Coefficient	0.016
Elevation	0.31 ft
Elevation Range	0.00 to 0.66 ft
Flow Area	1.68 ft ²
Wetted Perimeter	17.51 ft
Hydraulic Radius	0.10 ft
Top Width	16.80 ft
Normal Depth	0.31 ft
Critical Depth	0.40 ft

Worksheet for FRA1

Results

Critical Slope	0.75 %
Velocity	4.76 ft/s
Velocity Head	0.35 ft
Specific Energy	0.66 ft
Froude Number	2.651
Flow Type	Supercritical

GVF Input Data

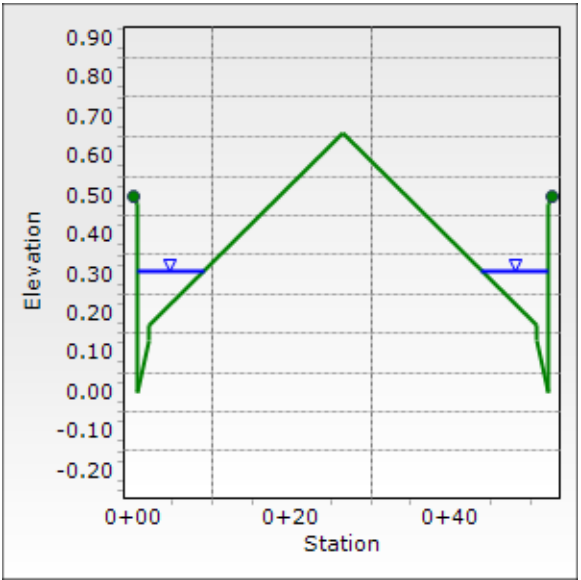
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.31 ft
Critical Depth	0.40 ft
Channel Slope	6.00 %
Critical Slope	0.75 %

Cross Section for FRA1

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	6.00 %
Normal Depth	0.31 ft
Discharge	8.0 cfs



Worksheet for KRW1

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	6.00 %
Discharge	8.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+20.50	0.54
0+39.00	0.17
0+39.00	0.13
0+40.50	0.00
0+40.50	0.48
0+41.00	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+41.00, 0.50)	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
Roughness Coefficient	0.016
Elevation	0.31 ft
Elevation Range	0.00 to 0.54 ft
Flow Area	1.68 ft ²
Wetted Perimeter	17.50 ft
Hydraulic Radius	0.10 ft
Top Width	16.79 ft
Normal Depth	0.31 ft
Critical Depth	0.40 ft

Worksheet for KRW1

Results

Critical Slope	0.75 %
Velocity	4.76 ft/s
Velocity Head	0.35 ft
Specific Energy	0.66 ft
Froude Number	2.655
Flow Type	Supercritical

GVF Input Data

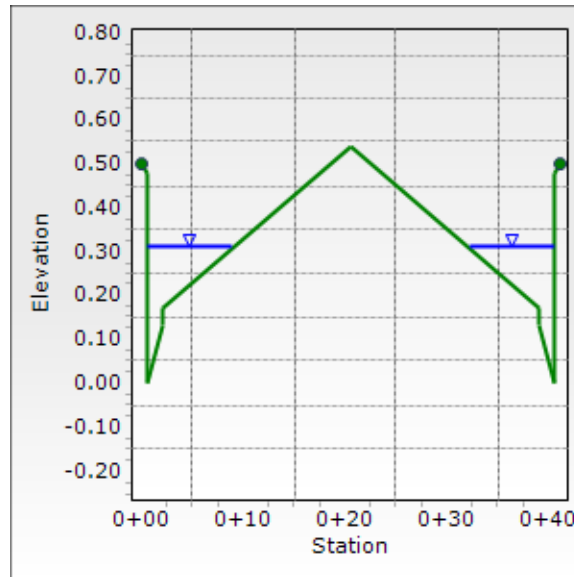
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.31 ft
Critical Depth	0.40 ft
Channel Slope	6.00 %
Critical Slope	0.75 %

Cross Section for KRW1

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	6.00 %
Normal Depth	0.31 ft
Discharge	8.0 cfs



Interior Street Flow Computations

Worksheet for A1 Normal 42'0 (no SW) HALF

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Channel Slope	10.75 %
Discharge	4.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.36	0.38
0+01.33	0.06
0+01.33	0.00
0+02.50	0.13
0+02.50	0.17
0+18.50	0.49

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+18.50, 0.49)	0.016

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

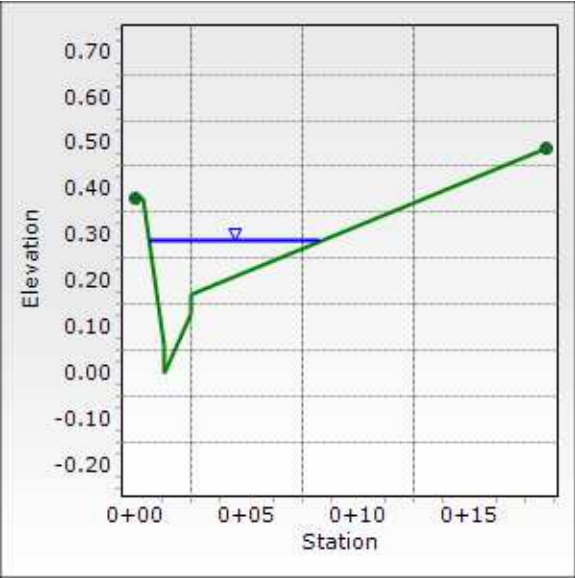
Results	
Normal Depth	0.29 ft
Roughness Coefficient	0.016
Elevation	0.29 ft
Elevation Range	0.00 to 0.49 ft
Flow Area	0.67 ft ²
Wetted Perimeter	7.80 ft
Hydraulic Radius	0.09 ft
Top Width	7.65 ft
Normal Depth	0.29 ft
Critical Depth	0.40 ft
Critical Slope	0.74 %
Velocity	5.95 ft/s
Velocity Head	0.55 ft
Specific Energy	0.84 ft

Worksheet for A1 Normal 42'0 (no SW) HALF

Results	
Froude Number	3.543
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	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.29 ft
Critical Depth	0.40 ft
Channel Slope	10.75 %
Critical Slope	0.74 %

Cross Section for A1 Normal 42'0 (no SW) HALF

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	10.75 %
Normal Depth	0.29 ft
Discharge	4.0 cfs



Worksheet for B1 SuperE 35.0' (w/ SW) MIN%

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	4.90 %
Discharge	6.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.00	0.38
0+05.00	0.38
0+05.36	0.38
0+06.33	0.06
0+06.33	0.00
0+07.50	0.13
0+07.50	0.17
0+20.00	0.42
0+32.50	0.67
0+32.50	0.63
0+33.67	0.50
0+33.67	0.56
0+34.64	0.88
0+35.00	0.88

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+35.00, 0.88)	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	0.35 ft
Roughness Coefficient	0.016
Elevation	0.35 ft
Elevation Range	0.00 to 0.88 ft
Flow Area	1.25 ft ²
Wetted Perimeter	11.12 ft

Worksheet for B1 SuperE 35.0' (w/ SW) MIN%

Results

Hydraulic Radius	0.11 ft
Top Width	10.97 ft
Normal Depth	0.35 ft
Critical Depth	0.45 ft
Critical Slope	0.73 %
Velocity	4.79 ft/s
Velocity Head	0.36 ft
Specific Energy	0.70 ft
Froude Number	2.495
Flow Type	Supercritical

GVF Input Data

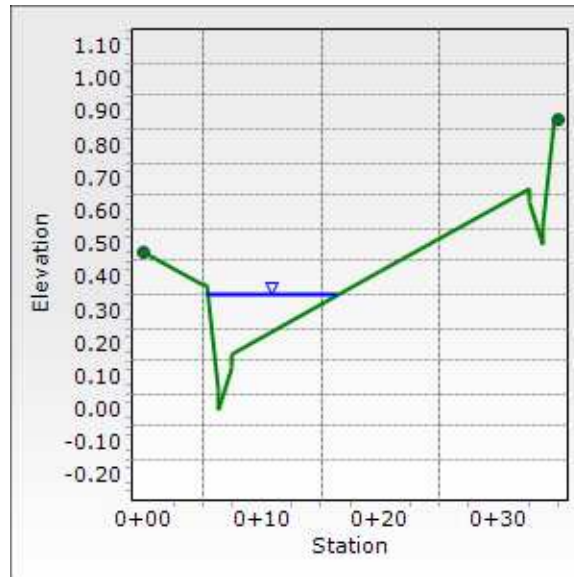
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.35 ft
Critical Depth	0.45 ft
Channel Slope	4.90 %
Critical Slope	0.73 %

Cross Section for B1 SuperE 35.0' (w/ SW) MIN%

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	4.90 %
Normal Depth	0.35 ft
Discharge	6.0 cfs



Worksheet for B1 SuperE 35.0' (w/ SW) MAX%

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	6.10 %
Discharge	6.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.00	0.38
0+05.00	0.38
0+05.36	0.38
0+06.33	0.06
0+06.33	0.00
0+07.50	0.13
0+07.50	0.17
0+20.00	0.42
0+32.50	0.67
0+32.50	0.63
0+33.67	0.50
0+33.67	0.56
0+34.64	0.88
0+35.00	0.88

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+35.00, 0.88)	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
Roughness Coefficient	0.016
Elevation	0.34 ft
Elevation Range	0.00 to 0.88 ft
Flow Area	1.15 ft ²
Wetted Perimeter	10.61 ft

Worksheet for B1 SuperE 35.0' (w/ SW) MAX%

Results

Hydraulic Radius	0.11 ft
Top Width	10.46 ft
Normal Depth	0.34 ft
Critical Depth	0.45 ft
Critical Slope	0.73 %
Velocity	5.21 ft/s
Velocity Head	0.42 ft
Specific Energy	0.76 ft
Froude Number	2.771
Flow Type	Supercritical

GVF Input Data

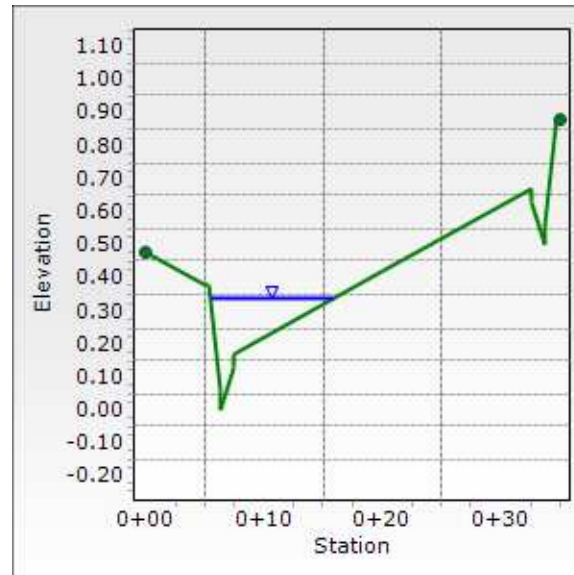
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.34 ft
Critical Depth	0.45 ft
Channel Slope	6.10 %
Critical Slope	0.73 %

Cross Section for B1 SuperE 35.0' (w/ SW) MAX%

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	6.10 %
Normal Depth	0.34 ft
Discharge	6.0 cfs



Worksheet for B2-S Normal 42'0 (w/ SW) HALF

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	8.50 %
Discharge	6.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+18.50	0.49
0+34.50	0.17
0+34.50	0.13
0+35.67	0.00
0+35.67	0.06
0+36.64	0.38
0+37.00	0.38
0+37.00	0.38
0+42.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+18.50, 0.49)	(0+42.00, 0.48)	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
Roughness Coefficient	0.016
Elevation	0.32 ft
Elevation Range	0.00 to 0.49 ft
Flow Area	1.01 ft ²
Wetted Perimeter	9.87 ft
Hydraulic Radius	0.10 ft
Top Width	9.72 ft
Normal Depth	0.32 ft
Critical Depth	0.45 ft
Critical Slope	0.73 %
Velocity	5.94 ft/s

Worksheet for B2-S Normal 42'0 (w/ SW) HALF

Results

Velocity Head	0.55 ft
Specific Energy	0.87 ft
Froude Number	3.245
Flow Type	Supercritical

GVF Input Data

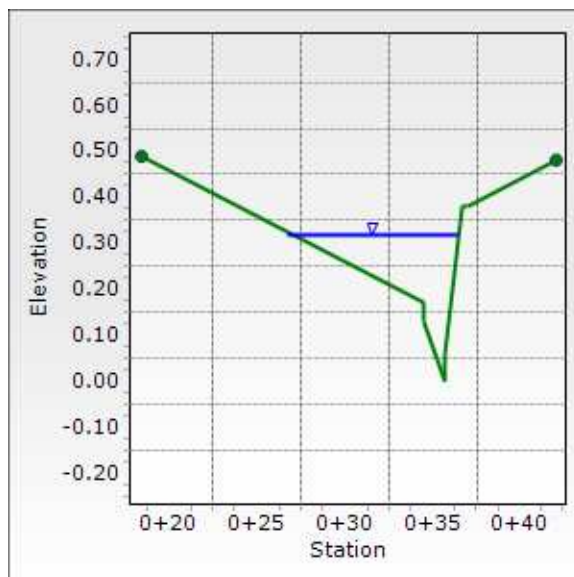
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.32 ft
Critical Depth	0.45 ft
Channel Slope	8.50 %
Critical Slope	0.73 %

Cross Section for B2-S Normal 42'0 (w/ SW) HALF

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	8.50 %
Normal Depth	0.32 ft
Discharge	6.0 cfs



Worksheet for B3-N Normal 42'0 (no SW) HALF

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	7.51 %
Discharge	3.5 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.36	0.38
0+01.33	0.06
0+01.33	0.00
0+02.50	0.13
0+02.50	0.17
0+18.50	0.49

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+18.50, 0.49)	0.016

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

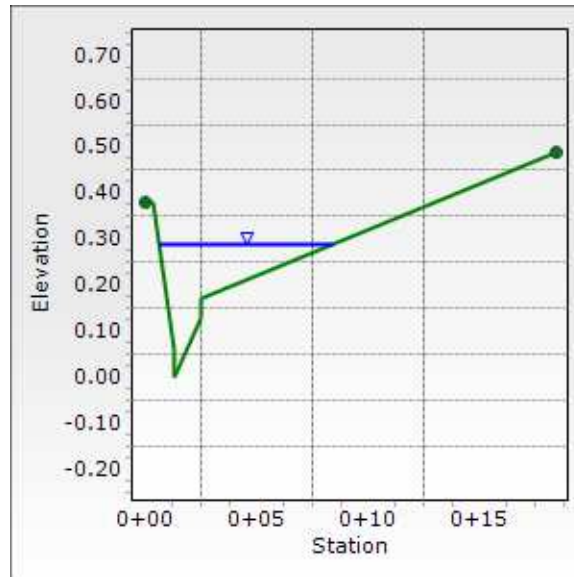
Results	
Normal Depth	0.29 ft
Roughness Coefficient	0.016
Elevation	0.29 ft
Elevation Range	0.00 to 0.49 ft
Flow Area	0.70 ft ²
Wetted Perimeter	7.98 ft
Hydraulic Radius	0.09 ft
Top Width	7.84 ft
Normal Depth	0.29 ft
Critical Depth	0.39 ft
Critical Slope	0.75 %
Velocity	5.01 ft/s
Velocity Head	0.39 ft
Specific Energy	0.68 ft

Worksheet for B3-N Normal 42'0 (no SW) HALF

Results	
Froude Number	2.957
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	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.29 ft
Critical Depth	0.39 ft
Channel Slope	7.51 %
Critical Slope	0.75 %

Cross Section for B3-N Normal 42'0 (no SW) HALF

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	7.51 %
Normal Depth	0.29 ft
Discharge	3.5 cfs



Worksheet for C1 Superelevated 30.0' (no SW) MIN%

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	5.65 %
Discharge	4.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.36	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	0.67
0+27.50	0.63
0+28.67	0.50
0+28.67	0.56
0+29.64	0.88
0+30.00	0.88

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+30.00, 0.88)	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
Roughness Coefficient	0.016
Elevation	0.31 ft
Elevation Range	0.00 to 0.88 ft
Flow Area	0.86 ft ²
Wetted Perimeter	9.04 ft
Hydraulic Radius	0.10 ft
Top Width	8.89 ft

Worksheet for C1 Superelevated 30.0' (no SW) MIN%

Results

Normal Depth	0.31 ft
Critical Depth	0.40 ft
Critical Slope	0.74 %
Velocity	4.63 ft/s
Velocity Head	0.33 ft
Specific Energy	0.64 ft
Froude Number	2.615
Flow Type	Supercritical

GVF Input Data

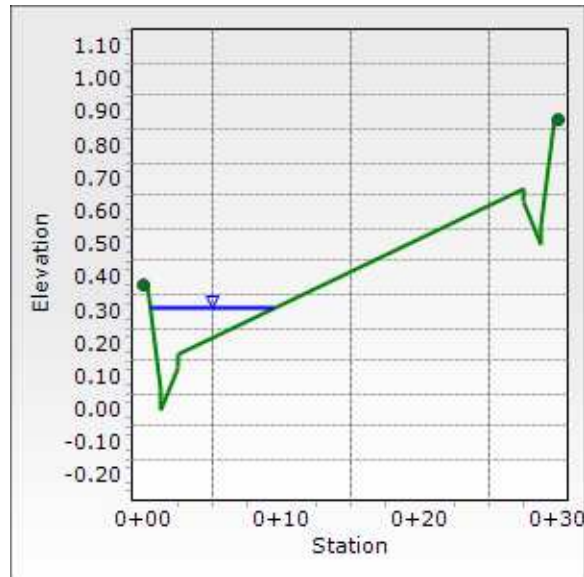
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.31 ft
Critical Depth	0.40 ft
Channel Slope	5.65 %
Critical Slope	0.74 %

Cross Section for C1 Superelevated 30.0' (no SW) MIN%

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	5.65 %
Normal Depth	0.31 ft
Discharge	4.0 cfs



Worksheet for C1 Superelevated 30.0' (no SW) MAX%

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	7.39 %
Discharge	4.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.36	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	0.67
0+27.50	0.63
0+28.67	0.50
0+28.67	0.56
0+29.64	0.88
0+30.00	0.88

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+30.00, 0.88)	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
Roughness Coefficient	0.016
Elevation	0.30 ft
Elevation Range	0.00 to 0.88 ft
Flow Area	0.78 ft ²
Wetted Perimeter	8.51 ft
Hydraulic Radius	0.09 ft
Top Width	8.36 ft

Worksheet for C1 Superelevated 30.0' (no SW) MAX%

Results

Normal Depth	0.30 ft
Critical Depth	0.40 ft
Critical Slope	0.74 %
Velocity	5.13 ft/s
Velocity Head	0.41 ft
Specific Energy	0.71 ft
Froude Number	2.963
Flow Type	Supercritical

GVF Input Data

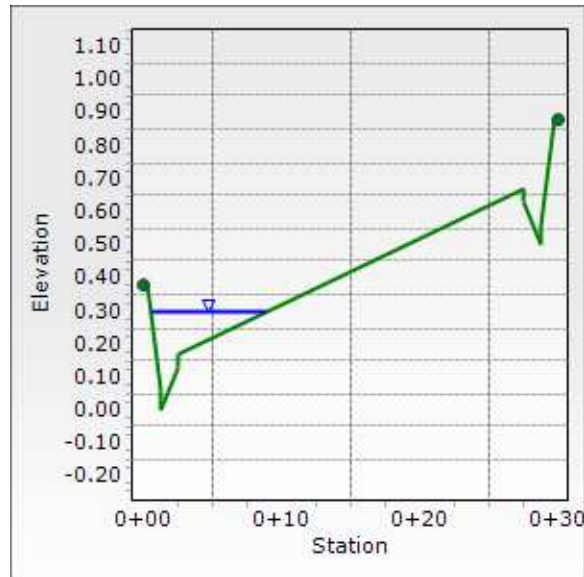
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.30 ft
Critical Depth	0.40 ft
Channel Slope	7.39 %
Critical Slope	0.74 %

Cross Section for C1 Superelevated 30.0' (no SW) MAX%

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	7.39 %
Normal Depth	0.30 ft
Discharge	4.0 cfs



Worksheet for D1 Superelevated 30.0' (no SW) MIN%

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	3.81 %
Discharge	6.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.36	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	0.67
0+27.50	0.63
0+28.67	0.50
0+28.67	0.56
0+29.64	0.88
0+30.00	0.88

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+30.00, 0.88)	0.016

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

Results	
Normal Depth	0.36 ft
Roughness Coefficient	0.016
Elevation	0.36 ft
Elevation Range	0.00 to 0.88 ft
Flow Area	1.38 ft ²
Wetted Perimeter	11.72 ft
Hydraulic Radius	0.12 ft
Top Width	11.56 ft

Worksheet for D1 Superelevated 30.0' (no SW) MIN%

Results

Normal Depth	0.36 ft
Critical Depth	0.45 ft
Critical Slope	0.70 %
Velocity	4.35 ft/s
Velocity Head	0.29 ft
Specific Energy	0.65 ft
Froude Number	2.220
Flow Type	Supercritical

GVF Input Data

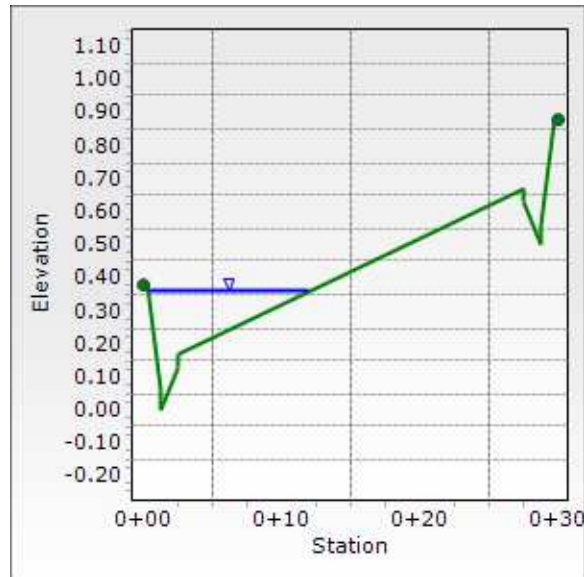
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.36 ft
Critical Depth	0.45 ft
Channel Slope	3.81 %
Critical Slope	0.70 %

Cross Section for D1 Superelevated 30.0' (no SW) MIN%

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	3.81 %
Normal Depth	0.36 ft
Discharge	6.0 cfs



Worksheet for D1 Superelevated 30.0' (no SW) MAX%

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	5.93 %
Discharge	6.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.36	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	0.67
0+27.50	0.63
0+28.67	0.50
0+28.67	0.56
0+29.64	0.88
0+30.00	0.88

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+30.00, 0.88)	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
Roughness Coefficient	0.016
Elevation	0.34 ft
Elevation Range	0.00 to 0.88 ft
Flow Area	1.16 ft ²
Wetted Perimeter	10.67 ft
Hydraulic Radius	0.11 ft
Top Width	10.52 ft

Worksheet for D1 Superelevated 30.0' (no SW) MAX%

Results

Normal Depth	0.34 ft
Critical Depth	0.45 ft
Critical Slope	0.70 %
Velocity	5.16 ft/s
Velocity Head	0.41 ft
Specific Energy	0.75 ft
Froude Number	2.735
Flow Type	Supercritical

GVF Input Data

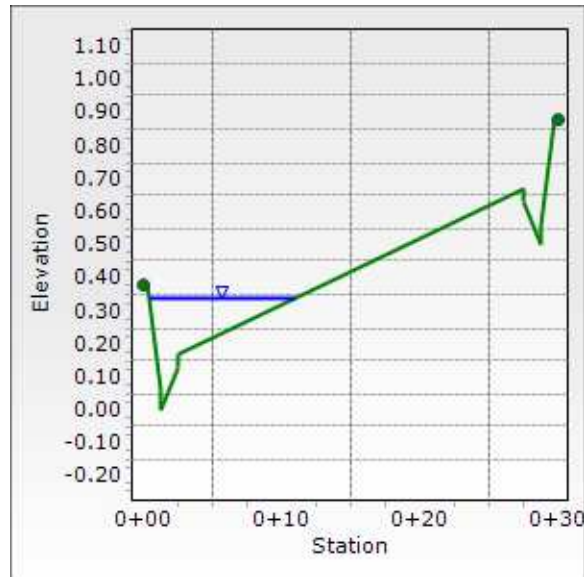
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.34 ft
Critical Depth	0.45 ft
Channel Slope	5.93 %
Critical Slope	0.70 %

Cross Section for D1 Superelevated 30.0' (no SW) MAX%

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	5.93 %
Normal Depth	0.34 ft
Discharge	6.0 cfs



Worksheet for D2 Normal 42'0 (w/ SW) HALF

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	10.75 %
Discharge	1.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+18.50	0.49
0+34.50	0.17
0+34.50	0.13
0+35.67	0.00
0+35.67	0.06
0+36.64	0.38
0+37.00	0.38
0+37.00	0.38
0+42.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+18.50, 0.49)	(0+42.00, 0.48)	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	0.20 ft
Roughness Coefficient	0.016
Elevation	0.20 ft
Elevation Range	0.00 to 0.49 ft
Flow Area	0.20 ft ²
Wetted Perimeter	3.07 ft
Hydraulic Radius	0.07 ft
Top Width	2.94 ft
Normal Depth	0.20 ft
Critical Depth	0.28 ft
Critical Slope	0.87 %
Velocity	4.97 ft/s

Worksheet for D2 Normal 42'0 (w/ SW) HALF

Results

Velocity Head	0.38 ft
Specific Energy	0.58 ft
Froude Number	3.345
Flow Type	Supercritical

GVF Input Data

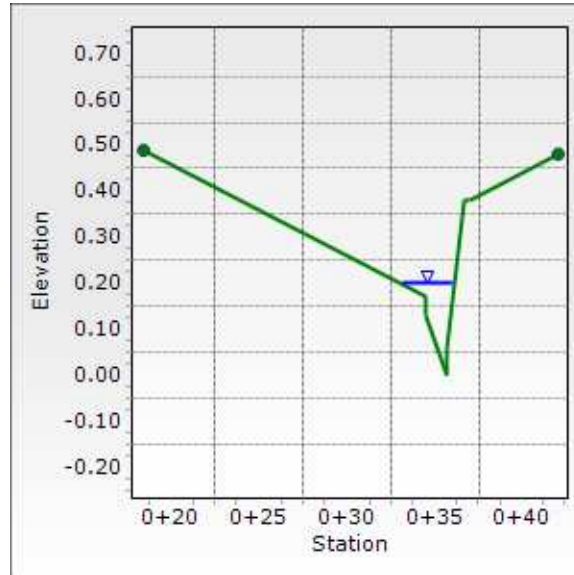
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.20 ft
Critical Depth	0.28 ft
Channel Slope	10.75 %
Critical Slope	0.87 %

Cross Section for D2 Normal 42'0 (w/ SW) HALF

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	10.75 %
Normal Depth	0.20 ft
Discharge	1.0 cfs



Worksheet for E1 Superelevated 30.0' (no SW)

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	1.67 %
Discharge	4.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.36	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	0.67
0+27.50	0.63
0+28.67	0.50
0+28.67	0.56
0+29.64	0.88
0+30.00	0.88

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+30.00, 0.88)	0.016

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

Results	
Normal Depth	0.36 ft
Roughness Coefficient	0.016
Elevation	0.36 ft
Elevation Range	0.00 to 0.88 ft
Flow Area	1.39 ft ²
Wetted Perimeter	11.75 ft
Hydraulic Radius	0.12 ft
Top Width	11.59 ft

Worksheet for E1 Superelevated 30.0' (no SW)

Results

Normal Depth	0.36 ft
Critical Depth	0.40 ft
Critical Slope	0.74 %
Velocity	2.88 ft/s
Velocity Head	0.13 ft
Specific Energy	0.49 ft
Froude Number	1.470
Flow Type	Supercritical

GVF Input Data

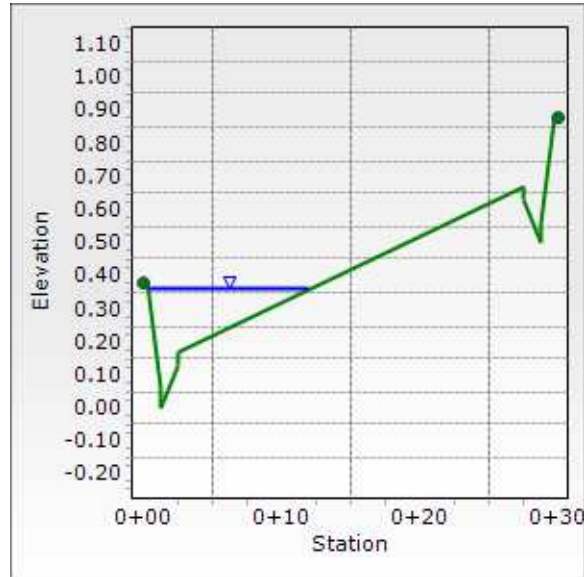
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.36 ft
Critical Depth	0.40 ft
Channel Slope	1.67 %
Critical Slope	0.74 %

Cross Section for E1 Superelevated 30.0' (no SW)

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	1.67 %
Normal Depth	0.36 ft
Discharge	4.0 cfs



Worksheet for E2 Superelevated 30.0' (no SW) MIN%

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	2.09 %
Discharge	10.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.36	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	0.67
0+27.50	0.63
0+28.67	0.50
0+28.67	0.56
0+29.64	0.88
0+30.00	0.88

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+30.00, 0.88)	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
Roughness Coefficient	0.016
Elevation	0.44 ft
Elevation Range	0.00 to 0.88 ft
Flow Area	2.57 ft ²
Wetted Perimeter	16.46 ft
Hydraulic Radius	0.16 ft
Top Width	16.23 ft

Worksheet for E2 Superelevated 30.0' (no SW) MIN%

Results

Normal Depth	0.44 ft
Critical Depth	0.52 ft
Critical Slope	0.66 %
Velocity	3.89 ft/s
Velocity Head	0.24 ft
Specific Energy	0.68 ft
Froude Number	1.723
Flow Type	Supercritical

GVF Input Data

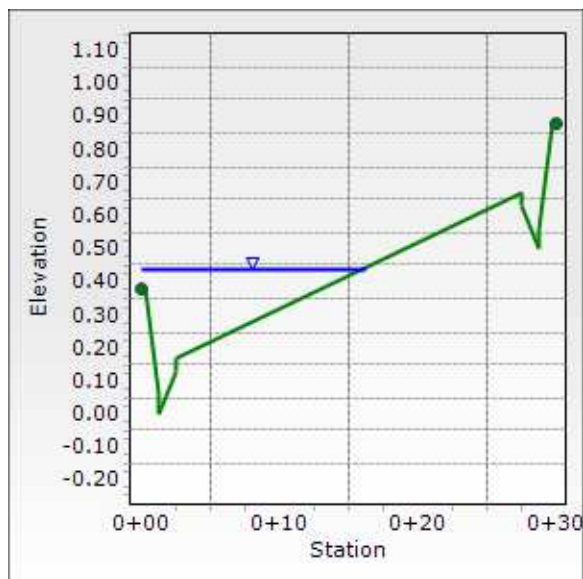
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.44 ft
Critical Depth	0.52 ft
Channel Slope	2.09 %
Critical Slope	0.66 %

Cross Section for E2 Superelevated 30.0' (no SW) MIN%

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	2.09 %
Normal Depth	0.44 ft
Discharge	10.0 cfs



Worksheet for E2 Superelevated 30.0' (no SW) MAX%

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	3.57 %
Discharge	10.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.36	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	0.67
0+27.50	0.63
0+28.67	0.50
0+28.67	0.56
0+29.64	0.88
0+30.00	0.88

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+30.00, 0.88)	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	0.41 ft
Roughness Coefficient	0.016
Elevation	0.41 ft
Elevation Range	0.00 to 0.88 ft
Flow Area	2.10 ft ²
Wetted Perimeter	14.91 ft
Hydraulic Radius	0.14 ft
Top Width	14.71 ft

Worksheet for E2 Superelevated 30.0' (no SW) MAX%

Results

Normal Depth	0.41 ft
Critical Depth	0.52 ft
Critical Slope	0.66 %
Velocity	4.76 ft/s
Velocity Head	0.35 ft
Specific Energy	0.77 ft
Froude Number	2.221
Flow Type	Supercritical

GVF Input Data

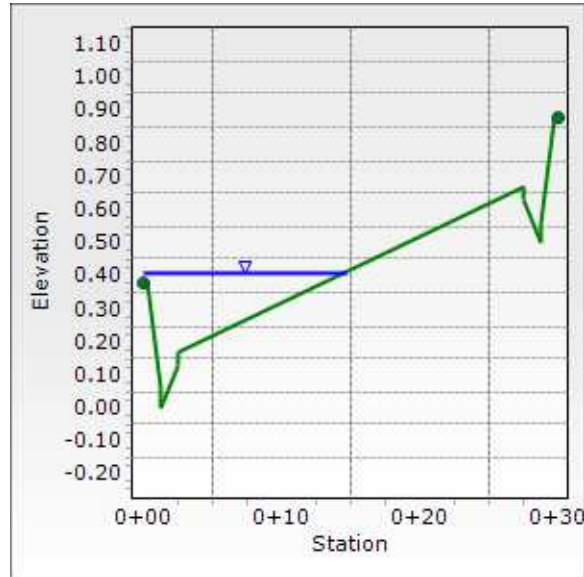
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.41 ft
Critical Depth	0.52 ft
Channel Slope	3.57 %
Critical Slope	0.66 %

Cross Section for E2 Superelevated 30.0' (no SW) MAX%

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	3.57 %
Normal Depth	0.41 ft
Discharge	10.0 cfs



Worksheet for F1 SuperE 35.0' (w/ SW)

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	3.55 %
Discharge	8.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.00	0.38
0+05.00	0.38
0+05.36	0.38
0+06.33	0.06
0+06.33	0.00
0+07.50	0.13
0+07.50	0.17
0+20.00	0.42
0+32.50	0.67
0+32.50	0.63
0+33.67	0.50
0+33.67	0.56
0+34.64	0.88
0+35.00	0.88

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+35.00, 0.88)	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
Roughness Coefficient	0.016
Elevation	0.39 ft
Elevation Range	0.00 to 0.88 ft
Flow Area	1.83 ft ²
Wetted Perimeter	14.62 ft

Worksheet for F1 SuperE 35.0' (w/ SW)

Results

Hydraulic Radius	0.12 ft
Top Width	14.46 ft
Normal Depth	0.39 ft
Critical Depth	0.49 ft
Critical Slope	0.70 %
Velocity	4.38 ft/s
Velocity Head	0.30 ft
Specific Energy	0.69 ft
Froude Number	2.173
Flow Type	Supercritical

GVF Input Data

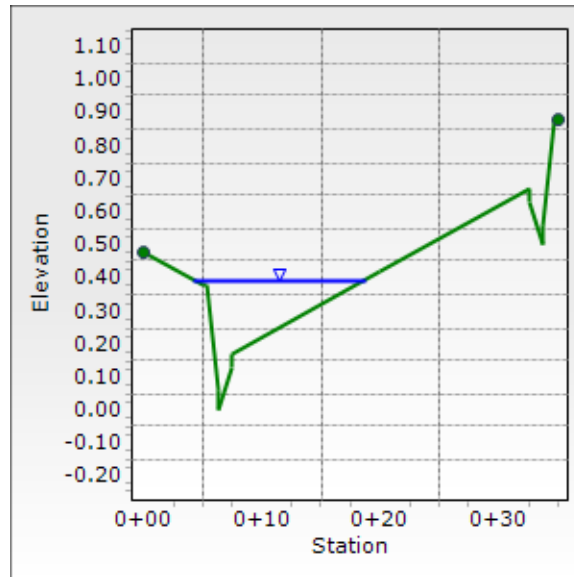
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.39 ft
Critical Depth	0.49 ft
Channel Slope	3.55 %
Critical Slope	0.70 %

Cross Section for F1 SuperE 35.0' (w/ SW)

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	3.55 %
Normal Depth	0.39 ft
Discharge	8.0 cfs



Worksheet for F2 SuperE 35.0' (w/ SW) MAX%

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	2.36 %
Discharge	4.5 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.00	0.38
0+05.00	0.38
0+05.36	0.38
0+06.33	0.06
0+06.33	0.00
0+07.50	0.13
0+07.50	0.17
0+20.00	0.42
0+32.50	0.67
0+32.50	0.63
0+33.67	0.50
0+33.67	0.56
0+34.64	0.88
0+35.00	0.88

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+35.00, 0.88)	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	0.35 ft
Roughness Coefficient	0.016
Elevation	0.35 ft
Elevation Range	0.00 to 0.88 ft
Flow Area	1.33 ft ²
Wetted Perimeter	11.47 ft

Worksheet for F2 SuperE 35.0' (w/ SW) MAX%

Results

Hydraulic Radius	0.12 ft
Top Width	11.31 ft
Normal Depth	0.35 ft
Critical Depth	0.42 ft
Critical Slope	0.74 %
Velocity	3.39 ft/s
Velocity Head	0.18 ft
Specific Energy	0.53 ft
Froude Number	1.748
Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

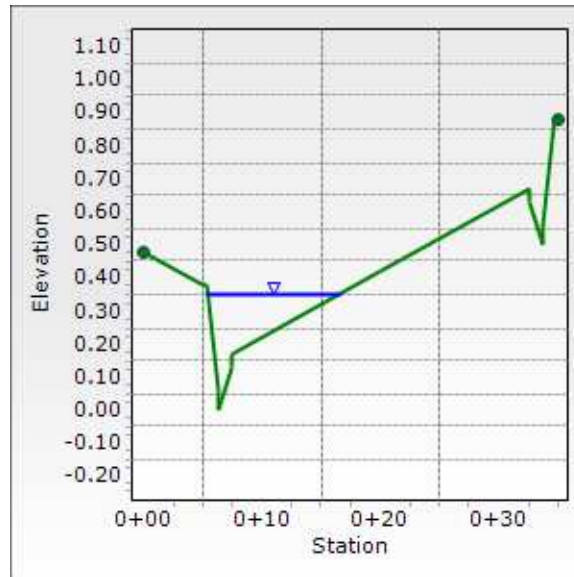
GVF Output Data

Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.35 ft
Critical Depth	0.42 ft
Channel Slope	2.36 %
Critical Slope	0.74 %

Cross Section for F2 SuperE 35.0' (w/ SW) MAX%

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth

Input Data	
Channel Slope	2.36 %
Normal Depth	0.35 ft
Discharge	4.5 cfs



Worksheet for G1 Superelevated 21.5 Entryway HALF

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	2.40 %
Discharge	3.5 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+01.50	0.56
0+21.00	0.17
0+21.00	0.13
0+22.50	0.00
0+22.50	0.48
0+23.00	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+01.50, 0.56)	(0+23.00, 0.50)	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

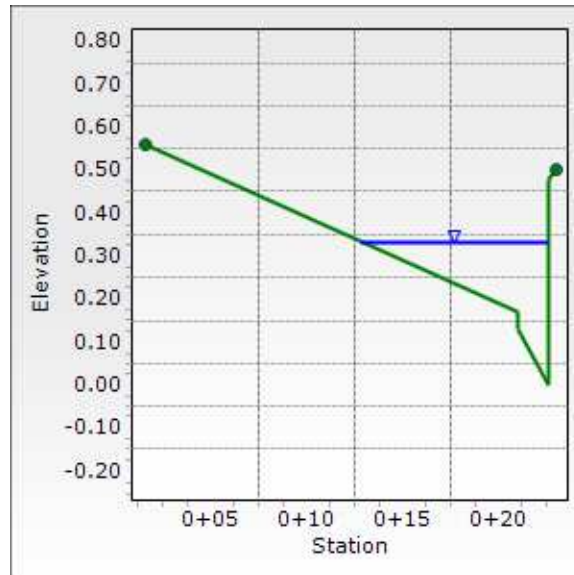
Normal Depth	0.33 ft
Roughness Coefficient	0.016
Elevation	0.33 ft
Elevation Range	0.00 to 0.56 ft
Flow Area	1.08 ft ²
Wetted Perimeter	10.10 ft
Hydraulic Radius	0.11 ft
Top Width	9.72 ft
Normal Depth	0.33 ft
Critical Depth	0.39 ft
Critical Slope	0.76 %
Velocity	3.24 ft/s
Velocity Head	0.16 ft
Specific Energy	0.50 ft
Froude Number	1.714

Worksheet for G1 Superelevated 21.5 Entryway HALF

Results	
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	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.33 ft
Critical Depth	0.39 ft
Channel Slope	2.40 %
Critical Slope	0.76 %

Cross Section for G1 Superelevated 21.5 Entryway HALF

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	2.40 %
Normal Depth	0.33 ft
Discharge	3.5 cfs



Worksheet for H1-S Normal 42'0 (w/ SW) HALF

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	6.52 %
Discharge	11.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+18.50	0.49
0+34.50	0.17
0+34.50	0.13
0+35.67	0.00
0+35.67	0.06
0+36.64	0.38
0+37.00	0.38
0+37.00	0.38
0+42.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+18.50, 0.49)	(0+42.00, 0.48)	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
Roughness Coefficient	0.016
Elevation	0.40 ft
Elevation Range	0.00 to 0.49 ft
Flow Area	1.85 ft ²
Wetted Perimeter	14.81 ft
Hydraulic Radius	0.13 ft
Top Width	14.65 ft
Normal Depth	0.40 ft
Critical Depth	0.52 ft
Critical Slope	0.66 %
Velocity	5.93 ft/s

Worksheet for H1-S Normal 42'0 (w/ SW) HALF

Results

Velocity Head	0.55 ft
Specific Energy	0.94 ft
Froude Number	2.939
Flow Type	Supercritical

GVF Input Data

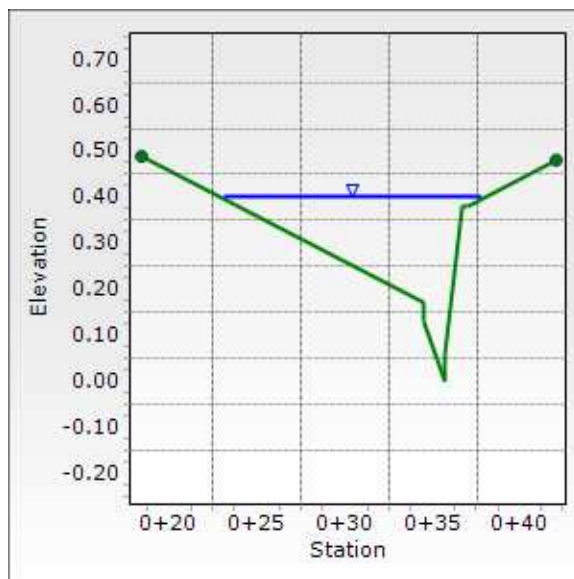
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.40 ft
Critical Depth	0.52 ft
Channel Slope	6.52 %
Critical Slope	0.66 %

Cross Section for H1-S Normal 42'0 (w/ SW) HALF

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	6.52 %
Normal Depth	0.40 ft
Discharge	11.0 cfs



Worksheet for H2-S Normal 42'0 (w/ SW) HALF

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	4.80 %
Discharge	7.5 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+18.50	0.49
0+34.50	0.17
0+34.50	0.13
0+35.67	0.00
0+35.67	0.06
0+36.64	0.38
0+37.00	0.38
0+37.00	0.38
0+42.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+18.50, 0.49)	(0+42.00, 0.48)	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

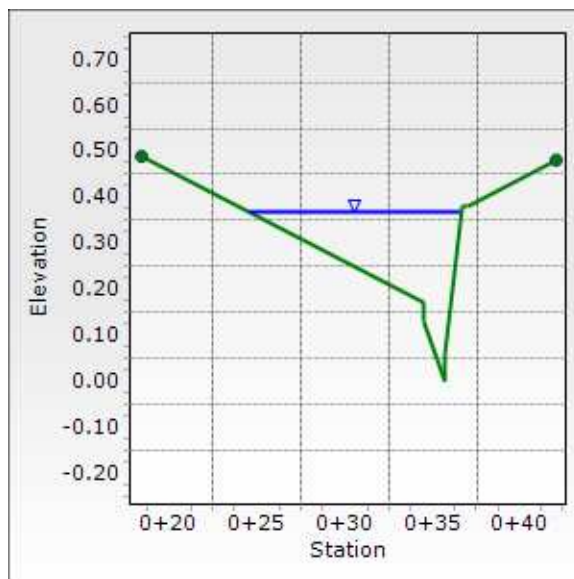
Normal Depth	0.37 ft
Roughness Coefficient	0.016
Elevation	0.37 ft
Elevation Range	0.00 to 0.49 ft
Flow Area	1.50 ft ²
Wetted Perimeter	12.24 ft
Hydraulic Radius	0.12 ft
Top Width	12.08 ft
Normal Depth	0.37 ft
Critical Depth	0.48 ft
Critical Slope	0.71 %
Velocity	5.01 ft/s

Worksheet for H2-S Normal 42'0 (w/ SW) HALF

Results	
Velocity Head	0.39 ft
Specific Energy	0.76 ft
Froude Number	2.511
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	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.37 ft
Critical Depth	0.48 ft
Channel Slope	4.80 %
Critical Slope	0.71 %

Cross Section for H2-S Normal 42'0 (w/ SW) HALF

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	4.80 %
Normal Depth	0.37 ft
Discharge	7.5 cfs



Worksheet for H3-S Normal 42'0 (w/ SW) HALF

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	6.40 %
Discharge	17.5 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+18.50	0.49
0+34.50	0.17
0+34.50	0.13
0+35.67	0.00
0+35.67	0.06
0+36.64	0.38
0+37.00	0.38
0+37.00	0.38
0+42.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+18.50, 0.49)	(0+42.00, 0.48)	0.016

Options

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

Results

Normal Depth	0.45 ft
Roughness Coefficient	0.016
Elevation	0.45 ft
Elevation Range	0.00 to 0.49 ft
Flow Area	2.79 ft ²
Wetted Perimeter	20.21 ft
Hydraulic Radius	0.14 ft
Top Width	20.05 ft
Normal Depth	0.45 ft
Critical Depth	0.59 ft
Critical Slope	0.60 %
Velocity	6.27 ft/s

Worksheet for H3-S Normal 42'0 (w/ SW) HALF

Results

Velocity Head	0.61 ft
Specific Energy	1.06 ft
Froude Number	2.962
Flow Type	Supercritical

GVF Input Data

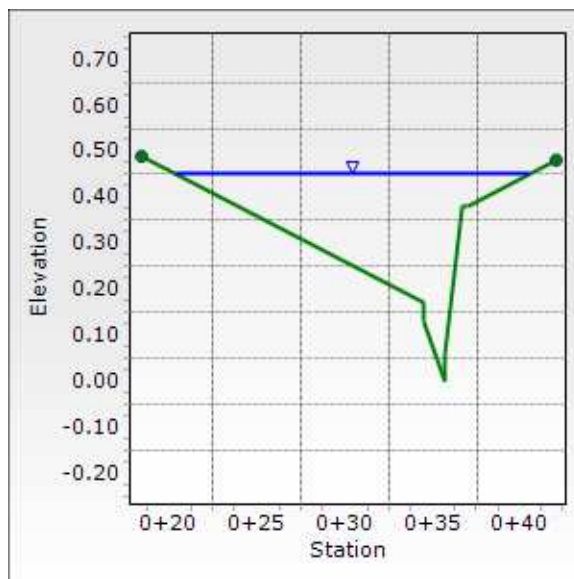
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.45 ft
Critical Depth	0.59 ft
Channel Slope	6.40 %
Critical Slope	0.60 %

Cross Section for H3-S Normal 42'0 (w/ SW) HALF

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	6.40 %
Normal Depth	0.45 ft
Discharge	17.5 cfs



Worksheet for H4-N Normal 42'0 (no SW) HALF

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	8.00 %
Discharge	3.5 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.36	0.38
0+01.33	0.06
0+01.33	0.00
0+02.50	0.13
0+02.50	0.17
0+18.50	0.49

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+18.50, 0.49)	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

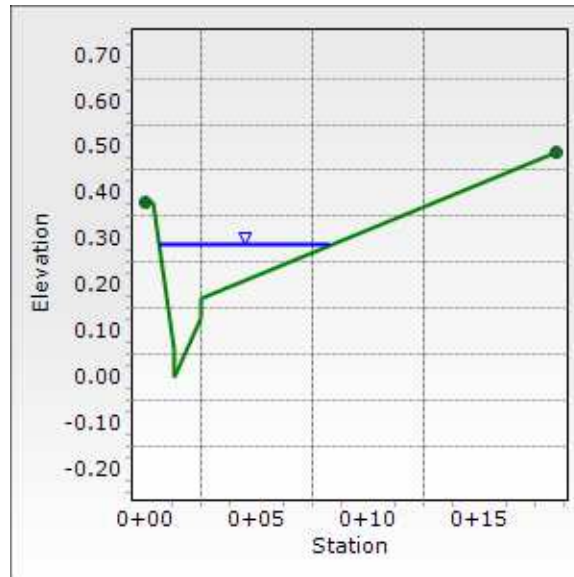
Normal Depth	0.29 ft
Roughness Coefficient	0.016
Elevation	0.29 ft
Elevation Range	0.00 to 0.49 ft
Flow Area	0.68 ft ²
Wetted Perimeter	7.84 ft
Hydraulic Radius	0.09 ft
Top Width	7.70 ft
Normal Depth	0.29 ft
Critical Depth	0.39 ft
Critical Slope	0.75 %
Velocity	5.16 ft/s
Velocity Head	0.41 ft
Specific Energy	0.70 ft

Worksheet for H4-N Normal 42'0 (no SW) HALF

Results	
Froude Number	3.062
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	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.29 ft
Critical Depth	0.39 ft
Channel Slope	8.00 %
Critical Slope	0.75 %

Cross Section for H4-N Normal 42'0 (no SW) HALF

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	8.00 %
Normal Depth	0.29 ft
Discharge	3.5 cfs



Worksheet for H4-S Normal 42'0 (w/ SW) HALF

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	8.00 %
Discharge	22.0 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+18.50	0.49
0+34.50	0.17
0+34.50	0.13
0+35.67	0.00
0+35.67	0.06
0+36.64	0.38
0+37.00	0.38
0+37.00	0.38
0+42.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+18.50, 0.49)	(0+42.00, 0.48)	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	0.46 ft
Roughness Coefficient	0.016
Elevation	0.46 ft
Elevation Range	0.00 to 0.49 ft
Flow Area	3.07 ft ²
Wetted Perimeter	21.54 ft
Hydraulic Radius	0.14 ft
Top Width	21.38 ft
Normal Depth	0.46 ft
Critical Depth	0.64 ft
Critical Slope	0.57 %
Velocity	7.17 ft/s

Worksheet for H4-S Normal 42'0 (w/ SW) HALF

Results

Velocity Head	0.80 ft
Specific Energy	1.26 ft
Froude Number	3.339
Flow Type	Supercritical

GVF Input Data

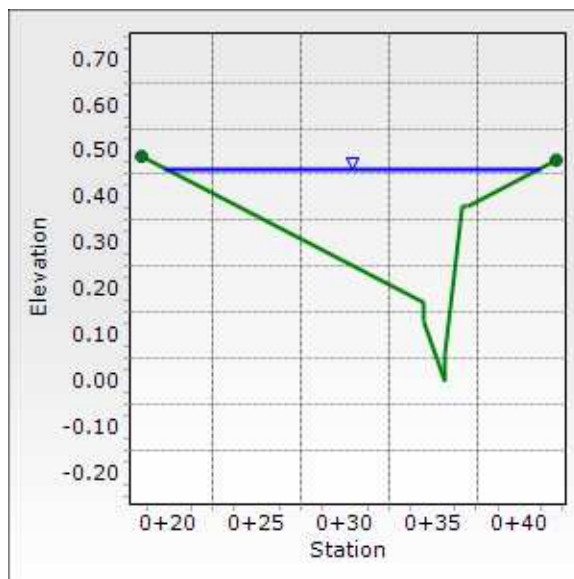
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.46 ft
Critical Depth	0.64 ft
Channel Slope	8.00 %
Critical Slope	0.57 %

Cross Section for H4-S Normal 42'0 (w/ SW) HALF

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	8.00 %
Normal Depth	0.46 ft
Discharge	22.0 cfs



Ditch Computations

Worksheet for V1 Triangular Channel

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.025
Channel Slope	3.60 %
Left Side Slope	25.00 %
Right Side Slope	5.00 %
Discharge	1.5 cfs
Results	
Normal Depth	0.22 ft
Flow Area	0.58 ft ²
Wetted Perimeter	5.32 ft
Hydraulic Radius	0.11 ft
Top Width	5.28 ft
Critical Depth	0.25 ft
Critical Slope	1.84 %
Velocity	2.58 ft/s
Velocity Head	0.10 ft
Specific Energy	0.32 ft
Froude Number	1.370
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	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.22 ft
Critical Depth	0.25 ft
Channel Slope	3.60 %
Critical Slope	1.84 %

Worksheet for V1 Triangular Channel

Notes:

Area impacting Section: 0.49 ac
Unit flowrate for Basin STU = 2.8
Q100 impacting section = 1.37 cfs

Cross Section for V1 Triangular Channel

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Roughness Coefficient	0.025
Channel Slope	3.60 %
Normal Depth	0.22 ft
Left Side Slope	25.00 %
Right Side Slope	5.00 %
Discharge	1.5 cfs



V: 1
H: 1

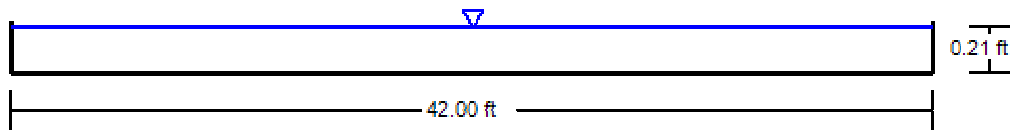
Emergency Overflow Computations

Worksheet for E01 - Emergency Overflow

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.013
Channel Slope	0.50 %
Bottom Width	42.00 ft
Discharge	25.5 cfs
Results	
Normal Depth	0.21 ft
Flow Area	8.92 ft ²
Wetted Perimeter	42.42 ft
Hydraulic Radius	0.21 ft
Top Width	42.00 ft
Critical Depth	0.23 ft
Critical Slope	0.41 %
Velocity	2.86 ft/s
Velocity Head	0.13 ft
Specific Energy	0.34 ft
Froude Number	1.093
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	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.21 ft
Critical Depth	0.23 ft
Channel Slope	0.50 %
Critical Slope	0.41 %

Cross Section for E01 - Emergency Overflow

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.013
Channel Slope	0.50 %
Normal Depth	0.21 ft
Bottom Width	42.00 ft
Discharge	25.5 cfs



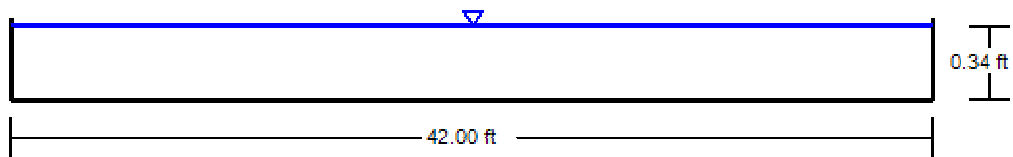
V: 10
H: 1

Worksheet for E01 - Emergency Overflow (Weir)

Project Description	
Solve For	Headwater Elevation
Input Data	
Discharge	25.5 cfs
Crest Elevation	0.00 ft
Tailwater Elevation	0.21 ft
Crest Surface Type	Paved
Crest Breadth	1.00 ft
Crest Length	42.00 ft
Results	
Headwater Elevation	0.34 ft
Headwater Height Above Crest	0.34 ft
Tailwater Height Above Crest	0.21 ft
Weir Coefficient	$3.09 \text{ ft}^{1/2}/\text{s}$
Submergence Factor	1.000
Adjusted Weir Coefficient	$3.09 \text{ ft}^{1/2}/\text{s}$
Flow Area	14.20 ft ²
Velocity	1.80 ft/s
Wetted Perimeter	42.68 ft
Top Width	42.00 ft

Cross Section for E01 - Emergency Overflow (Weir)

Project Description	
Solve For	Headwater Elevation
Input Data	
Discharge	25.5 cfs
Headwater Elevation	0.34 ft
Crest Elevation	0.00 ft
Tailwater Elevation	0.21 ft
Crest Surface Type	Paved
Crest Breadth	1.00 ft
Crest Length	42.00 ft



V: 10
H: 1

Worksheet for E02 - Emergency Overflow (Weir)

Project Description	
Solve For	Headwater Elevation
Input Data	
Discharge	25.5 cfs
Crest Elevation	0.00 ft
Weir Coefficient	3.00 ft ^(1/2) /s
Crest Length	70.00 ft
Results	
Headwater Elevation	0.25 ft
Headwater Height Above Crest	0.25 ft
Flow Area	17.17 ft ²
Velocity	1.49 ft/s
Wetted Perimeter	70.49 ft
Top Width	70.00 ft

Inlet Sizing Computations

Curb Inlet Sizing Computation		
Project Name & Number:		KBH2204 Summerlin Parcel STU
Date:		Sep 2022
By:		JSR
Westwood		
Notes:		
Facility ID:	SDDI#1	
Drainage Condition:	Proposed	
Source of Flow:	Q100 = STU(a + f1)	
Inlet Type:	Type CM2 (Continuous Grade)	
Inlet Length:	12.5-ft	
Number of Grates	4	
Input:	Variable:	Input:
Street Flow (cfs)	Q	8.0
Longitudinal Slope (ft/ft)	S _o	0.0355
Manning's Coefficient	n	0.016
Street Flow Velocity (fps)	V	4.38
Street Flow Depth (ft)	D	0.39
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	9.75
Length of Curb Opening (ft)	L _c	12.00
Clogging Factor - Grate (%)	CF _g	50%
Clogging Factor - Curb (%)	CF _c	50%
Effective Grate Length (ft)	L _{ge}	4.9
Effective Curb Opening Length (ft)	L _{ce}	6.00
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)	10.19
¹ E - Grate Flow Ratio	Frontal Flow/Side Flow	0.32
² Q _w - Frontal Flow (cfs)	Q _w = Q[1-(1-(W/T)) ^{2.67}]	2.56
¹ Q _s - Side Flow (cfs)	Q _s = Q-Q _w	5.4
T - Side Flow Spread (ft)	(D-D _g)/S _x	11.17
¹ R _s - Side Flow Factor	1/(1+(0.15*V ^{1.8})/(S _x *L _{ge} ^{2.3}))	0.26
¹ Q _{gi} - Intercepted Flow (cfs)	(R _f *E+R _s *(1-E))*Q	4.0
Output (Curb):	Equation:	Output (Curb):
¹ S _e - Equivalent Cross Slope (ft/ft)	S _x +S _g *E	0.056
Q _{sx} - Remaining Flow After Grate Interception (cfs)	Q-Q _{gi}	4.011
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}	26.76
¹ Q _{ci} - Intercepted Flow (cfs)	(1-(1-L _{ce} /L _t) ^{1.0})*Q _{sx} or Q _{sx} if L _t is less than L _{ce}	1.5
Output (Combination):	Equation:	Output (Combination):
Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	5.5
Bypass Flow (cfs)	Street Flow - Total Intercepted Flow	2.5
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:	KBH2204 Summerlin Parcel STU	
Date:	Sep 2022	
By:	JSR	
Westwood		
Notes:		
Facility ID:	SDDI#2	
Drainage Condition	Proposed	
Source of Flow	Q100 = Bypass SDDI(#1 + #3) + STU(d1 + d2 + e + f2 + g1 + g2)	
Design Flow (cfs)	25.5	
Inlet Type:	Type CM2 (Sump)	
Inlet Length:	15.-ft	
Number of Grates:	5	
Input:	Variable:	Input:
Depth at Inlet (ft)	D	0.67
Grate Width (ft)	W	1.50
Length of Grate (ft)	L _g	12.25
Length of Curb Opening (ft)	L _c	14.50
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	15.25
Adjusted Effective Weir Length (ft)	2*(1-CF _g /100)*W+(1-CF _g /100)*L _g	7.63
Grate Open Area (sf)	W*L _g	18.38
Adjusted Grate Open Area (sf)	Grate Open Area * G _c *(1-CF _g /100)	5.51
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}	12.5
Output (Curb):	Equation:	Output (Curb):
Effective Weir Length (ft)	L+1.8*W	17.20
Adjusted Effective Weir Length (ft)	L+1.8(1-CF _c /100)*W	15.91
Curb Open Area (sf)	L*H	7.25
Adjusted Curb Open Area (sf)	Curb Open Area * (1-CF _c /100)	3.63
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}	15.87
Output (Total):	Equation:	Output (Total):
Capacity Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	28.3

