DS #: 5157

APN: 137.27.510.001

PROJECT: Cascades Summerlin Village 21. Parcel L

SUBMITTAL: 1st

SCANNED BY/DATE:

CHECKED BY/DATE:

| CITY OF LAS VEGAS<br>INTER-OFFICE MEMORANDUM | | | | DATE:<br>July 31, 2019 |
|---|---|---|---|---|
| TO:<br>**Land Development Services**<br>Department of Building & Safety | | | | FROM:<br>Albert Sung, P.E.<br>Flood Control Project Engineer<br>Department of Public Works |
| **SUBJECT:** | Drainage Study for:<br>**Cascades Summerlin Village 21 – Parcel L** | | | **COPIES TO:**<br>Actus |
| **Cross Streets:** | SWC Desert Foothill Dr. & Kindle Corner Ave | | | Howard Hughes Company, LLC |
| **File Number:** | F:\Depot\DSMemos\DS5157A.doc | | | Bart Anderson, P.E., DevCo |
| **Parcel Number:** | 137-27-510-001 | | | CCRFCD |
| **Zoning Action:** | TMP-76889 | | | |
| **FEMA Flood Zone** | YES | NO | X | |
| **Proposed Storm Drain** | YES | NO | X | |

| HISTORY | DATE RECEIVED | DATE REVIEWED | COMMENTS | REVIEW FEES | FEES PAID Payment Trn # |
|---|---|---|---|---|---|
| 1st Submittal | 7/17/2019 | 7/31/2019 | See Comments Below | $400.00 | 3492232: $400 |
| | | | **TOTAL FEES (LDDRS):** | **$400.00** | **----** |

**REMARKS:**

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

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

1. Provide a copy of the zoning/planning conditions associated with this site (**TMP-76889**) with the next submittal to verify compliance with conditions. *Flood Control* will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the *City Council*). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and resubmitted.

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

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

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

3. Sites with a grade difference of 2 feet above or below existing are required to have approval from the *City Planning and Development Department*. The engineer must submit copies of the grading plans and detail sheet with a letter justifying the grade difference to the *City Planning Department* (229-6301). The engineer must provide Planning approval with the next submittal.

4. Drop inlets more than 10'-deep require special design and structural calculations. Provide as such to *City Building & Safety Department* for review and approval prior to the final approval of the subject drainage study.

5. The grading plans show an existing storm drain in *Kindle Corner Avenue*. However, the location of the storm drain being shown directly under the curb & gutter of *Kindle Corner Avenue* is not correct. There was an approved Update done by VTN Nevada on June 25, 2019 that relocated the storm drain to approximately 9' away from the curb. Consult with VTN Nevada for the latest set of improvement plans and revise the existing storm drain accordingly.

   Label the existing storm drains in *Kindle Corner Avenue* and *Desert Foothill Drive* with *City of Las Vegas* recorded drawing numbers on all pertinent exhibits and grading plans.

6. **Sheet C6**: It appears that *Common Element "D"* is composed of two portions, a 33.71' drivable access and a 21.5' drainage easement. However, it was not demonstrated that the 100-year flow will be totally contained in the 21.5' drainage easement. If such is the case, the whole *Common Element "D"* shall be dedicated as a Public Drainage Easement.

7. The curb in front of C.E. "D" is transitioned from roll-curb to "L"-curb. During a major storm event, the high velocity incoming flow from *Dragontail Peak Avenue* will cause splash when it hits the L-curb. Consider zero-curb in front of C.E. "D".

8. It is not clear whether there is any wall opening at the back of the proposed drop inlet in C.E. "D". In case of a worst case scenario that the inlet is totally clogged, there is no overflow path if a wall opening is not provided. Address and resolve in the next submittal.

9. Lot 25 to Lot 28 are below the corresponding street grade in *Kindle Corner Avenue*. *Detail Section 11/C7* should not be used to represent the grade difference. Provide a new detail to show the correct relationship between the lot and the corresponding street. The property wall for Lot 25 to Lot 28 must be solid grouted to three courses minimum for flood protection.

10. Revise Detail Sections 12/C7, 13/C7, 14/C7 and 26/C7 to provide minimum of three courses solid grout wall (8"-CMU or equivalent).

11. All drainage easements must be public drainage easements to be privately maintained and common lots to be labeled on the grading plans and to be dedicated as such in the final map.

12. The engineer must provide a table on the grading plans that shows a quantity estimate of all drainage improvements within Public Drainage Easements. All drainage improvements within Public Drainage Easements must be bonded and inspected.

13. Add a note in all pertinent sheets for the construction of all storm drain drop inlets per a newly adopted USDCCA Drawing No. 421 (*Stormwater Quality Management Stamp and Sign Detail*).

**In an effort to increase administrative efficiency, for all original and re-submittal packages including updates and the addenda, the City of Las Vegas Public Works Department requires both a hardcopy and a digital copy (PDF) on CD for the drainage study.**

**A letter sealed and signed by a Nevada registered civil engineer must be included in every submittal certifying documents on the electronic CD matches 100% of the hardcopy submittal. The new submittal requirement is effective on May 1, 2019. If there are any questions regarding these new requirements, please contact Albert Sung in the City Flood Control Section at (702) 229-6541.**

Sample Letter to certify CD.pdf

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

**END OF REMARKS**
ays

T/R/S: T20S/R59E/27
AREA K-27

August 19, 2019

3283 E. Warm Springs Road
Suite 300, Las Vegas, NV 89120
(702) 586-9296

Linda Hartman-Maynard
Department of Planning
Development Services
333 N. Rancho Drive
Las Vegas, NV 89106

**Re: City Planning Grading Approved Letter – Cascades (Summerlin Village 21 Parcel L)**
**(TMP-76889, APN: 137-27-510-001)**

Mrs. Hartman-Maynard,

On behalf of our Client, William Lyon Homes, we respectfully request your approval regarding the grading difference greater than two feet for this project site. The site was generally lowering and raising the site to match the proposed drainage patterns established by the Summerlin Master Plan.

We hope the above responses satisfy any concerns. If you have any questions or need any additional information, please feel free to call our office at (702) 586-9296.

Sincerely,

Darryl Lattimore, P.E.
President

PLANS APPROVED
PLANNING
Dept. of Planning
City of Las Vegas, Nevada
2' for - GRADE DIFFERENCE ONLY
LHM AUG 20 2019

Conforms to the minimum requirement of LVMC Title 19; applicable Master Plan Development standards and/or Conditions of Approval. Make No Change Without Approval. Plan Is Not a Permit to Violate Any Ordinance.

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

# DRAINAGE STUDY INFORMATION FORM

Name of Development: Cascades Summerlin Village 21 - Parcel L Date: 7/16/2019

Location of Development: a) Descriptive (Cross Streets) North/South: Desert Foothills Drive

East/West: Kindle Corner

b) Section: 27 Township: 20S Range: 59E

c) APN : 137-27-510-001

Name of Owner: Howard Hughes Company, LLC c/o William Lyon Homes

Telephone No.: 702-263-8200 Fax No.: N/A E-Mail Address: eddie.duenas@lyonhomes.com

Address: 1980 Festival Plaza Drive, Suite 500, Las Vegas, NV 89118

**Contact Person-Name:** Darryl Lattimore **Telephone No.:** (702) 586-9296

* **E-Mail Address:** darryl.lattimore@actus-nv.com **Fax No.:** N/A

**Firm:** Actus

**Address:** 3283 E. Warm Springs Road Suite 300, Las Vegas, NV 89120

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At Site: 7.47+/- Being Developed/Disturbed: 7.47+/-
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.): Single Family Residential
5. Approximate upstream land area which drains to the subject site: 0 +/-
6. Has the site drainage been evaluated in the past? ■ **YES** ☐ **NO** If yes, please identify documentation: 2018 Summerlin West Planning Area Master Plan Update
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Proposed infrastructure in Desert Foothills Drive
8. Briefly describe your proposed schedule for the subject project: ASAP

PROFESSIONAL ENGINEER — STATE OF NEVADA
DARRYL C. LATTIMORE
EXP: 12/31/19
CIVIL
No. 17516

7/16/2019

Engineer's Seal

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

***New Required Field**

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

| Revision | Date |
|---|---|
| | |
| | |
| | |

Local Entity File No.

REFERENCE:

STANDARD FORM 1

Updated 05/01/2008

# TECHNICAL DRAINAGE STUDY

**For**

# Cascades

# (aka Summerlin Village 21 – Parcel L)

**(APN: 137-27-510-001)**

Desert Foothills Drive and Kindle Corner Avenue

City of Las Vegas

Date: July 16, 2019

Prepared for:

Willian Lyon Homes
1980 Festival Plaza Drive, Suite 500
Las Vegas, NV 89118

Prepared By: Christian O'Quinn

Reviewed By: Darryl Lattimore, P.E.

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

# DRAINAGE SUBMITTAL CHECKLIST

| | |
|---|---|
| Project Name: Summerlin V21 - Parcel E & F | Map ID: |
| Firm Name: Actus | Engineer: Darryl Lattimore |
| Address: 3283 E. Warm Springs Road, Suite 300 | |
| City: Las Vegas | State: NV Zip: 89120 |
| Phone Number: (702) 586-9296 | Fax Number: N/A |
| Property Owner: Willian Lyon Homes | |
| Address: 1980 Festival Plaza Drive, Suite 500 | |
| City: Henderson | State: NV Zip: 89118 |

| Reviewed By: | Date Received: | Date Accepted for Review: |
|---|---|---|
| | | |

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

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

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

## I. GENERAL REQUIREMENT

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

## II. MAPS AND EXHIBITS

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

| **REFERENCE:** | **STANDARD FORM 2** |
|---|---|

# DRAINAGE SUBMITTAL CHECKLIST

**II. MAPS AND EXHIBITS (Continued)**

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

**III. DRAINAGE PLAN**

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

| **REFERENCE:** | **STANDARD FORM 2** |
|---|---|

# DRAINAGE SUBMITTAL CHECKLIST

**III. DRAINAGE PLAN (Continued)**

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

| **REFERENCE:** | **STANDARD FORM 2** |
|---|---|

# 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. |
| x | | Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from the $Q_{100}$ flows. |
| x | | Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent. |
| | 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 | |
|---|---|---|
| x | | Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated. |
| x | | Input and output information for existing conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models. |
| x | | Input and output information for future conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models. |
| x | | Use of correct precipitation values in and around the McCarran Airport rainfall area. |
| x | | A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs, supporting assumptions, and calculations. |
| x | | A summary table of stormwater flows showing basin area, $Q_{10}$ and $Q_{100}$ for both individual basins and combined basin flows, where applicable. |
| x | | Copies of supporting technical information referenced from a previously approved study and a statement accepting these results. |
| x | | On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners in accordance with current Nevada Drainage Law. |
| | N/A | Calculation for impervious area for parking lots and LIDs (if required). |

| **REFERENCE:** | **STANDARD FORM 2** |
|---|---|

# DRAINAGE SUBMITTAL CHECKLIST

**V. HYDRAULIC ANALYSIS**

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

| **REFERENCE:** | **STANDARD FORM 2** |
|---|---|

# CITY OF LAS VEGAS

## MINIMUM DRAINAGE STUDY CRITERIA
## STANDARD FORM 2 CHECKLIST SUPPLEMENT

**(Revised 5/18/11)**

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

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

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

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

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

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

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

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

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

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

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## I. INTRODUCTION

### A. Study Overview and Purpose

This study is intended to serve as the Technical drainage study for Cascades (aka Summerlin Village 21 – Parcel L). See Figure 1a, *Vicinity Map, and* Figure 1b*, Location Map*. The overall project is 9.28± gross acres (7.47± net acres) and is located within the City of Las Vegas. The project is comprised of 54 single-family residential lots and will be developed in one phase. This study is a stand-alone document, and, presents the findings of a detailed hydrologic analysis of the site and the contributing watershed areas. Please note that this study will provide hydrology summations for the Existing, and the Interim/Ultimate Conditions to meet mandated City of Las Vegas and the *Clark County Flood Control District Hydrologic Criteria and Drainage Design Manual (HCDDM)* requirements.

### B. Location

The proposed project is located in the East Half (E ½) of the Northeast Quarter of (NE ¼) Section 27, Township 20 South, Range 59 East, M.D.M., City of Las Vegas, Nevada, commonly known as APN: 137-27-510-001. The single-family development is located on the southwest corner of the intersection of Desert Foothills Drive and Kindle Corner Avenue (See Figure 2 in the Appendix of this report).

### C. FEMA Flood Plain Information

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Community-Panel Number 32003C 2150E, effective September 27, 2002, the site is located within Zone 'X'. Zone 'X' consists of areas lying outside of the 0.2% annual chance floodplain (500-year flood event). Figure 3, *Flood Insurance Rate Map*, depicts the FEMA flood zones within proximity of the site. Figure 3 is provided in the Appendix of this study.

### D. CCRFCD Master Plan Information

As shown on Figure F-22 from the 2018 *Flood Control Master Plan Update of the Las Vegas Valley* (Figures 4 and 5 of this report), the subject site is adjacent to proposed facility, 'APDF 0026'. Said proposed facilities are currently under construction and will provide approved storm drain collection stubs for the project site as discussed within the *Existing Conditions Drainage Description* section of this study. The site is shown to be located within regional basin 'SWFH-8' on Figure W-24 - *Gowan Watershed* (Figure 6 of this report).

## E. Reference Studies

The studies/plans utilized to prepare this study are as follows:

- *Update #1 to the Flood Control Master Plan Update for Summerlin West Planning Area, DS#4926*, *VTN (2019)* and addenda, herein referred to as the '***SWPA Master Study'***. This study was used as the basis of the onsite 100-year runoff conveyed to the proposed drainage facilities in Desert Foothills Drive within the referenced *DFD Study* below.

- *Technical Drainage Study for Summerlin West Village 21 Desert Foothills Drive (Redpoint to Summerlin Parkway), DS#5052, VTN (2018 and 2019)* and addenda, herein referred to as the "***DFD Study***". *The DFD study* was provided to show the hydraulics of the proposed storm drain laterals to the proposed main facilities in Desert Foothills Drive and the anticipated runoff conveyed from Parcel L into said facilities. Please note that the 10-year runoff criteria was not analyzed for Desert Foothills Drive within the *DFD Study.* Proposed drop inlets in Desert Foothills Drive and Kindle Corner Avenue were sized to collect all of the 100-year runoff and therefore all of the 10-year runoff accordingly to the *DFD Study*.

- *Technical Drainage Study for Summerlin West Village 21 Kindle Corner Ave & Kettle Ridge Drive, DS#5111, VTN (2018 and 2019)* and addenda, herein referred to as the "***Kindle Study***". *The Kindle Study* was provided to establish the depth of flow in Kindle Corner Avenue on the northern boundary of the project site. The roadway will be fully developed, and no runoff enters the site from Kindle Corner Avenue. This study is provided to verify the proposed lots adjacent to the northern boundary of the project meet the finished floor elevation criteria as well as to establish the necessary entry freeboard.

- *Technical Drainage Study for Summerlin Village 21 Redpoint Drive Improvements (Fox Hill Drive to Desert Foothills Drive), DS#5088, GCW (2019)* and addenda, herein referred to as the *"**RDI Study**".* This study was used as the basis for the anticipated depth of flow in the proposed cosway to the south of the Parcel L. The *RDI Study* depicts a diversion berm that will convey offsite runoff tributary to Redpoint Drive to the east to proposed drainage facilities in Desert Foothills Drive.

The engineer has reviewed the referenced studies and concurs that the current and proposed conditions are the same as those from the referenced study.

# II. DRAINAGE BASIN DESCRIPTIONS

## A. Site Description

The overall site is surrounded by undeveloped property. The site has an overall slope of 5% percent and slopes from west towards east.

## B. Offsite Drainage Description

The offsite drainage description includes analysis of the properties tributary to the project site or into the streets adjacent to the project site. All of the referenced studies are approved at the time of the report, as well as the civil improvement plans for the subject projects. The assumptions prior to construction of the current Cascades project:

*DFD Study*: The Desert Foothills drainage improvements (10x8 RCB with various drop inlets/RCPs) are complete and roadway is substantially complete. Said drainage improvements will accept runoff from the current project site via one 30-inch RCP installed specifically to collect runoff from this project site.

*RDI Study*: The diversion berm south of Parcel L is complete. Proposed finished floor elevations for the lots within Cascades adjacent to Redpoint Drive will reside at or above the freeboard requirements in the berm area.

All pertinent referenced material regarding offsite flows can be found in the Reference section of this study.

## C. Existing Condition Drainage Description

The Existing Condition considers the currently undeveloped project site. The project site (see Figure 7, *Existing Condition Basin Map* in the Appendix). A description of the Existing Condition flows are as follows using the assumptions in the *Section II Subsection B (Offsite Drainage Description)*:

Onsite:

Flows from the onsite basins discharge east towards Desert Foothills Drive in the existing condition. A 30" RCP has been proposed to collect the runoff from Parcel L into facilities in Desert Foothills Drive.

Kindle Corner Avenue (northern boundary of project):

The *Kindle Study* provided normal depth calculations for the street based on the Basin DES3 from the *SWPA Master Study* (*See Figure 7 – Existing Condition Basin Map*). Based on the depth of flows, no runoff from Kindle Corner Avenue will enter the project site. Please look at the reference section for Summerlin West Village 21 Kindle Corner Ave & Kettle Ridge Drive for the cross sections completed with the roadway.

Desert Foothills Drive (eastern boundary of project):

The only runoff within Desert Foothills Drive is based upon the delineated Basin DES4 in the *SWPA Master Study* (see Figure 7 – Existing Condition Basin Map). Said basin included the common elements adjacent to the project site and establishes 30 cfs in the 100-year flood event. Please note that the 10-year flood event was not considered in either the *SWPA Master Study* or the *DFD Study*.

All pertinent referenced material regarding offsite flows can be found in the Reference section of this study.

### D. Interim/Ultimate Conditions Drainage Description

The Interim/Ultimate Condition considers the project site and offsite street fully developed while other offsite areas remain in their existing condition. A description of the interim/ultimate Condition flows are as follows using the assumptions in the *Section II Subsection B (Offsite Drainage Description):*

The entry was for the project site has been humped in order to keep flows from Kindle Corner Avenue from entering the site. All flows within the site will convey southeast of the project site into an easement for a total of 30 cfs and will be collected underground into Desert Foothills.

Note that the basins were algebraically determine based on the slope of the street and the area of the basins.

All pertinent referenced material regarding offsite flows can be found in the Reference section of this study.

## III. HYDROLOGIC CRITERIA

### A. Method of Analysis

The U.S. Army Corps of Engineers HEC-1 flood hydrograph package was used to determine the peak runoff generated by the 100-year, 6-hour storm event. The HEC-1 computer model can simulate the surface runoff response of a given basin and smaller sub-basins to rainfall. The computed hydrographs from each sub-basin are then combined at the appropriate locations, from which a final discharge hydrograph is obtained. The HEC-1 analysis has been included in the Appendix.

### B. Precipitation

The project site is located outside of the McCarran Airport Rainfall Area. The rainfall depths for the 6-hour, 10-year and 100-year storm events were obtained per the *CCRFCD Hydrologic Criteria and Drainage Design Manual (1999), Section 500, Table 505* with the *RDI Study.* The referenced HEC-1 utilizes 3.4 inches for the 100-year flood event. Since the site encompasses less than 10-square miles a Storm Distribution Number three (SDN #3) was used within the referenced HEC-1 model in the *RFI Study* Section of the *References* of the *Appendix*.

### C. Hydrologic Abstractions

The SCS curve number method was used to determine the infiltration rates for the drainage basins. The engineer utilized the CN numbers utilized in the *RDI Study*. Please see the referenced Standard Form 4 in the *RFI Study* Section of the *References* of the *Appendix*.

**D. Basin Area**

Basin areas for the offsite drainage basins were utilized in this study from the referenced studies. The elevation topography is based on a project specific field survey in conjunction with reference studies within proximity of the site to delineate watersheds tributary to the project site (See Figures 7 and 8). The HEC-1 parameter calculations are referenced in the *RFI Study* Section of the *References* of the *Appendix* and are algebraically divided from Basin L in the *RFI Study.*

**E. SCS Lag-Time with Time of Concentration**

Lag-time, $T_L$, is defined as the time measured from the centroid of effective rainfall to the peak of the outflow hydrograph. Lag-times for this study were estimated by calculating the drainage basins' time of concentration, $T_C$. The time of concentration is defined as the time required for runoff to flow from the hydraulically most distant point of a subbasin to the outlet point of the subbasin. The equation for lag-time is: $T_L=0.6T_C$. Standard Form 4 as included in the CCRFCD Manual was utilized to determine the lag times for subbasins modeled. A copy of the referenced lag time computations is included in the Appendix.

## IV. MODEL RESULTS

**A. Peak Flows**

**TABLE 1**

**HEC-1 Summary (Existing Condition)**

| BASIN ID/CONCENTRATION POINT | DRAINAGE AREA (acres) | Reference | $Q_{100}$ cfs |
|---|---|---|---|
| Parcel L | 7.44 | *SWPA Master Study* | 30 |

1 Referenced from Flood Control Master Plan Update

Flows were algebraically summarized below to determine the Interim/Ultimate Condition flows.

