

DS #:

5196

APN:

137-23-101.002

PROJECT:

Summerlin Village 22 Parcel B Stockpile

SUBMITTAL:

1st

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		October 7, 2019
TO: Land Development Services Department of Building & Safety		FROM: Jennifer Shinn, P.E. Flood Control, Engr. Associate Department of Public Works
SUBJECT:	Drainage Study for:	
	Summerlin Village 22 Parcel B Stockpile	
Cross Streets:	NEC Fleet Wing Ave and Kettle Bend Rd	
File Number:	F:\Depot\DSMemos\DS5196A.doc	
Parcel Number:	137-23-101-002	
Zoning Action:	N/A	
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES	NO X
COPIES TO:		
Atkins		
Howard Hughes Company, LLC		
Bart Anderson, P.E., DevCo		

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	10/1/2019	10/7/2019	See Comments Below	\$400.00	3586327: \$400
			TOTAL FEES (LDDRS):	\$400.00	----

REMARKS:

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

x	is Conditionally 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. Prior to final acceptance of the drainage study and final approval of the stockpile plans, provide a copy of the approved Clark County Dust Mitigation Plan with the BMPs.
2. Complete Grading Note #13 on the Plans: "Stockpile to comply with the approved Dust Mitigation Plan # _____".
3. Add the time limit of the proposed stockpile (information taken from the approved Clark County Dust Mitigation Plan with the BMPs).

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

jks

T/R/S: T20S/R59E/23

AREA K-23



Summerlin West Village 22

Parcel B stockpile

Prepared for Howard Hughes Company, LLC

September 2019



CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 5/18/11)

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

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

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

I. GENERAL REQUIREMENT		
Yes	No	
137-23-101-002	Residential Single-Unit Flood & Erosion	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.)
Molly Anderson, PE	2270 Corporate Circle, Ste 200	Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions.
Henderson		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	
89074	(702) 551-0330	(1) 24" X 36" copy of the Grading Plan, (including all Detail Sheets) sealed by the engineer.
NV	Howard Hughes Company, LLC	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.
(702) 263-7200	NV	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	
89135	Las Vegas	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.
		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.
		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.
		Back of lot elevations and lot drainage pattern for all lots including common lots.
X	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.
	N/A	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.)
X		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.
		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	
X	X	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.
X	X	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.
		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	X	Minimum finish floor elevation is 6 inches above highest adjacent top of curb. Finish floor calculations must include allowances for super elevations on curves and velocity head for tee intersections.
	X	Finished floor elevations for buildings adjacent to public drainage easements must be a minimum of 18 inches above the Q100 weir of submerged weir elevation, whichever is greater.

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
	X	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.
	X	Bubblers are required across 80 foot and greater ROW streets. When flows exceed 10 cfs, bubblers larger than 18 inches will be required up to a maximum of 36”. Inlets must be sized to match the pipe size provided.

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

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

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: SUMMERLIN VILLAGE 22 PARCEL B STOCKPILE Date: October 1, 2019
Location of Development: a) Descriptive (Cross Streets) North/South: Desert Foothills Drive
East/West: Lake Mead Boulevard
b) Section: 23 Township: 20 S Range: 59 E
c) APN : 137-23-101-002

Name of Owner: Howard Hughes Company, LLC
Telephone No.: (702) 791-4000 Fax No.: (702) 791-4450 E-Mail Address: chris.anderson@howardhughes.com
Address: 10845 Griffith Peak Drive, Ste 160, Las Vegas, NV 89135

Contact Person-Name: Molly Anderson, PE Telephone No.: (702) 551-0330
* E-Mail Address: molly.anderson@atkinsglobal.com Fax No.: (702) 263-7200
Firm: Atkins
Address: 2270 Corporate Circle, Ste 200, Henderson, NV 89074

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	☒	Stockpile

1. Total Owned Land Area: At Site: +/- 446 acres Being Developed/Disturbed: 3.22 acres
2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ Yes** ☒ No
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? Yes** ☒ No
4. Proposed type of development (Residential, Commercial, Etc.): Stockpile
5. Approximate upstream land area which drains to the subject site: 225.54 acres
6. Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: Master Conceptual Drainage Study for Summerlin West Village 22
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Existing CC-215 Western Beltway Channel
8. Briefly describe your proposed schedule for the subject project: ASAP

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

***New Required Field**

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

	Revision	Date

Engineer's Seal

Local Entity File No.

REFERENCE:

STANDARD FORM 1

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Summerlin Village 22 Parcel B Stockpile		Map ID: 137-23-101-002																									
Firm Name: Atkins		Engineer: Molly Anderson, PE																									
Address: 2270 Corporate Circle, Ste 200																											
City: Henderson	State: NV	Zip: 89074																									
Phone Number: (702) 551-0330	Fax Number: (702) 263-7200																										
Property Owner: Howard Hughes Company, LLC																											
Address: 1045 Griffith Peak Drive, Ste 160																											
City: Las Vegas	State: NV	Zip: 89135																									
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 <table style="width: 100%;"> <tr> <td style="width: 10%; text-align: center;">Yes</td> <td style="width: 10%; text-align: center;">No</td> <td></td> </tr> <tr> <td style="text-align: center;"><u> x </u></td> <td style="text-align: center;"><u> </u></td> <td>Design Manual Standard Form 1 with the engineer's seal and signature.</td> </tr> <tr> <td style="text-align: center;"><u> X </u></td> <td style="text-align: center;"><u> </u></td> <td>Design Manual Standard Form 4.</td> </tr> <tr> <td style="text-align: center;"><u> X </u></td> <td style="text-align: center;"><u> </u></td> <td>2 copies of the 24" x 36" Drainage Plan.</td> </tr> <tr> <td style="text-align: center;"><u> </u></td> <td style="text-align: center;"><u> N/A </u></td> <td>A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge.</td> </tr> </table> II. MAPS AND EXHIBITS <table style="width: 100%;"> <tr> <td style="width: 10%; text-align: center;">Yes</td> <td style="width: 10%; text-align: center;">No</td> <td></td> </tr> <tr> <td style="text-align: center;"><u> X </u></td> <td style="text-align: center;"><u> </u></td> <td>A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated.</td> </tr> <tr> <td style="text-align: center;"><u> x </u></td> <td style="text-align: center;"><u> </u></td> <td>A copy of the current CCRFCD Master Plan Update Figure, (F-x), for Flood Control Facilities and Environmental areas with the site delineated.</td> </tr> </table>				Yes	No		<u> x </u>	<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.	Yes	No		<u> X </u>	<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.
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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> </u>	<u>N/A</u>	Street names, grades, widths.
<u> </u>	<u>N/A</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> </u>	<u>N/A</u>	Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.
<u> </u>	<u>N/A</u>	Proposed typical street sections.

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>	Streets with off-set crowns.
<u>X</u>	<u> </u>	Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.
<u>X</u>	<u> </u>	Property lines.
<u> </u>	<u>N/A</u>	Right-of-way lines and widths, existing and proposed.
<u> </u>	<u>N/A</u>	Existing improvements and their elevations.
<u>X</u>	<u> </u>	Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.
<u>X</u>	<u> </u>	Concentration points and drainage flow direction with Q_{100} and V_{100} and D_{100} in streets.
<u>X</u>	<u> </u>	Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
<u> </u>	<u>N/A</u>	Location and cross-section of street capacity calculations.
<u>X</u>	<u> </u>	Cross-sectional detail for channels, including cutoff wall locations.
<u>X</u>	<u> </u>	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.
<u>X</u>	<u> </u>	Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
<u> </u>	<u>N/A</u>	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.
<u> </u>	<u>N/A</u>	Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.
<u> </u>	<u>N/A</u>	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.
<u>X</u>	<u> </u>	Building and/or lot numbers.
<u>X</u>	<u> </u>	Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
<u> </u>	<u>N/A</u>	Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

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

IV. HYDROLOGIC ANALYSIS

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

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
☐	<u>N/A</u>	Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
☐	<u>N/A</u>	Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q_{100} and Q_{10} flows representing the worst case for interior and all perimeter streets. $Q_{100} d \times v \leq 8$. $Q_{10} d \times v \leq 6$ and 12 foot dry lane for rights-of-way ≥ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
☐	<u>N/A</u>	A summary table of interior and exterior street capacity calculations showing the street name, Q_{100} flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
☐	<u>N/A</u>	Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
☐	<u>N/A</u>	Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.
☐	<u>N/A</u>	Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, whichever is greater.
☐	<u>N/A</u>	A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. • Field survey data. • Input and output information. • Plotted cross-sections based on survey with proper encroachments. • A map showing the location of the cross-sections. • Analysis of both sub and super-critical flow segments. • A summary table and a discussion of the results in the text of the report.
☐	<u>N/A</u>	Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
☐	<u>N/A</u>	Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.
☒	☐	The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.
☐	<u>N/A</u>	Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:

STANDARD FORM 2

Engineer's Certification

Atkins certifies that the information contained herein has been prepared in accordance with generally accepted engineering principles and practices, and to the best of our knowledge, is true and correct.

This letter certifies that all items in the **Technical Drainage Study for Summerlin West Village 22 Parcel B Stockpile** electronic submittal matches the paper version bound into the study.

Molly M. Anderson, PE (NV #24365)
Senior Engineer

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Executive Summary

This Technical Drainage Study (TDS), prepared on behalf of Howard Hughes Company, LLC represents the hydrologic and hydraulic analysis for the Parcel B Stockpile of the Summerlin West Village 22 development. Summerlin West Village 22 is located in the northwest Las Vegas Valley, west of the CC-215 beltway and is bounded by Lake Mead Boulevard and Summerlin Parkway. A vicinity map is provided in Figure 1. The Parcel B Stockpile is located north of the future Fleet Wing Avenue (Street G) alignment between future Kettle Bend Road and CC-215 and is shown on the location map on Figure 2.

A Master Conceptual Drainage Study (MCDS) for Summerlin West Village 22 (W.O. 7861-3A) was approved November 28, 2018. Addendum #2 to Update #1 of the MCDS was approved May 29, 2019. Portions of the TDS, such as parcel names, rainfall depths, and facility locations are directly referenced from the MCDS and the relevant information is included in Appendix A.



1. Introduction

1.1. Study Overview and Purpose

The Howard Hughes Company, LLC is proposing to construct a temporary stockpile within Summerlin Village 22 Parcel B. The proposed stockpile is approximately 150-feet by 690-feet, with a maximum height of 8-feet. This Technical Drainage Study for Summerlin West Village 22 Parcel B Stockpile serves to accompany the grading plans and to provide a detailed hydrologic and hydraulic analysis for the proposed stockpile site. The methodology presented in this study is in accordance with the criteria set forth in the Clark County Regional Flood Control District (CCRFCD) Hydrologic Criteria and Drainage Design Manual (HCDDM) (hereinafter referred to as the Manual).

1.2. Location

The site is located within a portion of Section 23, Township 20, Range 59, M.D.M., Clark County, Nevada. The project lies within Village 22 of the Summerlin West Planning Area (SWPA) Lot 2 per Parcel Map Fil 123, Page 36. Refer to Figure 1: Vicinity Map.

1.3. Description

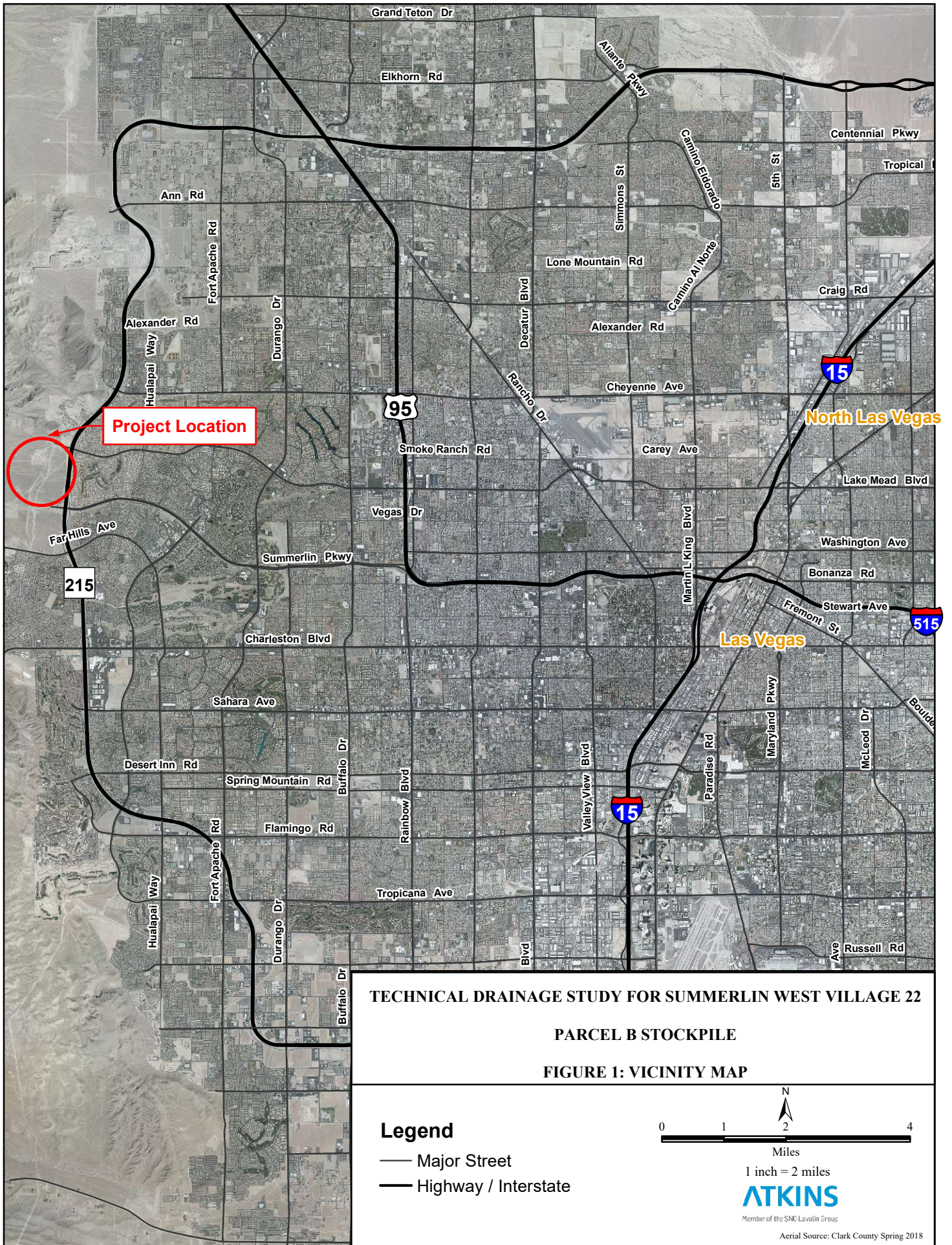
The existing site slopes from the west to the east at approximately 7%. The site and its surroundings are currently undeveloped land, bounded on the east by the existing Bruce Woodbury Beltway (CC-215) and the Western Beltway Channel.