Curb Inlet Sizing Computation		
Project Name & Number:		KBH2204 Summerlin Parcel STU
Date:		Sep 2022
By:		JSR
Westwood		
Notes:		
Facility ID:	SDDI#3	
Drainage Condition:	Proposed	
Source of Flow:	Q100 = STU(b1 + b3 + c)	
Inlet Type:	Type CM2 (Continuous Grade)	
Inlet Length:	7.5-ft	
Number of Grates	2	
Input:	Variable:	Input:
Street Flow (cfs)	Q	11.0
Longitudinal Slope (ft/ft)	S _o	0.0652
Manning's Coefficient	n	0.016
Street Flow Velocity (fps)	V	5.93
Street Flow Depth (ft)	D	0.40
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	4.75
Length of Curb Opening (ft)	L _c	7.00
Clogging Factor - Grate (%)	CF _g	50%
Clogging Factor - Curb (%)	CF _c	50%
Effective Grate Length (ft)	L _{ge}	2.4
Effective Curb Opening Length (ft)	L _{ce}	3.50
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)	6.44
¹ E - Grate Flow Ratio	Frontal Flow/Side Flow	0.31
² Q _w - Frontal Flow (cfs)	Q _w = Q[1-(1-(W/T)) ^{2.67}]	3.38
¹ Q _s - Side Flow (cfs)	Q _s = Q-Q _w	7.6
T - Side Flow Spread (ft)	(D-D _g)/S _x	11.67
¹ R _s - Side Flow Factor	1/(1+(0.15*V ^{1.8})/(S _x *L _{ge} ^{2.3}))	0.04
¹ Q _{gi} - Intercepted Flow (cfs)	(R _f *E+R _s *(1-E))*Q	3.7
Output (Curb):	Equation:	Output (Curb):
¹ S _e - Equivalent Cross Slope (ft/ft)	S _x +S _g *E	0.054
Q _{sx} - Remaining Flow After Grate Interception (cfs)	Q-Q _{gi}	7.327
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}	41.98
¹ Q _{ci} - Intercepted Flow (cfs)	(1-(1-L _{ce} /L _t) ^{1.0})*Q _{sx} or Q _{sx} if L _t is less than L _{ce}	1.1
Output (Combination):	Equation:	Output (Combination):
Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	4.5
Bypass Flow (cfs)	Street Flow - Total Intercepted Flow	6.5
¹ Formula referenced from the CCRFCD Manual		
² Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)		

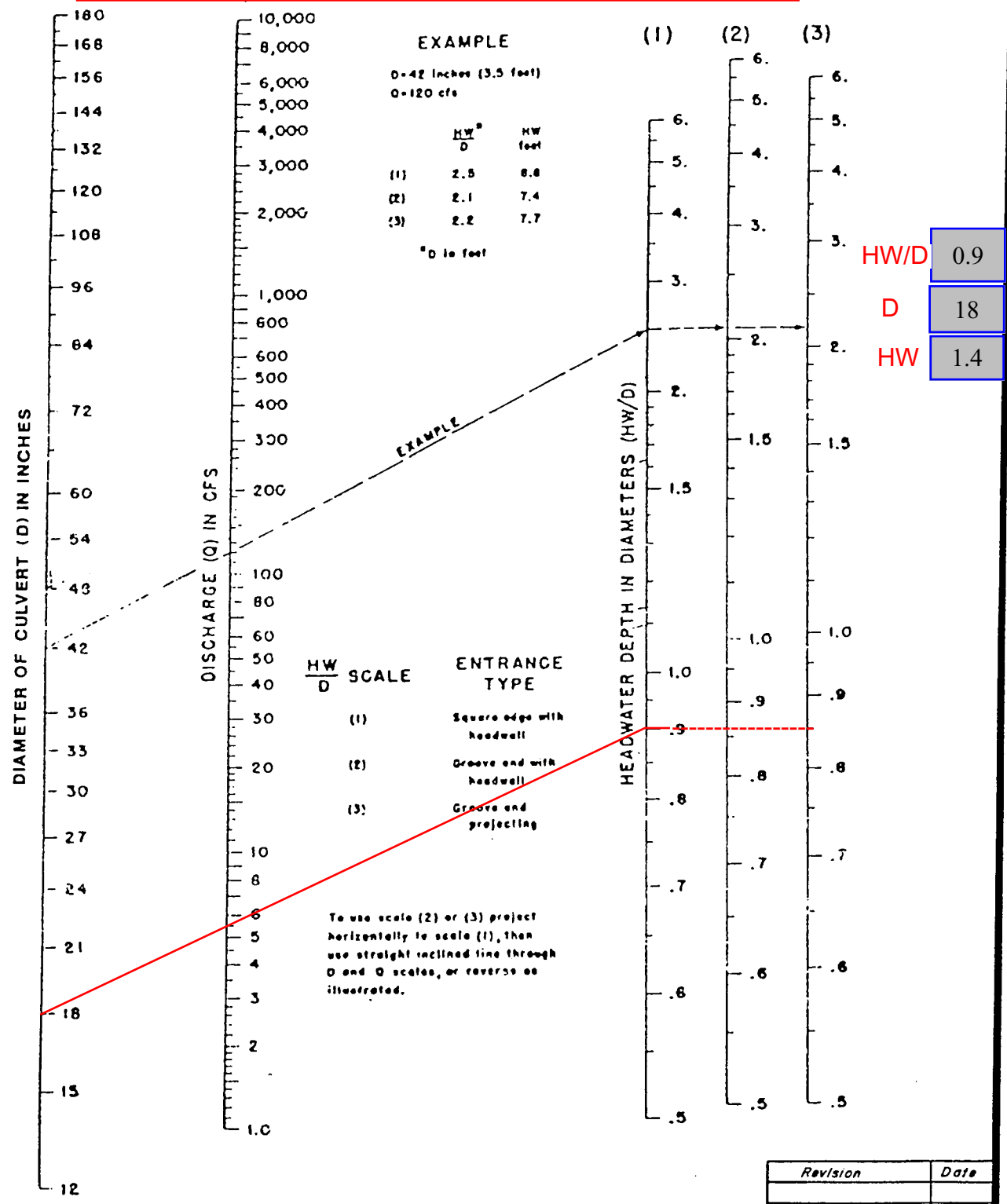
Curb Inlet Sizing Computation		
Project Name & Number:		KBH2204 Summerlin Parcel STU
Date:		Sep 2022
By:		JSR
Westwood		
Notes:		
Facility ID:	SDDI#4	
Drainage Condition:	Proposed	
Source of Flow:	Q100 = STU(b2)	
Inlet Type:	Type CM2 (Continuous Grade)	
Inlet Length:	12.5-ft	
Number of Grates	4	
Input:	Variable:	Input:
Street Flow (cfs)	Q	3.5
Longitudinal Slope (ft/ft)	S _o	0.0240
Manning's Coefficient	n	0.016
Street Flow Velocity (fps)	V	3.24
Street Flow Depth (ft)	D	0.33
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	9.75
Length of Curb Opening (ft)	L _c	12.00
Clogging Factor - Grate (%)	CF _g	50%
Clogging Factor - Curb (%)	CF _c	50%
Effective Grate Length (ft)	L _{ge}	4.9
Effective Curb Opening Length (ft)	L _{ce}	6.00
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)	10.19
¹ E - Grate Flow Ratio	Frontal Flow/Side Flow	0.42
² Q _w - Frontal Flow (cfs)	Q _w = Q[1-(1-(W/T)) ^{2.67}]	1.46
¹ Q _s - Side Flow (cfs)	Q _s = Q-Q _w	2.0
T - Side Flow Spread (ft)	(D-D _g)/S _x	8.17
¹ R _s - Side Flow Factor	1/(1+(0.15*V ^{1.8})/(S _x *L _{ge} ^{2.3}))	0.38
¹ Q _{gi} - Intercepted Flow (cfs)	(R _f *E+R _s *(1-E))*Q	2.2
Output (Curb):	Equation:	Output (Curb):
¹ S _e - Equivalent Cross Slope (ft/ft)	S _x +S _g *E	0.066
Q _{sx} - Remaining Flow After Grate Interception (cfs)	Q-Q _{gi}	1.261
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}	13.14
¹ Q _{ci} - Intercepted Flow (cfs)	(1-(1-L _{ce} /L _t) ^{1.0})*Q _{sx} or Q _{sx} if L _t is less than L _{ce}	0.8
Output (Combination):	Equation:	Output (Combination):
Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	3.0
Bypass Flow (cfs)	Street Flow - Total Intercepted Flow	0.5
¹ Formula referenced from the CCRFCD Manual		
² Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)		

Inlet Control Nomographs

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

FACILITY SDDI#1: Q=5.5 CFS

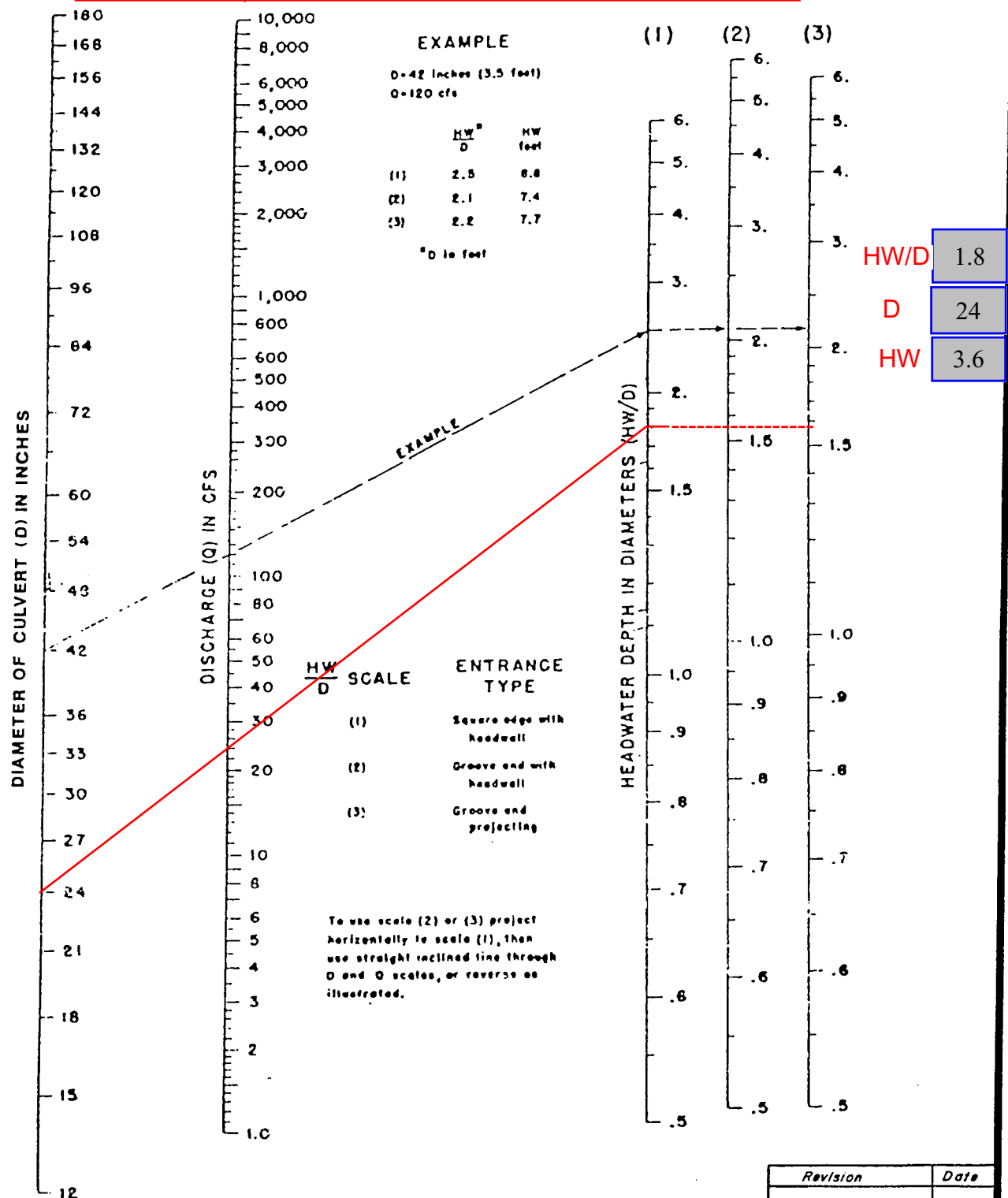


Revision	Date

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

FACILITY SDDI#2: Q=25.5 CFS



Revision	Date

WRC
ENGINEERING

REFERENCE:

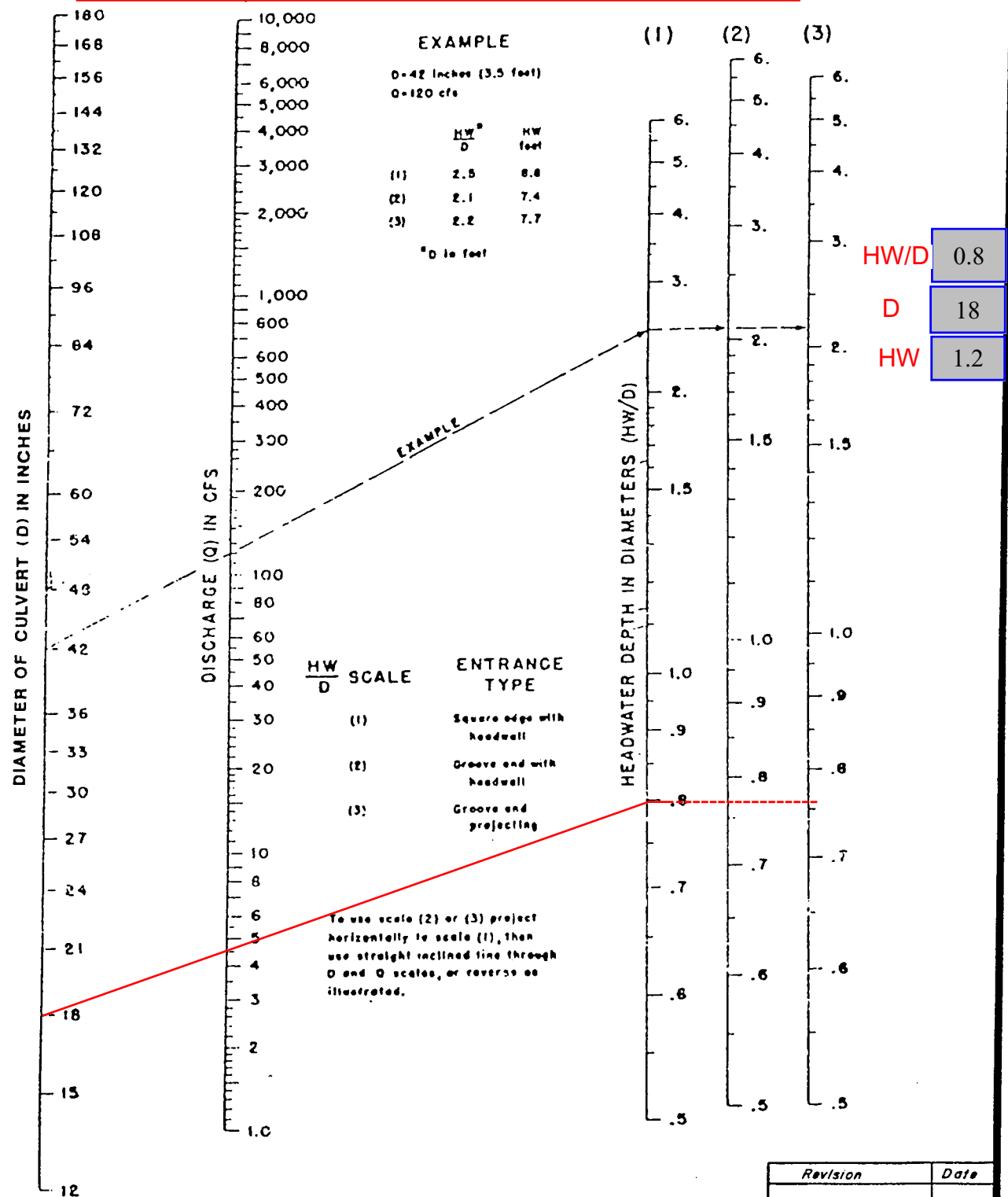
USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

FACILITY SDDI#3: Q=4.5 CFS

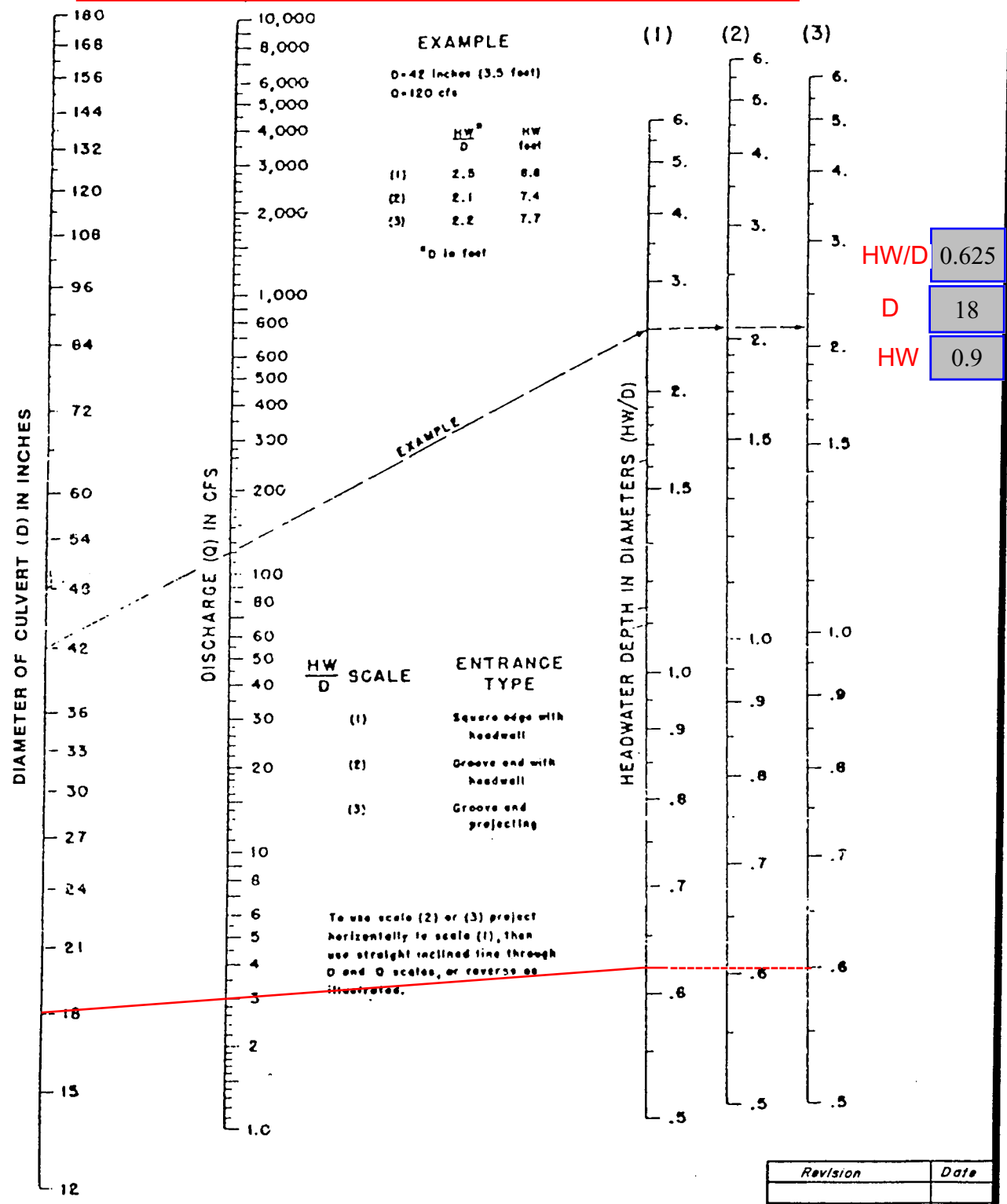


Revision	Date

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

FACILITY SDDI#4: Q=3 CFS



Revision	Date

WSPGW Mainline Model – Desert Foothills Drive
DFD2

DFD2 MODEL WSPG Summary
EX. DESERT FOOTHILLS SD SYSTEM

WSPG Station	Improvement Plan Sheet	Storm Drain Dimension	Invert Elevation (ft)	Q ₁₀₀ (cfs)	WSE (ft)	Velocity (ft/s)	FG Elevation	Facility Description	HGL Check ¹
--------------	------------------------	-----------------------	-----------------------	------------------------	----------	-----------------	--------------	----------------------	------------------------

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

0.00	PNP24	30" RCP	3348.65	44.52	3353.36	9.07	3369.00	Connection to Kindle Rise SD Main	OK
5.00	PNP24	30" RCP	3348.74	44.52	3353.42	9.07	3369.00	-	OK
51.83	PNP22	30" RCP	3349.65	44.52	3353.97	9.07	3369.97	EX. SDMH #9	OK
54.33	PNP22	30" RCP	3349.75	41.42	3354.34	8.44	3369.97	EX. SDMH #9	OK
56.83	PNP22	30" RCP	3349.85	41.42	3354.42	8.44	3369.97	EX. SDMH #9	OK
170.11	PNP22	30" RCP	3356.46	41.42	3358.62	9.19	3373.19	EX. SDMH #8	OK
172.61	PNP22	30" RCP	3356.56	8.42	3361.05	1.72	3373.19	EX. SDMH #8	OK
175.11	PNP22	30" RCP	3356.66	8.42	3361.05	1.72	3373.19	EX. SDMH #8	OK
366.28	PNP22	30" RCP	3359.08	8.42	3361.12	1.97	3378.31	EX. SDMH #7	OK
368.78	PNP22	30" RCP	3359.18	2.92	3361.22	0.68	3378.31	EX. SDMH #7	OK
371.28	PNP22	30" RCP	3359.28	2.92	3361.22	0.71	3378.31	EX. SDMH #7	OK
427.63	PNP20	30" RCP	3361.10	2.92	3361.66	3.56	3379.50	EX. SDMH #6	OK
430.13	PNP20	24" RCP	3361.20	1.12	3361.96	1.02	3379.50	EX. SDMH #6	OK
432.63	PNP20	24" RCP	3361.30	1.12	3361.96	1.25	3379.50	EX. SDMH #6	OK
458.38	SD-LAT29	24" RCP	3361.49	1.12	3361.93	2.15	3370.81	EX. SDDI	OK

DFD2.WSW

T1 KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

T2 DFD2 MODEL - DESERT FOOTHILLS DRIVE

T3 CONNECTION FROM KINDLE RISE WAY SD TO EX. DI IN DESERT FOOTHILLS

[illegible]

FILE: DFD2.WSW W S P G W - EDIT LISTING - Version 14.10 Date: 9- 6-2022 Time: 9:23:58
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 24 4 1 2.000
CD 30 4 0 2.500

W S P G W PAGE NO 1
WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU
HEADING LINE NO 2 IS - DFD2 MODEL - DESERT FOOTHILLS DRIVE
HEADING LINE NO 3 IS - CONNECTION FROM KINDLE RISE WAY SD TO EX. DI IN DESERT FOOTHILLS

W S P G W PAGE NO 2
WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO 1 IS A SYSTEM OUTLET * * *
U/S DATA STATION INVERT SECT W S ELEV
.000 3348.650 30 3353.358
ELEMENT NO 2 IS A REACH * * *
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
5.000 3348.740 30 .013 .000 .000 .000 0
ELEMENT NO 3 IS A REACH * * *
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
51.830 3349.650 30 .013 .000 .000 .000 0
ELEMENT NO 4 IS A JUNCTION * * * * *
U/S DATA STATION INVERT SECT LAT-1 LAT-2 N Q3 Q4 INVERT-3 INVERT-4 PHI 3 PHI 4
54.330 3349.750 30 30 30 .013 1.100 2.000 3350.760 3350.760 -90.000 90.000
RADIUS ANGLE
.000 .000
ELEMENT NO 5 IS A REACH * * *
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
56.830 3349.850 30 .013 .000 .000 .000 1
ELEMENT NO 6 IS A REACH * * *
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
170.110 3356.460 30 .013 .000 .000 .000 0
ELEMENT NO 7 IS A JUNCTION * * * * *
U/S DATA STATION INVERT SECT LAT-1 LAT-2 N Q3 Q4 INVERT-3 INVERT-4 PHI 3 PHI 4
172.610 3356.560 30 30 0 .013 33.000 .000 3356.660 .000 90.000 .000
RADIUS ANGLE
.000 .000
ELEMENT NO 8 IS A REACH * * *
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
175.110 3356.660 30 .013 .000 .000 .000 1
ELEMENT NO 9 IS A REACH * * *
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
366.280 3359.080 30 .013 .000 .000 .000 0
ELEMENT NO 10 IS A JUNCTION * * * * *

										DFD2.EDT					
U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4			
	368.780	3359.180	30	30	0	.013	5.500	.000	3359.280	.000	90.000	.000			
										RADIUS	ANGLE				
										.000	.000				
										PAGE NO 3					
W S P G W															
WATER SURFACE PROFILE - ELEMENT CARD LISTING															
ELEMENT NO 11 IS A REACH	*	*	*												
U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H			
	371.280	3359.280	30			.013			.000	.000	.000	1			
ELEMENT NO 12 IS A REACH	*	*	*												
U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H			
	427.630	3361.100	30			.013			.000	.000	.000	0			
ELEMENT NO 13 IS A JUNCTION	*	*	*	*	*										
U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4			
	430.130	3361.200	24	24	0	.013	1.800	.000	3361.300	.000	-90.000	.000			
										RADIUS	ANGLE				
										.000	.000				
ELEMENT NO 14 IS A REACH	*	*	*												
U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H			
	432.630	3361.300	24			.013			.000	.000	.000	1			
ELEMENT NO 15 IS A REACH	*	*	*												
U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H			
	458.380	3361.490	24			.013			.000	.000	.000	0			
ELEMENT NO 16 IS A SYSTEM HEADWORKS															
U/S DATA	STATION	INVERT	SECT												
	458.380	3361.490	24												
										W S ELEV					
										.000					

WATER SURFACE PROFILE LISTING

Date: 9- 6-2022 Time: 9:24: 0

KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

DFD2 MODEL - DESERT FOOTHILLS DRIVE

CONNECTION FROM KINDLE RISE WAY SD TO EX. DI IN DESERT FOOTHILLS

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
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
.000	3348.650	4.708	3353.358	44.52	9.07	1.28	3354.64	.00	2.22	.00	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-
5.000	.0180					.0118	.06	4.71	.00	1.70	.013	.00	.00	PIPE
5.000	3348.740	4.677	3353.417	44.52	9.07	1.28	3354.69	.00	2.22	.00	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-
46.830	.0194					.0118	.55	4.68	.00	1.66	.013	.00	.00	PIPE
51.830	3349.650	4.319	3353.969	44.52	9.07	1.28	3355.25	.00	2.22	.00	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-
JUNCT STR	.0400					.0110	.03	4.32	.00		.013	.00	.00	PIPE
54.330	3349.750	4.589	3354.339	41.42	8.44	1.11	3355.44	.00	2.16	.00	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-
2.500	.0400					.0102	.03	4.59	.00	1.26	.013	.00	.00	PIPE
56.830	3349.850	4.570	3354.420	41.42	8.44	1.11	3355.53	.00	2.16	.00	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-
13.753	.0583					.0102	.14	4.57	.00	1.13	.013	.00	.00	PIPE
70.583	3350.653	3.908	3354.560	41.42	8.44	1.11	3355.67	.00	2.16	.00	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-
HYDRAULIC JUMP														
70.583	3350.653	1.207	3351.859	41.42	17.65	4.84	3356.70	.00	2.16	2.50	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-
20.561	.0583					.0441	.91	1.21	3.21	1.13	.013	.00	.00	PIPE
91.144	3351.852	1.238	3353.090	41.42	17.09	4.53	3357.62	.00	2.16	2.50	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-
19.506	.0583					.0396	.77	1.24	3.06	1.13	.013	.00	.00	PIPE
110.650	3352.990	1.285	3354.276	41.42	16.29	4.12	3358.40	.00	2.16	2.50	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-
13.878	.0583					.0349	.48	1.29	2.85	1.13	.013	.00	.00	PIPE

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING

Date: 9- 6-2022 Time: 9:24: 0

KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

DFD2 MODEL - DESERT FOOTHILLS DRIVE

CONNECTION FROM KINDLE RISE WAY SD TO EX. DI IN DESERT FOOTHILLS

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
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
124.528	3353.800	1.335	3355.135	41.42	15.53	3.75	3358.88	.00	2.16	2.49	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
10.469	.0583					.0308	.32	1.33	2.65	1.13	.013	.00	.00	PIPE
134.997	3354.411	1.387	3355.798	41.42	14.81	3.41	3359.20	.00	2.16	2.48	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
8.172	.0583					.0272	.22	1.39	2.46	1.13	.013	.00	.00	PIPE
143.168	3354.888	1.442	3356.330	41.42	14.12	3.10	3359.43	.00	2.16	2.47	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
6.508	.0583					.0240	.16	1.44	2.28	1.13	.013	.00	.00	PIPE
149.677	3355.268	1.501	3356.768	41.42	13.46	2.81	3359.58	.00	2.16	2.45	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
5.241	.0583					.0213	.11	1.50	2.12	1.13	.013	.00	.00	PIPE
154.918	3355.573	1.562	3357.135	41.42	12.84	2.56	3359.69	.00	2.16	2.42	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4.230	.0583					.0189	.08	1.56	1.96	1.13	.013	.00	.00	PIPE
159.148	3355.820	1.628	3357.448	41.42	12.24	2.33	3359.77	.00	2.16	2.38	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3.401	.0583					.0168	.06	1.63	1.81	1.13	.013	.00	.00	PIPE
162.550	3356.019	1.698	3357.717	41.42	11.67	2.11	3359.83	.00	2.16	2.33	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.695	.0583					.0149	.04	1.70	1.67	1.13	.013	.00	.00	PIPE
165.245	3356.176	1.773	3357.949	41.42	11.13	1.92	3359.87	.00	2.16	2.27	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.074	.0583					.0133	.03	1.77	1.53	1.13	.013	.00	.00	PIPE
167.319	3356.297	1.854	3358.151	41.42	10.61	1.75	3359.90	.00	2.16	2.19	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.502	.0583					.0120	.02	1.85	1.40	1.13	.013	.00	.00	PIPE

▲ FILE: DFD2.WSW

W S P G W - CIVILDESIGN Version 14.08

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DFD2.OUT

WATER SURFACE PROFILE LISTING

Date: 9- 6-2022 Time: 9:24: 0

KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

DFD2 MODEL - DESERT FOOTHILLS DRIVE

CONNECTION FROM KINDLE RISE WAY SD TO EX. DI IN DESERT FOOTHILLS

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
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
168.821	3356.385	1.944	3358.328	41.42	10.12	1.59	3359.92	.00	2.16	2.08	2.500	.000	.00	0 .0
.945	.0583				.0108	.01	1.94	1.27	1.13	.013	.00	.00	PIPE	
169.766	3356.440	2.043	3358.483	41.42	9.64	1.44	3359.93	.00	2.16	1.93	2.500	.000	.00	0 .0
.344	.0583				.0098	.00	2.04	1.14	1.13	.013	.00	.00	PIPE	
170.110	3356.460	2.159	3358.619	41.42	9.19	1.31	3359.93	.00	2.16	1.72	2.500	.000	.00	0 .0
JUNCT STR	.0400				.0049	.01	2.16	1.00		.013	.00	.00	PIPE	
172.610	3356.560	4.487	3361.048	8.42	1.72	.05	3361.09	.00	.97	.00	2.500	.000	.00	0 .0
2.500	.0399				.0004	.00	4.49	.00	.54	.013	.00	.00	PIPE	
175.110	3356.660	4.391	3361.051	8.42	1.72	.05	3361.10	.00	.97	.00	2.500	.000	.00	0 .0
154.517	.0127				.0004	.06	4.39	.00	.72	.013	.00	.00	PIPE	
329.627	3358.616	2.500	3361.116	8.42	1.72	.05	3361.16	.00	.97	.00	2.500	.000	.00	0 .0
18.440	.0127				.0004	.01	2.50	.00	.72	.013	.00	.00	PIPE	
348.066	3358.849	2.268	3361.118	8.42	1.80	.05	3361.17	.00	.97	1.45	2.500	.000	.00	0 .0
10.553	.0127				.0004	.00	2.27	.18	.72	.013	.00	.00	PIPE	
358.620	3358.983	2.134	3361.116	8.42	1.89	.06	3361.17	.00	.97	1.77	2.500	.000	.00	0 .0
7.660	.0127				.0004	.00	2.13	.21	.72	.013	.00	.00	PIPE	
366.280	3359.080	2.035	3361.115	8.42	1.97	.06	3361.18	.00	.97	1.95	2.500	.000	.00	0 .0
JUNCT STR	.0399				.0002	.00	2.03	.23		.013	.00	.00	PIPE	

▲ FILE: DFD2.WSW

W S P G W - CIVILDESIGN Version 14.08

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Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING

Date: 9- 6-2022 Time: 9:24: 0

DFD2.OUT

KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

DFD2 MODEL - DESERT FOOTHILLS DRIVE

CONNECTION FROM KINDLE RISE WAY SD TO EX. DI IN DESERT FOOTHILLS

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
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
368.780	3359.180	2.041	3361.221	2.92	.68	.01	3361.23	.00	.56	1.94	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.466	.0400					.0001	.00	2.04	.08	.32	.013	.00	.00	PIPE
371.246	3359.279	1.942	3361.220	2.92	.71	.01	3361.23	.00	.56	2.08	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.034	.0400					.0001	.00	1.94	.09	.32	.013	.00	.00	PIPE
371.280	3359.280	1.941	3361.221	2.92	.71	.01	3361.23	.00	.56	2.08	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.735	.0323					.0001	.00	1.94	.09	.34	.013	.00	.00	PIPE
374.015	3359.368	1.852	3361.220	2.92	.75	.01	3361.23	.00	.56	2.19	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.495	.0323					.0001	.00	1.85	.10	.34	.013	.00	.00	PIPE
376.510	3359.449	1.770	3361.219	2.92	.79	.01	3361.23	.00	.56	2.27	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.298	.0323					.0001	.00	1.77	.11	.34	.013	.00	.00	PIPE
378.807	3359.523	1.695	3361.219	2.92	.82	.01	3361.23	.00	.56	2.34	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.137	.0323					.0001	.00	1.70	.12	.34	.013	.00	.00	PIPE
380.945	3359.592	1.626	3361.218	2.92	.86	.01	3361.23	.00	.56	2.38	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.995	.0323					.0001	.00	1.63	.13	.34	.013	.00	.00	PIPE
382.939	3359.657	1.560	3361.217	2.92	.91	.01	3361.23	.00	.56	2.42	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.871	.0323					.0001	.00	1.56	.14	.34	.013	.00	.00	PIPE
384.810	3359.717	1.499	3361.216	2.92	.95	.01	3361.23	.00	.56	2.45	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.762	.0323					.0001	.00	1.50	.15	.34	.013	.00	.00	PIPE

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KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

DFD2.OUT

DFD2 MODEL - DESERT FOOTHILLS DRIVE

CONNECTION FROM KINDLE RISE WAY SD TO EX. DI IN DESERT FOOTHILLS

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
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
386.572	3359.774	1.441	3361.214	2.92	1.00	.02	3361.23	.00	.56	2.47	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-	-
1.662	.0323					.0001	.00	1.44	.16	.34	.013	.00	.00	PIPE	
388.234	3359.828	1.386	3361.213	2.92	1.05	.02	3361.23	.00	.56	2.49	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-	-
1.571	.0323					.0002	.00	1.39	.17	.34	.013	.00	.00	PIPE	
389.805	3359.878	1.333	3361.212	2.92	1.10	.02	3361.23	.00	.56	2.49	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-	-
1.486	.0323					.0002	.00	1.33	.19	.34	.013	.00	.00	PIPE	
391.291	3359.927	1.284	3361.210	2.92	1.15	.02	3361.23	.00	.56	2.50	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-	-
1.409	.0323					.0002	.00	1.28	.20	.34	.013	.00	.00	PIPE	
392.700	3359.972	1.236	3361.208	2.92	1.21	.02	3361.23	.00	.56	2.50	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-	-
1.333	.0323					.0002	.00	1.24	.22	.34	.013	.00	.00	PIPE	
394.033	3360.015	1.191	3361.206	2.92	1.27	.02	3361.23	.00	.56	2.50	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-	-
1.267	.0323					.0003	.00	1.19	.23	.34	.013	.00	.00	PIPE	
395.300	3360.056	1.148	3361.204	2.92	1.33	.03	3361.23	.00	.56	2.49	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-	-
1.202	.0323					.0003	.00	1.15	.25	.34	.013	.00	.00	PIPE	
396.502	3360.095	1.107	3361.202	2.92	1.39	.03	3361.23	.00	.56	2.48	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-	-
1.138	.0323					.0003	.00	1.11	.27	.34	.013	.00	.00	PIPE	
397.640	3360.132	1.068	3361.199	2.92	1.46	.03	3361.23	.00	.56	2.47	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-	-
1.077	.0323					.0004	.00	1.07	.29	.34	.013	.00	.00	PIPE	

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KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

DFD2 MODEL - DESERT FOOTHILLS DRIVE

DFD2.OUT

CONNECTION FROM KINDLE RISE WAY SD TO EX. DI IN DESERT FOOTHILLS

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
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
398.718	3360.167	1.030	3361.197	2.92	1.53	.04	3361.23	.00	.56	2.46	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.022	.0323					.0004	.00	1.03	.31	.34	.013	.00	.00	PIPE
399.739	3360.199	.994	3361.193	2.92	1.61	.04	3361.23	.00	.56	2.45	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.965	.0323					.0005	.00	.99	.33	.34	.013	.00	.00	PIPE
400.704	3360.231	.959	3361.190	2.92	1.68	.04	3361.23	.00	.56	2.43	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.910	.0323					.0006	.00	.96	.35	.34	.013	.00	.00	PIPE
401.615	3360.260	.926	3361.186	2.92	1.77	.05	3361.23	.00	.56	2.41	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.854	.0323					.0006	.00	.93	.38	.34	.013	.00	.00	PIPE
402.469	3360.288	.894	3361.181	2.92	1.85	.05	3361.23	.00	.56	2.40	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.807	.0323					.0007	.00	.89	.40	.34	.013	.00	.00	PIPE
403.276	3360.314	.863	3361.177	2.92	1.94	.06	3361.24	.00	.56	2.38	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.751	.0323					.0008	.00	.86	.43	.34	.013	.00	.00	PIPE
404.027	3360.338	.834	3361.171	2.92	2.04	.06	3361.24	.00	.56	2.36	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.049	.0323					.0009	.00	.83	.46	.34	.013	.00	.00	PIPE
404.076	3360.340	.805	3361.145	2.92	2.14	.07	3361.22	.00	.56	2.34	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
HYDRAULIC JUMP														
404.076	3360.340	.351	3360.691	2.92	6.96	.75	3361.44	.00	.56	1.74	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4.382	.0323					.0263	.12	.35	2.49	.34	.013	.00	.00	PIPE

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KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

DFD2 MODEL - DESERT FOOTHILLS DRIVE

CONNECTION FROM KINDLE RISE WAY SD TO EX. DI IN DESERT FOOTHILLS

DFD2.OUT

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
408.458	3360.481	.363	3360.844	2.92	6.63	.68	3361.53	.00	.56	1.76	2.500	.000	.00	0 .0
5.371	.0323					.0230	.12	.36	2.34	.34	.013	.00	.00	PIPE
413.829	3360.655	.375	3361.030	2.92	6.32	.62	3361.65	.00	.56	1.79	2.500	.000	.00	0 .0
3.594	.0323					.0201	.07	.38	2.19	.34	.013	.00	.00	PIPE
417.423	3360.771	.388	3361.158	2.92	6.03	.56	3361.72	.00	.56	1.81	2.500	.000	.00	0 .0
2.593	.0323					.0175	.05	.39	2.05	.34	.013	.00	.00	PIPE
420.016	3360.854	.401	3361.255	2.92	5.75	.51	3361.77	.00	.56	1.83	2.500	.000	.00	0 .0
1.956	.0323					.0153	.03	.40	1.92	.34	.013	.00	.00	PIPE
421.972	3360.917	.414	3361.331	2.92	5.48	.47	3361.80	.00	.56	1.86	2.500	.000	.00	0 .0
1.505	.0323					.0134	.02	.41	1.80	.34	.013	.00	.00	PIPE
423.478	3360.966	.428	3361.394	2.92	5.23	.42	3361.82	.00	.56	1.88	2.500	.000	.00	0 .0
1.171	.0323					.0117	.01	.43	1.69	.34	.013	.00	.00	PIPE
424.649	3361.004	.442	3361.446	2.92	4.98	.39	3361.83	.00	.56	1.91	2.500	.000	.00	0 .0
.911	.0323					.0102	.01	.44	1.58	.34	.013	.00	.00	PIPE
425.560	3361.033	.457	3361.490	2.92	4.75	.35	3361.84	.00	.56	1.93	2.500	.000	.00	0 .0
.704	.0323					.0089	.01	.46	1.48	.34	.013	.00	.00	PIPE
426.264	3361.056	.473	3361.529	2.92	4.53	.32	3361.85	.00	.56	1.96	2.500	.000	.00	0 .0
.529	.0323					.0078	.00	.47	1.39	.34	.013	.00	.00	PIPE

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KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

DFD2 MODEL - DESERT FOOTHILLS DRIVE

CONNECTION FROM KINDLE RISE WAY SD TO EX. DI IN DESERT FOOTHILLS

DFD2.OUT															
Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/or I.D.	ZL	No Wth	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type	Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
426.792	3361.073	.489	3361.562	2.92	4.32	.29	3361.85	.00	.56	1.98	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.382	.0323					.0068	.00	.49	1.30	.34	.013	.00	.00	PIPE	
427.174	3361.085	.505	3361.591	2.92	4.12	.26	3361.85	.00	.56	2.01	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.259	.0323					.0059	.00	.51	1.22	.34	.013	.00	.00	PIPE	
427.433	3361.094	.522	3361.616	2.92	3.93	.24	3361.86	.00	.56	2.03	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.150	.0323					.0052	.00	.52	1.14	.34	.013	.00	.00	PIPE	
427.583	3361.099	.540	3361.638	2.92	3.74	.22	3361.86	.00	.56	2.06	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.047	.0323					.0045	.00	.54	1.07	.34	.013	.00	.00	PIPE	
427.630	3361.100	.559	3361.659	2.92	3.56	.20	3361.86	.00	.56	2.08	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0399					.0022	.01	.56	1.00		.013	.00	.00	PIPE	
430.130	3361.200	.764	3361.964	1.12	1.02	.02	3361.98	.00	.36	1.94	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.627	.0400					.0003	.00	.76	.24	.22	.013	.00	.00	PIPE	
430.757	3361.225	.738	3361.963	1.12	1.06	.02	3361.98	.00	.36	1.93	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.598	.0400					.0003	.00	.74	.25	.22	.013	.00	.00	PIPE	
431.355	3361.249	.712	3361.961	1.12	1.12	.02	3361.98	.00	.36	1.92	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.566	.0400					.0004	.00	.71	.27	.22	.013	.00	.00	PIPE	
431.921	3361.272	.688	3361.959	1.12	1.17	.02	3361.98	.00	.36	1.90	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.542	.0400					.0004	.00	.69	.29	.22	.013	.00	.00	PIPE	

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KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

DFD2 MODEL - DESERT FOOTHILLS DRIVE

CONNECTION FROM KINDLE RISE WAY SD TO EX. DI IN DESERT FOOTHILLS

Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt/	No Wth
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DFD2.OUT															
Station	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	
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
432.462	3361.293	.664	3361.958	1.12	1.23	.02	3361.98	.00	.36	1.88	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.168	.0400					.0004	.00	.66	.31	.22	.013	.00	.00	PIPE	
432.630	3361.300	.657	3361.957	1.12	1.25	.02	3361.98	.00	.36	1.88	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.902	.0074					.0005	.00	.66	.32	.33	.013	.00	.00	PIPE	
435.532	3361.322	.634	3361.956	1.12	1.31	.03	3361.98	.00	.36	1.86	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.761	.0074					.0006	.00	.63	.34	.33	.013	.00	.00	PIPE	
438.293	3361.342	.613	3361.955	1.12	1.37	.03	3361.98	.00	.36	1.84	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.635	.0074					.0006	.00	.61	.36	.33	.013	.00	.00	PIPE	
440.928	3361.361	.592	3361.954	1.12	1.44	.03	3361.99	.00	.36	1.83	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.507	.0074					.0007	.00	.59	.39	.33	.013	.00	.00	PIPE	
443.435	3361.380	.572	3361.952	1.12	1.51	.04	3361.99	.00	.36	1.81	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.390	.0074					.0008	.00	.57	.41	.33	.013	.00	.00	PIPE	
445.825	3361.397	.553	3361.951	1.12	1.58	.04	3361.99	.00	.36	1.79	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.270	.0074					.0009	.00	.55	.44	.33	.013	.00	.00	PIPE	
448.095	3361.414	.535	3361.949	1.12	1.66	.04	3361.99	.00	.36	1.77	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.162	.0074					.0011	.00	.53	.47	.33	.013	.00	.00	PIPE	
450.257	3361.430	.517	3361.947	1.12	1.74	.05	3361.99	.00	.36	1.75	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.032	.0074					.0012	.00	.52	.51	.33	.013	.00	.00	PIPE	

▲ FILE: DFD2.WSW

W S P G W - CIVILDESIGN Version 14.08

PAGE 10

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING

Date: 9- 6-2022 Time: 9:24: 0

KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

DFD2 MODEL - DESERT FOOTHILLS DRIVE

CONNECTION FROM KINDLE RISE WAY SD TO EX. DI IN DESERT FOOTHILLS

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Base Wt	No Wth

DFD2.OUT															
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type	Ch
452.289	3361.445	.500	3361.945	1.12	1.83	.05	3362.00	.00	.36	1.73	2.000	.000	.00	1	.0
1.896	.0074					.0014	.00	.50	.54	.33	.013	.00	.00	PIPE	
454.186	3361.459	.483	3361.942	1.12	1.91	.06	3362.00	.00	.36	1.71	2.000	.000	.00	1	.0
1.786	.0074					.0016	.00	.48	.58	.33	.013	.00	.00	PIPE	
455.972	3361.472	.467	3361.939	1.12	2.01	.06	3362.00	.00	.36	1.69	2.000	.000	.00	1	.0
1.668	.0074					.0018	.00	.47	.62	.33	.013	.00	.00	PIPE	
457.640	3361.484	.452	3361.936	1.12	2.11	.07	3362.00	.00	.36	1.67	2.000	.000	.00	1	.0
.740	.0074					.0020	.00	.45	.66	.33	.013	.00	.00	PIPE	
458.380	3361.490	.445	3361.934	1.12	2.15	.07	3362.01	.00	.36	1.66	2.000	.000	.00	1	.0

↑

WSPGW Lateral Model – Whistling Kite
Lat7-KITE

LAT7-KITE Model WSPG Summary

From Onsite Whistling Kite SD to Desert Foothills Drive Ex. SD

WSPG Station	Storm Drain Dimension	Invert Elevation (ft)	Q ₁₀₀ (cfs)	WSE (ft)	Velocity (ft/s)	FG Elevation	Facility Description	HGL Check ¹
--------------	-----------------------	-----------------------	------------------------	----------	-----------------	--------------	----------------------	------------------------

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

1000.00	30" RCP	3359.28	5.50	3361.22	1.35	3378.31	EX. SDMH / Connection to Dessert Foothills SD System	OK
1055.25	30" RCP	3361.62	5.50	3361.91	17.73	3381.10	SDMH1	OK
1060.25	18" RCP	3362.62	5.50	3362.97	17.75	3381.10		OK
1132.76	18" RCP	3377.12	5.50	3378.02	4.94	3386.50	SDDI1	OK

LAT7-KITE.wsw

T1 KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

T2 LAT7 MODEL - WHISTLING KITE

T3 CONNECTION FROM WHISTLING KITE SD TO DESSERT FOOTHILLS SD

SO	1000.00	3359.28	30							3361.220
R	1055.25	3361.62	30		.013					
JX	1060.25	3362.62	18		.013					
R	1132.76	3377.12	18		.013					
SH	1132.76	3377.12	18							
CD	18	4	1	0.000	1.500	0.000	0.000	0.000	0.0000.00	0.00
CD	30	4	0	0.000	2.500	0.000	0.000	0.000	0.0000.00	0.00
Q				5.500						

FILE: LAT7-KITE.WSW
 LAT7-KITE.EDT
Date: 9-13-2022 Time: 2: 0:21

W S P G W - EDIT LISTING - Version 14.10
 PAGE 1

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

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	18	4	1		1.500														
CD	30	4	0		2.500														

W S P G W

PAGE NO 1

HEADING LINE NO 1 IS - WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 2 IS - KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

HEADING LINE NO 3 IS - LAT7 MODEL - WHISTLING KITE

CONNECTION FROM WHISTLING KITE SD TO DESSERT FOOTHILLS SD

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	1 IS A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV												
				1000.000	3359.280	30	3361.220												
ELEMENT NO	2 IS A	REACH	U/S DATA	STATION	INVERT	SECT													
				1055.250	3361.620	30													
ELEMENT NO	3 IS A	JUNCTION	U/S DATA	STATION	INVERT	SECT													
				1060.250	3362.620	18													
ELEMENT NO	4 IS A	REACH	U/S DATA	STATION	INVERT	SECT													
				1132.760	3377.120	18													
ELEMENT NO	5 IS A	SYSTEM HEADWORKS	U/S DATA	STATION	INVERT	SECT													
				1132.760	3377.120	18													

WATER SURFACE PROFILE LISTING
KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU
LAT7 MODEL - WHISTLING KITE
CONNECTION FROM WHISTLING KITE SD TO DESSERT FOOTHILLS SD

Date: 9-13-2022 Time: 2: 0:22

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	3359.280	1.940	3361.220	5.50	1.35	.03	3361.25	.00	.77	2.08	2.500	.000	.00	0	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.044	.0424					.0002	.00	1.94	.17	.43	.013	.00	.00	PIPE	
1002.044	3359.367	1.851	3361.218	5.50	1.41	.03	3361.25	.00	.77	2.19	2.500	.000	.00	0	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.854	.0424					.0002	.00	1.85	.19	.43	.013	.00	.00	PIPE	
1003.898	3359.445	1.770	3361.215	5.50	1.48	.03	3361.25	.00	.77	2.27	2.500	.000	.00	0	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.701	.0424					.0003	.00	1.77	.20	.43	.013	.00	.00	PIPE	
1005.599	3359.517	1.695	3361.212	5.50	1.55	.04	3361.25	.00	.77	2.34	2.500	.000	.00	0	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.571	.0424					.0003	.00	1.69	.22	.43	.013	.00	.00	PIPE	
1007.170	3359.584	1.625	3361.209	5.50	1.63	.04	3361.25	.00	.77	2.38	2.500	.000	.00	0	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.458	.0424					.0003	.00	1.63	.24	.43	.013	.00	.00	PIPE	
1008.628	3359.646	1.560	3361.205	5.50	1.71	.05	3361.25	.00	.77	2.42	2.500	.000	.00	0	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.357	.0424					.0004	.00	1.56	.26	.43	.013	.00	.00	PIPE	
1009.985	3359.703	1.498	3361.201	5.50	1.79	.05	3361.25	.00	.77	2.45	2.500	.000	.00	0	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.265	.0424					.0004	.00	1.50	.28	.43	.013	.00	.00	PIPE	
1011.250	3359.756	1.440	3361.197	5.50	1.88	.05	3361.25	.00	.77	2.47	2.500	.000	.00	0	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.183	.0424					.0005	.00	1.44	.30	.43	.013	.00	.00	PIPE	
1012.432	3359.806	1.385	3361.191	5.50	1.97	.06	3361.25	.00	.77	2.49	2.500	.000	.00	0	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.371	.0424					.0005	.00	1.39	.33	.43	.013	.00	.00	PIPE	

WATER SURFACE PROFILE LISTING
KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU
LAT7 MODEL - WHISTLING KITE
CONNECTION FROM WHISTLING KITE SD TO DESSERT FOOTHILLS SD

Date: 9-13-2022 Time: 2: 0:22

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	

1012.803	3359.822	1.385	3361.207	5.50	1.97	.06	3361.27	.00	.77	2.49	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
HYDRAULIC JUMP															
1012.803	3359.822	.396	3360.218	5.50	11.01	1.88	3362.10	.00	.77	1.83	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.396	.0424					.0608	.08	.40	3.71	.43	.013	.00	.00	PIPE	
1014.199	3359.881	.396	3360.277	5.50	11.01	1.88	3362.16	.00	.77	1.83	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
7.664	.0424					.0653	.50	.40	3.71	.43	.013	.00	.00	PIPE	
1021.863	3360.206	.383	3360.589	5.50	11.55	2.07	3362.66	.00	.77	1.80	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
6.013	.0424					.0747	.45	.38	3.96	.43	.013	.00	.00	PIPE	
1027.876	3360.460	.371	3360.831	5.50	12.11	2.28	3363.11	.00	.77	1.78	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4.991	.0424					.0856	.43	.37	4.22	.43	.013	.00	.00	PIPE	
1032.868	3360.672	.359	3361.031	5.50	12.70	2.51	3363.54	.00	.77	1.75	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4.292	.0424					.0980	.42	.36	4.50	.43	.013	.00	.00	PIPE	
1037.159	3360.854	.347	3361.201	5.50	13.32	2.76	3363.96	.00	.77	1.73	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3.781	.0424					.1123	.42	.35	4.81	.43	.013	.00	.00	PIPE	
1040.940	3361.014	.336	3361.350	5.50	13.97	3.03	3364.38	.00	.77	1.71	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3.388	.0424					.1287	.44	.34	5.13	.43	.013	.00	.00	PIPE	
1044.328	3361.157	.325	3361.483	5.50	14.66	3.34	3364.82	.00	.77	1.68	2.500	.000	.00	0	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3.076	.0424					.1474	.45	.33	5.47	.43	.013	.00	.00	PIPE	

WATER SURFACE PROFILE LISTING
KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU
LAT7 MODEL - WHISTLING KITE
CONNECTION FROM WHISTLING KITE SD TO DESSERT FOOTHILLS SD

Date: 9-13-2022 Time: 2: 0:22

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
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1047.404	3361.288	.315	3361.603	5.50	15.37	3.67	3365.27	.00	.77	1.66	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.819	.0424					.1689	.48	.31	5.83	.43	.013	.00	.00	PIPE
1050.224	3361.407	.305	3361.712	5.50	16.12	4.04	3365.75	.00	.77	1.64	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.605	.0424					.1935	.50	.30	6.22	.43	.013	.00	.00	PIPE
1052.828	3361.518	.295	3361.813	5.50	16.91	4.44	3366.25	.00	.77	1.61	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.422	.0424					.2218	.54	.29	6.63	.43	.013	.00	.00	PIPE
1055.250	3361.620	.285	3361.906	5.50	17.73	4.88	3366.79	.00	.77	1.59	2.500	.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.2000					.2176	1.09	.29	7.08		.013	.00	.00	PIPE
1060.250	3362.621	.347	3362.968	5.50	17.75	4.89	3367.86	.00	.90	1.27	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
29.982	.2000					.1883	5.64	.35	6.32	.35	.013	.00	.00	PIPE
1090.232	3368.616	.357	3368.973	5.50	17.08	4.53	3373.50	.00	.90	1.28	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
12.115	.2000					.1670	2.02	.36	6.00	.35	.013	.00	.00	PIPE
1102.347	3371.039	.369	3371.408	5.50	16.29	4.12	3375.53	.00	.90	1.29	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
6.706	.2000					.1460	.98	.37	5.61	.35	.013	.00	.00	PIPE
1109.053	3372.380	.382	3372.761	5.50	15.53	3.75	3376.51	.00	.90	1.31	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4.530	.2000					.1277	.58	.38	5.26	.35	.013	.00	.00	PIPE
1113.582	3373.286	.395	3373.680	5.50	14.81	3.40	3377.08	.00	.90	1.32	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3.354	.2000					.1117	.37	.39	4.92	.35	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING
KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU
LAT7 MODEL - WHISTLING KITE
CONNECTION FROM WHISTLING KITE SD TO DESSERT FOOTHILLS SD

Date: 9-13-2022 Time: 2: 0:22

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
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1116.936	3373.956	.408	3374.365	5.50	14.12	3.10	3377.46	.00	.90	1.34	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.614	.2000					.0978	.26	.41	4.61	.35	.013	.00	.00	PIPE
1119.550	3374.479	.423	3374.902	5.50	13.46	2.81	3377.72	.00	.90	1.35	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.107	.2000					.0856	.18	.42	4.31	.35	.013	.00	.00	PIPE
1121.657	3374.900	.437	3375.338	5.50	12.83	2.56	3377.90	.00	.90	1.36	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.738	.2000					.0749	.13	.44	4.03	.35	.013	.00	.00	PIPE
1123.394	3375.248	.453	3375.700	5.50	12.24	2.33	3378.03	.00	.90	1.38	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.454	.2000					.0656	.10	.45	3.77	.35	.013	.00	.00	PIPE
1124.849	3375.539	.468	3376.007	5.50	11.67	2.11	3378.12	.00	.90	1.39	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.232	.2000					.0574	.07	.47	3.53	.35	.013	.00	.00	PIPE
1126.081	3375.785	.485	3376.270	5.50	11.12	1.92	3378.19	.00	.90	1.40	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.053	.2000					.0503	.05	.48	3.30	.35	.013	.00	.00	PIPE
1127.134	3375.995	.502	3376.497	5.50	10.61	1.75	3378.24	.00	.90	1.42	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.905	.2000					.0441	.04	.50	3.09	.35	.013	.00	.00	PIPE
1128.039	3376.176	.520	3376.696	5.50	10.11	1.59	3378.28	.00	.90	1.43	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.780	.2000					.0386	.03	.52	2.89	.35	.013	.00	.00	PIPE
1128.819	3376.332	.538	3376.871	5.50	9.64	1.44	3378.31	.00	.90	1.44	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.674	.2000					.0339	.02	.54	2.70	.35	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING
KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU
LAT7 MODEL - WHISTLING KITE
CONNECTION FROM WHISTLING KITE SD TO DESSERT FOOTHILLS SD

Date: 9-13-2022 Time: 2: 0:22

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
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1129.493	3376.467	.558	3377.025	5.50	9.19	1.31	3378.34	.00	.90	1.45	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.583	.2000					.0297	.02	.56	2.52	.35	.013	.00	.00	PIPE
1130.076	3376.584	.578	3377.161	5.50	8.77	1.19	3378.35	.00	.90	1.46	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.503	.2000					.0260	.01	.58	2.36	.35	.013	.00	.00	PIPE
1130.579	3376.684	.599	3377.283	5.50	8.36	1.08	3378.37	.00	.90	1.47	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.434	.2000					.0229	.01	.60	2.20	.35	.013	.00	.00	PIPE
1131.013	3376.771	.620	3377.391	5.50	7.97	.99	3378.38	.00	.90	1.48	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.372	.2000					.0201	.01	.62	2.05	.35	.013	.00	.00	PIPE
1131.385	3376.845	.643	3377.489	5.50	7.60	.90	3378.39	.00	.90	1.48	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.317	.2000					.0176	.01	.64	1.92	.35	.013	.00	.00	PIPE
1131.702	3376.909	.667	3377.576	5.50	7.24	.82	3378.39	.00	.90	1.49	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.267	.2000					.0155	.00	.67	1.79	.35	.013	.00	.00	PIPE
1131.969	3376.962	.692	3377.654	5.50	6.91	.74	3378.39	.00	.90	1.50	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.223	.2000					.0136	.00	.69	1.67	.35	.013	.00	.00	PIPE
1132.191	3377.007	.718	3377.724	5.50	6.59	.67	3378.40	.00	.90	1.50	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.181	.2000					.0120	.00	.72	1.55	.35	.013	.00	.00	PIPE
1132.372	3377.043	.745	3377.788	5.50	6.28	.61	3378.40	.00	.90	1.50	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.143	.2000					.0106	.00	.74	1.45	.35	.013	.00	.00	PIPE

KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU
 LAT7 MODEL - WHISTLING KITE
 CONNECTION FROM WHISTLING KITE SD TO DESSERT FOOTHILLS SD

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
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1132.516	3377.071	.773	3377.844	5.50	5.99	.56	3378.40	.00	.90	1.50	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-
.109	.2000					.0093	.00	.77	1.35	.35	.013	.00	.00	PIPE
1132.624	3377.093	.803	3377.896	5.50	5.71	.51	3378.40	.00	.90	1.50	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-
.076	.2000					.0082	.00	.80	1.25	.35	.013	.00	.00	PIPE
1132.700	3377.108	.835	3377.943	5.50	5.44	.46	3378.40	.00	.90	1.49	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-
.045	.2000					.0072	.00	.83	1.16	.35	.013	.00	.00	PIPE
1132.745	3377.117	.868	3377.985	5.50	5.19	.42	3378.40	.00	.90	1.48	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-
.015	.2000					.0064	.00	.87	1.08	.35	.013	.00	.00	PIPE
1132.760	3377.120	.904	3378.024	5.50	4.94	.38	3378.40	.00	.90	1.47	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-

WSPGW Mainline Model – Ashy Storm SDDI2
LAT6-DI2

LAT6-DI2 WSPG Summary ASHY STORM SYSTEM: ONSITE DI (LOT 20) TO DESERT FOOTHILLS EX. SD SYSTEM								
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WSPG Station	Storm Drain Dimension	Invert Elevation (ft)	Q ₁₀₀ (cfs)	WSE (ft)	Velocity (ft/s)	FG Elevation	Facility Description	HGL Check ¹
--------------	-----------------------	-----------------------	------------------------	----------	-----------------	--------------	----------------------	------------------------