**TABLE 2**

**Flow Summary (Interim/Ultimate Condition)**

| BASIN ID/CONCENTRATION POINT | DRAINAGE AREA (acres) | Reference | $Q_{100}$ cfs |
|---|---|---|---|
| DON1 | 2.60 | *Algebraically based on Master Study* | 10.0 |
| DON2 | 4.84 | *Algebraically based on Master Study* | 20.0 |
| CP1 | - | *DON1+DON2* | 30.0 |

1 Referenced from Flood Control Master Plan Update

**B. Street Flow Calculations**

| Table 3<br>100-year Street Flow Analysis (Ultimate Condition) | | | | | | |
|---|---|---|---|---|---|---|
| Street | Section | Slope (%) | Flow (100 year) | Velocity (ft/s) | Flow Depth (ft) | VxD |
| Street B | B | 7.00 | 10.0 | 4.81 | 0.30 | 1.44 |
| Street C | C | 6.51 | 20.0 | 5.47 | 0.35 | 1.91 |
| Street D | D | 0.69 | 20.0 | 2.64 | 0.46 | 1.21 |

Street Flow Criteria

The minor storm criteria for roadways greater than 80' are required to have 12' wide dry lane maintained in each direction and a VxD product less than or equal to 6. One adjacent roadway falls under that description and that is Desert Foothills Drive. Please note that the 10-year runoff criteria for Desert Foothills Drive was not provided within the *DFD Study.* The drop inlets in Desert Foothills Drive were sized to collect all the 100-year runoff and therefore the 10-year runoff did not have to be analyzed.

**C. Finished Floor Analyses**

Interior to Subdivision:

A finished floor analysis table depicting the proposed lot finished floor elevations, high side TCs, and correlating street flow depths has been utilized to check that the finished floors for the proposed buildings reside above the following criteria:

- Twice the depth of flow measured from the gutter flowline at the high side of the lot
- 18-inches above the centerline elevation of the street in front of the lot measured from middle of lot.
- Finished floors will be set to 6-inches above the top of curb on any portion of the lot per *CCRFCD Manual Section 1602 304.4.E.1*.
- Finished floor elevations will be set above the EGL at T-intersections

All finished floor elevations for the proposed buildings within the project site are above the minimum requirements specified above barring several corner conditions with respect to *CCRFCD*

*Manual Section 1602 304.4.E.1*. Please note that screen wall will have one-course of solid grouting on Lots 29 and 42 as a mitigation for said criteria. In addition, street flow criteria analyses were prepared at the T-intersections (see Section A) and the adjacent lots have finished floor above the EGL (annotated on the 100-year normal depth calculations in the Hydraulic Calculations Section of the Appendix. A copy of the finished floor table can be found in the Hydraulic Calculations section of this report.

Kindle Corner Avenue (Exterior Street):

The worst-case flow-depth (flow depth for minimum slope) is 0.27 ft per the *Kindle Study.* Twice the depth of flow is generally met via the existing L-curb and sidewalk. Solid grouting of walls will not be required against Kindle Corner Avenue.

Desert Foothills Drive (Exterior Street):

The finished floor elevation of lots adjacent to Desert Foothills Drive range between 10 feet to 16 feet above the roadway. Solid grouting of wall will not be required against Desert Foothills Drive.

Lots adjacent to southern cosway along southern boundary:

The *RDI Study* proposes a berm to convey interim condition runoff through said area to the existing facilities in Desert Foothills Drive (See *Fig 5* in the *RDI Study Reference Section* in the Appendix). Please note the 440 cfs in the western portion of the cosway historically combined with the 600 cfs north of Redpoint Drive for a cumulative 1,040 cfs per Figure 5 of the *RDI Study*. Our assumption for development of Parcel L is that the upstream Kindle Corner Avenue is already constructed and has intercepted said upstream 600 cfs. We have conservatively provided a normal depth calculation showing 440 cfs within this berm area. Please note that the ultimate condition within this cosway with be 18 cfs in the 100-year event. The channel contains the proposed runoff and necessary freeboard protections, therefore the proposed wall at the property line will not require solid grouting and the finished floors for the proposed lots are adequately protected.

## D. Drainage Easements

Weir Calculations

The *DFD Study* and *SWPA Master Study* show that runoff generated from onsite development is to be collected by a 30" RCP connecting to a proposed 10x8 RCB in Desert Foothills Drive as discussed in Section II Subsection B (Offsite Drainage Description). Weir calculations where the 100-year runoff within Parcel L converges at southeast drainage easement (between Lots 3 and 4) has been provided in the Appendix.

Normal Depth Calculations

Runoff from site will weir over the proposed curbing at the top of these easements (see section above) and will be collected via an a concrete-lined collection area at the bottom of the easement (see *Hydraulic Calculations - Easement Calculations Section* in the Appendix) via a proposed 17.5' Drop Inlet (15-foot grates). See section below. Please note the collection areas are necessary to collect the full extent of the project site and to also avoid conflicts with proposed sewer and water facilities within said easements.

Drop Inlet Calculations

The drop inlet calculations for the proposed drop inlets in Parcel L (between Lot 3 and Lot 4), have been provided in the Appendix of this study. The necessary head for both of the drop inlets are provided via proposed flood walls above the drop inlets. Please note that the freeboard above said walls should not be necessary since the finished floor elevations of the adjacent lots are well above said walls.

Headwater Nomograph Calculations

Nomograph calculations for the 30-inch pipes for the drainage easement are provided in the Appendix. Please note that the culvert calculations (HGLS) for these pipes were provided in the *DFD Study* and referenced in that section. Additional analysis of the pipe should not be necessary since the current runoff is lower that flows analyzed in the *DFD Study* that proposed said culverts.

## IV. CONCLUSIONS

The *Technical Drainage Study for Cascades (aka Summerlin Village 21 – Parcel L)* has been developed in accordance with criteria established in the Clark County Regional Flood Control District Hydrologic Criteria and Drainage Design Manual. The proposed development does not adversely impact any proposed or existing Clark County Regional Flood Control District Master Plan Update facilities.

## V. REFERENCES


1. *CCRFCD Hydrologic Criteria and Drainage Design Manual and Addenda*, WRC Engineering, 1999.

2. *2018 Las Vegas Valley Flood Control Master Plan Update,* Atkins.

3. *Flood Insurance Rate Map, Community Panel Number 32003C 2150E, Clark County, Nevada, Federal Emergency Management Agency, effective September 27, 2002.*

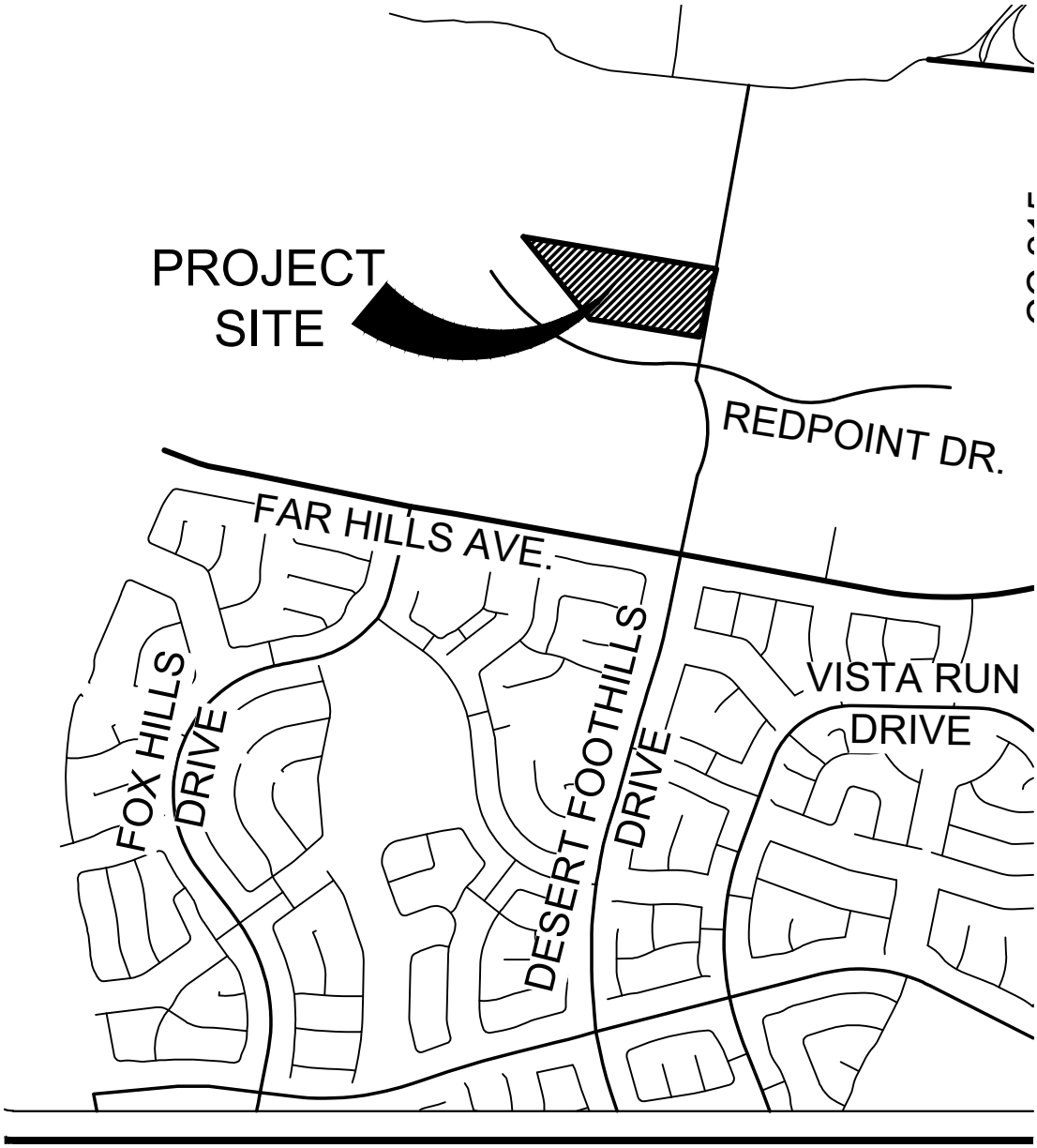
4. *Update #1 to the Flood Control Master Plan Update for Summerlin West Planning Area, DS#4926, and addenda.* VTN (2019)

5. *Technical Drainage Study for Summerlin West Village 21 Desert Foothills Drive (Far Hills Avenue to Street A), DS#5013, and addenda,* VTN (2018 and 2019)

6. *Technical Drainage Study for Summerlin West Village 21 Kindle Corner Ave & Kettle Ridge Drive (Sky Vista to Desert Foothills), DS#5111,* VTN (2019)

7. *Technical Drainage Study for Summerlin Village 21 Redpoint Drive Improvements (Fox Hill Drive to Desert Foothills Drive), DS#5088, and addenda,* GCW (2019)

# APPENDIX



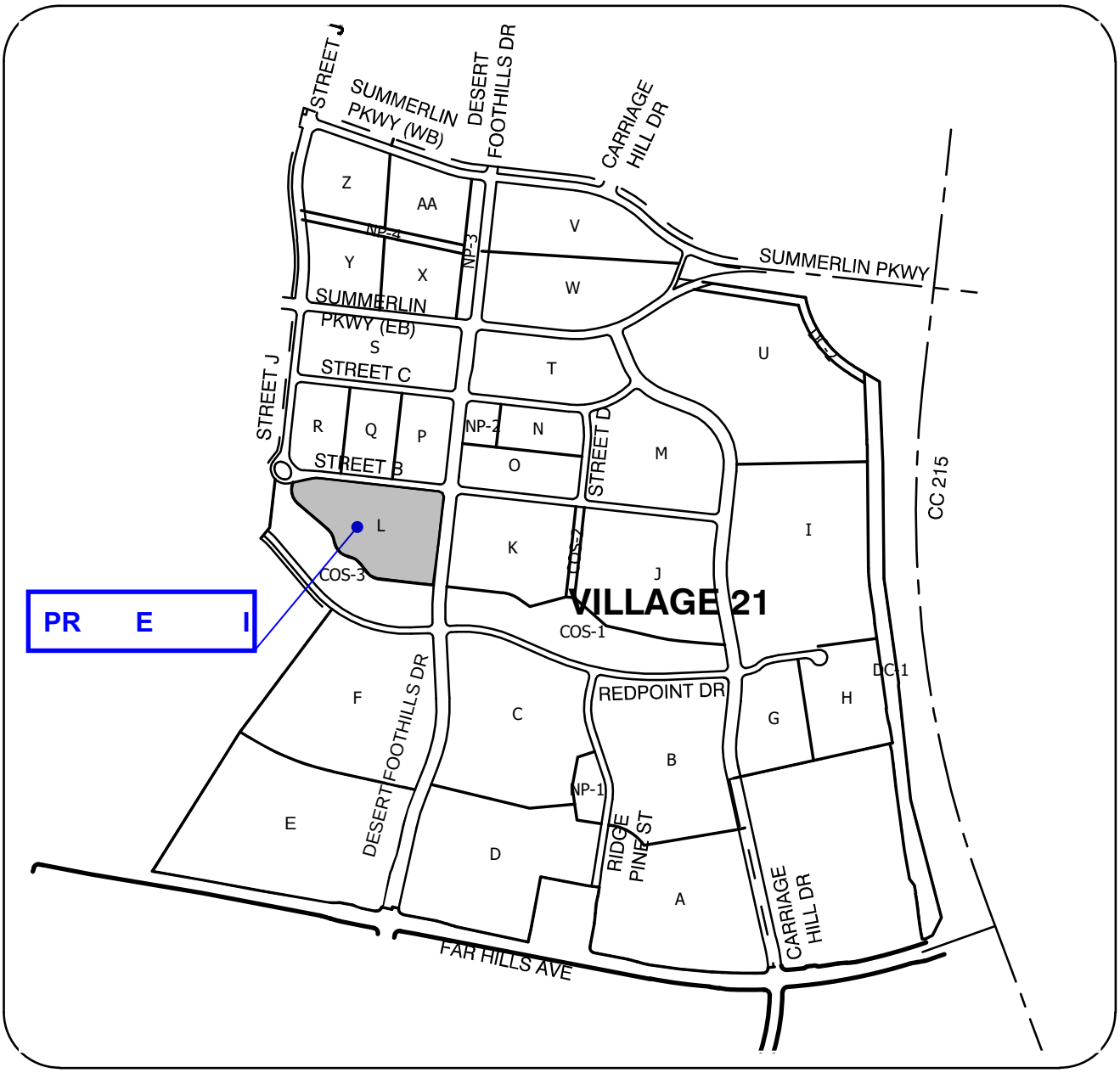

VICINITY MAP

SCALE: NTS

Actus
3203 E. Warm Springs Road
Suite 400
Las Vegas, NV 89120
www. Actus-NV.com
(702) 586-9296
Consulting- Planning-
Engineering - Surveying

**Cascades**
**(aka Summerlin Village 21 - Parcel L)**
**VICINITY MAP**

| | |
|---|---|
| DATE | 7/01/19 |
| DRAWN | Ro.Po |
| DESIGNED | Ro.Po |
| CHECKED | DCL |
| PROJECT # | WLH011803 |
| SHEET NUMBER | FIGURE 1a |




LOCATION MAP

SCALE: NTS


Actus

3283 E. Warm Springs Road Suite 300

Las Vegas, NV 89120

www. Actus-NV.com

(702) 586-9296

Consulting- Planning- Engineering - Surveying


# Cascades

**(aka Summerlin Village 21 - Parcel L)**

## LOCATION MAP

| | |
|---|---|
| DATE | 7/01/19 |
| DRAWN | Ro.Po. |
| DESIGNED | Ro.Po. |
| CHECKED | DCL |
| PROJECT # | WLH011803 |
| SHEET NUMBER | FIGURE 1b |

NOTES

This map is for assessment use only and does NOT represent a survey.

No liability is assumed for the accuracy of the data deliniated herein. Information on roads and other non-assessed parcels may be obtained from the Road Document Listing in the Assessor's Office.

This map is compiled from official records, including surveys and deeds, but only contains the information required for assessment. See the recorded documents for more detailed legal information.

USE THIS SCALE(FEET) WHEN MAP REDUCED FROM 11X17 ORIGINAL

0 100 200 400 600 800

MAP LEGEND

# ASSESSOR'S PARCELS - CLARK COUNTY, NV.
## Briana Johnson - Assessor

- PARCEL BOUNDARY
- SUB BOUNDARY
- PM/LD BOUNDARY
- ROAD EASEMENT
- MATCH / LEADER LINE
- HISTORIC LOT LINE
- HISTORIC SUB BOUNDARY
- HISTORIC PM/LD BOUNDARY
- SECTION LINE
- CONDOMINIUM UNIT
- AIR SPACE PCL
- RIGHT OF WAY PCL
- SUB-SURFACE PCL
- 001 ROAD PARCEL NUMBER
- 001 PARCEL NUMER
- 1.00 ACREAGE
- 202 PARCEL SUB/SEQ NUMBER
- PB 24-45 PLAT RECORDING NUMBER
- 5 BLOCK NUMBER
- 5 LOT NUMBER
- GL5 GOV. LOT NUMBER

BOOK T20S R59E

| | | |
|---|---|---|
| 127 | 126 | 125 |
| 136 | 137 | 138 |
| 165 | 164 | 163 |

Scale: 1" = 200'

SEC. 27

| | | | | | |
|---|---|---|---|---|---|
| 6 | 5 | 4 | 3 | 2 | 1 |
| 7 | 8 | 9 | 10 | 11 | 12 |
| 18 | 17 | 16 | 15 | 14 | 13 |
| 19 | 20 | 21 | 22 | 23 | 24 |
| 30 | 29 | 28 | 27 | 26 | 25 |
| 31 | 32 | 33 | 34 | 35 | 36 |

Rev: 7/10/2019

MAP N 2 NE 4

| | | | |
|---|---|---|---|
| 8 | 4 | 8 | 4 |
| 5 | 1 | 5 | 1 |
| 6 | 2 | 6 | 2 |
| 7 | 3 | 7 | 3 |
| 8 | 4 | 8 | 4 |
| 5 | 1 | 5 | 1 |

137-27-5

CLARK COUNTY NEVADA

PT 2

PM 124-51

PT 137-22-301-001

PT 2

PT 137-27-601-001

PT 2

PM 91-28

PM 124-51

PT F

PT 137-27-615-001

PT 137-23-410-001

PT 1

KINDLE CORNER WAY

001

012 013 011 010 009

49 11 10 9 8

003

510

SUMMERLIN VILLAGE 21 - UNIT 3

PB 159-50

001
7.47

PROJECT SITE

COS-3

L

005

REDPOINT DR

002
5.92

006

004

002

DESERT FOOTHILLS DR

007 008 025 024

6 7 42 41

023
40

50

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22

PT 137-27-615-001

PT 137-26-212-019

PT 137-26-613-001

PT 1 PT 3 PT 23

**FIGURE 2**

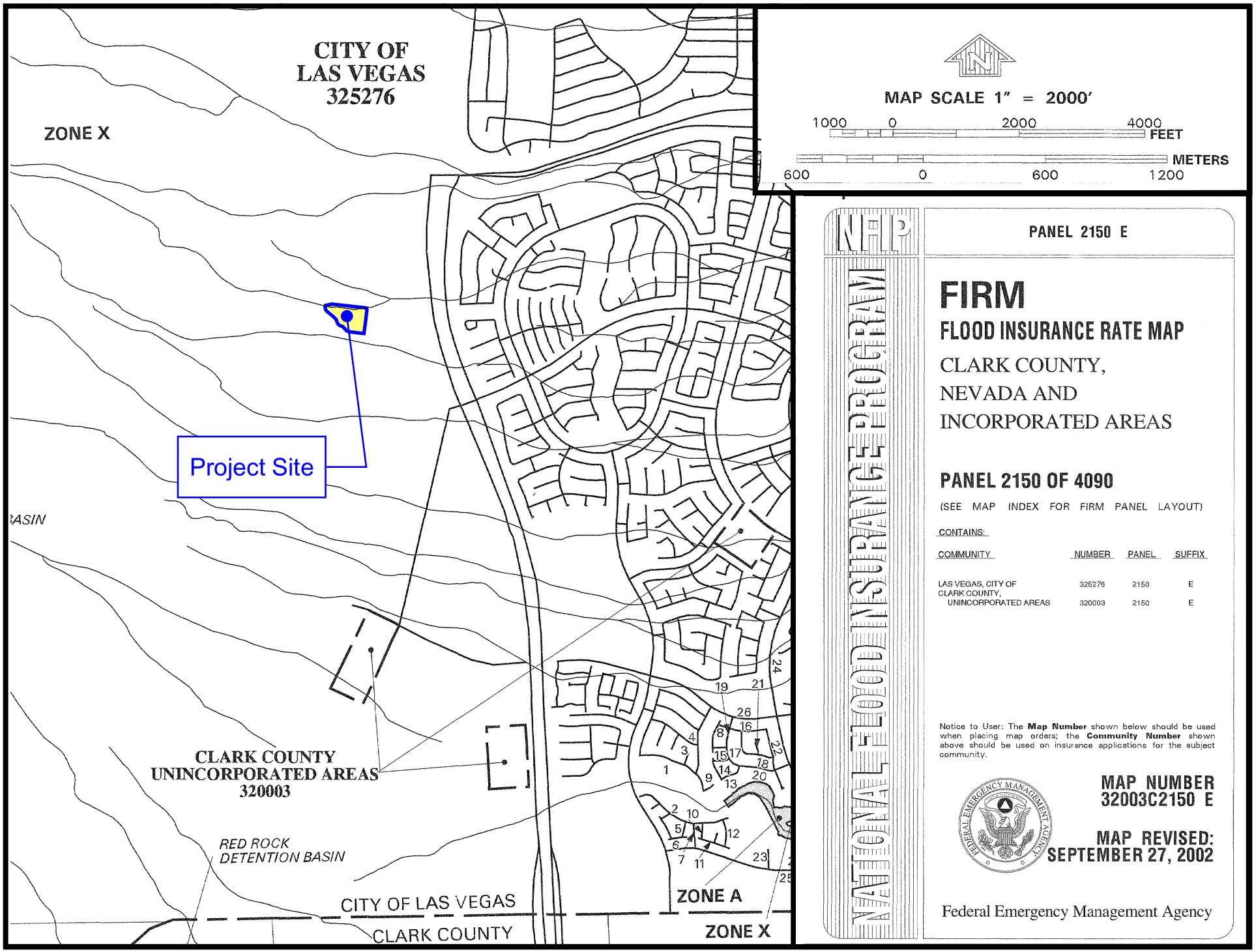
CITY OF
LAS VEGAS
325276
ZONE X
Project Site
CLARK COUNTY
UNINCORPORATED AREAS
320003
RED ROCK
DETENTION BASIN
CITY OF LAS VEGAS
CLARK COUNTY
ZONE A
ZONE X
MAP SCALE 1" = 2000'
1000 0 2000 4000
FEET
600 0 600 1200
METERS
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 2150 E
FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY,
NEVADA AND
INCORPORATED AREAS
PANEL 2150 OF 4090
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
LAS VEGAS, CITY OF 325276 2150 E
CLARK COUNTY,
UNINCORPORATED AREAS 320003 2150 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
32003C2150 E
MAP REVISED:
SEPTEMBER 27, 2002
Federal Emergency Management Agency