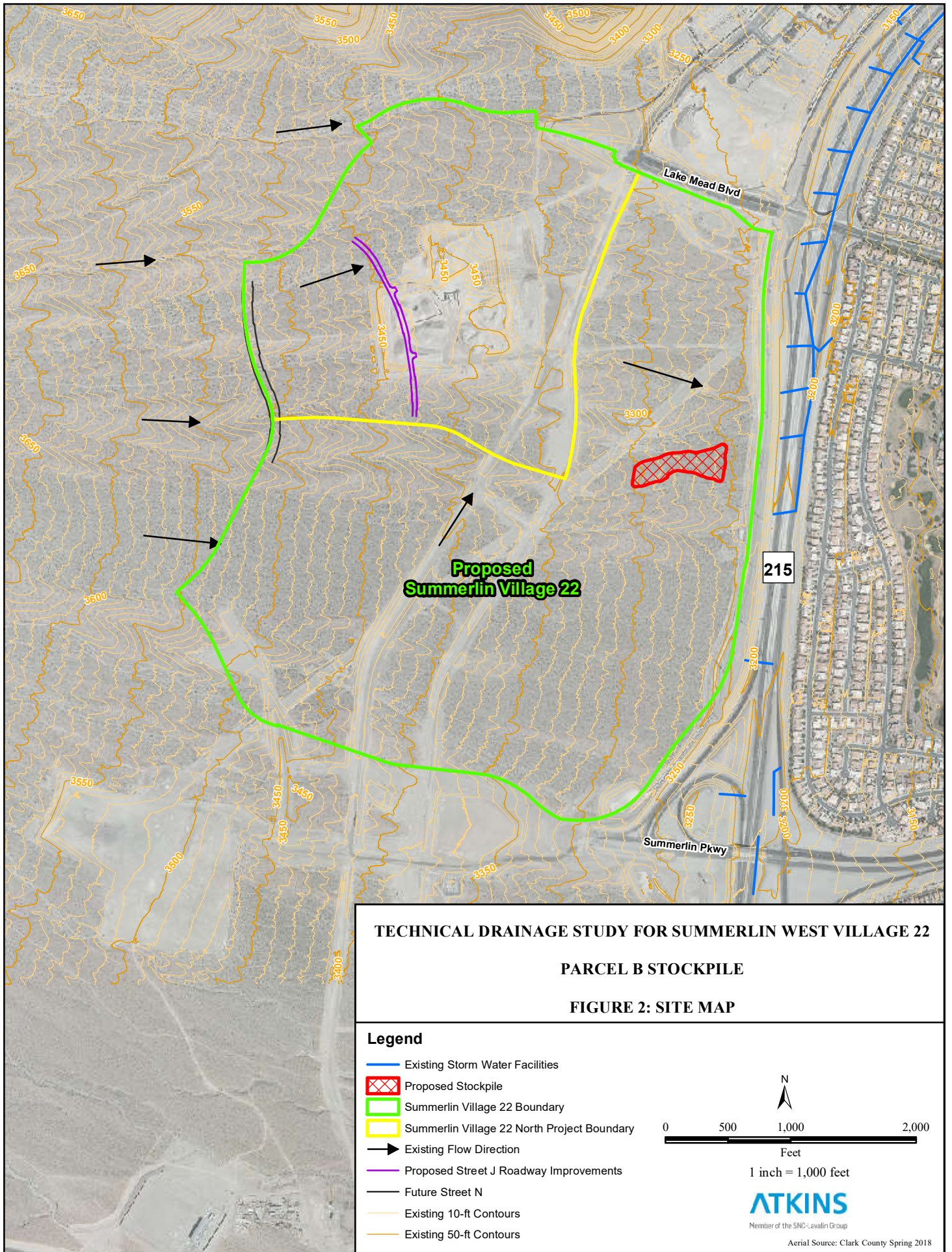
1.4. Floodplain Information

The site is within Village 22, depicted on the referenced Flood Insurance Rate Map (FIRM) Community Panel Number 32003C2150E, dated September 27, 2002. The site is located within an Un-shaded Zone X. Un-shaded Zone X is defined as an area determined to be outside the 0.2% annual chance floodplain. Referenced Figure 3 is provided in Appendix A.

1.5. Master Planning Information

The site is within Village 22, depicted on the referenced Figure 4A: MPU Facilities, Figure F-24 from the CCRFCD Master Plan Update. According to the 2013 CCRFCD MPU, no existing facilities cross the project and no CCRFCD facilities are proposed by this project.





2. Hydrologic Analysis

2.1. Existing Condition

The existing site condition is undeveloped desert land. As established in the Master Conceptual Drainage Study (MCDS), there is one existing downstream storm drain facility that collects runoff from the proposed stockpile. The Western Beltway Channel to the east of the project is fully developed and includes a 20-foot wide concrete channel that conveys flows north to the Village 26 Detention Basin.

In the existing condition, runoff generated by the project and the undeveloped areas west of the project drains east as sheet flow to the Western Beltway Channel. According to the 2002 Conceptual Drainage Study and Western Beltway Study, the existing channel has been designed to accept both the existing and ultimate condition flows from Village 22. The Village 22 site was included in the area previously analyzed in the Western Beltway Channel Study. In addition, the allowable discharge flow rates for the project have been established in the 2017 Summerlin West Planning Area (SWPA) MPU study. Therefore, an additional existing condition hydrologic model was not required as part of this study.

2.2. Interim Condition

The developer is proposing with the City of Las Vegas to stockpile soil between the future Kettle Bend Road alignment and the existing Bruce Woodbury Beltway (CC-215). The maximum stockpile volume is 36,750 cubic yards of stored material. The material will be generated from the construction of the Village 22 infrastructure and associated grading. The intent of the stockpile is to be temporary and will be removed as the surrounding area is fully developed. Upon approval of this Drainage Study, a Stockpile Permit application will be submitted to the City of Las Vegas Department of Building & Safety. A dust mitigation plan will be in place before the Stockpile Permit is issued.

Atkins has reviewed the stockpile location and its influence on the drainage patterns depicted in the MCDS. On the upstream side of Village 22 is the proposed berm from the Technical Drainage Study for Kettle Ridge Drive (Street J): Fleet Wing Avenue (Street G) to Lake Mead Boulevard and Scurry Bend Drive (Street N) Rough Grade: Fleet Wing Avenue (Street G) to Lake Mead Boulevard. The berm at Scurry Bend Drive will cut off upstream flow for Parcels E, F, and Kettle Ridge Drive in the interim condition. The flow discharges within the proposed and existing ditch to the east to the existing Western Beltway Channel. The proposed berm and storm drain in Kettle Ridge Drive will cut off upstream flow for Parcels G, H, J, and K. The Kettle Ridge Drive storm drain flows south and will discharge to the diversion ditch for the Scurry Bend Drive flow. The diversion ditch discharges south of the proposed stockpile. The berm and diversion ditch will remain in place until upstream infrastructure improvements are in place. The placement of the stockpile will not interfere with the flows from the diversion ditch. Runoff from the stockpile itself will enter the Western Beltway Channel similar to the existing condition in the approved MCDS. Figure 3 shows the location of the stockpile in relation to the hydrologic basins and proposed major grading. The Stockpile Plan is included in Appendix D.

The proposed street improvements referred to in this study and on the plans as a different name than in the Master Conceptual Drainage Study. The MCDS referred to the roadways by a letter. Now that the roadways have been named, the plans and report refer to the roadways by name. Table 3 in Section 2.7.1 compares the roadway names to their letter name in the MCDS.

The proposed Kettle Ridge Drive improvements will be constructed prior to the adjacent onsite parcels and roadways. As a result, an interim condition exists for the proposed improvements. Refer to Figure 3.

The proposed street improvements and interim grading have been designed to ensure that the existing drainage patterns are maintained in the interim condition and none of the existing downstream facilities are adversely affected by the proposed improvements. The location of the stockpile does not alter any significant drainage patterns in the proposed interim condition from the Technical Drainage Study for

(Street N) Rough Grade Fleet Wing Avenue (Street G) to Lake Mead Boulevard or the Technical Drainage Study for Desert Foothills Drive - Fleet Wing Avenue (Street G) to Lake Mead Boulevard. The results and conclusions of the TDS are still valid and remain unchanged with the addition of the stockpile material. The stockpile is temporary and will be removed in the ultimate condition. The ultimate condition will be addressed in a future TDS unrelated to the Parcel B Stockpile.

The interim subbasins were modeled using HEC-1 in the Technical Drainage Study for Kettle Ridge Drive (Street J) Fleet Wing Avenue (Street G) to Lake Mead Boulevard Scurry Bend Drive (Street N) Rough Grade Fleet Wing Avenue (Street G) to Lake Mead Boulevard. The results are summarized in Table 1 and on Figure 3. Flows from the area between Kettle Ridge Drive (Street J) and Desert Foothills Drive are routed to the north and will not impact the stockpile site.

Table 1 – Interim Condition HEC-1 Model Results

HEC-1 Node	Tributary Area (sq mi)	Tributary Area (ac)	100-year Flow (cfs)	10-year Flow (cfs)
3-0*	0.08050	51.52	189	100
DI-DIV	0.08417	53.87	84	69
<i>CP1</i>	<i>0.16467</i>	<i>105.39</i>	<i>269</i>	<i>163</i>
INT-J1	0.01270	8.13	25	11
StrJ-1E	0.00093	0.59	3	1
StrJ-1W	0.00109	0.70	3	2
<i>CP2</i>	<i>0.17937</i>	<i>114.80</i>	<i>299</i>	<i>175</i>
INT-J2	0.02073	13.27	40	18
StrJ-2E	0.00071	0.46	2	1
StrJ-2W	0.00093	0.59	3	1
<i>CP3</i>	<i>0.20174</i>	<i>129.11</i>	<i>343</i>	<i>194</i>
INT-J3	0.02834	18.13	55	24
StrJ-3E	0.00062	0.39	2	1
StrJ-3W	0.00082	0.53	2	1
<i>CP4</i>	<i>0.23151</i>	<i>148.17</i>	<i>402</i>	<i>218</i>
INT-N	0.18774	120.15	270	104
<i>CP5</i>	<i>0.41925</i>	<i>268.32</i>	<i>650</i>	<i>322</i>
INT-SPS	0.03343	21.40	62	28
<i>CPS</i>	<i>0.45268</i>	<i>289.72</i>	<i>711</i>	<i>350</i>
INT-SPN	0.00490	3.14	9	4

2.3. Ultimate Condition

The ultimate condition flows were directly referenced from the approved MCDS as shown in the HEC-1 output and hydrology figure in Appendix A.

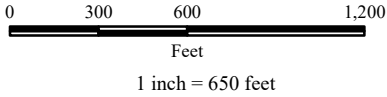
TECHNICAL DRAINAGE STUDY FOR SUMMERLIN WEST VILLAGE 22

PARCEL B STOCKPILE

FIGURE 3: HYDROLOGY WORKMAP

Legend

- subbasin
- stockpile
- DFD_InterimStreetFlowArrows
- J Flowline
- Interim Flow Direction
- Proposed Storm Drain
- Future Lake Mead Boulevard Storm Drain
- Interim Condition Combination Points
- DFD Interim Subbasins
- Interim Condition Subbasins
- Future Street N
- Existing Storm Water Facilities
- Ultimate Condition Parcels
- 50-ft Contours
- 10-ft Contours



*Per the Master Conceptual Drainage Study (MCDS) for Summerlin West Village 22 (W.O. 7861-3A) dated April 4, 2019 in Appendix A

Aerial Source: Clark County Spring 2018

Interim Condition				
HEC-1 Node	Tributary Area (sq mi)	Tributary Area (acres)	100-Year Discharge (cfs)	10-Year Discharge (cfs)
3-0*	0.08050	51.52	189	100
DI-DIV	0.08417	53.87	84	69
CP1	0.16467	105.39	269	163
INT-J1	0.01270	8.13	25	11
StrJ-1E	0.00093	0.59	3	1
StrJ-1W	0.00109	0.70	3	2
CP2	0.17937	114.80	299	175
INT-J2	0.02073	13.27	40	18
StrJ-2E	0.00071	0.46	2	1
StrJ-2W	0.00093	0.59	3	1
CP3	0.20174	129.11	343	194
INT-J3	0.02834	18.13	55	24
StrJ-3E	0.00062	0.39	2	1
StrJ-3W	0.00082	0.53	2	1
CP4	0.23151	148.17	402	218
INT-N	0.18774	120.15	270	104
CP5	0.41925	268.32	650	322

*Referenced from Addendum #1 to Update #1 for the MCDS for Summerlin West Village 22

Ultimate Condition (Referenced from V22 MCDS)		
HEC-1 Node	Tributary Area (acres)	100-Year Discharge (cfs)
3-0*	51.52	189
OFF-COS2	19.16	53
CP1	70.68	242
E	13.96	58
CP2	84.64	300
STREET J	3.76	17
CP3	88.40	317
NP-2	1.53	6
F	14.05	59
CP4	103.98	382

3. Hydraulic Analysis

3.1. Normal Depth Calculations

The computer program Bentley FlowMaster V8i was utilized to perform normal depth calculations for the proposed stockpile. These normal depth calculations were utilized to ensure that the proposed stockpile is adequately designed above the adjacent existing washes.

Two cross-sections were analyzed. The cross-section locations were specified based on the flow patterns and utilized the worst-case slope or wash width when applicable for the calculations.

Table 2 summarizes the normal depth calculations for the 100-year storm event. Print-outs of all normal depth calculations for the interim condition are provided in Appendix C. Cross section locations and calculation summaries are shown on Figure 3.

Table 2 – Normal Depth Calculations

ID	Total Flow (cfs)	Discharge Source	Slope (%)	Flow Depth (ft)	Velocity (ft/s)
Wash North	9	INT-SPN	7.84	0.41	4.11
Wash South	711	CPS	5.71	1.92	9.92

3.2. Differences between Village 22 MCDS and Proposed TDS

3.2.1. Road Names

Roadways in the Village 22 MCDS are represented by a letter or have been re-named. On the proposed improvement plans and in the report, the roadways are referenced by their proposed name. Table 3 compares the proposed name in the TDS to the MCDS letter.

Table 3 – Village 22 MCDS and TDS Roadway Names

MCDS Street Name	TDS Street Name
Street E	Flight Range Avenue
Street EE	Flight Edge Way
Street F	Kindle Rise Way
Street FF	Hive Bluff Lane
Street G	Fleet Wing Avenue
Street H	Clowder Pass Way
Street I	Kestrel Creek Avenue
Street J	Kettle Ridge Drive
Street L	Bask Ridge Drive
Street N	Scurry Bend Drive
Summerlin Parkway WB/Street Q	Sunset Run Drive
Carriage Hill Drive	Kettle Bend Road

Appendices



Appendix A.