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

1000.00	30" RCP	3356.66	33.00	3361.05	6.72	3373.19	Ex. SDMH / Connection to Dessert Foothills SD System	OK
1051.65	30" RCP	3357.06	33.00	3357.94	21.54	3374.50	SDMH2	OK
1056.65	24" RCP	3357.56	33.00	3358.55	21.29	3374.50		OK
1092.41	24" RCP	3362.52	33.00	3363.72	16.72	3378.60	SDMH3	OK
1093.24	24" RCP	3362.52	33.00	3363.72	16.81	3378.60		OK
1094.08	24" RCP	3362.52	33.00	3363.71	16.91	3378.60		OK
1094.91	24" RCP	3362.52	33.00	3363.71	17.00	3378.60		OK
1095.74	24" RCP	3362.52	33.00	3363.70	17.09	3378.60		OK
1096.58	24" RCP	3362.52	33.00	3363.70	17.18	3378.60		OK
1097.41	24" RCP	3362.52	25.50	3363.41	19.00	3378.60		OK
1130.36	24" RCP	3367.64	25.50	3369.41	8.66	3377.50	SDDI2	OK

T1 KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU
 T2 LAT6-DI2 MODEL - STU ONSITE ASHY STORM AVE
 T3 CONNECTION FROM ONSITE DI (LOT 20) TO DESERT FOOTHILLS EX. SD SYSTEM

SO	1000.00	3356.66	30						3361.050	
R	1051.65	3357.06	30		.013					
JX	1056.65	3357.56	24		.013					
R	1092.41	3362.52	24		.013				15.0	
R	1093.24	3362.52	24		.013				15.0	
R	1094.08	3362.52	24		.013				15.0	
R	1094.91	3362.52	24		.013				15.0	
R	1095.74	3362.52	24		.013				15.0	
R	1096.58	3362.52	24		.013				15.0	
JX	1097.41	3362.52	24	18	.013	7.5		3363.02	90.0	
R	1130.36	3367.64	24		.013					
SH	1130.36	3367.64	24							
CD	18	4	1		.000	1.500	.000	.000	.000	.00
CD	24	4	1		0.000	2.000	0.000	0.000	0.000	0.0000.00 0.00
CD	30	4	0		0.000	2.500	0.000	0.000	0.000	0.0000.00 0.00
Q						25.500	.0			

FILE: LAT6-DI2.WSW

LAT6-DI2.EDT
W S P G W - EDIT LISTING - Version 14.10 Date: 9-15-2022 Time: 1:37:30
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	18	4	1		1.500														
CD	24	4	1		2.000														
CD	30	4	0		2.500														

W S P G W

PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

HEADING LINE NO 2 IS - LAT6-DI2 MODEL - STU ONSITE ASHY STORM AVE

HEADING LINE NO 3 IS - CONNECTION FROM ONSITE DI (LOT 20) TO DESERT FOOTHILLS EX. SD SYSTEM

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	1 IS A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV												
				1000.000	3356.660	30	3361.050												
ELEMENT NO	2 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1051.650	3357.060	30		.000	.000	.000	0								
ELEMENT NO	3 IS A	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4				
				1056.650	3357.560	24	0	0	.013	.000	.000	.000	.000	.000	.000				
												RADIUS	ANGLE						
												.000	.000						
ELEMENT NO	4 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1092.410	3362.520	24		.000	.000	15.000	0								
ELEMENT NO	5 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1093.240	3362.520	24		.000	.000	15.000	0								
ELEMENT NO	6 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1094.080	3362.520	24		.000	.000	15.000	0								
ELEMENT NO	7 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1094.910	3362.520	24		.000	.000	15.000	0								
ELEMENT NO	8 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1095.740	3362.520	24		.000	.000	15.000	0								
ELEMENT NO	9 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1096.580	3362.520	24		.000	.000	15.000	0								
ELEMENT NO	10 IS A	JUNCTION																	

LAT6-DI2.EDT													
U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4	
	1097.410	3362.520	24	18	0	.013	7.500	.000	3363.020	.000	.900	.000	
									RADIUS	ANGLE			
									.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

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 11 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1130.360	3367.640	24	.013	.000	.000	.000	0

ELEMENT NO 12 IS A SYSTEM HEADWORKS

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1130.360	3367.640	24	.000

PAGE NO 3

WATER SURFACE PROFILE LISTING

Date: 9-15-2022 Time: 1:37:31

KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU
LAT6-DI2 MODEL - STU ONSITE ASHY STORM AVE

CONNECTION FROM ONSITE DI (LOT 20) TO DESERT FOOTHILLS EX. SD SYSTEM

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	3356.660	4.390	3361.050	33.00	6.72	.70	3361.75	.00	1.95	.00	2.500	.000	.00	0	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
46.707	.0077					.0065	.30	4.39	.00	1.88	.013	.00	.00	PIPE	
1046.707	3357.022	4.324	3361.346	33.00	6.72	.70	3362.05	.00	1.95	.00	2.500	.000	.00	0	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
HYDRAULIC JUMP															
1046.707	3357.022	.894	3357.916	33.00	20.92	6.79	3364.71	.00	1.95	2.40	2.500	.000	.00	0	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4.943	.0077					.0898	.44	.89	4.54	1.88	.013	.00	.00	PIPE	
1051.650	3357.060	.875	3357.936	33.00	21.54	7.20	3365.14	.00	1.95	2.39	2.500	.000	.00	0	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.1000					.0909	.45	.88	4.74		.013	.00	.00	PIPE	
1056.650	3357.560	.989	3358.550	33.00	21.29	7.04	3365.59	.00	1.90	2.00	2.000	.000	.00	1	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.023	.1387					.0878	.09	.99	4.26	.87	.013	.00	.00	PIPE	
1057.673	3357.702	.992	3358.695	33.00	21.21	6.99	3365.68	.00	1.90	2.00	2.000	.000	.00	1	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
10.562	.1387					.0821	.87	.99	4.24	.87	.013	.00	.00	PIPE	
1068.235	3359.167	1.030	3360.197	33.00	20.23	6.35	3366.55	.00	1.90	2.00	2.000	.000	.00	1	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
8.107	.1387					.0724	.59	1.03	3.95	.87	.013	.00	.00	PIPE	
1076.341	3360.292	1.070	3361.362	33.00	19.28	5.77	3367.14	.00	1.90	2.00	2.000	.000	.00	1	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
6.453	.1387					.0638	.41	1.07	3.67	.87	.013	.00	.00	PIPE	
1082.795	3361.187	1.112	3362.299	33.00	18.39	5.25	3367.55	.00	1.90	1.99	2.000	.000	.00	1	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
5.260	.1387					.0564	.30	1.11	3.41	.87	.013	.00	.00	PIPE	

WATER SURFACE PROFILE LISTING

Date: 9-15-2022 Time: 1:37:31

KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU
LAT6-DI2 MODEL - STU ONSITE ASHY STORM AVE

CONNECTION FROM ONSITE DI (LOT 20) TO DESERT FOOTHILLS EX. SD SYSTEM

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
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1088.055	3361.916	1.156	3363.072	33.00	17.53	4.77	3367.84	.00	1.90	1.98	2.000	.000	.00	1 .0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4.355	.1387					.0498	.22	1.16	3.17	.87	.013	.00	.00	PIPE
1092.410	3362.520	1.203	3363.723	33.00	16.72	4.34	3368.06	.00	1.90	1.96	2.000	.000	.00	1 .0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.830	.0000					.0471	.04	1.20	2.93	.00	.013	.00	.00	PIPE
1093.240	3362.520	1.197	3363.718	33.00	16.81	4.39	3368.11	.00	1.90	1.96	2.000	.000	.00	1 .0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.840	.0000					.0478	.04	1.20	2.96	.00	.013	.00	.00	PIPE
1094.080	3362.520	1.192	3363.712	33.00	16.91	4.44	3368.15	.00	1.90	1.96	2.000	.000	.00	1 .0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.830	.0000					.0485	.04	1.19	2.99	.00	.013	.00	.00	PIPE
1094.910	3362.520	1.186	3363.706	33.00	17.00	4.49	3368.20	.00	1.90	1.97	2.000	.000	.00	1 .0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.830	.0000					.0492	.04	1.19	3.02	.00	.013	.00	.00	PIPE
1095.740	3362.520	1.181	3363.701	33.00	17.09	4.54	3368.24	.00	1.90	1.97	2.000	.000	.00	1 .0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.840	.0000					.0498	.04	1.18	3.04	.00	.013	.00	.00	PIPE
1096.580	3362.520	1.176	3363.696	33.00	17.18	4.58	3368.28	.00	1.90	1.97	2.000	.000	.00	1 .0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0000					.0639	.05	1.18	3.07		.013	.00	.00	PIPE
1097.410	3362.520	.886	3363.405	25.50	19.00	5.60	3369.01	.00	1.77	1.99	2.000	.000	.00	1 .0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.956	.1554					.0752	.22	.89	4.07	.73	.013	.00	.00	PIPE
1100.366	3362.979	.901	3363.881	25.50	18.56	5.35	3369.23	.00	1.77	1.99	2.000	.000	.00	1 .0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
5.209	.1554					.0685	.36	.90	3.94	.73	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING

Date: 9-15-2022 Time: 1:37:31

KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

LAT6-DI2 MODEL - STU ONSITE ASHY STORM AVE

CONNECTION FROM ONSITE DI (LOT 20) TO DESERT FOOTHILLS EX. SD SYSTEM

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
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1105.575	3363.789	.935	3364.723	25.50	17.70	4.86	3369.59	.00	1.77	2.00	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4.276	.1554					.0602	.26	.93	3.67	.73	.013	.00	.00	PIPE	
1109.852	3364.453	.970	3365.423	25.50	16.87	4.42	3369.84	.00	1.77	2.00	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3.566	.1554					.0530	.19	.97	3.42	.73	.013	.00	.00	PIPE	
1113.417	3365.007	1.007	3366.014	25.50	16.09	4.02	3370.03	.00	1.77	2.00	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3.006	.1554					.0467	.14	1.01	3.19	.73	.013	.00	.00	PIPE	
1116.423	3365.474	1.046	3366.520	25.50	15.34	3.65	3370.17	.00	1.77	2.00	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.553	.1554					.0411	.11	1.05	2.96	.73	.013	.00	.00	PIPE	
1118.975	3365.871	1.086	3366.957	25.50	14.63	3.32	3370.28	.00	1.77	1.99	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.177	.1554					.0363	.08	1.09	2.76	.73	.013	.00	.00	PIPE	
1121.152	3366.209	1.129	3367.338	25.50	13.95	3.02	3370.36	.00	1.77	1.98	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.860	.1554					.0321	.06	1.13	2.56	.73	.013	.00	.00	PIPE	
1123.012	3366.498	1.174	3367.672	25.50	13.30	2.75	3370.42	.00	1.77	1.97	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.589	.1554					.0284	.05	1.17	2.37	.73	.013	.00	.00	PIPE	
1124.601	3366.745	1.222	3367.967	25.50	12.68	2.50	3370.46	.00	1.77	1.95	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.353	.1554					.0251	.03	1.22	2.20	.73	.013	.00	.00	PIPE	
1125.954	3366.955	1.273	3368.228	25.50	12.09	2.27	3370.50	.00	1.77	1.92	2.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.144	.1554					.0223	.03	1.27	2.03	.73	.013	.00	.00	PIPE	

FILE: LAT6-DI2.WSW
 LAT6-DI2.OUT
W S P G W - CIVILDESIGN Version 14.08
PAGE 4

Program Package Serial Number: 7189
 WATER SURFACE PROFILE LISTING
 KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU
 LAT6-DI2 MODEL - STU ONSITE ASHY STORM AVE
 CONNECTION FROM ONSITE DI (LOT 20) TO DESERT FOOTHILLS EX. SD SYSTEM
 Date: 9-15-2022 Time: 1:37:31

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
1127.098	3367.133	1.327	3368.460	25.50	11.53	2.06	3370.52	.00	1.77	1.89	2.000	.000	.00	1 .0
	.957	.1554				.0198	.02	1.33	1.88	.73	.013	.00	.00	PIPE
1128.055	3367.282	1.385	3368.666	25.50	10.99	1.88	3370.54	.00	1.77	1.85	2.000	.000	.00	1 .0
	.786	.1554				.0177	.01	1.38	1.73	.73	.013	.00	.00	PIPE
1128.841	3367.404	1.447	3368.851	25.50	10.48	1.70	3370.56	.00	1.77	1.79	2.000	.000	.00	1 .0
	.625	.1554				.0158	.01	1.45	1.58	.73	.013	.00	.00	PIPE
1129.466	3367.501	1.515	3369.015	25.50	9.99	1.55	3370.57	.00	1.77	1.71	2.000	.000	.00	1 .0
	.469	.1554				.0142	.01	1.51	1.44	.73	.013	.00	.00	PIPE
1129.935	3367.574	1.589	3369.163	25.50	9.53	1.41	3370.57	.00	1.77	1.62	2.000	.000	.00	1 .0
	.307	.1554				.0129	.00	1.59	1.30	.73	.013	.00	.00	PIPE
1130.242	3367.622	1.674	3369.295	25.50	9.08	1.28	3370.58	.00	1.77	1.48	2.000	.000	.00	1 .0
	.118	.1554				.0118	.00	1.67	1.16	.73	.013	.00	.00	PIPE
1130.360	3367.640	1.774	3369.414	25.50	8.66	1.16	3370.58	.00	1.77	1.27	2.000	.000	.00	1 .0

WSPGW Lateral Model – Ashy Storm SDDI3
LAT6-DI3

LAT6-DI3 WSPG Summary
ASHY STORM SYSTEM: ONSITE DI (LOT 105) TO SDMH (LOT 20)

WSPG Station	Storm Drain Dimension	Invert Elevation (ft)	Q ₁₀₀ (cfs)	WSE (ft)	Velocity (ft/s)	FG Elevation	Facility Description	HGL Check ¹
1 - 'HGL Check' reflects the minimum 1-ft below finished grade.								
1000.00	18" RCP	3363.02	7.50	3363.47	16.64	3378.60	SDMH3	OK
1084.88	18" RCP	3373.96	7.50	3374.46	14.53	3385.50	SDMH4	OK
1086.55	18" RCP	3373.96	7.50	3374.45	14.90	3385.50		OK
1088.22	18" RCP	3373.96	7.50	3374.44	15.27	3385.50		OK
1089.88	18" RCP	3373.96	7.50	3374.43	15.63	3385.50		OK
1131.48	18" RCP	3379.11	7.50	3379.71	11.27	3387.50		OK
1133.15	18" RCP	3379.11	7.50	3379.70	11.52	3387.50	SDMH5	OK
1134.82	18" RCP	3379.11	7.50	3379.70	11.77	3387.50		OK
1136.48	18" RCP	3379.11	7.50	3379.69	12.01	3387.50		OK
1246.98	18" RCP	3384.89	7.50	3385.49	11.26	3393.70		OK
1251.98	18" RCP	3384.89	7.50	3385.47	11.99	3393.70	SDMH6	OK
1360.50	18" RCP	3390.57	7.50	3391.63	5.61	3399.70	SDMH7	OK
1361.33	18" RCP	3390.57	7.50	3391.69	5.31	3399.70		OK
1362.17	18" RCP	3390.57	7.50	3391.71	5.20	3399.70		OK
1363.00	18" RCP	3390.57	7.50	3391.73	5.12	3399.70		OK
1363.83	18" RCP	3390.57	7.50	3391.74	5.06	3399.70		OK
1364.67	18" RCP	3390.57	7.50	3391.76	5.00	3399.70		OK
1365.50	18" RCP	3390.57	4.50	3392.16	2.55	3399.70		OK
1382.60	18" RCP	3391.42	4.50	3392.23	4.59	3399.40	SDDI3	OK

T1 KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

T2 LAT6-DI3 MODEL - STU ONSITE ASHY STORM AVE

T3 CONNECTION FROM ONSITE DI (LOT 105) TO SDMH (LOT 20)

SO	1000.00	3363.02	18					3363.760	
R	1084.88	3373.96	18	.013					15.000
R	1086.55	3373.96	18	.013					15.000
R	1088.22	3373.96	18	.013					15.000
JX	1089.88	3373.96	18	.013					
R	1131.48	3379.11	18	.013					-15.000
R	1133.15	3379.11	18	.013					-15.000
R	1134.82	3379.11	18	.013					-15.000
JX	1136.48	3379.11	18	.013					
R	1246.98	3384.89	18	.013					-2.000
JX	1251.98	3384.89	18	.013					
R	1360.50	3390.57	18	.013					15.000
R	1361.33	3390.57	18	.013					15.000
R	1362.17	3390.57	18	.013					15.000
R	1363.00	3390.57	18	.013					15.000
R	1363.83	3390.57	18	.013					15.000
R	1364.67	3390.57	18	.013					10.000
JX	1365.50	3390.57	18 18	.013	3.0		3390.57		-2.0
R	1382.60	3391.42	18	.013					
SH	1382.60	3391.42	18						
CD	18	4	1	0.000	1.500	0.000	0.000	0.000	0.000
CD	24	4	1	0.000	2.000	0.000	0.000	0.000	0.000
CD	30	4	0	0.000	2.500	0.000	0.000	0.000	0.000
Q				4.500	.0				

FILE: LAT6-DI3.WSW

LAT6-DI3.EDT
W S P G W - EDIT LISTING - Version 14.10
Date: 9-14-2022 Time: 9:40: 4
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	18	4	1		1.500														
CD	24	4	1		2.000														
CD	30	4	0		2.500														

W S P G W

PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

HEADING LINE NO 2 IS - LAT6-DI3 MODEL - STU ONSITE ASHY STORM AVE

HEADING LINE NO 3 IS - CONNECTION FROM ONSITE DI (LOT 105) TO SDMH (LOT 20)

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	1 IS A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV												
				1000.000	3363.020	18	3363.760												
ELEMENT NO	2 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1084.880	3373.960	18		324.218	15.000	.000	0								
ELEMENT NO	3 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1086.550	3373.960	18		6.379	15.000	.000	0								
ELEMENT NO	4 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1088.220	3373.960	18		6.379	15.000	.000	0								
ELEMENT NO	5 IS A	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4				
				1089.880	3373.960	18	0	0	.013	.000	.000	.000	.000	.000	.000	.000			
												RADIUS	ANGLE						
												.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	6 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1131.480	3379.110	18		158.900	-15.000	.000	0								
ELEMENT NO	7 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1133.150	3379.110	18		6.379	-15.000	.000	0								
ELEMENT NO	8 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1134.820	3379.110	18		6.379	-15.000	.000	0								
ELEMENT NO	9 IS A	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4				

LAT6-DI3.EDT

1136.480	3379.110	18	0	0	.013	.000	.000	.000	.000	.000	.000
								RADIUS	ANGLE		
								.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

W S P G W

PAGE NO 3

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 10 IS A REACH	*	*	*									
U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
	1246.980	3384.890	18			.013			3165.592	-2.000	.000	0
ELEMENT NO 11 IS A JUNCTION	*	*	*	*								
U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1251.980	3384.890	18	0	0	.013	.000	.000	.000	.000	.000	.000
									RADIUS	ANGLE		
									.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 12 IS A REACH	*	*	*									
U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
	1360.500	3390.570	18			.013			414.516	15.000	.000	0
ELEMENT NO 13 IS A REACH	*	*	*									
U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
	1361.330	3390.570	18			.013			3.170	15.000	.000	0
ELEMENT NO 14 IS A REACH	*	*	*									
U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
	1362.170	3390.570	18			.013			3.209	15.000	.000	0
ELEMENT NO 15 IS A REACH	*	*	*									
U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
	1363.000	3390.570	18			.013			3.170	15.000	.000	0
ELEMENT NO 16 IS A REACH	*	*	*									
U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
	1363.830	3390.570	18			.013			3.170	15.000	.000	0
ELEMENT NO 17 IS A REACH	*	*	*									
U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
	1364.670	3390.570	18			.013			4.813	10.000	.000	0
ELEMENT NO 18 IS A JUNCTION	*	*	*	*								
U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1365.500	3390.570	18	18	0	.013	3.000	.000	3390.570	.000	.000	2.000
									RADIUS	ANGLE		
									.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

W S P G W

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WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 19 IS A REACH	*	*	*									
U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
	1382.600	3391.420	18			.013			.000	.000	.000	0
ELEMENT NO 20 IS A SYSTEM HEADWORKS	*											

U/S DATA	STATION	INVERT	SECT		
	1382.600	3391.420	18	LAT6-DI3.EDT	W S ELEV
					.000

WATER SURFACE PROFILE LISTING
KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU
LAT6-DI3 MODEL - STU ONSITE ASHY STORM AVE
CONNECTION FROM ONSITE DI (LOT 105) TO SDMH (LOT 20)

Date: 9-14-2022 Time: 9:40: 5

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
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1000.000	3363.020	.454	3363.474	7.50	16.64	4.30	3367.77	.04	1.06	1.38	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
12.604	.1289					.1289	1.62	.49	5.13	.45	.013	.00	.00	PIPE
1012.604	3364.645	.454	3365.098	7.50	16.64	4.30	3369.40	.04	1.06	1.38	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
46.648	.1289					.1221	5.69	.49	5.13	.45	.013	.00	.00	PIPE
1059.252	3370.657	.467	3371.124	7.50	15.98	3.97	3375.09	.03	1.06	1.39	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
16.547	.1289					.1081	1.79	.50	4.85	.45	.013	.00	.00	PIPE
1075.799	3372.790	.483	3373.273	7.50	15.24	3.61	3376.88	.03	1.06	1.40	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
9.081	.1289					.0947	.86	.51	4.53	.45	.013	.00	.00	PIPE
1084.880	3373.960	.500	3374.460	7.50	14.53	3.28	3377.74	1.50	1.06	1.41	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.670	.0000					.0916	.15	1.50	4.24	.00	.013	.00	.00	PIPE
1086.550	3373.960	.491	3374.451	7.50	14.90	3.45	3377.90	1.50	1.06	1.41	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.670	.0000					.0982	.16	1.50	4.39	.00	.013	.00	.00	PIPE
1088.220	3373.960	.483	3374.443	7.50	15.27	3.62	3378.06	.00	1.06	1.40	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0000					.1049	.17	.55	4.55		.013	.00	.00	PIPE
1089.880	3373.959	.475	3374.434	7.50	15.63	3.79	3378.23	.07	1.06	1.40	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
13.365	.1238					.1025	1.37	.54	4.70	.46	.013	.00	.00	PIPE
1103.245	3375.614	.489	3376.103	7.50	15.00	3.49	3379.60	.06	1.06	1.41	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
9.057	.1238					.0906	.82	.55	4.43	.46	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING
KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU
LAT6-DI3 MODEL - STU ONSITE ASHY STORM AVE
CONNECTION FROM ONSITE DI (LOT 105) TO SDMH (LOT 20)

Date: 9-14-2022 Time: 9:40: 5

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	
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1112.302	3376.736	.506	3377.242	7.50	14.30	3.18	3380.42	.06	1.06	1.42	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
6.099	.1238					.0794	.48	.56	4.15	.46	.013	.00	.00	PIPE	
1118.401	3377.491	.524	3378.015	7.50	13.64	2.89	3380.90	.05	1.06	1.43	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4.498	.1238					.0696	.31	.58	3.88	.46	.013	.00	.00	PIPE	
1122.899	3378.048	.543	3378.590	7.50	13.00	2.62	3381.22	.05	1.06	1.44	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3.491	.1238					.0610	.21	.59	3.62	.46	.013	.00	.00	PIPE	
1126.390	3378.480	.562	3379.042	7.50	12.40	2.39	3381.43	.04	1.06	1.45	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.799	.1238					.0535	.15	.61	3.38	.46	.013	.00	.00	PIPE	
1129.189	3378.826	.583	3379.409	7.50	11.82	2.17	3381.58	.04	1.06	1.46	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.291	.1238					.0470	.11	.62	3.16	.46	.013	.00	.00	PIPE	
1131.480	3379.110	.604	3379.714	7.50	11.27	1.97	3381.69	1.50	1.06	1.47	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.670	.0000					.0453	.08	1.50	2.95	.00	.013	.00	.00	PIPE	
1133.150	3379.110	.594	3379.704	7.50	11.52	2.06	3381.76	1.50	1.06	1.47	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.670	.0000					.0480	.08	1.50	3.05	.00	.013	.00	.00	PIPE	
1134.820	3379.110	.584	3379.695	7.50	11.77	2.15	3381.85	.00	1.06	1.46	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0000					.0509	.08	.59	3.14		.013	.00	.00	PIPE	
1136.480	3379.110	.576	3379.686	7.50	12.01	2.24	3381.93	.00	1.06	1.46	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
21.359	.0523					.0523	1.12	.58	3.24	.58	.013	.00	.00	PIPE	

WATER SURFACE PROFILE LISTING
KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU
LAT6-DI3 MODEL - STU ONSITE ASHY STORM AVE
CONNECTION FROM ONSITE DI (LOT 105) TO SDMH (LOT 20)

Date: 9-14-2022 Time: 9:40: 5

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

1157.839	3380.227	.576	3380.803	7.50	12.01	2.24	3383.04	.00	1.06	1.46	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
56.669	.0523					.0511	2.90	.58	3.24	.58	.013	.00	.00	PIPE	
1214.508	3383.191	.583	3383.774	7.50	11.81	2.17	3385.94	.00	1.06	1.46	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
32.472	.0523					.0469	1.52	.58	3.16	.58	.013	.00	.00	PIPE	
1246.980	3384.890	.604	3385.494	7.50	11.26	1.97	3387.46	.00	1.06	1.47	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0000					.0479	.24	.62	2.95		.013	.00	.00	PIPE	
1251.980	3384.890	.576	3385.466	7.50	11.99	2.23	3387.70	.02	1.06	1.46	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
51.578	.0523					.0491	2.53	.59	3.23	.58	.013	.00	.00	PIPE	
1303.558	3387.589	.595	3388.185	7.50	11.49	2.05	3390.23	.01	1.06	1.47	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
18.427	.0523					.0434	.80	.61	3.03	.58	.013	.00	.00	PIPE	
1321.985	3388.554	.617	3389.171	7.50	10.95	1.86	3391.03	.01	1.06	1.48	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
10.318	.0523					.0381	.39	.63	2.83	.58	.013	.00	.00	PIPE	
1332.302	3389.094	.639	3389.733	7.50	10.44	1.69	3391.43	.01	1.06	1.48	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
6.907	.0523					.0335	.23	.65	2.64	.58	.013	.00	.00	PIPE	
1339.209	3389.456	.663	3390.118	7.50	9.96	1.54	3391.66	.01	1.06	1.49	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
5.026	.0523					.0294	.15	.67	2.47	.58	.013	.00	.00	PIPE	
1344.236	3389.719	.688	3390.406	7.50	9.49	1.40	3391.81	.01	1.06	1.49	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3.834	.0523					.0259	.10	.70	2.30	.58	.013	.00	.00	PIPE	

WATER SURFACE PROFILE LISTING
KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU
LAT6-DI3 MODEL - STU ONSITE ASHY STORM AVE
CONNECTION FROM ONSITE DI (LOT 105) TO SDMH (LOT 20)

Date: 9-14-2022 Time: 9:40: 5

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	
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1348.070	3389.919	.713	3390.633	7.50	9.05	1.27	3391.90	.01	1.06	1.50	1.500	.000	.00	1	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.996	.0523					.0228	.07	.72	2.14	.58	.013	.00	.00	PIPE	
1351.066	3390.076	.740	3390.816	7.50	8.63	1.16	3391.97	.01	1.06	1.50	1.500	.000	.00	1	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.378	.0523					.0200	.05	.75	2.00	.58	.013	.00	.00	PIPE	
1353.444	3390.201	.769	3390.969	7.50	8.23	1.05	3392.02	.01	1.06	1.50	1.500	.000	.00	1	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.899	.0523					.0177	.03	.78	1.86	.58	.013	.00	.00	PIPE	
1355.343	3390.300	.798	3391.098	7.50	7.84	.96	3392.05	.01	1.06	1.50	1.500	.000	.00	1	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.514	.0523					.0156	.02	.81	1.73	.58	.013	.00	.00	PIPE	
1356.857	3390.379	.830	3391.209	7.50	7.48	.87	3392.08	.01	1.06	1.49	1.500	.000	.00	1	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.194	.0523					.0137	.02	.84	1.61	.58	.013	.00	.00	PIPE	
1358.051	3390.442	.862	3391.304	7.50	7.13	.79	3392.09	.01	1.06	1.48	1.500	.000	.00	1	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.921	.0523					.0121	.01	.87	1.49	.58	.013	.00	.00	PIPE	
1358.971	3390.490	.897	3391.387	7.50	6.80	.72	3392.11	.01	1.06	1.47	1.500	.000	.00	1	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.685	.0523					.0108	.01	.90	1.38	.58	.013	.00	.00	PIPE	
1359.656	3390.526	.934	3391.460	7.50	6.48	.65	3392.11	.00	1.06	1.45	1.500	.000	.00	1	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.473	.0523					.0095	.00	.94	1.28	.58	.013	.00	.00	PIPE	
1360.129	3390.551	.973	3391.524	7.50	6.18	.59	3392.12	.00	1.06	1.43	1.500	.000	.00	1	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.279	.0523					.0085	.00	.98	1.18	.58	.013	.00	.00	PIPE	

WATER SURFACE PROFILE LISTING
KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU
LAT6-DI3 MODEL - STU ONSITE ASHY STORM AVE
CONNECTION FROM ONSITE DI (LOT 105) TO SDMH (LOT 20)

Date: 9-14-2022 Time: 9:40: 5

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
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1360.408	3390.565	1.015	3391.580	7.50	5.89	.54	3392.12	.00	1.06	1.40	1.500	.000	.00	1 .0
	-.092	-.0523				.0075	.00	1.02	1.09	.58	.013	.00	.00	PIPE
1360.500	3390.570	1.061	3391.631	7.50	5.61	.49	3392.12	.42	1.06	1.37	1.500	.000	.00	1 .0
	-.728	-.0000				.0067	.00	1.48	1.00	.00	.013	.00	.00	PIPE
1361.228	3390.570	1.114	3391.684	7.50	5.33	.44	3392.13	.37	1.06	1.31	1.500	.000	.00	1 .0
	-.102	-.0000				.0063	.00	1.48	.91	.00	.013	.00	.00	PIPE
1361.330	3390.570	1.118	3391.688	7.50	5.31	.44	3392.13	.36	1.06	1.31	1.500	.000	.00	1 .0
	-.840	-.0000				.0061	.01	1.47	.90	.00	.013	.00	.00	PIPE
1362.170	3390.570	1.141	3391.711	7.50	5.20	.42	3392.13	.34	1.06	1.28	1.500	.000	.00	1 .0
	-.830	-.0000				.0058	.00	1.48	.86	.00	.013	.00	.00	PIPE
1363.000	3390.570	1.159	3391.729	7.50	5.12	.41	3392.14	.32	1.06	1.26	1.500	.000	.00	1 .0
	-.830	-.0000				.0057	.00	1.48	.84	.00	.013	.00	.00	PIPE
1363.830	3390.570	1.174	3391.744	7.50	5.06	.40	3392.14	.20	1.06	1.24	1.500	.000	.00	1 .0
	-.840	-.0000				.0055	.00	1.38	.81	.00	.013	.00	.00	PIPE
1364.670	3390.570	1.187	3391.757	7.50	5.00	.39	3392.15	.00	1.06	1.22	1.500	.000	.00	1 .0
JUNCT STR	.0000					.0036	.00	1.19	.79		.013	.00	.00	PIPE
1365.500	3390.570	1.588	3392.158	4.50	2.55	.10	3392.26	.00	.81	.00	1.500	.000	.00	1 .0
	1.846	.0497				.0018	.00	1.59	.00	.45	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING
KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU
LAT6-DI3 MODEL - STU ONSITE ASHY STORM AVE
CONNECTION FROM ONSITE DI (LOT 105) TO SDMH (LOT 20)

Date: 9-14-2022 Time: 9:40: 5

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

1367.346	3390.662	1.500	3392.162	4.50	2.55	.10	3392.26	.00	.81	.00	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.667	.0497					.0017	.00	1.50	.00	.45	.013	.00	.00	PIPE	
1370.013	3390.794	1.361	3392.155	4.50	2.67	.11	3392.27	.00	.81	.87	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.451	.0497					.0017	.00	1.36	.34	.45	.013	.00	.00	PIPE	
1371.465	3390.866	1.280	3392.146	4.50	2.80	.12	3392.27	.00	.81	1.06	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.136	.0497					.0018	.00	1.28	.40	.45	.013	.00	.00	PIPE	
1372.601	3390.923	1.214	3392.136	4.50	2.94	.13	3392.27	.00	.81	1.18	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.771	.0497					.0020	.00	1.21	.45	.45	.013	.00	.00	PIPE	
1373.371	3390.961	1.155	3392.116	4.50	3.08	.15	3392.26	.00	.81	1.26	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
HYDRAULIC JUMP															
1373.371	3390.961	.544	3391.506	4.50	7.77	.94	3392.44	.00	.81	1.44	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.447	.0497					.0217	.03	.54	2.16	.45	.013	.00	.00	PIPE	
1374.819	3391.033	.564	3391.597	4.50	7.41	.85	3392.45	.00	.81	1.45	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.867	.0497					.0191	.04	.56	2.02	.45	.013	.00	.00	PIPE	
1376.686	3391.126	.584	3391.710	4.50	7.06	.77	3392.49	.00	.81	1.46	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.494	.0497					.0167	.02	.58	1.89	.45	.013	.00	.00	PIPE	
1378.179	3391.200	.605	3391.806	4.50	6.74	.70	3392.51	.00	.81	1.47	1.500	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.198	.0497					.0147	.02	.61	1.76	.45	.013	.00	.00	PIPE	

FILE: LAT6-DI3.WSW
 W S P G W - CIVILDESIGN Version 14.08
 Program Package Serial Number: 7189
 WATER SURFACE PROFILE LISTING
 KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU
 LAT6-DI3 MODEL - STU ONSITE ASHY STORM AVE
 CONNECTION FROM ONSITE DI (LOT 105) TO SDMH (LOT 20)
 Date: 9-14-2022 Time: 9:40: 5

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 or I.D.	Base Wt	ZL	No Wth
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1379.377	3391.260	.628	3391.887	4.50	6.42	.64	3392.53	.00	.81	1.48	1.500	.000	.00	1 .0
	.957 .0497					.0129	.01	.63	1.64	.45	.013	.00	.00	PIPE
1380.334	3391.307	.651	3391.958	4.50	6.12	.58	3392.54	.00	.81	1.49	1.500	.000	.00	1 .0
	.751 .0497					.0113	.01	.65	1.53	.45	.013	.00	.00	PIPE
1381.085	3391.345	.675	3392.019	4.50	5.84	.53	3392.55	.00	.81	1.49	1.500	.000	.00	1 .0
	.577 .0497					.0100	.01	.67	1.43	.45	.013	.00	.00	PIPE
1381.662	3391.373	.700	3392.073	4.50	5.57	.48	3392.55	.00	.81	1.50	1.500	.000	.00	1 .0
	.426 .0497					.0088	.00	.70	1.33	.45	.013	.00	.00	PIPE
1382.088	3391.395	.726	3392.121	4.50	5.31	.44	3392.56	.00	.81	1.50	1.500	.000	.00	1 .0
	.290 .0497					.0077	.00	.73	1.24	.45	.013	.00	.00	PIPE
1382.377	3391.409	.754	3392.163	4.50	5.06	.40	3392.56	.00	.81	1.50	1.500	.000	.00	1 .0
	.167 .0497					.0068	.00	.75	1.16	.45	.013	.00	.00	PIPE
1382.544	3391.417	.783	3392.200	4.50	4.83	.36	3392.56	.00	.81	1.50	1.500	.000	.00	1 .0
	.056 .0497					.0060	.00	.78	1.08	.45	.013	.00	.00	PIPE
1382.600	3391.420	.814	3392.234	4.50	4.59	.33	3392.56	.00	.81	1.49	1.500	.000	.00	1 .0

WSPGW Lateral Model – Entryway
LAT6-ENTRY

LAT6-MAIN WSPG Summary
From Entryway to LAT6-DI3 Model

WSPG Station	Storm Drain Dimension	Invert Elevation (ft)	Q ₁₀₀ (cfs)	WSE (ft)	Velocity (ft/s)	FG Elevation	Facility Description	HGL Check ¹
--------------	-----------------------	-----------------------	------------------------	----------	-----------------	--------------	----------------------	------------------------

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

1000.00	18" RCP	3390.57	3.00	3392.16	1.70	3399.70	SDMH7 / Connection to LAT6-DI3 Model	OK
1035.23	18" RCP	3393.30	3.00	3393.69	8.11	3402.30	SDMH8	OK
1036.48	18" RCP	3393.30	3.00	3393.69	8.33	3402.30		OK
1037.73	18" RCP	3393.30	3.00	3393.68	8.56	3402.30		OK
1038.98	18" RCP	3393.30	3.00	3393.67	8.79	3402.30		OK
1040.23	18" RCP	3393.30	3.00	3393.67	9.03	3402.30		OK
1094.05	18" RCP	3395.99	3.00	3396.65	4.02	3402.10	SDDI5	OK

T1 KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

T2 LATERAL MODEL - ENTRYWAY

T3 CONNECTION FROM ENTRYWAY TO ONSITE SD (LAT6 MAIN)

SO	1000.00	3390.57	18		3392.160		
R	1035.23	3393.30	18	.013		15.000	
R	1036.48	3393.30	18	.013		15.000	
R	1037.73	3393.30	18	.013		15.000	
R	1038.98	3393.30	18	.013		15.000	
R	1040.23	3393.30	18	.013		14.000	
R	1094.05	3395.99	18	.013			
SH	1094.05	3395.99	18				
CD	18	4	1	0.000	1.500	0.000	0.000 0.000 0.000 0.0000.00 0.00
Q				3.000			

FILE: LAT6-ENTRY.WSW

LAT6-ENTRY.EDT
W S P G W - EDIT LISTING - Version 14.10
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

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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 18 4 1 1.500

W S P G W

PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

HEADING LINE NO 2 IS - LATERAL MODEL - ENTRYWAY

HEADING LINE NO 3 IS - CONNECTION FROM ENTRYWAY TO ONSITE SD (LAT6 MAIN)

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	1 IS A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV												
				1000.000	3390.570	18	3392.160												
ELEMENT NO	2 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1035.230	3393.300	18	.013	134.569	15.000	.000	0								
ELEMENT NO	3 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1036.480	3393.300	18	.013	4.775	15.000	.000	0								
ELEMENT NO	4 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1037.730	3393.300	18	.013	4.775	15.000	.000	0								
ELEMENT NO	5 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1038.980	3393.300	18	.013	4.775	15.000	.000	0								
ELEMENT NO	6 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1040.230	3393.300	18	.013	5.116	14.000	.000	0								
ELEMENT NO	7 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1094.050	3395.990	18	.013	.000	.000	.000	0								
ELEMENT NO	8 IS A	SYSTEM HEADWORKS	U/S DATA	STATION	INVERT	SECT		W S ELEV											
				1094.050	3395.990	18	.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/or I.D.	ZL	No Wth
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	3390.570	1.590	3392.160	3.00	1.70	.04	3392.20	.00	.66	.00	1.500	.000	.00	1 .0
1.180	.0775					.0008	.00	.00	.00	.32	.013	.00	.00	PIPE
1001.180	3390.662	1.500	3392.162	3.00	1.70	.04	3392.21	1.50	.66	.00	1.500	.000	.00	1 .0
1.741	.0775					.0008	.00	1.50	.00	.32	.013	.00	.00	PIPE
1002.922	3390.797	1.361	3392.157	3.00	1.78	.05	3392.21	.00	.66	.87	1.500	.000	.00	1 .0
.989	.0775					.0007	.00	1.36	.23	.32	.013	.00	.00	PIPE
1003.910	3390.873	1.280	3392.153	3.00	1.87	.05	3392.21	.00	.66	1.06	1.500	.000	.00	1 .0
.798	.0775					.0008	.00	1.28	.27	.32	.013	.00	.00	PIPE
1004.708	3390.935	1.214	3392.149	3.00	1.96	.06	3392.21	.00	.66	1.18	1.500	.000	.00	1 .0
.221	.0775					.0008	.00	1.21	.30	.32	.013	.00	.00	PIPE
1004.930	3390.952	1.214	3392.166	3.00	1.96	.06	3392.23	.00	.66	1.18	1.500	.000	.00	1 .0
HYDRAULIC JUMP														
1004.930	3390.952	.329	3391.281	3.00	10.44	1.69	3392.97	.03	.66	1.24	1.500	.000	.00	1 .0
2.806	.0775					.0717	.20	.36	3.83	.32	.013	.00	.00	PIPE
1007.736	3391.169	.332	3391.502	3.00	10.30	1.65	3393.15	.03	.66	1.25	1.500	.000	.00	1 .0
11.878	.0775					.0658	.78	.36	3.75	.32	.013	.00	.00	PIPE
1019.614	3392.090	.344	3392.434	3.00	9.82	1.50	3393.93	.03	.66	1.26	1.500	.000	.00	1 .0
6.243	.0775					.0576	.36	.37	3.51	.32	.013	.00	.00	PIPE

LAT6-ENTRY.OUT

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING

Date: 9-13-2022 Time: 6:22:56

KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

LATERAL MODEL - ENTRYWAY

CONNECTION FROM ENTRYWAY TO ONSITE SD (LAT6 MAIN)

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
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1025.857	3392.574	.356	3392.929	3.00	9.36	1.36	3394.29	.03	.66	1.28	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4.106	.0775					.0503	.21	.38	3.29	.32	.013	.00	.00	PIPE
1029.963	3392.892	.368	3393.260	3.00	8.93	1.24	3394.50	.02	.66	1.29	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.983	.0775					.0440	.13	.39	3.08	.32	.013	.00	.00	PIPE
1032.946	3393.123	.380	3393.503	3.00	8.51	1.12	3394.63	.02	.66	1.31	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.284	.0775					.0385	.09	.40	2.89	.32	.013	.00	.00	PIPE
1035.230	3393.300	.394	3393.694	3.00	8.11	1.02	3394.72	.57	.66	1.32	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.250	.0000					.0373	.05	.96	2.70	.00	.013	.00	.00	PIPE
1036.480	3393.300	.386	3393.686	3.00	8.33	1.08	3394.76	.59	.66	1.31	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.250	.0000					.0402	.05	.98	2.80	.00	.013	.00	.00	PIPE
1037.730	3393.300	.379	3393.679	3.00	8.56	1.14	3394.82	.62	.66	1.30	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.250	.0000					.0434	.05	1.00	2.91	.00	.013	.00	.00	PIPE
1038.980	3393.300	.372	3393.672	3.00	8.79	1.20	3394.87	.61	.66	1.30	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.250	.0000					.0468	.06	.98	3.02	.00	.013	.00	.00	PIPE
1040.230	3393.300	.365	3393.665	3.00	9.03	1.27	3394.93	.00	.66	1.29	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
22.977	.0500					.0457	1.05	.36	3.13	.36	.013	.00	.00	PIPE
1063.207	3394.448	.377	3394.825	3.00	8.63	1.16	3395.98	.00	.66	1.30	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
9.299	.0500					.0401	.37	.38	2.94	.36	.013	.00	.00	PIPE

▲ FILE: LAT6-ENTRY.WSW

W S P G W - CIVILDESIGN Version 14.08

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Program Package Serial Number: 7189

LAT6-ENTRY.OUT
WATER SURFACE PROFILE LISTING
KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU
LATERAL MODEL - ENTRYWAY
CONNECTION FROM ENTRYWAY TO ONSITE SD (LAT6 MAIN)

Date: 9-13-2022 Time: 6:22:56

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	
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1072.506	3394.913	.390	3395.303	3.00	8.23	1.05	3396.35	.00	.66	1.32	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
5.496	.0500				.0350	.19	.39	2.75	.36	.013	.00	.00	PIPE	
1078.002	3395.188	.403	3395.591	3.00	7.85	.96	3396.55	.00	.66	1.33	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3.779	.0500				.0307	.12	.40	2.58	.36	.013	.00	.00	PIPE	
1081.781	3395.377	.417	3395.794	3.00	7.48	.87	3396.66	.00	.66	1.34	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.786	.0500				.0268	.07	.42	2.41	.36	.013	.00	.00	PIPE	
1084.567	3395.516	.431	3395.948	3.00	7.13	.79	3396.74	.00	.66	1.36	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.141	.0500				.0235	.05	.43	2.26	.36	.013	.00	.00	PIPE	
1086.708	3395.623	.447	3396.070	3.00	6.80	.72	3396.79	.00	.66	1.37	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.689	.0500				.0206	.03	.45	2.11	.36	.013	.00	.00	PIPE	
1088.397	3395.708	.462	3396.170	3.00	6.48	.65	3396.82	.00	.66	1.39	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.350	.0500				.0180	.02	.46	1.98	.36	.013	.00	.00	PIPE	
1089.747	3395.775	.478	3396.253	3.00	6.18	.59	3396.85	.00	.66	1.40	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.083	.0500				.0158	.02	.48	1.85	.36	.013	.00	.00	PIPE	
1090.830	3395.829	.495	3396.324	3.00	5.90	.54	3396.86	.00	.66	1.41	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.873	.0500				.0138	.01	.50	1.73	.36	.013	.00	.00	PIPE	
1091.703	3395.873	.513	3396.385	3.00	5.62	.49	3396.88	.00	.66	1.42	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.697	.0500				.0121	.01	.51	1.62	.36	.013	.00	.00	PIPE	

▲ FILE: LAT6-ENTRY.WSW

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WATER SURFACE PROFILE LISTING

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LAT6-ENTRY.OUT

KBH2204: SUMMERLIN VILLAGE 22 PARCEL STU

LATERAL MODEL - ENTRYWAY

CONNECTION FROM ENTRYWAY TO ONSITE SD (LAT6 MAIN)

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	
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type	Ch

1092.400	3395.908	.531	3396.439	3.00	5.36	.45	3396.88	.00	.66	1.43	1.500	.000	.00	1	.0
	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -
	.547	.0500				.0106	.01	.53	1.51	.36	.013	.00	.00	PIPE	
1092.947	3395.935	.550	3396.485	3.00	5.11	.41	3396.89	.00	.66	1.45	1.500	.000	.00	1	.0
	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -
	.422	.0500				.0093	.00	.55	1.41	.36	.013	.00	.00	PIPE	
1093.369	3395.956	.570	3396.526	3.00	4.87	.37	3396.89	.00	.66	1.46	1.500	.000	.00	1	.0
	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -
	.309	.0500				.0082	.00	.57	1.32	.36	.013	.00	.00	PIPE	
1093.677	3395.971	.590	3396.562	3.00	4.65	.34	3396.90	.00	.66	1.47	1.500	.000	.00	1	.0
	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -
	.209	.0500				.0072	.00	.59	1.23	.36	.013	.00	.00	PIPE	
1093.887	3395.982	.612	3396.594	3.00	4.43	.30	3396.90	.00	.66	1.47	1.500	.000	.00	1	.0
	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -
	.123	.0500				.0063	.00	.61	1.15	.36	.013	.00	.00	PIPE	
1094.010	3395.988	.634	3396.622	3.00	4.22	.28	3396.90	.00	.66	1.48	1.500	.000	.00	1	.0
	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -
	.040	.0500				.0055	.00	.63	1.07	.36	.013	.00	.00	PIPE	
1094.050	3395.990	.658	3396.648	3.00	4.02	.25	3396.90	.00	.66	1.49	1.500	.000	.00	1	.0
	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -	-. -

^

APPENDIX D

Finished Floor Analyses

Sumerlin Village 22 Parcel STU - TDS
FINISHED FLOOR - CITY OF LAS VEGAS JURISDICTION

INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C ¹ (ft)	F/L ² (ft)	D ₁₀₀ (ft)	Flowline F.F. _{min} ³ (ft)	T/C + 6" F.F. _{min} ⁴ (ft)	F.F. _{Design} (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
1	B3-N	3429.29	3428.91	0.29	3429.49	3429.79	3430.7	OK	OK	
2	B3-N	3427.91	3427.53	0.29	3428.11	3428.41	3429.3	OK	OK	
3	B3-N	3426.07	3425.69	0.29	3426.27	3426.57	3427.5	OK	OK	
4	B3-N	3423.87	3423.49	0.29	3424.07	3424.37	3425.3	OK	OK	
5	B3-N	3420.00	3419.62	0.29	3420.20	3420.50	3421.4	OK	OK	
6	B3-N	3417.11	3416.73	0.29	3417.31	3417.61	3418.5	OK	OK	
7	B3-N	3414.37	3413.99	0.29	3414.57	3414.87	3415.8	OK	OK	
8	B3-N	3411.83	3411.45	0.29	3412.03	3412.33	3413.3	OK	OK	
9	H4-N	3401.13	3400.75	0.45	3401.65	3401.63	3402.2	OK	OK	
10	H4-N	3399.05	3398.67	0.45	3399.57	3399.55	3400.2	OK	OK	
11	H4-N	3397.29	3396.91	0.45	3397.81	3397.79	3398.4	OK	OK	
12	H4-N	3395.50	3395.12	0.45	3396.02	3396.00	3396.6	OK	OK	
13	H4-N	3393.99	3393.61	0.45	3394.51	3394.49	3395.1	OK	OK	
14	H4-N	3391.65	3391.27	0.45	3392.17	3392.15	3392.8	OK	OK	
15	H4-N	3389.95	3389.57	0.45	3390.47	3390.45	3391.1	OK	OK	
16	H4-N	3388.11	3387.73	0.45	3388.63	3388.61	3389.2	OK	OK	
17	H4-N	3385.73	3385.35	0.45	3386.25	3386.23	3386.8	OK	OK	
18	H4-N	3383.04	3382.66	0.45	3383.56	3383.54	3384.1	OK	OK	
19	H4-N	3380.56	3380.18	0.45	3381.08	3381.06	3381.7	OK	OK	
20	F2	3382.85	3382.47	0.35	3383.17	3383.35	3384.1	OK	OK	
21	F2	3383.85	3383.47	0.35	3384.17	3384.35	3385.1	OK	OK	
22	F2	3384.83	3384.45	0.35	3385.15	3385.33	3386.1	OK	OK	
23	F2	3385.70	3385.32	0.35	3386.02	3386.20	3387.0	OK	OK	
24	F1	3388.33	3387.95	0.39	3388.73	3388.83	3389.6	OK	OK	
25	F1	3389.43	3389.05	0.39	3389.83	3389.93	3390.7	OK	OK	
26	F1	3390.64	3390.26	0.39	3391.04	3391.14	3391.9	OK	OK	
27	F1	3391.55	3391.17	0.39	3391.95	3392.05	3392.9	OK	OK	
28	F1	3392.36	3391.98	0.39	3392.76	3392.86	3393.4	OK	OK	
29	A1	3393.85	3393.47	0.29	3394.05	3394.35	3395.3	OK	OK	
30	A1	3394.12	3393.74	0.29	3394.32	3394.62	3395.5	OK	OK	
31	A1	3394.99	3394.61	0.29	3395.19	3395.49	3396.4	OK	OK	

Sumerlin Vilage 22 Parcel STU - TDS
FINISHED FLOOR - CITY OF LAS VEGAS JURISDICTION

INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C ¹ (ft)	F/L ² (ft)	D ₁₀₀ (ft)	Flowline F.F. _{min} ³ (ft)	T/C + 6" F.F. _{min} ⁴ (ft)	F.F. _{Design} (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
32	A1	3396.13	3395.75	0.29	3396.33	3396.63	3397.6	OK	OK	
33	A1	3397.70	3397.32	0.29	3397.90	3398.20	3399.1	OK	OK	
34	A1	3400.66	3400.28	0.29	3400.86	3401.16	3402.1	OK	OK	
35	A1	3403.19	3402.81	0.29	3403.39	3403.69	3404.6	OK	OK	
36	A1	3406.13	3405.75	0.29	3406.33	3406.63	3407.6	OK	OK	
37	A1	3409.47	3409.09	0.29	3409.67	3409.97	3410.6	OK	OK	
38	A1	3414.71	3414.33	0.29	3414.91	3415.21	3415.8	OK	OK	
39	A1	3418.36	3417.98	0.29	3418.56	3418.86	3419.4	OK	OK	
40	A1	3422.02	3421.64	0.29	3422.22	3422.52	3423.1	OK	OK	
41	A1	3425.67	3425.29	0.29	3425.87	3426.17	3426.7	OK	OK	
42	A1	3429.33	3428.95	0.29	3429.53	3429.83	3430.4	OK	OK	
43	A1	3435.37	3434.99	0.29	3435.57	3435.87	3436.4	OK	OK	
44	A1	3438.99	3438.61	0.29	3439.19	3439.49	3440.1	OK	OK	
45	A1	3442.37	3441.99	0.29	3442.57	3442.87	3443.5	OK	OK	
46	A1	3446.47	3446.09	0.29	3446.67	3446.97	3447.9	OK	OK	
47	A1	3448.78	3448.40	0.29	3448.98	3449.28	3450.2	OK	OK	
48	A1	3450.50	3450.12	0.29	3450.70	3451.00	3451.9	OK	OK	
49	A1	3451.78	3451.40	0.29	3451.98	3452.28	3453.2	OK	OK	
50	B1	3455.19	3454.81	0.35	3455.51	3455.69	3457.3	OK	OK	
51	B1	3454.35	3453.97	0.35	3454.67	3454.85	3456.4	OK	OK	
52	B1	3453.21	3452.83	0.35	3453.53	3453.71	3455.2	OK	OK	
53	B1	3451.87	3451.49	0.35	3452.19	3452.37	3453.8	OK	OK	
54	B1	3450.34	3449.96	0.35	3450.66	3450.84	3452.3	OK	OK	
55	B1	3446.92	3446.54	0.35	3447.24	3447.42	3448.8	OK	OK	
56	B1	3444.82	3444.44	0.35	3445.14	3445.32	3446.7	OK	OK	
57	B1	3442.53	3442.15	0.35	3442.85	3443.03	3444.4	OK	OK	
58	B1	3440.04	3439.66	0.35	3440.36	3440.54	3442.1	OK	OK	
59	B1	3437.70	3437.32	0.35	3438.02	3438.20	3439.8	OK	OK	
60	B1	3434.86	3434.48	0.35	3435.18	3435.36	3436.7	OK	OK	
61	B1	3433.27	3432.89	0.35	3433.59	3433.77	3434.9	OK	OK	
62	B1	3431.98	3431.60	0.35	3432.30	3432.48	3433.4	OK	OK	

Sumerlin Vilage 22 Parcel STU - TDS
FINISHED FLOOR - CITY OF LAS VEGAS JURISDICTION

INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C ¹ (ft)	F/L ² (ft)	D ₁₀₀ (ft)	Flowline F.F. _{min} ³ (ft)	T/C + 6" F.F. _{min} ⁴ (ft)	F.F. _{Design} (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
63	B1	3431.01	3430.63	0.35	3431.33	3431.51	3432.4	OK	OK	
64	B1	3430.33	3429.95	0.35	3430.65	3430.83	3431.7	OK	OK	
65	B1	3432.59	3432.21	0.35	3432.91	3433.09	3434.0	OK	OK	
66	B1	3433.91	3433.53	0.35	3434.23	3434.41	3435.3	OK	OK	
67	B1	3435.61	3435.23	0.35	3435.93	3436.11	3437.0	OK	OK	
68	B1	3437.42	3437.04	0.35	3437.74	3437.92	3438.8	OK	OK	
69	B1	3439.68	3439.30	0.35	3440.00	3440.18	3441.1	OK	OK	
70	B1	3443.17	3442.79	0.35	3443.49	3443.67	3444.6	OK	OK	
71	B1	3445.18	3444.80	0.35	3445.50	3445.68	3446.6	OK	OK	
72	B1	3447.20	3446.82	0.35	3447.52	3447.70	3448.6	OK	OK	
73	B1	3448.87	3448.49	0.35	3449.19	3449.37	3450.3	OK	OK	
74	B1	3450.28	3449.90	0.35	3450.60	3450.78	3451.7	OK	OK	
75	C1	3440.68	3440.30	0.31	3440.92	3441.18	3442.1	OK	OK	
76	C1	3439.27	3438.89	0.31	3439.51	3439.77	3440.7	OK	OK	
77	C1	3437.10	3436.72	0.31	3437.34	3437.60	3438.5	OK	OK	
78	C1	3434.39	3434.01	0.31	3434.63	3434.89	3435.8	OK	OK	
79	C1	3431.87	3431.49	0.31	3432.11	3432.37	3433.3	OK	OK	
80	C1	3428.25	3427.87	0.31	3428.49	3428.75	3429.7	OK	OK	
81	C1	3426.12	3425.74	0.31	3426.36	3426.62	3427.5	OK	OK	
82	C1	3424.23	3423.85	0.31	3424.47	3424.73	3425.7	OK	OK	
83	C1	3422.59	3422.21	0.31	3422.83	3423.09	3424.0	OK	OK	
84	C1	3421.20	3420.82	0.31	3421.44	3421.70	3422.6	OK	OK	
85	H1-S	3410.97	3410.59	0.4	3411.39	3411.47	3412.5	OK	OK	
86	H1-S	3413.36	3412.98	0.4	3413.78	3413.86	3414.9	OK	OK	
87	H1-S	3415.54	3415.16	0.4	3415.96	3416.04	3417.1	OK	OK	
88	C1	3422.08	3421.70	0.31	3422.32	3422.58	3423.5	OK	OK	
89	C1	3424.02	3423.64	0.31	3424.26	3424.52	3425.4	OK	OK	
90	C1	3426.46	3426.08	0.31	3426.70	3426.96	3427.9	OK	OK	
91	C1	3430.16	3429.78	0.31	3430.40	3430.66	3431.6	OK	OK	
92	C1	3432.67	3432.29	0.31	3432.91	3433.17	3434.1	OK	OK	
93	C1	3434.87	3434.49	0.31	3435.11	3435.37	3436.3	OK	OK	

Sumerlin Village 22 Parcel STU - TDS
FINISHED FLOOR - CITY OF LAS VEGAS JURISDICTION

INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C ¹ (ft)	F/L ² (ft)	D ₁₀₀ (ft)	Flowline F.F. _{min} ³ (ft)	T/C + 6" F.F. _{min} ⁴ (ft)	F.F. _{Design} (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
94	D2	3435.78	3435.40	0.2	3435.80	3436.28	3437.5	OK	OK	
95	D2	3433.09	3432.71	0.2	3433.11	3433.59	3434.3	OK	OK	
96	D2	3429.76	3429.38	0.2	3429.78	3430.26	3430.9	OK	OK	
97	D2	3426.10	3425.72	0.2	3426.12	3426.60	3427.3	OK	OK	
98	D2	3422.77	3422.39	0.2	3422.79	3423.27	3423.9	OK	OK	
99	D1	3412.64	3412.26	0.36	3412.98	3413.14	3413.9	OK	OK	
100	D1	3411.40	3411.02	0.36	3411.74	3411.90	3412.7	OK	OK	
101	D1	3410.04	3409.66	0.36	3410.38	3410.54	3411.3	OK	OK	
102	D1	3408.20	3407.82	0.36	3408.54	3408.70	3409.5	OK	OK	
103	D1	3406.96	3406.58	0.36	3407.30	3407.46	3408.2	OK	OK	
104	D1	3405.60	3405.22	0.36	3405.94	3406.10	3406.9	OK	OK	
105	D1	3403.39	3403.01	0.36	3403.73	3403.89	3405.4	OK	OK	
106	D1	3402.63	3402.25	0.36	3402.97	3403.13	3403.7	OK	OK	
107	D1	3401.41	3401.03	0.36	3401.75	3401.91	3402.5	OK	OK	
108	D1	3399.41	3399.03	0.36	3399.75	3399.91	3400.5	OK	OK	
109	D1	3397.59	3397.21	0.36	3397.93	3398.09	3398.7	OK	OK	
110	D1	3406.05	3405.67	0.36	3406.39	3406.55	3407.3	OK	OK	
111	D1	3407.41	3407.03	0.36	3407.75	3407.91	3408.7	OK	OK	
112	D1	3409.37	3408.99	0.36	3409.71	3409.87	3410.7	OK	OK	
113	D1	3410.73	3410.35	0.36	3411.07	3411.23	3412.0	OK	OK	
114	D1	3412.09	3411.71	0.36	3412.43	3412.59	3413.3	OK	OK	
115	D1	3412.99	3412.61	0.36	3413.33	3413.49	3414.3	OK	OK	
116	D1	3413.75	3413.37	0.36	3414.09	3414.25	3415.0	OK	OK	
117	E1	3400.91	3400.53	0.36	3401.25	3401.41	3402.2	OK	OK	
118	E1	3400.16	3399.78	0.36	3400.50	3400.66	3401.4	OK	OK	
119	E1	3399.26	3398.88	0.36	3399.60	3399.76	3400.5	OK	OK	
120	E1	3398.43	3398.05	0.36	3398.77	3398.93	3399.7	OK	OK	
121	E1	3397.92	3397.54	0.36	3398.26	3398.42	3399.2	OK	OK	
122	E1	3397.35	3396.97	0.36	3397.69	3397.85	3398.6	OK	OK	
123	E1	3398.65	3398.27	0.36	3398.99	3399.15	3400.2	OK	OK	
124	E2	3393.70	3393.32	0.44	3394.20	3394.20	3395.0	OK	OK	
125	E2	3394.83	3394.45	0.44	3395.33	3395.33	3396.1	OK	OK	

Sumerlin Village 22 Parcel STU - TDS
FINISHED FLOOR - CITY OF LAS VEGAS JURISDICTION

INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C ¹ (ft)	F/L ² (ft)	D ₁₀₀ (ft)	Flowline F.F. _{min} ³ (ft)	T/C + 6" F.F. _{min} ⁴ (ft)	F.F. _{Design} (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
126	E2	3395.46	3395.08	0.44	3395.96	3395.96	3396.7	OK	OK	
127	E1	3396.03	3395.65	0.36	3396.37	3396.53	3397.3	OK	OK	
128	E1	3396.56	3396.18	0.36	3396.90	3397.06	3397.8	OK	OK	
129	E1	3397.33	3396.95	0.36	3397.67	3397.83	3398.6	OK	OK	
130	E1	3397.90	3397.52	0.36	3398.24	3398.40	3399.2	OK	OK	
131	E1	3398.42	3398.04	0.36	3398.76	3398.92	3399.7	OK	OK	
132	E1	3398.78	3398.40	0.36	3399.12	3399.28	3400.1	OK	OK	
133	E1	3399.18	3398.80	0.36	3399.52	3399.68	3400.5	OK	OK	
134	E1	3399.48	3399.10	0.36	3399.82	3399.98	3400.8	OK	OK	
135	F1	3392.96	3392.58	0.39	3393.36	3393.46	3394.3	OK	OK	
136	F1	3392.11	3391.73	0.39	3392.51	3392.61	3393.5	OK	OK	
137	F1	3390.89	3390.51	0.39	3391.29	3391.39	3392.3	OK	OK	
138	F1	3389.68	3389.30	0.39	3390.08	3390.18	3391.1	OK	OK	
139	F1	3388.47	3388.09	0.39	3388.87	3388.97	3389.9	OK	OK	
140	F1	3386.98	3386.60	0.39	3387.38	3387.48	3388.4	OK	OK	
141	F1	3386.11	3385.73	0.39	3386.51	3386.61	3387.5	OK	OK	
142	F1	3385.24	3384.86	0.39	3385.64	3385.74	3386.6	OK	OK	
143	F1	3384.63	3384.25	0.39	3385.03	3385.13	3386.0	OK	OK	
144	F1	3384.01	3383.63	0.39	3384.41	3384.51	3385.4	OK	OK	

Where:

- 1: Top of Curb at High Side of Lot
- 2: TC-0.38 (For Mod. Roll Curb), TC-0.5 (For L Curb)
- 3: Minimum Allowable Finished Floor Elevation above flowline elevation @ high side of lot = (2 x D₁₀₀) + 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. Per HCDDM, Section 304.4.
- The finished floor shall be set a vertical distance of at least 6-inches above the highest adjacent top of curb. Per HCDDM, Section 1602.