**FIGURE 3**

| ID / Mile | Status | Facility Description | Length (ft.) | Flow (cfs) | HEC-1 Node | HEC-1 Model | Tributary Area (sq.mi.) | Channel Slope (%) ** |
|---|---|---|---|---|---|---|---|---|
| **APAD** | | **ANGEL PARK - ALTA DRIVE BRANCH** | | | | | | |
| 0203 | E | 2: 7' X 5.5' RCB | 1104 | 2200 | CSWAA-1 | GOW3A | 6.95 | 5.28 |
| 0225 | E | 2: 7' X 5.5' RCB OUTLET | 360 | 2137 | SUM5DB | GOW3A | 6.73 | 3.40 |
| **APBE** | | **ANGEL PARK - BELTWAY BRANCH** | | | | | | |
| 0022 | E | CONC CHNL 20'W 7'D 2:1 SS | 1556 | 3366 | CCSWFH15 | GOW3A | 3.39 | 1.81 |
| 0051 | E | CONC CHNL 20'W 7'D 2:1 SS | 1583 | 3366 | CCSWFH15 | GOW3A | 3.39 | 2.77 |
| 0081 | E | 8' X 8' RCBC @ FAR HILLS | 777 | 1048 | CSWFH-15 | GOW3A | 0.59 | 2.32 |
| 0094 | E | CONC CHNL 10'W 5'D 2:1 SS | 1465 | 1048 | CSWFH-15 | GOW3A | 0.59 | 1.88 |
| 0122 | E | CONC CHNL 10'W 4'D 2:1 SS | 1685 | 1048 | CSWFH-15 | GOW3A | 0.59 | 0.80 |
| 0154 | P0 | 8' X 6' RCB | 5012 | 781 | CSWFH-12 | GOW3A | 0.41 | 1.30 |
| 0249 | P0 | 6' X 5' RCB | 2858 | 606 | CSWFH-11 | GOW3A | 0.31 | 3.00 |
| **APCH** | | **ANGEL PARK - CARRIAGE HILL BRANCH** | | | | | | |
| 0000 | E | 8' X 6' RCB | 152 | 399 | CSWFH-14 | GOW3A | 0.21 | 0.87 |
| 0003 | P0 | 72" RCP | 1685 | 399 | CSWFH-14 | GOW3A | 0.21 | 2.00 |
| 0031 | P0 | 60" RCP | 2008 | 206 | SWFH-13 | GOW3A | 0.10 | 1.38 |
| **APD2** | | **ANGEL PARK - DESERT FOOTHILLS 2 BRANCH** | | | | | | |
| 0002 | E | 7' X 6' RCB | 883 | 674 | SWAA-2 | GOW3A | 0.68 | 1.08 |
| **APDF** | | **ANGEL PARK - DESERT FOOTHILLS BRANCH** | | | | | | |
| 0000 | P0 | 10' X 6' RCB | 1788 | 1428 | CSWFH-9 | GOW3B | 0.80 | 3.55 |
| 0026 | P0 | 8' X 6' RCB | 1813 | 968 | CSWFH-8 | GOW3A | 1.80 | 2.00 |
| 0073 | P0 | 6' X 4' RCB | 1922 | 486 | CSWFH-4 | GOW3A | 1.52 | 4.40 |
| 0123 | P0 | 42" RCP | 1076 | 141 | GPDB | GOW3A | 1.29 | 6.00 |
| 0125 | P0 | 130 AC-FT GRAND PARK DETENTION BASIN | | 1543 | CSWFH-3 | GOW3A | 1.29 | |
| 0127 | P0 | 6' X 6' RCB | 2977 | 853 | SWFH-1 | GOW3A | 0.69 | 3.80 |
| 0128 | P0 | 5' X 4' RCB | 2197 | 509 | SWFH-2 | GOW3A | 0.37 | 5.70 |
| **APFH** | | **ANGEL PARK - FAR HILLS BRANCH** | | | | | | |
| 0000 | E | 2: 8' X 8' RCB | 1070 | 2494 | CCSWFH14 | GOW3B | 1.51 | 3.50 |
| 0019 | E | 2: 8' X 8' RCB | 250 | 2149 | CCSWFH-9 | GOW3B | 1.30 | 4.19 |
| 0024 | E | 16' X 8' RCAP | 1951 | 2149 | CCSWFH-9 | GOW3B | 1.30 | 5.10 |
| 0061 | E | 8' X 6' RCB | 1435 | 839 | CSWFH-7 | GOW3A | 0.50 | 2.00 |
| 0089 | E | 8' X 6' RCB | 2946 | 839 | CSWFH-7 | GOW3A | 0.50 | 2.00 |
| 0144 | P0 | 5' X 4' RCB | 2497 | 456 | SWFH-6 | GOW3A | 0.28 | 5.50 |
| **APM5** | | **DETENTION BASIN #5** | | | | | | |
| 0000 | E | 384 AC-FT DETENTION BASIN #5 | | 6856 | SUM5IN | GOW3A | 6.73 | |
| 0008 | P0 | CONC CHNL 50'W 4.5'D 2:1 SS | 2102 | 3634 | CCDB54-7 | GOW3A | 4.13 | 5.20 |
| 0009 | P0 | CONC CHNL 50'W 4'D 2:1 SS | 4180 | 3495 | CDB55-7 | GOW3A | 2.60 | 5.80 |
| 0047 | E | DIVERSION BERM WITH GABION BANK PROTECTION | 1000 | 3634 | CCDB54-7 | GOW3A | 4.13 | 1.30 |
| 0056 | P0 | CONC CHNL 80'W 4'D 2:1 SS | 264 | 3634 | CCDB54-7 | GOW3A | 4.13 | 1.30 |
| 0057 | P0 | CONC CHNL 50'W 3'D 2:1 SS | 9922 | 1664 | CDB54-4 | GOW3A | 0.81 | 6.80 |
| 0059 | P0 | CONC CHNL 100'W 3'D 2:1 SS | 9075 | 2606 | CDB54-7 | GOW3A | 3.31 | 7.00 |
| 0212 | P0 | CONC CHNL 30'W 3'D 2:1 SS | 6695 | 1092 | DB55-1 | GOW3A | 0.64 | 7.50 |
| 0213 | P0 | CONC CHNL 50'W 3'D 2:1 SS | 6522 | 1729 | CDB55-5 | GOW3A | 1.30 | 7.30 |
| **APSP** | | **ANGEL PARK - SUMMERLIN PARKWAY** | | | | | | |
| 0183 | E | CONC CHNL 10'W 6'D 2:1 SS | 1680 | 884 | C11B-1 | GOW3A | 0.84 | 1.70 |
| **GOB3** | | **GOWAN LONE MOUNTAIN SYST. 3 BELTWAY** | | | | | | |
| 0000 | E | 66" RCP | 1370 | 341 | SV22-1 | GOW3A | 0.18 | 4.50 |
| **GOBE** | | **GOWAN LONE MOUNTAIN SYST. BELTWAY** | | | | | | |
| 0000 | E | 20' X 10' RCBC @ ACCESS RD | 30 | 1044 | CSV22 | GOW3A | 0.67 | 5.67 |
| 0001 | E | CONC CHNL 20'W 5'D 2:1 SS | 1100 | 1044 | CSV22 | GOW3A | 0.67 | 6.50 |
| 0021 | E | CONC CHNL 11'W 6.8'D 0:1 SS | 2143 | 1044 | CSV22 | GOW3A | 0.67 | 6.50 |
| 0058 | E | CONC CHNL 15'W 7.5'D 0:1 SS | 487 | 1044 | CSV22 | GOW3A | 0.67 | 3.93 |
| 0065 | E | CONC CHNL 17'W 7.5'D 0:1 SS | 844 | 1044 | CSV22 | GOW3A | 0.67 | 0.76 |
| 0088 | E | 2: 10' X 9' RCBC @ LAKE MEAD | 400 | 782 | SV22-2 | GOW3A | 0.49 | 0.50 |
| 0096 | E | CONC CHNL 20'W 9'D 2:1 SS | 627 | 782 | SV22-2 | GOW3A | 0.49 | 0.50 |
| 0108 | E | CONC CHNL 20'W 6'D 2:1 SS | 1021 | 782 | SV22-2 | GOW3A | 0.49 | 0.50 |
| 0127 | E | CONC CHNL 20'W 6'D 2:1 SS | 638 | 782 | SV22-2 | GOW3A | 0.49 | 0.50 |
| 0139 | E | CONC CHNL 10'W 5.5'D 2:1 SS | 1500 | 782 | SV22-2 | GOW3A | 0.49 | 1.02 |
| **GOL3** | | **GOWAN LONE MOUNTAIN SYSTEM-BRANCH 3** | | | | | | |
| 0010 | E | CONC CHNL 20'W 10'D 0:1 SS | 3037 | 3277 | CRCLMT1R | GOW3A | 7.31 | 2.78 |
| 0068 | E | TRANSITION STRUCTURE | 100 | 3277 | CRCLMT1R | GOW3A | 7.31 | 3.50 |
| 0070 | E | 20' X 6' RCBC @ CLIFF SHADOWS | 350 | 1271 | CRCSV22 | GOW3A | 4.99 | 2.44 |
| 0077 | E | CONC CHNL 20'W 6'D 0:1 SS | 1229 | 1271 | CRCSV22 | GOW3A | 4.99 | 6.11 |

| ID / Mile | Status | Facility Description | Length (ft.) | Flow (cfs) | HEC-1 Node | HEC-1 Model | Tributary Area (sq.mi.) | Channel Slope (%) ** |
|---|---|---|---|---|---|---|---|---|
| **GOL3** | | **GOWAN LONE MOUNTAIN SYSTEM-BRANCH 3** | | | | | | |
| 0100 | E | CONC CHNL 20'W 10'D 0:1 SS | 200 | 1271 | CRCSV22 | GOW3A | 4.99 | 5.67 |
| 0115 | E | 96" RCP OUTLET | 670 | 666 | DET26 | GOW3A | 4.31 | 0.29 |
| 0128 | E | 305 AC-FT VILLAGE 26 DETENTION BASIN | | 3615 | VIL26IN | GOW3A | 4.31 | |
| 0137 | E | CONC CHNL 20'W 7.5'D 0:1 SS | 2720 | 3615 | VIL26IN | GOW3A | 4.31 | 6.50 |
| 0188 | E | CONC CHNL 20'W 8'D 0:1 SS | 563 | 3615 | VIL26IN | GOW3A | 4.31 | 3.91 |
| 0197 | E | 14' X 14' RCB | 890 | 3615 | VIL26IN | GOW3A | 4.31 | 0.88 |
| 0214 | E | Dual 10' X 14' RCB | 124 | 3615 | VIL26IN | GOW3A | 4.31 | 0.57 |
| 0216 | P0 | CONC CHNL 50'W 4'D 2:1 SS | 4060 | 3524 | CSV26-1 | GOW3A | 4.02 | 6.08 |
| 0289 | P0 | CONC CHNL 50'W 3.5'D 2:1 SS | 6215 | 2281 | 30 | GOW3A | 2.44 | 7.95 |
| 0290 | E | NATURAL WASH 363'W | 4850 | 1410 | SV26-1 | GOW3A | 1.59 | 22.50 |
| 0370 | E | NATURAL WASH 450'W | 7000 | 2281 | 30 | GOW3A | 2.44 | 8.50 |
| **GOL4** | | **GOWAN LONE MOUNTAIN SYSTEM-BRANCH 4** | | | | | | |
| 0000 | E | 14' X 8' RCB | 554 | 2243 | CLMT1R | GOW3A | 2.33 | 2.50 |
| 0010 | E | 2: 9' X 8' RCB | 820 | 2243 | CLMT1R | GOW3A | 2.33 | 4.74 |
| 0025 | E | SOIL CEMENT CHNL 60'W 8'D 3-4:1 SS | 320 | 2243 | CLMT1R | GOW3A | 2.33 | 2.00 |
| 0026 | E | SOIL CEMENT CHNL 42'W 6'D 3-4:1 SS | 700 | 2243 | CLMT1R | GOW3A | 2.33 | 1.00 |

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

REGIONAL FLOOD CONTROL DISTRICT

**2018 LAS VEGAS VALLEY FLOOD CONTROL MASTER PLAN UPDATE**

**FACILITY INVENTORY FIGURE F-22**

**LEGEND**

ID (Facility Identifier) AABB
Parent Stream Name
Stream Name
Mile 0000
Distance Above Confluence with Parent Stream (Miles)
Miles in Hundredths

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

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

Construction Features

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

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**FIGURE 4**

REGIONAL FLOOD CONTROL DISTRICT

2018
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

# FIGURE F-22
## FLOOD CONTROL FACILITIES

**LEGEND**

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

**Remove & Replace/Parallel Facilities**

| Category A | Category B |
|---|---|
| Channel | Channel |
| Stormdrain | Stormdrain |
| Crossing | Crossing |

PROJECT SITE

# FIGURE 5

N

0 500 1,000 2,000 3,000
Feet

Scale: 1 inch = 2,000 feet

AerialSource:Esri World Imagery 2017

US95 I-15 CC-215 I-215

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54

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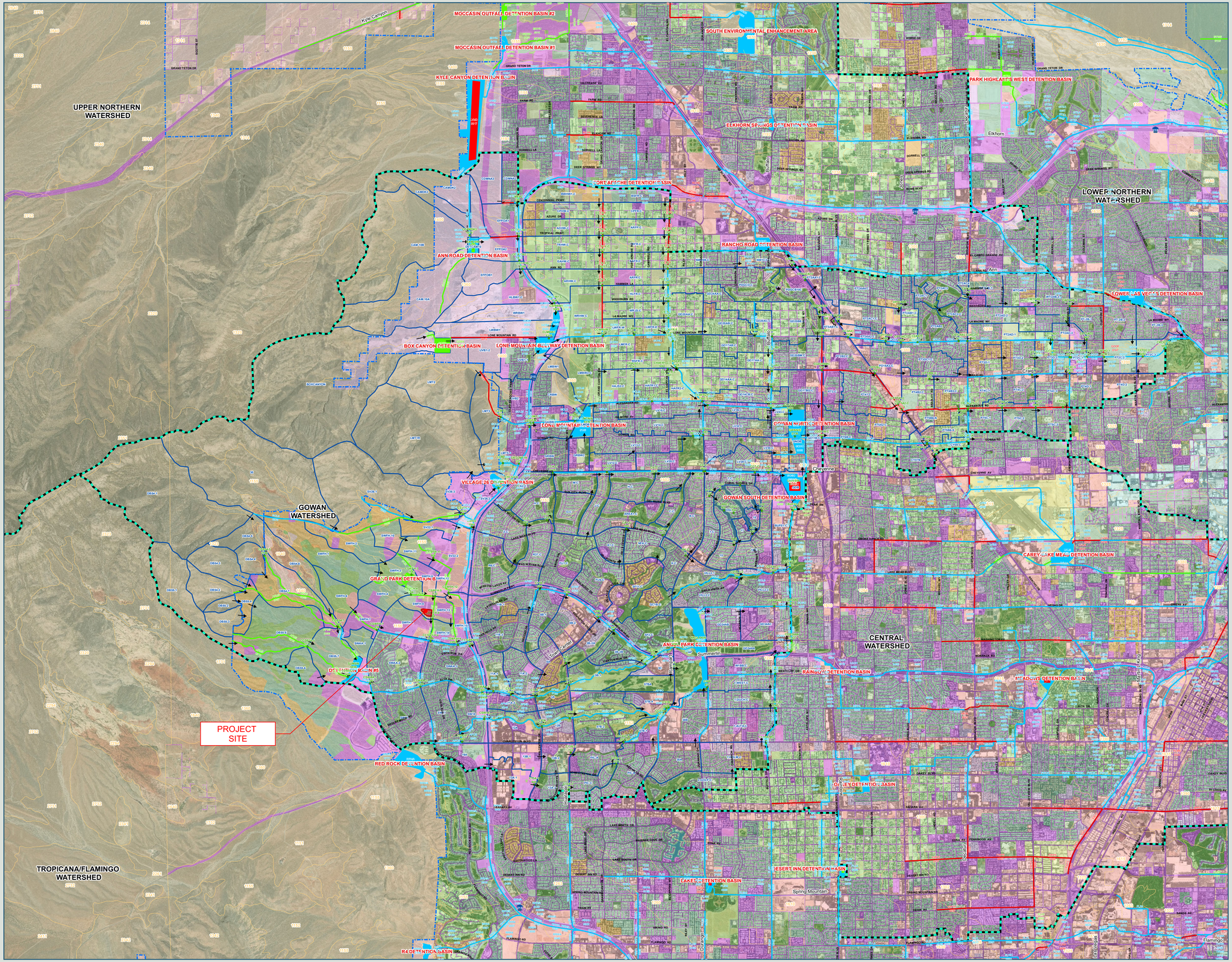
REGIONAL FLOOD CONTROL DISTRICT

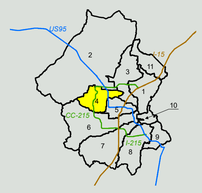
# 2018 Las Vegas Valley Master Plan Update