Summerlin West Village 22 Master Conceptual Drainage Study Reference

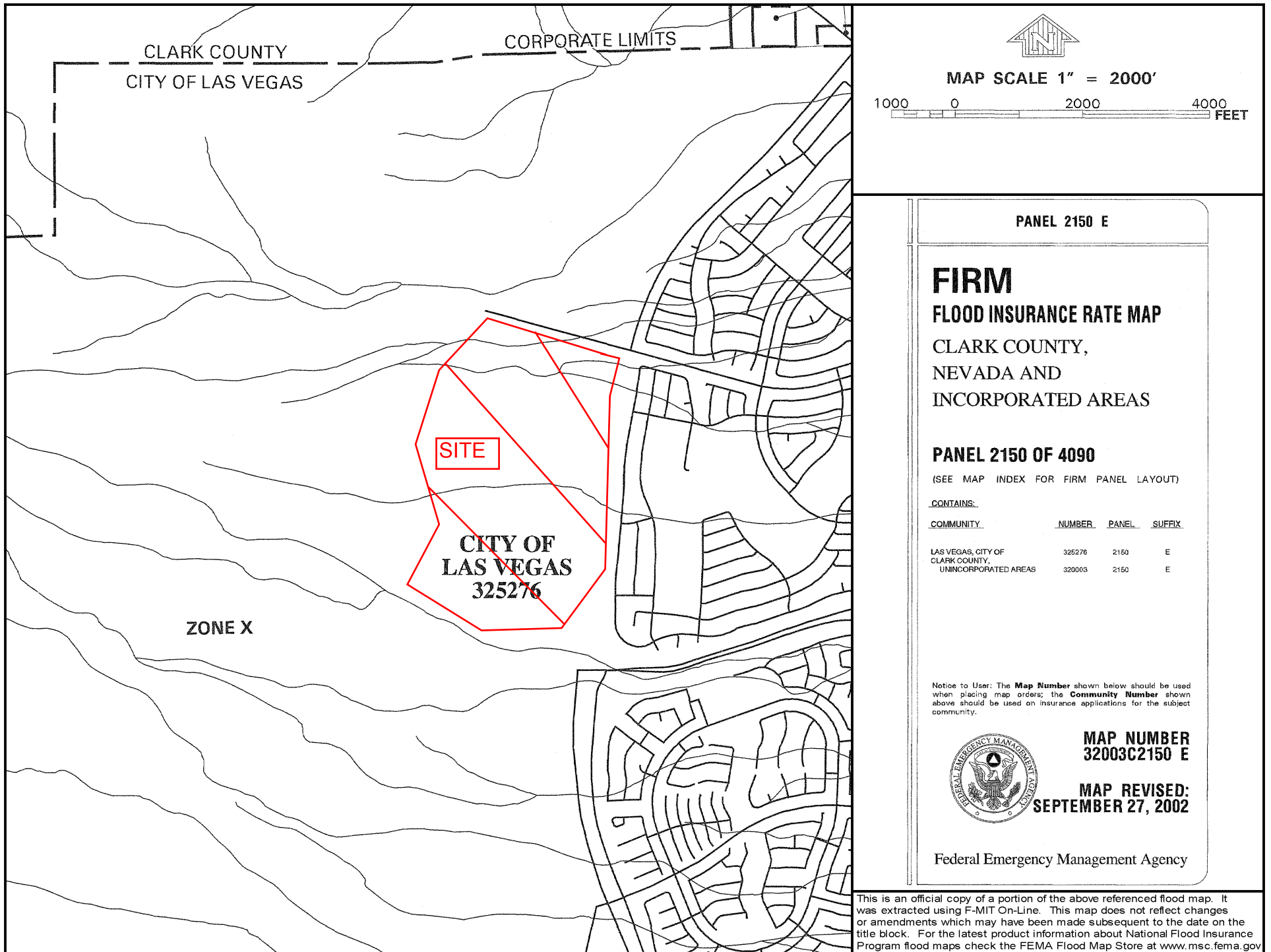


FIGURE 3

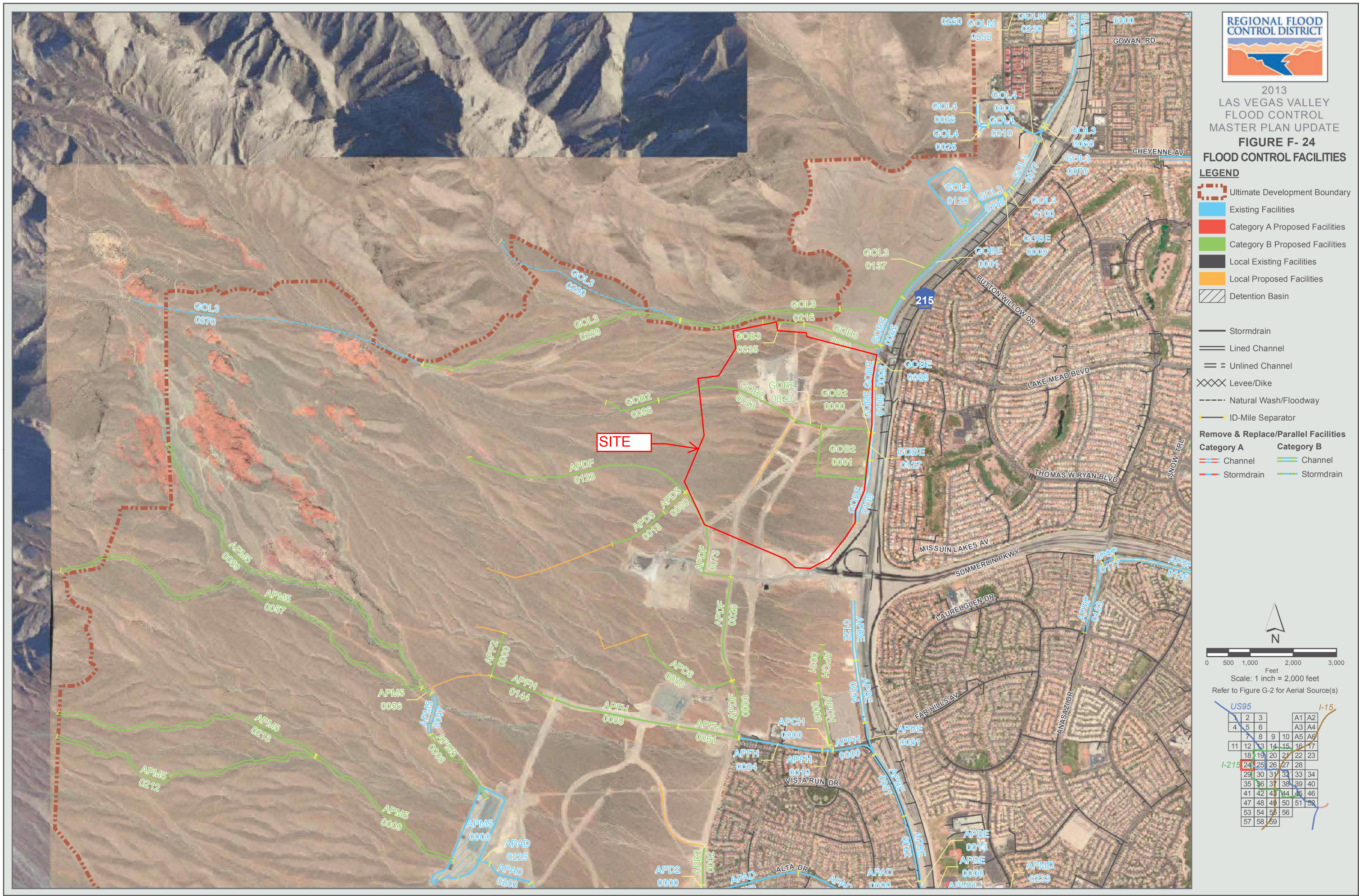


FIGURE 4A - MPU Facilities

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
APAD		ANGEL PARK - ALTA DRIVE BRANCH						
0044	E	11' X 8' RCAP	1565	3140	CSWAA-3	ALLGOW4	8.26	4.24
0073	E	11' X 8' RCAP	2220	2917	CSWAA-2	ALLGOW3	7.68	3.50
0146	E	10' X 8' RCB	3010	2220	CSWAA-1	ALLGOW3	6.98	4.40
0203	E	2: 7' X 5.5' RCB	1136	2220	CSWAA-1	ALLGOW3	6.98	5.28
0225	E	2: 7' X 5.5' RCB Outlet	360	2149	SUMSDB	ALLGOW3	6.74	3.40
APBE		ANGEL PARK - BELTWAY BRANCH						
0013	E	3: 12' X 8' RCB	489	4060	CSWFH-9	ALLGOW3	2.65	6.50
0022	E	Conc Chnl 20"W 7'D 2:1 SS	1556	4060	CSWFH-9	ALLGOW3	2.65	1.81
0051	E	Conc Chnl 20"W 7'D 2:1 SS	1583	4060	CSWFH-9	ALLGOW3	2.65	2.77
0081	E	8' X 8' RCBC @ Far Hills	777	423	SWFH-9	ALLGOW3	0.17	2.32
0094	E	Conc Chnl 10"W 5'D 2:1 SS	1465	423	SWFH-9	ALLGOW3	0.17	1.88
0122	E	Conc Chnl 10"W 4'D 2:1 SS	1409	423	SWFH-9	ALLGOW3	0.17	0.80
APCH		ANGEL PARK - CARRIAGE HILL BRANCH						
0000	E	8' X 6' RCB	152	585	SWFH-8	ALLGOW3	0.29	0.87
0003	P0	8' X 7' RCB	1461	585	SWFH-8	ALLGOW3	0.29	2.39
0031	P0	8' X 5' RCB	896	585	SWFH-8	ALLGOW3	0.29	0.60
APD2		ANGEL PARK - DESERT FOOTHILLS 2 BRANCH						
0002	P0	7' X 7' RCB	964	948	SWAA-2	ALLGOW3	0.70	2.00
APD5		ANGEL PARK - DESERT FOOTHILLS 5 BRANCH						
0000	P0	8' X 6' RCB	685	1701	CSWFH-2	ALLGOW3	1.09	1.89
0013	P0	72" RCP	1436	1701	CSWFH-2	ALLGOW3	1.09	4.18
APD6		ANGEL PARK - DESERT FOOTHILLS 6 BRANCH						
0000	P0	6' X 6' RCB	2604	1076	CSWFH-6	ALLGOW3	0.56	6.15
APDF		ANGEL PARK - DESERT FOOTHILLS BRANCH						
0000	P0	12' X 10' RCB	1356	2897	CSWFH-7	ALLGOW3	1.81	2.20
0026	P0	12' X 10' RCB	2463	1962	CSWFH-3	ALLGOW3	1.25	1.62
0073	P0	10' X 8' RCB	2679	1962	CSWFH-3	ALLGOW3	1.25	4.10
0123	P0	6' X 5' RCB	5355	1701	CSWFH-2	ALLGOW3	1.09	6.53
APF2		ANGEL PARK - FAR HILLS 2 BRANCH						
0000	P0	8' X 6' RCB	1046	669	CSWFH-5	ALLGOW3	0.38	1.00
APFH		ANGEL PARK - FAR HILLS BRANCH						
0000	E	2: 8' X 8' RCB	995	3862	CSWFH-8	ALLGOW3	2.48	3.50
0019	E	2: 8' X 8' RCB	250	3392	CCSWFH-7	ALLGOW3	2.18	4.19
0024	E	16' X 8' RCAP	1943	3392	CCSWFH-7	ALLGOW3	2.18	5.10
0061	P0	8' X 6' RCB	1492	669	CSWFH-5	ALLGOW3	0.38	2.00
0089	P0	8' X 6' RCB	2902	669	CSWFH-5	ALLGOW3	0.38	2.00
0144	P0	7' X 6' RCB	1556	669	CSWFH-5	ALLGOW3	0.38	5.50
APM5		ANGEL PARK - MIDDLE 5 BRANCH						
0000	E	384 ac-ft Detention Basin #5		7001	SUM5IN	ALLGOW3	6.74	
0001	E	12,153 cfs PMF Spillway		12153	SUM5IN	ALLGOW3	6.74	
0008	P0	Conc Chnl 50"W 4.5'D 2:1 SS	2102	3725	CDB54-6R	ALLGOW3	4.30	5.20
0009	P0	Conc Chnl 50"W 4.5'D 2:1 SS	4180	3624	CDB55-8	ALLGOW3	2.45	5.80
0047	E	Diversion Berm with Gabion Bank Protection	1000	3725	CDB54-6R	ALLGOW3	4.30	1.30
0056	P0	Conc Chnl 80"W 4'D 2:1 SS	264	3725	CDB54-6R	ALLGOW3	4.30	1.30
0057	P0	Conc Chnl 50"W 3'D 2:1 SS	9922	1821	CDB54-4	ALLGOW3	1.01	6.80
0059	P0	Conc Chnl 100"W 3'D 2:1 SS	8923	2358	CDB54-5	ALLGOW3	2.45	7.00
0212	P0	Conc Chnl 30"W 3.5'D 2:1 SS	6695	1238	CDB55-2	ALLGOW3	0.74	7.50
0213	P0	Conc Chnl 50"W 2.5'D 2:1 SS	6522	1125	CDB55-5	ALLGOW3	0.62	7.30
APSP		ANGEL PARK - SUMMERLIN PARKWAY						
0135	E	Conc Chnl 10"W 6'D 2:1 SS	2030	1173	C8B-1	ALLGOW3	1.14	2.40
0177	E	9' X 8' RCBC @ Anasazi	330	867	C11B-1	ALLGOW3	0.84	1.70
0183	E	Conc Chnl 10"W 6'D 2:1 SS	1680	867	C11B-1	ALLGOW3	0.84	1.70
GO02		GOWAN SOUTH FACILITIES (CHEYENNE CHANNEL)						
0257	E	Conc Chnl 10"W 6.75'D 1.5:1 SS	4293	2577	CCJ-C	ALLGOW3	2.97	4.10
GOB2		GOWAN LONE MOUNTAIN SYST. 2 BELTWAY						
0000	P0	36" RCP Outlet	118	75	DET22	ALLGOW3	0.76	6.76
0001	P0	123 ac-ft Village 22 Detention Basin		1344	CSV22-DB	ALLGOW3	0.76	
0020	P0	8' X 7' RCB	657	1247	SV22-2	ALLGOW3	0.70	8.30
0033	P0	8' X 6' RCB	3359	1247	SV22-2	ALLGOW3	0.70	6.90
0096	P0	6' X 5' RCB	1332	1247	SV22-2	ALLGOW3	0.70	6.00

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
GOB3		GOWAN LONE MOUNTAIN SYST. 3 BELTWAY						
0000	P0	66" RCP	1877	530	SV22-3	ALLGOW3	0.28	6.60
0035	P0	54" RCP	965	530	SV22-3	ALLGOW3	0.28	6.40
GOBE		GOWAN LONE MOUNTAIN SYST. BELTWAY						
0000	E	20' X 10' RCBC @ Access Rd	30	958	CSV22-3	GW3SC	0.28	5.67
0001	E	Conc Chnl 20"W 5'D 2:1 SS	3355	958	CSV22-3	GW3SC	0.28	6.50
0065	E	Conc Chnl 20"W 6'D 2:1 SS	1220	958	CSV22-3	GW3SC	0.28	1.90
0088	E	2: 10'X9' RCBC @ Lake Mead	400	471	CDET22	ALLGOW3	0.96	0.50
0096	E	Conc Chnl 20"W 9'D 2:1 SS	627	471	CDET22	ALLGOW3	0.96	0.50
0108	E	Conc Chnl 20"W 6'D 2:1 SS	1021	471	CDET22	ALLGOW3	0.96	0.50
0127	E	Conc Chnl 20"W 6'D 2:1 SS	638	442	SV22-1	ALLGOW3	0.20	0.50
0139	E	Conc Chnl 10"W 5.5'D 2:1 SS	1500	442	SV22-1	ALLGOW3	0.20	1.02
GOL3		GOWAN LONE MOUNTAIN SYSTEM-BRANCH 3						
0010	E	Conc Chnl 20"W 10'D 0:1 SS	3037	2946	CRCLMT1R	GW3SC	2.61	2.78
0068	E	Transition Structure	100	2946	CRCLMT1R	GW3SC	2.61	3.50
0070	E	20' X 6' RCBC @ Cliff Shadows	350	1162	CRCSV223	ALLGOW3	5.68	2.44
0077	E	Conc Chnl 20"W 6'D 0:1 SS	1229	1162	CRCSV223	ALLGOW3	5.68	6.11
0100	E	Conc Chnl 20"W 10'D 0:1 SS	200	1162	CRCSV223	ALLGOW3	5.68	5.67
0115	E	66" RCP Outlet	670	679	DET26	ALLGOW3	4.43	
0128	E	333 ac-ft Village 26 Detention Basin		3767	VIL26IN	ALLGOW3	4.43	
0137	P0	14' X 14' RCB	4335	3767	VIL26IN	ALLGOW3	4.43	0.50
0216	P0	Conc Chnl 50"W 4.5'D 2:1 SS	3761	3693	CSV26-1	ALLGOW3	4.15	6.08
0289	P0	Conc Chnl 50"W 3.5'D 2:1 SS	6215	2396	30	ALLGOW3	2.51	7.95
0290	E	Natural Wash 363"W	4850	1465	SV26-1	ALLGOW3	1.64	22.50
0370	E	Natural Wash 450"W	7000	2396	30	ALLGOW3	2.51	8.50
GOL4		GOWAN LONE MOUNTAIN SYSTEM-BRANCH 4						
0000	E	14' X 8' RCB	554	2257	CLMT1R	ALLGOW3	2.33	2.50
0010	E	2: 9' X 8' RCB	820	2257	CLMT1R	ALLGOW3	2.33	4.74
0025	E	Soil Cement Chnl 60"W 8'D 3-4:1 SS	320	2257	CLMT1R	ALLGOW3	2.33	2.00
0026	E	Soil Cement Chnl 42"W 6'D 3-4:1 SS	700	2257	CLMT1R	ALLGOW3	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).



2013 LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FACILITY INVENTORY
FIGURE F - 24

L E G E N D	ID (Facility Identifier)	AAB	Existing Facility.....E		Construction Features			
	Parent Stream Name		Proposed or Modified Facility.....P		Bottom Width.....W	Cast in Place Concrete Pipe.....	CIPCP	Reinforced Concrete Arch Culvert.....RCAC
	Stream Name		Contingency Level		Depth.....D	Corrugated Metal Arch Pipe Culvert.....	CMAP	Reinforced Concrete Box.....RCB
	River Mile	0000	Category B.....P0		Side Slope, H:V.....SS	Corrugated Metal Pipe Culvert.....	CMPC	Reinforced Concrete Box Culvert.....RCBC
	Distance Above Confluence with Parent Stream (Miles)		Master Plan.....P1			High Density Polyethylene.....	HDPE	Reinforced Concrete Pipe.....RCP
	Miles in Hundredths		Preliminary Design.....P2			Horizontal Elliptical Reinforced Concrete Pipe.....	HERCP	Reinforced Concrete Pipe Culvert.....RCPC
			Design.....P3			Reinforced Concrete Arch Pipe.....	RCAP	Storm Sewer Pipe.....SSP