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	FG/TRW ⁵	# of Solid Grout Courses ⁶	Notes
1	Ashy Storm Ave	3429.81	3429.43	B1	0.35	3430.13	3430.7	OK	No		-	
1	Kindle Rise Way	3426.09	3425.59	KRW1	0.31	3426.21	3430.7	OK	No		-	
2	Kindle Rise Way	3425.19	3424.69	KRW1	0.31	3425.31	3429.3	OK	No		-	
3	Kindle Rise Way	3423.95	3423.45	KRW1	0.31	3424.07	3427.5	OK	No		-	
4	Kindle Rise Way	3422.32	3421.82	KRW1	0.31	3422.44	3425.3	OK	No		-	
5	Kindle Rise Way	3419.33	3418.83	KRW1	0.31	3419.45	3421.4	OK	No		-	
6	Kindle Rise Way	3416.82	3416.32	KRW1	0.31	3416.94	3418.5	OK	No		-	
7	Kindle Rise Way	3414.01	3413.51	KRW1	0.31	3414.13	3415.8	OK	No		-	
8	Kindle Rise Way	3411.22	3410.72	KRW1	0.31	3411.34	3413.3	OK	No		-	
9	Pearl Kite St	3402.79	3402.41	G1	0.33	3403.07	3402.2	CHECK	Yes	3403.40	See note	**
9	Kindle Rise Way	3397.23	3396.73	KRW1	0.31	3397.35	3402.2	OK	No		-	
10	Kindle Rise Way	3393.99	3393.49	KRW1	0.31	3394.11	3400.2	OK	No		-	
11	Kindle Rise Way	3391.14	3390.64	KRW1	0.31	3391.26	3398.4	OK	No		-	
12	Kindle Rise Way	3388.11	3387.61	KRW1	0.31	3388.23	3396.6	OK	No		-	
13	Kindle Rise Way	3385.34	3384.84	KRW1	0.31	3385.46	3395.1	OK	No		-	
14	Kindle Rise Way	3381.14	3380.64	KRW1	0.31	3381.26	3392.8	OK	No		-	
15	Kindle Rise Way	3378.56	3378.06	KRW1	0.31	3378.68	3391.1	OK	No		-	
16	Kindle Rise Way	3376.50	3376.00	KRW1	0.31	3376.62	3389.2	OK	No		-	
17	Kindle Rise Way	3374.58	3374.08	KRW1	0.31	3374.70	3386.8	OK	No		-	
18	Kindle Rise Way	3372.99	3372.49	KRW1	0.31	3373.11	3384.1	OK	No		-	
19	Kindle Rise Way	3371.89	3371.39	KRW1	0.31	3372.01	3381.7	OK	No		-	
19	Desert Foothills Drive	3371.89	3371.39	DFD3	0.26	3371.91	3381.7	OK	No		-	
20	Desert Foothills Drive	3374.79	3374.29	DFD3	0.26	3374.81	3384.1	OK	No		-	
20	Ashy Storm Ave	3379.07	3378.69	H4-S	0.46	3379.61	3384.1	OK	No		-	
21	Desert Foothills Drive	3375.69	3375.19	DFD3	0.26	3375.71	3385.1	OK	No		-	
22	Desert Foothills Drive	3376.58	3376.08	DFD3	0.26	3376.60	3386.1	OK	No		-	
23	Desert Foothills Drive	3377.48	3376.98	DFD3	0.26	3377.50	3387.0	OK	No		-	
24	Desert Foothills Drive	3379.53	3379.03	DFD3	0.26	3379.55	3389.6	OK	No		-	
25	Desert Foothills Drive	3380.01	3379.51	DFD3	0.26	3380.03	3390.7	OK	No		-	
26	Desert Foothills Drive	3380.41	3379.91	DFD3	0.26	3380.43	3391.9	OK	No		-	
27	Desert Foothills Drive	3380.73	3380.23	DFD3	0.26	3380.75	3392.9	OK	No		-	
28	Desert Foothills Drive	3381.08	3380.58	DFD3	0.26	3381.10	3393.4	OK	No		-	
28	Stone Curlew Ave	3393.35	3392.97	D2	0.20	3393.37	3393.4	OK	No		-	
29	Desert Foothills Drive	3382.21	3381.71	DFD3	0.26	3382.23	3395.3	OK	No		-	
29	Flight Range Ave	3386.72	3386.22	FRA1	0.31	3386.84	3395.3	OK	No		-	
30	Flight Range Ave	3388.51	3388.01	FRA1	0.31	3388.63	3395.5	OK	No		-	
31	Flight Range Ave	3390.59	3390.09	FRA1	0.31	3390.71	3396.4	OK	No		-	
32	Flight Range Ave	3392.94	3392.44	FRA1	0.31	3393.06	3397.6	OK	No		-	
33	Flight Range Ave	3395.50	3395.00	FRA1	0.31	3395.62	3399.1	OK	No		-	
34	Flight Range Ave	3399.73	3399.23	FRA1	0.31	3399.85	3402.1	OK	No		-	
35	Flight Range Ave	3402.78	3402.28	FRA1	0.31	3402.90	3404.6	OK	No		-	

Supplemental Finish Floor Checks												
36	Flight Range Ave	3405.85	3405.35	FRA1	0.31	3405.97	3407.6	OK	No		-	
37	Flight Range Ave	3408.92	3408.42	FRA1	0.31	3409.04	3410.6	OK	No		-	
38	Flight Range Ave	3413.38	3412.88	FRA1	0.31	3413.50	3415.8	OK	No		-	
39	Flight Range Ave	3416.55	3416.05	FRA1	0.31	3416.67	3419.4	OK	No		-	
40	Flight Range Ave	3419.73	3419.23	FRA1	0.31	3419.85	3423.1	OK	No		-	
41	Flight Range Ave	3422.90	3422.40	FRA1	0.31	3423.02	3426.7	OK	No		-	
42	Flight Range Ave	3426.17	3425.67	FRA1	0.31	3426.29	3430.4	OK	No		-	
43	Flight Range Ave	3431.42	3430.92	FRA1	0.31	3431.54	3436.4	OK	No		-	
44	Flight Range Ave	3434.82	3434.32	FRA1	0.31	3434.94	3440.1	OK	No		-	
45	Flight Range Ave	3438.23	3437.73	FRA1	0.31	3438.35	3443.5	OK	No		-	
46	Flight Range Ave	3443.11	3442.61	FRA1	0.31	3443.23	3447.9	OK	No		-	
47	Flight Range Ave	3446.37	3445.87	FRA1	0.31	3446.49	3450.2	OK	No		-	
48	Flight Range Ave	3449.09	3448.59	FRA1	0.31	3449.21	3451.9	OK	No		-	
49	Flight Range Ave	3451.62	3451.12	FRA1	0.31	3451.74	3453.2	OK	No		-	
49	Little Penguin St	3454.79	3454.41	B1	0.35	3455.11	3453.2	CHECK	Yes		See Note	*
50	Flight Range Ave	3455.40	3454.90	FRA1	0.31	3455.52	3457.3	OK	No	3457.20	See Note	*
50	Kettle Ridge Drive	3456.82	3456.32	ST1-E	0.24	3456.80	3457.3	OK	No		-	
51	Kettle Ridge Drive	3455.92	3455.42	ST1-E	0.24	3455.90	3456.4	OK	No		-	
52	Kettle Ridge Drive	3454.72	3454.22	ST1-E	0.24	3454.70	3455.2	OK	No		-	
53	Kettle Ridge Drive	3453.33	3452.83	ST1-E	0.24	3453.31	3453.8	OK	No		-	
54	Kettle Ridge Drive	3451.75	3451.25	ST1-E	0.24	3451.73	3452.3	OK	No		-	
55	Kettle Ridge Drive	3448.27	3447.77	ST1-E	0.24	3448.25	3448.8	OK	No		-	
56	Kettle Ridge Drive	3446.15	3445.65	ST1-E	0.24	3446.13	3446.7	OK	No		-	
57	Kettle Ridge Drive	3443.87	3443.37	ST1-E	0.24	3443.85	3444.4	OK	No		-	
58	Kettle Ridge Drive	3441.58	3441.08	ST1-E	0.24	3441.56	3442.1	OK	No		-	
59	Kettle Ridge Drive	3439.32	3438.82	ST1-E	0.24	3439.30	3439.8	OK	No		-	
60	Kettle Ridge Drive	3436.24	3435.74	ST1-E	0.24	3436.22	3436.7	OK	No		-	
61	Kettle Ridge Drive	3434.42	3433.92	ST1-E	0.24	3434.40	3434.9	OK	No		-	
62	Kettle Ridge Drive	3432.89	3432.39	ST1-E	0.24	3432.87	3433.4	OK	No		-	
63	Kettle Ridge Drive	3431.63	3431.13	ST1-E	0.24	3431.61	3432.4	OK	No		-	
64	Kettle Ridge Drive	3430.66	3430.16	ST1-E	0.24	3430.64	3431.7	OK	No		-	
65	Ashy Storm Ave	3430.33	3429.95	B2-S	0.32	3430.59	3434.0	OK	No		-	
74	Stone Curlew Ave	3450.72	3450.34	D2	0.20	3450.74	3451.7	OK	No		-	
75	Stone Curlew Ave	3450.17	3449.79	D2	0.20	3450.19	3442.1	CHECK	Yes		See Note	*
84	Ashy Storm Ave	3425.31	3424.93	B2-S	0.32	3425.57	3422.6	CHECK	Yes	3426.18	1	
87	Bat Hawk St	3419.67	3419.29	C1	0.31	3419.91	3417.1	CHECK	Yes	3420.44	1	

Supplemental Finish Floor Checks												
105	Ashy Storm Drive	3403.98	3403.60	H1-S	0.40	3404.40	3405.4	OK	No		-	
106	Ashy Storm Drive	3401.84	3401.46	H1-S	0.40	3402.26	3403.7	OK	No		-	
107	Ashy Storm Drive	3399.78	3399.40	H1-S	0.40	3400.20	3402.5	OK	No		-	
108	Ashy Storm Drive	3397.67	3397.29	H1-S	0.40	3398.09	3400.5	OK	No		-	
109	Ashy Storm Drive	3395.73	3395.35	H1-S	0.40	3396.15	3398.7	OK	No		-	
110	Crowned Eagle Ave	3402.63	3402.25	D1	0.36	3402.97	3407.3	OK	No		-	****
116	Stone Curlew Ave	3411.72	3411.34	D2	0.20	3411.74	3415.0	OK	No		-	*
117	Stone Curlew Ave	3411.72	3411.34	D2	0.20	3411.74	3402.2	CHECK	Yes		See Note	*
123	Nocturnal Flight St	3396.56	3396.18	E1	0.36	3396.90	3400.2	OK	No		-	****
124	Ashy Storm Ave	3390.94	3390.56	H3-S	0.45	3391.46	3395.0	OK	No		-	
134	Stone Curlew Ave	3398.92	3398.54	D2	0.20	3398.94	3400.8	OK	No		-	*
135	Stone Curlew Ave	3395.10	3394.72	D2	0.20	3395.12	3394.3	CHECK	Yes		See Note	*
144	Ashy Storm Ave	3387.11	3386.73	H3-S	0.45	3387.63	3385.4	CHECK	Yes	3387.98	1	

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 for mod. Roll curb, 0.50-ft for L curb

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

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

5: FG = finished grade elevation at top of scarp in landscape/common element. TRW = top of retaining wall height.

6: Assumed 8" tall courses.

NOTES:

* Lot Adjacent to H.P. therefore flow depth in street is negligible.

** 2x the flow depth is contained by the adjacent FG or TRW. Therefore, solid grouting is not necessary.

*** Substantial elevation difference between lot and adjacent/perimeter roadway. Therefore, detailed lot assessment is not needed nor provided. Solid grouting is not necessary.

**** Flowline taken on low side of superelevated road

Supplemental Finish Floor Checks

Hydraulic Swale Check										
Lot Number	High TC/FL ¹	Section	Flow Depth ²	Min FF ³	Design FF	Check	Solid Grout	D ⁴	# of Solid Grout Courses ⁵	Notes
85	3407.60	V1	0.22	3408.04	3412.50	OK	No		n/a	
96	3415.20	V1	0.22	3415.64	3430.90	OK	No		n/a	
97	3415.20	V1	0.22	3415.64	3427.30	OK	No		n/a	
98	3415.20	V1	0.22	3415.64	3423.90	OK	No		n/a	
99	3415.20	V1	0.22	3415.64	3413.90	CHECK	Yes		1	
100	3414.00	V1	0.22	3414.44	3412.70	CHECK	Yes		1	
101	3412.60	V1	0.22	3413.04	3411.30	CHECK	Yes		1	
102	3410.80	V1	0.22	3411.24	3409.50	CHECK	Yes		1	
103	3409.50	V1	0.22	3409.94	3408.20	CHECK	Yes		1	
104	3408.20	V1	0.22	3408.64	3406.90	CHECK	Yes		1	
105	3403.39	V1	0.22	3403.83	3405.40	OK	No		n/a	

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).

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

4: D = Available depth from drainage easement FL to drainage easement edge

5: Assumed 8" tall courses.

Supplemental Finish Floor Checks

Drainage Easements Check - Emergency Overflow

Lot Number	High TC/FL ¹	Section	Flow Depth ²	Min FF ³	Design FF	Check	Solid Grout
19	3378.04	EO1 (weir)	0.34	3378.38	3381.70	OK	No
19	3379.40	EO2 (weir)	0.25	3379.65	3381.70	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.

Supplemental Finish Floor Checks

Specific Energy Check for Fronting Lots							
Lot Number	High TC ¹	High FL ²	Section	Specific Energy ³	Min FF ⁴	Design FF	Check
5	3417.11	3416.73	C1	0.71	3417.44	3421.40	OK
6	3417.11	3416.73	C1	0.71	3417.44	3418.50	OK
13	3392.37	3391.99	E2	0.77	3392.76	3395.10	OK
18	3380.56	3380.18	F2	0.53	3380.71	3384.10	OK
125	3394.83	3394.45	D1	0.75	3395.20	3396.10	OK
126	3395.46	3395.08	D1	0.75	3395.83	3396.70	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.

APPENDIX E

Reference Material

*Update #2 to the Master Conceptual Drainage Study for
Summerlin West Village 22 (DS 5005),
by VTN Nevada*

Approval Letters

CITY OF LAS VEGAS			DATE:
INTER-OFFICE MEMORANDUM			January 23, 2020
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: Master Conceptual Drainage Study for – Update #2 Summerlin West Village 22			COPIES TO: VTN Nevada
Cross Streets:	I-215 Western Beltway & Summerlin Parkway		Howard Hughes Company, LLC
File Number:	F:\Depot\DSMemos\DS5005H.doc		Bart Anderson, P.E., DevCo
Parcel Number:	137-14-401-006, 137-23-101-002		CCRFCFCD
Zoning Action:	MDR-73901		CCPW
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	6/12/2018	6/28/2018 & 7/13/2018	Not Approved	\$400.00	49696: \$400
2 nd Submittal	7/31/2018	8/22/2018	Not Approved	\$400.00	497790: \$400
3 rd Submittal	11/5/2018	11/27/2018	Conditional Approval	\$400.00	500639: \$400
Memo Revision	12/3/2018	12/3/2018	Conditional Approval	N/C	N/C
CCRFCFCD	1/10/2019	1/10/2019	Concurrence Recv'd	N/C	N/C
4 th Submittal	2/12/2019	3/6/2019	Not Approved	\$100.00	503164: \$100
5 th Submittal	3/21/2019	4/4/2019	Conditional Approval	\$400.00	3057847: \$400
CCPW & CCRFCFCD	4/25/2019 & 5/23/2019	5/29/2019	Concurrence Received	N/C	N/C
6 th Submittal	11/13/2019	12/10/2019	Conditional Approval	\$100.00	3644006: \$100
Memo Revision	12/12/2019	12/12/2019	Conditional Approval	N/C	N/C
CCPW & CCRFCFCD	1/13/2020 & 1/16/2020	1/23/2020	Concurrence Recv'd	N/C	N/C
			TOTAL FEES (LDDRS):	\$1,800.00	

REMARKS:

6th Submittal: Update #2 to address Village 22 Overall Development Plan changes

4th & 5th Submittals: Update #1 & Addendum #1 to revise Village 22 in accordance to the Update of the latest overall Summerlin West Master Plan Drainage Study

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 *Grand Park Detention Basin* is proposed to regulate and meter outflow to match the previously approved downstream flow conditions at the junction of *Far Hills* storm drain and the *Beltway Channel*. Without the *Grand Park Detention Basin*, there will be a net increase in flows at the *Beltway Channel* downstream of *Far Hills* intersection exceeding the previously approved flow.

A technical drainage study for the analysis, design and construction plans for the *Grand Park Detention Basin* must be submitted and approved by the City prior to the individual onsite parcel developments.

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/14
AREA K-14

REGIONAL FLOOD CONTROL DISTRICT



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

BOARD OF DIRECTORS

Lawrence L. Brown, III
Chair
Clark County

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Clark County

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City of Las Vegas

Stavros Anthony
City of Las Vegas

Isaac Barron
City of North Las Vegas

Mayor Klerman McManus
City of Boulder City

January 16, 2020

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

**DISTRICT CONCURRENCE: UPDATE #2 FOR SUMMERL WEST VILLAGE 22-
MDS
(DS5005G-REV) (RFCD No. 19-11423)**

Dear Mr. Kwon:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated November 15, 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 December 12, 2019.

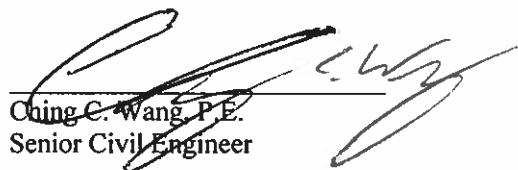
District concurs with acceptance of this Technical Drainage Study by City of Las Vegas Department of Public Works.

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: Joanna Y. Ayson, P.E., VTN Nevada

P:\Letters and Memos\Local Drainage\Land Development & Drainage\2020\L-19-11423.doc



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: January 13, 2020
Firm: VTN Nevada
Engineer: Joanna Ayson, P.E.
Address: 2727 South Rainbow Boulevard, Las Vegas, NV 89146
Phone: (702) 873-7550
Fax: (702) 362-2597
E-mail: jayson@vtnnv.com

Subject: Update #2 for Master Conceptual Drainage Study for Summerlin West Village 22
Location: West of I-215 between Lake Mead Boulevard and Summerlin Parkway
APN: 137-14-401-007 & 137-23-201-001
Sec, Township, Range: S14 & 23, T20S, R59E
Flood Zone & Panel: Zone X, 2150E, Dated September 27, 2002
Application Number: PW19-20502UP

Submittals	Date Received	Date Returned	Reviewer	Miscellaneous
Update	12/20/2019	01/10/2020	CR	
Supplement	01/13/2020	01/13/2020	CR	Emailed

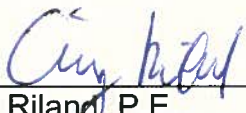
The above-referenced project is located within the **City of Las Vegas** adjacent to Clark County unincorporated areas. The drainage study was submitted to the County for concurrence on December 20, 2019. In addition, the County has received the City of Las Vegas acceptance letter dated December 12, 2019 for the Technical Drainage Study (DS5005G-Rev).

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.

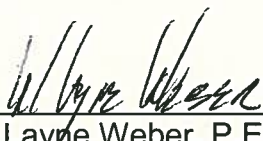
Additional Conditions:

1. This update combines parcels; changes parcel boundaries; shifts street alignments; and removes streets; therefore revising hydrology and storm drain systems accordingly. The previously approved Technical Drainage Studies are: PW18-19645 and PW19-12867.
2. 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.
3. Beltway channel modifications may be necessary prior to site development.

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.



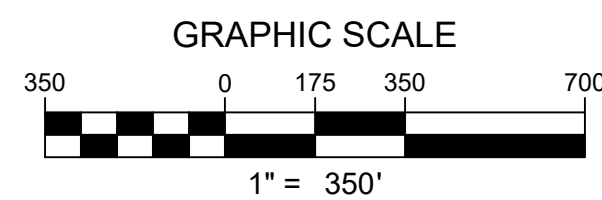
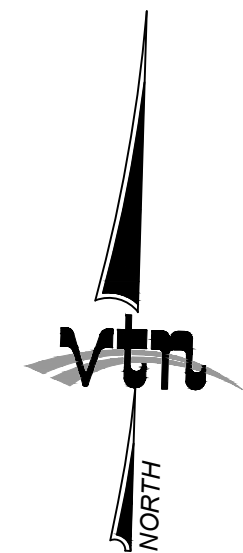
Crissy Riland, P.E.
Senior Civil Engineer
Development Review
crissy@ClarkCountyNV.gov



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

Referenced Drainage Exhibits

DS5005 UP2 MAPS - REFERENCED FOR CONCEPTUAL
ULTIMATE CONDITION DRAINAGE PATTERNS



LEGEND

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

ULTIMATE CONDITION HEC-1 SUMMARY TABLE					
BASIN ID	AREA (ac)	Q100 (CFS)	BASIN ID	AREA (ac)	Q100 (CFS)
LM	10.04	36	STN1	3.61	13
D	11.96	50	CSTN1	-	244
DES1	4.46	20	STG1	1.85	8
CDES1	-	70	CSTG1	-	229
COS-2	7.51	22	CP6	-	532
CCOS-2	-	89	L-M	21.14	81
A	17.39	68	STJ2	3.10	13
CA	-	156	STJ2	-	612
CP1	-	191	STF	1.84	8
STI	2.42	11	CSTF	-	610
C	12.05	51	U	3.49	11
CSTI	-	62	DES4	1.77	8
G	7.05	30	CDES4	-	19
CG	-	92	S	3.01	10
H	7.64	33	CS	-	29
CH	-	124	CP7	-	639
STH	2.29	10	STF2	1.21	5
J	5.93	24	CSTF2	-	637
CJ	-	34	V	5.01	17
K	5.28	22	W	5.28	19
DES2	3.09	13	CVW	-	36
CDES2	-	68	CAARR3	2.14	8
CP2	-	189	CAARR3	-	667
CARR1	6.95	29	STE3	1.36	6
I	13.44	38	CP8	-	673
N-O-P	14.52	49	EE	6.80	25
NP-1	1.73	6	CEE	-	689
STG2	2.86	13	NP3	0.70	2
CSTG2	-	68	STEE3	1.23	5
DES3	2.00	9	CSTEE3	-	7
CP3	-	77	CP9	-	205
STG3	0.72	3	HH	4.85	20
CSTG3	-	79	CARR4	-	10
Q	4.58	17	25-HS1B	-	48
R	4.97	20	STN2	-	19
CQR	-	37	CSTN2	-	67
CARR2	3.58	15	Y-Z	11.28	42
CCARR2	-	52	STE1	1.75	8
CP4	-	131	CSTE1	-	115
CP5	-	379	COS-3	1.70	4
II	16.03	61	STJ3	3.22	14
X	17.45	60	CSTJ3	-	126
B	80.77	304	AA	10.13	33
DC-1	12.59	36	STE2	-	8
COS-4	0.57	2	BB	6.29	23
COS-1	2.87	6	CBB	-	31
V27-F	19.13	83	T	4.02	13
V27-COS2	5.25	20	CT	-	44
LM2	7.23	28	CC	5.34	19
CLM2	-	132	CCC	-	63
27-COS3	17.46	53	DD	4.76	17
COFF	-	185	DDD	-	77
E	13.91	58	DES5	1.57	7
STJ1	3.52	15	CDES5	-	81
CSTJ1	-	255	STEE2	1.79	8
NP-2	1.34	5	CSTEE2	-	88
CNP-2	-	255	GG	4.98	21
F	14.22	59	CGG	-	109
CF	-	309	FF	3.49	15
25-HS1	49.49	211			

Basins S, T, U reanalyzed as
single development

THE HOWARD HUGHES COMPANY, LLC

FIGURE 6
ULTIMATE CONDITION BASIN MAP

DRAWN BY:
JVA

DESIGNED BY:
JVA

CHECKED BY:
JVA

PROJECT NO.
2801

SHEET
OF SHEETS
DRAWING NO.

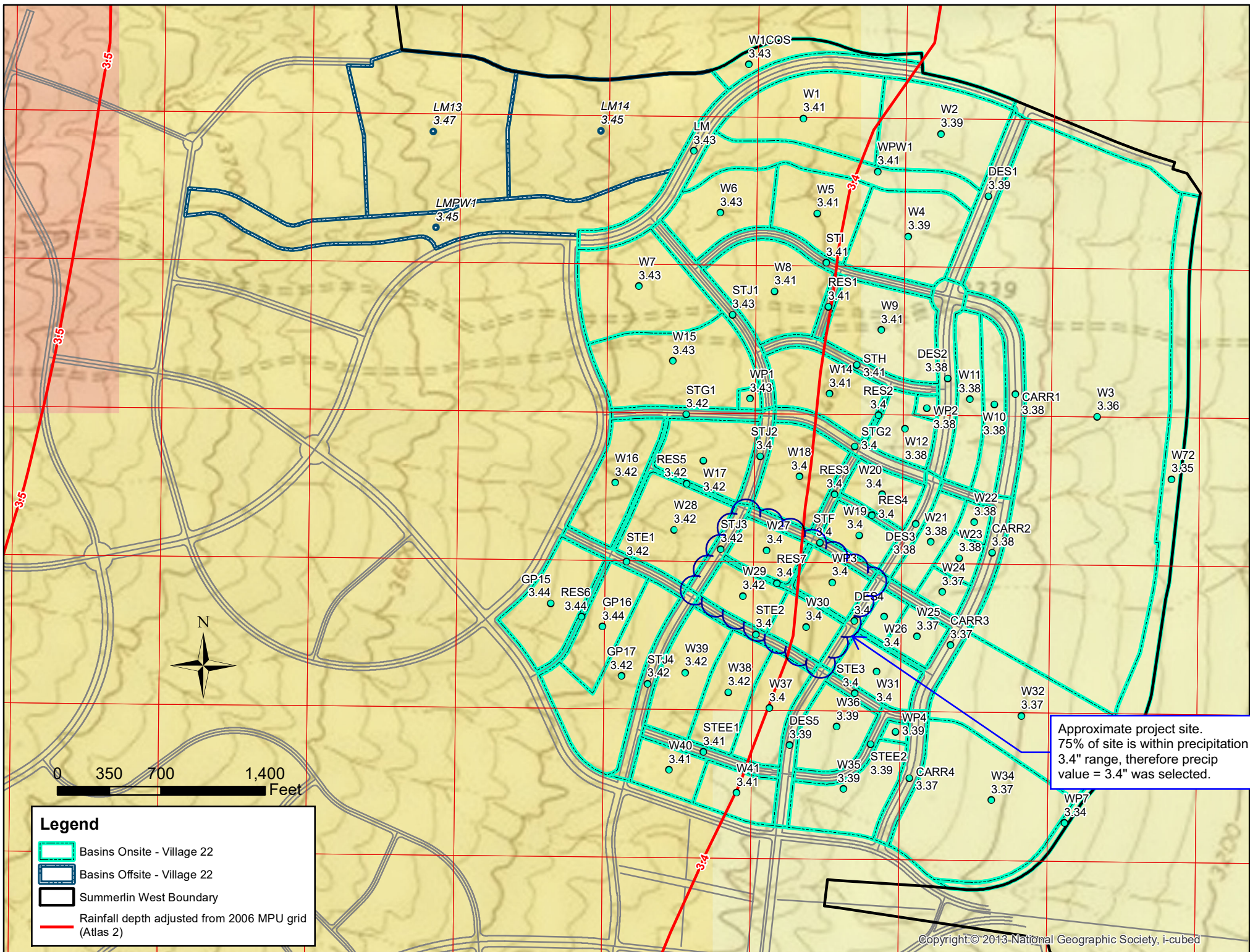
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PH: (702) 893-7500 FAX: (702) 362-2897 WEB: WWW.VTNV.COM
CONSULTING ENGINEERS & LAND SURVEYORS

SUMMERLIN WEST VILLAGE 22

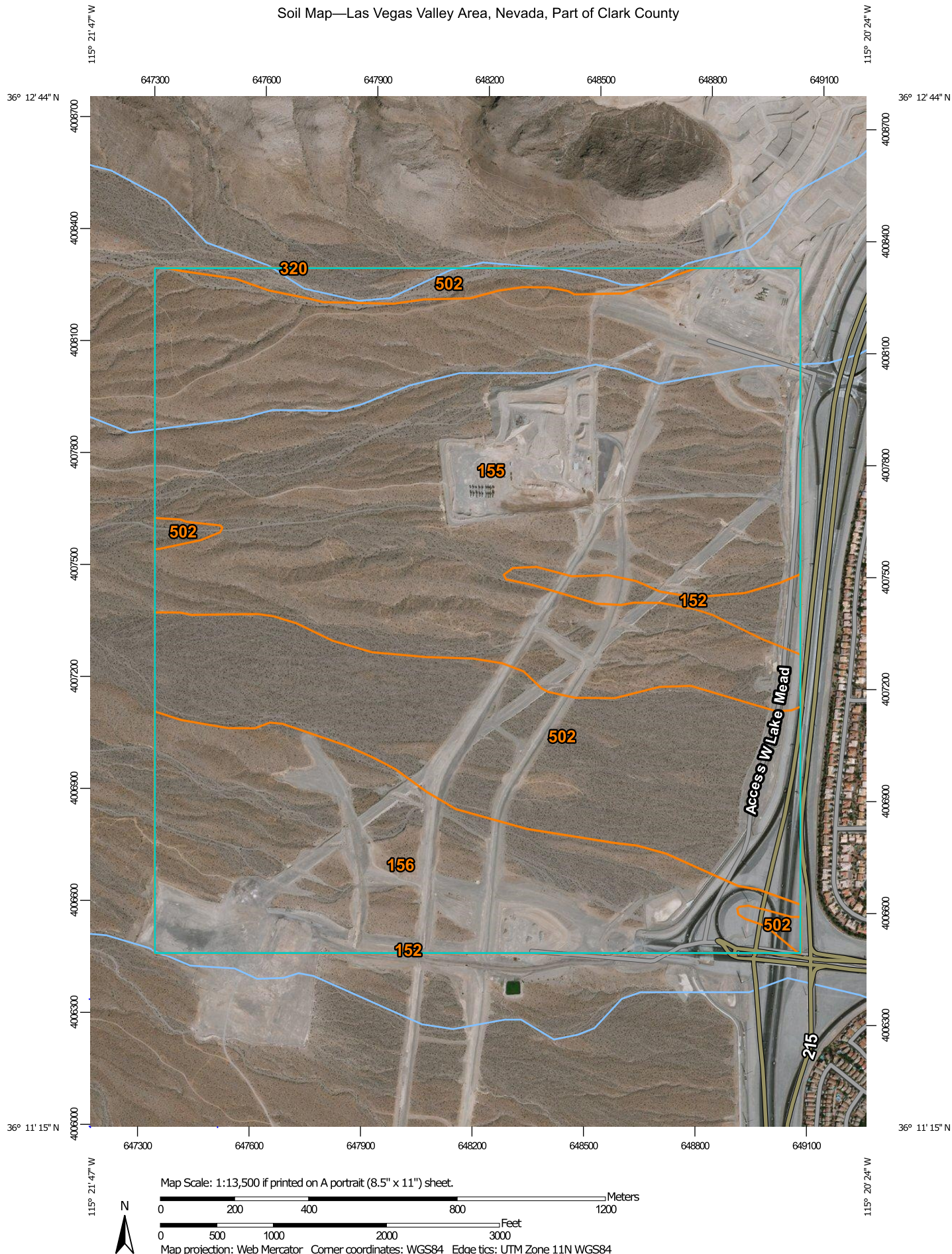
SCALE: 1" = 350' HORIZ.
NA VERT.

REVISION
BY
DATE
REV

Referenced Hydrology



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



MAP LEGEND

Area of Interest (AOI)		Area of Interest (AOI)		Spoil Area
Soils		Soil Map Unit Polygons		Stony Spot
		Soil Map Unit Lines		Very Stony Spot
		Soil Map Unit Points		Wet Spot
Special Point Features		Blowout		Other
		Borrow Pit		Special Line Features
		Clay Spot	Water Features	
		Closed Depression		Streams and Canals
		Gravel Pit	Transportation	
		Gravelly Spot		Rails
		Landfill		Interstate Highways
		Lava Flow		US Routes
		Marsh or swamp		Major Roads
		Mine or Quarry		Local Roads
		Miscellaneous Water	Background	
		Perennial Water		Aerial Photography
		Rock Outcrop		
		Saline Spot		
		Sandy Spot		
		Severely Eroded Spot		
		Sinkhole		
		Slide or Slip		
		Sodic Spot		

MAP INFORMATION

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

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL: <http://websoilsurvey.sc.egov.usda.gov>

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County

Survey Area Data: Version 12, Sep 15, 2017

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

Date(s) aerial images were photographed: Sep 19, 2015—Nov 23, 2016

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
152	Cave gravelly fine sandy loam, 0 to 4 percent slopes	14.6	1.9%
155	Cave gravelly fine sandy loam, 4 to 15 percent slopes	417.0	52.8%
156	Vace-Wechech association	172.4	21.8%
320	Boxspring-Zeheme-Rock outcrop complex, 15 to 50 to percent slopes MLRA 30	0.0	0.0%
502	Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes	186.5	23.6%
Totals for Area of Interest		790.5	100.0%

Las Vegas Valley Area, Nevada, Part of Clark County

152—Cave gravelly fine sandy loam, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: hr9v

Elevation: 2,000 to 4,800 feet

Mean annual precipitation: 4 to 12 inches

Mean annual air temperature: 57 to 70 degrees F

Frost-free period: 180 to 280 days

Farmland classification: Not prime farmland

Map Unit Composition

Cave and similar soils: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cave

Setting

Landform: Fan remnants

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Mixed alluvium

Typical profile

H1 - 0 to 12 inches: gravelly fine sandy loam

H2 - 12 to 36 inches: indurated

H3 - 36 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 0 to 4 percent

Depth to restrictive feature: 4 to 20 inches to petrocalcic

Natural drainage class: Well drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 40 percent

Gypsum, maximum in profile: 5 percent

Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 12.0

Available water storage in profile: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D

Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)

Hydric soil rating: No

Data Source Information

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County
Survey Area Data: Version 12, Sep 15, 2017

Las Vegas Valley Area, Nevada, Part of Clark County

155—Cave gravelly fine sandy loam, 4 to 15 percent slopes

Map Unit Setting

National map unit symbol: hr9w

Elevation: 2,000 to 4,800 feet

Mean annual precipitation: 4 to 12 inches

Mean annual air temperature: 57 to 70 degrees F

Frost-free period: 180 to 280 days

Farmland classification: Not prime farmland

Map Unit Composition

Cave and similar soils: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cave

Setting

Landform: Fan remnants

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Mixed alluvium

Typical profile

H1 - 0 to 15 inches: gravelly fine sandy loam

H2 - 15 to 60 inches: indurated

Properties and qualities

Slope: 4 to 15 percent

Depth to restrictive feature: 4 to 20 inches to petrocalcic

Natural drainage class: Well drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 40 percent

Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Available water storage in profile: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D

Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)

Hydric soil rating: No

Data Source Information

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County
Survey Area Data: Version 12, Sep 15, 2017

Las Vegas Valley Area, Nevada, Part of Clark County

156—Vace-Wechech association

Map Unit Setting

National map unit symbol: 1tf5w

Elevation: 2,720 to 4,030 feet

Mean annual precipitation: 5 to 7 inches

Mean annual air temperature: 57 to 69 degrees F

Frost-free period: 180 to 300 days

Farmland classification: Not prime farmland

Map Unit Composition

Vace and similar soils: 45 percent

Wechech and similar soils: 25 percent

Wechech, steep, and similar soils: 15 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Vace

Setting

Landform: Fan remnants

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Calcareous loess and mixed alluvium

Typical profile

H1 - 0 to 2 inches: gravelly fine sandy loam

H2 - 2 to 8 inches: loam

H3 - 8 to 60 inches: cemented material

Properties and qualities

Slope: 2 to 8 percent

Depth to restrictive feature: 4 to 14 inches to petrocalcic

Natural drainage class: Well drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 30 percent

Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 5.0

Available water storage in profile: Very low (about 1.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D
Ecological site: Desert Fans 4-6 P.Z. (R030XB005NV)
Other vegetative classification: Limy 5-7 p.z. (030XB005NV_3)
Hydric soil rating: No

Description of Wechech

Setting

Landform: Fan remnants
Landform position (two-dimensional): Summit
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from limestone and dolomite

Typical profile

H1 - 0 to 2 inches: very gravelly sandy loam
- 2 to 7 inches: very gravelly sandy loam
H2 - 7 to 13 inches: very gravelly sandy loam
H3 - 13 to 60 inches: cemented material

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 8 to 14 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 50 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: Desert Fans 4-6 P.Z. (R030XB005NV)
Hydric soil rating: No

Description of Wechech, Steep

Setting

Landform: Fan remnants
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from limestone and dolomite

Typical profile

H1 - 0 to 2 inches: very gravelly sandy loam

- 2 to 7 inches: very gravelly sandy loam
H2 - 7 to 13 inches: very gravelly sandy loam
H3 - 13 to 60 inches: cemented material

Properties and qualities

Slope: 8 to 30 percent
Depth to restrictive feature: 8 to 14 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 50 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: LIMY HILL 5-7 P.Z. (R030XB001NV)
Hydric soil rating: No

Minor Components

Weiser

Percent of map unit: 8 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: GRAVELLY FAN 5-7 P.Z. (R030XB075NV)
Other vegetative classification: Gravelly Fan 5-7 p.z. (030XB075NV_1)
Hydric soil rating: No

Irongold

Percent of map unit: 4 percent
Landform: Fan remnants
Landform position (two-dimensional): Shoulder
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: SHALLOW GRAVELLY LOAM 5-7 P.Z. cool thermic fan portions corr cool hills to R030XB029NV (R030XB029NV)
Other vegetative classification: Shallow Gravelly Loam 5-7 p.z. (030XB029NV_2)
Hydric soil rating: No

Commski

Percent of map unit: 2 percent

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: CALCAREOUS LOAM 5-7 P.Z. (R030XA066NV)
Other vegetative classification: Calcareous Loam 5-7 p.z.
(030XA066NV_1)
Hydric soil rating: No

Threelakes

Percent of map unit: 1 percent
Landform: Drainageways
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: VALLEY WASH (R030XB028NV)
Hydric soil rating: No

Data Source Information

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County
Survey Area Data: Version 12, Sep 15, 2017

Las Vegas Valley Area, Nevada, Part of Clark County

320—Boxspring-Zeheme-Rock outcrop complex, 15 to 50 to percent slopes MLRA 30

Map Unit Setting

National map unit symbol: 2vjqh

Elevation: 2,360 to 6,890 feet

Mean annual precipitation: 5 to 9 inches

Mean annual air temperature: 54 to 64 degrees F

Frost-free period: 150 to 210 days

Farmland classification: Not prime farmland

Map Unit Composition

Boxspring and similar soils: 50 percent

Zeheme and similar soils: 25 percent

Rock outcrop: 15 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boxspring

Setting

Landform: Hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Colluvium over residuum weathered from limestone and dolomite

Typical profile

A - 0 to 2 inches: extremely gravelly loam

C1 - 2 to 5 inches: very gravelly loam

C2 - 5 to 15 inches: extremely gravelly loam

R - 15 to 25 inches: bedrock

Properties and qualities

Slope: 15 to 50 percent

Percent of area covered with surface fragments: 1.0 percent

Depth to restrictive feature: 14 to 20 inches to lithic bedrock

Natural drainage class: Well drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.01 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 30 percent

Gypsum, maximum in profile: 2 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 2.0

Available water storage in profile: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D

Ecological site: SHALLOW GRAVELLY LOAM 7-9 P.Z. Mountain portions correlated t (R030XC007NV)

Other vegetative classification: Shallow Gravelly Loam 8-10 p.z. (029XY077NV_1)

Hydric soil rating: No

Description of Zeheme

Setting

Landform: Hills

Landform position (two-dimensional): Backslope

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Colluvium over residuum weathered from limestone and dolomite

Typical profile

A - 0 to 2 inches: extremely gravelly fine sandy loam

Bk - 2 to 9 inches: very gravelly fine sandy loam

R - 9 to 19 inches: bedrock

Properties and qualities

Slope: 15 to 50 percent

Percent of area covered with surface fragments: 15.0 percent

Depth to restrictive feature: 7 to 14 inches to lithic bedrock

Natural drainage class: Well drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 40 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 5.0

Available water storage in profile: Very low (about 0.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D

Ecological site: LIMESTONE HILL 5-7 P.Z. (R030XB068NV)

Other vegetative classification: Shallow Limestone Slope 5-7 p.z. (030XB030NV_1)

Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Cliffs

Down-slope shape: Convex

Across-slope shape: Convex

Minor Components

Zeheme

Percent of map unit: 8 percent

Landform: Hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Down-slope shape: Convex, linear

Across-slope shape: Convex

Ecological site: SHALLOW LIMESTONE SLOPE 5-7 P.Z.
(R030XB030NV)

Hydric soil rating: No

Typic haplocalcids

Percent of map unit: 2 percent

Landform: Hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Down-slope shape: Linear

Across-slope shape: Convex

Ecological site: SHALLOW GRAVELLY LOAM 5-7 P.Z. cool
thermic fan portions corr cool hills to R030XB029NV
(R030XB029NV)

Other vegetative classification: Shallow Gravelly Loam 7-9 p.z.
(030XB029NV_4)

Hydric soil rating: No

Data Source Information

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County

Survey Area Data: Version 12, Sep 15, 2017

Las Vegas Valley Area, Nevada, Part of Clark County

502—Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: hrcf

Elevation: 1,700 to 4,800 feet

Mean annual precipitation: 4 to 12 inches

Mean annual air temperature: 57 to 70 degrees F

Frost-free period: 180 to 300 days

Farmland classification: Not prime farmland

Map Unit Composition

Canutio and similar soils: 55 percent

Cave and similar soils: 40 percent

Minor components: 5 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canutio

Setting

Landform: Inset fans

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Mixed alluvium

Typical profile

H1 - 0 to 9 inches: gravelly fine sandy loam

H2 - 9 to 60 inches: stratified extremely gravelly loamy coarse sand to gravelly loam

Properties and qualities

Slope: 2 to 8 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): High
(1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 10 percent

Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e

Land capability classification (nonirrigated): 7c

Hydrologic Soil Group: A

Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

Description of Cave

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 16 inches: gravelly fine sandy loam
H2 - 16 to 30 inches: indurated
H3 - 30 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 4 to 20 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

Minor Components

Arizo

Percent of map unit: 5 percent
Landform: Channels
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: VALLEY WASH (R030XB028NV)

Hydric soil rating: No

Data Source Information

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County
Survey Area Data: Version 12, Sep 15, 2017

RUNOFF CURVE NUMBERS (URBAN AREAS¹)

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

See Table 602A

Developing urban areas

Newly graded areas (pervious areas only, no vegetation) ⁵	77	86	91	94
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1 Average runoff condition, and $I_a = 0.2S$.

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

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

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

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

Revision	Date

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RUNOFF CURVE NUMBERS - RESIDENTIAL DISTRICTS

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

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

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

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

Revision	Date

REFERENCE:

TABLE 602A

CURVE NUMBERS FOR SOILS - W.O. #7861

Soil # 152 Cave gravelly fine sandy loam, 0 to 4 percent slopes							
Soil	Percent	Group	Apartment/Condo ₁	Townhouses ₂	Open Space ₃	Urban Districts ₄	Impervious ₅
Cave	100%	D	93	92	89	95	98
Total	100%		93	92	89	95	98

Soil # 155 Cave gravelly fine sandy loam, 4 to 15 percent slopes							
Soil	Percent	Group	Apartment/Condo ₁	Townhouses ₂	Open Space ₃	Urban Districts ₄	Impervious ₅
Cave	100%	D	93	92	89	95	98
Total	100%		93	92	89	95	98

Soil # 156 Vace - Wechech association							
Soil	Percent	Group	Apartment/Condo ₁	Townhouses ₂	Open Space ₃	Urban Districts ₄	Impervious ₅
Vace and Similar	45%	D	93	92	89	95	98
Wechech and Similar	25%	D	93	92	89	95	98
Wechech, steep, and similar	15%	D	93	92	89	95	98
Weiser	8%	B	88	87	79	92	98
Irongold	4%	D	93	92	89	95	98
Commski	2%	B	88	87	79	92	98
Threelakes	1%	A	81	80	68	89	98
Total	100%		93	92	88	95	98

Soil # 502 Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes							
Soil	Percent	Group	Apartment/Condo ₁	Townhouses ₂	Open Space ₃	Urban Districts ₄	Impervious ₅
Canutio	55%	A	81	80	68	89	98
Cave	40%	D	93	92	89	95	98
Arizo	5%	D	93	92	89	95	98
Total	100%		87	86	78	92	98

1-Referenced Clark County's Hydrologic Criteria and Drainage Design Manual Table 602A

* Residential (Apartments / Condos)

2-Referenced Clark County's Hydrologic Criteria and Drainage Design Manual Table 602A

* Residential (Townhouses)

3-Referenced Clark County's Hydrologic Criteria and Drainage Design Manual Table 602 page 1 of 4

* Open spaces in poor condition (grass cover < 50%)

4-Referenced Clark County's Hydrologic Criteria and Drainage Design Manual Table 602 page 1 of 4

* Urban Districts (Commercial / Business & Residential with average lot size <6000 sqft)

5-Referenced Clark County's Hydrologic Criteria and Drainage Design Manual Table 602 page 1 of 4

*Impervious (Paved Streets)

HIGHLIGHTED DENOTES SOIL TYPES ENCOMPASSING PROJECT SITE.
2022 NRCS SOILS DATA LIST SOIL TYPE #502 WITH 60% HSG 'A', 40% HSG 'D'

FROM TDS UP#2

Curve Number calculations for ONSITE Basins

Basin	Type	Soil Percentage	Apartment/Condo ₁	Townhouses ₂	Open Space ₃	Urban Districts ₄	Impervious ₅	CN Value
A	155	100%				100%		95.0
B	152	7%	40%			60%		93.5
	155	76%	40%			60%		
	502	17%	40%			60%		
C	155	100%				100%		95.0
D	155	100%				100%		95.0
E	155	100%				100%		95.0
F	155	100%				100%		95.0
G	155	100%				100%		95.0
H	155	100%				100%		95.0
I	152	12%		100%				92.0
	155	88%		100%				
J	152	2%		100%				92.0
	155	98%		100%				
K	152	36%		100%				92.0
	155	64%		100%				
L-M	155	81%		100%				94.4
	502	19%		100%				
N-O-P	152	2%		95%		5%		90.3
	155	98%		95%		5%		
Q	155	100%		95%		5%		92.2
R	155	66%		95%		5%		93.2
	502	34%		95%		5%		
S	155	27%		95%		5%		87.9
	502	73%		95%		5%		
T	502	100%		95%		5%		86.3
U	502	100%		95%		5%		86.3
V	155	0%	40%			60%		90.0
	502	100%	40%			60%		
W	502	100%	40%			60%		90.0
X	502	100%	40%			60%		90.0
Y-Z	156	7%		100%				92.2
	502	93%		100%				
AA	156	77%	100%					88.4
	502	23%	100%					
BB	156	26%	40%			60%		91.1
	502	74%	40%			60%		
CC	156	16%	40%			60%		90.7
	502	84%	40%			60%		
DD	156	13%	40%			60%		90.5
	502	87%	40%			60%		
EE	156	5%	40%			60%		90.2
	502	95%	40%			60%		
FF	156	100%	40%			60%		94.2

BASINS S, T, U ENCOMPASSES THE PROJECT SITE.

GG	156	100%	40%			60%		94.2
HH	156	100%	40%			60%		94.2
II	156	75%	40%			60%		93.2
	502	25%	40%			60%		
COS-1	155	16%			100%			79.8
	502	84%			100%			
COS-2	155	100%			100%			89.0
COS-3	156	52%			100%			83.2
	502	48%			100%			
COS-4	156	100%			100%			88.0
NP-1	155	100%			100%			89.0
NP-2	155	100%			100%			89.0
NP-3	156	25%			100%			80.5
	502	75%			100%			
DC-1	152	14%				100%		98.0
	155	46%				100%		
	156	9%				100%		
	502	31%				100%		
LM	155	95%				100%		98.0
	502	5%				100%		
LM2	155	88%				100%		98.0
	502	12%				100%		
DES1	155	100%				100%		98.0
DES2	152	23%				100%		98.0
	155	77%				100%		
DES3	155	100%				100%		98.0
DES4	155	18%				100%		98.0
	502	82%				100%		
DES5	156	7%				100%		98.0
	502	94%				100%		
DES6	156	100%				100%		98.0
CARR1	152	4%				100%		98.0
	155	96%				100%		
CARR2	155	55%				100%		98.0
	502	45%				100%		
CARR3	502	100%				100%		98.0
CARR4	156	67%				100%		98.0
	502	33%				100%		
STE1	502	100%				100%		98.0
STE2	502	100%				100%		98.0
STE3	502	100%				100%		98.0
STF	155	100%				100%		98.0
STF2	155	16%				100%		98.0
	502	84%				100%		
STG1	155	100%				100%		98.0
STG2	152	42%				100%		98.0
	155	58%				100%		

HIGHLIGHT DENOTES REFERENCED BASINS

STG3	155	100%					100%	98.0
STH	155	100%					100%	98.0
STI	155	100%					100%	98.0
STJ1	155	100%					100%	98.0
STJ2	155	70%					100%	98.0
	502	30%					100%	
STJ3	156	50%					100%	98.0
	502	50%					100%	
STN1	155	502%					100%	98.0
STN2	155	44%					100%	98.0
	502	56%					100%	
STEE2	156	100%					100%	98.0
STEE3	156	100%					100%	98.0
25-HS1	155	94%				100%		94.8
	502	6%				100%		
25-HS1B	155	7%				100%		92.2
	502	93%				100%		
27-COS2	155	100%			100%			89.0
27-COS3	155	100%			100%			89.0
27-F	155	74%				100%		94.2
	502	26%				100%		

HIGHLIGHT DENOTES REFERENCED BASINS

Hydrologic analysis for Basins S, T, U
reanalyzed. Highlighted is for comparison
only.

TRAVEL TIME CALCULATIONS

DEVELOPMENT: **Summerlin West Village 22**

W.O. # **7861**

CALCULATED BY: **AH**

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

C1 applies to the first 500 feet of travel distance
C2 applies to the remaining travel distance

Non-Urban		Urban	
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								
A	1651	3448	3310	0.084	20.2	5.8	30.6	8.8
B	1355	3336	3230	0.078	20.2	5.6	30.6	8.6
C	538	3454	3371	0.154	20.2	7.9	30.6	12.0
D	541	3368	3327	0.076	20.2	5.6	30.6	8.4
E	849	3526	3447	0.093	20.2	6.2	30.6	9.3
F	941	3514	3422	0.098	20.2	6.3	30.6	9.6
G	419	3435	3408	0.064	20.2	5.1	30.6	7.8
H	494	3408	3336	0.146	20.2	7.7	30.6	11.7
I	1044	3347	3299	0.046	20.2	4.3	30.6	6.6
J	403	3433	3371	0.154	20.2	7.9	30.6	12.0
K	326	3389	3346	0.132	20.2	7.3	30.6	11.1
L-M	1375	3514	3448	0.048	20.2	4.4	30.6	6.7
N-O-P	1164	3429	3375	0.046	20.2	4.4	30.6	6.6
Q	640	3353	3315	0.059	20.2	4.9	30.6	7.5
R	622	3364	3319	0.072	20.2	5.4	30.6	8.2
S	1000	3432	3375	0.057	20.2	4.8	30.6	7.3
T	284	3451	3403	0.169	20.2	8.3	30.6	12.6
U	276	3421	3384	0.134	20.2	7.4	30.6	11.2
V	680	3370	3329	0.060	20.2	5.0	30.6	7.5
W	700	3381	3333	0.069	20.2	5.3	30.6	8.0
X	1072	3338	3254	0.078	20.2	5.7	30.6	8.6
Y-Z	900	3530	3475	0.061	20.2	5.0	30.6	7.6
AA	1050	3535	3475	0.057	20.2	4.8	30.6	7.3
BB	703	3468	3428	0.057	20.2	4.8	30.6	7.3
CC	652	3431	3408	0.035	20.2	3.8	30.6	5.7
DD	621	3421	3391	0.048	20.2	4.4	30.6	6.7
EE	555	3393	3341	0.094	20.2	6.2	30.6	9.4
FF	269	3469	3416	0.197	20.2	9.0	30.6	13.6
GG	392	3426	3392	0.087	20.2	5.9	30.6	9.0
HH	505	3387	3343	0.087	20.2	6.0	30.6	9.0
II	962	3337	3268	0.072	20.2	5.4	30.6	8.2
COS-1	1373	3450	3350	0.073	14.8	4.0	29.4	7.9
COS-2	1676	3452	3417	0.021	14.8	2.1	29.4	4.2
COS-3	1035	3530	3465	0.063	14.8	3.7	29.4	7.4
COS-4	362	3326	3308	0.050	14.8	3.3	29.4	6.6
NP-1	98	3359	3343	0.163	20.2	8.2	30.6	12.4
NP-2	95	3460	3420	0.421	20.2	13.1	30.6	19.9
NP-3	123	3391	3376	0.122	20.2	7.1	30.6	10.7
DC-1	3630	3252	3219	0.009	20.2	1.9	30.6	2.9

TRAVEL TIME CALCULATIONS

DEVELOPMENT: **Summerlin West Village 22**

W.O. # **7861**

CALCULATED BY: **AH**

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

C1 applies to the first 500 feet of travel distance
C2 applies to the remaining travel distance

Non-Urban		Urban	
C1=14.8	C2=29.4	C1=20.2	C2=30.6

Basin	Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (ft/ft)	First 500 feet		Remaining Travel Distance	
					C1	V1 (fps)	C2	V2 (fps)
LM	3472	3515	3305	0.060	20.2	5.0	30.6	7.5
LM2	2360	3654	3510	0.061	20.2	5.0	30.6	7.6
DES1	1148	3344	3303	0.036	20.2	3.8	30.6	5.8
DES2	1035	3354	3336	0.017	20.2	2.7	30.6	4.0
DES3	552	3369	3337	0.058	20.2	4.9	30.6	7.4
DES4	652	3385	3366	0.029	20.2	3.4	30.6	5.2
DES5	696	3393	3380	0.019	20.2	2.8	30.6	4.2
DES6	318	3400	3391	0.028	20.2	3.4	30.6	5.1
CARR1	1400	3343	3301	0.030	20.2	3.5	30.6	5.3
CARR2	920	3320	3302	0.020	20.2	2.8	30.6	4.3
CARR3	720	3335	3332	0.004	20.2	1.3	30.6	2.0
CARR4	735	3350	3337	0.018	20.2	2.7	30.6	4.1
STE1	870	3519	3461	0.067	20.2	5.2	30.6	7.9
STE2	867	3455	3384	0.082	20.2	5.8	30.6	8.8
STE3	505	3384	3341	0.085	20.2	5.9	30.6	8.9
STF	887	3436	3370	0.074	20.2	5.5	30.6	8.3
STF2	620	3362	3325	0.060	20.2	4.9	30.6	7.5
STG1	890	3513	3421	0.103	20.2	6.5	30.6	9.8
STG2	1025	3424	3348	0.074	20.2	5.5	30.6	8.3
STG3	405	3341	3309	0.079	20.2	5.7	30.6	8.6
STH	1102	3421	3343	0.071	20.2	5.4	30.6	8.1
STI	1262	3442	3345	0.077	20.2	5.6	30.6	8.5
STJ1	1498	3457	3415	0.028	20.2	3.4	30.6	5.1
STJ2	1025	3440	3413	0.026	20.2	3.3	30.6	5.0
STJ3	926	3473	3453	0.022	20.2	3.0	30.6	4.5
STN1	1450	3519	3508	0.008	20.2	1.8	30.6	2.7
STN2	1175	3546	3514	0.027	20.2	3.3	30.6	5.0
STEE2	791	3470	3393	0.097	20.2	6.3	30.6	9.5
STEE3	575	3386	3342	0.077	20.2	5.6	30.6	8.5
25-HS1	1685	3636	3520	0.069	20.2	5.3	30.6	8.0
25-HS1B	1355	3632	3531	0.075	20.2	5.5	30.6	8.4
27-COS2	990	3670	3597	0.074	14.8	4.0	29.4	8.0
27-COS3	4130	3791	3461	0.080	14.8	4.2	29.4	8.3
27-F	1215	3711	3624	0.072	20.2	5.4	30.6	8.2

STANDARD FORM 4

DEVELOPMENT: Summerlin West Village 22

W.O. # 7861

CALCULATED BY: AH

V1 applies to the first 500 feet of travel distance
V2 applies to the remaining travel distance

Existing:	Developed

$$T_i = \frac{1.8(1.1 - k)L^{1/2}}{S^{1/3}} \quad T_i = \frac{L}{60V} \quad T_c = T_i + T_t$$

$$V1 = 148 * S^{1/2} \quad V2 = 294 * S^{1/2} \quad k = 0.0132C_n - 0.39$$

$$V1 = 202 * S^{1/2} \quad V2 = 306 * S^{1/2}$$

SUB-BASIN DATA					INITIAL/OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc CHECK (URBANIZED BASINS)		FINAL Tc	LAG TIME	REMARKS
DESIG.	Cn	K	AREA Ac.	AREA MI^2	LENGTH Ft	SLOPE %	Ti Min.	LENGTH Ft.	SLOPE %	V1 fps (9a)	V2 fps (9b)	Tt Min.	TOTAL LENGTH (11)	Tc Min.	Min.	TLAG Hr.	
(1)	(2)	(3)	(3)	(4)	(4)	(5)	(6)	(7)	(8)	(9a)	(9b)	(10)	(11)	(12)			
DEVELOPED CONDITION ONSITE																	
A	95.0	0.864	17.39	0.0272	100	1.0	4.25	1651	8.4	5.8	8.8	3.60	1751	19.73	7.84	0.078	
B	93.5	0.844	80.77	0.1262	100	1.0	4.61	1355	7.8	5.6	8.6	3.14	1455	18.08	7.75	0.077	
C	95.0	0.864	12.05	0.0188	100	1.0	4.25	538	15.4	7.9	12.0	1.10	638	13.54	5.35	0.054	
D	95.0	0.864	11.96	0.0187	100	1.0	4.25	541	7.6	5.6	8.4	1.58	641	13.56	5.83	0.058	
E	95.0	0.864	13.91	0.0217	100	1.0	4.25	849	9.3	6.2	9.3	1.98	949	15.27	6.22	0.062	
F	95.0	0.864	14.22	0.0222	100	1.0	4.25	941	9.8	6.3	9.6	2.09	1041	15.78	6.34	0.063	
G	95.0	0.864	7.05	0.0110	100	1.0	4.25	419	6.4	5.1	7.8	1.36	519	12.88	5.61	0.056	
H	95.0	0.864	7.64	0.0119	100	1.0	4.25	494	14.6	7.7	11.7	1.07	594	13.30	5.32	0.053	
I	92.0	0.824	13.44	0.0210	100	1.0	4.96	1044	4.6	4.3	6.6	3.31	1144	16.36	8.27	0.083	
J	92.0	0.824	5.93	0.0093	100	1.0	4.96	403	15.4	7.9	12.0	0.85	503	12.79	5.81	0.058	
K	92.0	0.824	5.28	0.0083	100	1.0	4.96	326	13.2	7.3	11.1	0.74	426	12.37	5.70	0.057	
L-M	94.4	0.856	21.14	0.0330	100	1.0	4.38	1375	4.8	4.4	6.7	4.06	1475	18.19	8.44	0.084	
N-O-P	90.3	0.801	14.52	0.0227	100	1.0	5.38	1164	4.6	4.4	6.6	3.59	1264	17.02	8.97	0.090	
Q	92.2	0.826	4.58	0.0072	100	1.0	4.93	640	5.9	4.9	7.5	2.01	740	14.11	6.93	0.069	
R	93.2	0.840	4.97	0.0078	100	1.0	4.68	622	7.2	5.4	8.2	1.78	722	14.01	6.46	0.065	
S	87.9	0.770	3.01	0.0047	100	1.0	5.94	1000	5.7	4.8	7.3	2.87	1100	16.11	8.81	0.088	
T	86.3	0.749	4.02	0.0063	100	1.0	6.32	284	16.9	8.3	12.6	0.57	384	12.13	6.89	0.069	
U	86.3	0.749	3.49	0.0055	100	1.0	6.32	276	13.4	7.4	11.2	0.62	376	12.09	6.94	0.069	
V	90.0	0.798	5.01	0.0078	100	1.0	5.44	680	6.0	5.0	7.5	2.08	780	14.33	7.52	0.075	
W	90.0	0.798	5.28	0.0083	100	1.0	5.44	700	6.9	5.3	8.0	1.99	800	14.44	7.43	0.074	
X	90.0	0.798	17.45	0.0273	100	1.0	5.44	1072	7.8	5.7	8.6	2.59	1172	16.51	8.02	0.080	
Y-Z	92.2	0.827	11.28	0.0176	100	1.0	4.91	900	6.1	5.0	7.6	2.55	1000	15.56	7.46	0.075	
AA	88.4	0.777	10.13	0.0158	100	1.0	5.82	1050	5.7	4.8	7.3	2.98	1150	16.39	8.80	0.088	
BB	91.1	0.812	6.29	0.0098	100	1.0	5.18	703	5.7	4.8	7.3	2.19	803	14.46	7.37	0.074	
CC	90.7	0.807	5.34	0.0083	100	1.0	5.28	652	3.5	3.8	5.7	2.64	752	14.18	7.91	0.079	
DD	90.5	0.805	4.76	0.0074	100	1.0	5.31	621	4.8	4.4	6.7	2.18	721	14.01	7.48	0.075	
EE	90.2	0.801	6.80	0.0106	100	1.0	5.39	555	9.4	6.2	9.4	1.45	655	13.64	6.83	0.068	
FF	94.2	0.853	3.49	0.0055	100	1.0	4.44	269	19.7	9.0	13.6	0.50	369	12.05	4.94	0.049	Use Min TLAG = 0.050 per HCDDM
GG	94.2	0.853	4.98	0.0078	100	1.0	4.44	392	8.7	5.9	9.0	1.10	492	12.73	5.54	0.055	
HH	94.2	0.853	4.85	0.0076	100	1.0	4.44	505	8.7	6.0	9.0	1.41	605	13.36	5.84	0.058	
II	93.2	0.840	16.03	0.0250	100	1.0	4.69	962	7.2	5.4	8.2	2.48	1062	15.90	7.17	0.072	
COS-1	79.8	0.663	2.87	0.0045	100	1.0	7.87	1373	7.3	4.0	7.9	3.92	1473	18.18	11.79	0.118	
COS-2	89.0	0.785	7.51	0.0117	100	1.0	5.67	1676	2.1	2.1	4.2	8.51	1776	19.87	14.18	0.142	
COS-3	83.2	0.708	1.70	0.0027	100	1.0	7.05	1035	6.3	3.7	7.4	3.46	1135	16.31	10.51	0.105	Use Min TLAG = 0.100 per HCDDM
COS-4	88.0	0.772	0.57	0.0009	100	1.0	5.91	362	5.0	3.3	6.6	1.83	462	12.57	7.74	0.077	Use Min TLAG = 0.100 per HCDDM
NP-1	89.0	0.785	1.73	0.0027	100	1.0	5.67	98	16.3	8.2	12.4	0.20	198	11.10	5.87	0.059	
NP-2	89.0	0.785	1.34	0.0021	100	1.0	5.67	95	42.1	13.1	19.9	0.12	195	11.08	5.79	0.058	
NP-3	80.5	0.673	0.70	0.0011	100	1.0	7.69	123	12.2	7.1	10.7	0.29	223	11.24	7.98	0.080	
DC-1	98.0	0.904	12.59	0.0197	100	1.0	3.54	3630	0.9	1.9	2.9	22.21	3730	30.72	25.74	0.257	
LM	98.0	0.904	10.04	0.0157	100	1.0	3.54	3472	6.0	5.0	7.5	8.26	3572	29.84	11.79	0.118	
LM2	98.0	0.904	7.23	0.0113	100	1.0	3.54	2360	6.1	5.0	7.6	5.77	2460	23.67	9.31	0.093	
DES1	98.0	0.904	4.46	0.0070	38	2.0	1.73	1148	3.6	3.8	5.8	4.05	1186	16.59	5.78	0.058	
DES2	98.0	0.904	3.09	0.0048	38	2.0	1.73	1035	1.7	2.7	4.0	5.34	1073	15.96	7.07	0.071	

Hydrology analysis for Basins S, T, U reanalyzed. Highlighted is for comparison only.