## Figure W-4
## Gowan Watershed




## Legend

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




N

Scale: 1 inch = 0.65 mile

0 0.325 0.65 1.3

Miles

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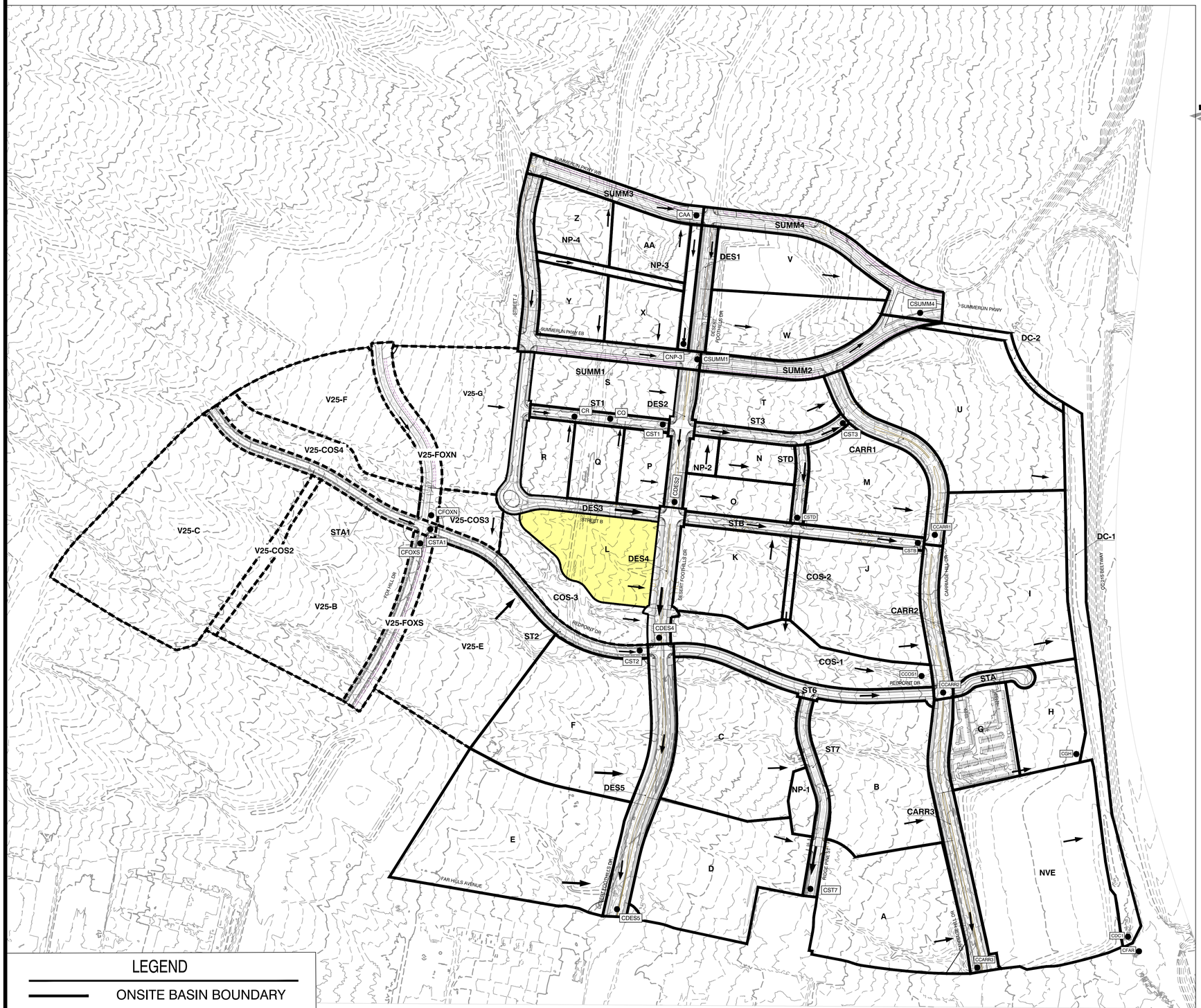
FIGURE 6




GRAPHIC SCALE

300 0 150 300 600

1" = 300'

NORTH

## HEC-1 SUMMARY TABLE
## VILLAGE 21
## ULTIMATE CONDITION

| Basin / Concentration Point | Area (Acre) | | | $Q_{100}$ (cfs) | | | SDN |
|---|---|---|---|---|---|---|---|
| | Update | Previous | Difference | Update | Previous | Difference | |
| SUMM3 | 7.73 | 5.00 | 2.73 | 13 | 30 | -17 | SDN3 |
| Z | 4.50 | 4.50 | 0.00 | 18 | 17 | 1 | SDN3 |
| AA | 4.02 | 3.71 | 0.31 | 17 | 14 | 3 | SDN3 |
| CAA | - | - | - | 48 | - | N/A | SDN3 |
| NP-4 | 1.05 | N/A | N/A | 3 | 0 | n/a | SDN3 |
| NP-3 | 1.14 | 1.49 | -0.35 | 3 | 4 | -1 | SDN3 |
| CNP-3 | - | - | - | 7 | - | N/A | SDN3 |
| SUMM1 | 5.05 | 5.00 | 0.05 | 20 | 19 | 1 | SDN3 |
| Y | 3.98 | 3.98 | 0.00 | 16 | 15 | 1 | SDN3 |
| X | 3.94 | 3.63 | 0.31 | 16 | 14 | 2 | SDN3 |
| DES1 | 1.80 | 1.83 | -0.03 | 8 | 7 | 1 | SDN3 |
| CSUMM1 | - | - | - | 113 | - | N/A | SDN3 |
| S | 6.33 | 6.56 | -0.23 | 24 | 25 | -1 | SDN3 |
| V25-G | 11.44 | N/A | N/A | 45 | - | N/A | SDN3 |
| R | 3.07 | 3.10 | -0.03 | 12 | 11 | 1 | SDN3 |
| CR | - | - | - | 56 | - | N/A | SDN3 |
| Q | 3.16 | 3.16 | 0.00 | 12 | 11 | 1 | SDN3 |
| CQ | - | - | - | 68 | - | N/A | SDN3 |
| ST1 | 1.50 | 1.62 | -0.12 | 7 | 6 | 1 | SDN3 |
| CST1 | - | - | - | 74 | 54 | 20 | SDN3 |
| P | 3.00 | 3.17 | -0.17 | 11 | 11 | 0 | SDN3 |
| DES2 | 2.39 | 2.27 | 0.12 | 10 | 9 | 1 | SDN3 |
| CDES2 | - | - | - | 119 | - | N/A | SDN3 |
| DES3 | 3.73 | 3.78 | -0.05 | 17 | 15 | 2 | SDN3 |
| L | 7.44 | 7.36 | 0.08 | 30 | 26 | 4 | SDN3 |
| COS-3 | 5.90 | 6.10 | -0.20 | 17 | 18 | -1 | SDN3 |
| DES4 | 2.79 | 2.88 | -0.09 | 12 | 11 | 1 | SDN3 |
| V25-F | 10.45 | N/A | N/A | 43 | - | N/A | SDN3 |
| V25-COS4 | 4.64 | N/A | N/A | 15 | - | N/A | SDN3 |
| V25-FOXN | 3.23 | N/A | N/A | 14 | - | N/A | SDN3 |
| CFOXN | - | - | - | 72 | - | N/A | SDN3 |
| V25-B | 19.93 | N/A | N/A | 76 | - | N/A | SDN3 |
| V25-FOXS | 3.19 | N/A | N/A | 11 | - | N/A | SDN3 |
| CFOXS | - | - | - | 85 | - | N/A | SDN3 |
| V25-C | 26.54 | N/A | N/A | 99 | - | N/A | SDN3 |
| V25-COS2 | 1.79 | N/A | N/A | 5 | - | N/A | SDN3 |
| STA1 | 2.98 | N/A | N/A | 13 | - | N/A | SDN3 |
| CSTA1 | - | - | - | 274 | - | N/A | SDN3 |
| V25-E | 17.13 | N/A | N/A | 65 | - | N/A | SDN3 |
| V25-COS3 | 2.37 | N/A | N/A | 8 | - | N/A | SDN3 |
| ST2 | 2.88 | 2.93 | -0.05 | 12 | 12 | 0 | SDN3 |
| CST2 | - | - | - | 360 | - | N/A | SDN3 |
| F | 16.58 | 16.88 | -0.30 | 65 | 59 | 6 | SDN3 |
| E | 20.15 | 20.20 | -0.05 | 78 | 77 | 1 | SDN3 |
| DES5 | 5.83 | 5.46 | 0.37 | 22 | 20 | 2 | SDN3 |
| CDES5 | - | - | - | 624 | - | N/A | SDN3 |
| C | 14.83 | 14.05 | 0.78 | 54 | 44 | 10 | SDN3 |
| NP-1 | 1.27 | 1.35 | -0.08 | 4 | 5 | -1 | SDN3 |
| ST7 | 2.30 | 2.30 | 0.00 | 9 | 9 | 0 | SDN3 |
| D | 14.73 | 15.42 | -0.69 | 56 | 53 | 3 | SDN3 |
| CST7 | - | - | - | 124 | 108 | 16 | SDN3 |
| W | 8.31 | 7.11 | 1.20 | 31 | 27 | 4 | SDN3 |
| SUMM2 | 3.63 | 3.28 | 0.35 | 16 | 13 | 3 | SDN3 |
| T | 5.98 | 5.99 | -0.01 | 23 | 23 | 0 | SDN3 |
| NP-2 | 0.93 | 0.87 | 0.06 | 3 | 3 | 0 | SDN3 |
| ST3 | 1.70 | 2.09 | -0.39 | 8 | 8 | 0 | SDN3 |
| CST3 | - | - | - | 11 | 43 | -32 | SDN3 |
| CARR1 | 3.52 | 3.52 | 0.00 | 15 | 14 | 1 | SDN3 |
| M | 9.11 | 9.11 | 0.00 | 32 | 32 | 0 | SDN3 |
| CCARR1 | - | - | - | 129 | - | N/A | SDN3 |
| N | 2.54 | 2.54 | 0.00 | 10 | 9 | 1 | SDN3 |
| O | 3.47 | 3.43 | 0.04 | 13 | 13 | 0 | SDN3 |
| STD | 0.88 | N/A | N/A | 4 | - | N/A | SDN3 |
| CSTD | - | - | - | 26 | - | N/A | SDN3 |
| K | 8.20 | 8.01 | 0.19 | 30 | 29 | 1 | SDN3 |
| STB | 2.65 | N/A | N/A | 12 | - | N/A | SDN3 |
| CSTB | - | - | - | 68 | - | N/A | SDN3 |
| J | 11.83 | 11.83 | 0.00 | 42 | 42 | 0 | SDN3 |
| COS-2 | 0.58 | N/A | N/A | 2 | - | N/A | SDN3 |
| COS-1 | 7.80 | 7.78 | 0.02 | 22 | 22 | 0 | SDN3 |
| CCOS-1 | - | - | - | 24 | - | N/A | SDN3 |
| CARR2 | 2.45 | 2.49 | -0.04 | 10 | 10 | 0 | SDN3 |
| ST6 | 3.08 | 3.01 | 0.07 | 13 | 12 | 1 | SDN3 |
| CCARR2 | - | - | - | 286 | - | N/A | SDN3 |
| B | 13.90 | 13.71 | 0.19 | 54 | 46 | 8 | SDN3 |
| A | 14.15 | 14.36 | -0.21 | 51 | 47 | 4 | SDN3 |
| CARR3 | 4.87 | 4.85 | 0.02 | 19 | 19 | 0 | SDN3 |
| CCARR3 | - | - | - | 410 | - | N/A | SDN3 |
| V | 7.25 | 7.19 | 0.06 | 29 | 27 | 2 | SDN3 |
| SUMM4 | 4.87 | N/A | N/A | 21 | - | N/A | SDN3 |
| CSUMM4 | - | - | - | 50 | - | N/A | SDN3 |
| DC-2 | 1.19 | 1.40 | -0.21 | 5 | 5 | 0 | SDN3 |
| U | 20.17 | 20.42 | -0.25 | 73 | 74 | -1 | SDN3 |
| I | 18.69 | 18.50 | 0.19 | 61 | 60 | 1 | SDN3 |
| STA | 1.01 | 0.00 | n/a | 5 | 0 | n/a | SDN3 |
| G | 5.01 | 5.71 | -0.70 | 19 | 21 | -2 | SDN3 |
| H | 5.79 | 6.26 | -0.47 | 21 | 22 | -1 | SDN3 |
| CGH | - | - | - | 39 | - | N/A | SDN3 |
| DC-1 | 8.19 | 8.19 | 0.00 | 23 | 25 | -2 | SDN3 |
| NVE | 21.74 | 21.74 | 0.00 | 75 | 79 | -4 | SDN3 |
| CDC1 | - | - | - | 326 | - | N/A | SDN3 |
| CFAR | - | - | - | 1598 | - | N/A | SDN3 |

## LEGEND

- ONSITE BASIN BOUNDARY
- OFFSITE BASIN BOUNDARY
- W51 BASIN DESIGNATION
- CONCENTRATION POINT
- FLOW ARROW

REVISION

| REV | DATE | BY |
|---|---|---|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# 2018 UPDATE TO SUMMERLIN WEST PLANNING AREA

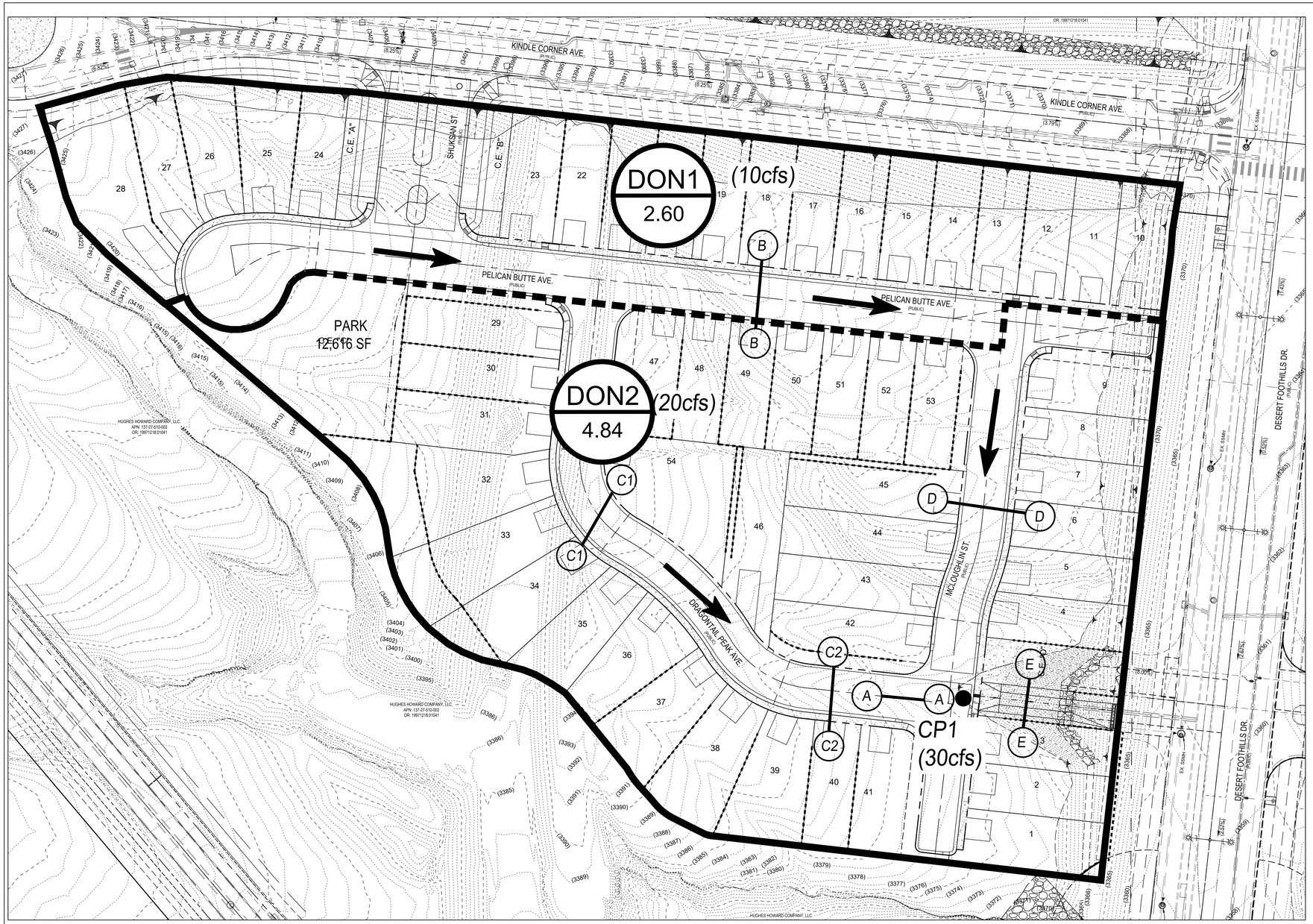
FIGURE 7 - EXISTING CONDITION BASINS MAP

| DRAWN BY: | DESIGNED BY: | CHECKED BY: | PROJECT NO: | SCALE: | |
|---|---|---|---|---|---|
| JYA/GSB | JYA/GSB | WJM | 7809 | N/A | HORIZ. |
| NOV 2018 | NOV 2018 | FEB 2018 | | N/A | VERT. |

SHEET A.6.6 OF SHEETS

DRAWING NO.

H:\7809\Drainage\7_LIP\ ADD\1A Figures\A.6.6 Village 21 Drainage Basin Maps\A.6.6 Area 1 Drainage Basin Map.dwg




N

SCALE: 1"= 40'
40 20 0 40

## DRAINAGE LEGEND

| | |
|---|---|
| XON1 / X.XX | BASIN IDENTIFICATION<br>BASIN AREA (ACRES) |
| | BASIN BOUNDARY |
| C1 | CONCENTRATION POINT |
| | FLOW PATH |
| A — A | CROSS SECTION |
| (XX/XXX) | REFERENCE FLOW (CFS) |

**TABLE 2**
**Flow Summary (Interim/Ultimate Condition)**

| BASIN ID/CONCENTRATION POINT | DRAINAGE AREA (acres) | Reference | $Q_{100}$ cfs |
|---|---|---|---|
| DON1 | 2.60 | *Algebraically based on Master Study* | 10.0 |
| DON2 | 4.84 | *Algebraically based on Master Study* | 20.0 |
| CP1 | - | *DON1+DON2* | 30.0 |

1 Referenced from Flood Control Master Plan Update

**Table 3**
**100-year Street Flow Analysis (Ultimate Condition)**

| Street | Section | Slope (%) | Flow (100 year) | Velocity (ft/s) | Flow Depth (ft) | VxD |
|---|---|---|---|---|---|---|
| Pelican Butte Ave | B | 7.00 | 10.0 | 4.81 | 0.30 | 1.44 |
| Dragontail Peak Ave | C1 | 2.25 | 20.0 | 3.86 | 0.40 | 1.54 |
| Dragontail Peak Ave | C2 | 8.06 | 20.0 | 5.92 | 0.34 | 2.01 |
| Dragontail Peak Ave | A | 0.90 | 30.0 | 3.27 | 0.40 | 1.31 |
| Mcloughlin St. | D | 0.69 | 20.0 | 2.64 | 0.46 | 1.21 |

**Table 4**
**Easements Calculations - 100 Year Flows**

| Street | Section | Slope (%) | Flow (100 year) | Velocity (ft/s) | Flow Depth (ft) | VxD |
|---|---|---|---|---|---|---|
| 25' Easement | E | 5.00 | 30.0 | 9.00 | 0.29 | 2.61 |

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# FIGURE 8: INTERIM/ULTIMATE CONDITION BASIN MAP
# SUMMERLIN VILLAGE 21 - PARCEL L
## WILLIAM LYON HOMES
## LAS VEGAS, NEVADA

| BY | DATE | DESCRIPTION |
|---|---|---|
| A | | |

DATE 7/12/19
DRAWN CO
DESIGNED RS
CHECKED DL
PROJECT # WLH011901

SHEET TITLE
FIGRUE 8

SHEET NUMBER
1

HTE # HTE# or SHEET#

Plot Stamp: 7/16/2019 11:52:44 AM - Christian O'Quinn
File: P:\WLH011901 - V21 Parcel L\Studies & Reports\Drainage\Original\Exhibits\Ultimate Condition Basin Map 7-12-19.dwg, Tab: Layout1

# HYDRAULIC CALCULATIONS

# HYDRAULIC CALCULATIONS

100-yr Interior Street Calculations (Interim/Ultimate Condition)

# Section B - 41' ROW 100 Year

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 7.00 | % |
| Discharge | 10.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.00 | 0.48 |
| 0+05.00 | 0.38 |
| 0+05.35 | 0.37 |
| 0+06.33 | 0.06 |
| 0+06.33 | 0.00 |
| 0+07.50 | 0.13 |
| 0+07.50 | 0.17 |
| 0+23.00 | 0.36 |
| 0+38.50 | 0.17 |
| 0+38.50 | 0.13 |
| 0+39.67 | 0.00 |
| 0+39.67 | 0.06 |
| 0+40.65 | 0.37 |
| 0+41.00 | 0.38 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.00, 0.48) | (0+07.50, 0.17) | 0.013 |
| (0+07.50, 0.17) | (0+38.50, 0.17) | 0.016 |
| (0+38.50, 0.17) | (0+41.00, 0.38) | 0.013 |

## Options

| | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |

# Section B - 41' ROW 100 Year

## Options

| | | | |
|---|---|---|---|
| Closed Channel Weighting Method | Pavlovskii's Method | | |

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 0.30 | ft |
| Elevation Range | 0.00 to 0.48 ft | | |
| Flow Area | | 2.08 | ft² |
| Wetted Perimeter | | 25.15 | ft |
| Hydraulic Radius | | 0.08 | ft |
| Top Width | | 24.86 | ft |
| Normal Depth | | 0.30 | ft |
| Critical Depth | | 0.39 | ft |
| Critical Slope | | 0.00698 | ft/ft |
| Velocity | | 4.81 | ft/s |
| Velocity Head | | 0.36 | ft |
| Specific Energy | | 0.66 | ft |
| Froude Number | | 2.93 | |
| Flow Type | Supercritical | | |

## GVF Input Data

| | | | |
|---|---|---|---|
| Downstream Depth | | 0.00 | ft |
| Length | | 0.00 | ft |
| Number Of Steps | | 0 | |