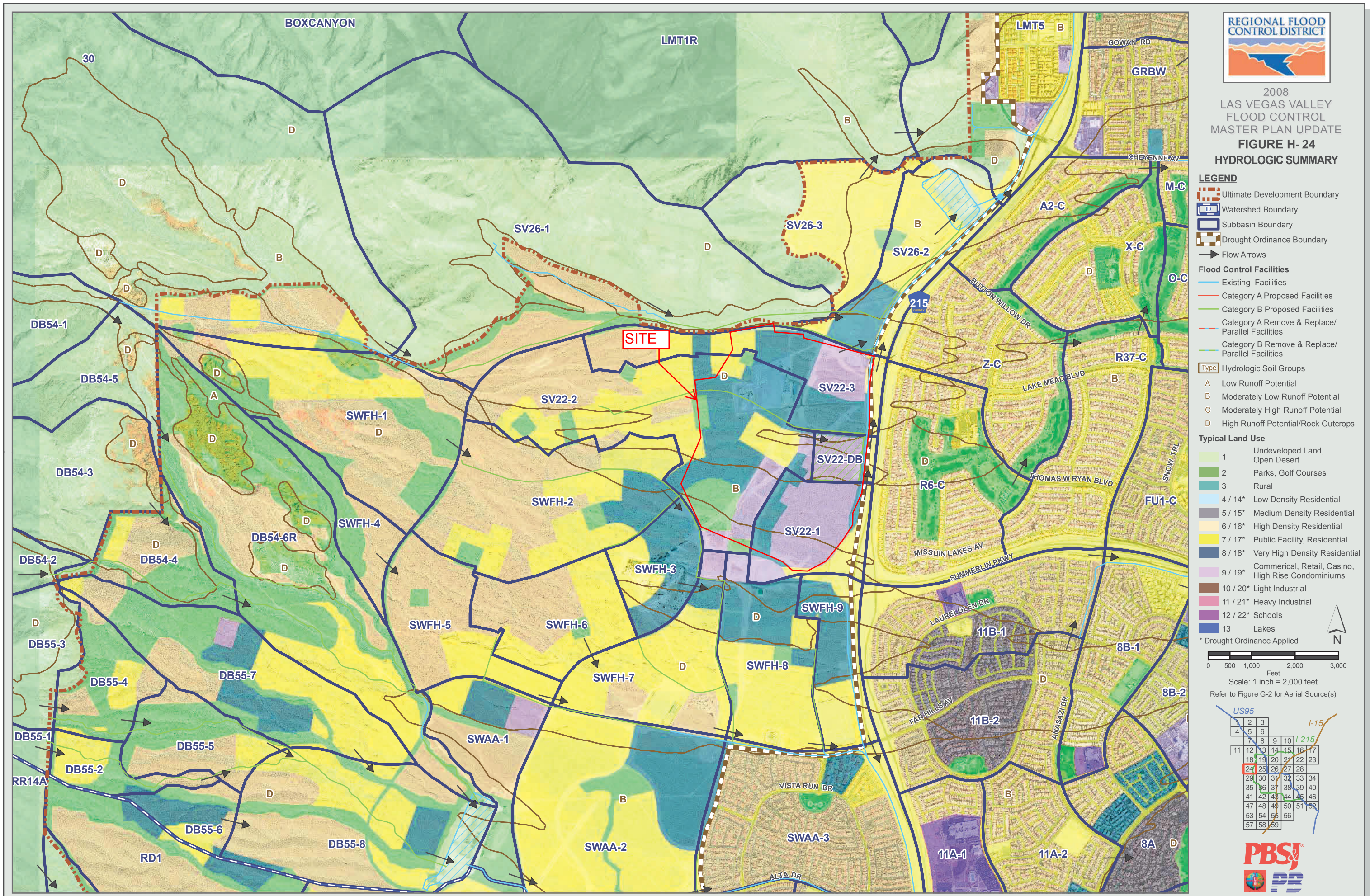
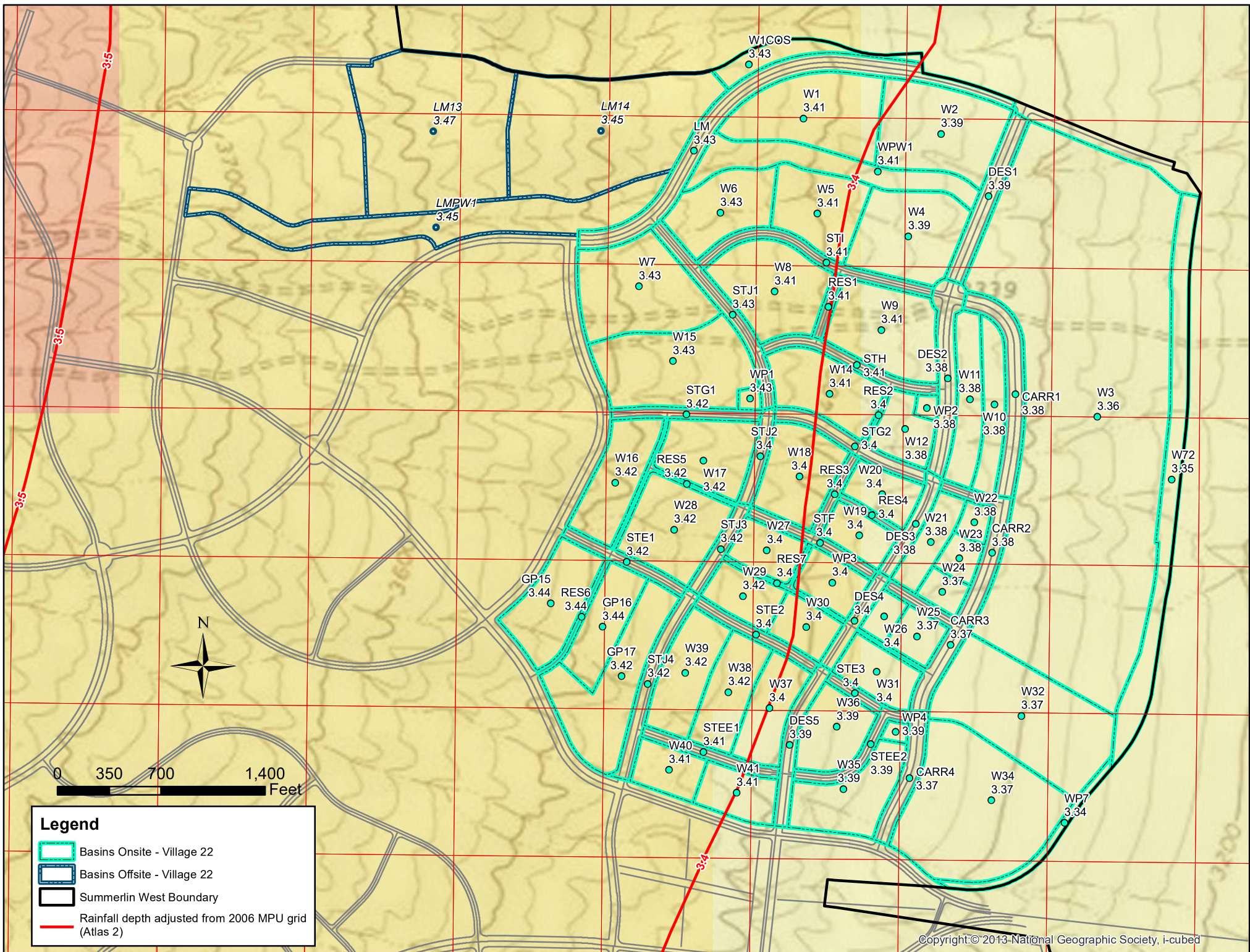


FIGURE 4B - MPU HYDROLOGIC SUMMARY



DRAWN BY: AH
AUGUST 2018

DESIGNED BY: JVA

CHECKED BY: JVA

PROJECT NO.: 178/1

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

ULTIMATE CONDITION BASIN MAP

FIGURE 6

SUMMERLIN WEST VILLAGE 22

THE HOWARD HUGHES CORPORATION

10801 WEST CHARLESTON BLVD, 3RD FLOOR
LAS VEGAS, NEVADA 89135

CONSULTING ENGINEERS ● PLANNERS ● LAND SURVEYORS
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LAS VEGAS, NEVADA 89146-5148

REV

DATE

BY

REVISION

DRAWING NO.

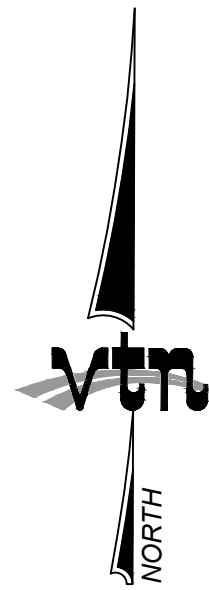
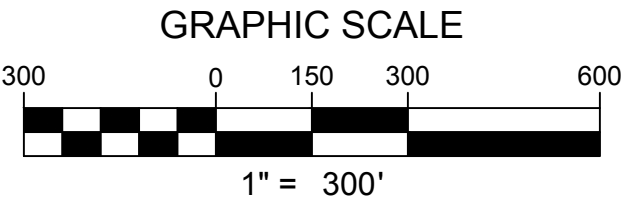
SHEETS

OF

SHEET



ULTIMATE CONDITION HEC-1 SUMMARY TABLE					
BASIN ID	AREA (ac)	Q100 (CFS)	BASIN ID	AREA (ac)	Q100 (CFS)
LW	9.16	41	STL1	3.76	17
D	11.27	47	CSTL1	-	317
DES1	3.76	14	NP-2	1.53	6
CDES1	62	62	ES-1	14.05	59
COS2	10.17	32	DES-1	52.68	209
COS2-2	83	83	OFF4	0.09	35
CA	16.92	66	L	1.78	8
CPI	-	201	STL1	-	43
STI	2.46	11	CSTL1	1.77	8
C	11.68	50	STG1	-	260
CSTI	-	61	M	11.24	48
G	7.08	30	STL2	3.10	13
CG	-	91	S	3.01	11
H	7.65	33	STF	1.83	8
CH	-	124	NP-3	3.61	9
STH	2.29	10	U	3.49	11
J	5.8	25	DES4	1.72	8
CJ	-	35	CDES4	-	19
K	5.17	22	V	3.85	14
CK	-	58	W	3.97	15
NP-1	0.49	2	CWL	-	29
CNP-1	-	59	CARR3	2.95	13
DES2	3.40	15	STE3	1.11	5
CDES2	-	74	EE	6.65	24
CP2	-	198	STEE3	1.49	7
CARR1	6.68	29	HH	4.60	19
I	10.56	38	CARR4	3.10	13
COARR1	-	265	OFF5	12.73	53
N	6.67	28	STE1	1.72	8
STFF	1.08	5	Y	8.07	31
CSTFF	-	33	CY	-	92
STG2	2.83	13	STL2	1.79	8
CSTG2	-	46	CSTL2	-	100
O	3.25	13	Z	7.04	22
P	3.37	13	STL3	2.44	11
COP	-	26	CSTL3	-	33
DES3	1.84	8	STE2	1.78	8
CDES3	-	34	BB	6.18	23
CP3	-	80	TE	4.02	16
Q	3.62	14	CC	3.50	20
R	3.49	15	DD	4.57	16
CCR	-	29	DES5	1.80	8
CARR2	3.58	15	NP-4	0.71	2
COARR2	-	44	AA	4.64	19
CP4	-	389	STL4	1.05	4
II	19.56	77	CSTL4	-	23
X	16.47	56	STEE1	1.45	7
B	87.12	328	CSTEE2	-	30
DC-1	10.84	48	STEE2	2.40	11
COS-3	1.75	4	FF	3.08	13
3-O*	189	8	CFF	-	53
OFF-COS2	19.16	53	GG	3.74	16
COFFCOS2	-	242	DES6	1.11	5
E	13.96	59			



LEGEND

- CCRFGD STORM DRAIN ALIGNMENT
- EXISTING FACILITY
- VILLAGE 22 LOCAL STORM DRAIN
- W51 BASIN DESIGNATION
- CONCENTRATION POINT
- LOCAL FACILITY DESIGNATION
- DEVELOPED CONDITION FLOW ARROW

VILLAGE 22 LOCAL FLOOD PROTECTION FACILITIES									
Facility #	Design Slope %	Q100 cfs	Velocity ft/s	Facility	Facility #	Design Slope %	Q100 cfs	Velocity ft/s	Facility
4	5.4	41	18.69	30" RCP	56	1.5	44	11.54	30" RCP
5	2.0	47	13.16	30" RCP	58	1.5	15	8.93	30" RCP
6	2.7	62	15.58	30" RCP	61	3.1	389	26.21	60" RCP
7	2.0	32	12.11	30" RCP	62	8.0	35	20.39	30" RCP
8	2.9	93	17.93	36" RCP	63	1.5	43	11.50	30" RCP
9	8.0	66	14.44	36" RCP	64	8.0	48	22.29	36" RCP
10	3.0	160	20.54	42" RCP	65	8.2	260	33.90	42" RCP
11	N/A	201	N/A	EX 66" RCP**	66	3.1	11	10.63	30" RCP
12A	8.0	53	22.91	36" RCP	68	1.3	9	7.36	30" RCP
12B	2.6	53	15.05	36" RCP	69	8.0	11	14.88	30" RCP
13	8.0	58	10.63	36" RCP	72	7.0	29	18.72	30" RCP
19	0.5	50	8.01	42" RCP	74	6.3	5	10.83	30" RCP
20	5.8	61	20.97	42" RCP	77A	8.0	53	22.91	36" RCP
21	0.5	30	7.07	36" RCP	77B	7.4	209	31.33	42" RCP
22	9.7	91	28.22	42" RCP	78	8.0	31	20.01	30" RCP
23	0.8	33	8.46	30" RCP	79	8.1	92	26.52	36" RCP
24	10.1	124	31.13	42" RCP	80	3.1	8	9.69	30" RCP
25	1.5	6	6.89	30" RCP	81	8.0	100	27.08	36" RCP
27	2.3	59	14.86	36" RCP	82	2.9	22	12.60	30" RCP
29	0.5	25	6.65	30" RCP	83	3.2	23	13.22	30" RCP
30	7.0	35	19.71	30" RCP	84	0.5	16	6.05	30" RCP
33	0.6	22	6.99	30" RCP	85	2.3	20	11.29	30" RCP
34	5.0	58	19.78	36" RCP	86	8.0	16	16.59	30" RCP
35	1.0	2	4.32	30" RCP	87	8.0	19	17.43	30" RCP
36	1.0	74	11.43	42" RCP	88	7.8	30	19.83	30" RCP
37	0.9	198	13.98	60" RCP	89	8.0	13	15.62	30" RCP
40	7.6	38	20.77	30" RCP	90	7.8	53	22.70	36" RCP
41	0.9	265	13.39	6'x6' RCB	91	0.5	2	3.39	30" RCP
43	0.5	28	6.73	30" RCP	92	2.7	16	11.25	30" RCP
44	3.3	33	14.72	30" RCP	93	7.4	24	18.12	30" RCP
45	6.8	46	20.97	30" RCP	94	6.2	19	15.91	30" RCP
50	7.9	26	18.97	30" RCP	95	4.0	77	19.52	42" RCP
51	2.5	34	13.37	30" RCP	96	5.0	56	23.05	36" RCP
52	7.1	80	24.48	36" RCP	97	5.0	339	30.51	54" RCP
55	7.3	29	19.01	30" RCP	98	N/A	138	N/A	EX 48" RCP***

*Replaces existing 30" RCP stub provided in Lake Mead Study
**Existing 66" RCP per Lake Mead Blvd Study
***Existing Facility (Per Lake Mead Blvd Study) can accept 138 cfs and may be used for flexibility

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

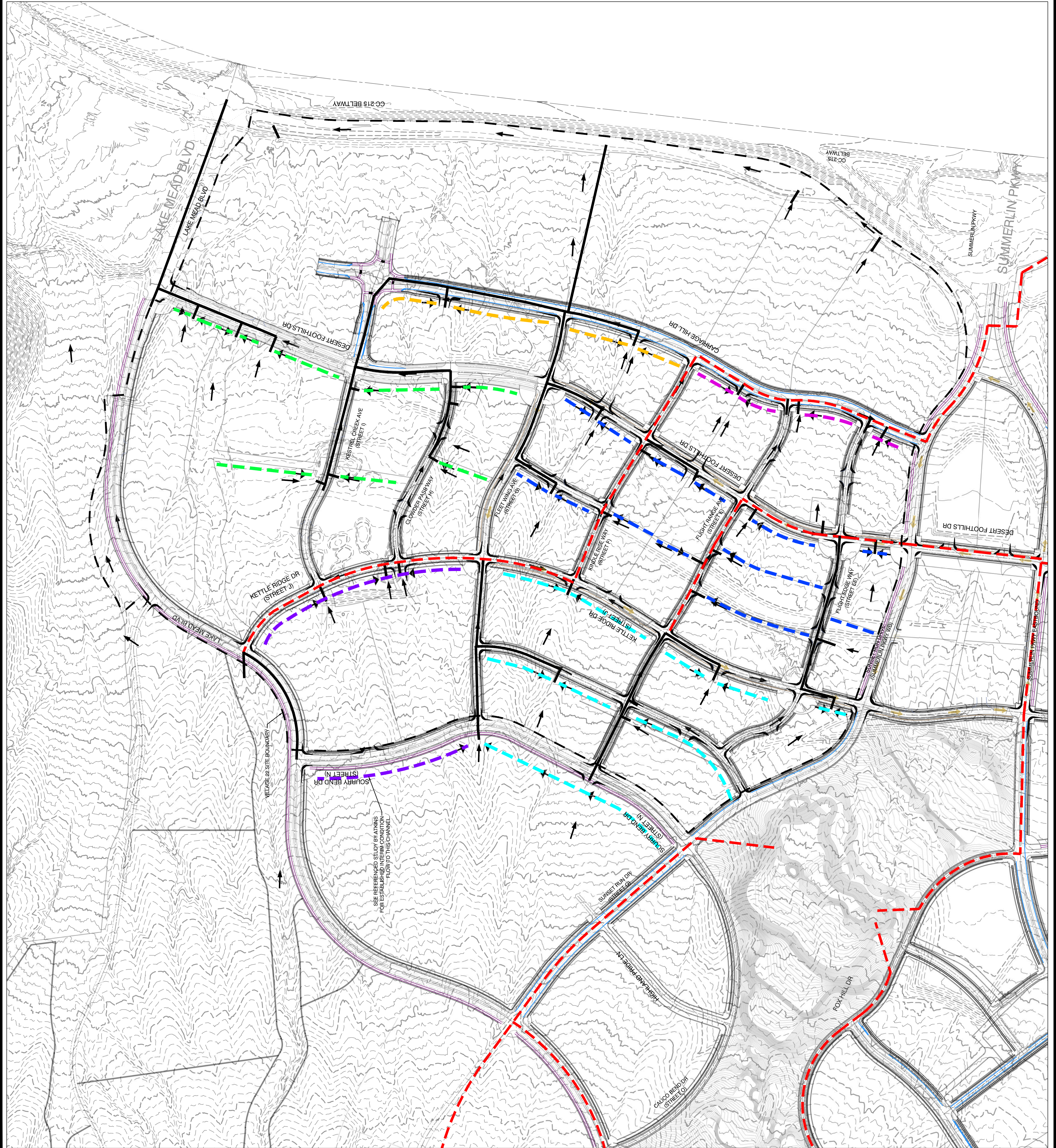
FIGURE 7
LOCAL STORM DRAIN
FACILITIES MAP

SUMMERLIN WEST VILLAGE 22

DRAWN BY: ATM	MAY 2018
DESIGNED BY: STG/TA	MAY 2018
CHECKED BY: JYA	MAY 2018
PROJECT NO: 2801	SCALE: 1"=300' HORIZ. VERT.