STANDARD FORM 4

DEVELOPMENT: Summerlin West Village 22

W.O. # 7861

CALCULATED BY: AH

V1 applies to the first 500 feet of travel distance V2 applies to the remaining travel distance	
Existing:	Developed

$$T_i = \frac{1.8(1.1 - k)L^{1/2}}{S^{1/3}} \quad T_i = \frac{L}{60V} \quad T_c = T_i + T_t$$

$$f1 = 148 * S^{1/2} \quad f2 = 294 * S^{1/2} \quad k = 0.0132C_n - 0.39$$

$$f1 = 202 * S^{1/2} \quad f2 = 306 * S^{1/2}$$

SUB-BASIN DATA					INITIAL/OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc CHECK (URBANIZED BASINS)		FINAL Tc	LAG TIME	REMARKS
DESIG. (1)	Cn	K (2)	AREA Ac. (3)	AREA MI^2	LENGTH Ft (4)	SLOPE % (5)	Ti Min. (6)	LENGTH Ft. (7)	SLOPE % (8)	V1 fps (9a)	V2 fps (9b)	Tt Min. (10)	TOTAL LENGTH (11)	Tc Min. (12)	Min.	TLAG Hr.	
DES3	98.0	0.904	2.00	0.0031	30	2.0	1.54	552	5.8	4.9	7.4	1.83	582	13.23	3.37	0.034	Use Min TLAG = 0.050 per HCDDM
DES4	98.0	0.904	1.77	0.0028	30	2.0	1.54	652	2.9	3.4	5.2	2.90	682	13.79	4.44	0.044	Use Min TLAG = 0.050 per HCDDM
DES5	98.0	0.904	1.57	0.0025	30	2.0	1.54	696	1.9	2.8	4.2	3.80	726	14.03	5.34	0.053	
DES6	98.0	0.904	1.31	0.0020	30	2.0	1.54	318	2.8	3.4	5.1	1.56	348	11.93	3.10	0.031	Use Min TLAG = 0.050 per HCDDM
CARR1	98.0	0.904	6.95	0.0109	42	2.0	1.82	1400	3.0	3.5	5.3	5.21	1442	18.01	7.03	0.070	
CARR2	98.0	0.904	3.58	0.0056	42	2.0	1.82	920	2.0	2.8	4.3	4.58	962	15.34	6.40	0.064	
CARR3	98.0	0.904	2.14	0.0033	42	2.0	1.82	720	0.4	1.3	2.0	8.25	762	14.23	10.07	0.101	
CARR4	98.0	0.904	2.33	0.0036	42	2.0	1.82	735	1.8	2.7	4.1	4.06	777	14.32	5.88	0.059	
STE1	98.0	0.904	1.75	0.0027	21	2.0	1.29	870	6.7	5.2	7.9	2.38	891	14.95	3.66	0.037	Use Min TLAG = 0.050 per HCDDM
STE2	98.0	0.904	1.78	0.0028	21	2.0	1.29	867	8.2	5.8	8.8	2.14	888	14.93	3.43	0.034	Use Min TLAG = 0.050 per HCDDM
STE3	98.0	0.904	1.36	0.0021	21	2.0	1.29	505	8.5	5.9	8.9	1.42	526	12.92	2.71	0.027	Use Min TLAG = 0.050 per HCDDM
STF	98.0	0.904	1.84	0.0029	21	2.0	1.29	887	7.4	5.5	8.3	2.29	908	15.04	3.57	0.036	Use Min TLAG = 0.050 per HCDDM
STF2	98.0	0.904	1.21	0.0019	21	2.0	1.29	620	6.0	4.9	7.5	1.96	641	13.56	3.24	0.032	Use Min TLAG = 0.050 per HCDDM
STG1	98.0	0.904	1.85	0.0029	19	2.0	1.22	890	10.3	6.5	9.8	1.94	909	15.05	3.17	0.032	Use Min TLAG = 0.050 per HCDDM
STG2	98.0	0.904	2.86	0.0045	30	2.0	1.54	1025	7.4	5.5	8.3	2.57	1055	15.86	4.10	0.041	Use Min TLAG = 0.050 per HCDDM
STG3	98.0	0.904	0.72	0.0011	30	2.0	1.54	405	7.9	5.7	8.6	1.19	435	12.42	2.73	0.027	Use Min TLAG = 0.050 per HCDDM
STH	98.0	0.904	2.29	0.0036	21	2.0	1.29	1102	7.1	5.4	8.1	2.78	1123	16.24	4.07	0.041	Use Min TLAG = 0.050 per HCDDM
STI	98.0	0.904	2.42	0.0038	19	2.0	1.22	1262	7.7	5.6	8.5	2.99	1281	17.12	4.21	0.042	Use Min TLAG = 0.050 per HCDDM
STJ1	98.0	0.904	3.52	0.0055	19	2.0	1.22	1498	2.8	3.4	5.1	5.71	1517	18.43	6.93	0.069	
STJ2	98.0	0.904	3.10	0.0048	30	2.0	1.54	1025	2.6	3.3	5.0	4.30	1055	15.86	5.84	0.058	
STJ3	98.0	0.904	3.22	0.0050	30	2.0	1.54	926	2.2	3.0	4.5	4.39	956	15.31	5.92	0.059	
STN1	98.0	0.904	3.61	0.0056	40	2.0	1.77	1450	0.8	1.8	2.7	10.68	1490	18.28	12.45	0.125	
STN2	98.0	0.904	4.33	0.0068	40	2.0	1.77	1175	2.7	3.3	5.0	4.73	1215	16.75	6.50	0.065	
STEE2	98.0	0.904	1.79	0.0028	21	2.0	1.29	791	9.7	6.3	9.5	1.83	812	14.51	3.12	0.031	Use Min TLAG = 0.050 per HCDDM
STEE3	98.0	0.904	1.23	0.0019	21	2.0	1.29	575	7.7	5.6	8.5	1.64	596	13.31	2.92	0.029	Use Min TLAG = 0.050 per HCDDM
25-HS1	94.8	0.862	49.49	0.0773	21	2.0	1.56	1685	6.9	5.3	8.0	4.03	1706	19.48	5.59	0.056	
25-HS1B	92.2	0.827	11.63	0.0182	21	2.0	1.79	1355	7.5	5.5	8.4	3.22	1376	17.64	5.00	0.050	
27-COS2	89.0	0.785	5.25	0.0082	21	2.0	2.06	990	7.4	4.0	8.0	3.10	1011	15.62	5.16	0.052	
27-COS3	89.0	0.785	17.46	0.0273	21	2.0	2.06	4130	8.0	4.2	8.3	9.27	4151	33.06	11.34	0.113	
27-F	94.2	0.854	19.13	0.0299	21	2.0	1.61	1215	7.2	5.4	8.2	3.00	1236	16.87	4.61	0.046	Use Min TLAG = 0.050 per HCDDM

Tc Min (Urban)= 5 min
Tc Min (Non Urb)= 10 min


```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
*
* RUN DATE 23OCT19 TIME 13:10:22 *
*
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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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      X  X  XXXXXX  XXXXX  X
      X  X  X      X  X  XX
      X  X  X      X  X  X
      XXXXXX XXXX  X      XXXXX X
      X  X  X      X  X  X
      X  X  X      X  X  X
      X  X  XXXXXX  XXXXX  XXX

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

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

1 HEC-1 INPUT PAGE 1

```

LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
*DIAGRAM
*** FREE ***
1      ID      ULTIMATE CONDITION HYDROLOGIC MODEL
2      ID      INPUT FILE DATE = OCTOBER 2019
3      ID      DESIGN STORM = 100-YEAR 6-HR STORM
4      ID      STORM DISTRIBUTION = SDN #3
5      ID      MODELED BY VTN (JYA)
6      ID
7      ID      *****
8      ID      * UPDATE #2 - SUMMERLIN WEST VILLAGE 22 *
9      ID      *****
10     ID
11     ID
12     ID
13     ID
14     ID      JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)
15     ID
16     ID      100-YEAR, 6-HOUR STORM, SDN3
17     ID
18     IT      5      0      0      100
19     IO      5      0      0
20     IN      5      0      0
21     JR      PREC  1.00
*
22     KK      LM
23     BA      0.0157
24     PB      3.41
25     PC      0      0.020  0.057  0.070  0.087  0.108  0.124  0.130  0.130  0.130
26     PC      0.130  0.130  0.130  0.133  0.140  0.142  0.148  0.158  0.172  0.181
27     PC      0.190  0.197  0.199  0.200  0.201  0.204  0.214  0.229  0.241  0.249
28     PC      0.251  0.256  0.270  0.278  0.281  0.283  0.295  0.322  0.352  0.409
29     PC      0.499  0.590  0.710  0.744  0.781  0.812  0.819  0.835  0.851  0.856
30     PC      0.860  0.868  0.876  0.888  0.910  0.926  0.937  0.950  0.970  0.976
31     PC      0.982  0.985  0.987  0.989  0.990  0.993  0.993  0.994  0.995  0.998
32     PC      0.998  0.999      1
33     LS      0      98.0
34     UD      0.118
*
35     KK      D
36     BA      0.0187
37     PB      3.39
38     LS      0      95.0
39     UD      0.058
*
40     KK      DES1
41     BA      0.0070
42     PB      3.39
43     LS      0      98.0
44     UD      0.058
*

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383 KK RCSTJ2
384 KM ROUTE CSTJ2 TO CSTF
385 RD 1000 0.069 0.015 0 DEEP 6 0
*

386 KK STF
387 BA 0.0029
388 PB 3.40
389 LS 0 98.0
390 UD 0.050
*

1

HEC-1 INPUT

PAGE 12

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

391 KK CSTF
392 KM COMBINE CSTJ2 AND CSTF
393 HC 2
*

394 KK U
395 BA 0.0055
396 PB 3.40
397 LS 0 86.3
398 UD 0.069
*

399 KK DES4
400 BA 0.0028
401 PB 3.40
402 LS 0 98.0
403 UD 0.050
*

404 KK CDES4
405 KM COMBINE U AND DES4
406 HC 2
*

407 KK S
408 BA 0.0047
409 PB 3.40
410 LS 0 87.9
411 UD 0.088
*

412 KK CS
413 KM CDES4 AND S
414 HC 2
*

415 KK CP7
416 KM COMBINE CSTF AND CS
417 HC 2
*

418 KK RCP7
419 KM ROUTE CP7 TO CSTF2
420 RD 710 0.066 0.015 0 DEEP 6 0
*

421 KK STF2
422 BA 0.0019
423 PB 3.37
424 LS 0 98.0
425 UD 0.050
*

1

HEC-1 INPUT

PAGE 13

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

426 KK CSTF2
427 KM COMBINE CP7 AND STF2
428 HC 2
*

429 KK RCSTF2
430 KM ROUTE CSTF2 TO CCARR3
431 RD 420 0.005 0.015 0 DEEP 8 0
*

432 KK V
433 BA 0.0078
434 PB 3.37
435 LS 0 90.0
436 UD 0.075
*

Hydrology analysis for Basins S, T, U
reanalyzed. Highlighted is for comparison
only.

551 UD 0.059
 *
 552 KK CSTJ3
 553 KM COMBINE CSTE1, COS-3 AND STJ3
 554 HC 3
 *
 555 KK AA
 556 BA 0.0158
 557 PB 3.44
 558 LS 0 88.4
 559 UD 0.088
 *
 560 KK DUMMY3
 561 KM COMBINE CSTJ3 AND AA
 562 HC 2
 *

563 KK STE2
 564 BA 0.0028
 565 PB 3.40
 566 LS 0 98.0
 567 UD 0.050
 *

1

HEC-1 INPUT

PAGE 17

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

568 KK BB
 569 BA 0.0098
 570 PB 3.42
 571 LS 0 91.1
 572 UD 0.074
 *

573 KK CBB
 574 HC 2
 *

575 KK T
 576 BA 0.0063
 577 PB 3.42
 578 LS 0 86.3
 579 UD 0.069
 *

Hydrology analysis for Basins S, T, U
 reanalyzed. Highlighted is for comparison
 only.

580 KK CT
 581 HC 2
 *

582 KK CC
 583 BA 0.0083
 584 PB 3.42
 585 LS 0 90.7
 586 UD 0.079
 *

587 KK CCC
 588 HC 2
 *

589 KK RCCC
 590 KM ROUTE CCC TO CDD
 591 RD 570 0.005 0.015 0 CIRC 3
 *

592 KK DD
 593 BA 0.0074
 594 PB 3.40
 595 LS 0 90.5
 596 UD 0.075
 *

597 KK CDD
 598 HC 2
 *

1

HEC-1 INPUT

PAGE 18

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

599 KK RCDD
 600 KM ROUTE CCDD TO CDESS
 601 RD 390 0.005 0.015 0 CIRC 3.5
 *

602 KK DESS
 603 BA 0.0025

	.	V	
	.	V	
325	.	RCNP-2	
	.	.	
	.	.	F
328	.	.	.
	.	.	.
	.	CF.....	
333	.	V	
	.	V	
336	.	RCF	
	.	.	
	.	.	25-HS1
339	.	.	.
	.	.	.
344	.	.	STN1
	.	.	.
	.	.	.
	.	CSTN1.....	
350	.	V	
	.	V	
353	.	RCSTN1	
	.	.	
	.	.	STG1
356	.	.	.
	.	.	.
	.	CSTG1.....	
361	.	.	.
	.	.	.
	.	CP6.....	
364	.	V	
	.	V	
367	.	RCP6	
	.	.	
	.	.	L-M
370	.	.	.
	.	.	.
375	.	.	STJ2
	.	.	.
	.	.	.
	.	CSTJ2.....	
380	.	V	
	.	V	
383	.	RCSTJ2	
	.	.	
	.	STF	
386	.	.	.
	.	.	.
391	.	CSTF.....	
	.	.	
	.	U	
394	.	.	.
	.	.	DES4
399	.	.	.
	.	.	.
404	.	CDES4.....	
	.	.	.
	.	.	S
407	.	.	.
	.	.	.
	.	CS.....	
412	.	.	.
	.	.	.
	.	CP7.....	
415	.	V	
	.	V	
418	.	RCP7	
	.	.	
	.	.	STF2
421	.	.	.
	.	.	.
	.	CSTF2.....	
426	.	V	
	.	V	
429	.	RCSTF2	
	.	.	
	.	.	V
432	.	.	.
	.	.	.
437	.	.	W
	.	.	.

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560      .      .      DUMMY3.....
      .      .      .
563      .      .      .      STE2
      .      .      .
568      .      .      .      BB
      .      .      .
573      .      .      .      CBB.....
      .      .      .
575      .      .      .      T
      .      .      .
580      .      .      .      CT.....
      .      .      .
582      .      .      .      CC
      .      .      .
587      .      .      .      CCC.....
      .      .      .      V
      .      .      .      V
589      .      .      .      RCCC
      .      .      .
592      .      .      .      DD
      .      .      .
597      .      .      .      CDD.....
      .      .      .      V
      .      .      .      V
599      .      .      .      RCDD
      .      .      .
602      .      .      .      DESS
      .      .      .
607      .      .      .      CDESS.....
      .      .      .      V
      .      .      .      V
609      .      .      .      RCDESS
      .      .      .
612      .      .      .      STEE2
      .      .      .
617      .      .      .      CSTEE2.....
      .      .      .
619      .      .      .      GG
      .      .      .
624      .      .      .      CGG.....
      .      .      .
626      .      .      .      FF
      .      .      .
631      .      .      DUMMY4.....

```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 23OCT19 TIME 13:10:22 *
*
*****

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

```

ULTIMATE CONDITION HYDROLOGIC MODEL
 INPUT FILE DATE = OCTOBER 2019
 DESIGN STORM = 100-YEAR 6-HR STORM
 STORM DISTRIBUTION = SDN #3
 MODELED BY VTN (JYA)

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*****
* UPDATE #2 - SUMMERLIN WEST VILLAGE 22 *
*****

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JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)

+	RCSTN1	.08	1	FLOW TIME	220. 3.50
---	--------	-----	---	--------------	--------------

HYDROGRAPH AT +	STG1	.00	1	FLOW TIME	8. 3.50
--------------------	------	-----	---	--------------	------------

2 COMBINED AT +	CSTG1	.09	1	FLOW TIME	229. 3.50
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2 COMBINED AT +	CP6	.21	1	FLOW TIME	532. 3.50
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ROUTED TO +	RCP6	.21	1	FLOW TIME	518. 3.50
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HYDROGRAPH AT +	L-M	.03	1	FLOW TIME	81. 3.50
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HYDROGRAPH AT +	STJ2	.00	1	FLOW TIME	13. 3.50
--------------------	------	-----	---	--------------	-------------

3 COMBINED AT +	CSTJ2	.25	1	FLOW TIME	612. 3.50
--------------------	-------	-----	---	--------------	--------------

ROUTED TO +	RCSTJ2	.25	1	FLOW TIME	602. 3.50
----------------	--------	-----	---	--------------	--------------

HYDROGRAPH AT +	STF	.00	1	FLOW TIME	8. 3.50
--------------------	-----	-----	---	--------------	------------

2 COMBINED AT +	CSTF	.25	1	FLOW TIME	610. 3.50
--------------------	------	-----	---	--------------	--------------

HYDROGRAPH AT +	U	.01	1	FLOW TIME	11. 3.50
--------------------	---	-----	---	--------------	-------------

HYDROGRAPH AT +	DES4	.00	1	FLOW TIME	8. 3.50
--------------------	------	-----	---	--------------	------------

2 COMBINED AT +	CDES4	.01	1	FLOW TIME	19. 3.50
--------------------	-------	-----	---	--------------	-------------

HYDROGRAPH AT +	S	.00	1	FLOW TIME	10. 3.50
--------------------	---	-----	---	--------------	-------------

2 COMBINED AT +	CS	.01	1	FLOW TIME	29. 3.50
--------------------	----	-----	---	--------------	-------------

2 COMBINED AT +	CP7	.27	1	FLOW TIME	639. 3.50
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ROUTED TO +	RCP7	.27	1	FLOW TIME	632. 3.50
----------------	------	-----	---	--------------	--------------

HYDROGRAPH AT +	STF2	.00	1	FLOW TIME	5. 3.50
--------------------	------	-----	---	--------------	------------

2 COMBINED AT +	CSTF2	.27	1	FLOW TIME	637. 3.50
--------------------	-------	-----	---	--------------	--------------

ROUTED TO +	RCSTF2	.27	1	FLOW TIME	623. 3.50
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HYDROGRAPH AT +	V	.01	1	FLOW TIME	17. 3.50
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HYDROGRAPH AT +	W	.01	1	FLOW TIME	19. 3.50
--------------------	---	-----	---	--------------	-------------

HYDROGRAPH AT					
+	STE1	.00	1	FLOW TIME	8. 3.50

3 COMBINED AT					
+	CSTE1	.05	1	FLOW TIME	115. 3.50

ROUTED TO					
+	RCSTE1	.05	1	FLOW TIME	107. 3.50

HYDROGRAPH AT					
+	COS-3	.00	1	FLOW TIME	4. 3.50

HYDROGRAPH AT					
+	STJ3	.00	1	FLOW TIME	14. 3.50

3 COMBINED AT					
+	CSTJ3	.05	1	FLOW TIME	126. 3.50

HYDROGRAPH AT					
+	AA	.02	1	FLOW TIME	33. 3.50

2 COMBINED AT					
+	DUMMY3	.07	1	FLOW TIME	159. 3.50

HYDROGRAPH AT					
+	STE2	.00	1	FLOW TIME	8. 3.50

HYDROGRAPH AT					
+	BB	.01	1	FLOW TIME	23. 3.50

2 COMBINED AT					
+	CBB	.01	1	FLOW TIME	31. 3.50

HYDROGRAPH AT					
+	T	.01	1	FLOW TIME	13. 3.50

2 COMBINED AT					
+	CT	.02	1	FLOW TIME	44. 3.50

HYDROGRAPH AT					
+	CC	.01	1	FLOW TIME	19. 3.50

2 COMBINED AT					
+	CCC	.03	1	FLOW TIME	63. 3.50

ROUTED TO					
+	RCCC	.03	1	FLOW TIME	60. 3.50

HYDROGRAPH AT					
+	DD	.01	1	FLOW TIME	17. 3.50

2 COMBINED AT					
+	CDD	.03	1	FLOW TIME	77. 3.50

ROUTED TO					
+	RCDD	.03	1	FLOW TIME	74. 3.50

HYDROGRAPH AT					
+	DESS	.00	1	FLOW TIME	7. 3.50

2 COMBINED AT					
+	CDESS	.04	1	FLOW TIME	81. 3.50

ROUTED TO					
+	RCDESS	.04	1	FLOW TIME	80. 3.50

HYDROGRAPH AT					
+	STEE2	.00	1	FLOW	8.

APPENDIX F

Reference Material

*Technical Drainage Study for Summerlin West Village 22 Desert
Foothills Drive – From Sunset Run Drive to Fleet Wing Avenue
(DS 5344), by Atkins Global*

Approval Letters

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM		DATE: July 19, 2021
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for:	
	Summerlin West Village 22 - Desert Foothills Drive - Update (from Sunset Run Drive to Fleet Wing Avenue)	
Cross Streets:	Desert Foothills Drive and Sunset Run Drive	COPIES TO: Atkins Global
File Number:	F:\Depot\DSMemos\DS5344E.doc	Howard Hughes Company, LLC.
Parcel Number:	137-23-201-001	Bart Anderson, P.E., DevCo
Zoning Action:	N/A	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	8/26/2020	9/10/2020	Not Approved	\$400.00	3966922: \$400
2 nd Submittal	10/26/2020	11/10/2020	Not Approved	\$400.00	4044466: \$400
3 rd Submittal	11/23/2020	12/14/2020	Conditional Approval	N/C	N/C
4 th Submittal	6/3/2021	6/15/2021	Not Approved	\$100.00	4319413: \$100
5 th Submittal & CCRFC	6/24/2021 & 7/6/2021	7/19/2021	Concurrence Recv'd	\$400.00	4361532: \$400
TOTAL FEES (LDDRS):				\$1,300.00	----

REMARKS:

4th & 5th Submittals: Update #1 & Addendum to revise storm drain laterals

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.

- The project proposes to build temporary drainage facilities, ie, berms/swales along the sides of *Desert Foothills Drive* for interim flood protection. Prior to final plan approval the developer must complete a maintenance and liability agreement for the interim drainage improvements (berms or channels) 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 facility and an exhibit that adequately shows the location and limits of the drainage facility 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* (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. The subject street improvement of *Desert Foothills Drive* is premised on the existence of *Fleet Wing Avenue*, *Kindle Rise Way*, *Flight Range Avenue*, *Sunset Run Drive* and the associated storm drain facilities are in place for downstream flood perpetuation. The subject improvement plans will not be approved prior to the posting of the construction bonds of all of the above stated street improvements projects.

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
HDR/AYS

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



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

BOARD OF DIRECTORS

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Commissioner
Tick Segerblom
Clark County

June 16, 2021

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 VILLAGE 22-DESERT FOOTHILLS
DRIVE- SUNSET RUN TO FLEET WING AVE
(DS5344C) (RFC D No. 21-13789)**

Dear Mr. Kwon:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated August 20, 2020, Addendum No. 1 dated October 26, 2020, and Supplement No. 1 dated November 23, 2020 for above-mentioned project as submitted by ATKINS. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas Department of Public Works dated December 14, 2020.

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 ATKINS 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

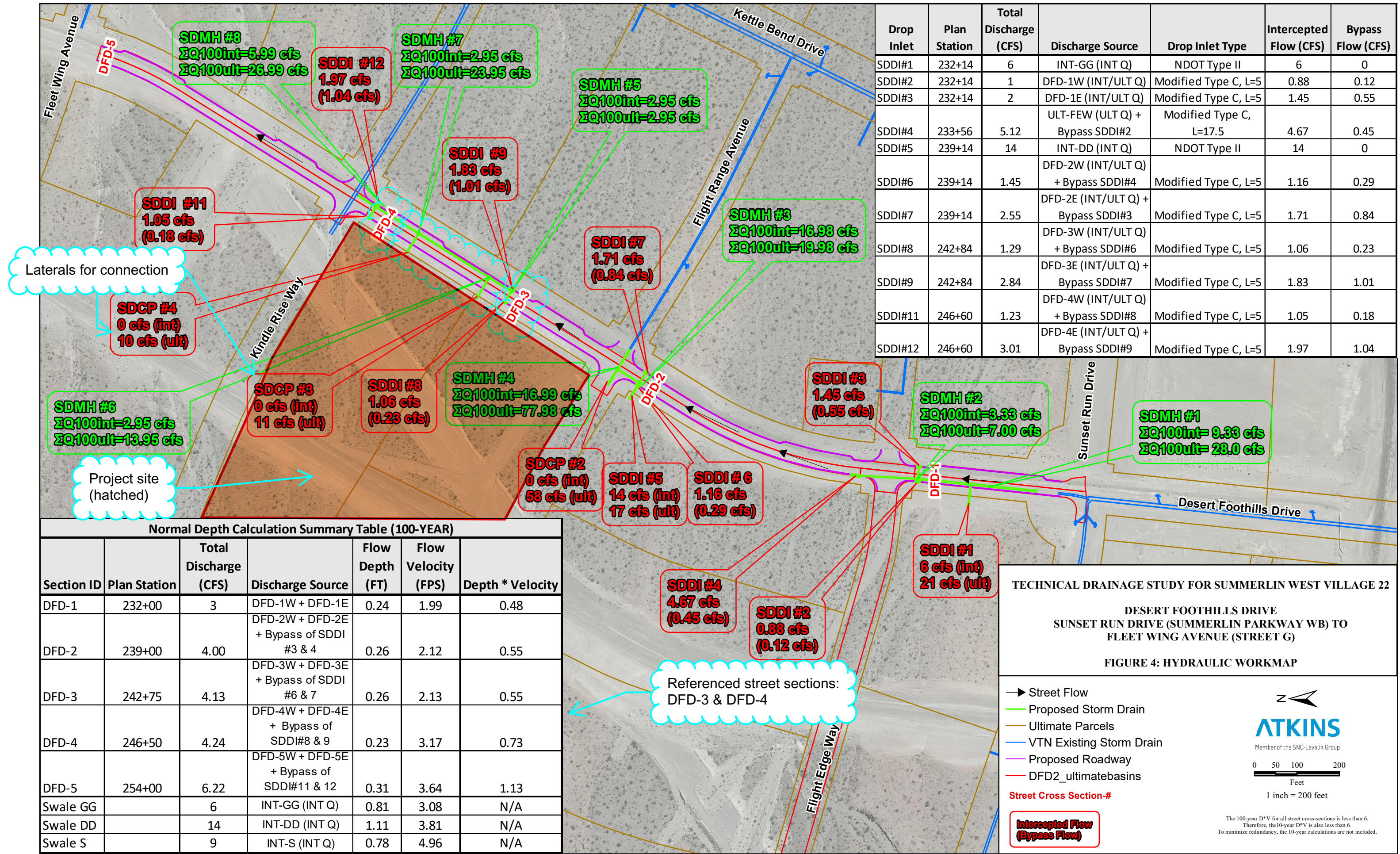
BY: 
Ching Wang (Jun 23, 2021 16:17 PDT)
Ching C. Wang, P.E.
Senior Civil Engineer

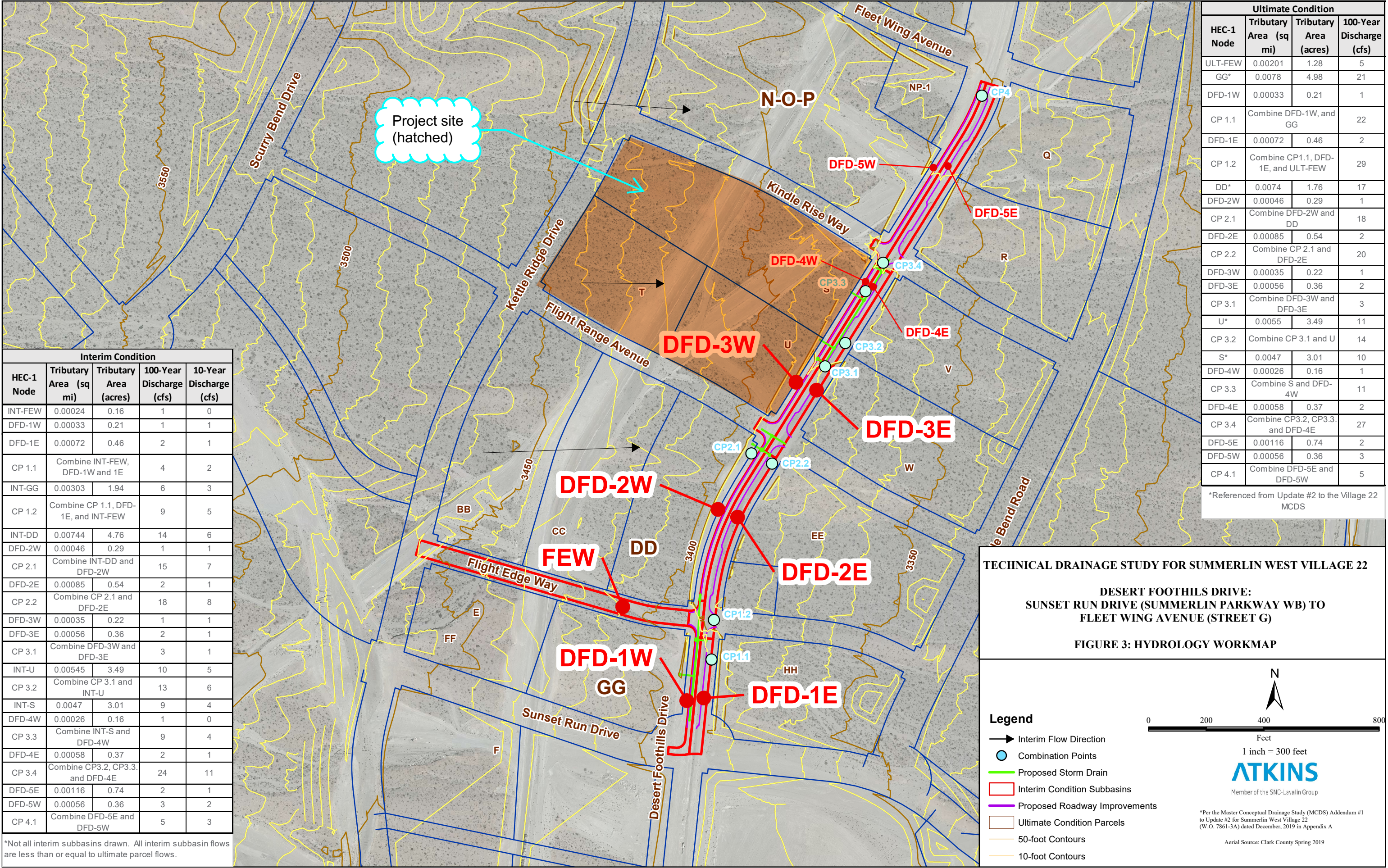
CCW:jr

c: JANELLE KLEIN, P.E., ATKINS

P:\Letters and Memos\Local Drainage\Land Development & Drainage\2021\L-21-13789.doc

Referenced Drainage Exhibits





Referenced Hydraulics

Cross Section for DFD 3

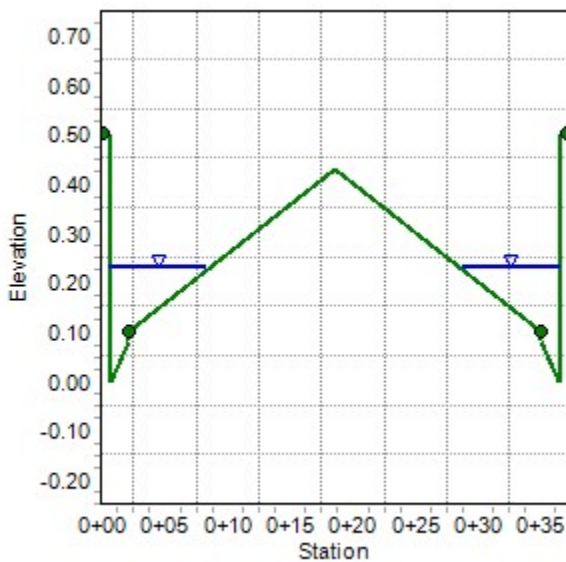
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00970	ft/ft
Normal Depth	0.23	ft
Discharge	2.55	ft ³ /s

Cross Section Image



Worksheet for DFD 3

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00970 ft/ft
Discharge 2.55 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.58	0.00
0+02.00	0.08
0+02.00	0.10
0+18.50	0.43
0+35.00	0.10
0+35.00	0.08
0+36.42	0.00
0+36.50	0.50
0+37.00	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+02.00, 0.10)	0.013
(0+02.00, 0.10)	(0+35.00, 0.10)	0.015
(0+35.00, 0.10)	(0+37.00, 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 DFD 3

Results

Normal Depth		0.23	ft
Elevation Range	0.00 to 0.50 ft		
Flow Area		1.33	ft ²
Wetted Perimeter		15.89	ft
Hydraulic Radius		0.08	ft
Top Width		15.45	ft
Normal Depth		0.23	ft
Critical Depth		0.24	ft
Critical Slope		0.00718	ft/ft
Velocity		1.92	ft/s
Velocity Head		0.06	ft
Specific Energy		0.29	ft
Froude Number		1.16	
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	0.24	ft
Channel Slope	0.00970	ft/ft
Critical Slope	0.00718	ft/ft

Cross Section for DFD 4

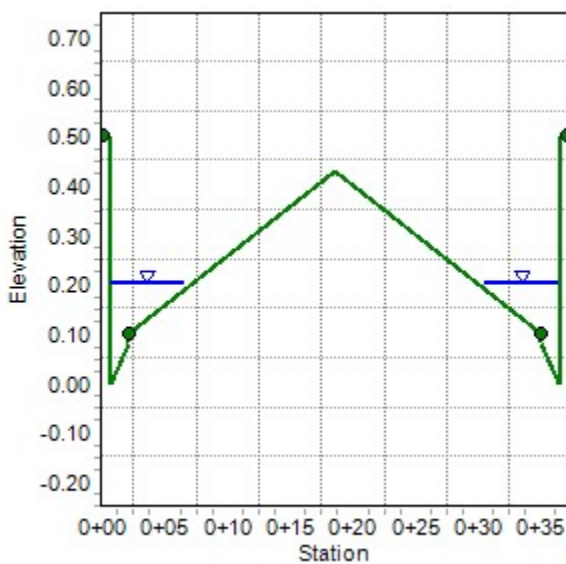
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02630	ft/ft
Normal Depth	0.20	ft
Discharge	2.45	ft ³ /s

Cross Section Image



Worksheet for DFD 4

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.02630 ft/ft
Discharge 2.45 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.58	0.00
0+02.00	0.08
0+02.00	0.10
0+18.50	0.43
0+35.00	0.10
0+35.00	0.08
0+36.42	0.00
0+36.50	0.50
0+37.00	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+02.00, 0.10)	0.013
(0+02.00, 0.10)	(0+35.00, 0.10)	0.015
(0+35.00, 0.10)	(0+37.00, 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 DFD 4

Results

Normal Depth		0.20	ft
Elevation Range	0.00 to 0.50 ft		
Flow Area		0.87	ft ²
Wetted Perimeter		12.49	ft
Hydraulic Radius		0.07	ft
Top Width		12.11	ft
Normal Depth		0.20	ft
Critical Depth		0.24	ft
Critical Slope		0.00711	ft/ft
Velocity		2.82	ft/s
Velocity Head		0.12	ft
Specific Energy		0.32	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	0.20	ft
Critical Depth	0.24	ft
Channel Slope	0.02630	ft/ft
Critical Slope	0.00711	ft/ft

DFD2-KRW-ULT.WSW

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T1 SUMMERLIN WEST VILLAGE 22
T2 DESERT FOOTHILLS DRAIVE - FLIGHT RANGE AVENUE TO KINDLE RISE WAY
T3 ULTIMATE CONDITION 100-YEAR, 6-HOUR STORM EVENT
SO .0003348.648 1 3353.358
R 5.0003348.740 1 .013 .000 .000 0
R 51.8303349.648 1 .013 .000 .000 0
JX 54.3303349.748 1 1 1.013 1.070 1.9703350.7603350.760-90.0 90.0 .000
REM***** ATKINS ***** SDDI#11 & 12
R 56.8303349.848 1 .013 .000 .000 1
REM***** ATKINS ***** SDMH#8
R 170.1103356.460 1 .013 .000 .000 0
JX 172.6103356.560 1 1 .013 10.000 3356.660 90.0 .000
REM***** ATKINS ***** PARCEL S
R 175.1103356.660 1 .013 .000 .000 1
REM***** ATKINS ***** SDMH#7
R 366.2803359.080 1 .013 .000 .000 0
JX 368.7803359.180 1 1 .013 11.000 3359.280 90.0 .000
REM***** ATKINS ***** PARCEL U
R 371.2803359.280 1 .013 .000 .000 1
REM***** ATKINS ***** SDMH#6
R 427.6303361.100 1 .013 .000 .000 0
JX 430.1303361.200 2 2 .013 1.830 3361.300 -90.0 .000
REM***** ATKINS ***** SDDI#9
R 432.6303361.300 2 .013 .000 90.000 1
REM***** ATKINS ***** SDMH#5
R 458.3803361.490 2 .013 .000 .000 0
REM***** ATKINS ***** SDDI#8
SH 458.3803361.490 2 3361.490
CD 1 4 1 .000 2.500 .000 .000 .000 .00
CD 2 4 1 .000 2.000 .000 .000 .000 .00
Q 1.120 .0

Mainline model for Desert Foothills SD revised per this TDS:

STA 172.61 & 368.78 revised for flowrate per this TDS

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WATER SURFACE PROFILE LISTING

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SUMMERLIN WEST VILLAGE 22

DESERT FOOTHILLS DRAIVE - FLIGHT RANGE AVENUE TO KINDLE RISE WAY

ULTIMATE CONDITION 100-YEAR, 6-HOUR STORM EVENT

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
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
.000	3348.648	4.710	3353.358	26.99	5.50	.47	3353.83	.00	1.77	.00	2.500	.000	.00	1 .0
5.000	.0184					.0043	.02	4.71	.00	1.23	.013	.00	.00	PIPE
5.000	3348.740	4.640	3353.380	26.99	5.50	.47	3353.85	.00	1.77	.00	2.500	.000	.00	1 .0
46.830	.0194					.0043	.20	4.64	.00	1.21	.013	.00	.00	PIPE
51.830	3349.648	3.934	3353.583	26.99	5.50	.47	3354.05	.00	1.77	.00	2.500	.000	.00	1 .0
JUNCT STR	.0400					.0039	.01	3.93	.00		.013	.00	.00	PIPE
54.330	3349.748	4.044	3353.792	23.95	4.88	.37	3354.16	.00	1.67	.00	2.500	.000	.00	1 .0
2.500	.0399					.0034	.01	4.04	.00	.93	.013	.00	.00	PIPE
56.830	3349.848	3.971	3353.819	23.95	4.88	.37	3354.19	.00	1.67	.00	2.500	.000	.00	1 .0
17.677	.0584					.0034	.06	3.97	.00	.84	.013	.00	.00	PIPE
74.507	3350.880	2.999	3353.878	23.95	4.88	.37	3354.25	.00	1.67	.00	2.500	.000	.00	1 .0
HYDRAULIC JUMP														
74.507	3350.880	.873	3351.753	23.95	15.69	3.82	3355.58	.00	1.67	2.38	2.500	.000	.00	1 .0
9.937	.0584					.0489	.49	.87	3.46	.84	.013	.00	.00	PIPE
84.444	3351.460	.881	3352.340	23.95	15.50	3.73	3356.07	.00	1.67	2.39	2.500	.000	.00	1 .0
23.268	.0584					.0451	1.05	.88	3.40	.84	.013	.00	.00	PIPE
107.712	3352.818	.912	3353.730	23.95	14.78	3.39	3357.12	.00	1.67	2.41	2.500	.000	.00	1 .0
14.676	.0584					.0396	.58	.91	3.17	.84	.013	.00	.00	PIPE

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WATER SURFACE PROFILE LISTING

Date:10-15-2020 Time:10: 2: 9

SUMMERLIN WEST VILLAGE 22

DESERT FOOTHILLS DRAIVE - FLIGHT RANGE AVENUE TO KINDLE RISE WAY

ULTIMATE CONDITION 100-YEAR, 6-HOUR STORM EVENT

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
122.388	3353.675	.945	3354.619	23.95	14.09	3.08	3357.70	.00	1.67	2.42	2.500	.000	.00	1 .0
10.413	.0584					.0347	.36	.94	2.97	.84	.013	.00	.00	PIPE
132.801	3354.282	.979	3355.261	23.95	13.44	2.80	3358.07	.00	1.67	2.44	2.500	.000	.00	1 .0
7.862	.0584					.0305	.24	.98	2.77	.84	.013	.00	.00	PIPE
140.663	3354.741	1.015	3355.756	23.95	12.81	2.55	3358.30	.00	1.67	2.46	2.500	.000	.00	1 .0
6.153	.0584					.0267	.16	1.01	2.59	.84	.013	.00	.00	PIPE
146.816	3355.101	1.052	3356.152	23.95	12.22	2.32	3358.47	.00	1.67	2.47	2.500	.000	.00	1 .0
4.929	.0584					.0235	.12	1.05	2.42	.84	.013	.00	.00	PIPE
151.746	3355.388	1.090	3356.479	23.95	11.65	2.11	3358.59	.00	1.67	2.48	2.500	.000	.00	1 .0
4.004	.0584					.0206	.08	1.09	2.25	.84	.013	.00	.00	PIPE
155.750	3355.622	1.131	3356.752	23.95	11.11	1.92	3358.67	.00	1.67	2.49	2.500	.000	.00	1 .0
3.279	.0584					.0181	.06	1.13	2.10	.84	.013	.00	.00	PIPE
159.029	3355.813	1.173	3356.986	23.95	10.59	1.74	3358.73	.00	1.67	2.50	2.500	.000	.00	1 .0
2.689	.0584					.0160	.04	1.17	1.96	.84	.013	.00	.00	PIPE
161.718	3355.970	1.217	3357.187	23.95	10.10	1.58	3358.77	.00	1.67	2.50	2.500	.000	.00	1 .0
2.202	.0584					.0140	.03	1.22	1.83	.84	.013	.00	.00	PIPE
163.920	3356.099	1.263	3357.362	23.95	9.63	1.44	3358.80	.00	1.67	2.50	2.500	.000	.00	1 .0
1.787	.0584					.0124	.02	1.26	1.70	.84	.013	.00	.00	PIPE

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WATER SURFACE PROFILE LISTING

Date:10-15-2020 Time:10: 2: 9

SUMMERLIN WEST VILLAGE 22

DESERT FOOTHILLS DRAIVE - FLIGHT RANGE AVENUE TO KINDLE RISE WAY

ULTIMATE CONDITION 100-YEAR, 6-HOUR STORM EVENT

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
165.707	3356.203	1.312	3357.515	23.95	9.18	1.31	3358.82	.00	1.67	2.50	2.500	.000	.00	1 .0
1.429	.0584					.0109	.02	1.31	1.58	.84	.013	.00	.00	PIPE
167.135	3356.286	1.363	3357.649	23.95	8.75	1.19	3358.84	.00	1.67	2.49	2.500	.000	.00	1 .0
1.114	.0584					.0096	.01	1.36	1.47	.84	.013	.00	.00	PIPE
168.249	3356.351	1.417	3357.768	23.95	8.34	1.08	3358.85	.00	1.67	2.48	2.500	.000	.00	1 .0
.834	.0584					.0085	.01	1.42	1.37	.84	.013	.00	.00	PIPE
169.083	3356.400	1.474	3357.874	23.95	7.96	.98	3358.86	.00	1.67	2.46	2.500	.000	.00	1 .0
.577	.0584					.0075	.00	1.47	1.27	.84	.013	.00	.00	PIPE
169.660	3356.434	1.534	3357.967	23.95	7.59	.89	3358.86	.00	1.67	2.43	2.500	.000	.00	1 .0
.337	.0584					.0067	.00	1.53	1.17	.84	.013	.00	.00	PIPE
169.997	3356.453	1.597	3358.051	23.95	7.23	.81	3358.86	.00	1.67	2.40	2.500	.000	.00	1 .0
.113	.0584					.0059	.00	1.60	1.09	.84	.013	.00	.00	PIPE
170.110	3356.460	1.666	3358.126	23.95	6.89	.74	3358.86	.00	1.67	2.36	2.500	.000	.00	1 .0
JUNCT STR	.0400					.0034	.01	1.67	1.00		.013	.00	.00	PIPE
172.610	3356.560	2.504	3359.063	13.95	2.84	.13	3359.19	.00	1.26	.00	2.500	.000	.00	1 .0
.097	.0399					.0011	.00	2.50	.00	.70	.013	.00	.00	PIPE
172.707	3356.564	2.500	3359.064	13.95	2.84	.13	3359.19	.00	1.26	.00	2.500	.000	.00	1 .0
2.403	.0399					.0011	.00	2.50	.00	.70	.013	.00	.00	PIPE

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WATER SURFACE PROFILE LISTING

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SUMMERLIN WEST VILLAGE 22

DESERT FOOTHILLS DRAIVE - FLIGHT RANGE AVENUE TO KINDLE RISE WAY

ULTIMATE CONDITION 100-YEAR, 6-HOUR STORM EVENT

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
175.110	3356.660	2.402	3359.062	13.95	2.88	.13	3359.19	.00	1.26	.97	2.500	.000	.00	1 .0
13.873	.0127					.0010	.01	2.40	.23	.94	.013	.00	.00	PIPE
188.983	3356.835	2.228	3359.063	13.95	3.02	.14	3359.21	.00	1.26	1.56	2.500	.000	.00	1 .0
9.683	.0127					.0011	.01	2.23	.31	.94	.013	.00	.00	PIPE
198.665	3356.958	2.102	3359.060	13.95	3.17	.16	3359.22	.00	1.26	1.83	2.500	.000	.00	1 .0
7.926	.0127					.0012	.01	2.10	.36	.94	.013	.00	.00	PIPE
206.591	3357.058	1.995	3359.053	13.95	3.32	.17	3359.22	.00	1.26	2.01	2.500	.000	.00	1 .0
6.783	.0127					.0013	.01	1.99	.40	.94	.013	.00	.00	PIPE
213.374	3357.144	1.901	3359.045	13.95	3.48	.19	3359.23	.00	1.26	2.13	2.500	.000	.00	1 .0
5.915	.0127					.0014	.01	1.90	.45	.94	.013	.00	.00	PIPE
219.289	3357.219	1.815	3359.035	13.95	3.65	.21	3359.24	.00	1.26	2.23	2.500	.000	.00	1 .0
5.211	.0127					.0016	.01	1.82	.49	.94	.013	.00	.00	PIPE
224.500	3357.285	1.737	3359.022	13.95	3.83	.23	3359.25	.00	1.26	2.30	2.500	.000	.00	1 .0
4.580	.0127					.0018	.01	1.74	.54	.94	.013	.00	.00	PIPE
229.080	3357.343	1.664	3359.007	13.95	4.02	.25	3359.26	.00	1.26	2.36	2.500	.000	.00	1 .0
1.099	.0127					.0019	.00	1.66	.58	.94	.013	.00	.00	PIPE
230.179	3357.357	1.664	3359.021	13.95	4.02	.25	3359.27	.00	1.26	2.36	2.500	.000	.00	1 .0

HYDRAULIC JUMP

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SUMMERLIN WEST VILLAGE 22

DESERT FOOTHILLS DRAIVE - FLIGHT RANGE AVENUE TO KINDLE RISE WAY

ULTIMATE CONDITION 100-YEAR, 6-HOUR STORM EVENT

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
230.179	3357.357	.943	3358.300	13.95	8.24	1.05	3359.35	.00	1.26	2.42	2.500	.000	.00	1 .0
2.107	.0127					.0127	.03	.94	1.74	.94	.013	.00	.00	PIPE
232.285	3357.384	.943	3358.326	13.95	8.24	1.05	3359.38	.00	1.26	2.42	2.500	.000	.00	1 .0
79.621	.0127					.0119	.95	.94	1.74	.94	.013	.00	.00	PIPE
311.906	3358.392	.974	3359.365	13.95	7.88	.97	3360.33	.00	1.26	2.44	2.500	.000	.00	1 .0
24.797	.0127					.0105	.26	.97	1.63	.94	.013	.00	.00	PIPE
336.703	3358.706	1.009	3359.715	13.95	7.52	.88	3360.59	.00	1.26	2.45	2.500	.000	.00	1 .0
12.623	.0127					.0093	.12	1.01	1.52	.94	.013	.00	.00	PIPE
349.326	3358.865	1.046	3359.911	13.95	7.17	.80	3360.71	.00	1.26	2.47	2.500	.000	.00	1 .0
7.529	.0127					.0081	.06	1.05	1.42	.94	.013	.00	.00	PIPE
356.855	3358.961	1.084	3360.045	13.95	6.83	.73	3360.77	.00	1.26	2.48	2.500	.000	.00	1 .0
4.680	.0127					.0071	.03	1.08	1.33	.94	.013	.00	.00	PIPE
361.534	3359.020	1.124	3360.144	13.95	6.52	.66	3360.80	.00	1.26	2.49	2.500	.000	.00	1 .0
2.810	.0127					.0063	.02	1.12	1.24	.94	.013	.00	.00	PIPE
364.344	3359.056	1.166	3360.222	13.95	6.21	.60	3360.82	.00	1.26	2.49	2.500	.000	.00	1 .0
1.483	.0127					.0055	.01	1.17	1.15	.94	.013	.00	.00	PIPE
365.827	3359.074	1.210	3360.285	13.95	5.92	.54	3360.83	.00	1.26	2.50	2.500	.000	.00	1 .0
.453	.0127					.0049	.00	1.21	1.08	.94	.013	.00	.00	PIPE

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SUMMERLIN WEST VILLAGE 22

DESERT FOOTHILLS DRAIVE - FLIGHT RANGE AVENUE TO KINDLE RISE WAY

ULTIMATE CONDITION 100-YEAR, 6-HOUR STORM EVENT

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
366.280	3359.080	1.257	3360.337	13.95	5.64	.49	3360.83	.00	1.26	2.50	2.500	.000	.00	1 .0
JUNCT STR	.0399					.0023	.01	1.26	1.00		.013	.00	.00	PIPE
368.780	3359.180	1.898	3361.078	2.95	.74	.01	3361.09	.00	.56	2.14	2.500	.000	.00	1 .0
2.109	.0400					.0001	.00	1.90	.10	.32	.013	.00	.00	PIPE
370.889	3359.264	1.813	3361.077	2.95	.77	.01	3361.09	.00	.56	2.23	2.500	.000	.00	1 .0
.391	.0400					.0001	.00	1.81	.10	.32	.013	.00	.00	PIPE
371.280	3359.280	1.797	3361.077	2.95	.78	.01	3361.09	.00	.56	2.25	2.500	.000	.00	1 .0
2.361	.0323					.0001	.00	1.80	.11	.34	.013	.00	.00	PIPE
373.641	3359.356	1.720	3361.076	2.95	.82	.01	3361.09	.00	.56	2.32	2.500	.000	.00	1 .0
2.187	.0323					.0001	.00	1.72	.12	.34	.013	.00	.00	PIPE
375.828	3359.427	1.648	3361.075	2.95	.86	.01	3361.09	.00	.56	2.37	2.500	.000	.00	1 .0
2.038	.0323					.0001	.00	1.65	.13	.34	.013	.00	.00	PIPE
377.867	3359.493	1.582	3361.074	2.95	.90	.01	3361.09	.00	.56	2.41	2.500	.000	.00	1 .0
1.911	.0323					.0001	.00	1.58	.14	.34	.013	.00	.00	PIPE
379.778	3359.554	1.519	3361.073	2.95	.95	.01	3361.09	.00	.56	2.44	2.500	.000	.00	1 .0
1.796	.0323					.0001	.00	1.52	.15	.34	.013	.00	.00	PIPE
381.575	3359.613	1.460	3361.072	2.95	.99	.02	3361.09	.00	.56	2.46	2.500	.000	.00	1 .0
1.694	.0323					.0001	.00	1.46	.16	.34	.013	.00	.00	PIPE

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SUMMERLIN WEST VILLAGE 22

DESERT FOOTHILLS DRAIVE - FLIGHT RANGE AVENUE TO KINDLE RISE WAY

ULTIMATE CONDITION 100-YEAR, 6-HOUR STORM EVENT

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
383.268	3359.667	1.404	3361.071	2.95	1.04	.02	3361.09	.00	.56	2.48	2.500	.000	.00	1 .0
1.599	.0323					.0002	.00	1.40	.17	.34	.013	.00	.00	PIPE
384.868	3359.719	1.350	3361.069	2.95	1.09	.02	3361.09	.00	.56	2.49	2.500	.000	.00	1 .0
1.511	.0323					.0002	.00	1.35	.18	.34	.013	.00	.00	PIPE
386.379	3359.768	1.300	3361.068	2.95	1.14	.02	3361.09	.00	.56	2.50	2.500	.000	.00	1 .0
1.432	.0323					.0002	.00	1.30	.20	.34	.013	.00	.00	PIPE
387.811	3359.814	1.252	3361.066	2.95	1.20	.02	3361.09	.00	.56	2.50	2.500	.000	.00	1 .0
1.358	.0323					.0002	.00	1.25	.21	.34	.013	.00	.00	PIPE
389.169	3359.858	1.206	3361.064	2.95	1.26	.02	3361.09	.00	.56	2.50	2.500	.000	.00	1 .0
1.287	.0323					.0002	.00	1.21	.23	.34	.013	.00	.00	PIPE
390.456	3359.899	1.163	3361.062	2.95	1.32	.03	3361.09	.00	.56	2.49	2.500	.000	.00	1 .0
1.221	.0323					.0003	.00	1.16	.25	.34	.013	.00	.00	PIPE
391.677	3359.939	1.121	3361.060	2.95	1.38	.03	3361.09	.00	.56	2.49	2.500	.000	.00	1 .0
1.158	.0323					.0003	.00	1.12	.26	.34	.013	.00	.00	PIPE
392.835	3359.976	1.081	3361.057	2.95	1.45	.03	3361.09	.00	.56	2.48	2.500	.000	.00	1 .0
1.097	.0323					.0004	.00	1.08	.28	.34	.013	.00	.00	PIPE
393.932	3360.012	1.042	3361.054	2.95	1.52	.04	3361.09	.00	.56	2.47	2.500	.000	.00	1 .0
1.035	.0323					.0004	.00	1.04	.30	.34	.013	.00	.00	PIPE