## GVF Output Data

| | | | |
|---|---|---|---|
| Upstream Depth | | 0.00 | ft |
| Profile Description | | | |
| Profile Headloss | | 0.00 | ft |
| Downstream Velocity | | Infinity | ft/s |
| Upstream Velocity | | Infinity | ft/s |
| Normal Depth | | 0.30 | ft |
| Critical Depth | | 0.39 | ft |
| Channel Slope | | 7.00 | % |
| Critical Slope | | 0.00698 | ft/ft |

# Section B - 41' ROW 100 Year

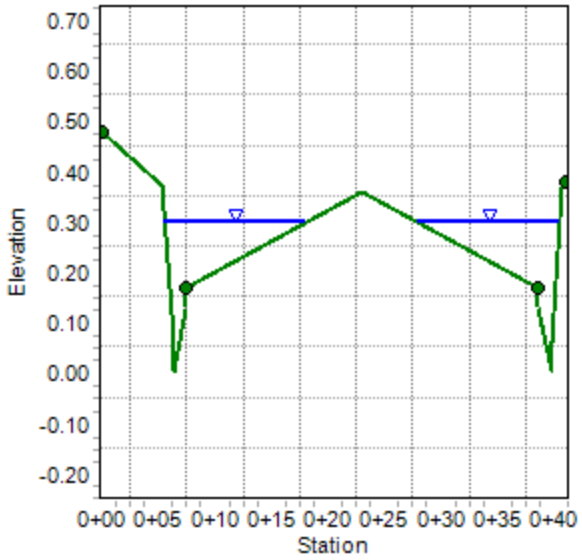
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 7.00 | % |
| Normal Depth | 0.30 | ft |
| Discharge | 10.00 | ft³/s |

## Cross Section Image



# Section C1 - 41' ROW 100 Year

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.25 | % |
| Discharge | 20.00 | cfs |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.00 | 0.48 |
| 0+05.00 | 0.38 |
| 0+05.35 | 0.37 |
| 0+06.33 | 0.06 |
| 0+06.33 | 0.00 |
| 0+07.50 | 0.13 |
| 0+07.50 | 0.17 |
| 0+23.00 | 0.36 |
| 0+38.50 | 0.17 |
| 0+38.50 | 0.13 |
| 0+39.67 | 0.00 |
| 0+39.67 | 0.06 |
| 0+40.65 | 0.37 |
| 0+41.00 | 0.38 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.00, 0.48) | (0+07.50, 0.17) | 0.013 |
| (0+07.50, 0.17) | (0+38.50, 0.17) | 0.016 |
| (0+38.50, 0.17) | (0+41.00, 0.38) | 0.013 |

## Options

| | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |

# Section C1 - 41' ROW 100 Year

## Options

| | |
|---|---|
| Closed Channel Weighting Method | Pavlovskii's Method |

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 0.40 | ft |
| Elevation Range | 0.00 to 0.48 ft | | |
| Flow Area | | 5.18 | ft² |
| Wetted Perimeter | | 37.08 | ft |
| Hydraulic Radius | | 0.14 | ft |
| Top Width | | 36.76 | ft |
| Normal Depth | | 0.40 | ft |
| Critical Depth | | 0.47 | ft |
| Critical Slope | | 0.00613 | ft/ft |
| Velocity | | 3.86 | ft/s |
| Velocity Head | | 0.23 | ft |
| Specific Energy | | 0.63 | ft |
| Froude Number | | 1.81 | |
| Flow Type | Supercritical | | |

## GVF Input Data

| | | |
|---|---|---|
| Downstream Depth | 0.00 | ft |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.40 | ft |
| Critical Depth | 0.47 | ft |
| Channel Slope | 2.25 | % |
| Critical Slope | 0.00613 | ft/ft |

# Section C1 - 41' ROW 100 Year

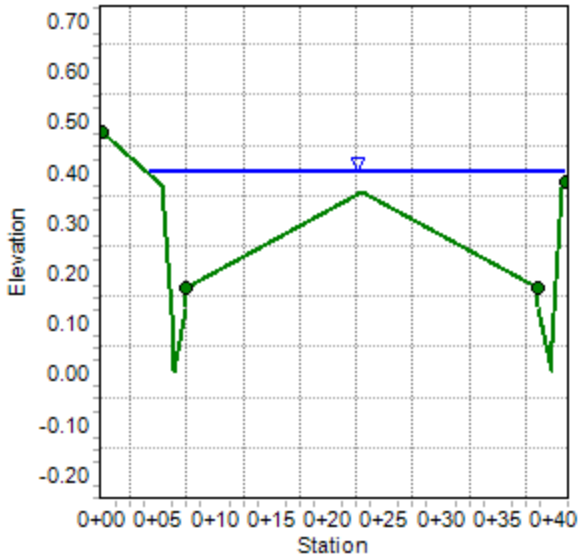
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.25 | % |
| Normal Depth | 0.40 | ft |
| Discharge | 20.00 | cfs |

## Cross Section Image



# Section C2 - 41' ROW 100 Year

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 8.06 | % |
| Discharge | 20.00 | cfs |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.00 | 0.48 |
| 0+05.00 | 0.38 |
| 0+05.35 | 0.37 |
| 0+06.33 | 0.06 |
| 0+06.33 | 0.00 |
| 0+07.50 | 0.13 |
| 0+07.50 | 0.17 |
| 0+23.00 | 0.36 |
| 0+38.50 | 0.17 |
| 0+38.50 | 0.13 |
| 0+39.67 | 0.00 |
| 0+39.67 | 0.06 |
| 0+40.65 | 0.37 |
| 0+41.00 | 0.38 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.00, 0.48) | (0+07.50, 0.17) | 0.013 |
| (0+07.50, 0.17) | (0+38.50, 0.17) | 0.016 |
| (0+38.50, 0.17) | (0+41.00, 0.38) | 0.013 |

## Options

| | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |

# Section C2 - 41' ROW 100 Year

## Options

| | |
|---|---|
| Closed Channel Weighting Method | Pavlovskii's Method |

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 0.34 | ft |
| Elevation Range | 0.00 to 0.48 ft | | |
| Flow Area | | 3.38 | ft² |
| Wetted Perimeter | | 32.84 | ft |
| Hydraulic Radius | | 0.10 | ft |
| Top Width | | 32.53 | ft |
| Normal Depth | | 0.34 | ft |
| Critical Depth | | 0.47 | ft |
| Critical Slope | | 0.00620 | ft/ft |
| Velocity | | 5.92 | ft/s |
| Velocity Head | | 0.54 | ft |
| Specific Energy | | 0.89 | ft |
| Froude Number | | 3.24 | |
| Flow Type | Supercritical | | |

## GVF Input Data

| | | |
|---|---|---|
| Downstream Depth | 0.00 | ft |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.34 | ft |
| Critical Depth | 0.47 | ft |
| Channel Slope | 8.06 | % |
| Critical Slope | 0.00620 | ft/ft |

# Section C2 - 41' ROW 100 Year

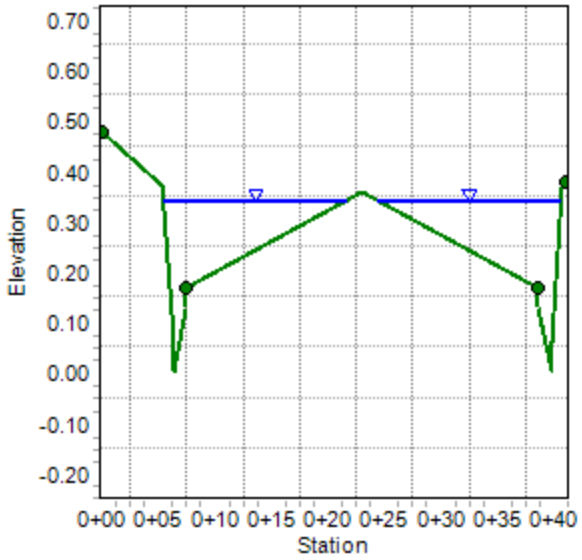
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 8.06 | % |
| Normal Depth | 0.34 | ft |
| Discharge | 20.00 | cfs |

## Cross Section Image



# Section D - 41' ROW 100 Year

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 0.69 | % |
| Discharge | 20.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.00 | 0.48 |
| 0+05.00 | 0.38 |
| 0+05.35 | 0.37 |
| 0+06.33 | 0.06 |
| 0+06.33 | 0.00 |
| 0+07.50 | 0.13 |
| 0+07.50 | 0.17 |
| 0+23.00 | 0.36 |
| 0+38.50 | 0.17 |
| 0+38.50 | 0.13 |
| 0+39.67 | 0.00 |
| 0+39.67 | 0.06 |
| 0+40.65 | 0.37 |
| 0+41.00 | 0.38 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.00, 0.48) | (0+07.50, 0.17) | 0.013 |
| (0+07.50, 0.17) | (0+38.50, 0.17) | 0.016 |
| (0+38.50, 0.17) | (0+41.00, 0.38) | 0.013 |

## Options

| | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |

# Section D - 41' ROW 100 Year

## Options

| | |
|---|---|
| Closed Channel Weighting Method | Pavlovskii's Method |

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 0.46 | ft |
| Elevation Range | 0.00 to 0.48 ft | | |
| Flow Area | | 7.57 | ft² |
| Wetted Perimeter | | 40.27 | ft |
| Hydraulic Radius | | 0.19 | ft |
| Top Width | | 39.88 | ft |
| Normal Depth | | 0.46 | ft |
| Critical Depth | | 0.47 | ft |
| Critical Slope | | 0.00599 | ft/ft |
| Velocity | | 2.64 | ft/s |
| Velocity Head | | 0.11 | ft |
| Specific Energy | | 0.57 | ft |
| Froude Number | | 1.07 | |
| Flow Type | Supercritical | | |

## GVF Input Data

| | | |
|---|---|---|
| Downstream Depth | 0.00 | ft |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.46 | ft |
| Critical Depth | 0.47 | ft |
| Channel Slope | 0.69 | % |
| Critical Slope | 0.00599 | ft/ft |

# Section D - 41' ROW 100 Year

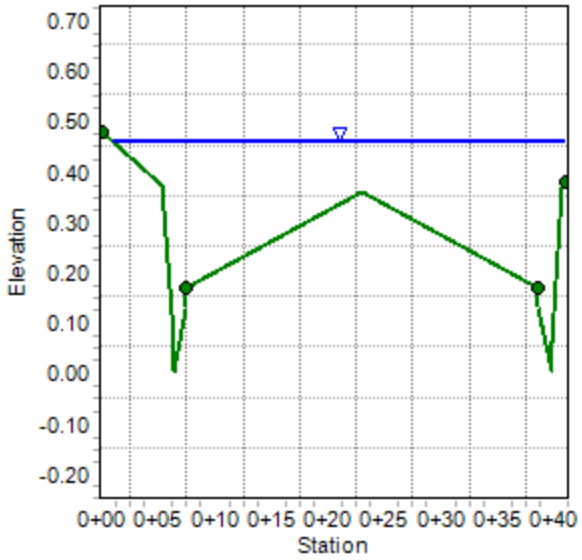
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 0.69 | % |
| Normal Depth | 0.46 | ft |
| Discharge | 20.00 | ft³/s |

## Cross Section Image



# Section A - 41' ROW 100 Year

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 0.90 | % |
| Discharge | 30.00 | cfs |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.00 | 0.19 |
| 0+38.50 | 0.17 |
| 0+38.50 | 0.13 |
| 0+39.67 | 0.00 |
| 0+39.67 | 0.06 |
| 0+40.65 | 0.37 |
| 0+41.00 | 0.38 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.00, 0.19) | (0+38.50, 0.17) | 0.016 |
| (0+38.50, 0.17) | (0+41.00, 0.38) | 0.013 |

## Options

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

## Results

| | | |
|---|---|---|
| Normal Depth | 0.40 | ft |
| Elevation Range | 0.00 to 0.38 ft | |
| Flow Area | 9.19 | ft² |
| Wetted Perimeter | 41.39 | ft |
| Hydraulic Radius | 0.22 | ft |

# Section A - 41' ROW 100 Year

## Results

| | | | |
|---|---|---|---|
| Top Width | | 41.00 | ft |
| Normal Depth | | 0.40 | ft |
| Critical Depth | | 0.43 | ft |
| Critical Slope | | 0.00584 | ft/ft |
| Velocity | | 3.27 | ft/s |
| Velocity Head | | 0.17 | ft |
| Specific Energy | | 0.57 | ft |
| Froude Number | | 1.22 | |
| Flow Type | Supercritical | | |

This section is applicable to Lot 3 and Lot 4 for EGL analysis. The finished floor for these lots are above the EGL.

## GVF Input Data

| | | |
|---|---|---|
| Downstream Depth | 0.00 | ft |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.40 | ft |
| Critical Depth | 0.43 | ft |
| Channel Slope | 0.90 | % |
| Critical Slope | 0.00584 | ft/ft |

# Section A - 41' ROW 100 Year

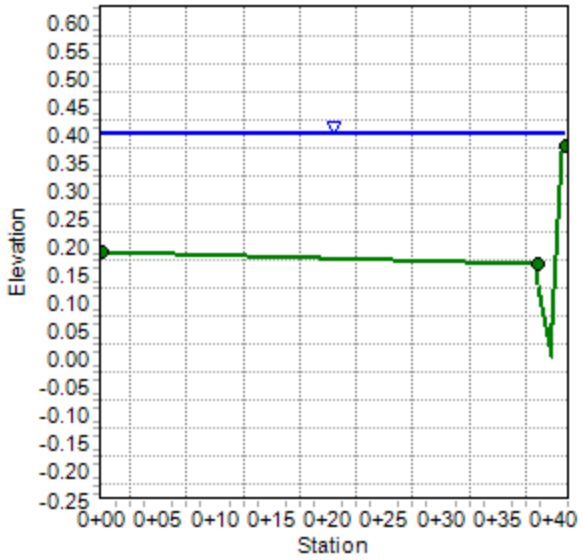
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 0.90 | % |
| Normal Depth | 0.40 | ft |
| Discharge | 30.00 | cfs |

## Cross Section Image



# HYDRAULIC CALCULATIONS

Easement Calculations (Interim/Ultimate Condition)

Common Element C (between Lots 3 and 4)

*Easement Weir Calculation*
*Normal Depth Calculations*
*Drop Inlet Calculation*
*Headwater Calculation for 30" Pipe*
*Cosway C Normal Depth Calculation*

Actus

# Weir Depth Calculator

| | |
|---|---|
| Company: | Actus |
| By: | Christian O'Quinn |
| Date: | 7/15/2019 |
| Project Name: | Summerlin Vil 21 - Parcel L |
| Description | Easement in Parcel L |
| Location | Between Lots 3 and 4 |

| | | |
|---|---|---|
| Q | 30 | cfs |
| C | 3.0 | |
| L | 25.0 | ft |

**Weir Flow = Q = C*L*H^(3/2)**

$$H = \left(\frac{Q}{C * L}\right)^{(2/3)}$$

**H = 0.543 ft**

[1] Q = Flow (cfs) (Q100 @ DON1)
[2] C = Weir Coefficient
[3] L = Weir Length (ft)
[4] H = Weir Height (ft)

# Section E - 100 Year - Easement Parcel L

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 5.00 | % |
| Discharge | 30.00 | cfs |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.00 | 0.50 |
| 0+06.00 | 0.05 |
| 0+10.75 | 0.00 |
| 0+15.50 | 0.05 |
| 0+21.50 | 0.50 |
| 0+25.00 | 0.55 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.00, 0.50) | (0+25.00, 0.55) | 0.013 |

## Options

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

## Results

| | | |
|---|---|---|
| Normal Depth | 0.29 | ft |
| Elevation Range | 0.00 to 0.55 ft | |
| Flow Area | 3.34 | ft² |
| Wetted Perimeter | 16.00 | ft |
| Hydraulic Radius | 0.21 | ft |
| Top Width | 15.98 | ft |
| Normal Depth | 0.29 | ft |

# Section E - 100 Year - Easement Parcel L

## Results

| | | | |
|---|---|---|---|
| Critical Depth | | 0.57 | ft |
| Critical Slope | | 0.00350 | ft/ft |
| Velocity | | 9.00 | ft/s |
| Velocity Head | | 1.26 | ft |
| Specific Energy | | 1.55 | ft |
| Froude Number | | 3.47 | |
| Flow Type | Supercritical | | |

## GVF Input Data

| | | |
|---|---|---|
| Downstream Depth | 0.00 | ft |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.29 | ft |
| Critical Depth | 0.57 | ft |
| Channel Slope | 5.00 | % |
| Critical Slope | 0.00350 | ft/ft |

# Section E - 100 Year - Easement Parcel L

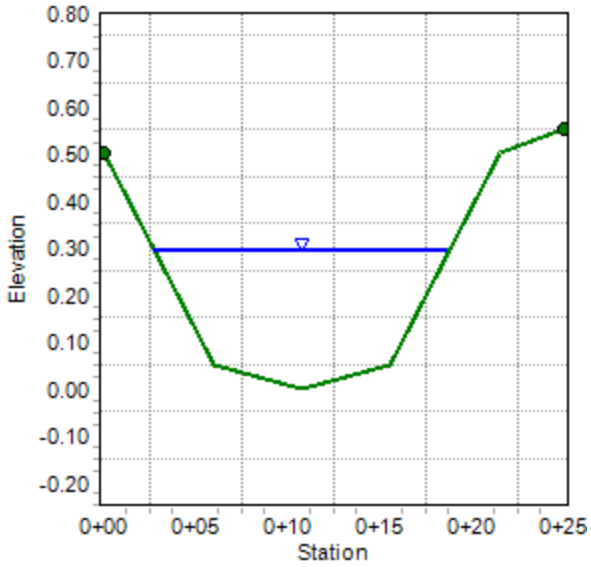
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 5.00 | % |
| Normal Depth | 0.29 | ft |
| Discharge | 30.00 | cfs |

## Cross Section Image



# Combination Inlet In Sag - 15' DI - Parcel L

## Project Description

| | |
|---|---|
| Solve For | Spread |

## Input Data

| | | | |
|---|---|---|---|
| Discharge | | 30.00 | cfs |
| Gutter Width | | 1.50 | ft |
| Gutter Cross Slope | | 11.30 | % |
| Road Cross Slope | | 5.00 | % |
| Local Depression | | 3.00 | in |
| Local Depression Width | | 1.50 | ft |
| Grate Width | | 1.50 | ft |
| Grate Length | | 7.50 | ft |
| Grate Type | P-50 mm (P-1-7/8") | | |
| Clogging | | 0.00 | % |
| Curb Opening Length | | 7.50 | ft |
| Opening Height | | 0.50 | ft |
| Curb Throat Type | Horizontal | | |
| Throat Incline Angle | | 90.00 | degrees |

Drop Inlet conservatively sized for the 30 cfs from Parcel L, referenced in the 2018 Update to SWMP

50% Clogging considered

## Options

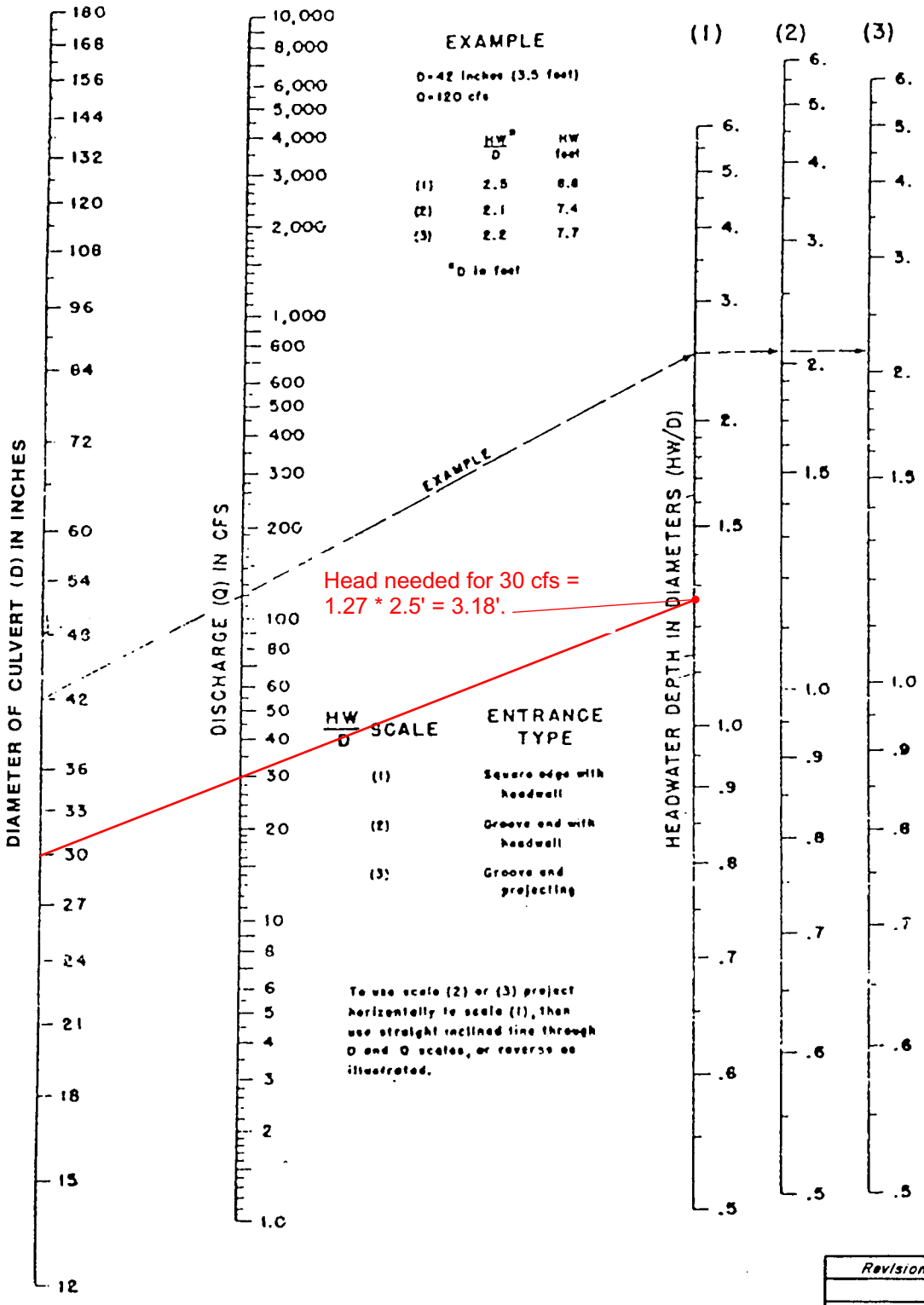
| | |
|---|---|
| Calculation Option | Use Both |