SHEET
OF SHEETS
DRAWING NO.

H:\7881 Village 22 Master\Drawings\4_ADD1 TO UP\A_Figures\Figure 7 - Local Flood Control Facilities Map.dwg



PROJECT NO.: 7861

CHECKED BY: JVA

DESIGNED BY: JVA

DRAWN BY: AH

SCALE: 1" = 300' HORIZ. N/A VERT.

AUGUST 2018

SUMMERLIN WEST VILLAGE 22

INTERIM CONDITION DITCH LOCATIONS

FIGURE 8

THE HOWARD HUGHES CORPORATION

10801 WEST CHARLESTON BLVD, 3RD FLOOR

LAS VEGAS, NEVADA 89135

PH: (702) 873-7550 FAX: (702) 362-2597 WEB: WWW.VTNV.COM

CONSULTING ENGINEERS ● PLANNERS ● LAND SURVEYORS

2727 SOUTH RAINBOW BOULEVARD

LAS VEGAS, NEVADA 89146-5148

REV

DATE

BY

REVISION

DRAWING NO.

SHEETS

OF

SHEET


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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 19MAR19 TIME 11:17:59
*
*****

V22.OUT

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

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

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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 = NOVEMBER 1, 2018
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 #1 - 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 0.0143
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 0.050
*