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SUMMERLIN WEST VILLAGE 22

DESERT FOOTHILLS DRAIVE - FLIGHT RANGE AVENUE TO KINDLE RISE WAY

ULTIMATE CONDITION 100-YEAR, 6-HOUR STORM EVENT

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
394.967	3360.045	1.006	3361.051	2.95	1.60	.04	3361.09	.00	.56	2.45	2.500	.000	.00	1 .0
.982	.0323					.0005	.00	1.01	.32	.34	.013	.00	.00	PIPE
395.949	3360.077	.971	3361.048	2.95	1.67	.04	3361.09	.00	.56	2.44	2.500	.000	.00	1 .0
.927	.0323					.0005	.00	.97	.35	.34	.013	.00	.00	PIPE
396.876	3360.107	.937	3361.044	2.95	1.76	.05	3361.09	.00	.56	2.42	2.500	.000	.00	1 .0
.872	.0323					.0006	.00	.94	.37	.34	.013	.00	.00	PIPE
397.748	3360.135	.904	3361.039	2.95	1.84	.05	3361.09	.00	.56	2.40	2.500	.000	.00	1 .0
.818	.0323					.0007	.00	.90	.40	.34	.013	.00	.00	PIPE
398.565	3360.161	.873	3361.035	2.95	1.93	.06	3361.09	.00	.56	2.38	2.500	.000	.00	1 .0
.682	.0323					.0008	.00	.87	.43	.34	.013	.00	.00	PIPE
399.247	3360.183	.843	3361.027	2.95	2.03	.06	3361.09	.00	.56	2.36	2.500	.000	.00	1 .0
HYDRAULIC JUMP														
399.247	3360.183	.353	3360.536	2.95	6.98	.76	3361.29	.00	.56	1.74	2.500	.000	.00	1 .0
9.129	.0323					.0263	.24	.35	2.49	.34	.013	.00	.00	PIPE
408.376	3360.479	.365	3360.843	2.95	6.65	.69	3361.53	.00	.56	1.76	2.500	.000	.00	1 .0
5.387	.0323					.0230	.12	.36	2.34	.34	.013	.00	.00	PIPE
413.763	3360.653	.377	3361.030	2.95	6.34	.62	3361.65	.00	.56	1.79	2.500	.000	.00	1 .0
3.607	.0323					.0201	.07	.38	2.19	.34	.013	.00	.00	PIPE

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SUMMERLIN WEST VILLAGE 22

DESERT FOOTHILLS DRAIVE - FLIGHT RANGE AVENUE TO KINDLE RISE WAY

ULTIMATE CONDITION 100-YEAR, 6-HOUR STORM EVENT

*****																	*****	
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				
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****				
417.370	3360.769	.390	3361.158	2.95	6.05	.57	3361.73	.00	.56	1.81	2.500	.000	.00	1	.0			
	2.604	.0323				.0175	.05	.39	2.05	.34	.013	.00	.00	PIPE				
419.974	3360.853	.403	3361.256	2.95	5.76	.52	3361.77	.00	.56	1.84	2.500	.000	.00	1	.0			
	1.965	.0323				.0153	.03	.40	1.92	.34	.013	.00	.00	PIPE				
421.939	3360.917	.416	3361.333	2.95	5.50	.47	3361.80	.00	.56	1.86	2.500	.000	.00	1	.0			
	1.512	.0323				.0134	.02	.42	1.80	.34	.013	.00	.00	PIPE				
423.451	3360.965	.430	3361.396	2.95	5.24	.43	3361.82	.00	.56	1.89	2.500	.000	.00	1	.0			
	1.181	.0323				.0117	.01	.43	1.69	.34	.013	.00	.00	PIPE				
424.632	3361.003	.445	3361.448	2.95	5.00	.39	3361.84	.00	.56	1.91	2.500	.000	.00	1	.0			
	.915	.0323				.0102	.01	.44	1.58	.34	.013	.00	.00	PIPE				
425.547	3361.033	.460	3361.492	2.95	4.76	.35	3361.84	.00	.56	1.94	2.500	.000	.00	1	.0			
	.707	.0323				.0089	.01	.46	1.48	.34	.013	.00	.00	PIPE				
426.254	3361.056	.475	3361.531	2.95	4.54	.32	3361.85	.00	.56	1.96	2.500	.000	.00	1	.0			
	.531	.0323				.0078	.00	.48	1.39	.34	.013	.00	.00	PIPE				
426.785	3361.073	.491	3361.564	2.95	4.33	.29	3361.86	.00	.56	1.99	2.500	.000	.00	1	.0			
	.387	.0323				.0068	.00	.49	1.30	.34	.013	.00	.00	PIPE				
427.172	3361.085	.508	3361.593	2.95	4.13	.26	3361.86	.00	.56	2.01	2.500	.000	.00	1	.0			
	.261	.0323				.0059	.00	.51	1.22	.34	.013	.00	.00	PIPE				

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SUMMERLIN WEST VILLAGE 22

DESERT FOOTHILLS DRAIVE - FLIGHT RANGE AVENUE TO KINDLE RISE WAY

ULTIMATE CONDITION 100-YEAR, 6-HOUR STORM EVENT

*****															*****	
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		
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****		
427.433	3361.094	.525	3361.619	2.95	3.94	.24	3361.86	.00	.56	2.04	2.500	.000	.00	1 .0		
	.147	.0323				.0052	.00	.52	1.14	.34	.013	.00	.00	PIPE		
427.580	3361.098	.543	3361.641	2.95	3.75	.22	3361.86	.00	.56	2.06	2.500	.000	.00	1 .0		
	.050	.0323				.0045	.00	.54	1.07	.34	.013	.00	.00	PIPE		
427.630	3361.100	.562	3361.662	2.95	3.57	.20	3361.86	.00	.56	2.09	2.500	.000	.00	1 .0		
JUNCT STR	.0399					.0022	.01	.56	1.00		.013	.00	.00	PIPE		
430.130	3361.200	.769	3361.969	1.12	1.01	.02	3361.98	.00	.36	1.95	2.000	.000	.00	1 .0		
	.632	.0400				.0003	.00	.77	.23	.22	.013	.00	.00	PIPE		
430.762	3361.225	.742	3361.968	1.12	1.06	.02	3361.99	.00	.36	1.93	2.000	.000	.00	1 .0		
	.603	.0400				.0003	.00	.74	.25	.22	.013	.00	.00	PIPE		
431.365	3361.250	.717	3361.966	1.12	1.11	.02	3361.99	.00	.36	1.92	2.000	.000	.00	1 .0		
	.572	.0400				.0003	.00	.72	.27	.22	.013	.00	.00	PIPE		
431.937	3361.272	.692	3361.965	1.12	1.16	.02	3361.99	.00	.36	1.90	2.000	.000	.00	1 .0		
	.545	.0400				.0004	.00	.69	.29	.22	.013	.00	.00	PIPE		
432.482	3361.294	.668	3361.963	1.12	1.22	.02	3361.99	.00	.36	1.89	2.000	.000	.00	1 .0		
	.148	.0400				.0004	.00	.67	.31	.22	.013	.00	.00	PIPE		
432.630	3361.300	.662	3361.962	1.12	1.23	.02	3361.99	.00	.36	1.88	2.000	.000	.00	1 .0		
	2.933	.0074				.0005	.00	.66	.31	.33	.013	.00	.00	PIPE		

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SUMMERLIN WEST VILLAGE 22

DESERT FOOTHILLS DRAIVE - FLIGHT RANGE AVENUE TO KINDLE RISE WAY

ULTIMATE CONDITION 100-YEAR, 6-HOUR STORM EVENT

*****																	*****	
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				
*****																	*****	
435.563	3361.322	.639	3361.961	1.12	1.29	.03	3361.99	.00	.36	1.87	2.000	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2.792	.0074					.0005	.00	.64	.33	.33	.013	.00	.00	PIPE				
438.355	3361.342	.618	3361.960	1.12	1.36	.03	3361.99	.00	.36	1.85	2.000	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2.652	.0074					.0006	.00	.62	.36	.33	.013	.00	.00	PIPE				
441.007	3361.362	.597	3361.959	1.12	1.42	.03	3361.99	.00	.36	1.83	2.000	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2.554	.0074					.0007	.00	.60	.38	.33	.013	.00	.00	PIPE				
443.561	3361.381	.577	3361.957	1.12	1.49	.03	3361.99	.00	.36	1.81	2.000	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2.408	.0074					.0008	.00	.58	.41	.33	.013	.00	.00	PIPE				
445.969	3361.398	.557	3361.956	1.12	1.57	.04	3361.99	.00	.36	1.79	2.000	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2.304	.0074					.0009	.00	.56	.44	.33	.013	.00	.00	PIPE				
448.273	3361.416	.539	3361.954	1.12	1.64	.04	3362.00	.00	.36	1.77	2.000	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2.181	.0074					.0010	.00	.54	.47	.33	.013	.00	.00	PIPE				
450.454	3361.432	.521	3361.952	1.12	1.72	.05	3362.00	.00	.36	1.76	2.000	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2.053	.0074					.0012	.00	.52	.50	.33	.013	.00	.00	PIPE				
452.507	3361.447	.503	3361.950	1.12	1.81	.05	3362.00	.00	.36	1.74	2.000	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
1.935	.0074					.0014	.00	.50	.53	.33	.013	.00	.00	PIPE				
454.442	3361.461	.487	3361.948	1.12	1.89	.06	3362.00	.00	.36	1.72	2.000	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
1.827	.0074					.0016	.00	.49	.57	.33	.013	.00	.00	PIPE				

DFD2-KRW-ULT.OUT

FILE: DFD2-KRW-ULT.WSW

W S P G W - CIVILDESIGN Version 14.08

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Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING

Date:10-15-2020 Time:10: 2: 9

SUMMERLIN WEST VILLAGE 22

DESERT FOOTHILLS DRAIVE - FLIGHT RANGE AVENUE TO KINDLE RISE WAY

ULTIMATE CONDITION 100-YEAR, 6-HOUR STORM EVENT

*****															*****	
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		
*****															*****	
456.268	3361.474	.471	3361.945	1.12	1.99	.06	3362.01	.00	.36	1.70	2.000	.000	.00	1 .0		
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -		
1.675	.0074					.0018	.00	.47	.61	.33	.013	.00	.00	PIPE		
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -		
457.943	3361.487	.455	3361.942	1.12	2.08	.07	3362.01	.00	.36	1.68	2.000	.000	.00	1 .0		
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -		
.437	.0074					.0019	.00	.46	.65	.33	.013	.00	.00	PIPE		
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -		
458.380	3361.490	.451	3361.941	1.12	2.11	.07	3362.01	.00	.36	1.67	2.000	.000	.00	1 .0		
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -		

DFD2-KRW-ULT-LAT6.WSW

0

```

T1 SUMMERLIN WEST VILLAGE 22
T2 DESERT FOOTHILLS DRIVE - SUNSET RUN DRIVE TO FLEET WING AVENUE
T3 ULTIMATE CONDITION 100-YEAR, 6-HOUR STORM EVENT
SO 371.2803359.280 1 3361.077
REM***** ATKINS ***** SDMH#6
R 455.7103361.620 1 .013 .000 .000 0
REM***** ATKINS ***** PARCEL U
SH 431.5303361.620 1 3361.619
CD 1 4 1 .000 2.500 .000 .000 .000 .00
CD 2 4 1 .000 2.000 .000 .000 .000 .00
Q 11.000 .0

```

Lateral 6 model revised per this TDS: reanalyzed downstream HGL per DFD2 Model, updated flowrate and extended model for onsite improvements

DFD2-KRW-ULT-LAT6.OUT

FILE: DFD2-KRW-ULT-LAT6.WSW

W S P G W - CIVILDESIGN Version 14.08

PAGE 1

Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING

Date: 6- 1-2021 Time:11: 1: 9

SUMMERLIN WEST VILLAGE 22

DESERT FOOTHILLS DRIVE - SUNSET RUN DRIVE TO FLEET WING AVENUE

ULTIMATE CONDITION 100-YEAR, 6-HOUR STORM EVENT

*****																	*****	
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				

371.280	3359.280	1.797	3361.077	11.00	2.91	.13	3361.21	.00	1.11	2.25	2.500	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2.389	.0277					.0010	.00	1.80	.40	.68	.013	.00	.00	PIPE				
373.669	3359.346	1.720	3361.066	11.00	3.05	.14	3361.21	.00	1.11	2.32	2.500	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
.737	.0277					.0011	.00	1.72	.43	.68	.013	.00	.00	PIPE				
374.406	3359.367	1.692	3361.059	11.00	3.11	.15	3361.21	.00	1.11	2.34	2.500	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
HYDRAULIC JUMP																		
374.406	3359.367	.691	3360.058	11.00	9.95	1.54	3361.59	.00	1.11	2.24	2.500	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
18.107	.0277					.0249	.45	.69	2.49	.68	.013	.00	.00	PIPE				
392.513	3359.868	.703	3360.571	11.00	9.72	1.47	3362.04	.00	1.11	2.25	2.500	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
21.354	.0277					.0226	.48	.70	2.41	.68	.013	.00	.00	PIPE				
413.868	3360.460	.727	3361.188	11.00	9.27	1.33	3362.52	.00	1.11	2.27	2.500	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
12.103	.0277					.0198	.24	.73	2.26	.68	.013	.00	.00	PIPE				
425.971	3360.796	.753	3361.549	11.00	8.84	1.21	3362.76	.00	1.11	2.29	2.500	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
8.081	.0277					.0173	.14	.75	2.11	.68	.013	.00	.00	PIPE				
434.052	3361.020	.779	3361.799	11.00	8.42	1.10	3362.90	.00	1.11	2.32	2.500	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
5.805	.0277					.0152	.09	.78	1.98	.68	.013	.00	.00	PIPE				
439.857	3361.180	.807	3361.987	11.00	8.03	1.00	3362.99	.00	1.11	2.34	2.500	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
4.339	.0277					.0133	.06	.81	1.85	.68	.013	.00	.00	PIPE				

DFD2-KRW-ULT-LAT6.OUT

FILE: DFD2-KRW-ULT-LAT6.WSW

W S P G W - CIVILDESIGN Version 14.08

PAGE 2

Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING

Date: 6- 1-2021 Time:11: 1: 9

SUMMERLIN WEST VILLAGE 22

DESERT FOOTHILLS DRIVE - SUNSET RUN DRIVE TO FLEET WING AVENUE

ULTIMATE CONDITION 100-YEAR, 6-HOUR STORM EVENT

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
444.196	3361.301	.835	3362.136	11.00	7.66	.91	3363.05	.00	1.11	2.36	2.500	.000	.00	1 .0
3.311	.0277					.0116	.04	.84	1.73	.68	.013	.00	.00	PIPE
447.506	3361.393	.865	3362.257	11.00	7.30	.83	3363.09	.00	1.11	2.38	2.500	.000	.00	1 .0
2.540	.0277					.0102	.03	.86	1.62	.68	.013	.00	.00	PIPE
450.046	3361.463	.895	3362.358	11.00	6.96	.75	3363.11	.00	1.11	2.40	2.500	.000	.00	1 .0
1.941	.0277					.0089	.02	.90	1.51	.68	.013	.00	.00	PIPE
451.987	3361.517	.927	3362.444	11.00	6.64	.68	3363.13	.00	1.11	2.42	2.500	.000	.00	1 .0
1.450	.0277					.0078	.01	.93	1.41	.68	.013	.00	.00	PIPE
453.437	3361.557	.961	3362.518	11.00	6.33	.62	3363.14	.00	1.11	2.43	2.500	.000	.00	1 .0
1.044	.0277					.0069	.01	.96	1.32	.68	.013	.00	.00	PIPE
454.481	3361.586	.996	3362.582	11.00	6.03	.57	3363.15	.00	1.11	2.45	2.500	.000	.00	1 .0
.702	.0277					.0060	.00	1.00	1.23	.68	.013	.00	.00	PIPE
455.183	3361.605	1.032	3362.637	11.00	5.75	.51	3363.15	.00	1.11	2.46	2.500	.000	.00	1 .0
.399	.0277					.0053	.00	1.03	1.15	.68	.013	.00	.00	PIPE
455.581	3361.616	1.070	3362.686	11.00	5.49	.47	3363.15	.00	1.11	2.47	2.500	.000	.00	1 .0
.129	.0277					.0047	.00	1.07	1.07	.68	.013	.00	.00	PIPE
455.710	3361.620	1.110	3362.730	11.00	5.22	.42	3363.15	.00	1.11	2.48	2.500	.000	.00	1 .0
431.530	3361.620	1.110	3362.730	11.00	5.22	.42	3363.15	.00	1.11	2.48	2.500	.000	.00	1 .0

DFD2-KRW-ULT-LAT7.WSW

0

T1 SUMMERLIN WEST VILLAGE 22
T2 DESERT FOOTHILLS DRIVE - SUNSET RUN DRIVE TO FLEET WING AVENUE
T3 ULTIMATE CONDITION 100-YEAR, 6-HOUR STORM EVENT
SO 175.1103356.660 1 3359.062
REM***** ATKINS ***** SDMH#7
R 231.7603357.060 1 .013 .000 .000 0
REM***** ATKINS ***** PARCEL S
SH 231.7603357.060 1 3357.060
CD 1 4 1 .000 2.500 .000 .000 .000 .00
CD 2 4 1 .000 2.000 .000 .000 .000 .00
Q 10.000 .0

Lateral 7 model revised per this TDS: reanalyzed downstream HGL per DFD2 Model, updated flowrate and extended model for onsite improvements

DFD2-KRW-ULT-LAT7.OUT

FILE: DFD2-KRW-ULT-LAT7.WSW

W S P G W - CIVILDESIGN Version 14.08

PAGE 1

Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING

Date: 6- 1-2021 Time:11: 1:30

SUMMERLIN WEST VILLAGE 22

DESERT FOOTHILLS DRIVE - SUNSET RUN DRIVE TO FLEET WING AVENUE

ULTIMATE CONDITION 100-YEAR, 6-HOUR STORM EVENT

*****															*****	
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		
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****		
175.110	3356.660	2.402	3359.062	10.00	2.06	.07	3359.13	.00	1.06	.97	2.500	.000	.00	1 .0		
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
25.637	.0071					.0005	.01	2.40	.16	.92	.013	.00	.00	PIPE		
200.747	3356.841	2.228	3359.069	10.00	2.16	.07	3359.14	.00	1.06	1.56	2.500	.000	.00	1 .0		
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
18.285	.0071					.0005	.01	2.23	.22	.92	.013	.00	.00	PIPE		
219.031	3356.970	2.101	3359.072	10.00	2.27	.08	3359.15	.00	1.06	1.83	2.500	.000	.00	1 .0		
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
12.729	.0071					.0006	.01	2.10	.26	.92	.013	.00	.00	PIPE		
231.760	3357.060	2.013	3359.073	10.00	2.36	.09	3359.16	.00	1.06	1.98	2.500	.000	.00	1 .0		
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Referenced Plan Sheets

SHEET INDEX		
1	COVER SHEET	
2	LEGEND AND ABBREVIATIONS	
3	GENERAL NOTES	
4	GENERAL NOTES	
5	HORIZONTAL CONTROL PLAN	
6	HORIZONTAL CONTROL PLAN	
7	MASTER DRAINAGE PLAN	
8	MASTER DRAINAGE PLAN	
9	MASTER WATER PLAN	
10	MASTER WATER PLAN	
11	MASTER SEWER PLAN	
12	MASTER SEWER PLAN	
13	ROADWAY GRADING PLAN	BEGIN TO STA 231+00
14	ROADWAY PLAN AND PROFILE	BEGIN TO STA 231+00
15	ROADWAY GRADING PLAN	STA 231+00 TO STA 235+00
16	ROADWAY PLAN AND PROFILE	STA 231+00 TO STA 235+00
17	ROADWAY GRADING PLAN	STA 235+00 TO STA 239+00
18	ROADWAY PLAN AND PROFILE	STA 235+00 TO STA 239+00
19	ROADWAY GRADING PLAN	STA 239+00 TO STA 243+00
20	ROADWAY PLAN AND PROFILE	STA 239+00 TO STA 243+00
21	ROADWAY GRADING PLAN	STA 243+00 TO STA 247+00
22	ROADWAY PLAN AND PROFILE	STA 243+00 TO STA 247+00
23	ROADWAY GRADING PLAN	STA 247+00 TO STA 251+00
24	ROADWAY PLAN AND PROFILE	STA 247+00 TO STA 251+00
25	ROADWAY GRADING PLAN	STA 251+00 TO END
26	ROADWAY PLAN AND PROFILE	STA 251+00 TO END
27	SWALE GRADING PLAN	STA 18+50 TO 15+50
28	STORM DRAIN LATERAL PROFILES	
29	WATER LATERAL PROFILES	
30	WATER LATERAL PROFILES	
31	WATER LATERAL PROFILES	
32	WATER LATERAL PROFILES	
33	SEWER LATERAL PROFILES	
34	STREET LIGHT PLAN	
35	STREET LIGHT PLAN	
36	SIGNAGE AND STRIPING PLAN	
37	SIGNAGE AND STRIPING PLAN	
38	TYPICAL SECTIONS	
39	STORM DETAILS	
40	STORM DETAILS	
41	WATER DETAILS	
42	STREET LIGHT DETAILS	
43	HANDICAP GRADING DETAILS	
44	HANDICAP GRADING DETAILS	
45	HANDICAP GRADING DETAILS	
46	HANDICAP GRADING DETAILS	
47	TRAFFIC SIGNAL UNDERGROUND PLAN 1	
48	TRAFFIC SIGNAL UNDERGROUND SCHEDULES 1	
49	TRAFFIC SIGNAL UNDERGROUND PLAN 2	
50	TRAFFIC SIGNAL UNDERGROUND SCHEDULES 2	

UTILITY NOTE

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 OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

CALL BEFORE YOU DIG: 1-800-642-2444

THIS PROPERTY MAY HAVE STATIC WATER PRESSURE IN EXCESS OF 80 PSI. THE UNIFORM PLUMBING CODE REQUIRES THAT INDIVIDUAL, ON-SITE (PRIVATE) PRESSURE REDUCING VALVES BE INSTALLED WHENEVER THE PRESSURE EXCEEDS 80 PSI. PRV'S ARE THE DEVELOPER'S RESPONSIBILITY AND WILL NOTE BE INSPECTED OR INCLUDED IN THE ACCEPTANCE OF THE LAS VEGAS VALLEY WATER DISTRICT FACILITIES.

NOTICE OF INTENT NOTE

NOTE: ALL LAND SURFACE AREA DISTURBANCES OVER 1 ACRE REQUIRE A STORMWATER DISCHARGE PERMIT ISSUED BY THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP). A PHASED CONSTRUCTION UNIT IN A CONTIGUOUS SUBDIVISION IS CONSIDERED UNDER CONSTRUCTION UNTIL ALL STRIPPED SURFACE AREAS HAVE BEEN COVERED BY PAVING, BUILDING CONSTRUCTION OR PLANTING. A STORMWATER DISCHARGE PERMIT APPLICATION AND ASSOCIATED INFORMATION MAY BE DOWNLOADED FROM THE WEB SITE: [HTTP://WWW.STATE.NV.US/BWPC/STORM01.HTM](http://www.state.nv.us/bwpc/storm01.htm) PROJECTS THAT DISTURB MORE THAN ONE ACRE OF LAND MUST SUBMIT TO NDEP A "NOTICE OF INTENT" FOR INCLUSION UNDER STORMWATER PERMIT NO. NVR100000 ALONG WITH APPROPRIATE FILLING FEE.

NPDES PERMIT NOTE

THE ENGINEER SHOULD CONTACT THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP) TO OBTAIN A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT PRIOR TO CONSTRUCTION. ALL CONSTRUCTION PROJECTS ONE ACRE OR LARGER MUST APPLY FOR THE PERMIT THROUGH NDEP. ALL QUESTIONS REGARDING THE NPDES PERMIT REQUIREMENTS SHOULD BE DIRECTED TO THE NDEP AT (775) 687-9429.

FEMA FLOOD ZONE INFORMATION

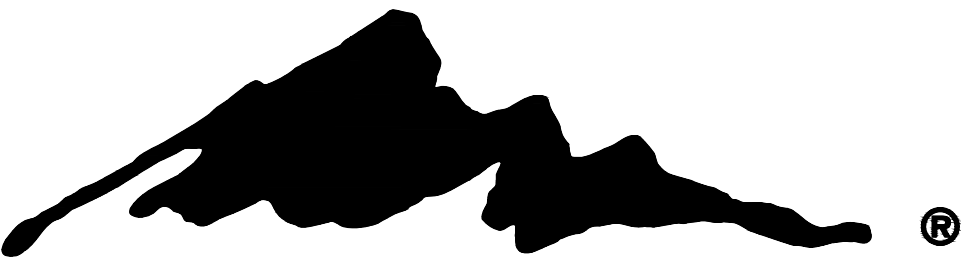
THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C2150E, DATED 9/27/2002. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.

PROPOSED RIGHT-OF-WAY ACREAGE
3.54 AC.

PROPOSED DISTURBED AREA ACREAGE
8.60 AC.

GEOTECHNICAL ENGINEER
PREPARED BY: NOVA GEOTECHNICAL & INSPECTION SERVICES
4480 W. HACIENDA AVE. SUITE 104, LAS VEGAS, NV 89118
PHONE: 702-873-3478
PROJECT NO.: G-18-176
DATED: DECEMBER 3, 2018 & SUBSEQUENT LETTER DATED ON DECEMBER 2, 2020

SUMMERLIN VILLAGE 22
IMPROVEMENT PLANS FOR:
DESERT FOOTHILLS DRIVE
SUNSET RUN DRIVE TO FLEET WING AVENUE
FUTURE SID PROJECT
APN 137-23-211-001


SUMMERLIN®

OWNER / DEVELOPER

OWNER

CONTACT: BRIAN WALSH
HOWARD HUGHES COMPANY LLC, A DELAWARE LIMITED LIABILITY COMPANY
10845 GRIFFITH PEAK DRIVE, SUITE 160
LAS VEGAS, NEVADA 89135

BRIAN WALSH, SR. VICE PRESIDENT

DATE

ENGINEER / CONSULTANT

CIVIL

CONTACT: NICOLAS BARCOS, P.E.
ATKINS
2270 CORPORATE CIRCLE SUITE 200
HENDERSON, NEVADA 89074
(702) 263-7275

LOCATION MAP

PROJECT SITE
APN 137-23-211-001

VICINITY MAP

PROJECT LOCATION
APN 137-23-211-001

APPROVALS

CITY OF LAS VEGAS ENGINEERING APPROVAL STAMP

CITY OF LAS VEGAS DEPARTMENT OF PLANNING

NOTE:
THIS PLAN CONFORMS TO THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT.

LAS VEGAS FIRE AND RESCUE

DATE

CENTRAL TELEPHONE COMPANY d/b/a CENTURYLINK

DATE

THE AFFIXED CENTRAL TELEPHONE COMPANY d/b/a CENTURYLINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUTES, AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING & ENGINEERING SERVICES

PROJECT NO. 138549 FIRST APPROVED DATE:

LVVWD APPROVED FIRE FLOW1500 GPM AT 20 PSI RESIDUAL

SHEETS:1, 2, 3, 9, 10, 14, 16, 18, 20, 22, 24, 26, 27, 28, 29, 30, 31, 32, 41

NV ENERGY

DATE

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

SOUTHWEST GAS CORPORATION

DATE

COX COMMUNICATIONS OF LAS VEGAS, INC

DATE

BASIS OF BEARING

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

LINEAR UNIT: US SURVEY FOOT (FTUS)

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

SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)

ZONE: LAS VEGAS HIGH ELEVATION ZONE

PROJECTION: TRANSVERSE MERCATOR STANDARD PARALLEL (AND LATITUDE OF GRID ORIGIN): 36°15'00"N

LONGITUDE OF CENTRAL MERIDIAN: 114°58'00"W

NORTHING AT GRID OF ORIGIN: 400,000.00 M (1,312,333.3333 FTUS)

EASTING AT CENTRAL MERIDIAN: 300,000 M (984,250.0000 FTUS)

SCALE FACTOR ON CENTRAL MERIDIAN: 1.000135 (EXACT)

NOTES:

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

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

BENCHMARK

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

CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)

NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)

FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.

T21S,R59E,S03

LEGAL DESCRIPTION

BEING A PORTION OF LOT 1 AS SHOWN ON THE MAP THEREOF IN BOOK 163 OF PLATS, PAGE 43, OFFICIAL RECORDS, CITY OF LAS VEGAS CLARK COUNTY, NEVADA

FAST

Call before you Dig
UnderGround
1-702-432-5300

Call before you Dig
811
1-800-642-2444

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

LOWE ENGINEER-STATE OF NEVADA
NICOLAS BARCOS
EXP. 9-30-28
CIVIL
No. 26673
5/27/21

DESIGNED BY: B. MOCHTAK
DRAWN BY: L. SOSA
CHECKED BY: P. BATES
INCH: NONE
VERT: NONE

XXXXXX
L21-00307
DATE: JUNE, 2021
DRAWING NO.
1 / 50

REVISIONS

DESCRIPTION

REV.

BY

DATE

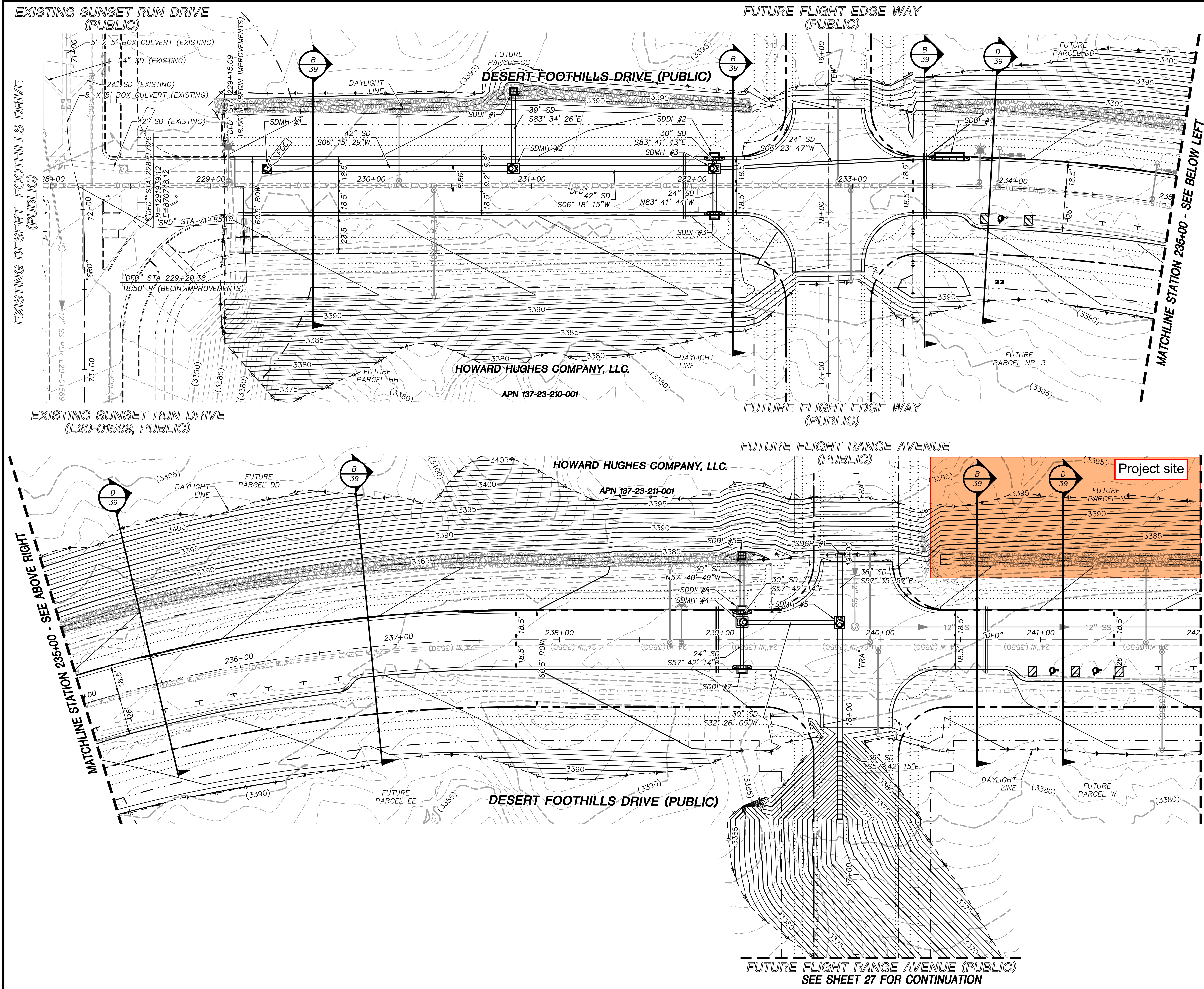
APPROVAL

SUMMERLIN VILLAGE 22
DESERT FOOTHILLS DRIVE
SUNSET RUN DRIVE TO FLEET WING AVENUE (STREET 9)
COVER SHEET

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

SUMMERLIN®

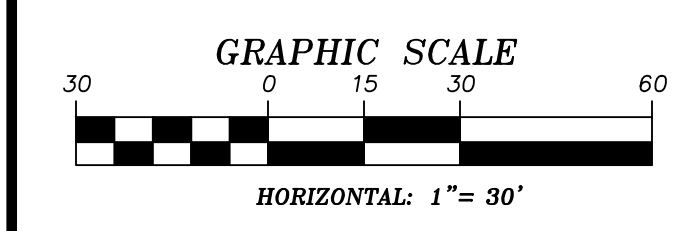
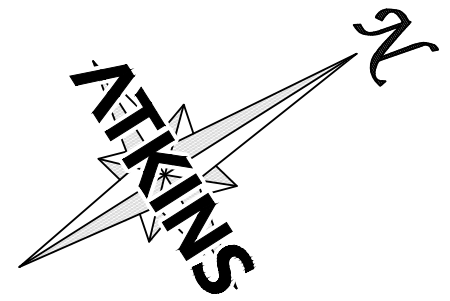
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SUMMARY OF QUANTITIES		
DESCRIPTION	QUANTITY	UNIT
DRAINAGE		
24" RCP CLASS III	245	LF
30" RCP CLASS III	740	LF
36" RCP CLASS III	170	LF
42" RCP CLASS III	285	LF
5" TYPE CM2 SDDI	8	EA
17.5" TYPE CM2 SDDI	1	EA
2' X 2' NDOT TYPE 2 DROP INLET	2	EA
CAP	3	EA
TYPE II SDMH	4	EA
TYPE III SDMH	5	EA
RIP-RAP (D50=8" THICKNESS=16")	962	CY

MASTER PLAN NOTE
THIS SHEET IS FOR INFORMATIONAL PURPOSES ONLY. IT IS AN OVERALL REPRESENTATION OF THE UTILITY FOR REVIEW AND COORDINATION WITH OTHER PROJECT DETAILS WITHIN THIS PLAN SET.

- STORM DRAIN NOTES**
- SEE ROADWAY PLAN AND PROFILE SHEETS FOR CONSTRUCTION DETAILS AND INFORMATION RELATED TO PIPE SIZE (INNER DIAMETER), MANHOLE BASE SIZE (I.D.) AND DROP INLET LENGTHS (CURB OPENING).
 - ALL STORM DRAIN MATERIAL TO BE CLASS III REINFORCED CONCRETE PIPE, UNLESS OTHERWISE NOTED IN PROFILES.
 - CONTRACTOR TO PROVIDE 6" MINIMUM OF CLEARANCE BETWEEN OUTSIDE OF PIPE TO INSIDE WALL OF STORM DRAIN STRUCTURES.



SOILS REPORT	
BY NOVA	
PROJECT NO.	G-18-176
DATED	12/3/18 & 12/2/20
EARTHWORK QUANTITIES (RAW):	
CUT=	17,900 CU YDS
FILL=	11,100 CU YDS

GRADING PLAN CERTIFICATION

NICOLAS BARCOS PE#25673 5/27/21 DATE

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

DS#3544

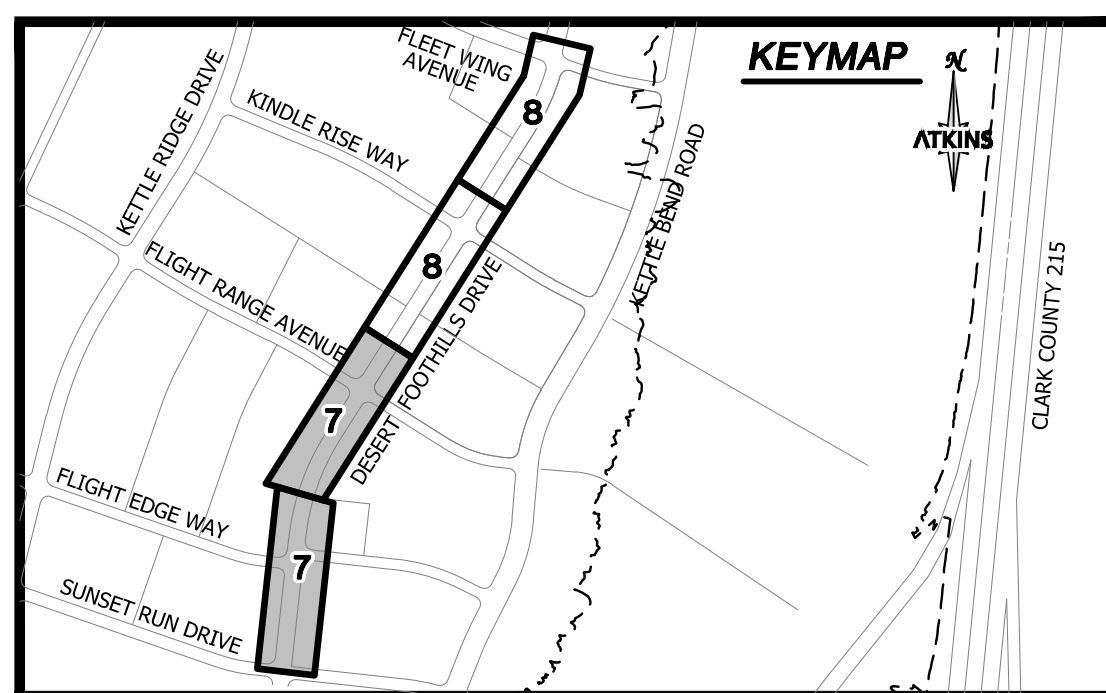
BASIS OF BEARING
GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NORS). LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

BENCHMARK
CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
NAVD83 ELEVATION: 989.574 METERS (3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S.R59E.S03

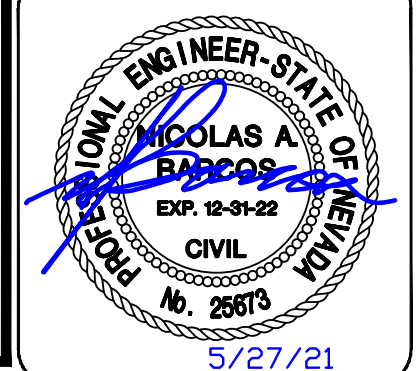
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CALL BEFORE YOU DIG
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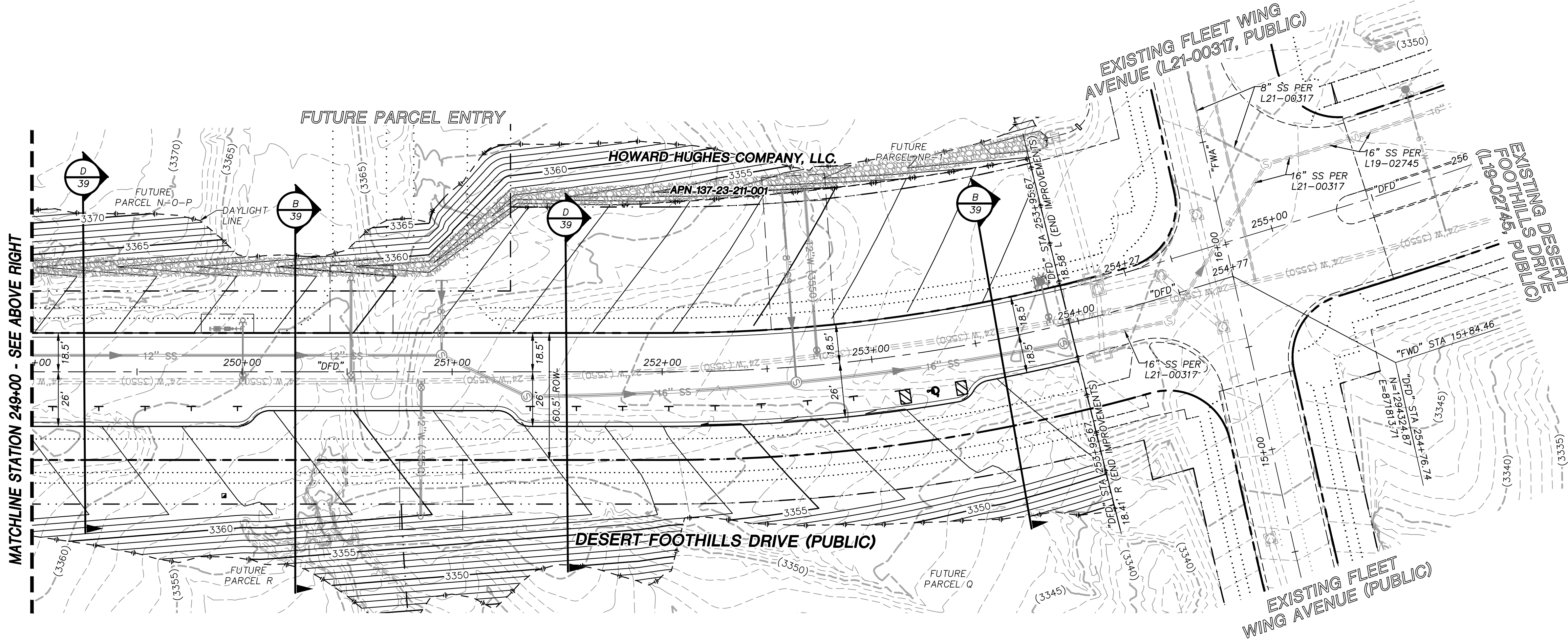
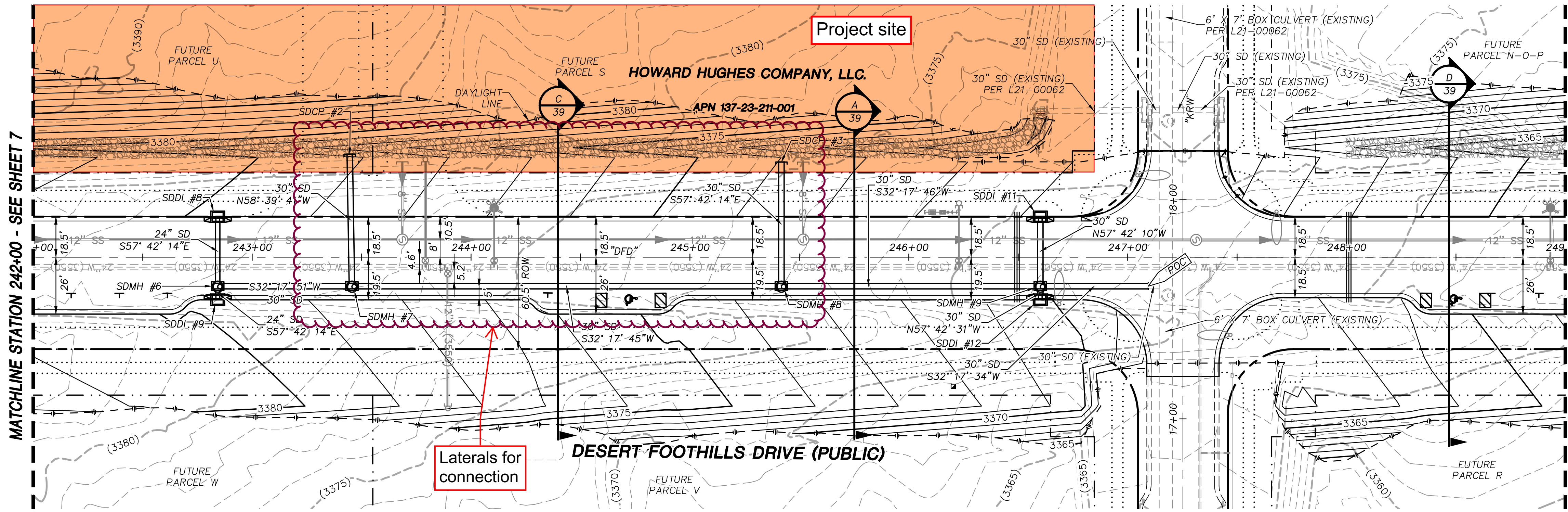
UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER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



ATKINS 2270 Corporate Circle Suite 200 Henderson, Nevada 89074 Telephone: +1702.263.7275 Fax: +1702.263.7200	
SUMMERLIN	
SUMMERLIN VILLAGE 22 DESERT FOOTHILLS DRIVE SUNSET RUN DRIVE TO FLEET WING AVENUE (STREET G)	MASTER DRAINAGE PLAN BEGIN TO STA 242+00
DESIGNED BY: B. MOCHTAK DRAWN BY: L. S. S. S. S. S. CHECKED BY: P. BATES HORIZ.: 1"=30' VERT.: NONE	XXXVXXX L21-00307 DATE: JUNE, 2021 DRAWING NO. 7 / 50
JOB NO. 100065774	

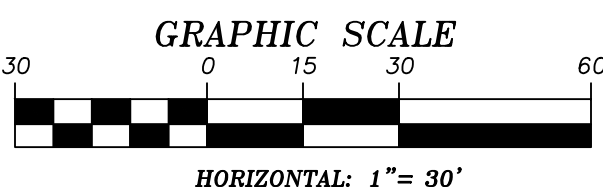
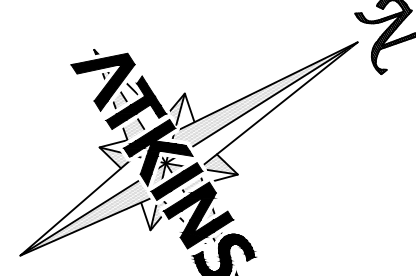
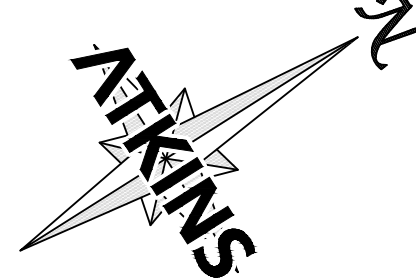
MATCHLINE STATION 242+00 - SEE SHEET 7

MATCHLINE STATION 249+00 - SEE ABOVE RIGHT



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BY NOVA
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FILL= 11,100 CU YDS

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NICOLAS BARCOS PE#25673
5/27/21
DATE
CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.
DS#3544

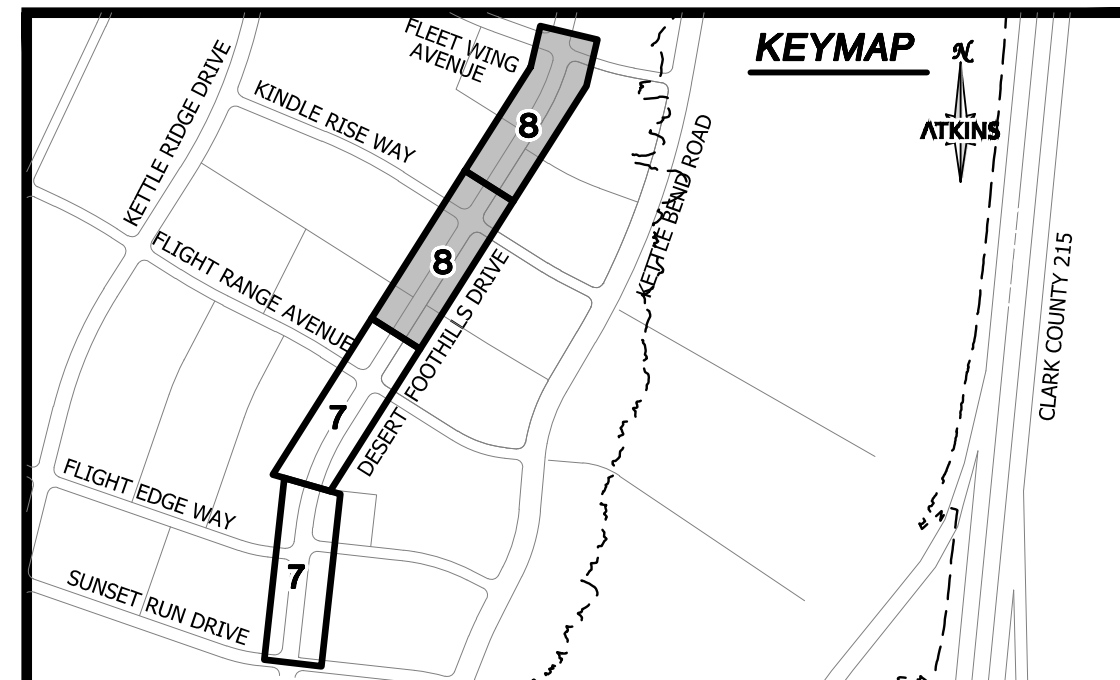
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FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
TZ15RS9E.S03

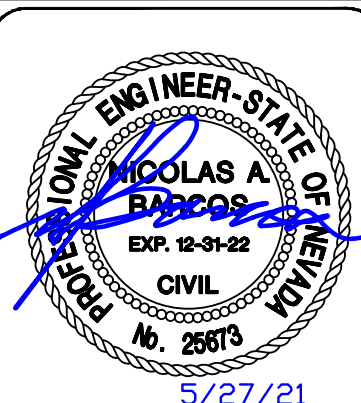
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UnderGround
1-702-432-5300
PREMIER AND NATIONAL SERVICE OF TRANSPORTATION

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Call 811
1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES (70 VOLTS)
CALL BEFORE YOU DIG OVERHEAD
1-702-227-2929



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REVISIONS		DESCRIPTION	BY	DATE	APPROVAL
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ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7755
Fax: +1702.263.7200

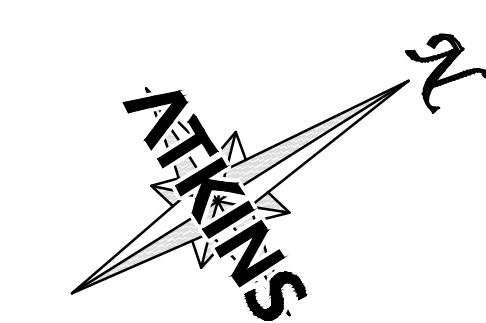
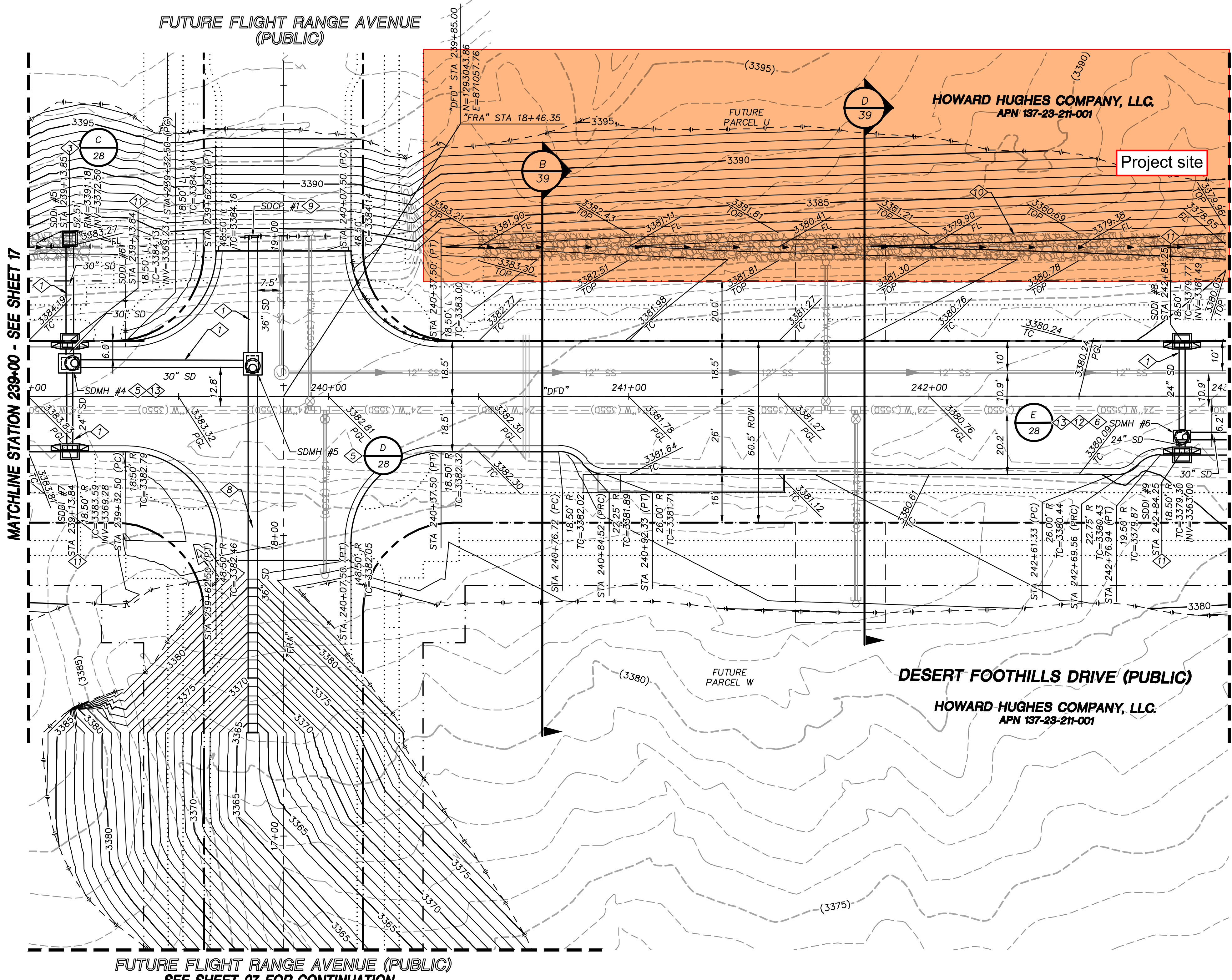
SUMMERLIN

SUMMERLIN VILLAGES 22
DESERT FOOTHILLS DRIVE
SUNSET RUN DRIVE TO FLEET WING AVENUE (STREET G)
MASTER DRAINAGE PLAN
STA 242+00 TO END

DESIGNED BY: XXXVXXX
DRAWN BY: B. MOCHTAK
CHECKED BY: L. SOSA
P. BATES
HORIZ.: 1"=30'
VERT.: NONE

DATE: JUNE, 2021
DRAWING NO. 8 / 50
JOB NO. 100065774

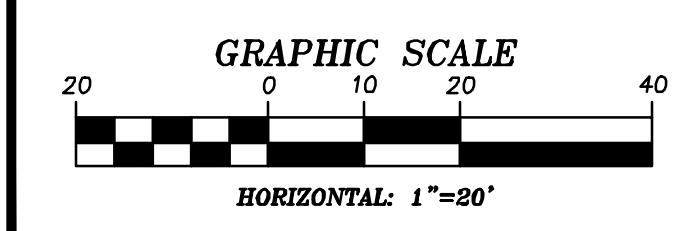
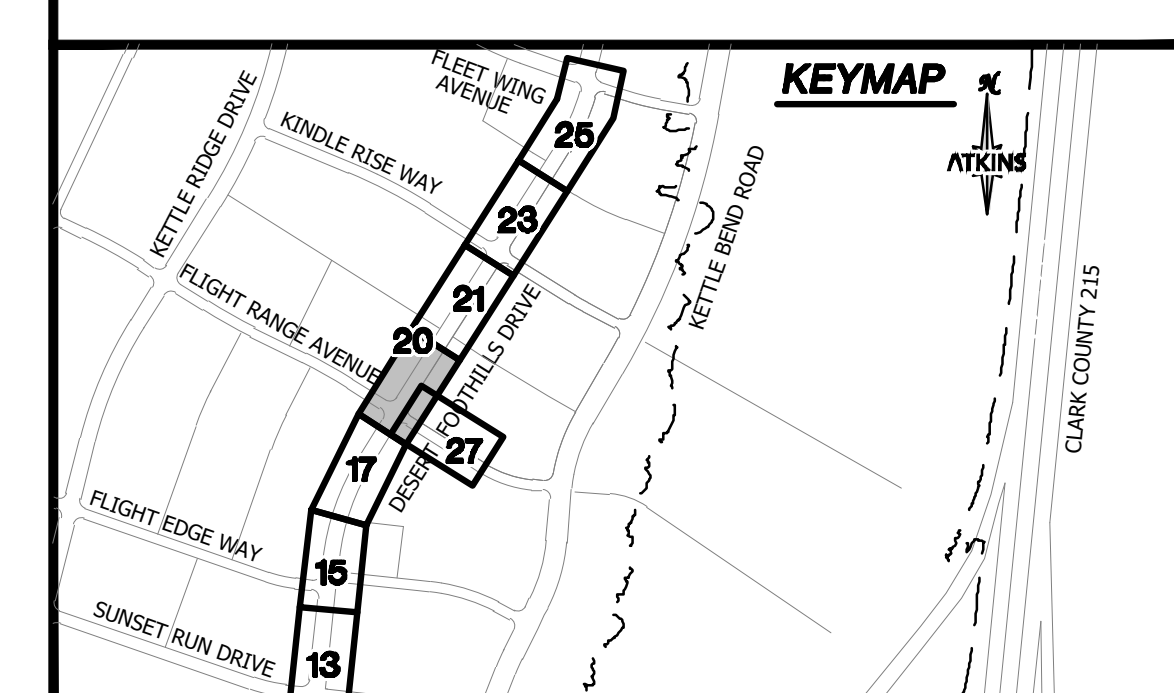
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- STORM DRAIN CONSTRUCTION NOTES**
1. INSTALL STORM DRAIN. SEE ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
 2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
 3. INSTALL NDOT TYPE II DROP INLET PER NDOT R-4.2.1 (SEE SHEET 39)
 4. INSTALL TYPE I SD MANHOLE PER CCAUSD #403
 5. INSTALL TYPE II SD MANHOLE PER CCAUSD #405.2
 6. INSTALL TYPE III SD MANHOLE PER CCAUSD #406
 7. INSTALL TYPE "A" DROP INLET PER CCAUSD #411 & #421
 8. REMOVE CAP AND CONNECT TO EXISTING STORM DRAIN STUB
 9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
 10. INSTALL RIP-RAP (D50=12", THICKNESS=24")
 11. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421, AND DETAIL C SHEET 38
 12. ENCASE STRUCTURE WITH MINIMUM 4" CEMENT SLURRY (CLSM II) PER UDACS 02.22.01B
 13. STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B

DEPTH OF COVER DURING CONSTRUCTION
MAINTAIN MINIMUM TWENTY-FOUR (24) INCH COVER PER UDACS SECTION 2.08.04. GRADING MUST BE COMPLETED PRIOR TO WATERLINE INSTALLATION.

TO ENSURE LVWWD ACCESS WITHIN EASEMENT
ALL ABOVE GROUND OBSTRUCTIONS INCLUDING BUT NOT LIMITED TO, LANDSCAPE BOULDERS, FENCES / WALLS (TO INCLUDE NO FOOTINGS), AND SIGNS ARE STRICTLY PROHIBITED WITHIN EASEMENT.