## Results

| | | |
|---|---|---|
| Spread | 16.00 | ft |
| Depth | 0.89 | ft |
| Gutter Depression | 0.09 | ft |
| Total Depression | 0.34 | ft |
| Open Grate Area | 10.13 | ft² |
| Active Grate Weir Length | 10.50 | ft |

# NOMOGRAPH – INLET CONTROL RCP

**Southern Easement**




| Revision | Date |
|---|---|
| | |
| | |
| | |
| | |

WRC ENGINEERING

REFERENCE:
USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

# Cosway Southern Section

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 1.00 | % |
| Discharge | 440.00 | cfs |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.00 | 3.00 |
| 0+12.00 | 0.00 |
| 0+37.00 | 0.00 |
| 0+37.00 | 4.00 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.00, 3.00) | (0+37.00, 0.00) | 0.025 |
| (0+37.00, 0.00) | (0+37.00, 4.00) | 0.013 |

## Options

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

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 1.88 | ft |
| Elevation Range | 0.00 to 4.00 ft | | |
| Flow Area | | 53.97 | ft² |
| Wetted Perimeter | | 34.62 | ft |
| Hydraulic Radius | | 1.56 | ft |
| Top Width | | 32.51 | ft |
| Normal Depth | | 1.88 | ft |
| Critical Depth | | 2.01 | ft |

# Cosway Southern Section

## Results

| | | | |
|---|---|---|---|
| Critical Slope | | 0.00790 | ft/ft |
| Velocity | | 8.15 | ft/s |
| Velocity Head | | 1.03 | ft |
| Specific Energy | | 2.91 | ft |
| Froude Number | | 1.12 | |
| Flow Type | Supercritical | | |

Freeboard: $1 + 0.025(V)d^{1/3}$
Freeboard: 1.25'
Total Protection: 1.88+1.25 = 3.13'

## 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 | 1.88 | ft |
| Critical Depth | 2.01 | ft |
| Channel Slope | 1.00 | % |
| Critical Slope | 0.00790 | ft/ft |

# Cosway Southern Section

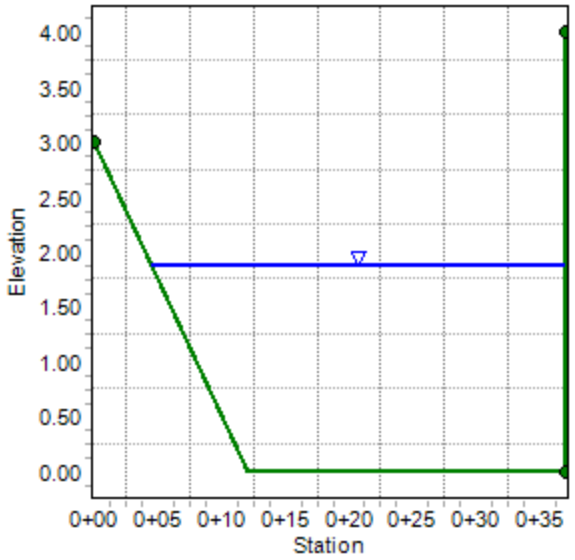
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 1.00 | % |
| Normal Depth | 1.88 | ft |
| Discharge | 440.00 | cfs |

## Cross Section Image



HYDRAULIC CALCULATIONS

# HYDRAULIC CALCULATIONS

Finish Floor Analysis

| Summerlin Village 21 Parcel L | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FINISH FLOOR ANALYSIS (OVERALL) | | | | | | | | | | | | | | |
| INPUT INFORMATION | | | | | | | FINISHED FLOORS | | | | | | | NOTES |
| Lot Number | Hydraulic Section Utilized | Centerline Elevation (ft) | T/C[1] (ft) | Mod Roll, Roll, or L Curb? Type | F/L[2] (ft) | $D_{100}$ (ft) | Flowline FF min[3] (ft) | Centerline (of TC) FF min[4] (ft) | Pad (ft) | Section (ft) | FF Design (ft) | Flowline Check (ft) | Centerline Check (ft) | See References on Last Sheet (ft) |
| 1 | D | 3372.85 | 3372.85 | Roll | 3372.47 | 0.46 | 3373.39 | 3374.35 | 3373.6 | 1.00 | 3374.60 | OK | OK | |
| 2 | D | 3372.20 | 3372.20 | Roll | 3371.82 | 0.46 | 3372.74 | 3373.70 | 3372.9 | 1.00 | 3373.90 | OK | OK | |
| 3 | D | 3371.47 | 3371.47 | Roll | 3371.09 | 0.46 | 3372.01 | 3372.97 | 3372.2 | 1.00 | 3373.20 | OK | OK | |
| 4 | D | 3371.51 | 3371.51 | Roll | 3371.13 | 0.46 | 3372.05 | 3373.01 | 3372.4 | 1.00 | 3373.40 | OK | OK | |
| 5 | D | 3371.75 | 3371.75 | Roll | 3371.37 | 0.46 | 3372.29 | 3373.25 | 3372.6 | 1.00 | 3373.60 | OK | OK | |
| 6 | D | 3371.99 | 3371.99 | Roll | 3371.61 | 0.46 | 3372.53 | 3373.49 | 3372.8 | 1.00 | 3373.80 | OK | OK | |
| 7 | D | 3372.24 | 3372.24 | Roll | 3371.86 | 0.46 | 3372.78 | 3373.74 | 3373.1 | 1.00 | 3374.10 | OK | OK | |
| 8 | D | 3372.48 | 3372.48 | Roll | 3372.10 | 0.46 | 3373.02 | 3373.98 | 3373.3 | 1.00 | 3374.30 | OK | OK | |
| 9 | D | 3372.79 | 3372.79 | Roll | 3372.41 | 0.46 | 3373.33 | 3374.29 | 3373.6 | 1.00 | 3374.60 | OK | OK | |
| 10 | B | 3373.50 | 3373.50 | Roll | 3373.12 | 0.3 | 3373.72 | 3375.00 | 3374.2 | 1.00 | 3375.20 | OK | OK | |
| 11 | B | 3373.35 | 3373.35 | Roll | 3372.97 | 0.3 | 3373.57 | 3374.85 | 3374.0 | 1.00 | 3375.00 | OK | OK | |
| 12 | B | 3373.62 | 3373.62 | Roll | 3373.24 | 0.3 | 3373.84 | 3375.12 | 3374.2 | 1.00 | 3375.20 | OK | OK | |
| 13 | B | 3375.12 | 3375.12 | Roll | 3374.74 | 0.3 | 3375.34 | 3376.62 | 3375.8 | 1.00 | 3376.80 | OK | OK | |
| 14 | B | 3377.30 | 3377.30 | Roll | 3376.92 | 0.3 | 3377.52 | 3378.80 | 3378.0 | 1.00 | 3379.00 | OK | OK | |
| 15 | B | 3379.75 | 3379.75 | Roll | 3379.37 | 0.3 | 3379.97 | 3381.25 | 3380.4 | 1.00 | 3381.40 | OK | OK | |
| 16 | B | 3382.20 | 3382.20 | Roll | 3381.82 | 0.3 | 3382.42 | 3383.70 | 3382.9 | 1.00 | 3383.90 | OK | OK | |
| 17 | B | 3384.65 | 3384.65 | Roll | 3384.27 | 0.3 | 3384.87 | 3386.15 | 3385.3 | 1.00 | 3386.30 | OK | OK | |
| 18 | B | 3387.10 | 3387.10 | Roll | 3386.72 | 0.3 | 3387.32 | 3388.60 | 3387.8 | 1.00 | 3388.80 | OK | OK | |
| 19 | B | 3389.55 | 3389.55 | Roll | 3389.17 | 0.3 | 3389.77 | 3391.05 | 3390.2 | 1.00 | 3391.20 | OK | OK | |
| 20 | B | 3392.00 | 3392.00 | Roll | 3391.62 | 0.3 | 3392.22 | 3393.50 | 3392.7 | 1.00 | 3393.70 | OK | OK | |
| 21 | B | 3394.45 | 3394.45 | Roll | 3394.07 | 0.3 | 3394.67 | 3395.95 | 3395.1 | 1.00 | 3396.10 | OK | OK | |
| 22 | B | 3396.90 | 3396.90 | Roll | 3396.52 | 0.3 | 3397.12 | 3398.40 | 3397.6 | 1.00 | 3398.60 | OK | OK | |
| 23 | B | 3399.71 | 3399.71 | Roll | 3399.33 | 0.3 | 3399.93 | 3401.21 | 3400.4 | 1.00 | 3401.40 | OK | OK | |
| 24 | B | 3310.42 | 3310.42 | Roll | 3310.04 | 0.3 | 3310.64 | 3311.92 | 3411.1 | 1.00 | 3412.10 | OK | OK | |
| 25 | B | 3312.10 | 3312.10 | Roll | 3311.72 | 0.3 | 3312.32 | 3313.60 | 3412.8 | 1.00 | 3413.80 | OK | OK | |
| 26 | B | 3313.58 | 3313.58 | Roll | 3313.20 | 0.3 | 3313.80 | 3315.08 | 3414.2 | 1.00 | 3415.20 | OK | OK | |
| 27 | B | 3314.97 | 3314.97 | Roll | 3314.59 | 0.3 | 3315.19 | 3316.47 | 3415.8 | 1.00 | 3416.80 | OK | OK | |
| 28 | B | 3316.55 | 3316.55 | Roll | 3316.17 | 0.3 | 3316.77 | 3318.05 | 3417.5 | 1.00 | 3418.50 | OK | OK | |
| 29 | C1 | 3393.71 | 3393.71 | Roll | 3393.33 | 0.4 | 3394.13 | 3395.21 | 3395.4 | 1.00 | 3396.40 | OK | OK | |
| 30 | C1 | 3392.87 | 3392.87 | Roll | 3392.49 | 0.4 | 3393.29 | 3394.37 | 3394.7 | 1.00 | 3395.70 | OK | OK | |
| 31 | C1 | 3392.08 | 3392.08 | Roll | 3391.70 | 0.4 | 3392.50 | 3393.58 | 3393.9 | 1.00 | 3394.90 | OK | OK | |
| 32 | C1 | 3391.39 | 3391.39 | Roll | 3391.01 | 0.4 | 3391.81 | 3392.89 | 3393.3 | 1.00 | 3394.30 | OK | OK | |
| 33 | C1 | 3390.78 | 3390.78 | Roll | 3390.40 | 0.4 | 3391.20 | 3392.28 | 3392.9 | 1.00 | 3393.90 | OK | OK | |
| 34 | C1 | 3390.17 | 3390.17 | Roll | 3389.79 | 0.4 | 3390.59 | 3391.67 | 3392.4 | 1.00 | 3393.40 | OK | OK | |
| 35 | C1 | 3389.53 | 3389.53 | Roll | 3389.15 | 0.4 | 3389.95 | 3391.03 | 3391.7 | 1.00 | 3392.70 | OK | OK | |
| 36 | C1 | 3388.36 | 3388.36 | Roll | 3387.98 | 0.4 | 3388.78 | 3389.86 | 3389.6 | 1.00 | 3390.60 | OK | OK | |
| 37 | C1 | 3385.25 | 3385.25 | Roll | 3384.87 | 0.4 | 3385.67 | 3386.75 | 3386.3 | 1.00 | 3387.30 | OK | OK | |
| 38 | C1 | 3383.31 | 3383.31 | Roll | 3382.93 | 0.4 | 3383.73 | 3384.81 | 3384.5 | 1.00 | 3385.50 | OK | OK | |

| Summerlin Village 21 Parcel L | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FINISH FLOOR ANALYSIS (OVERALL) | | | | | | | | | | | | | | |
| INPUT INFORMATION | | | | | | | FINISHED FLOORS | | | | | | | NOTES |
| Lot Number | Hydraulic Section Utilized | Centerline Elevation | T/C[1] | Mod Roll, Roll, or L Curb? | F/L[2] | $D_{100}$ | Flowline FF min[3] | Centerline (of TC) FF min[4] | Pad | Section | FF Design | Flowline Check | Centerline Check | See References on Last Sheet |
| | | (ft) | (ft) | Type | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) |
| 39 | C2 | 3381.18 | 3381.18 | Roll | 3380.80 | 0.34 | 3381.48 | 3382.68 | 3382.4 | 1.00 | 3383.40 | OK | OK | |
| 40 | C2 | 3378.80 | 3378.80 | Roll | 3378.42 | 0.34 | 3379.10 | 3380.30 | 3379.3 | 1.00 | 3380.30 | OK | OK | |
| 41 | C2 | 3375.98 | 3375.98 | Roll | 3375.60 | 0.34 | 3376.28 | 3377.48 | 3376.5 | 1.00 | 3377.50 | OK | OK | |
| 42 | D | 3371.34 | 3371.34 | Roll | 3370.96 | 0.46 | 3371.88 | 3372.84 | 3372.2 | 1.00 | 3373.20 | OK | OK | |
| 43 | D | 3371.58 | 3371.58 | Roll | 3371.20 | 0.46 | 3372.12 | 3373.08 | 3372.3 | 1.00 | 3373.30 | OK | OK | |
| 44 | D | 3371.83 | 3371.83 | Roll | 3371.45 | 0.46 | 3372.37 | 3373.33 | 3372.6 | 1.00 | 3373.60 | OK | OK | |
| 45 | D | 3372.11 | 3372.11 | Roll | 3371.73 | 0.46 | 3372.65 | 3373.61 | 3372.9 | 1.00 | 3373.90 | OK | OK | |
| 46 | C1 | 3386.67 | 3386.67 | Roll | 3386.29 | 0.4 | 3387.09 | 3388.17 | 3389.0 | 1.00 | 3390.00 | OK | OK | |
| 47 | B | 3391.53 | 3391.53 | Roll | 3391.15 | 0.3 | 3391.75 | 3393.03 | 3392.2 | 1.00 | 3393.20 | OK | OK | |
| 48 | B | 3389.56 | 3389.56 | Roll | 3389.18 | 0.3 | 3389.78 | 3391.06 | 3390.2 | 1.00 | 3391.20 | OK | OK | |
| 49 | B | 3387.11 | 3387.11 | Roll | 3386.73 | 0.3 | 3387.33 | 3388.61 | 3387.8 | 1.00 | 3388.80 | OK | OK | |
| 50 | B | 3384.66 | 3384.66 | Roll | 3384.28 | 0.3 | 3384.88 | 3386.16 | 3385.3 | 1.00 | 3386.30 | OK | OK | |
| 51 | B | 3382.21 | 3382.21 | Roll | 3381.83 | 0.3 | 3382.43 | 3383.71 | 3382.9 | 1.00 | 3383.90 | OK | OK | |
| 52 | B | 3379.76 | 3379.76 | Roll | 3379.38 | 0.3 | 3379.98 | 3381.26 | 3380.4 | 1.00 | 3381.40 | OK | OK | |
| 53 | B | 3377.30 | 3377.30 | Roll | 3376.92 | 0.3 | 3377.52 | 3378.80 | 3378.0 | 1.00 | 3379.00 | OK | OK | |
| 54 | C1 | 3391.75 | 3391.75 | Roll | 3391.37 | 0.4 | 3392.17 | 3393.25 | 3393.4 | 1.00 | 3394.40 | OK | OK | |

**Where**

1: Top of Curb at High Side of Lot

2: Flowline = TC - 0.38 feet (for Mod Roll)

3: Minimum Allowable Finished Floor Elevation above flowline @ high side of lot = $(2 \times D_{100}) + F/L$

4: Minimum Allowable Finished Floor Elevation above centerline (or TC whicher is higher) elevation = Centerline elevation (or Center TC) + 1.5 feet

# REFERENCES

Update #1 to the Flood Control Master Plan Update for Summerlin West Planning Area, DS#4926, VTN (2019) and addenda

Approval Letter
Figure A.6.6 Village 21 Drainage Basin Map (*Addendum #1)*
Figure A.6.7 Village 21 Local Flood Control Facilities Map *(Addendum #1)*
HEC-1 Summary Table Village 21 Ultimate Condition *(Original)*
Standard Form 4 (*Original)*
HEC-1 *(SDN 3)*

| CITY OF LAS VEGAS<br>INTER-OFFICE MEMORANDUM | | | | DATE:<br>April 17, 2019 |
|---|---|---|---|---|
| TO:<br>**Land Development Services**<br>Department of Building & Safety | | | | FROM:<br>Albert Sung, P.E.<br>Flood Control Project Engineer<br>Department of Public Works |
| **SUBJECT:** | Drainage Study for:<br>**Summerlin West Planning Area Master Plan Update** | | | **COPIES TO:**<br>VTN Nevada |
| **Cross Streets:** | West of I-215 between Lake Mead Boulevard and Charleston Boulevard | | | The Howard Hughes Corporation |
| **File Number:** | F:\Depot\DSMemos\DS4926H.doc | | | Bart Anderson, P.E., DevCo |
| **Parcel Number:** | 137-22-000-017 | | | CCRFCD |
| **Zoning Action:** | | | | CCPW |
| **FEMA Flood Zone** | YES | **X** | NO | |
| **Proposed Storm Drain** | YES | **X** | NO | |

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

**REMARKS:**

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

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

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

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

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

2. The *Study* states that ***Detention Basin 5*** (**DB5**) needs additional capacity to accommodate the increased flows from the proposed SWPA revision. An update to the **DB5** technical drainage study must be submitted and approved prior to any upstream Villages development with the exception of Villages 21 and 22.

3. The *Study* states that a portion of the existing *Beltway Channel* between *Far Hills Avenue* and *Summerlin Parkway* requires modification with heightened stem walls. An update to the Western Beltway Channel modification must be submitted and approved prior to any upstream Villages development with the exception of Villages 21 and 22.

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

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

**END OF REMARKS**
WSP/AYS

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

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

## SUMMERLIN WEST PLANNING AREA

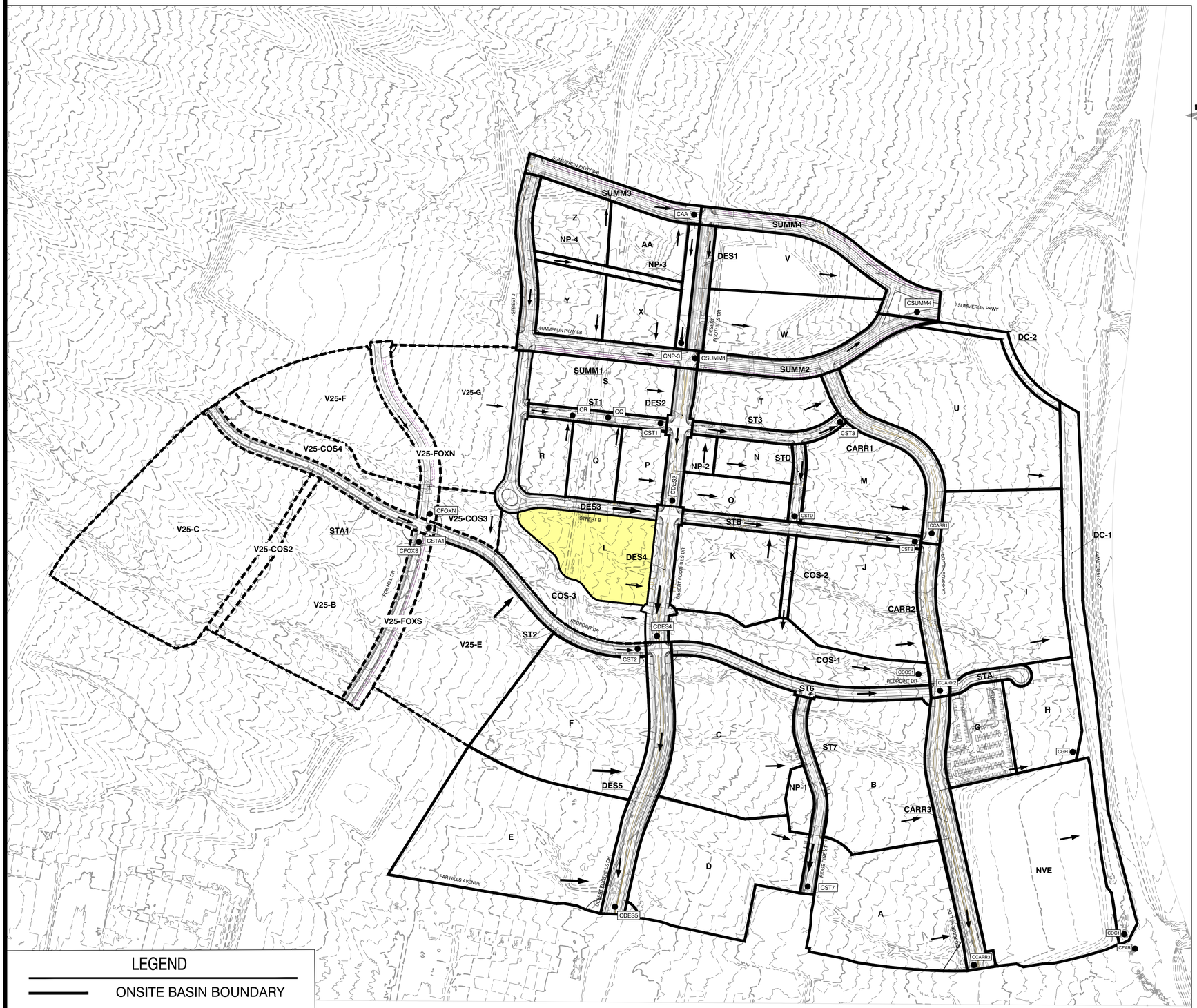
*Las Vegas, Nevada*

W.O. # 7809

*Prepared for:*
Howard Hughes Corp.