35 KK D
36 BA 0.0176
37 PB 3.39
38 LS 0 95.0
39 UD 0.058
*

40 KK DES1
41 BA .0059
42 PB 3.39
43 LS 0 98.0

```


1 HEC-1 INPUT PAGE 2

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

44 UD 0.100
 *
 45 KK CDES1
 46 KM COMBINE D AND DES1
 47 HC 2
 *
 48 KK COS-2
 49 BA 0.0159
 50 PB 3.41
 51 LS 0 89.0
 52 UD 0.100
 *
 53 KK CCOS-2
 54 KM COMBINE CDES1 AND COS-2
 55 HC 2
 *
 56 KK A
 57 BA 0.0264
 58 PB 3.41
 59 LS 0 95.0
 60 UD 0.078
 *
 61 KK CA
 62 KM COMBINE CCOS-2 AND A
 63 HC 2
 *
 64 KK CP1
 65 KM COMBINE LM AND CA
 66 HC 2
 *
 67 KK STI
 68 KM STREET I
 69 BA 0.0038
 70 PB 3.41
 71 LS 0 98.0
 72 UD 0.050
 *
 73 KK C
 74 BA 0.0183
 75 PB 3.41
 76 LS 0 95.0
 77 UD 0.054
 *

1 HEC-1 INPUT PAGE 3

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

78 KK CSTI
 79 KM COMBINE C AND STI
 80 HC 2
 *
 81 KK G
 82 BA 0.0111
 83 PB 3.41
 84 LS 0 95.0
 85 UD 0.056
 *
 86 KK CG
 87 KM COMBINE CSTI AND CG
 88 HC 2
 *
 89 KK H
 90 BA 0.0120
 91 PB 3.41
 92 LS 0 95.0
 93 UD 0.053
 *
 94 KK CH
 95 KM COMBINE CG AND CH
 96 HC 2
 *

V22.OUT

97 KK STH
 98 KM STREET H
 99 BA 0.0036
 100 PB 3.41
 101 LS 0 98.0
 102 UD 0.057
 *
 103 KK J
 104 BA 0.0091
 105 PB 3.41
 106 LS 0 95.0
 107 UD 0.051
 *
 108 KK CJ
 109 KM COMBINE J AND STH
 110 HC 2
 *

1 HEC-1 INPUT PAGE 4

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

111 KK K
 112 BA 0.0081
 113 PB 3.40
 114 LS 0 95.0
 115 UD 0.050
 *
 116 KK CK
 117 KM COMBINE CJ AND K
 118 HC 2
 *
 119 KK NP-1
 120 BA 0.0008
 121 PB 3.38
 122 LS 0 89.0
 123 UD 0.097
 *
 124 KK CNP-1
 125 KM COMBINE CK AND NP-1
 126 HC 2
 *
 127 KK DES2
 128 BA .0053
 129 PB 3.38
 130 LS 0 98.0
 131 UD 0.058
 *
 132 KK CDES2
 133 KM COMBINE DES2 & CNP-1
 134 HC 2
 *
 135 KK CP2
 136 KM COMBINE CDES2 & CH
 137 HC 2
 *
 138 KK CARR1
 139 BA 0.0104
 140 PB 3.38
 141 LS 0 98.0
 142 UD 0.056
 *
 143 KK I
 144 BA 0.0165
 145 PB 3.38
 146 LS 0 92.0
 147 UD 0.083
 *

1 HEC-1 INPUT PAGE 5

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

148 KK CCARR1
 149 KM COMBINE CP2, I, CARR1
 150 HC 3
 *
 151 KK N

V22.OUT

152	BA	0.0104	
153	PB	3.40	
154	LS	0	95.0
155	UD	0.054	
	*		
156	KK	STFF	
157	BA	0.0017	
158	PB	3.40	
159	LS	0	98.0
160	UD	0.050	
	*		
161	KK	CSTFF	
162	KM	COMBINE N AND STFF	
163	HC	2	
	*		
164	KK	STG2	
165	BA	0.0044	
166	PB	3.40	
167	LS	0	98.0
168	UD	0.050	
	*		
169	KK	CSTG2	
170	KM	COMBINE CSTFF AND STG2	
171	HC	2	
	*		
172	KK	0	
173	BA	0.0051	
174	PB	3.40	
175	LS	0	92.2
176	UD	0.055	
	*		
177	KK	P	
178	BA	0.0053	
179	PB	3.40	
180	LS	0	92.2
181	UD	0.060	
	*		

1 HEC-1 INPUT PAGE 6

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

182	KK	COP	
183	KM	COMBINE P AND O	
184	HC	2	
	*		
185	KK	DES3	
186	BA	0.0029	
187	PB	3.38	
188	LS	0	98.0
189	UD	0.069	
	*		
190	KK	CDES3	
191	KM	COMBINE COP & DES3	
192	HC	2	
	*		
193	KK	CP3	
194	KM	COMBINES CSTG2 & CDES3	
195	HC	2	
	*		
196	KK	Q	
197	BA	0.0057	
198	PB	3.38	
199	LS	0	92.2
200	UD	0.057	
	*		
201	KK	R	
202	BA	0.0055	
203	PB	3.37	
204	LS	0	94.3
205	UD	0.053	
	*		
206	KK	CQR	
207	KM	COMBINE R AND Q	
208	HC	2	
	*		

V22.OUT

209	KK	CARR2		
210	BA	0.0056		
211	PB	3.38		
212	LS	0	98.0	
213	UD	0.075		
	*			
214	KK	CCARR2		
215	KM	COMBINE CQR AND CARR2		
216	HC	2		
	*			

1 HEC-1 INPUT PAGE 7

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

217	KK	CP4		
218	KM	COMBINE CP3, CCARR1, AND CCARR2		
219	HC	3		
	*			
220	KK	II		
221	BA	0.0306		
222	PB	3.37		
223	LS	0	92.7	
224	UD	0.062		
	*			
225	KK	X		
226	BA	0.0257		
227	PB	3.37		
228	LS	0	90.0	
229	UD	0.080		
	*			
230	KK	B		
231	BA	0.1361		
232	PB	3.36		
233	LS	0	93.5	
234	UD	0.077		
	*			
235	KK	DC-1		
236	BA	0.0169		
237	PB	3.35		
238	LS	0	98.0	
239	UD	0.050		
	*			
240	KK	COS-3		
241	BA	0.0027		
242	PB	3.36		
243	LS	0	84.7	
244	UD	0.140		
	*			
245	KK	DUMMY1		
246	KM	REGIONAL FACILITY - BELTWAY CHANNEL NORTH		
247	KM	COMBINE CP1, CP4, II, X, B, DC1, AND COS-3		
248	HC	7		
	*			
249	KK	3-0*		
250	KM	REFERENCED FROM THE OVERALL SWPA MPU		
251	BA	0.0805		
252	PB	3.48		
253	LS	0	94.5	
254	UD	0.103		
	*			

1 HEC-1 INPUT PAGE 8

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

255	KKOFF-COS2			
256	KM	OFFSITE BASIN		
257	BA	.0299		
258	PB	3.45		
259	LS	0	86.0	
260	UD	0.110		
	*			
261	KKCOFFCOS2			
262	KM	COMBINE 3-0 AND OFF-COS2		
263	HC	2		
	*			
264	KK	E		
265	BA	0.0218		

V22.OUT

266	PB	3.43	
267	LS	0	95.0
268	UD	0.062	
	*		
269	KK	STJ1	
270	KM	STREET J1	
271	BA	0.0059	
272	PB	3.43	
273	LS	0	98.0
274	UD	0.050	
	*		
275	KK	CSTJ1	
276	KM	COMBINE OFF-COS2, E, AND STJ1	
277	HC	3	
	*		
278	KK	NP-2	
279	BA	0.0024	
280	PB	3.43	
281	LS	0	89.0
282	UD	0.059	
	*		
283	KK	ES-1	
284	BA	0.0220	
285	PB	3.43	
286	LS	0	95.0
287	UD	0.063	
	*		
288	KK	CES-1	
289	KM	COMBINE CSTJ, NP-2, AND ES-1	
290	HC	3	
	*		

1

HEC-1 INPUT

PAGE 9

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
291	KK OFF4
292	BA 0.0823
293	PB 3.44
294	LS 0 94.8
295	UD 0.077
	*
296	KK L
297	BA 0.0126
298	PB 3.42
299	LS 0 94.6
300	UD 0.050
	*
301	KK STL1
302	BA 0.0028
303	PB 3.42
304	LS 0 98.0
305	UD 0.050
	*
306	KK CSTL1
307	KM COMBINE L AND STL1
308	HC 2
	*
309	KK STG1
310	BA 0.0028
311	PB 3.42
312	LS 0 98.0
313	UD 0.050
	*
314	KK CSTG1
315	KM COMBINE OFF4, CSTL, AND STG1
316	HC 3
	*
317	KK M
318	BA 0.0176
319	PB 3.42
320	LS 0 94.3
321	UD 0.053
	*
322	KK STJ2
323	BA 0.0048
324	PB 3.42

325 LS 0 98.0
 326 UD 0.072
 *

1

HEC-1 INPUT

PAGE 10

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

327 KK DUMMY2
 328 KM REGIONAL FACILITY
 329 HC 4
 *

330 KK S
 331 BA 0.0047
 332 PB 3.40
 333 LS 0 88.3
 334 UD 0.064
 *

335 KK STF
 336 BA 0.0029
 337 PB 3.40
 338 LS 0 98.0
 339 UD 0.050
 *

340 KK NP-3
 341 BA 0.0056
 342 PB 3.4
 343 LS 0 80.3
 344 UD 0.079
 *

345 KK U
 346 BA 0.0055
 347 PB 3.40
 348 LS 0 86.3
 349 UD 0.069
 *

350 KK DES4
 351 BA 0.0027
 352 PB 3.40
 353 LS 0 98.0
 354 UD 0.050
 *

355 KK CDES4
 356 KM COMBINE U AND DES4
 357 HC 2
 *

358 KK DUMMY3
 359 KM COMBINE S, STF, NP-3, CDES4
 360 HC 5
 *

1

HEC-1 INPUT

PAGE 11

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

361 KK V
 362 BA 0.0060
 363 PB 3.37
 364 LS 0 90.0
 365 UD 0.060
 *

366 KK W
 367 BA 0.0062
 368 PB 3.40
 369 LS 0 90.0
 370 UD 0.065
 *

371 KK CVW
 372 KM COMBINE W AND V
 373 HC 2
 *

374 KK CARR3
 375 BA 0.0046
 376 PB 3.37
 377 LS 0 98.0
 378 UD 0.050
 *

379 KK DUMMY4

V22.OUT

380	KM	REGIONAL FACILITY	
381	HC	3	
	*		
382	KK	STE3	
383	BA	0.0017	
384	PB	3.40	
385	LS	0	98.0
386	UD	0.050	
	*		
387	KK	EE	
388	BA	0.0104	
389	PB	3.39	
390	LS	0	90.5
391	UD	0.075	
	*		
392	KK	DUMMY5	
393	KM	REGIONAL FACILITY	
394	HC	3	
	*		

1 HEC-1 INPUT PAGE 12

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

395	KK	STEE3	
396	BA	0.0023	
397	PB	3.39	
398	LS	0	98.0
399	UD	0.050	
	*		
400	KK	HH	
401	BA	0.0072	
402	PB	3.39	
403	LS	0	94.2
404	UD	0.055	
	*		
405	KK	CARR4	
406	BA	0.0048	
407	PB	3.37	
408	LS	0	98.0
409	UD	0.056	
	*		
410	KK	DUMMY6	
411	KM	REGIONAL FACILITY - BELTWAY CHANNEL SOUTH	
412	HC	4	
	*		
413	KK	OFF5	
414	BA	0.0199	
415	PB	3.44	
416	LS	0	92.2
417	UD	0.050	
	*		
418	KK	STE1	
419	BA	0.0027	
420	PB	3.42	
421	LS	0	98.0
422	UD	0.050	
	*		
423	KK	Y	
424	BA	0.0126	
425	PB	3.44	
426	LS	0	92.4
427	UD	0.071	
	*		
428	KK	CY	
429	KM	COMBINES OFF5, Y, AND STE1	
430	HC	3	
	*		

1 HEC-1 INPUT PAGE 13

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

431	KK	STL2	
432	BA	0.0028	
433	PB	3.44	
434	LS	0	98.0
435	UD	0.050	
	*		

436	KK	CSTL2		
437	KM	COMBINES CY AND STL2		
438	HC	2		
	*			
439	KK	Z		
440	BA	0.0110		
441	PB	3.42		
442	LS	0	87.6	
443	UD	0.086		
	*			
444	KK	STJ3		
445	BA	0.0038		
446	PB	3.42		
447	LS	0	98.0	
448	UD	0.058		
	*			
449	KK	CSTJ3		
450	KM	COMBINE Z AND STJ3		
451	HC	2		
	*			
452	KK	DUMMY7		
453	KM	REGIONAL FACILITY		
454	HC	2		
	*			
455	KK	STE2		
456	BA	0.0028		
457	PB	3.40		
458	LS	0	98.0	
459	UD	0.050		
	*			
460	KK	BB		
461	BA	0.0097		
462	PB	3.42		
463	LS	0	91.0	
464	UD	0.074		
	*			

1

HEC-1 INPUT

PAGE 14

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

465	KK	T		
466	BA	0.0063		
467	PB	3.42		
468	LS	0	92.0	
469	UD	0.055		
	*			
470	KK	CC		
471	BA	0.0086		
472	PB	3.42		
473	LS	0	90.7	
474	UD	0.079		
	*			
475	KK	DD		
476	BA	0.0071		
477	PB	3.40		
478	LS	0	90.6	
479	UD	0.079		
	*			
480	KK	DUMMY8		
481	KM	REGIONAL FACILITY		
482	HC	6		
	*			
483	KK	DESS		
484	BA	0.0028		
485	PB	3.40		
486	LS	0	98.0	
487	UD	0.050		
	*			
488	KK	NP-4		
489	BA	0.0011		
490	PB	3.39		
491	LS	0	84.1	
492	UD	0.071		
	*			
493	KK	DUMMY9		

494 KM REGIONAL FACILITY V22.OUT
 495 HC 3
 *
 496 KK AA
 497 BA 0.0073
 498 PB 3.43
 499 LS 0 93.0
 500 UD 0.065
 *

1 HEC-1 INPUT PAGE 15

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

501 KK STJ4
 502 BA 0.0016
 503 PB 3.41
 504 LS 0 98.0
 505 UD 0.059
 *
 506 KK CSTJ4
 507 KM COMBINE AA AND STJ4
 508 HC 2
 *
 509 KK STEE1
 510 BA 0.0023
 511 PB 3.44
 512 LS 0 98.0
 513 UD 0.050
 *
 514 KK CSTEE2
 515 KM COMBINES CSTJ4 AND STEE1
 516 HC 2
 *
 517 KK STEE2
 518 BA 0.0038
 519 PB 3.41
 520 LS 0 98.0
 521 UD 0.050
 *
 522 KK FF
 523 BA 0.0048
 524 PB 3.41
 525 LS 0 94.2
 526 UD 0.059
 *
 527 KK CFF
 528 KM COMBINES CSTEE2,STEE2, AND FF
 529 HC 3
 *
 530 KK DUMMY10
 531 KM REGIONAL FACILITY
 532 HC 2
 *
 533 KK GG
 534 BA 0.0058
 535 PB 3.41
 536 LS 0 94.2
 537 UD 0.050
 *

1 HEC-1 INPUT PAGE 16

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

538 KK DES6
 539 BA 0.0017
 540 PB 3.39
 541 LS 0 98.0
 542 UD 0.053
 *
 543 KK DUMMY11
 544 KM REGIONAL FACILITY - DESERT FOOTHILLS
 545 HC 3
 *
 546 ZZ

1 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT

LINE	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
22	LM	
	.	
35	.	D
	.	
40	.	DES1
	.	
45	CDES1.....	
	.	
48	.	COS-2
	.	
53	CCOS-2.....	
	.	
56	.	A
	.	
61	CA.....	
	.	
64	CP1.....	
	.	
67	STI	
	.	
73	.	C
	.	
78	CSTI.....	
	.	
81	.	G
	.	
86	CG.....	
	.	
89	.	H
	.	
94	CH.....	
	.	
97	.	STH
	.	
103	.	J
	.	
108	CJ.....	
	.	
111	.	K
	.	
116	CK.....	
	.	
119	.	NP-1
	.	
124	CNP-1.....	
	.	
127	.	DES2
	.	
132	CDES2.....	
	.	
135	CP2.....	
	.	
138	.	CARR1
	.	
143	.	I
	.	
148	CCARR1.....	

151	.	.	N					
156	.	.		STFF				
161	.	.	CSTFF.....					
164	.	.		STG2				
169	.	.	CSTG2.....					
172	.	.		O				
177	.	.			P			
182	.	.		COP.....				
185	.	.			DES3			
190	.	.		CDES3.....				
193	.	.	CP3.....					
196	.	.		Q				
201	.	.			R			
206	.	.		CQR.....				
209	.	.			CARR2			
214	.	.		CCARR2.....				
217	.	.	CP4.....					
220	.	.	II					
225	.	.		X				
230	.	.			B			
235	.	.				DC-1		
240	.	.					COS-3	
245	DUMMY1.....							
249		3-O*						
255			OFF-COS2					
261		COFFCOS2.....						
264			E					
269				STJ1				
275		CSTJ1.....						

278	.	.	NP-2					
	.	.	.					
283	.	.	.	ES-1				
	.	.	.					
288	.	CES-1						
	.	.						
291	.	.	OFF4					
	.	.	.					
296	.	.	.	L				
	.	.	.	.				
301	.	.	.	.	STL1			
	.	.	.	.	.			
306	.	.	.	CSTL1				
	.	.	.	.				
309	.	.	.	.	STG1			
	.	.	.	.	.			
314	.	.	CSTG1					
	.	.	.					
317	.	.	.	M				
	.	.	.	.				
322	.	.	.	.	STJ2			
	.	.	.	.	.			
327	.	DUMMY2						
	.	.						
330	.	.	S					
	.	.	.					
335	.	.	.	STF				
	.	.	.	.				
340	.	.	.	.	NP-3			
	.	.	.	.	.			
345	.	.	.	.	.	U		
	.	.	.	.	.	.		
350	.	.	.	.	.	.	DES4	
	.	.	.	.	.	.	.	
355	.	.	.	.	.	.	CDES4	
	.	.	.	.	.	.	.	
358	.	DUMMY3						
	.	.						
361	.	.	V					
	.	.	.					
366	.	.	.	W				
	.	.	.	.				
371	.	.	CVW					
	.	.	.					
374	.	.	.	CARR3				
	.	.	.	.				
379	.	DUMMY4						
	.	.						
382	.	.	STE3					
	.	.	.					
387	.	.	.	EE				
	.	.	.	.				
392	.	DUMMYS						
	.	.						
395	.	.	STEE3					
	.	.	.					
400	.	.	.	HH				
	.	.	.	.				
405	.	.	.	.	CARR4			
	.	.	.	.	.			

410	.	DUMMY6.....	.	.	.	.
413	.	.	OFF5	.	.	.
418	.	.	.	STE1	.	.
423	.	.	.	.	.	Y
428	.	.	CY.....	.	.	.
431	.	.	.	STL2	.	.
436	.	.	CSTL2.....	.	.	.
439	.	.	.	.	Z	.
444	.	.	.	.	.	STJ3
449	.	.	.	CSTJ3.....	.	.
452	.	.	DUMMY7.....	.	.	.
455	.	.	.	STE2	.	.
460	.	.	.	.	BB	.
465	.	.	.	.	.	T
470	.	.	.	.	.	CC
475	.	.	.	.	.	DD
480	.	.	DUMMY8.....	.	.	.
483	.	.	.	DESS	.	.
488	.	.	.	.	NP-4	.
493	.	.	DUMMY9.....	.	.	.
496	.	.	.	AA	.	.
501	.	.	.	.	STJ4	.
506	.	.	.	CSTJ4.....	.	.
509	.	.	.	.	STEE1	.
514	.	.	.	CSTEE2.....	.	.
517	.	.	.	.	STEE2	.
522	.	.	.	.	.	FF
527	.	.	.	CFF.....	.	.
530	.	.	DUMMY10.....	.	.	.
533	.	.	.	GG	.	.

V22.OUT

538 DES6
543 . . DUMMY11.....

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 19MAR19 TIME 11:17:59 *

* 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 = NOVEMBER 1, 2018
DESIGN STORM = 100-YEAR 6-HR STORM
STORM DISTRIBUTION = SDN #3
MODELED BY VTN (JYA)

* UPDATE #1 - SUMMERLIN WEST VILLAGE 22 *

JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)

100-YEAR, 6-HOUR STORM, SDN3

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 100 NUMBER OF HYDROGRAPH ORDINATES
NDDATE 1 0 ENDING DATE
NDTIME 0815 ENDING TIME
ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 8.25 HOURS

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

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
1.00

1

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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION
				RATIO 1
				1.00
HYDROGRAPH AT				
+	LM	.01	1 FLOW	41.
			TIME	3.50
HYDROGRAPH AT				
+	D	.02	1 FLOW	47.

				TIME	3.50
HYDROGRAPH AT					
+	DES1	.01	1	FLOW TIME	14. 3.50
2 COMBINED AT					
+	CDES1	.02	1	FLOW TIME	62. 3.50
HYDROGRAPH AT					
+	COS-2	.02	1	FLOW TIME	32. 3.50
2 COMBINED AT					
+	CCOS-2	.04	1	FLOW TIME	93. 3.50
HYDROGRAPH AT					
+	A	.03	1	FLOW TIME	66. 3.50
2 COMBINED AT					
+	CA	.07	1	FLOW TIME	160. 3.50
2 COMBINED AT					
+	CP1	.08	1	FLOW TIME	201. 3.50
HYDROGRAPH AT					
+	STI	.00	1	FLOW TIME	11. 3.50
HYDROGRAPH AT					
+	C	.02	1	FLOW TIME	50. 3.50
2 COMBINED AT					
+	CSTI	.02	1	FLOW TIME	61. 3.50
HYDROGRAPH AT					
+	G	.01	1	FLOW TIME	30. 3.50
2 COMBINED AT					
+	CG	.03	1	FLOW TIME	91. 3.50
HYDROGRAPH AT					
+	H	.01	1	FLOW TIME	33. 3.50
2 COMBINED AT					
+	CH	.05	1	FLOW TIME	124. 3.50
HYDROGRAPH AT					
+	STH	.00	1	FLOW TIME	10. 3.50
HYDROGRAPH AT					
+	J	.01	1	FLOW TIME	25. 3.50
2 COMBINED AT					
+	CJ	.01	1	FLOW TIME	35. 3.50
HYDROGRAPH AT					
+	K	.01	1	FLOW TIME	22. 3.50
2 COMBINED AT					
+	CK	.02	1	FLOW TIME	58. 3.50
HYDROGRAPH AT					
+	NP-1	.00	1	FLOW TIME	2. 3.50
2 COMBINED AT					
+	CNP-1	.02	1	FLOW TIME	59. 3.50
HYDROGRAPH AT					
+	DES2	.01	1	FLOW TIME	15. 3.50

2 COMBINED AT +	CDES2	.03	1	FLOW TIME	74. 3.50
2 COMBINED AT +	CP2	.07	1	FLOW TIME	198. 3.50
HYDROGRAPH AT +	CARR1	.01	1	FLOW TIME	29. 3.50
HYDROGRAPH AT +	I	.02	1	FLOW TIME	38. 3.50
3 COMBINED AT +	CCARR1	.10	1	FLOW TIME	265. 3.50
HYDROGRAPH AT +	N	.01	1	FLOW TIME	28. 3.50
HYDROGRAPH AT +	STFF	.00	1	FLOW TIME	5. 3.50
2 COMBINED AT +	CSTFF	.01	1	FLOW TIME	33. 3.50
HYDROGRAPH AT +	STG2	.00	1	FLOW TIME	13. 3.50
2 COMBINED AT +	CSTG2	.02	1	FLOW TIME	46. 3.50
HYDROGRAPH AT +	O	.01	1	FLOW TIME	13. 3.50
HYDROGRAPH AT +	P	.01	1	FLOW TIME	13. 3.50
2 COMBINED AT +	COP	.01	1	FLOW TIME	26. 3.50
HYDROGRAPH AT +	DES3	.00	1	FLOW TIME	8. 3.50
2 COMBINED AT +	CDES3	.01	1	FLOW TIME	34. 3.50
2 COMBINED AT +	CP3	.03	1	FLOW TIME	80. 3.50
HYDROGRAPH AT +	Q	.01	1	FLOW TIME	14. 3.50
HYDROGRAPH AT +	R	.01	1	FLOW TIME	15. 3.50
2 COMBINED AT +	CQR	.01	1	FLOW TIME	29. 3.50
HYDROGRAPH AT +	CARR2	.01	1	FLOW TIME	15. 3.50
2 COMBINED AT +	CCARR2	.02	1	FLOW TIME	44. 3.50
3 COMBINED AT +	CP4	.15	1	FLOW TIME	389. 3.50

HYDROGRAPH AT +	II	.03	1	FLOW TIME	77. 3.50
HYDROGRAPH AT +	X	.03	1	FLOW TIME	56. 3.50
HYDROGRAPH AT +	B	.14	1	FLOW TIME	328. 3.50
HYDROGRAPH AT +	DC-1	.02	1	FLOW TIME	48. 3.50
HYDROGRAPH AT +	COS-3	.00	1	FLOW TIME	4. 3.58
7 COMBINED AT +	DUMMY1	.44	1	FLOW TIME	1103. 3.50
HYDROGRAPH AT +	3-O*	.08	1	FLOW TIME	189. 3.50
HYDROGRAPH AT +	OFF-COS2	.03	1	FLOW TIME	53. 3.50
2 COMBINED AT +	COFFCOS2	.11	1	FLOW TIME	242. 3.50
HYDROGRAPH AT +	E	.02	1	FLOW TIME	58. 3.50
HYDROGRAPH AT +	STJ1	.01	1	FLOW TIME	17. 3.50
3 COMBINED AT +	CSTJ1	.14	1	FLOW TIME	317. 3.50
HYDROGRAPH AT +	NP-2	.00	1	FLOW TIME	6. 3.50
HYDROGRAPH AT +	ES-1	.02	1	FLOW TIME	59. 3.50
3 COMBINED AT +	CES-1	.16	1	FLOW TIME	382. 3.50
HYDROGRAPH AT +	OFF4	.08	1	FLOW TIME	209. 3.50
HYDROGRAPH AT +	L	.01	1	FLOW TIME	35. 3.50
HYDROGRAPH AT +	STL1	.00	1	FLOW TIME	8. 3.50
2 COMBINED AT +	CSTL1	.02	1	FLOW TIME	43. 3.50
HYDROGRAPH AT +	STG1	.00	1	FLOW TIME	8. 3.50
3 COMBINED AT +	CSTG1	.10	1	FLOW TIME	260. 3.50
HYDROGRAPH AT +	M	.02	1	FLOW TIME	48. 3.50
HYDROGRAPH AT					

V22.OUT

+	STJ2	.00	1	FLOW TIME	13. 3.50
4 COMBINED AT +	DUMMY2	.29	1	FLOW TIME	702. 3.50
HYDROGRAPH AT +	S	.00	1	FLOW TIME	11. 3.50
HYDROGRAPH AT +	STF	.00	1	FLOW TIME	8. 3.50
HYDROGRAPH AT +	NP-3	.01	1	FLOW TIME	9. 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
5 COMBINED AT +	DUMMY3	.31	1	FLOW TIME	749. 3.50
HYDROGRAPH AT +	V	.01	1	FLOW TIME	14. 3.50
HYDROGRAPH AT +	W	.01	1	FLOW TIME	15. 3.50
2 COMBINED AT +	CVW	.01	1	FLOW TIME	29. 3.50
HYDROGRAPH AT +	CARR3	.00	1	FLOW TIME	13. 3.50
3 COMBINED AT +	DUMMY4	.32	1	FLOW TIME	791. 3.50
HYDROGRAPH AT +	STE3	.00	1	FLOW TIME	5. 3.50
HYDROGRAPH AT +	EE	.01	1	FLOW TIME	24. 3.50
3 COMBINED AT +	DUMMY5	.34	1	FLOW TIME	820. 3.50
HYDROGRAPH AT +	STEE3	.00	1	FLOW TIME	7. 3.50
HYDROGRAPH AT +	HH	.01	1	FLOW TIME	19. 3.50
HYDROGRAPH AT +	CARR4	.00	1	FLOW TIME	13. 3.50
4 COMBINED AT +	DUMMY6	.35	1	FLOW TIME	859. 3.50
HYDROGRAPH AT +	OFF5	.02	1	FLOW TIME	53. 3.50
HYDROGRAPH AT +	STE1	.00	1	FLOW	8.

				TIME	3.50
HYDROGRAPH AT					
+	Y	.01	1	FLOW TIME	31. 3.50
3 COMBINED AT					
+	CY	.04	1	FLOW TIME	92. 3.50
HYDROGRAPH AT					
+	STL2	.00	1	FLOW TIME	8. 3.50
2 COMBINED AT					
+	CSTL2	.04	1	FLOW TIME	100. 3.50
HYDROGRAPH AT					
+	Z	.01	1	FLOW TIME	22. 3.50
HYDROGRAPH AT					
+	STJ3	.00	1	FLOW TIME	11. 3.50
2 COMBINED AT					
+	CSTJ3	.01	1	FLOW TIME	33. 3.50
2 COMBINED AT					
+	DUMMY7	.05	1	FLOW TIME	133. 3.50
HYDROGRAPH AT					
+	STE2	.00	1	FLOW TIME	8. 3.50
HYDROGRAPH AT					
+	BB	.01	1	FLOW TIME	23. 3.50
HYDROGRAPH AT					
+	T	.01	1	FLOW TIME	16. 3.50
HYDROGRAPH AT					
+	CC	.01	1	FLOW TIME	20. 3.50
HYDROGRAPH AT					
+	DD	.01	1	FLOW TIME	16. 3.50
6 COMBINED AT					
+	DUMMY8	.09	1	FLOW TIME	215. 3.50
HYDROGRAPH AT					
+	DES5	.00	1	FLOW TIME	8. 3.50
HYDROGRAPH AT					
+	NP-4	.00	1	FLOW TIME	2. 3.50
3 COMBINED AT					
+	DUMMY9	.09	1	FLOW TIME	225. 3.50
HYDROGRAPH AT					
+	AA	.01	1	FLOW TIME	19. 3.50
HYDROGRAPH AT					
+	STJ4	.00	1	FLOW TIME	4. 3.50
2 COMBINED AT					
+	CSTJ4	.01	1	FLOW TIME	23. 3.50
HYDROGRAPH AT					
+	STEE1	.00	1	FLOW TIME	7. 3.50
2 COMBINED AT					
+	CSTEE2	.01	1	FLOW TIME	30. 3.50

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HYDROGRAPH AT					
+	STEE2	.00	1	FLOW	11.
				TIME	3.50
HYDROGRAPH AT					
+	FF	.00	1	FLOW	13.
				TIME	3.50
3 COMBINED AT					
+	CFF	.02	1	FLOW	53.
				TIME	3.50
2 COMBINED AT					
+	DUMMY10	.11	1	FLOW	279.
				TIME	3.50
HYDROGRAPH AT					
+	GG	.01	1	FLOW	16.
				TIME	3.50
HYDROGRAPH AT					
+	DES6	.00	1	FLOW	5.
				TIME	3.50
3 COMBINED AT					
+	DUMMY11	.12	1	FLOW	299.
				TIME	3.50

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

Appendix B. Hydrology Appendix

B.1 Parameters

SUMMERLIN WEST VILLAGE 22

Kettle Ridge Drive (Street J)
 Lake Mead Boulevard to Fleet Wing Avenue (Street G)
 Scurry Bend Drive (Street N) Rough Grade
 Lake Mead Boulevard to Fleet Wing Avenue (Street G)

BASIN ID	LAND USE INDEX NUMBER	LAND USE DESCRIPTION	SOIL MAP UNIT #	SUBREGION CN	SUBREGION AREA (SQ FT)	SUBBASIN AREA (SQ FT)	PERCENT OF SUBBASIN	CUMULATIVE PERCENT	AREAL WEIGHTED CN	CUMULATIVE CN	COMPOSITE CN
INT-J1	1	Undeveloped Land, Open Desert	1155	88	353955	353955	100.0%	100.0%	88.00	88.00	88.0
INT-J2	1	Undeveloped Land, Open Desert	1155	88	577890	577890	100.0%	100.0%	88.00	88.00	88.0
INT-J3	1	Undeveloped Land, Open Desert	1155	88	789937	789937	100.0%	100.0%	88.00	88.00	88.0
INT-LMB1	1	Undeveloped Land, Open Desert	1155	88	2344383	2346443	99.9%	99.9%	87.92	87.92	
INT-LMB1	1	Undeveloped Land, Open Desert	1191	63	2060	2346443	0.1%	100.0%	0.06	87.98	88.0
INT-N	1	Undeveloped Land, Open Desert	1155	88	3837752	5233734	73.3%	73.3%	64.53	64.53	
INT-N	1	Undeveloped Land, Open Desert	1191	63	148364	5233734	2.8%	76.2%	1.79	66.31	
INT-N	1	Undeveloped Land, Open Desert	1502	73	1247617	5233734	23.8%	100.0%	17.40	83.72	83.7
StrJ-1E	7	Public Facility and Residential, 8-12 units/acre	1155	94	25786	25786	100.0%	100.0%	94.00	94.00	94.0
StrJ-1W	7	Public Facility and Residential, 8-12 units/acre	1155	94	30287	30287	100.0%	100.0%	94.00	94.00	94.0
StrJ-2E	7	Public Facility and Residential, 8-12 units/acre	1155	94	19917	19917	100.0%	100.0%	94.00	94.00	94.0
StrJ-2W	7	Public Facility and Residential, 8-12 units/acre	1155	94	25778	25778	100.0%	100.0%	94.00	94.00	94.0
StrJ-3E	7	Public Facility and Residential, 8-12 units/acre	1155	94	17181	17181	100.0%	100.0%	94.00	94.00	94.0
StrJ-3W	7	Public Facility and Residential, 8-12 units/acre	1155	94	22888	22888	100.0%	100.0%	94.00	94.00	94.0

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION



TDS for Summerlin Village 22 West
 Kettle Ridge Drive (Street J)
 Lake Mead Boulevard to Fleet Wing Avenue (Street G)
 & Scurry Bend Drive (Street N) Rough Grade
 Lake Mead Boulevard to Fleet Wing Avenue (Street G)
INTERIM CONDITION

BY: **MMA**
 DATE: **5/2/19**

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check	Tlag
DESIG:	DEV./EX. (D or E)	CN	K	AREA Ac	AREA Mi^2	INITIAL LENGTH Feet	SLOPE %	Ti Min	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY FPS	V2 VELOCITY FPS	Tt Min	Min (13)	Min (14)	Tlag= 0.6Tc/60 Hours
(1)			(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9a)	(9b)	(10)			
INT-J1	E	88.0	0.772	8.13	0.01270	100	7.0	3.1	1011	6.8	3.9	7.7	3.3	6.4	N/A	0.100**
INT-J2	E	88.0	0.772	13.27	0.02073	100	10.0	2.7	1216	8.1	4.2	8.4	3.4	6.1	N/A	0.100**
INT-J3	E	88.0	0.772	18.13	0.02834	100	8.0	3.0	1219	8.0	4.2	8.3	3.4	6.4	N/A	0.100**
INT-LMB1	E	88.0	0.771	53.87	0.08417	100	6.0	3.3	6217	8.0	4.2	8.3	13.4	16.7	N/A	0.167
INT-N	E	83.7	0.715	120.15	0.18774	100	8.0	3.5	6,493	7.3	4.0	7.9	14.7	18.1	N/A	0.181
StrJ-1E	D	94.0	0.851	0.59	0.00093	16	2.0	1.4	639	7.0	5.3	8.1	1.8	3.3	13.6	0.050*
StrJ-1W	D	94.0	0.851	0.70	0.00109	16	2.0	1.4	611	7.0	5.3	8.1	1.8	3.2	13.5	0.050*
StrJ-2E	D	94.0	0.851	0.46	0.00071	16	2.0	1.4	468	3.0	3.5	5.3	2.2	3.7	12.7	0.050*
StrJ-2W	D	94.0	0.851	0.59	0.00093	16	2.0	1.4	533	3.0	3.5	5.3	2.5	3.9	13.1	0.050*
StrJ-3E	D	94.0	0.851	0.39	0.00062	16	2.0	1.4	403	1.0	2.0	3.1	3.3	4.7	12.3	0.050*
StrJ-3W	D	94.0	0.851	0.53	0.00082	16	2.0	1.4	474	1.0	2.0	3.1	3.9	5.3	12.7	0.053
Tc = Ti + Tt Tlag = 0.6 Tc Ti = 1.8 (1.1 - K) L^1/2 / S^1/3 K = 0.0132 (CN) - 0.39 Tc Check = L/180+10						For the travel time (Tt) calculations, V1 applies to the first 500 feet of travel distance; V2 applies to the remaining travel distance.					V1 = 14.8*(S/100)^1/2 V2 = 29.4*(S/100)^1/2		Developed Developed		V1 = 20.2*(S/100)^1/2 V2 = 30.6*(S/100)^1/2	
REFERENCE :													STANDARD FORM 4			

*Minimum recommended Tc for developed subbasins is 5 mins. A value of 0.05 was use for the Tlag where the calculated Tc was less than 5 mins.

**Minimum recommended Tc for undeveloped subbasins is 10 mins. A value of 0.10 was use for the Tlag where the calculated Tc was less than 10 mins.

B.2 HEC-1 Model

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 22JUN19 TIME 16:33:21 *
*
*****