GRADING PLAN CERTIFICATION

Nicolas Barcos
NICOLAS BARCOS PE#25673 DATE 5/27/21

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DS#3544

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T21S,R59E,S03

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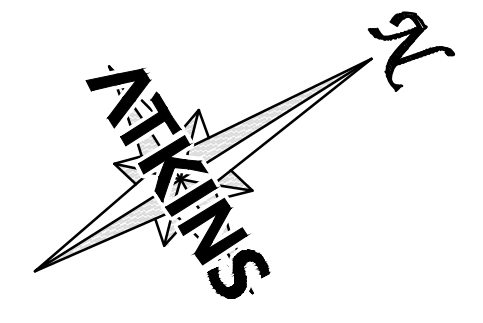
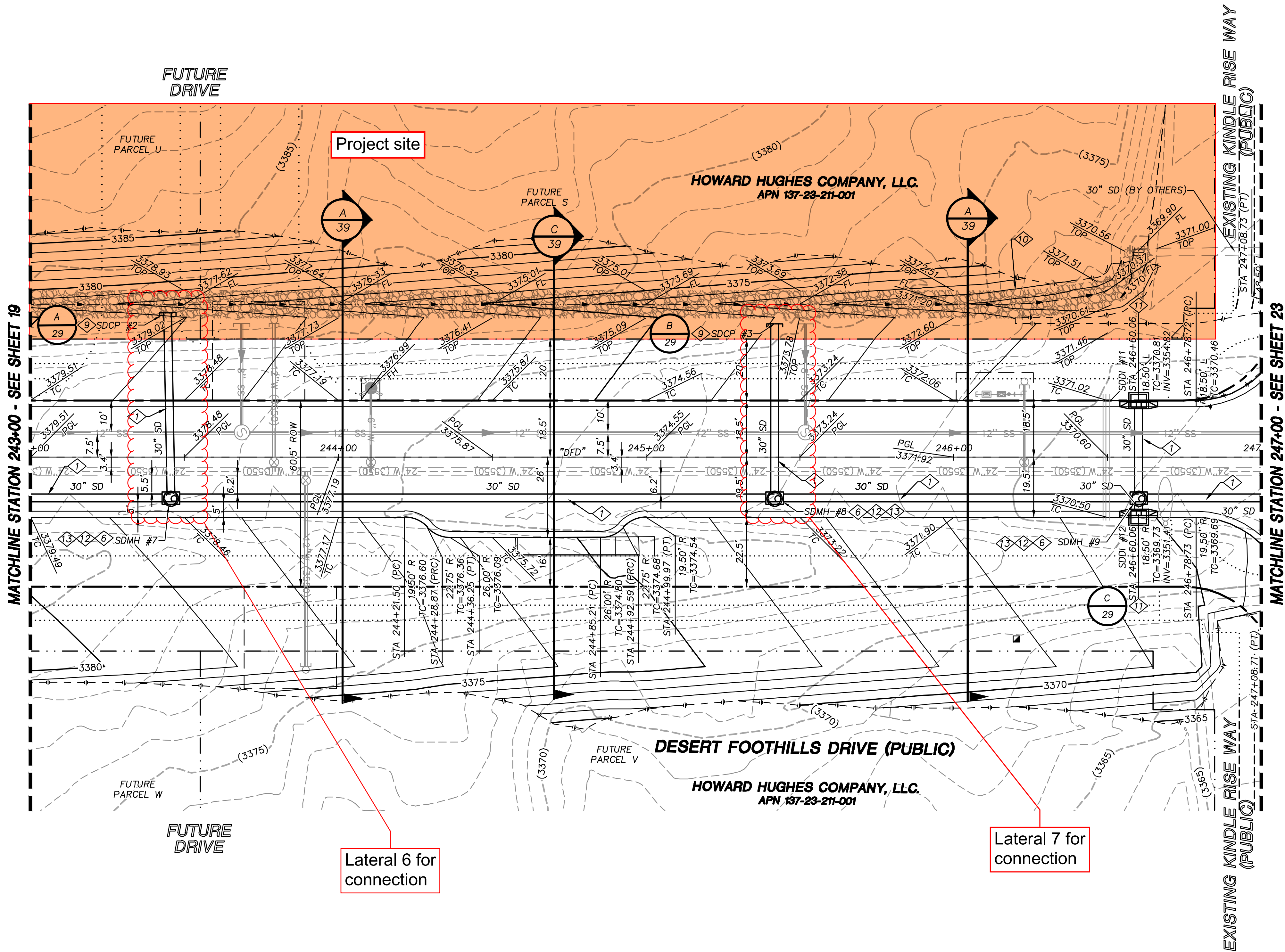
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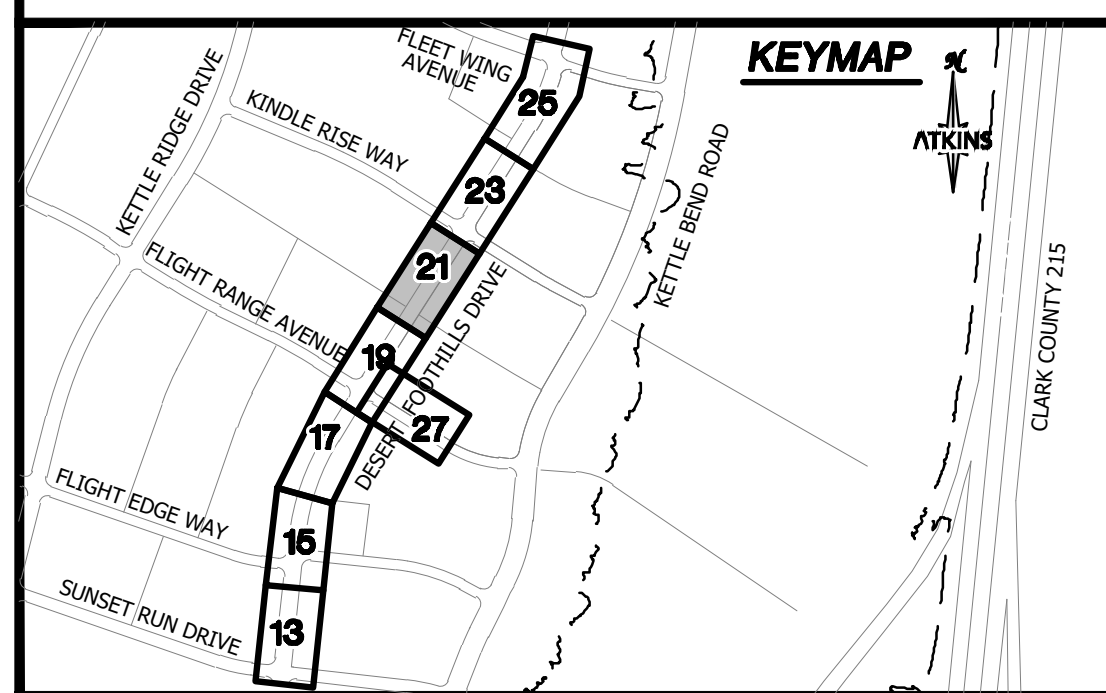
ATKINS		SUMMERLIN	
2270 Corporate Circle Suite 200 Henderson, Nevada 89074 Telephone: +1702.263.7755 Fax: +1702.263.7700		SUMMERLIN VILLAGE 22 DESERT FOOTHILLS DRIVE SUNSET RUN DRIVE TO FLEET WING AVENUE (STREET G) ROADWAY GRADING PLAN STA 239+00 TO STA 243+00	
DESIGNED BY: B. MOCHTAK	DRAWN BY: L. L. SOSA	CHECKED BY: J. B. BATES	DATE: JUNE, 2021
DRAWING NO. 19/50		VERT.: 1"=5'	
JOB NO. 100065774			



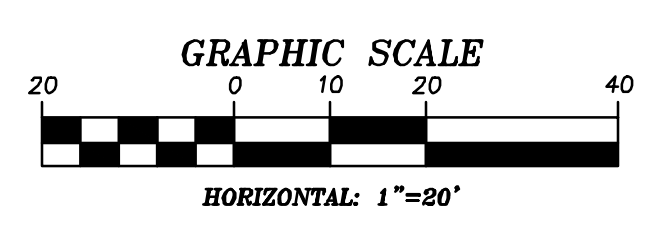
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Nicolas Barcos
NICOLAS BARCOS PE#25673 DATE 5/27/21

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DS#3544

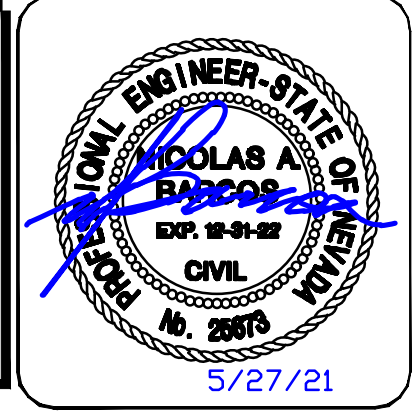
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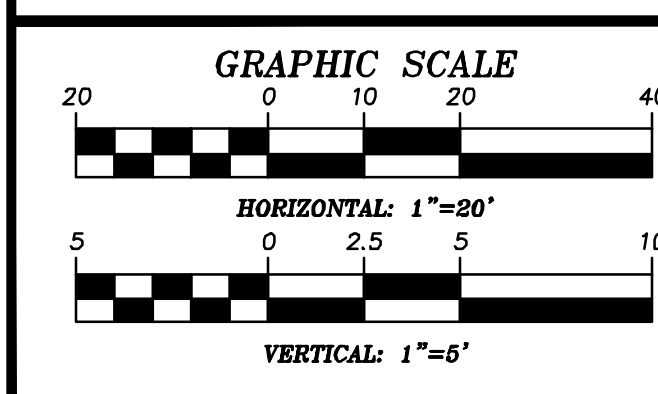
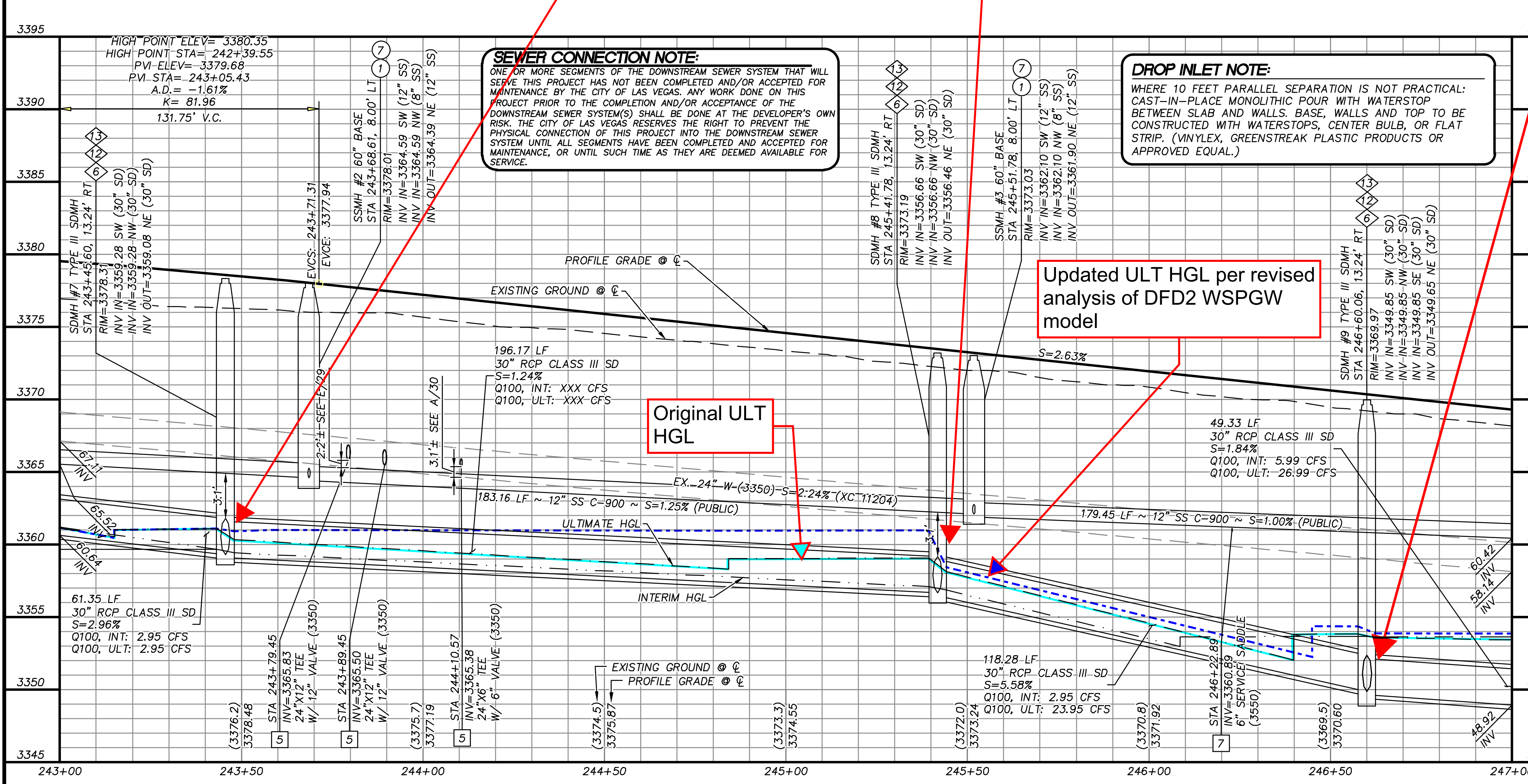
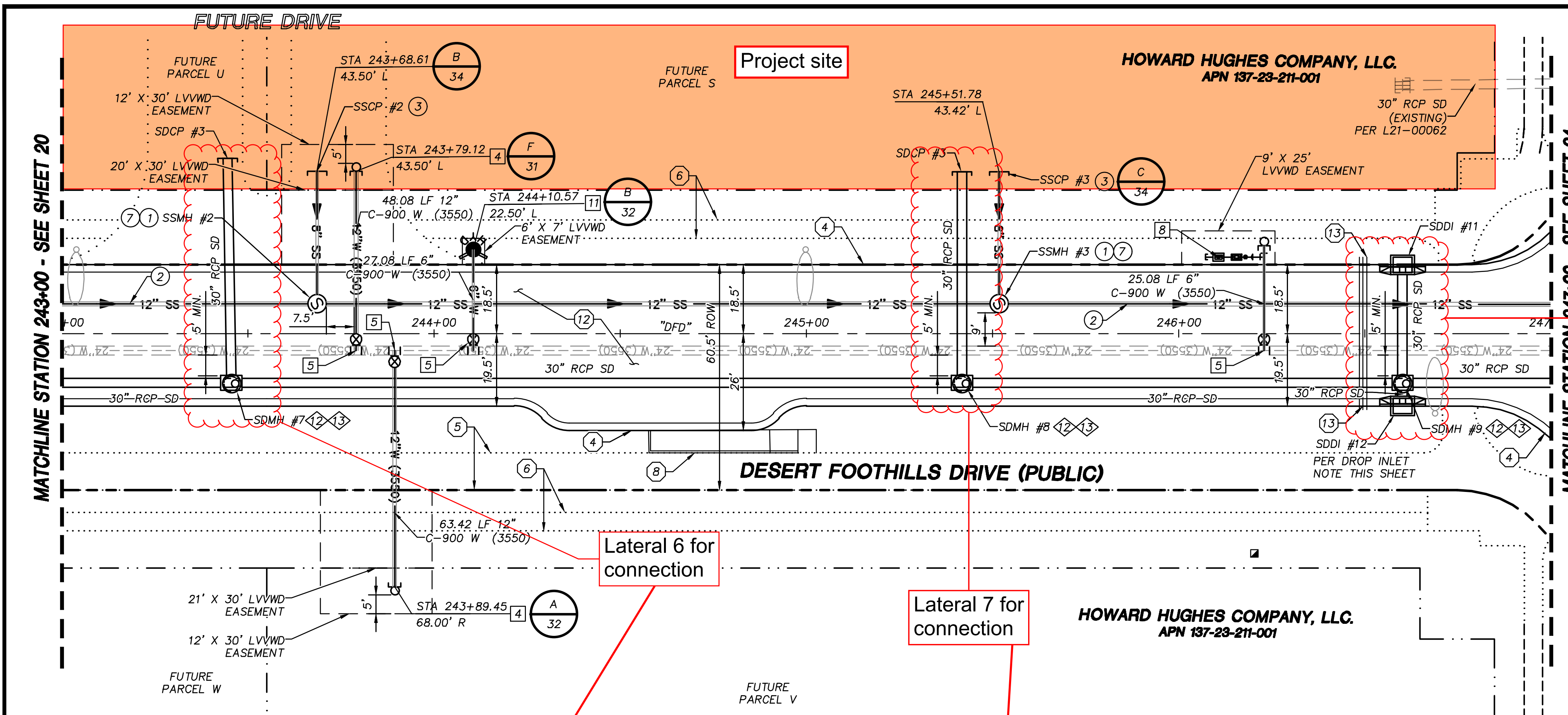
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Call before you Dig
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XXVYXXXX L21-00307		DESIGNED BY: B. MOCHTAK		SUMMERLIN VILLAGE 22		ATKINS		REV.		REVISIONS	
DRAWN BY: L. L. SOSA		CHECKED BY: P. BATES		DESERT FOOTHILLS DRIVE		2270 Corporate Circle, Suite 200 Henderson, Nevada 89074 Telephone: +1702.263.7275 Fax: +1702.263.7200		BY		DATE	
DATE: JUNE, 2021		DATE: JUNE, 2021		SUNSET RUN DRIVE TO FLEET WING AVENUE (STREET G)							
DRAWING NO. 21/50		HORIZ: 1"=20'		ROADWAY GRADING PLAN							
JOB NO. 100065774		VERT: 1"=5'		STA 243+00 TO STA 247+00							



APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT
PLANNING AND ENGINEERING SERVICES

PROJECT NO. 138549 FIRST APPROVED DATE:
LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

LAS VEGAS FIRE & RESCUE APPROVAL

LAS VEGAS FIRE & RESCUE DATE:

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1-702-227-2929

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL NDOT TYPE II DROP INLET PER NDOT R-4.2.1 (SEE SHEET 41)
4. INSTALL TYPE I SD MANHOLE PER CCAUSD #403
5. INSTALL TYPE II SD MANHOLE PER CCAUSD #405.2
6. INSTALL TYPE III SD MANHOLE PER CCAUSD #406
7. INSTALL TYPE "A" DROP INLET PER CCAUSD #411 & #421
8. REMOVE CAP AND CONNECT TO EXISTING STORM DRAIN STUB
9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
10. INSTALL RIP-RAP (D50=12", THICKNESS=24")
11. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421, AND DETAIL C SHEET 40
12. ENCASE STRUCTURE WITH MINIMUM 4" CEMENT SLURRY (CLSM II) PER UDACS 02.22.01B
13. STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B

SEWER CONSTRUCTION NOTES

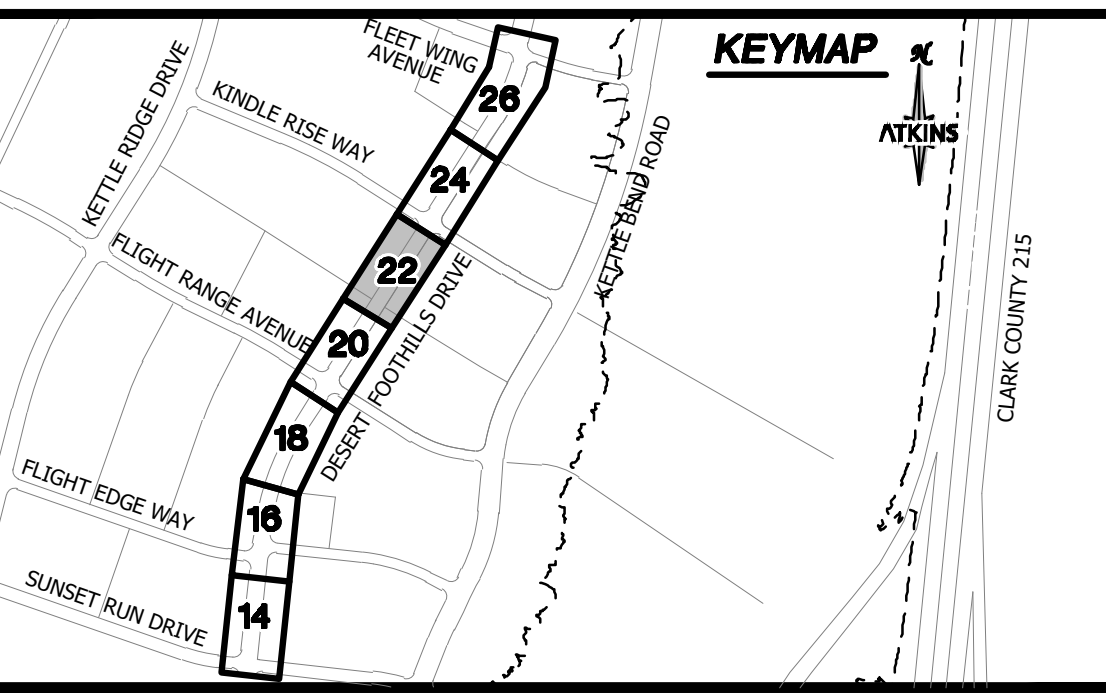
1. INSTALL SEWER MANHOLE WITH WATERTIGHT JOINTS AND SINGLE 24" LID PER DCSWCS SD-1, SD-3, AND SD-4
2. INSTALL SEWER MAIN PER DCSWCS SD-17
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5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19
7. NOT USED
8. INSTALL SEWER MANHOLE WITH WATERTIGHT JOINTS WITH DUAL CONCENTRIC LID PER DCSWCS SD-1, SD-2, SD-4, AND SD-5

WATERLINE CONSTRUCTION NOTES

1. INSTALL WATER MAIN PER UDACS PLATES #17 AND PLATE #19
2. INSTALL GATE VALVE PER UDACS PLATES #30 AND #39
3. INSTALL CROSS PER UDACS PLATE #31
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ROADWAY CONSTRUCTION NOTES 2,3,7,&11 NOT USED

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4. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
5. FUTURE BIKE LANE BY OTHERS
6. FUTURE SIDEWALK BY OTHERS
8. CONSTRUCT CURB RAMP, TYPE A, PER NDOT STANDARD PLAN R-5.2.1 (A=B=6.5').
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10. TRANSITION CURB FROM FULL HEIGHT (6") TO FLUSH (0")
12. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT. SEE SHEET 39 FOR TYPICAL PAVEMENT SECTION.
13. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET 42



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 OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

DESIGNED BY: B. MOCHTAK
DRAWN BY: L. S. SOKA
CHECKED BY: J. S. SOKA
DATE: JUNE, 2021
HORIZ.: 1"=20'
VERT.: 1"=5'

22/60

5/27/21

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.775
Fax: +1702.263.7700

SUMMERLIN

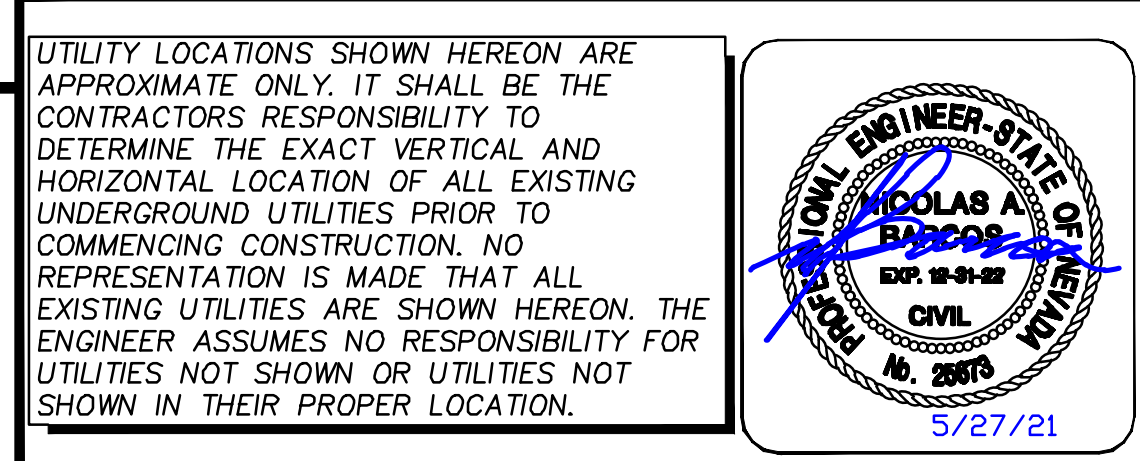
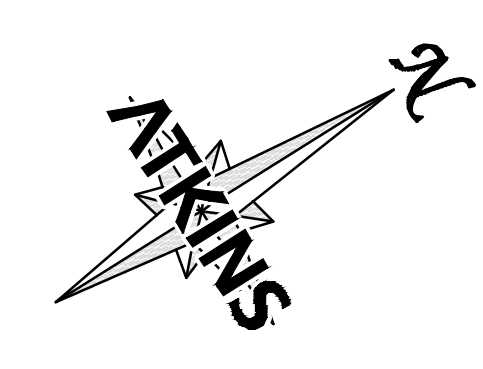
SUMMERLIN VILLAGE 22
DESERT FOOTHILLS DRIVE
SUNSET RUN DRIVE TO FLEET WING AVENUE (STREET 9)
ROADWAY PLAN AND PROFILE
STA 243+00 TO STA 247+00

DESIGNED BY: B. MOCHTAK
DRAWN BY: L. S. SOKA
CHECKED BY: J. S. SOKA
DATE: JUNE, 2021
HORIZ.: 1"=20'
VERT.: 1"=5'

22/60

5/27/21

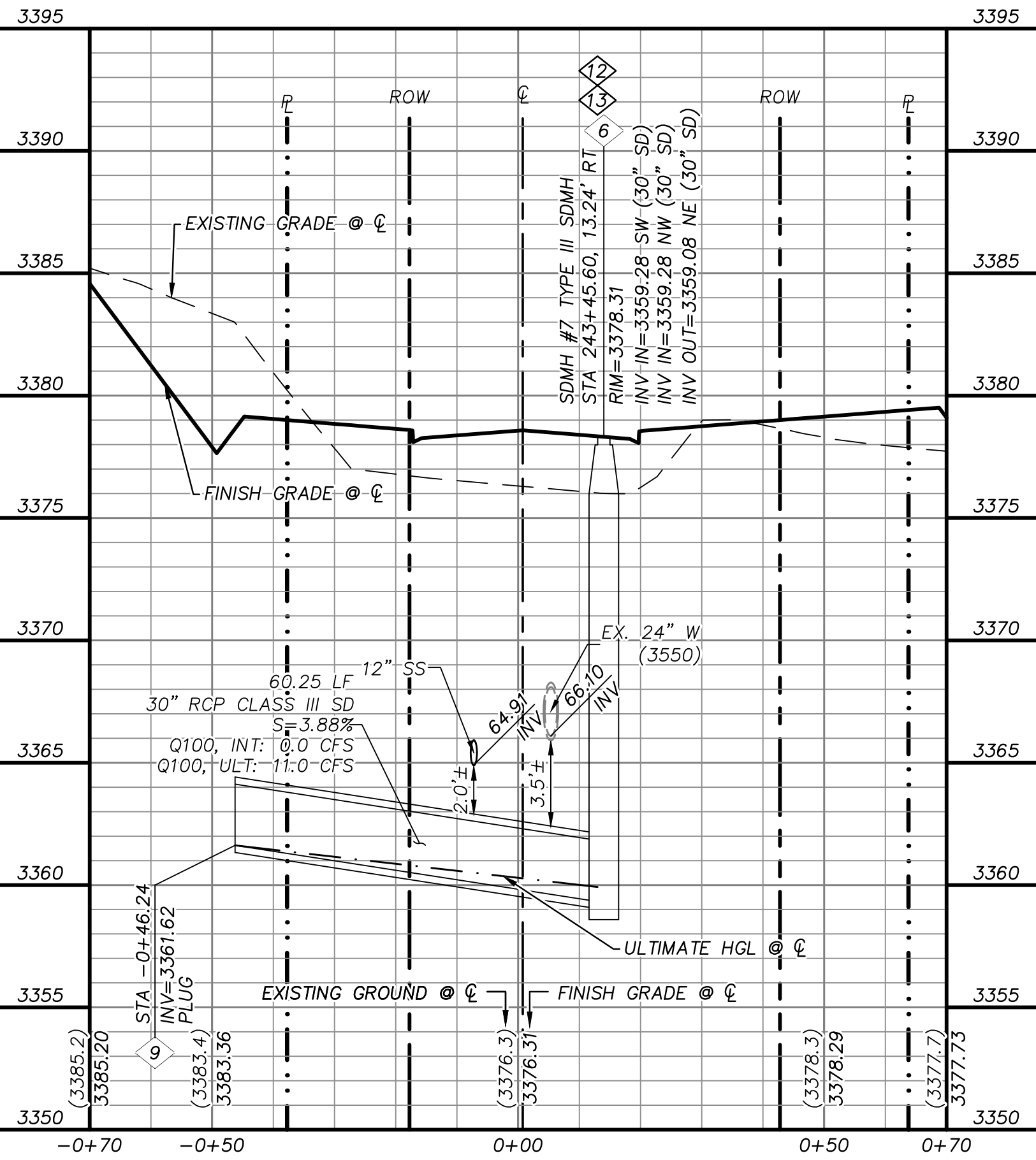
JOB NO. 100065774

[illegible]

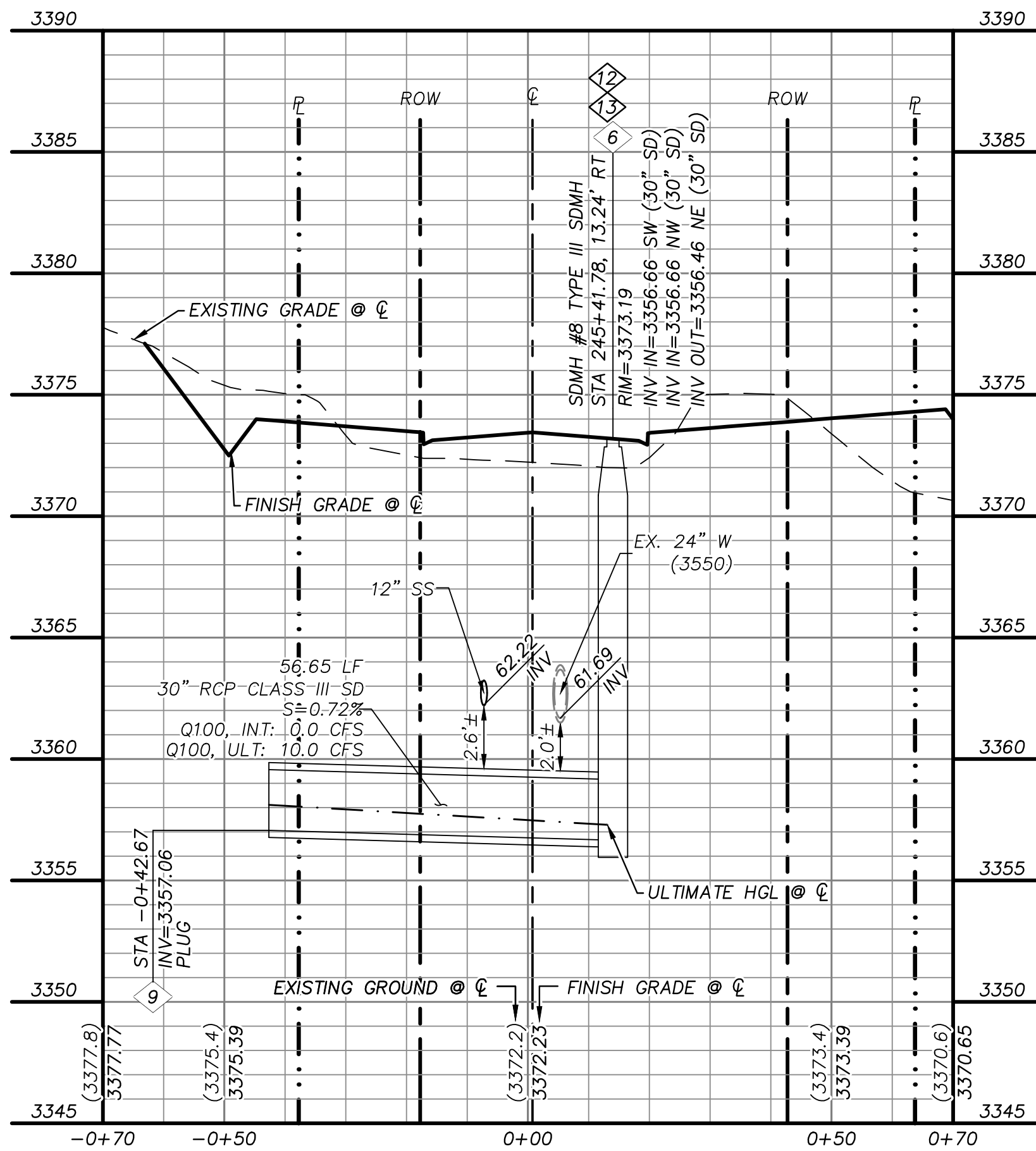
IN AREAS WHERE THE EXCAVATION OR GROUND ELEVATION IS LESS THAN THREE (3) FEET, FROM THE TOP OF THE LVWWD TRANSMISSION MAIN, NO EXCAVATION EQUIPMENT, OTHER THAN HAND HELD EQUIPMENT WILL BE ALLOWED WITHIN TEN (10) FEET OF THE PIPELINE IN THESE AREAS. THE CONTRACTOR IS TO PLACE A CONCRETE BARRIER; I. E. JERSEY RAIL, TO IDENTIFY AND PROTECT THE "NO EQUIPMENT ZONE".

BASIS OF BEARING	BENCHMARK
GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.	CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008) NADATION NUMBER: 989.574 METERS (3,246.83 FEET) FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN. T215.RS9E.S03

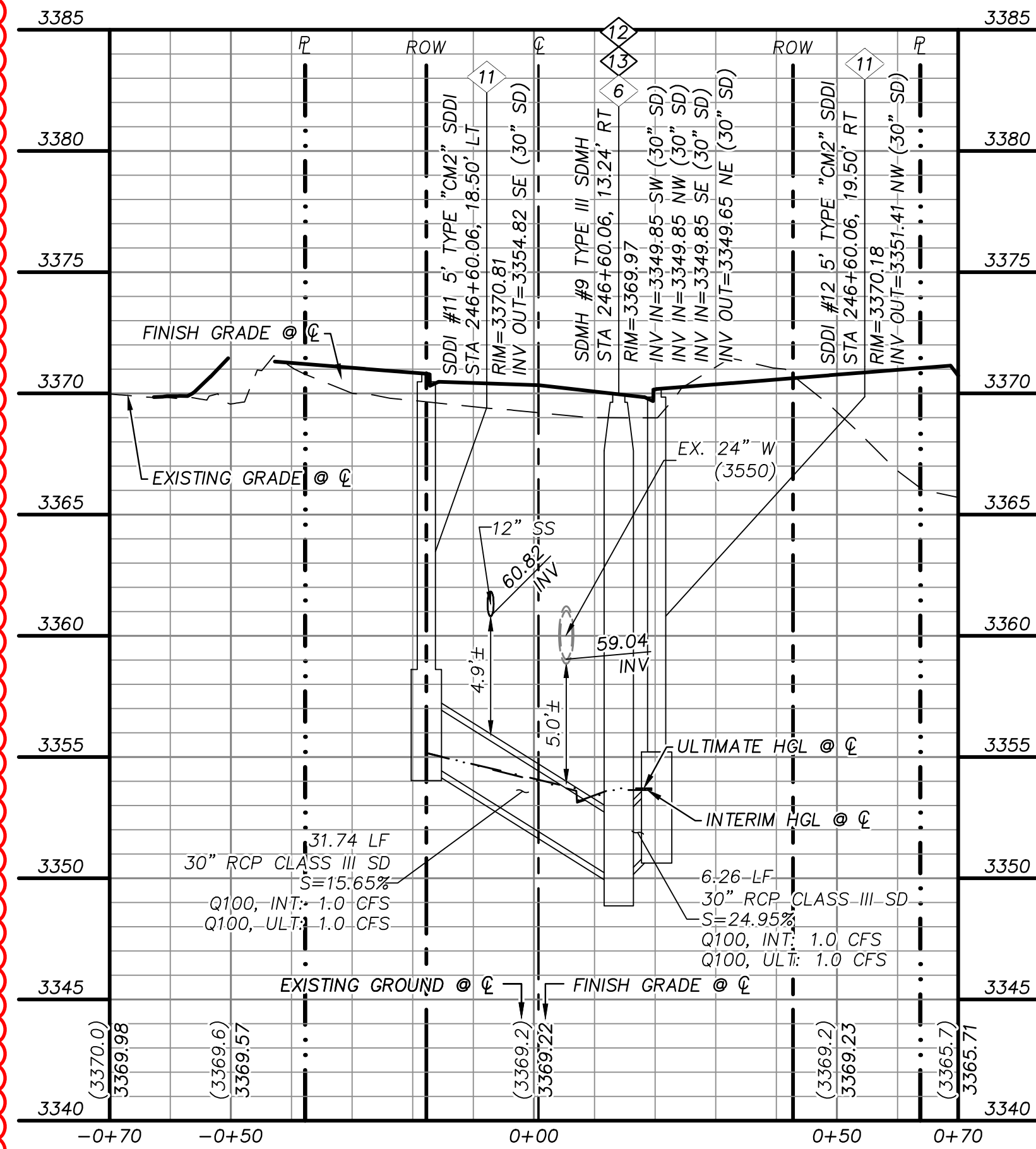
 FAST Call before you UnderGround 1-702-432-6300 THE LEADER IN THE TRENCH SERVICE OF THE APARTMENT	Call before you Dig or you will be the Diggy Call  ON 1-800-642-2444	AVOID SETTING ORBING POTHOLE MARKS. IT'S THE EASY WAY. CALL BEFORE YOU DITCH  1-702-227-2929
--	--	---



STORM DRAIN LATERAL 6
"DFD" STA. 243+45.60 SEE SHEET 21



STORM DRAIN LATERAL 7
"DFD" STA. 245+41.78 SEE SHEET 21



STORM DRAIN LATERAL 8
"DFD" STA. 246+69.53 SEE SHEET 21

Storm drain laterals #6 & #7 provided for collection of surface runoff for project site.

STORM DRAIN CONSTRUCTION NOTES

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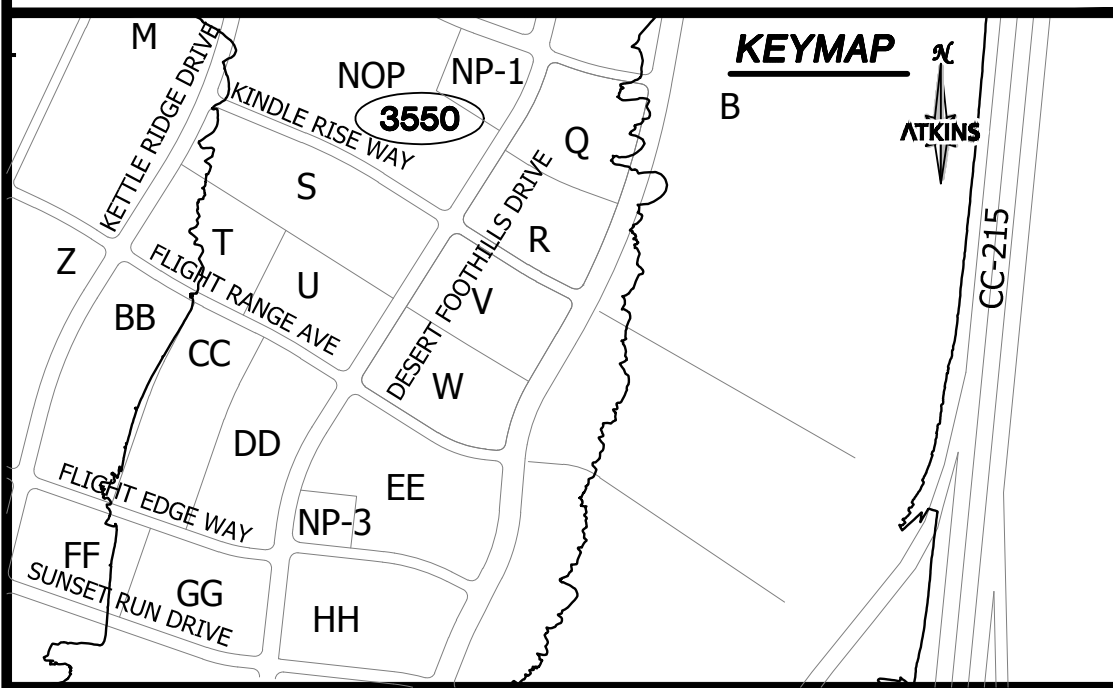
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WATERLINE CONSTRUCTION NOTES

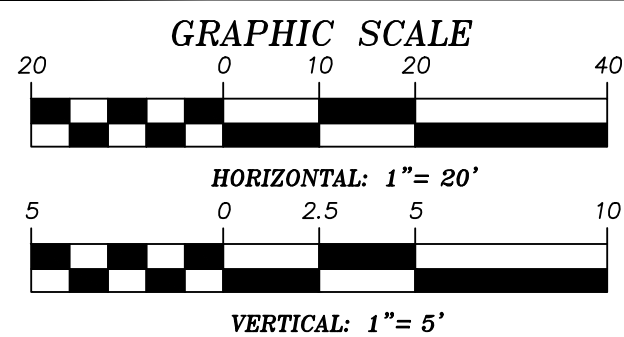
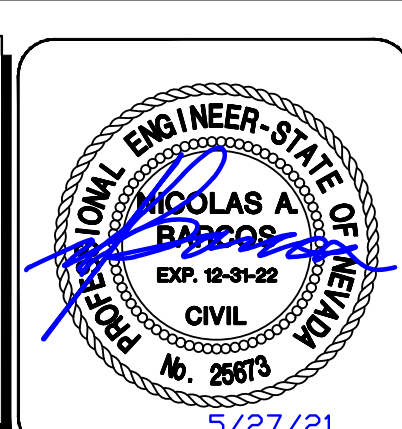
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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT
PLANNING AND ENGINEERING SERVICES

PROJECT NO. 138549 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

BASIS OF BEARING

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

BENCHMARK

CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03



ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

SUMMERLIN

SUMMERLIN VILLAGE 22
DESERT FOOTHILLS DRIVE
SUNSET RUN DRIVE TO FLEET WING AVENUE (STREET 6)

STORM DRAIN LATERAL PROFILES

DESIGNED BY: XXXVXXX
DRAWN BY: B. MOCHTYAK
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: 1"=5'

DATE: JUNE, 2021
DRAWING NO. 29/50
JOB NO. 100066774

APPENDIX G

Reference Material

*Technical Drainage Study for Summerlin Village 22 Kettle
Ridge Drive– From Sunset Run Drive to Kindle Rise Way
(DS 5349), by Atkins Global*

Approval Letters

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		July 12, 2021
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for:	
	Summerlin West Village 22 - Kettle Ridge Drive (Street J) (from Sunset Run Drive to Kindle Rise Way)	
Cross Streets:	Kettle Ridge Drive and Sunset Run Drive	COPIES TO:
File Number:	F:\Depot\DSMemos\DS5349D.doc	Atkins Global
Parcel Number:	137-23-210-001	Howard Hughes Company, LLC.
Zoning Action:	N/A	Bart Anderson, P.E., DevCo
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES X	NO
		CCRFC

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	8/27/2020	9/14/2020	Not Approved	\$400.00	3990502: \$400
2 nd Submittal	11/4/2020	11/17/2020	Not Approved	\$400.00	4061002: \$400
3 rd Submittal	1/12/2021	1/21/2021	Conditional Approval	\$400.00	4127576: \$400
CCRFC	7/6/2021	7/12/2021	Concurrence Recv'd	N/C	N/C
TOTAL FEES (LDDRS):				\$1,200.00	----

REMARKS:

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

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

1. The subject street improvement of *Kettle Ridge Drive (Street J)* is premised on the existence of *Sunset Run Drive*, *Kindle Rise Way* and the associated storm drain facilities are in place for downstream flood perpetuation. The subject drainage study will not be approved prior to the posting of the construction bonds of the above stated street improvements projects.
2. The project proposes to build temporary drainage facilities, ie, berms/swales along the sides of *Kettle Ridge Drive (Street J)* for interim flood protection. Prior to final plan approval the developer must complete a maintenance and liability agreement for the interim drainage improvements (berms or channels) 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 facility and an exhibit that adequately shows the location and limits of the drainage facility 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* (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.

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

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

END OF REMARKS
HDR/AYS

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

Rec'd: 7/6/21

DS 05349

K-23

N/C

REGIONAL FLOOD
CONTROL DISTRICT



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

BOARD OF DIRECTORS

Mayor
Debra March
Chair
City of Henderson

Commissioner
Justin Jones
Vice-Chair
Clark County

Mayor
Carolyn Goodman
City of Las Vegas

Mayor Pro Tem
Isaac Barron
City of North Las Vegas

Councilman
George Gault
City of Mesquite

Mayor
Kiernan McManus
City of Boulder City

Mayor Pro Tem
Stavros Anthony
City of Las Vegas

Commissioner
Tick Segerblom
Clark County

June 29, 2021

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 V22 KETTLE RIDGE DRIVE:
SUNSET RUN DRIVE TO KINDLE RISE WAY
(DS5349C) (RFCD No. 21-13795)**

Dear Mr. Kwon:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated August 27, 2020, Addendum No. 1 dated November 4, 2020, and Supplement No. 1 dated January 12, 2021, for above-mentioned project as submitted by ATKINS. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas Department of Public Works dated January 21, 2021.

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 ATKINS 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

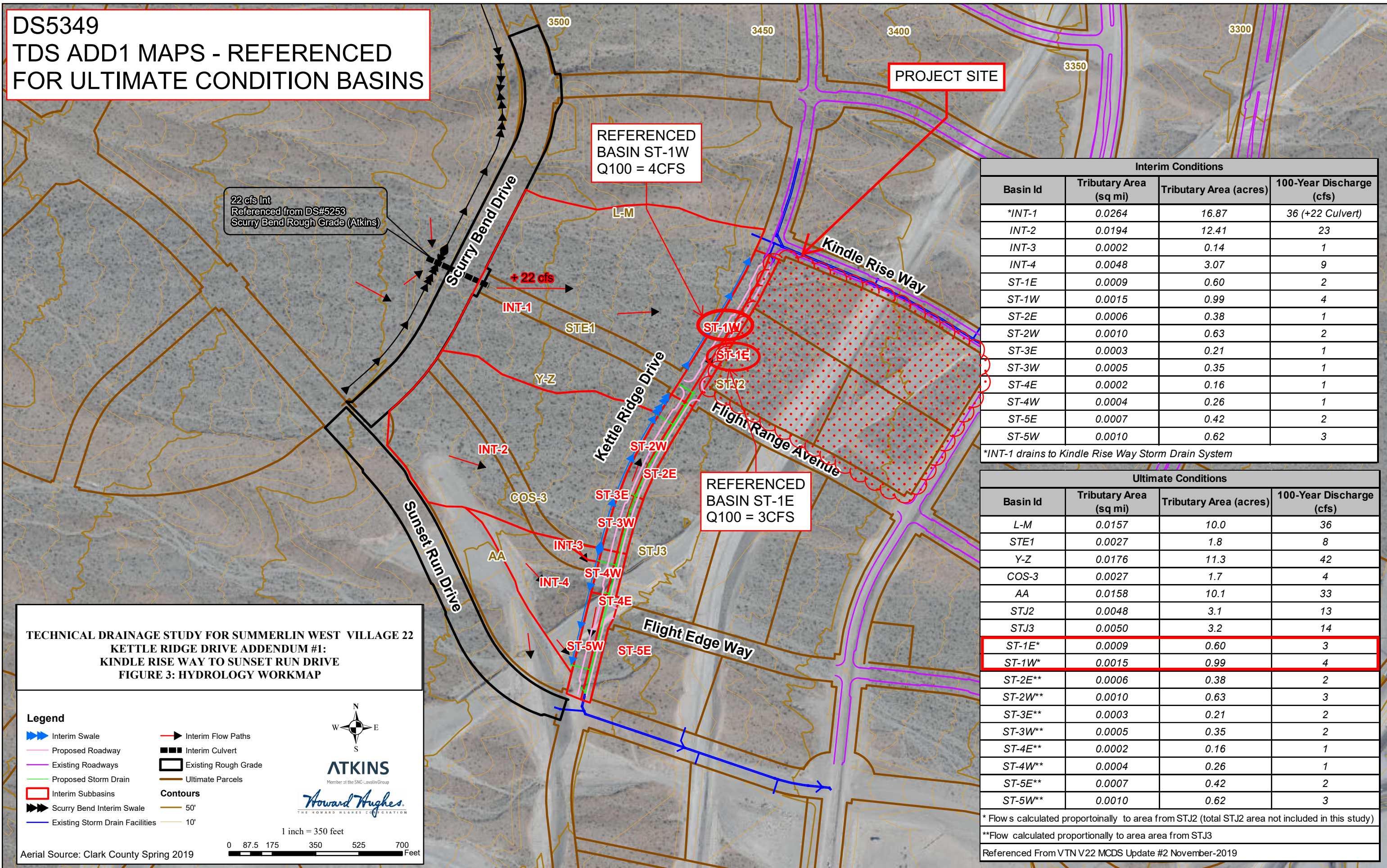
CCW:jr

c: MOLLY M. ANDERSON, P.E., ATKINS

P:\Letters and Memos\Local Drainage\Land Development & Drainage\2021\L-21-13795.doc

Referenced Drainage Exhibits

DS5349
TDS ADD1 MAPS - REFERENCED
FOR ULTIMATE CONDITION BASINS



DS5349
TDS ADD1 MAPS - REFERENCED
FOR EXISTING SD FACILITIES

REFERENCED DROP INLET
ST-1E Q100 = 3.0CFS
ST-1W Q100 = 4.2 CFS

Cap #1
Int 0 cfs
*Ult 115 cfs
*Referenced From MCDS Update #2
CSTE1 (Facility #79)

SDDI#8 No bypass
into Flight Range
Avenue

SDDI #7
Int 2 cfs
Ult 3 cfs
(0/0.2 cfs Int/Ult bypass)

SDDI #8
Int 1 cfs
Ult 2 cfs
(0 cfs bypass)

SDDI #5
Int 1 cfs
Ult 2 cfs
(0 cfs bypass)

SDDI #11
Int 23 cfs
Ult 42 cfs

SDDI #6
Int 1 cfs
Ult 2 cfs
(0 cfs bypass)

SDDI #10
Int 1 cfs
Ult 4 cfs

SDDI #3
Int 1 cfs
Ult 1 cfs
(0 cfs bypass)

SDDI #4
Int 1 cfs
Ult 1 cfs
(0 cfs bypass)

SDDI #9
Int 7 cfs
Ult 33 cfs

SDDI #2
Int 2 cfs
Ult 2 cfs
(0 cfs bypass)

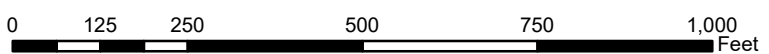
SDDI #1
Int 5 cfs
Ult 3 cfs
(0.9/0.2 cfs Int/Ult bypass)

TECHNICAL DRAINAGE STUDY FOR SUMMERLIN WEST VILLAGE 22
KETTLE RIDGE DRIVE:
KINDLE RISE WAY TO SUNSET RUN DRIVE
FIGURE 4: HYDRAULIC WORKMAP

- Street XS
- Culvert
- Street Flows
- Proposed Storm Drain
- Kettle Ridge Interim Swale
- Proposed Roadway
- Existing Scurry Bend Drive Rough Grade
- Existing Storm Water Facilities
- Ultimate Parcels



The 100-year D*V for all street-sections is less than 6. Consequently, the 10-year D*V is also less than 6. To minimize redundancy, the 10-year street flow calculations are not included on this figure.



PROJECT SITE

VTN- Summerlin Parkway Extension TDS
Update #1
SDMH#31
DS#5159
Conditionally Approved 3/31/2020
HGL=3434 ft

Interim Condition (100-Year) Street Flow and Drop Inlet Calculations Summary Table							
XS/SD ID	Total Discharge (cfs)	Drop Inlet			Flow Depth in Street (ft)	Velocity of Flow in Street (ft/s)	Depth*Velocity (must be less than 8)
		Intercepted Flow (cfs)	Bypass Flow (cfs)	Sump Depth (ft)			
ST-1E	2.0	N/A	N/A	N/A	0.2	4.2	0.9
ST-1W	4.2	N/A	N/A	N/A	0.3	5.0	1.3
ST-2E	1.0	N/A	N/A	N/A	0.2	1.5	0.4
ST-2W	2.0	N/A	N/A	N/A	0.3	1.8	0.5
ST-3E	1.0	N/A	N/A	N/A	0.2	1.5	0.4
ST-3W	1.0	N/A	N/A	N/A	0.2	1.5	0.4
ST-4E	1.0	N/A	N/A	N/A	0.2	2.2	0.5
ST-4W	1.0	N/A	N/A	N/A	0.2	2.2	0.5
ST-5E	2.0	N/A	N/A	N/A	0.3	2.6	0.6
ST-5W	5.9	N/A	N/A	N/A	0.3	3.3	1.1
SDDI #1	5.0	4.1	0.9	N/A	N/A	N/A	N/A
SDDI #2	2.0	2.0	0.0	N/A	N/A	N/A	N/A
SDDI #3	1.0	1.0	0.0	N/A	N/A	N/A	N/A
SDDI #4	1.0	1.0	0.0	N/A	N/A	N/A	N/A
SDDI #5	1.0	1.0	0.0	N/A	N/A	N/A	N/A
SDDI #6	1.0	1.0	0.0	N/A	N/A	N/A	N/A
SDDI #7	2.0	2.0	0.0	N/A	N/A	N/A	N/A
SDDI #8	1.0	1.0	0.0	N/A	N/A	N/A	N/A
SDDI #9	7.0	7.0	0.0	0.3	N/A	N/A	N/A
SDDI #10	1.0	1.0	0.0	0.1	N/A	N/A	N/A
SDDI #11	23.0	23.0	0.0	0.7	N/A	N/A	N/A

*All street criteria are met in 100-yr event, thus all 10-yr criteria are met as well.

Ultimate Condition (100-Year) Street Flow and Drop Inlet Calculations Summary Table							
XS/SD ID	Total Discharge (cfs)	Drop Inlet			Flow Depth in Street (ft)	Velocity of Flow in Street (ft/s)	Depth*Velocity (must be less than 8)
		Intercepted Flow (cfs)	Bypass Flow (cfs)	Sump Depth (ft)			
ST-1E	3.0	N/A	N/A	N/A	0.2	4.7	1.1
ST-1W	4.2	N/A	N/A	N/A	0.3	5.0	1.3
ST-2E	2.0	N/A	N/A	N/A	0.3	1.8	0.5
ST-2W	3.0	N/A	N/A	N/A	0.3	2.0	0.6
ST-3E	2.0	N/A	N/A	N/A	0.3	1.8	0.5
ST-3W	2.0	N/A	N/A	N/A	0.3	1.8	0.5
ST-4E	1.0	N/A	N/A	N/A	0.2	2.2	0.5
ST-4W	1.0	N/A	N/A	N/A	0.2	2.2	0.5
ST-5E	2.0	N/A	N/A	N/A	0.3	2.6	0.6
ST-5W	3.2	N/A	N/A	N/A	0.3	2.8	0.8
SDDI #1	3.00	2.80	0.20	N/A	N/A	N/A	N/A
SDDI #2	2.00	2.00	0.00	N/A	N/A	N/A	N/A
SDDI #3	1.00	1.00	0.00	N/A	N/A	N/A	N/A
SDDI #4	1.00	1.00	0.00	N/A	N/A	N/A	N/A
SDDI #5	2.00	2.00	0.00	N/A	N/A	N/A	N/A
SDDI #6	2.00	2.00	0.00	N/A	N/A	N/A	N/A
SDDI #7	3.00	2.00	0.20	N/A	N/A	N/A	N/A
SDDI #8	2.00	2.00	0.00	N/A	N/A	N/A	N/A
SDDI #9	33.00	N/A	N/A	N/A	N/A	N/A	N/A
SDDI #10	4.00	N/A	N/A	N/A	N/A	N/A	N/A
SDDI #11	42.00	N/A	N/A	N/A	N/A	N/A	N/A

*All street criteria are met in 100-yr event, thus all 10-yr criteria are met as well.

Referenced Hydraulics

KettleRidge-1E-100yr

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.068 ft/ft
Discharge	3.20 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.46
0+18	0.10
0+19	0.00
0+19	0.50
0+20	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.46)	(0+18, 0.10)	0.016
(0+18, 0.10)	(0+20, 0.50)	0.013

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

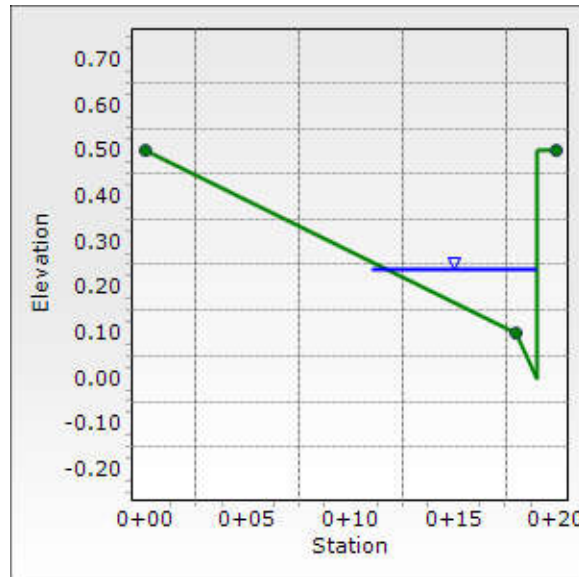
Results	
Normal Depth	0.24 ft
Elevation Range	0.0 to 0.5 ft
Flow Area	0.7 ft ²
Wetted Perimeter	8.2 ft
Hydraulic Radius	0.08 ft
Top Width	7.99 ft
Normal Depth	0.24 ft
Critical Depth	0.33 ft
Critical Slope	0.007 ft/ft
Velocity	4.72 ft/s
Velocity Head	0.35 ft
Specific Energy	0.59 ft
Froude Number	2.853
Flow Type	Supercritical

GVF Input Data

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.24 ft
Critical Depth	0.33 ft
Channel Slope	0.068 ft/ft
Critical Slope	0.007 ft/ft

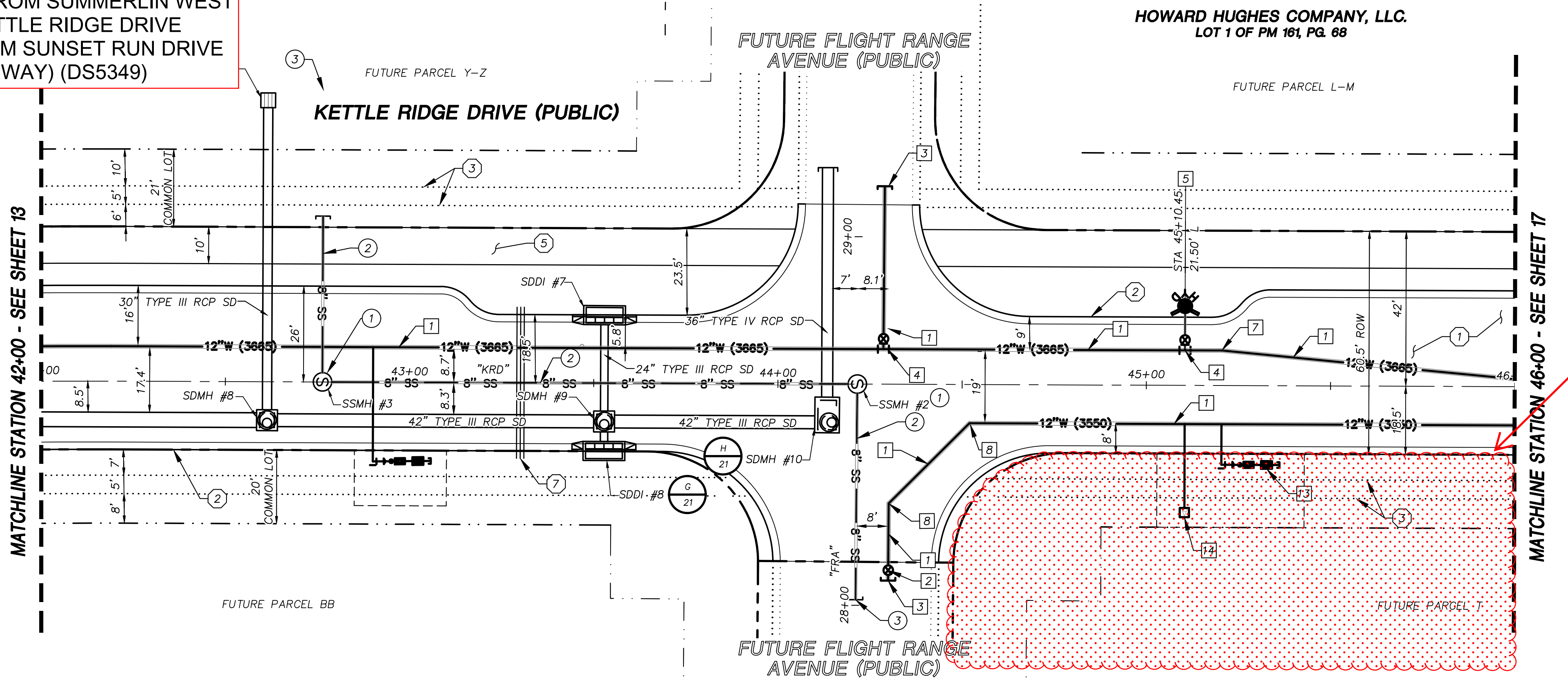
Cross Section for KettleRidge-1E-100yr

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.068 ft/ft
Normal Depth	0.24 ft
Discharge	3.20 cfs

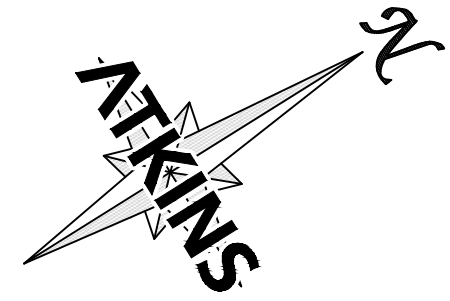


Referenced Plan Sheets

REFERENCED FROM SUMMERLIN WEST VILLAGE 22 - KETTLE RIDGE DRIVE (STREET J) (FROM SUNSET RUN DRIVE TO KINDLE RISE WAY) (DS5349)



PROJECT SITE



STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 3 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL TYPE II SD MANHOLE PER CCAUSD #405.2
4. INSTALL TYPE III SD MANHOLE PER CCAUSD #406
5. INSTALL NDOT TYPE 2 DROP INLET PER NDOT R-4.2.1 (SEE SHEET 27)
6. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL (SEE SHEET 27)
7. INSTALL RIP-RAP (D50=12", THICKNESS=24")
8. INSTALL RIP-RAP (D50=6", THICKNESS=12")

SEWER CONSTRUCTION NOTES

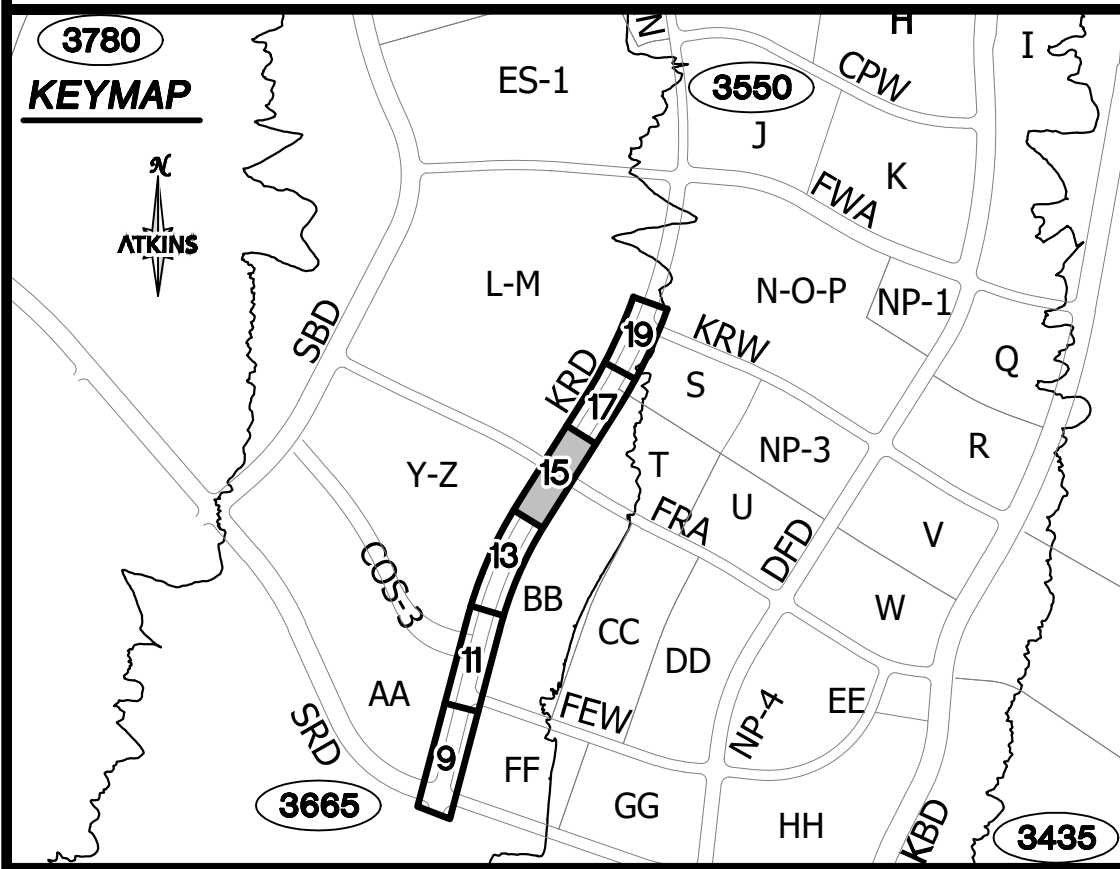
1. INSTALL SEWER MANHOLE PER DCSWCS SD-1A, SD-1B, AND SD-4
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).