*Submitted to:*
Public Works Department
City of Las Vegas

vtn




## LEGEND

- ONSITE BASIN BOUNDARY
- OFFSITE BASIN BOUNDARY
- W51 BASIN DESIGNATION
- CONCENTRATION POINT
- FLOW ARROW

NORTH

GRAPHIC SCALE

300 0 150 300 600

1" = 300'

**HEC-1 SUMMARY TABLE**
**VILLAGE 21**
**ULTIMATE CONDITION**

| Basin / Concentration Point | Area (Acre) | | | $Q_{100}$ (cfs) | | | SDN |
|---|---|---|---|---|---|---|---|
| | Update | Previous | Difference | Update | Previous | Difference | |
| SUMM3 | 7.73 | 5.00 | 2.73 | 13 | 30 | -17 | SDN3 |
| Z | 4.50 | 4.50 | 0.00 | 18 | 17 | 1 | SDN3 |
| AA | 4.02 | 3.71 | 0.31 | 17 | 14 | 3 | SDN3 |
| CAA | - | - | - | 48 | - | N/A | SDN3 |
| NP-4 | 1.05 | N/A | N/A | 3 | 0 | n/a | SDN3 |
| NP-3 | 1.14 | 1.49 | -0.35 | 3 | 4 | -1 | SDN3 |
| CNP-3 | - | - | - | 7 | - | N/A | SDN3 |
| SUMM1 | 5.05 | 5.00 | 0.05 | 20 | 19 | 1 | SDN3 |
| Y | 3.98 | 3.98 | 0.00 | 16 | 15 | 1 | SDN3 |
| X | 3.94 | 3.63 | 0.31 | 16 | 14 | 2 | SDN3 |
| DES1 | 1.80 | 1.83 | -0.03 | 8 | 7 | 1 | SDN3 |
| CSUMM1 | - | - | - | 113 | - | N/A | SDN3 |
| S | 6.33 | 6.56 | -0.23 | 24 | 25 | -1 | SDN3 |
| V25-G | 11.44 | N/A | N/A | 45 | - | N/A | SDN3 |
| R | 3.07 | 3.10 | -0.03 | 12 | 11 | 1 | SDN3 |
| CR | - | - | - | 56 | - | N/A | SDN3 |
| Q | 3.16 | 3.16 | 0.00 | 12 | 11 | 1 | SDN3 |
| CQ | - | - | - | 68 | - | N/A | SDN3 |
| ST1 | 1.50 | 1.62 | -0.12 | 7 | 6 | 1 | SDN3 |
| CST1 | - | - | - | 74 | 54 | 20 | SDN3 |
| P | 3.00 | 3.17 | -0.17 | 11 | 11 | 0 | SDN3 |
| DES2 | 2.39 | 2.27 | 0.12 | 10 | 9 | 1 | SDN3 |
| CDES2 | - | - | - | 119 | - | N/A | SDN3 |
| DES3 | 3.73 | 3.78 | -0.05 | 17 | 15 | 2 | SDN3 |
| L | 7.44 | 7.36 | 0.08 | 30 | 26 | 4 | SDN3 |
| COS-3 | 5.90 | 6.10 | -0.20 | 17 | 18 | -1 | SDN3 |
| DES4 | 2.79 | 2.88 | -0.09 | 12 | 11 | 1 | SDN3 |
| V25-F | 10.45 | N/A | N/A | 43 | - | N/A | SDN3 |
| V25-COS4 | 4.64 | N/A | N/A | 15 | - | N/A | SDN3 |
| V25-FOXN | 3.23 | N/A | N/A | 14 | - | N/A | SDN3 |
| CFOXN | - | - | - | 72 | - | N/A | SDN3 |
| V25-B | 19.93 | N/A | N/A | 76 | - | N/A | SDN3 |
| V25-FOXS | 3.19 | N/A | N/A | 11 | - | N/A | SDN3 |
| CFOXS | - | - | - | 85 | - | N/A | SDN3 |
| V25-C | 26.54 | N/A | N/A | 99 | - | N/A | SDN3 |
| V25-COS2 | 1.79 | N/A | N/A | 5 | - | N/A | SDN3 |
| STA1 | 2.98 | N/A | N/A | 13 | - | N/A | SDN3 |
| CSTA1 | - | - | - | 274 | - | N/A | SDN3 |
| V25-E | 17.13 | N/A | N/A | 65 | - | N/A | SDN3 |
| V25-COS3 | 2.37 | N/A | N/A | 8 | - | N/A | SDN3 |
| ST2 | 2.88 | 2.93 | -0.05 | 12 | 12 | 0 | SDN3 |
| CST2 | - | - | - | 360 | - | N/A | SDN3 |
| F | 16.58 | 16.88 | -0.30 | 65 | 59 | 6 | SDN3 |
| E | 20.15 | 20.20 | -0.05 | 78 | 77 | 1 | SDN3 |
| DES5 | 5.83 | 5.46 | 0.37 | 22 | 20 | 2 | SDN3 |
| CDES5 | - | - | - | 624 | - | N/A | SDN3 |
| C | 14.83 | 14.05 | 0.78 | 54 | 44 | 10 | SDN3 |
| NP-1 | 1.27 | 1.35 | -0.08 | 4 | 5 | -1 | SDN3 |
| ST7 | 2.30 | 2.30 | 0.00 | 9 | 9 | 0 | SDN3 |
| D | 14.73 | 15.42 | -0.69 | 56 | 53 | 3 | SDN3 |
| CST7 | - | - | - | 124 | 108 | 16 | SDN3 |
| W | 8.31 | 7.11 | 1.20 | 31 | 27 | 4 | SDN3 |
| SUMM2 | 3.63 | 3.28 | 0.35 | 16 | 13 | 3 | SDN3 |
| T | 5.98 | 5.99 | -0.01 | 23 | 23 | 0 | SDN3 |
| NP-2 | 0.93 | 0.87 | 0.06 | 3 | 3 | 0 | SDN3 |
| ST3 | 1.70 | 2.09 | -0.39 | 8 | 8 | 0 | SDN3 |
| CST3 | - | - | - | 11 | 43 | -32 | SDN3 |
| CARR1 | 3.52 | 3.52 | 0.00 | 15 | 14 | 1 | SDN3 |
| M | 9.11 | 9.11 | 0.00 | 32 | 32 | 0 | SDN3 |
| CCARR1 | - | - | - | 129 | - | N/A | SDN3 |
| N | 2.54 | 2.54 | 0.00 | 10 | 9 | 1 | SDN3 |
| O | 3.47 | 3.43 | 0.04 | 13 | 13 | 0 | SDN3 |
| STD | 0.88 | N/A | N/A | 4 | - | N/A | SDN3 |
| CSTD | - | - | - | 26 | - | N/A | SDN3 |
| K | 8.20 | 8.01 | 0.19 | 30 | 29 | 1 | SDN3 |
| STB | 2.65 | N/A | N/A | 12 | - | N/A | SDN3 |
| CSTB | - | - | - | 68 | - | N/A | SDN3 |
| J | 11.83 | 11.83 | 0.00 | 42 | 42 | 0 | SDN3 |
| COS-2 | 0.58 | N/A | N/A | 2 | - | N/A | SDN3 |
| COS-1 | 7.80 | 7.78 | 0.02 | 22 | 22 | 0 | SDN3 |
| CCOS-1 | - | - | - | 24 | - | N/A | SDN3 |
| CARR2 | 2.45 | 2.49 | -0.04 | 10 | 10 | 0 | SDN3 |
| ST6 | 3.08 | 3.01 | 0.07 | 13 | 12 | 1 | SDN3 |
| CCARR2 | - | - | - | 286 | - | N/A | SDN3 |
| B | 13.90 | 13.71 | 0.19 | 54 | 46 | 8 | SDN3 |
| A | 14.15 | 14.36 | -0.21 | 51 | 47 | 4 | SDN3 |
| CARR3 | 4.87 | 4.85 | 0.02 | 19 | 19 | 0 | SDN3 |
| CCARR3 | - | - | - | 410 | - | N/A | SDN3 |
| V | 7.25 | 7.19 | 0.06 | 29 | 27 | 2 | SDN3 |
| SUMM4 | 4.87 | N/A | N/A | 21 | - | N/A | SDN3 |
| CSUMM4 | - | - | - | 50 | - | N/A | SDN3 |
| DC-2 | 1.19 | 1.40 | -0.21 | 5 | 5 | 0 | SDN3 |
| U | 20.17 | 20.42 | -0.25 | 73 | 74 | -1 | SDN3 |
| I | 18.69 | 18.50 | 0.19 | 61 | 60 | 1 | SDN3 |
| STA | 1.01 | 0.00 | n/a | 5 | 0 | n/a | SDN3 |
| G | 5.01 | 5.71 | -0.70 | 19 | 21 | -2 | SDN3 |
| H | 5.79 | 6.26 | -0.47 | 21 | 22 | -1 | SDN3 |
| CGH | - | - | - | 39 | - | N/A | SDN3 |
| DC-1 | 8.19 | 8.19 | 0.00 | 23 | 25 | -2 | SDN3 |
| NVE | 21.74 | 21.74 | 0.00 | 75 | 79 | -4 | SDN3 |
| CDC1 | - | - | - | 326 | - | N/A | SDN3 |
| CFAR | - | - | - | 1598 | - | N/A | SDN3 |

REVISION | BY | DATE | REV


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

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


# 2018 UPDATE TO SUMMERLIN WEST PLANNING AREA

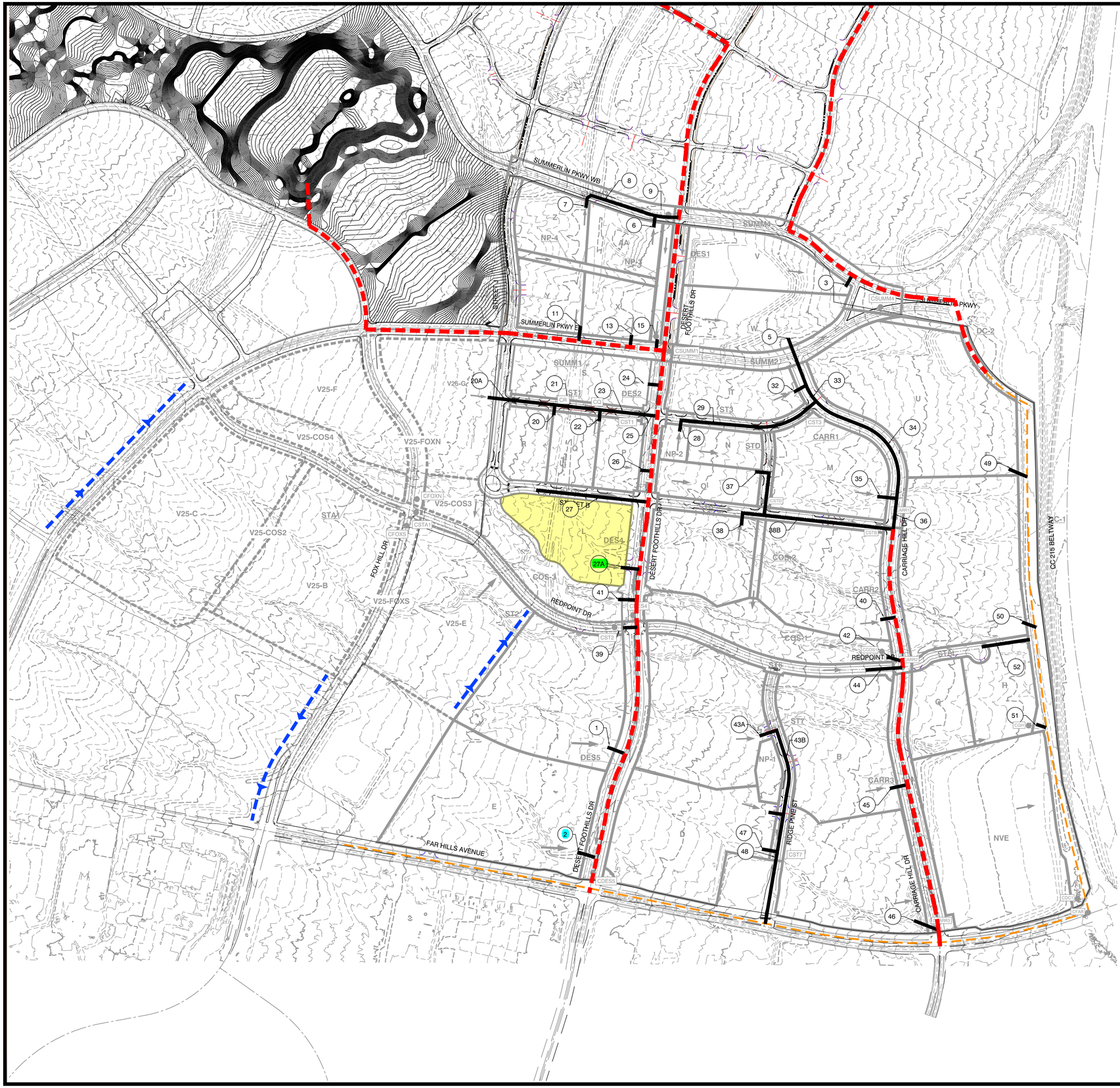
## A.6.6 VILLAGE 21 DRAINAGE BASIN MAP

| | | | |
|---|---|---|---|
| DRAWN BY: JYA/GSB | NOV 2018 | SCALE: | HORIZ. N/A |
| DESIGNED BY: JYA/GSB | NOV 2018 | | VERT. N/A |
| CHECKED BY: WJM | FEB 2018 | | |
| PROJECT NO: 7809 | | | |

SHEET A.6.6 OF SHEETS

DRAWING NO.

H:\7809\Drainage\7_UP1 ADD\1A Figures\A.6.6 Village 21 Drainage Basin Map\A.6.6 Area 1 Drainage Basin Map.dwg


SUMMERLIN PKWY WB
SUMMERLIN PKWY EB
SUMMERLIN PKWY
DESERT FOOTHILLS DR
DESERT FOOTHILLS DR
CARRIAGE HILL DR
RIDGE PINE ST
REDPOINT DR
FOX HILL DR
FAR HILLS AVENUE
DC-215 BELTWAY
DC-1
DC-2
DC-3
NVE
SUMM1
SUMM2
SUMM3
SUMM4
CSUMM1
CSUMM4
DES1
DES2
DES4
DES5
CDES5
NP-1
NP-2
NP-3
NP-4
CARR1
CARR2
CARR3
CSTA1
CSTA2
CSTA3
ST1
ST2
ST3
ST4
ST5
ST6
ST7
CST1
CST2
CST3
CST4
CST7
COS-1
COS-2
COS-3
V25-B
V25-C
V25-E
V25-F
V25-G
V25-COS1
V25-COS2
V25-COS3
V25-COS4
V25-FOXN
V25-FOXS
CFOXN
CFOXS
STA1
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# Update #1 to the FLOOD CONTROL MASTER PLAN UPDATE

## SUMMERLIN WEST PLANNING AREA

*Las Vegas, Nevada*

W.O. # 7809

*Prepared for:*
Howard Hughes Corp.

*Submitted to:*
Public Works Department
City of Las Vegas

# STANDARD FORM 4

DEVELOPMENT: Village 21

W.O. # 7809 CALCULATED BY: GB

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

| Existing: | | Developed: | |
|---|---|---|---|
| $V1 = 14.8 * S^{1/2}$ | $V2 = 29.4 * S^{1/2}$ | $V1 = 20.2 * S^{1/2}$ | $V2 = 30.6 * S^{1/2}$ |

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

$$k = 0.0132 C_n - 0.39 \qquad T_c = T_i + T_t$$

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

# STANDARD FORM 4

DEVELOPMENT: Village 21

W.O. # 7809 CALCULATED BY: GB

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

| Existing: | | Developed | |
|---|---|---|---|
| $V1=14.8*S^{1/2}$ | $V2=29.4*S^{1/2}$ | $V1=20.2*S^{1/2}$ | $V2=30.6*S^{1/2}$ |