```

```

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

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

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

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

1 HEC-1 INPUT PAGE 1

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

*DIAGRAM

*** FREE ***

```

1 ID TECHNICAL DRAINAGE STUDY
2 ID SUMMERLIN VILLAGE 22
3 ID KETTLE RIDGE DRIVE (STREET J)
4 ID FLEET WING AVENUE (STREET G) TO LAKE MEAD BOULEVARD
5 ID & SCURRY BEND DRIVE (STREET N) ROUGH GRADE
6 ID FLEET WING AVENUE (STREET G) TO LAKE MEAD BOULEVARD
7 ID JULY 2019
8 ID
9 ID JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES
10 ID
11 ID AREA (SQUARE MILES) DARF
12 ID
13 ID 0 - 0.5 0.99
14 ID Estimated 10-year 0.57
15 ID
16 IT 5 0 0 300
17 IO 5 0 0
18 IN 5 0 0
19 JR PREC 0.99 0.57
*
20 KK 3-O*
21 KM REFERENCED FROM ADDENDUM #1 TO UPDATE #1 FOR THE MCDS FOR SUMMERLIN WEST VILLA
22 KM WHICH REFERENCED SUBBASIN FROM OVERALL SWPA MPU
23 BA 0.08050
24 PB 3.48
25 PC 0.000 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 1.000
33 LS 0 95.0
34 UD 0.103
*
35 KKINT-LMB1
36 BA 0.08417
37 PB 3.55
38 LS 0 88.0
39 UD 0.167
*
40 KKDIV-LMB1
41 KM FLOW CAPTURED FROM INT-LMB1 INTO STREET J SYSTEM UTILIZING FUTURE LAKE MEAD BO
42 DT DI_DIV
43 DI 0 69 153
44 DQ 0 0 69

```


LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
45	KK CP1
46	HC 2
	*
47	KK INT-J1
48	BA 0.01270
49	PB 3.43
50	LS 0 88.0
51	UD 0.100
	*
52	KK StrJ-1E
53	BA 0.00093
54	PB 3.43
55	LS 0 94.0
56	UD 0.050
	*
57	KK StrJ-1W
58	BA 0.00109
59	PB 3.43
60	LS 0 94.0
61	UD 0.050
	*
62	KK CP2
63	HC 4
	*
64	KK INT-J2
65	BA 0.02073
66	PB 3.43
67	LS 0 88.0
68	UD 0.100
	*
69	KK StrJ-2E
70	BA 0.00071
71	PB 3.43
72	LS 0 94.0
73	UD 0.050
	*
74	KK StrJ-2W
75	BA 0.00093
76	PB 3.43
77	LS 0 94.0
78	UD 0.050
	*

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
79	KK CP3
80	HC 4
	*
81	KK INT-J3
82	BA 0.02834
83	PB 3.43
84	LS 0 88.0
85	UD 0.100
	*
86	KK StrJ-3E
87	BA 0.00062
88	PB 3.43
89	LS 0 94.0
90	UD 0.050
	*
91	KK StrJ-3W
92	BA 0.00082
93	PB 3.43
94	LS 0 94.0
95	UD 0.053
	*
96	KK CP4
97	HC 4
	*
98	KK INT-N

```

99      BA 0.18774
100     PB 3.43
101     LS 0      83.7
102     UD 0.181
      *

103     KK      CP5
104     HC      2
      *
105     ZZ

```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```

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

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

20      3-O*
      .
      .
35      .      INT-LMB1
      .      .
      .      .
42      .      .-----> DI_DIV
40      .      DIV-LMB1
      .      .
      .      .
45      CP1.....
      .
      .
47      .      INT-J1
      .      .
      .      .
52      .      .      StrJ-1E
      .      .      .
      .      .      .
57      .      .      .      StrJ-1W
      .      .      .      .
      .      .      .      .
62      CP2.....
      .
      .
64      .      INT-J2
      .      .
      .      .
69      .      .      StrJ-2E
      .      .      .
      .      .      .
74      .      .      .      StrJ-2W
      .      .      .      .
      .      .      .      .
79      CP3.....
      .
      .
81      .      INT-J3
      .      .
      .      .
86      .      .      StrJ-3E
      .      .      .
      .      .      .
91      .      .      .      StrJ-3W
      .      .      .      .
      .      .      .      .
96      CP4.....
      .
      .
98      .      INT-N
      .      .
      .      .
103     CP5.....

```

(**) RUNOFF ALSO COMPUTED AT THIS LOCATION

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
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* RUN DATE 22JUN19 TIME 16:33:21
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```

TECHNICAL DRAINAGE STUDY
 SUMMERLIN VILLAGE 22
 KETTLE RIDGE DRIVE (STREET J)
 FLEET WING AVENUE (STREET G) TO LAKE MEAD BOULEVARD

& SCURRY BEND DRIVE (STREET N) ROUGH GRADE
FLEET WING AVENUE (STREET G) TO LAKE MEAD BOULEVARD
JULY 2019

JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES

AREA (SQUARE MILES)	DARF
0 - 0.5	0.99
Estimated 10-year	0.57

17 IO OUTPUT CONTROL VARIABLES

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

IT HYDROGRAPH TIME DATA

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

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

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

JP MULTI-PLAN OPTION

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

JR MULTI-RATIO OPTION

RATIOS OF PRECIPITATION	
.99	.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 .99	RATIO 2 .57
HYDROGRAPH AT						
+	3-O*	.08	1	FLOW TIME	189. 3.50	100. 3.50
HYDROGRAPH AT						
+	INT-LMB1	.08	1	FLOW TIME	153. 3.58	69. 3.58
DIVERSION TO						
+	DI_DIV	.08	1	FLOW TIME	69. 3.58	0. .00
HYDROGRAPH AT						
+	DIV-LMB1	.08	1	FLOW TIME	84. 3.58	69. 3.58
2 COMBINED AT						
+	CP1	.16	1	FLOW TIME	269. 3.50	163. 3.58
HYDROGRAPH AT						
+	INT-J1	.01	1	FLOW TIME	25. 3.50	11. 3.50
HYDROGRAPH AT						
+	StrJ-1E	.00	1	FLOW TIME	3. 3.50	1. 3.50
HYDROGRAPH AT						
+	StrJ-1W	.00	1	FLOW TIME	3. 3.50	2. 3.50
4 COMBINED AT						
+	CP2	.18	1	FLOW TIME	299. 3.50	175. 3.58

HYDROGRAPH AT						
+	INT-J2	.02	1	FLOW	40.	18.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	StrJ-2E	.00	1	FLOW	2.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	StrJ-2W	.00	1	FLOW	3.	1.
				TIME	3.50	3.50
4 COMBINED AT						
+	CP3	.20	1	FLOW	343.	194.
				TIME	3.50	3.58
HYDROGRAPH AT						
+	INT-J3	.03	1	FLOW	55.	24.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	StrJ-3E	.00	1	FLOW	2.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	StrJ-3W	.00	1	FLOW	2.	1.
				TIME	3.50	3.50
4 COMBINED AT						
+	CP4	.23	1	FLOW	402.	218.
				TIME	3.50	3.58
HYDROGRAPH AT						
+	INT-N	.19	1	FLOW	270.	104.
				TIME	3.58	3.58
2 COMBINED AT						
+	CP5	.42	1	FLOW	650.	322.
				TIME	3.58	3.58

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

Appendix C. Hydraulics Appendix

C.1 Normal Depth Calculations

Cross Section for North Wash Section

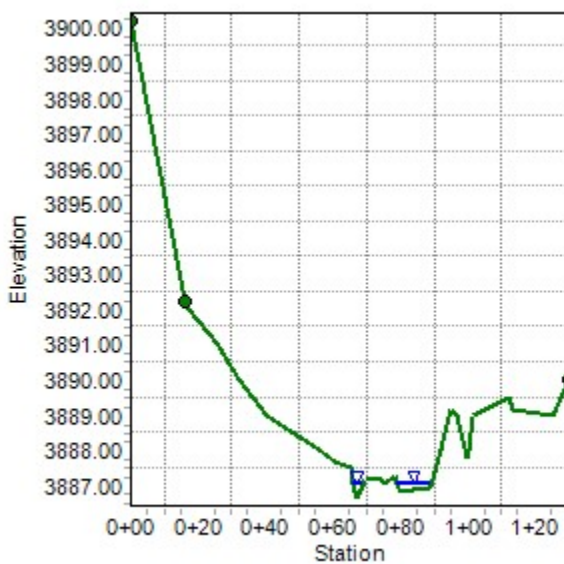
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.07839	ft/ft
Normal Depth	0.41	ft
Discharge	9.00	ft ³ /s

Cross Section Image



Worksheet for North Wash Section

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.07839	ft/ft
Discharge	9.00	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.0	3900.20
0+16.0	3892.20
0+17.4	3892.00
0+25.4	3891.00
0+32.1	3890.00
0+40.2	3889.00
0+55.7	3888.00
0+60.6	3887.64
0+65.0	3887.51
0+65.7	3887.00
0+67.3	3886.63
0+68.5	3887.00
0+69.6	3887.13
0+73.7	3887.23
0+75.3	3887.04
0+78.5	3887.25
0+78.9	3887.00
0+79.9	3886.81
0+83.6	3886.89
0+87.7	3886.88
0+88.9	3887.00
0+91.6	3888.00
0+94.0	3889.00
0+94.9	3889.13
0+96.6	3889.00
0+98.8	3888.00
0+99.5	3887.75

Worksheet for North Wash Section

Input Data

Station (ft)	Elevation (ft)
0+99.9	3888.00
1+01.2	3889.00
1+11.8	3889.49
1+13.3	3889.16
1+25.1	3889.00
1+29.8	3890.00

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
Elevation Range	3886.63 to 3900.20 ft	
Flow Area	2.19	ft ²
Wetted Perimeter	13.55	ft
Hydraulic Radius	0.16	ft
Top Width	13.40	ft
Normal Depth	0.41	ft
Critical Depth	0.49	ft
Critical Slope	0.02250	ft/ft
Velocity	4.11	ft/s
Velocity Head	0.26	ft
Specific Energy	0.67	ft
Froude Number	1.79	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

Worksheet for North Wash Section

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.41	ft
Critical Depth	0.49	ft
Channel Slope	0.07839	ft/ft
Critical Slope	0.02250	ft/ft