WATERLINE CONSTRUCTION NOTES

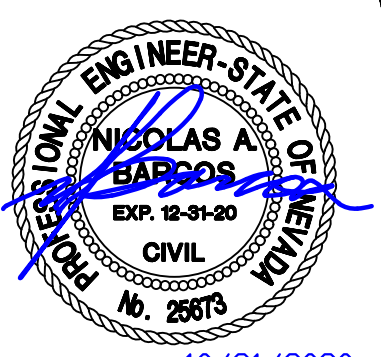
1. INSTALL WATER MAIN PER UDACS PLATES #17 AND PLATE #19
2. INSTALL GATE VALVE PER UDACS PLATES #30 AND #39
3. INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
4. INSTALL TEE W/ VALVE AND LATERAL PER UDACS PLATES #17, #19, #30, #31 AND #39
5. INSTALL FIRE HYDRANT WITH APPURTENANCES (CONCRETE PAD, LATERAL, VALVE, AND TEE) PER UDACS PLATES #30, #31, #39, AND #40.
6. INSTALL DEFLECTION AT PIPE JOINTS (MAXIMUM OF 1')
7. INSTALL 5' HORIZONTAL BEND PER UDACS PLATE #31
8. INSTALL 45' HORIZONTAL BEND PER UDACS PLATE #31
9. INSTALL TAPPING SLEEVE WITH TAPPING VALVE AND LATERAL PER UDACS PLATES #17, #19, #30, #31, #34, AND #39
10. REMOVE CAP AND 2" BLOWOFF AND CONNECT TO EXISTING WATERLINE STUB
11. INSTALL 11.25' VERTICAL BEND PER UDACS PLATE #31
12. INSTALL 5' VERTICAL BEND PER UDACS PLATE #31
13. INSTALL 1-1/2" IRRIGATION METER WITH 1-1/2" RPPA PER UDACS PLATES #4 AND #8 WITH CURB STOP
14. INSTALL COMBINATION AIR VALVE ASSEMBLY WITH ALL APPURTENANCES PER UDACS PLATE #38

ROADWAY CONSTRUCTION NOTES

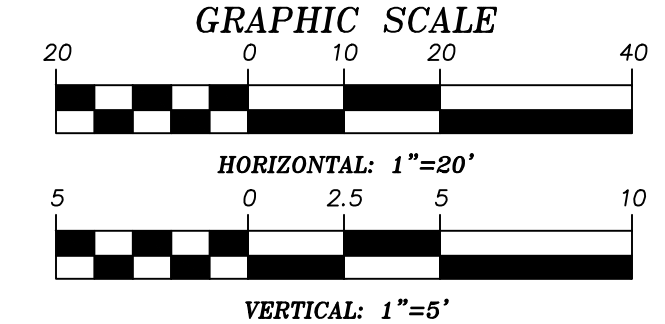
1. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT. SEE SHEET 26 FOR TYPICAL PAVEMENT SECTION.
2. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
3. FUTURE SIDEWALK BY OTHERS
4. CONSTRUCT CURB RAMP, TYPE A, PER NDOT STANDARD PLAN R-5.2.1.
5. CONSTRUCT CONCRETE BIKE PATH PER CCAUSD #234
6. CONSTRUCT CURB RAMP, TYPE A, PER NDOT STANDARD PLAN R-5.2.1 (A=B=6.5')
7. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL B ON SHEET 29



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DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ: NONE
VERT: NONE
JOB NO. 1000066768
DATE: NOVEMBER, 2020
DRAWING NO. 15 / 29
CLV 00-00000



APPROVED FOR CONSTRUCTION
LAS VEGAS VALLEY WATER DISTRICT
PROJECT NO. 0000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION
NICOLAS BARCOS PE#25673 DATE _____
CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.
DS#XXX-0000

BASIS OF BEARING
GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NORS). LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.
BENCHMARK
CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
TZ15R59E.S03



REVISIONS
DESCRIPTION
BY DATE APPROVAL

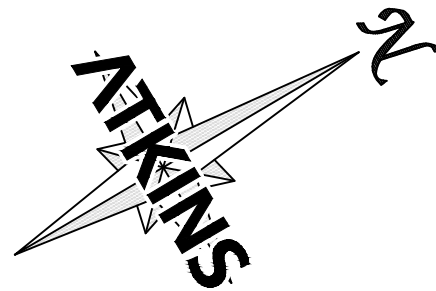
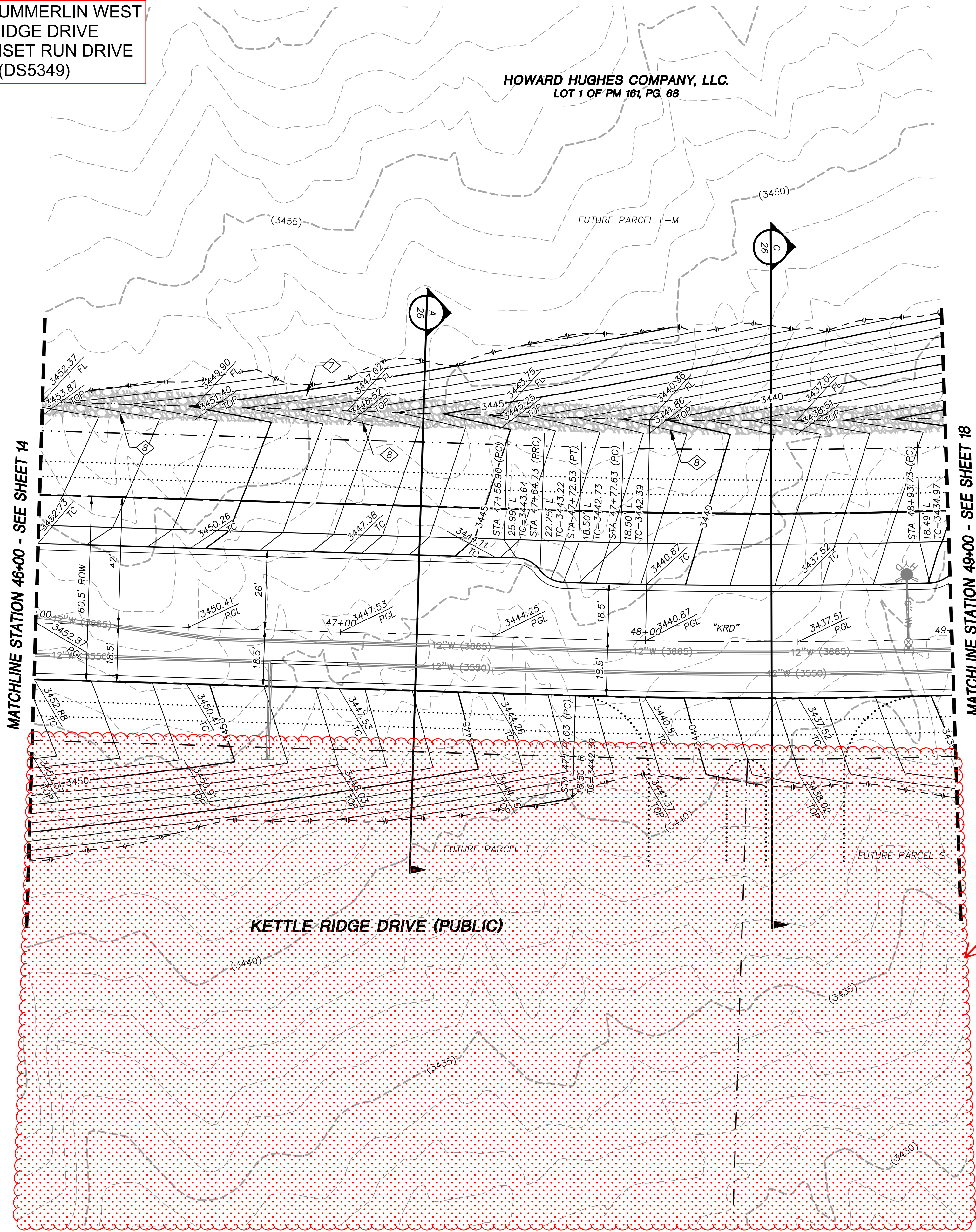
ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.725
Fax: +1702.263.700

SUMMERLIN
SUMMERLIN VILLAGE 22
KETTLE RIDGE DRIVE (STREET J)
SUNSET RUN DRIVE TO KINDLE RISE WAY (STREET F)

ROADWAY PLAN AND PROFILE
STA 42+00 TO STA 46+00

10/21/2020

REFERENCED FROM SUMMERLIN WEST VILLAGE 22 - KETTLE RIDGE DRIVE (STREET J) (FROM SUNSET RUN DRIVE TO KINDLE RISE WAY) (DS5349)

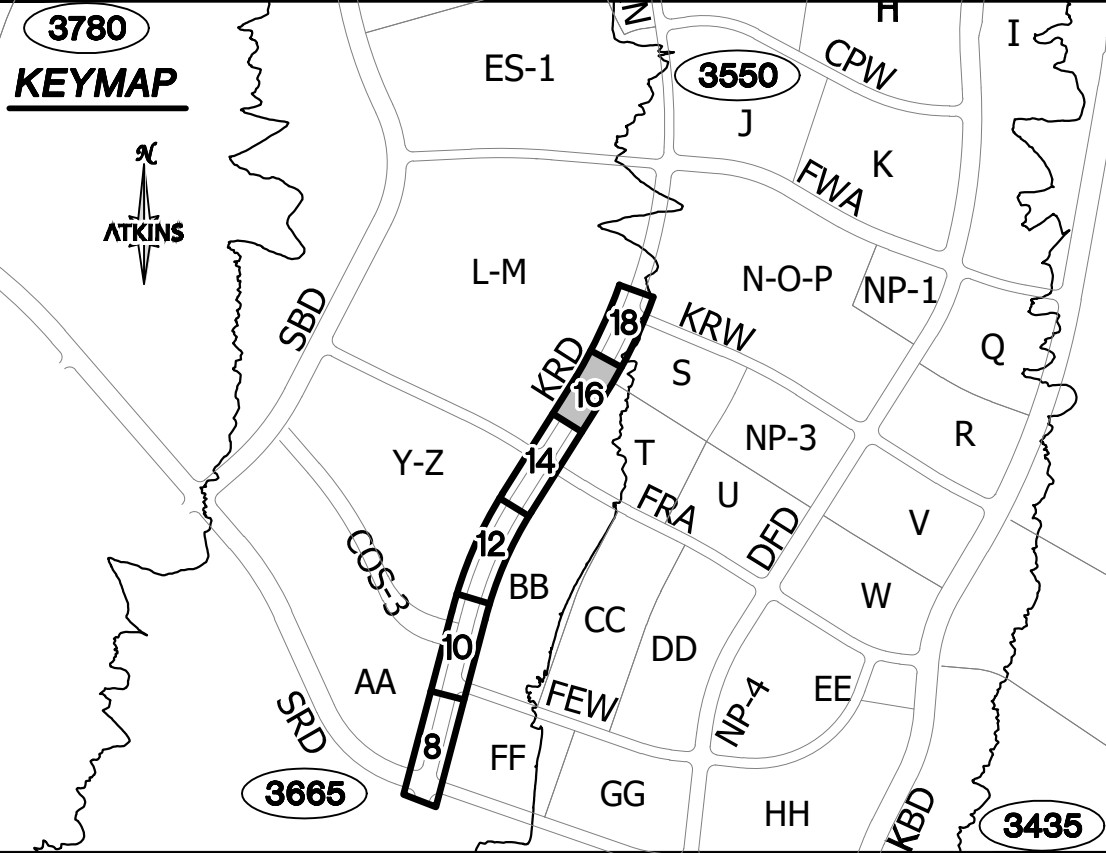


STORM DRAIN CONSTRUCTION NOTES

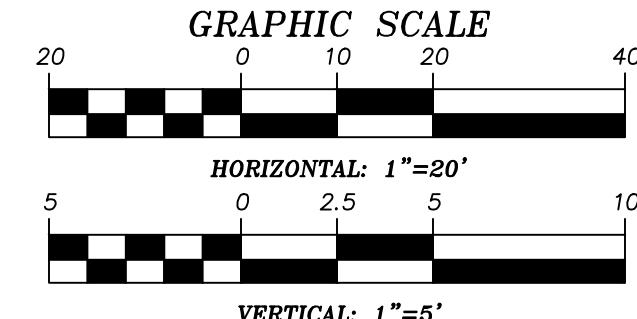
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3. FUTURE SIDEWALK BY OTHERS
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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT
PROJECT NO. 0000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

NICOLAS BARCOS PE#25673 DATE _____
CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.
DS#XXX-0000

BASIS OF BEARING

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

BENCHMARK

CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03



SUMMERLIN VILLAGE 22
KETTLE RIDGE DRIVE (STREET J)
SUNSET RUN DRIVE TO KINDLE RISE WAY (STREET F)
ROADWAY GRADING PLAN
STA 46+00 TO STA 49+00

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: NONE
VERT.: NONE
JOB NO. 1000066768
DATE: NOVEMBER, 2020
DRAWING NO. 16 / 29
CLV 00-00000

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7755
Fax: +1702.263.7200

SUMMERLIN
10/21/2020

REV.	DESCRIPTION	BY	DATE	APPROVAL

REFERENCED FROM SUMMERLIN WEST VILLAGE 22 - KETTLE RIDGE DRIVE (STREET J) (FROM SUNSET RUN DRIVE TO KINDLE RISE WAY) (DS5349)

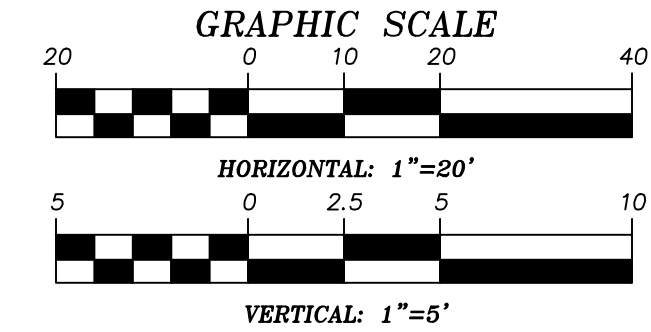
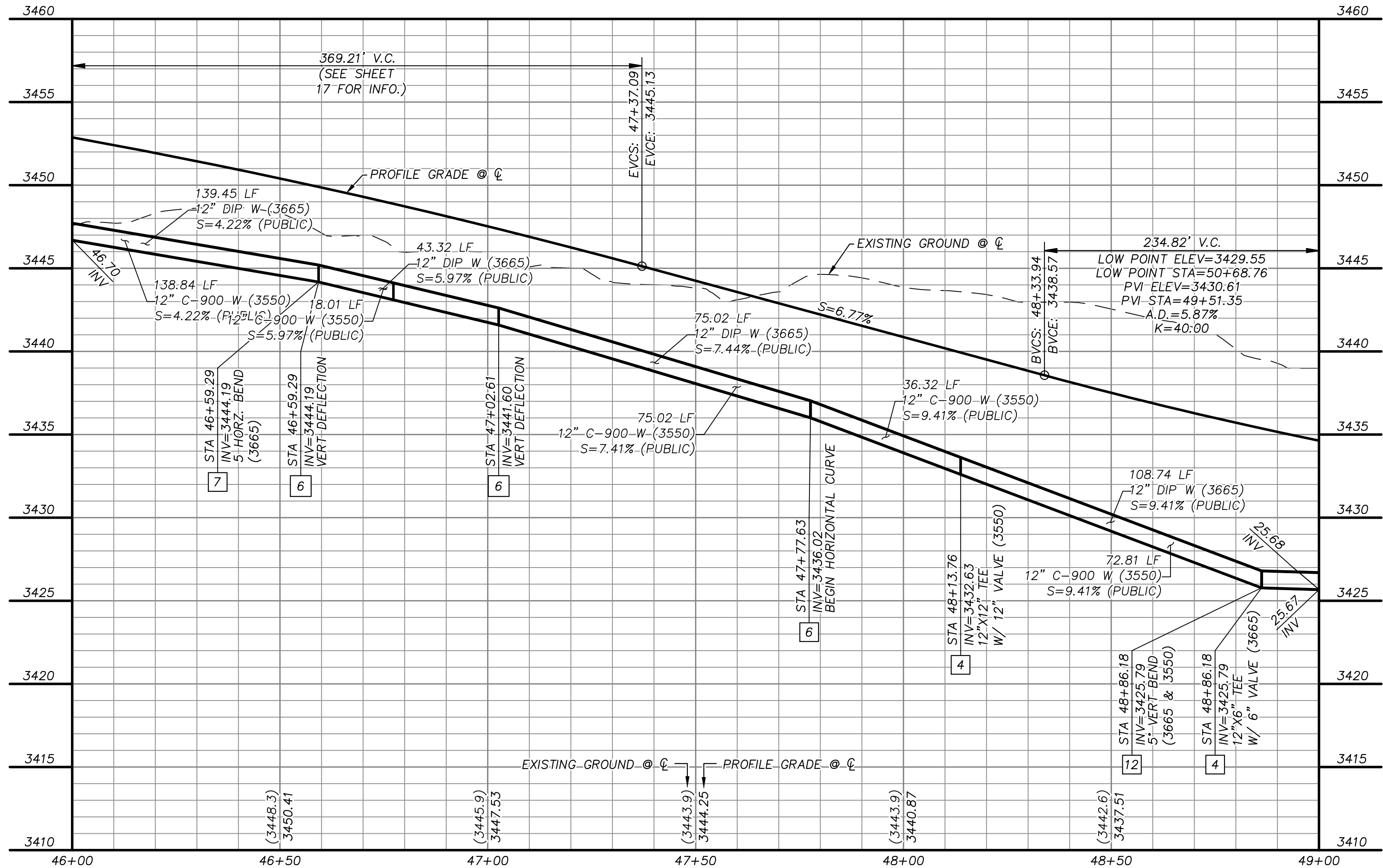
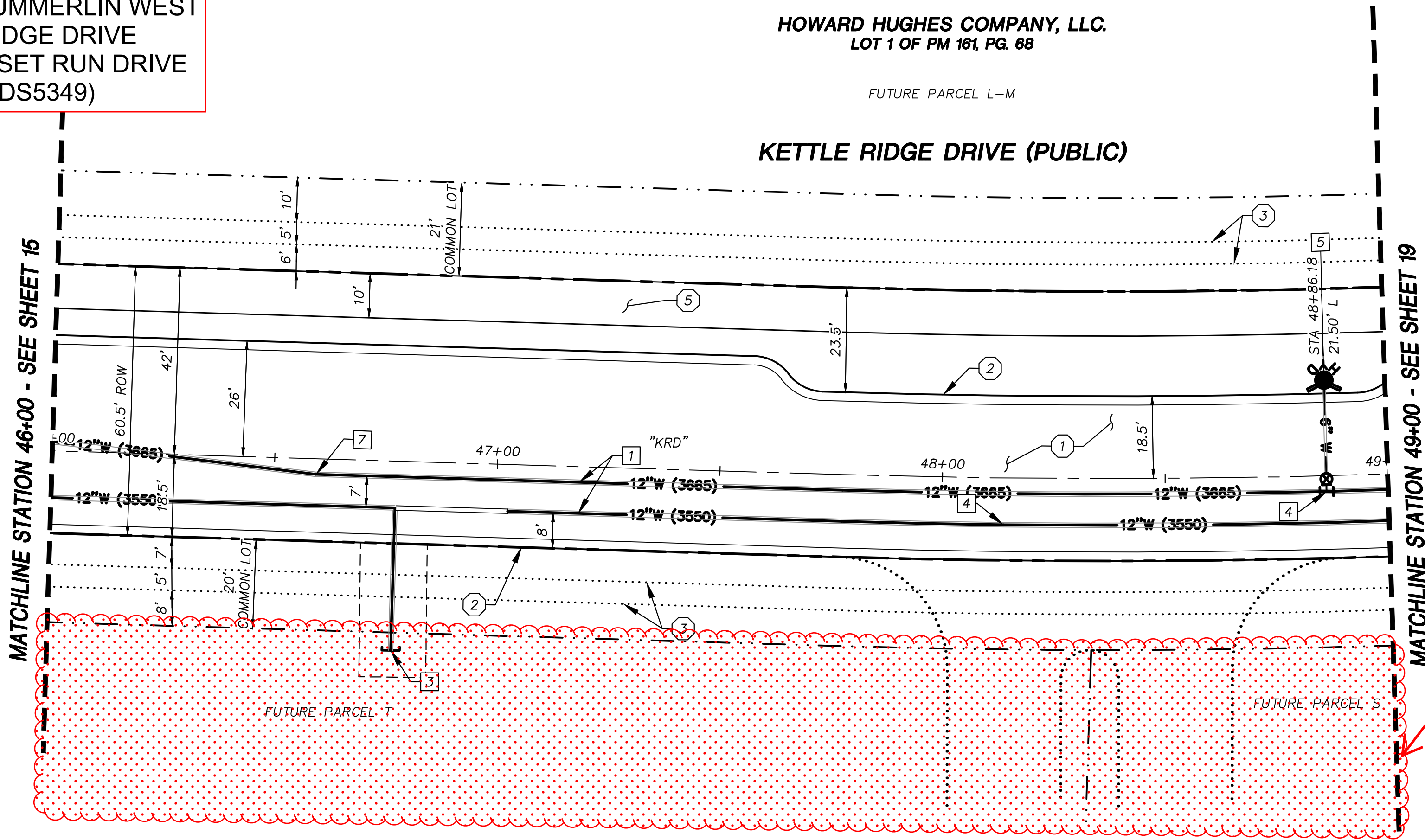
HOWARD HUGHES COMPANY, LLC.
LOT 1 OF PM 161, PG. 68

FUTURE PARCEL L-M

KETTLE RIDGE DRIVE (PUBLIC)

MATCHLINE STATION 46+00 - SEE SHEET 15

MATCHLINE STATION 49+00 - SEE SHEET 19



APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT
PROJECT NO. 0000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

NICOLAS BARCOS PE#25673 DATE _____

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.
DS#XXX-0000

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T21S,R59E,S03



STORM DRAIN CONSTRUCTION NOTES

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SEWER CONSTRUCTION NOTES

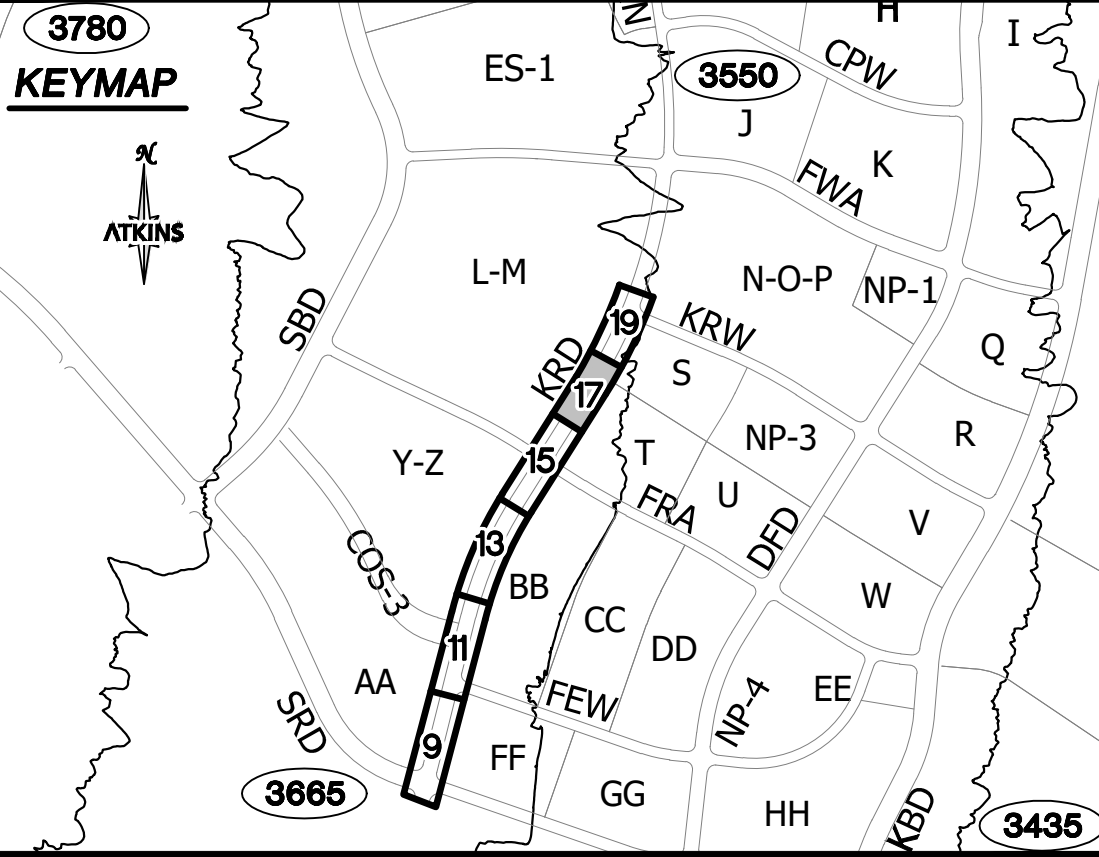
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DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: NONE
VERT.: NONE
JOB NO. 1000066768
DATE: NOVEMBER, 2020
DRAWING NO. 17 / 29
CLV 00-000000

SUMMERLIN VILLAGE 22
KETTLE RIDGE DRIVE (STREET J)
SUNSET RUN DRIVE TO KINDLE RISE WAY (STREET F)
ROADWAY PLAN AND PROFILE
STA 46+00 TO STA 49+00



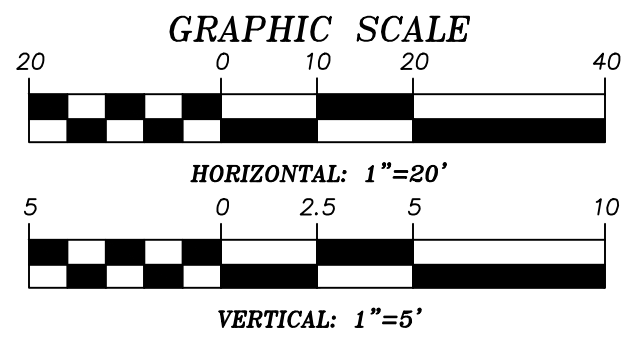
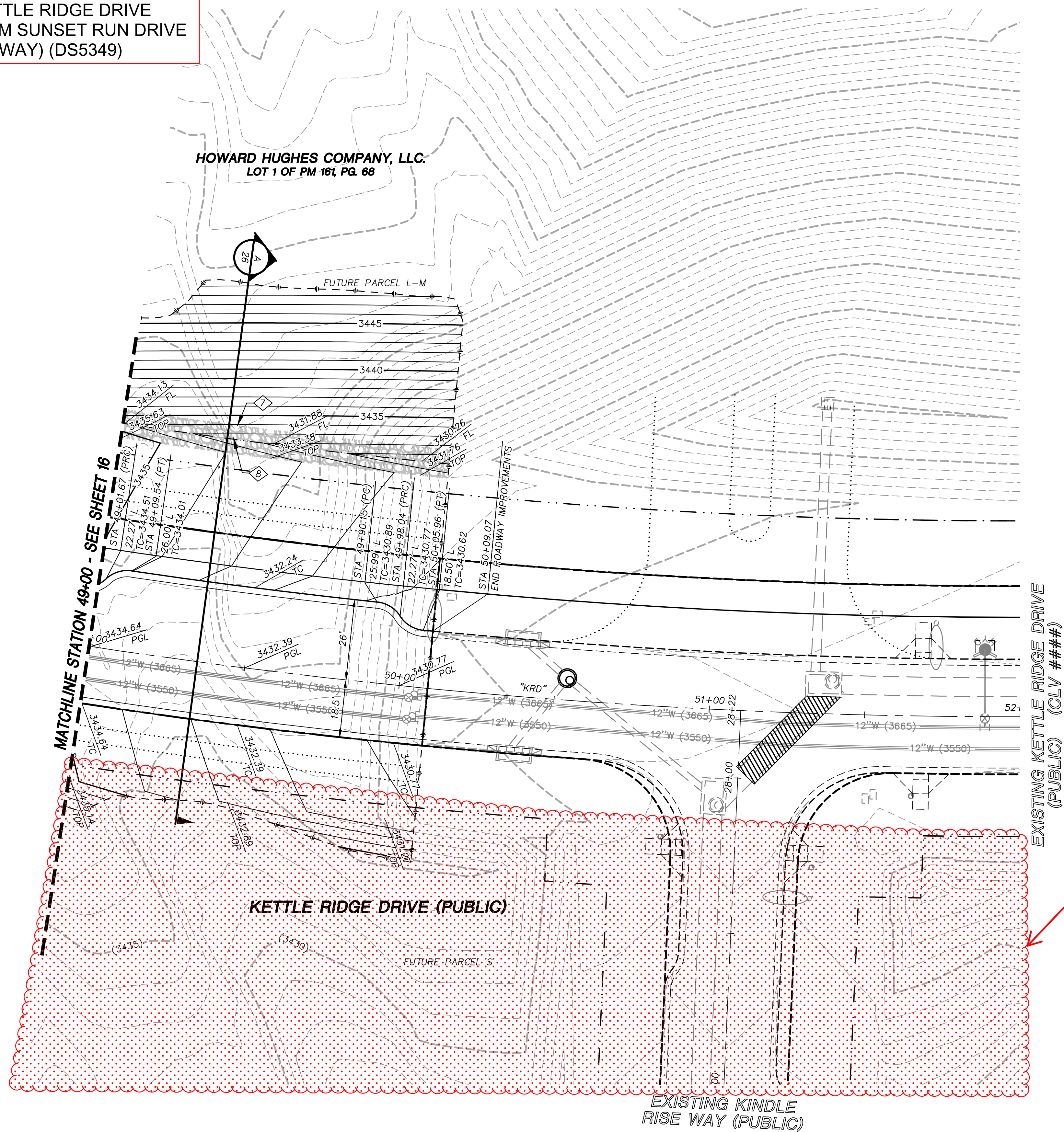
ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7755
Fax: +1702.263.7200

REV.	DESCRIPTION	DATE	APPROVAL

REV.	DESCRIPTION	DATE	APPROVAL

X:\Projects\Summerlin\Summerlin Village 22\1000066768 - V22 Kettle Ridge (Sunset to Fleet Wing)_Sheets\66768-11-PLAN-C11.dwg LAYOUT: P5 Nov 02, 2020 - 5:30PM

REFERENCED FROM SUMMERLIN WEST
VILLAGE 22 - KETTLE RIDGE DRIVE
(STREET J) (FROM SUNSET RUN DRIVE
TO KINDLE RISE WAY) (DS5349)



APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT
PROJECT NO. 0000 FIRST APPROVED DATE:

GRADING PLAN CERTIFICATION

NICOLAS BARCOS	PE#25673	DATE
CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT. DS#XXX-0000		

BASIS OF BEARING

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

CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
 NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)
 FND USCGS6 DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
 T21S,R59E,S03

BENCHMARK

CITY OF LAS VEGAS BENCHMARK: D368
(REVISED 2008)
NAVDD88 ELEVATION: 989.574 METERS
(3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150'
SOUTH OF CHARLESTON BLVD. & WEST OF
DETENTION BASIN.
T21S,R59E,S03

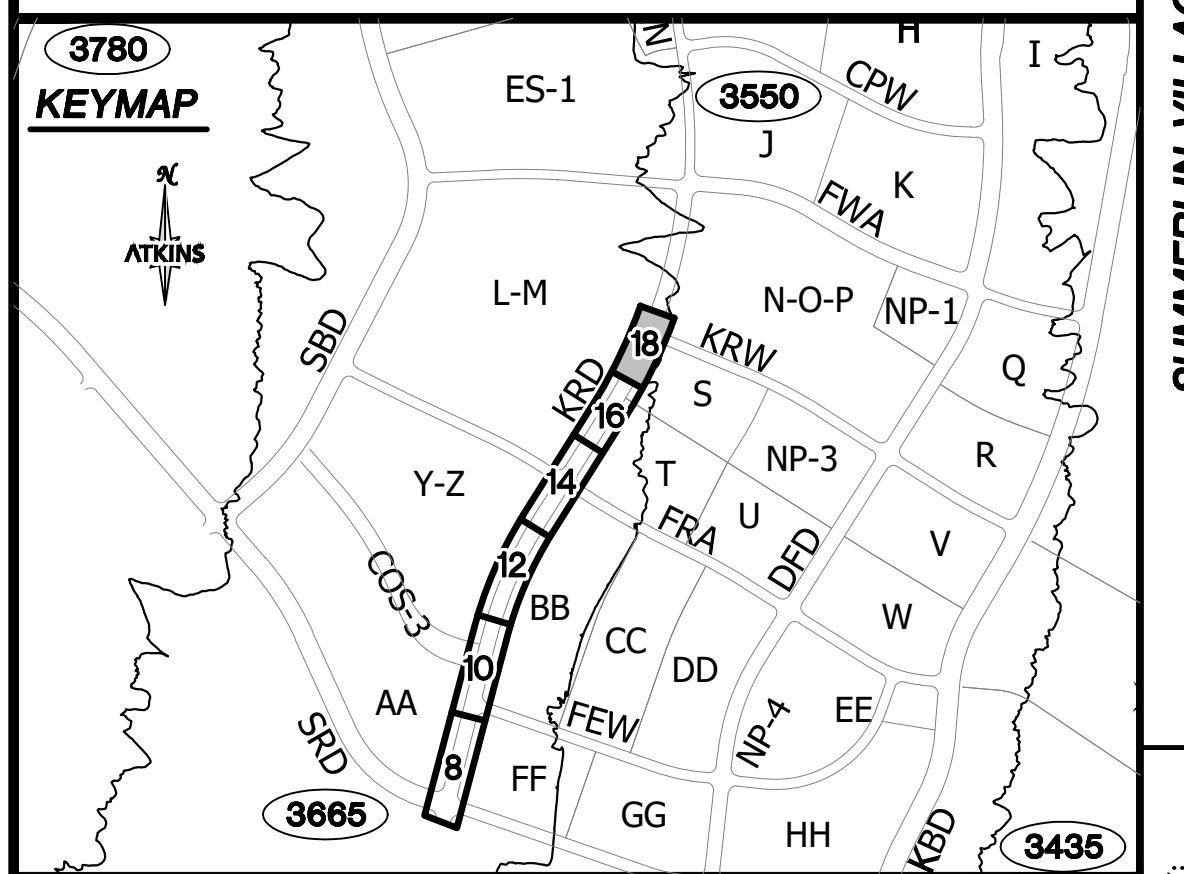


STORM DRAIN CONSTRUCTION NOTES

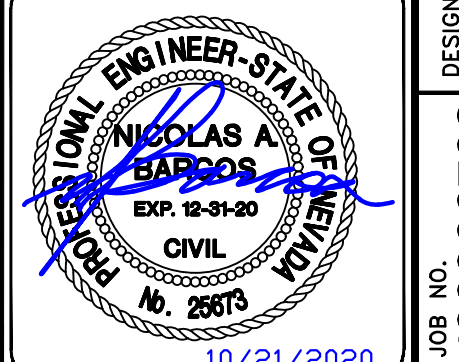
1. INSTALL STORM DRAIN. SEE SHEET 3 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL TYPE II SD MANHOLE PER CCAUSD #405.2
4. INSTALL TYPE III SD MANHOLE PER CCAUSD #406
5. INSTALL NDOT TYPE 2 DROP INLET PER NDOT R-4.2.1 (SEE SHEET 27)
6. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL (SEE SHEET 27)
7. INSTALL RIP-RAP (D50=12", THICKNESS=24")
8. INSTALL RIP-RAP (D50=6", THICKNESS=12")

ROADWAY CONSTRUCTION NOTES

- (1) CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT. SEE SHEET 26 FOR TYPICAL PAVEMENT SECTION.
- (2) CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
- (3) FUTURE SIDEWALK BY OTHERS
- (4) CONSTRUCT CURB RAMP, TYPE A, PER NDOT STANDARD PLAN R-5.2.1.
- (5) CONSTRUCT CONCRETE BIKE PATH PER CCAUSD #234
- (6) CONSTRUCT CURB RAMP, TYPE A, PER NDOT STANDARD PLAN R-5.2.1 (A=B=6.5')
- (7) INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2'-4", 1'-6") PER DETAIL B ON SHEET 29



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 OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.



TION

ATKINS
2270 Corporate Circle Suite 200



SUMMERLIN VILLAGE 22
ATTLE RIDGE DRIVE (STREET
UN DRIVE TO KINDLE RISE WAY (S

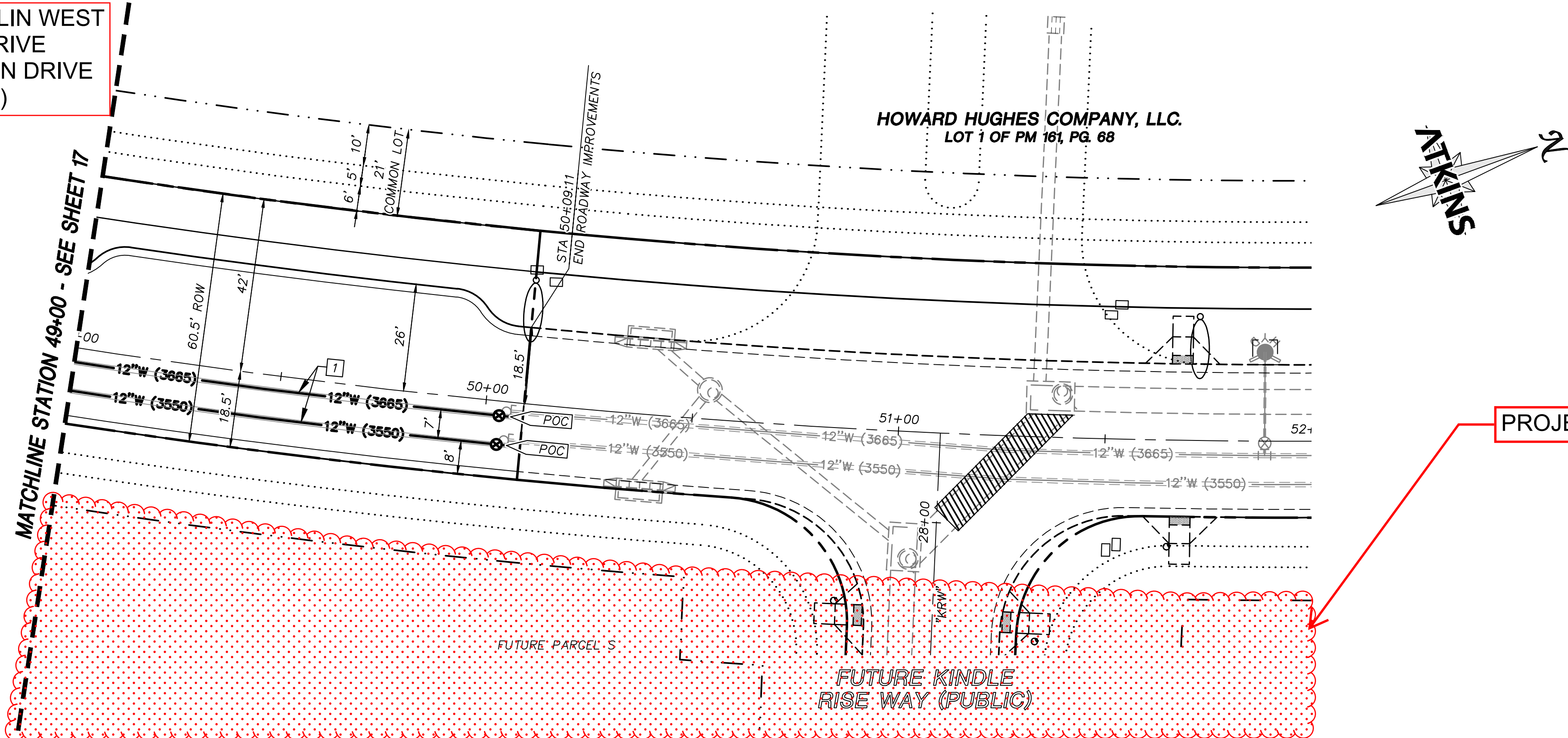
SUMMEHLIN VILLAGE 22
TITLE RIDGE DRIVE (STREET
UN DRIVE TO KINDLE RISE WAY (ST

ROADWAY GRADING PLAN
STA 49+00 TO END

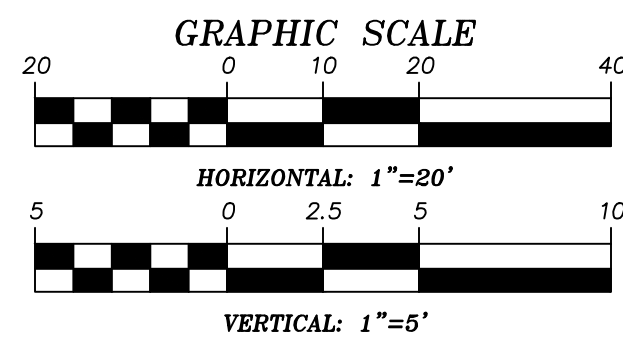
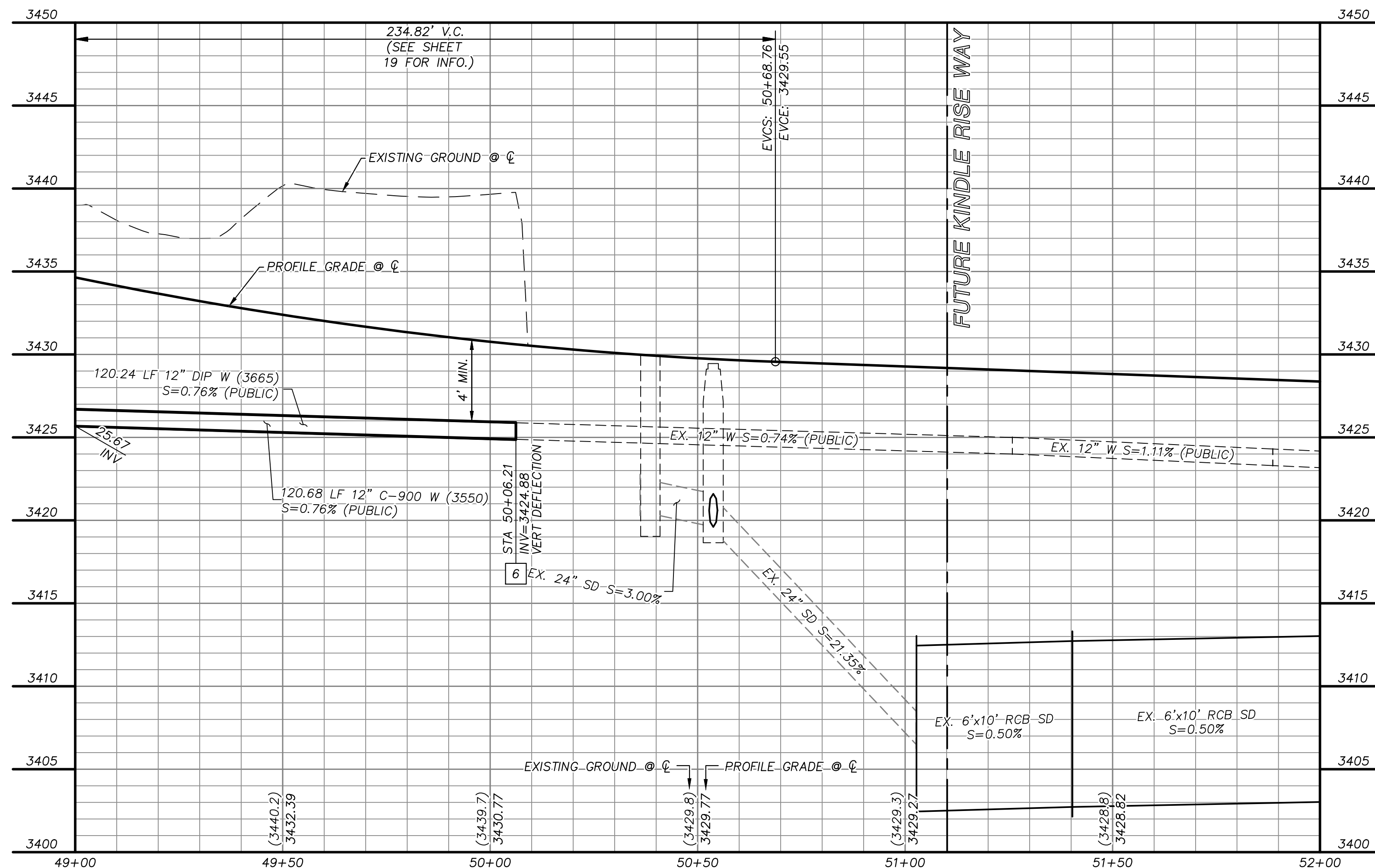
100066768	N. BARCOS
DATE:	DRAWN BY:
NOVEMBER, 2020	L. MANACLAY
DRAWING NO.	CHECKED BY:
	P. BATES
	HORIZ.: NONE
18/29	VERT.: NONE

X: \Projects\SummWest\ Village 22\100066768 - V22 Kettle Ridge (Sunset to Fleet Wing)_Sheets\66768-10-GRAD-C10.dwg LAYOUT: G6 Nov 02, 2020 - 5:30PM

REFERENCED FROM SUMMERLIN WEST
VILLAGE 22 - KETTLE RIDGE DRIVE
(STREET J) (FROM SUNSET RUN DRIVE
TO KINDLE RISE WAY) (DS5349)



PROJECT SITE



APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT
PROJECT NO. 0000 FIRST APPROVED DATE:

GRADING PLAN CERTIFICATION

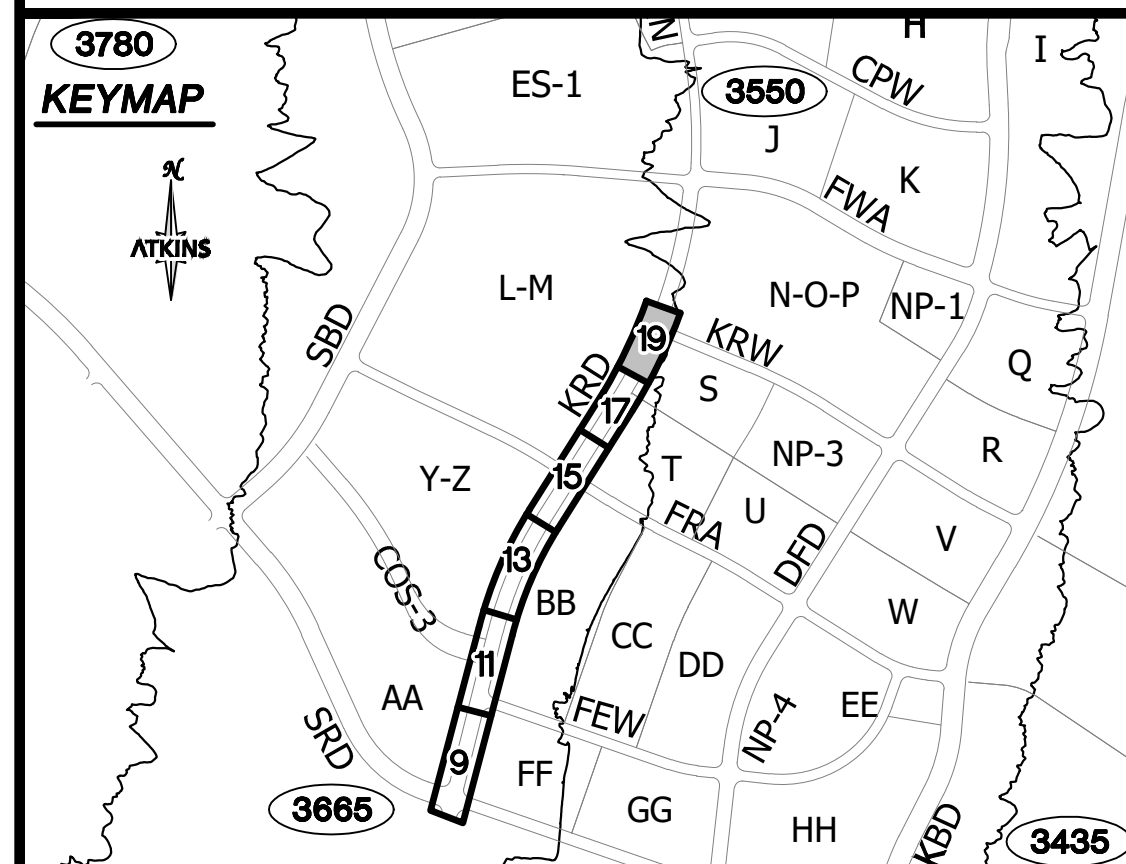
NICOLAS BARCOS	PE#25673	DATE
CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.		
		DS###-0000

BASIS OF BEARING

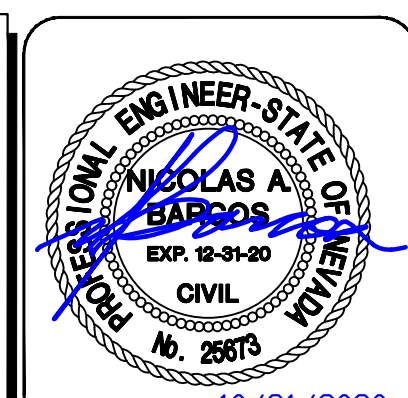
GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.	CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008) NAD 83 ELEVATION: 989.574 METERS (3,246.61 FEET) FNU: USGS DISC SET IN ROCK RIDGE 150 SOUTH OF CHARLTON BLVD. & WEST OF DETENTION BASIN. T21S,R59E,S03
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BENCHMARK

CITY OF LAS VEGAS BENCHMARK: D368
(REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS
(3,246.63 FEET)
END USC&GS DISC SET IN ROCK RIDGE 150
SOUTH OF CHARLESTON BLVD. & WEST OF
DETENTION BASIN.
T21S,R59E,S03



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 OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.



DESIGNED BY: N. BARCOS	JOB NO. 1100066768
DRAWN BY: L. MAMACLAY	
CHECKED BY: P. BATES	
HORIZ.: NONE VERT.: NONE	
DATE: NOVEMBER, 2020	
DRAWING NO.	
19 / 29	

SUMMERLIN VILLAGE 22
LITTLE RIDGE DRIVE (STREET J)
RUN DRIVE TO KINDLE RISE WAY (STREET F)
ROADWAY PLAN AND PROFILE
STA 49+00 TO END



ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

[illegible]

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 3 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
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7. INSTALL RIP-RAP (D50=12", THICKNESS=24")
8. INSTALL RIP-RAP (D50=6", THICKNESS=12")

SEWER CONSTRUCTION NOTES

- ① INSTALL SEWER MANHOLE PER DCSWCS SD-1A, SD-1B, AND SD-4
- ② INSTALL SEWER MAIN PER DCSWCS SD-17
- ③ STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).

WATERLINE CONSTRUCTION NOTES

- [1] INSTALL WATER MAIN PER UDACS PLATES #17 AND PLATE #19
- [2] INSTALL GATE VALVE PER UDACS PLATES #30 AND #39
- [3] INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
- [4] INSTALL TEE W/ VALVE AND LATERAL PER UDACS PLATES #17, #19, #30, #31 AND #39
- [5] INSTALL FIRE HYDRANT WITH APPURTENANCES (CONCRETE PAD, LATERAL, VALVE, AND TEE) PER UDACS PLATES #30, #31, #39, AND #40.
- [6] INSTALL DEFLECTION AT PIPE JOINTS (MAXIMUM OF 1")
- [7] INSTALL 5' HORIZONTAL BEND PER UDACS PLATE #31
- [8] INSTALL 45° HORIZONTAL BEND PER UDACS PLATE #31
- [9] INSTALL TAPPING SLEEVE WITH TAPPING VALVE AND LATERAL PER UDACS PLATES #17, #19, #30, #31, #34, AND #39
- [10] REMOVE CAP AND 2" BLOWOFF AND CONNECT TO EXISTING WATERLINE SUB
- [11] INSTALL 11.25° VERTICAL BEND PER UDACS PLATE #31
- [12] INSTALL 5° VERTICAL BEND PER UDACS PLATE #31
- [13] INSTALL 1-1/2" IRRIGATION METER WITH 1-1/2" RPPA PER UDACS PLATES #4 AND #8 WITH CURB STOP
- [14] INSTALL COMBINATION AIR VALVE ASSEMBLY WITH ALL APPURTENANCES PER UDACS PLATE #38

ROADWAY CONSTRUCTION NOTES

- ① CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT. SEE SHEET 26 FOR TYPICAL PAVEMENT SECTION.
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- ⑦ INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2'-4", 1'-6") PER DETAIL B ON SHEET 29

APPENDIX H

Entitlement Documents



**LAS VEGAS
CITY COUNCIL**

CAROLYN G. GOODMAN
Mayor

STAVROS S. ANTHONY
Mayor Pro Tem

MICHELE FIORE

CEDRIC CREAR

BRIAN KNUDSEN

VICTORIA SEAMAN

OLIVIA DIAZ

JORGE CERVANTES
City Manager

DEPARTMENT OF PLANNING

SETH T. FLOYD

DIRECTOR OF
COMMUNITY DEVELOPMENT

CITY HALL

495 S. MAIN ST.
3RD FLOOR
LAS VEGAS, NV 89101
702.229.6301 | VOICE
702.464.2545 | FAX
711 | TTY



cityoflasvegas
lasvegasnevada.gov

September 14, 2022

Howard Hughes Company LLC
10801 West Charleston Boulevard
Las Vegas, Nevada 89135

RE: 22-0394-TMP1

PLANNING COMMISSION MEETING OF SEPTEMBER 13, 2022

Dear Applicant:

The Planning Commission at a regular meeting held on **September 13, 2022** voted to **APPROVE** a request FOR A 144-LOT SINGLE-FAMILY DETACHED RESIDENTIAL SUBDIVISION on 13.97 acres at the northwest corner of Flight Range Avenue and Desert Foothill Drive (APNs 137-23-213-002, 003 and 004), P-C (Planned Community) Zone [SFSD (Single Family Special Lot Development) Summerlin Special Land Use Designation], Ward 2 (Seaman).

This approval is subject to the following conditions:

Planning

1. Approval of the Tentative Map shall be for no more than four (4) years. If a Final Map is not recorded on all or a portion of the area embraced by the Tentative Map within four (4) years of the approval of the Tentative Map, this action is void.
2. Street names must be provided in accordance with the City's Street Naming Regulations.
3. A fully operational fire protection system, including fire apparatus roads, fire hydrants and water supply, shall be installed and shall be functioning prior to construction of any combustible structures.
4. In conjunction with creation, declaration and recordation of the subject common-interest community, and prior to recordation of the Covenants, Codes and Restrictions ("CC&R"), or conveyance of any unit within the community, the Developer is required to record a Declaration of Private Maintenance Requirements ("DPMR") as a covenant on all associated properties, and on behalf of all current and future property owners. The DPMR is to include a listing of all

privately owned and/or maintained infrastructure improvements, along with assignment of maintenance responsibility for each to the common interest community or the respective individual property owners, and is to provide a brief description of the required level of maintenance for privately maintained components. The DPMR must be reviewed and approved by the City of Las Vegas Department of Field Operations prior to recordation, and must include a statement that all properties within the community are subject to assessment for all associated costs should private maintenance obligations not be met, and the City of Las Vegas be required to provide for said maintenance. Also, the CC&R are to include a statement of obligation of compliance with the DPMR. Following recordation, the Developer is to submit copies of the recorded DPMR and CC&R documents to the City of Las Vegas Department of Field Operations.

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

Public Works

6. Private streets must be granted and labeled on the Final Map for this site as Public Utility Easements (P.U.E.), Public Sewer Easements, and Public Drainage Easements to be privately maintained by the Homeowner's Association.
7. Grant a minimum 40-foot wide Public Sewer and Public Drainage Easement to be privately maintained for the public sewer and storm drain facilities within Common Element "A" between lots 23 and 24. No walls, signs, lights, parking area, buildings or other structures, or permanent landscaping having a mature height of greater than 3-feet shall be placed anywhere in public easements or in the vehicle ingress or egress pathways to such easements. Additionally, grant a minimum 20-foot wide Public Drainage Easement over proposed storm drain facilities within Common Element "A" between lots 19 and 20 as well as lots 42 and 43. Grant the appropriately wide public easements where these easements are needed on adjacent Summerlin owned Common Elements prior to or concurrent with the recordation of a Final Map for this site.
8. Prior to the submittal of construction drawings for this site, submit a pedestrian circulation plan to identify nearby pedestrian attractors and recommend measures to accommodate pedestrians, such as but not limited to pedestrian access, crosswalk, pedestrian activated flashers and temporary sidewalks. Comply with the recommendation of the approved pedestrian circulation plan. Additionally, the Master Developer shall submit a landscaping plan for the western side of Kettle Ridge Drive that provides mature landscaping that will be used to deter jaywalking across Kettle Ridge Drive. This landscape plan must meet the approval of the City Traffic Engineer.

9. A Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works prior to the issuance of any building or grading permits or submittal of any construction drawings, whichever may occur first. Provide and improve all drainageways recommended in the approved drainage plan/study. The developer of this site shall be responsible to construct such neighborhood or local drainage facility improvements as are recommended by the City of Las Vegas Neighborhood Drainage Studies and approved Drainage Plan/Study concurrent with development of this site.
10. As per Unified Development Code (UDC) 19.16.060.G, all requirements must be complied with or such future compliance must be guaranteed by an approved performance security method in accordance with UDC sections 19.02.130.
11. The approval of all Public Works related improvements shown on this Tentative Map is in concept only. Specific design and construction details relating to size, type and/or alignment of improvements, including but not limited to street, sewer and drainage improvements, shall be resolved prior to approval of the construction plans by the City. No deviations from adopted City Standards shall be allowed unless specific written approval for such is received from the City Engineer prior to the recordation of a Final Map or the approval of subdivision-related construction plans, whichever may occur first. Approval of this Tentative Map does not constitute approval of any deviations. If such approval cannot be obtained, a revised Tentative Map must be submitted showing elimination of such deviations.

This action by the Planning Commission on **September 13, 2022** is final unless a written appeal is filed with the City Clerk within seven days of the date of the Planning Commission's decision as allowed by code or there is a review action filed by the City Council within the same time period. For additional information on appeals or review requests submitted please access <https://www.lasvegasnevada.gov/Business/Permits-Licenses/Building-Permits/Permit-Application-Status>, or contact the Department of Planning and Development at 702.229.6301 after **September 21, 2022**. No building permits or business licenses related to these items shall be issued prior to the expiration of the required seven day waiting period, or until any filed appeal is resolved pursuant to LVMC Title 19.18.

Sincerely,



Nicole Eddowes
Community Development Coordinator
Case Planning Division

NE:nl

cc:

Christa Bilbrey
KB Home
5795 Badura Avenue Suite 180
Las Vegas, Nevada 89118

Roxanne Leigh
Westwood Professional Services
5725 Badura Avenue Suite 100
Las Vegas, Nevada 89118

APPENDIX I

Improvement Plans