Cross Section for South Wash Section

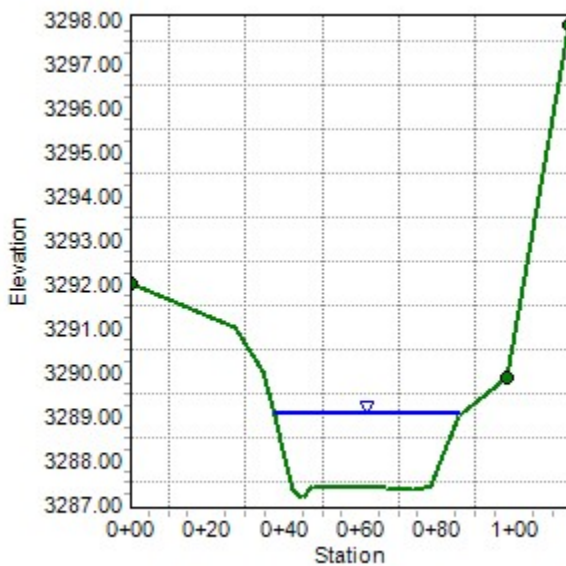
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.05711	ft/ft
Normal Depth	1.92	ft
Discharge	711.00	ft ³ /s

Cross Section Image



Project Description

Manning Formula

Normal Depth

711.00 ft³/s

Elevation (ft)

0+00.0	3292.00
0+27.3	3291.00
0+34.6	3290.00
0+37.6	3289.00
0+40.0	3288.00
0+42.2	3287.32
0+44.2	3287.13
0+44.7	3287.14
0+47.0	3287.37
0+47.5	3287.39
0+63.2	3287.38
0+67.1	3287.37
0+73.5	3287.32
0+76.4	3287.34
0+78.1	3287.40
0+81.0	3288.00
0+85.4	3289.00
0+98.3	3289.86
1+14.3	3297.86

0.025

Worksheet for South Wash Section

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	1.92	ft
Elevation Range	3287.13 to 3297.86 ft	
Flow Area	71.68	ft ²
Wetted Perimeter	49.22	ft
Hydraulic Radius	1.46	ft
Top Width	48.71	ft
Normal Depth	1.92	ft
Critical Depth	2.39	ft
Critical Slope	0.02626	ft/ft
Velocity	9.92	ft/s
Velocity Head	1.53	ft
Specific Energy	3.45	ft
Froude Number	1.44	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.92	ft
Critical Depth	2.39	ft
Channel Slope	0.05711	ft/ft
Critical Slope	0.02626	ft/ft

Appendix D. Proposed Improvement Plans

Appendix F. CD-ROM

Atkins

2270 Corporate Circle
Suite 200
Henderson, NV 89074-7755

Tel: +1 702 263 7275/+1 800 483 6244

Fax: +1 702 263 7200

Direct: 702 551 0330

molly.anderson@atkinsglobal.com

SHEET INDEX		
1	COVER SHEET	
2	STOCKPILE PLAN	

1	COVER SHEET	
2	STOCKPILE PLAN	

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 NOT BE INSPECTED OR INCLUDED IN THE ACCEPTANCE OF THE LAS VEGAS VALLEY WATER DISTRICT FACILITIES.

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, BULKHEAD CONSTRUCTION, OR OTHER PERMANENT STABILIZATION. PERMIT APPLICATION AND ASSOCIATED INFORMATION MAY BE DOWNLOADED FROM THE WEB SITE: <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.

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.

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

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 PROPOSED DISTURBED AREA ACREAGE
 0.00 AC 3.22 AC

GEOTECHNICAL ENGINEER
 PREPARED BY: NOVA GEOTECHNICAL & INSPECTION SERVICES
 4480 W. HACIENDA AVENUE, SUITE 104, LAS VEGAS, NV 89118
 PHONE: 702-873-3478
 PROJECT NO.: G-18-176
 DATED: DECEMBER 3, 2018

CONTACT: KEVIN ORROCK
HOWARD HUGHES COMPANY LLC, A DELAWARE LIMITED LIABILITY COMPANY
10801 W. CHARLESTON BLVD., 3rd FLOOR
LAS VEGAS, NEVADA 89135

CONTACT: DAVID WILSON P.E.
ATKINS
2270 CORPORATE CIRCLE SUITE 200
HENDERSON, NEVADA 89074
(702) 263-7275

HOWARD HUGHES COMPANY LLC, A DELAWARE LIMITED LIABILITY COMPANY

KEVIN T. ORROCK, VICE PRESIDENT

ALLEN PAVELKA, P.E. #9029
CITY ENGINEER

APPROVAL OF THESE PLANS IS LIMITED TO STOCKPILING ONLY

CITY OF LAS VEGAS PLANNING DEVELOPMENT DATE

NOTE:
THIS PLAN CONFORMS TO THE APPLICABLE STANDARDS OF THE PLANNING
DEPARTMENT.

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

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

BEING A PORTION OF LOT 2 AS SHOWN ON THE MAP
THEREOF IN BOOK 123 OF PLATS, PAGE 36, OFFICIAL
RECORDS, CITY OF LAS VEGAS CLARK COUNTY, NEVADA.



NOT FOR CONSTRUCTION

LOCATION MAP

PROJECT SITE
APN 137-23-101-002

LAKE MEAD BLVD

SUMMERLIN PKWY

FAR HILLS AVE

ANASAZI DR

CC-215

ATKINS

VICINITY MAP

LAKE MEAD BOULEVARD

SCURRY BEND DRIVE

KETTLE RIDGE DRIVE

COS-2

KESTREL CREEK AVENUE

CLOWDER PASS WAY

FLEET WING AVENUE

DESERT FOOTHILLS DRIVE

REFERENCE PARKWAY

ATKINS

CC-215

PROJECT LOCATION

[illegible]

ATKINS
22270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

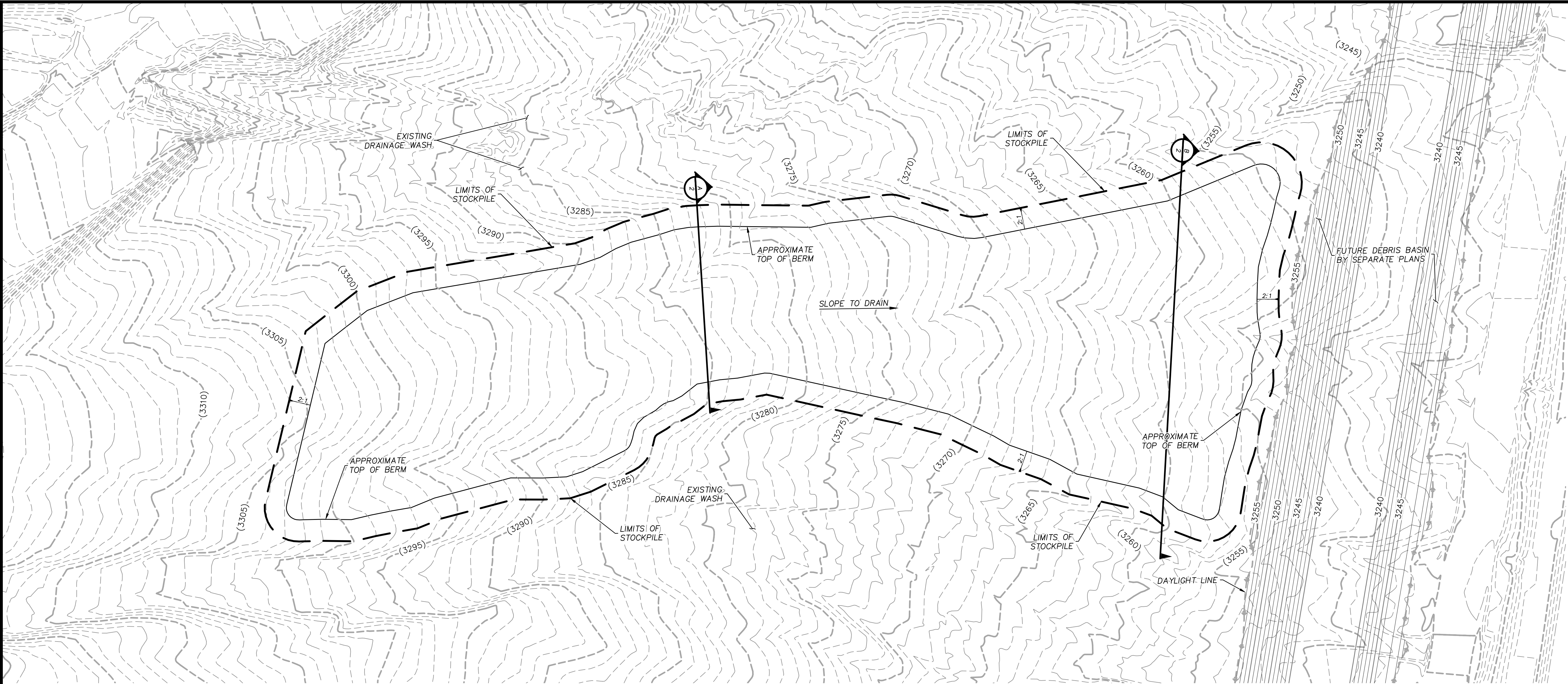


SUMMERLIN®

SUMMERLIN VILLAGE 22
PARCEL B STOCKPILE

COVER SHEET

JOB NO.: 100060655	DESIGNED BY: N. BARCOS
DATE: JULY, 2019	DRAWN BY: T. YOYMAN
DRAWING NO.	CHECKED BY: C. ANDRESO
1 / 2	HORIZ.: NONE VERT.: NONE

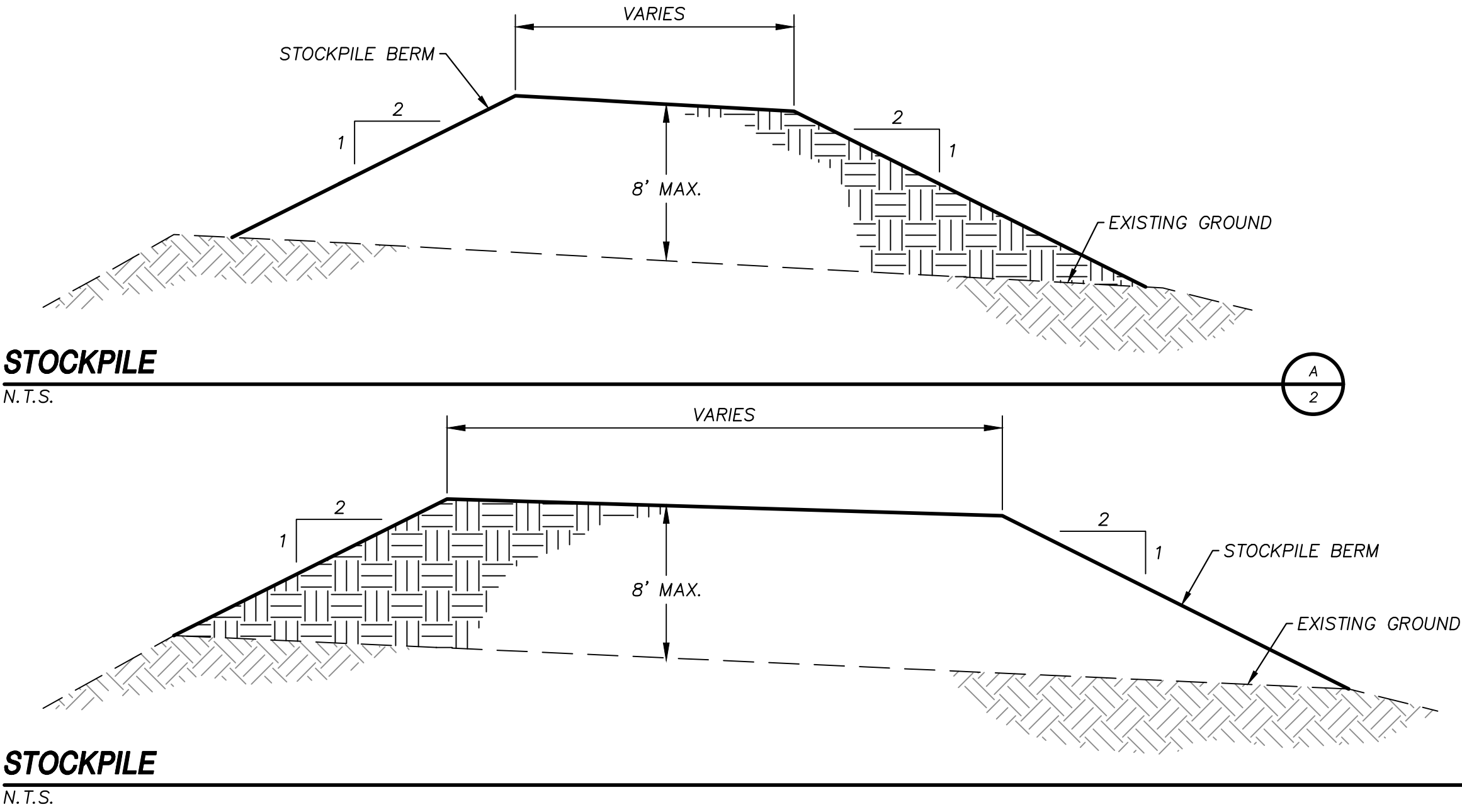
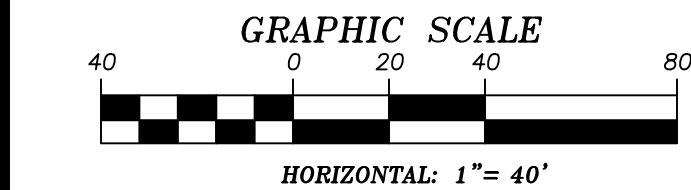


CITY OF LAS VEGAS GRADING NOTES

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

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

COMPACTION TESTING WILL BE PERFORMED BY THE OWNER OR HIS REPRESENTATIVE.
7. ALL CUT AND FILL SLOPES SHALL BE PROTECTED UNTIL EFFECTIVE EROSION CONTROL HAS BEEN ESTABLISHED.
8. THE USE OF POTABLE WATER WITHOUT A SPECIAL PERMIT FOR BUILDING OR CONSTRUCTION PURPOSES INCLUDING CONSOLIDATION OF BACKFILL OR DUST CONTROL IS PROHIBITED. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR CONSTRUCTION WATER.
9. THE CONTRACTOR SHALL MAINTAIN THE STREETS, SIDEWALKS AND ALL OTHER PUBLIC RIGHT-OF-WAY IN A CLEAN, SAFE AND USABLE CONDITION. ALL SPILLS OF SOIL, ROCK OR CONSTRUCTION DEBRIS SHALL BE PROMPTLY REMOVED FROM THE PUBLICLY OWNED PROPERTY DURING CONSTRUCTION AND UPON COMPLETION OF THE PROJECT. ALL ADJACENT PROPERTY, PRIVATE OR PUBLIC SHALL BE MAINTAINED IN A CLEAN, SAFE AND USABLE CONDITION.
10. IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED THAT IS NOT SHOWN ON THESE DRAWINGS, THE OWNER AGREES TO PROVIDE AND INSTALL SUCH ITEM AT HIS OWN EXPENSE AND AT THE DIRECTION OF THE CITY ENGINEER. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERMS, ROAD SIGNS AND BARRICADES, ETC.
11. STOCKPILE MATERIALS SHALL CONSIST OF CLEAN EARTH FILL UNLESS OTHERWISE APPROVED BY THE CITY OF LAS VEGAS
12. STOCKPILES WITH HEIGHT OVER 4 FT MUST BE PROVIDED WITH TEMPORARY FENCING
13. THE CITY WILL NOT ISSUE A STOCK PILE PERMIT PRIOR TO THE DUST MITIGATION PLAN APPROVED BY THE CLARK COUNTY. STOCKPILE TO COMPLY WITH APPROVED CLARK COUNTY DUST MITIGATION PLAN #XXXXX



LEGEND

- PROPOSED LIMITS OF DISTURBANCE ————
- PROPOSED TOP OF STOCKPILE BERM ————
- FUTURE MAJOR CONTOUR ————
- FUTURE MINOR CONTOUR ————
- EXISTING MAJOR CONTOUR - - - - -
- EXISTING MINOR CONTOUR - - - - -

**PARCEL B
STOCKPILE**
AREA = 140,300 SF/3.22 AC
VOLUME = 36,750 CY

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.

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



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NOT FOR CONSTRUCTION

CLV 00-00000		DRAWING NO. 2 / 2		HORIZ.: 1"=30'		VERT.: NONE		STOCKPILE PLAN		SUMMERLIN VILLAGE 22 PARCEL B STOCKPILE		 SUMMERLIN®		 2270 Corporate Circle Suite 200 Henderson, Nevada 89074 Telephone: +1702.263.7275 Fax: +1702.263.7200		REVISONS			
DESIGNED BY: N. BARCOS		DRAWN BY: T. YOHHAN		CHECKED BY: C. ANDERSON		DATE: JULY, 2019		JOB NO. 100060655		REV.		DESCRIPTION		BY		DATE		APPROVAL	