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

$$k = 0.0132C_n - 0.39 \qquad T_c = T_i + T_t$$

| SUB-BASIN DATA | | | | | INITIAL/OVERLAND TIME (Ti) | | | TRAVEL TIME (Tt) | | | | | Tc CHECK (URBANIZED BASINS) | | FINAL Tc | LAG TIME | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIG. (1) | Cn | K (2) | AREA Ac. (3) | AREA Mi^2 | LENGTH Ft (4) | SLOPE % (5) | Ti Min. (6) | LENGTH Ft. (7) | SLOPE % (8) | V1 fps (9a) | V2 fps (9b) | Tt Min. (10) | TOTAL LENGTH (11) | Tc Min. (12) | Min. | TLAG Hr. | |
| DEVELOPED CONDITION ONSITE | | | | | | | | | | | | | | | | | |
| SUMM4 | 98.0 | 0.904 | 4.87 | 0.0076 | 40 | 2.0 | 1.77 | 1545 | 7.0 | 5.3 | 8.1 | 3.71 | 1585 | 18.81 | 5.49 | 0.055 | |
| DES1 | 98.0 | 0.904 | 1.80 | 0.0028 | 35 | 2.0 | 1.66 | 775 | 1.3 | 2.3 | 3.5 | 4.95 | 810 | 14.50 | 6.61 | 0.066 | |
| DES2 | 98.0 | 0.904 | 2.39 | 0.0037 | 35 | 2.0 | 1.66 | 855 | 1.8 | 2.7 | 4.1 | 4.57 | 890 | 14.94 | 6.23 | 0.062 | |
| DES3 | 98.0 | 0.904 | 3.73 | 0.0058 | 35 | 2.0 | 1.66 | 995 | 7.0 | 5.4 | 8.1 | 2.57 | 1030 | 15.72 | 4.23 | 0.042 | $T_{LAG}$=0.050 |
| DES4 | 98.0 | 0.904 | 2.79 | 0.0044 | 35 | 2.0 | 1.66 | 900 | 1.1 | 2.1 | 3.2 | 5.98 | 935 | 15.19 | 7.64 | 0.076 | |
| DES5 | 98.0 | 0.904 | 5.83 | 0.0091 | 32 | 2.0 | 1.59 | 1620 | 1.2 | 2.2 | 3.4 | 9.20 | 1652 | 19.18 | 10.79 | 0.108 | |
| CARR1 | 98.0 | 0.904 | 3.52 | 0.0055 | 24 | 2.0 | 1.37 | 1315 | 3.4 | 3.7 | 5.7 | 4.63 | 1339 | 17.44 | 6.00 | 0.060 | |
| CARR2 | 98.0 | 0.904 | 2.45 | 0.0038 | 24 | 2.0 | 1.37 | 980 | 1.5 | 2.5 | 3.8 | 5.45 | 1004 | 15.58 | 6.82 | 0.068 | |
| CARR3 | 98.0 | 0.904 | 4.87 | 0.0076 | 30 | 2.0 | 1.54 | 1685 | 2.1 | 2.9 | 4.4 | 7.34 | 1715 | 19.53 | 8.88 | 0.089 | |
| ST1 | 98.0 | 0.904 | 1.50 | 0.0023 | 20 | 2.0 | 1.25 | 910 | 6.0 | 5.0 | 7.5 | 2.59 | 930 | 15.17 | 3.84 | 0.038 | $T_{LAG}$=0.050 |
| ST2 | 98.0 | 0.904 | 2.88 | 0.0045 | 41 | 2.0 | 1.80 | 1555 | 5.8 | 4.9 | 7.4 | 4.10 | 1596 | 18.87 | 5.90 | 0.059 | |
| ST3 | 98.0 | 0.904 | 1.70 | 0.0027 | 20 | 2.0 | 1.25 | 985 | 6.1 | 5.0 | 7.6 | 2.74 | 1005 | 15.58 | 4.00 | 0.040 | $T_{LAG}$=0.050 |
| ST6 | 98.0 | 0.904 | 3.08 | 0.0048 | 24 | 2.0 | 1.37 | 1615 | 5.3 | 4.6 | 7.0 | 4.45 | 1639 | 19.11 | 5.82 | 0.058 | |
| ST7 | 98.0 | 0.904 | 2.30 | 0.0036 | 40 | 2.0 | 1.77 | 1230 | 1.3 | 2.3 | 3.5 | 7.10 | 1270 | 17.06 | 8.88 | 0.089 | |
| DC-1 | 93.0 | 0.838 | 8.19 | 0.0128 | 50 | 1.0 | 3.34 | 3243 | 1.2 | 2.2 | 3.4 | 17.39 | 3293 | 28.29 | 20.73 | 0.207 | |
| DC-2 | 93.0 | 0.838 | 1.19 | 0.0019 | 25 | 1.0 | 2.36 | 1220 | 5.7 | 4.8 | 7.3 | 3.38 | 1245 | 16.92 | 5.75 | 0.057 | |
| NVE | 93.0 | 0.838 | 21.74 | 0.0340 | 100 | 1.0 | 4.72 | 1480 | 3.8 | 3.9 | 6.0 | 4.86 | 1580 | 18.78 | 9.59 | 0.096 | |
| STD | 98.0 | 0.904 | 0.88 | 0.0014 | 20 | 2.0 | 1.25 | 466 | 1.9 | 2.8 | 4.3 | 2.77 | 486 | 12.70 | 4.02 | 0.040 | $T_{LAG}$=0.050 |
| STB | 98.0 | 0.904 | 2.65 | 0.0041 | 20 | 2.0 | 1.25 | 1439 | 6.0 | 5.0 | 7.5 | 3.76 | 1459 | 18.11 | 5.01 | 0.050 | |
| STA | 98.0 | 0.904 | 1.01 | 0.0016 | 30 | 2.0 | 1.54 | 454 | 5.7 | 4.8 | 7.3 | 1.57 | 484 | 12.69 | 3.10 | 0.031 | $T_{LAG}$=0.050 |
| V25-E | 95.0 | 0.864 | 17.13 | 0.0268 | 100 | 1.0 | 4.25 | 1250 | 3.3 | 3.7 | 5.5 | 4.53 | 1350 | 17.50 | 8.78 | 0.088 | |
| V25-FOXS | 98.0 | 0.904 | 3.19 | 0.0050 | 60 | 2.0 | 2.17 | 2150 | 0.7 | 1.7 | 2.6 | 15.70 | 2210 | 22.28 | 17.87 | 0.179 | |
| V25-FOXN | 98.0 | 0.904 | 3.23 | 0.0050 | 60 | 2.0 | 2.17 | 1230 | 4.1 | 4.1 | 6.2 | 4.02 | 1290 | 17.17 | 6.19 | 0.062 | |
| V25-G | 93.0 | 0.838 | 11.44 | 0.0179 | 100 | 1.0 | 4.72 | 720 | 6.1 | 5.0 | 7.6 | 2.15 | 820 | 14.56 | 6.88 | 0.069 | |
| V25-F | 95.0 | 0.864 | 10.45 | 0.0163 | 100 | 1.0 | 4.25 | 1030 | 8.1 | 5.7 | 8.7 | 2.47 | 1130 | 16.28 | 6.72 | 0.067 | |
| V25-COS3 | 88.1 | 0.773 | 2.37 | 0.0037 | 100 | 1.0 | 5.89 | 390 | 7.9 | 5.7 | 8.6 | 1.14 | 490 | 12.72 | 7.03 | 0.070 | |
| V25-COS4 | 88.0 | 0.772 | 4.64 | 0.0073 | 100 | 1.0 | 5.91 | 1205 | 7.2 | 5.4 | 8.2 | 2.96 | 1305 | 17.25 | 8.88 | 0.089 | |
| V25-COS2 | 88.0 | 0.772 | 1.79 | 0.0028 | 100 | 1.0 | 5.91 | 1036 | 1.0 | 2.1 | 3.1 | 6.94 | 1136 | 16.31 | 12.85 | 0.128 | |
| STA1 | 98.0 | 0.904 | 2.98 | 0.0046 | 18 | 2.0 | 1.19 | 1455 | 5.6 | 4.8 | 7.2 | 3.95 | 1473 | 18.18 | 5.14 | 0.051 | |
| V25-C | 90.7 | 0.808 | 26.54 | 0.0415 | 100 | 1.0 | 5.26 | 1465 | 2.7 | 3.3 | 5.1 | 5.68 | 1565 | 18.69 | 10.94 | 0.109 | |
| V25-B | 91.0 | 0.811 | 19.93 | 0.0311 | 100 | 1.0 | 5.20 | 1311 | 3.6 | 3.8 | 5.8 | 4.51 | 1411 | 17.84 | 9.71 | 0.097 | |
| | | | | | | | | | | | | | | | Tc Min (DEV)= 5 min | | |
| | | | | | | | | | | | | | | | Tc Min (UNDEV)= 10 min | | |

```
1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998              *                    *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                    *          609 SECOND STREET           *
 *                                      *                    *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   27DEC18  TIME  16:51:33  *                    *           (916) 756-1104             *
 *                                      *                    *                                      *
 ****************************************                    ****************************************

                                        X     X  XXXXXXX   XXXXX          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     X  XXXXXXX   XXXXX        XXX
```

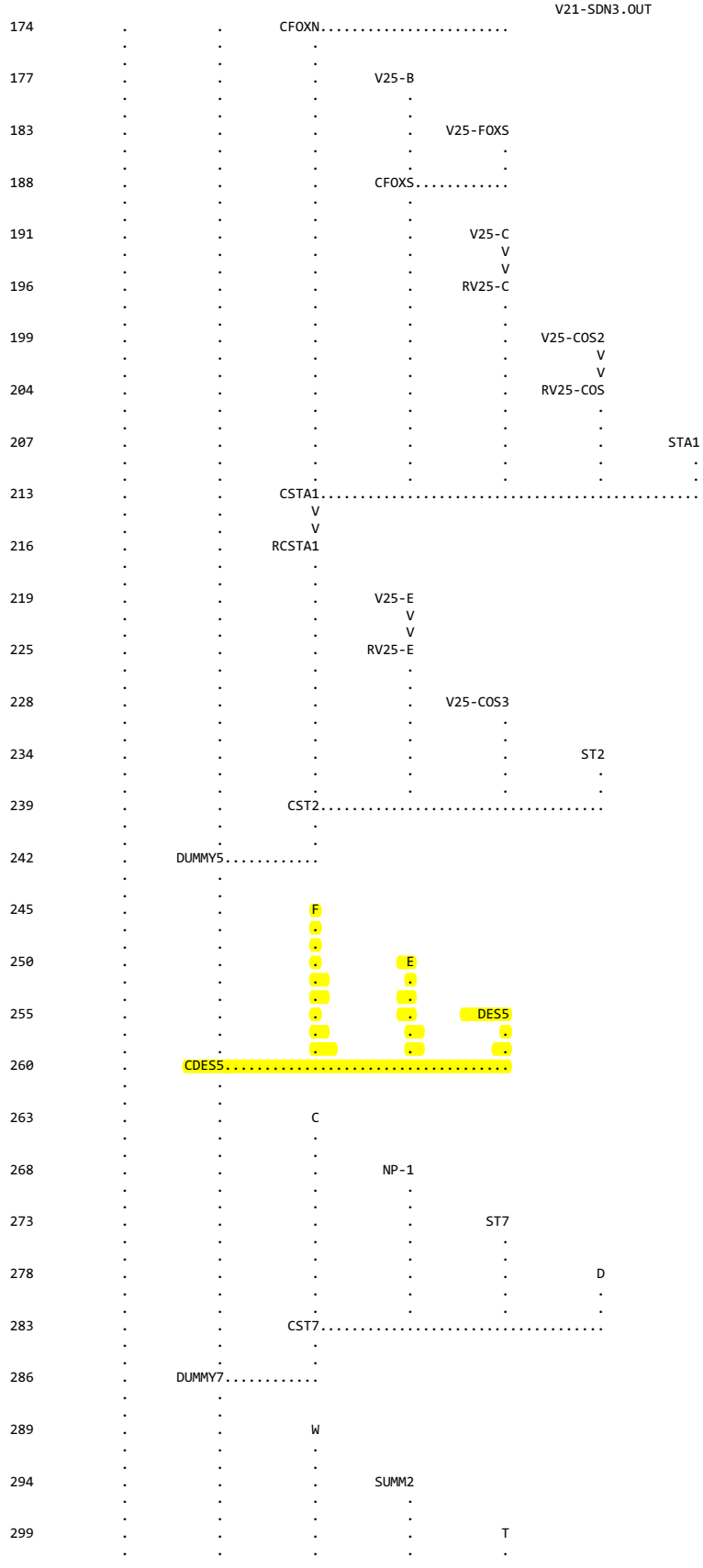
THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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



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

                        *DIAGRAM
 *** FREE ***
              1         ID    INPUT FILE DATE = SEPTEMBER 12,2017
              2         ID    DESIGN STORM = 100-YEAR 6-HR STORM
              3         ID    STORM DISTRIBUTION = SDN #3
              4         ID    MODELED BY VTN (JYA)
              5         ID
              6         ID    ****************************************************************
              7         ID    * VILLAGE 21 (PREVIOUSLY AREA 1) HEC-1 MODE                    *
              8         ID    * REFER TO LAND USE EXHIBIT BY VTN FOR LOCATION OF AREAS 1      *
              9         ID    *                                                              *
             10         ID    ****************************************************************
             11         ID
             12         ID
             13         ID
             14         ID  100-YEAR,  6-HOUR STORM,  SDN3
             15         ID
             16         IT       5       0       0     100
             17         IO       5       0       0
             18         IN       5       0       0
             19         JR    PREC    1.00
                        *
             20         KK   SUMM3
             21         BA  0.0045
             22         PB    3.40
             23         PC       0    0.02   0.057    0.07   0.087   0.108   0.124    0.13    0.13   0.130
             24         PC    0.13    0.13    0.13   0.133    0.14   0.142   0.148   0.158   0.172   0.181
             25         PC    0.19   0.197   0.199     0.2   0.201   0.204   0.214   0.229   0.241   0.249
             26         PC   0.251   0.256    0.27   0.278   0.281   0.283   0.295   0.322   0.352   0.409
             27         PC   0.499    0.59    0.71   0.744   0.781   0.812   0.819   0.835   0.851   0.856
             28         PC    0.86   0.868   0.876   0.888    0.91   0.926   0.937    0.95    0.97   0.976
             29         PC   0.982   0.985   0.987   0.989    0.99   0.993   0.993   0.994   0.995   0.998
             30         PC   0.998   0.999       1
             31         LS       0      98
             32         UD   0.050
                        *
             33         KK       Z
             34         BA  0.0070
             35         PB    3.41
             36         LS       0    94.2
             37         UD   0.065
                        *
             38         KK      AA
             39         BA  0.0063
             40         PB    3.40
             41         LS       0    94.2
             42         UD   0.060
                        *
```

```
                *
 213            KK   CSTA1
 214            KM   COMBINE V25-FOXS, V25-C, CFOXS, V25-COS2, STA1, AND CFOXS
 215            HC       5
                *
1                                       HEC-1 INPUT                                             PAGE  7

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


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

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

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

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

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

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

 242            KK  DUMMY5
 243            KM   RFCD FACILITY IN DESERT FOOTHILLS DR
 244            HC       2
                *

 245            KK       F
 246            BA  0.0259
 247            PB    3.39
 248            LS       0    95.0
 249            UD   0.079
                *
1                                       HEC-1 INPUT                                             PAGE  8

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


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

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

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

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


CFOXN
V25-B
V25-FOXS
CFOXS
V25-C
RV25-C
V25-COS2
RV25-COS
STA1
CSTA1
RCSTA1
V25-E
RV25-E
V25-COS3
ST2
CST2
DUMMY5
F
E
DES5
CDES5
C
NP-1
ST7
D
CST7
DUMMY7
W
SUMM2
T

```
 HYDROGRAPH AT
+              V25-COS2       .00     1   FLOW          5.
                                          TIME        3.58

 ROUTED TO
+              RV25-COS       .00     1   FLOW          5.
                                          TIME        3.67

 HYDROGRAPH AT
+                  STA1       .00     1   FLOW         13.
                                          TIME        3.50

  5 COMBINED AT
+                 CSTA1       .11     1   FLOW        238.
                                          TIME        3.50

 ROUTED TO
+                RCSTA1       .11     1   FLOW        217.
                                          TIME        3.58

 HYDROGRAPH AT
+                 V25-E       .03     1   FLOW         65.
                                          TIME        3.50

 ROUTED TO
+                RV25-E       .03     1   FLOW         59.
                                          TIME        3.58

 HYDROGRAPH AT
+              V25-COS3       .00     1   FLOW          8.
                                          TIME        3.50

 HYDROGRAPH AT
+                   ST2       .00     1   FLOW         12.
                                          TIME        3.50

  4 COMBINED AT
+                  CST2       .15     1   FLOW        291.
                                          TIME        3.58

  2 COMBINED AT
+                 DUMMY5      .23     1   FLOW        461.
                                          TIME        3.50

 HYDROGRAPH AT
+                     F       .03     1   FLOW         65.
                                          TIME        3.50

 HYDROGRAPH AT
+                     E       .03     1   FLOW         78.
                                          TIME        3.50

 HYDROGRAPH AT
+                  DES5       .01     1   FLOW         22.
                                          TIME        3.50

  4 COMBINED AT
+                 CDES5       .29     1   FLOW        624.
                                          TIME        3.50

 HYDROGRAPH AT
+                     C       .02     1   FLOW         54.
                                          TIME        3.50

 HYDROGRAPH AT
+                  NP-1       .00     1   FLOW          4.
                                          TIME        3.50

 HYDROGRAPH AT
+                   ST7       .00     1   FLOW          9.
                                          TIME        3.50

 HYDROGRAPH AT
+                     D       .02     1   FLOW         56.
                                          TIME        3.50

  4 COMBINED AT
+                  CST7       .05     1   FLOW        124.
                                          TIME        3.50

  2 COMBINED AT
+                 DUMMY7      .35     1   FLOW        748.
                                          TIME        3.50

 HYDROGRAPH AT
+                     W       .01     1   FLOW         31.
                                          TIME        3.50

 HYDROGRAPH AT
```

# REFERENCES

Technical Drainage Study for Summerlin West
Village 21 Kindle Corner Ave & Kettle Ridge Drive (Sky Vista to Desert Foothills, DS#5013, VTN (2018 and 2019) and addenda

Approval Letters?
Figure 8: Ultimate Condition Basin Map Street B

100 Year Ultimate Condition Cross Section Summary for Section's 2B,3 and 4

# Technical Drainage Study for

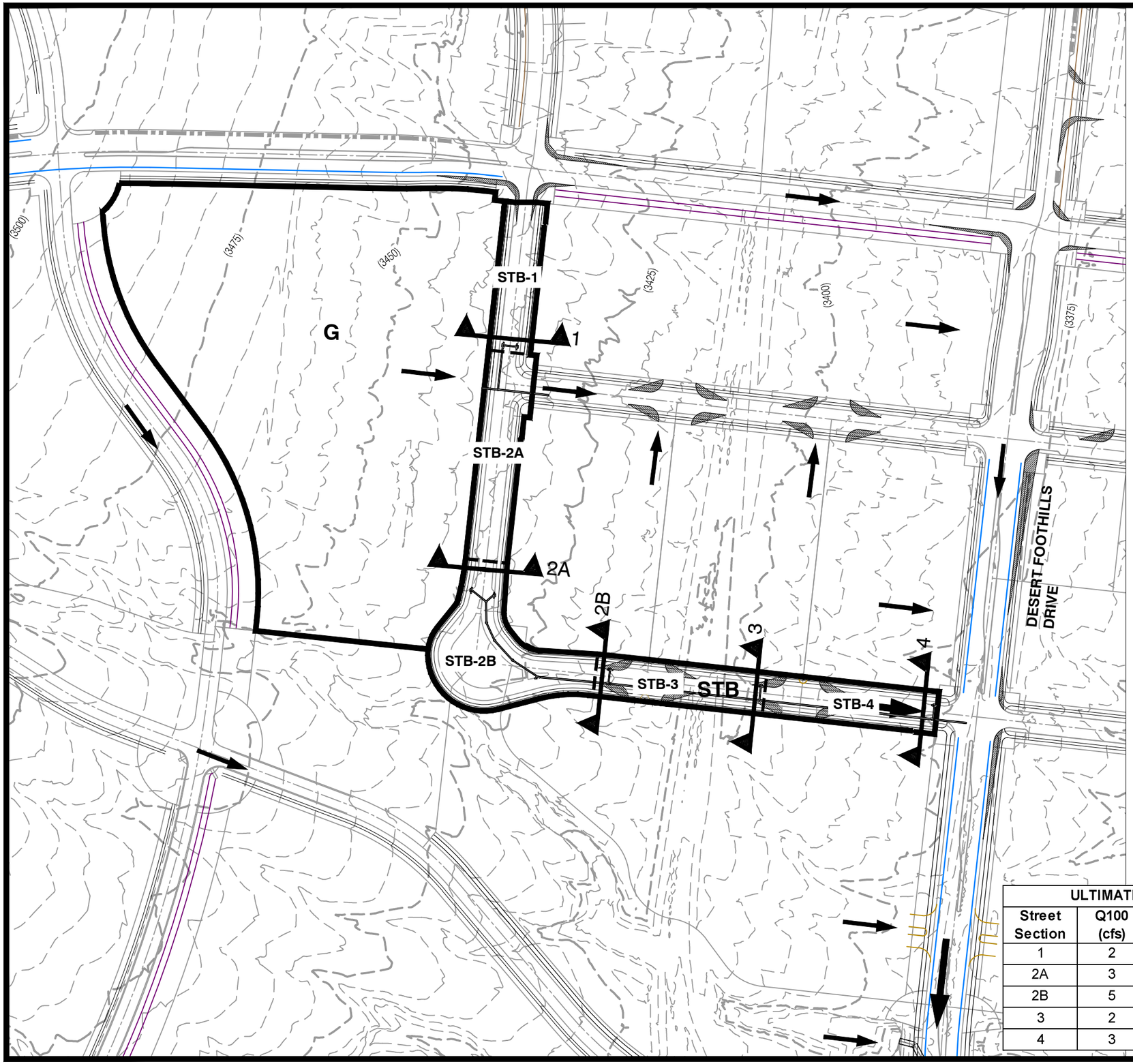
## Summerlin West Village 21
## Kindle Corner Ave & Kettle Ridge Drive
## (Sky Vista to Desert Foothills)

*Las Vegas, Nevada*

W.O. # 7851

*Prepared for:*
Howard Hughes Company, LLC

*Submitted to:*
City of Las Vegas
Public Works




NORTH

GRAPHIC SCALE

200 0 100 200 400

1" = 200'

LEGEND

- BASIN BOUNDARY
- A — BASIN DESIGNATION
- PRORATED SUBBASIN BOUNDARY
- STB-1 — SUBBASIN DESIGNATION
- CROSS SECTION
- CONCENTRATION POINT

| ULTIMATE CONDITION HEC-1 SUMMARY TABLE | | |
|---|---|---|
| Basin ID | Area (a.c.) | Q100 (cfs) |
| G | 11.43 | 44 |
| STB | 3.73 | 15 |

| PRORATED SUBBASIN SUMMARY INTERIM CONDITION | | | |
|---|---|---|---|
| BASIN | BASIN AREA | | Q100 |
| STB | 3.73 | | 15 |
| SUBBASIN | SUB AREA | SUB AREA | Q100 |
| STB-1 | 0.53 | 14.21% | 2 |
| STB-2A | 0.79 | 21.18% | 3 |
| STB-2B | 1.16 | 31.10% | 5 |
| STB-3 | 0.61 | 16.35% | 2 |
| STB-4 | 0.64 | 17.16% | 3 |

| ULTIMATE CONDITION STREET FLOW ANALYSIS SUMMARY | | | | | | |
|---|---|---|---|---|---|---|
| Street Section | Q100 (cfs) | Slope | Velocity (ft/s) | Depth (ft) | V x D | Tributary Basin |
| 1 | 2 | 0.70% | 1.58 | 0.28 | 0.44 | STB-1 |
| 2A | 3 | 1.09% | 2.04 | 0.3 | 0.61 | STB-2A |
| 2B | 5 | 5.69% | 4.40 | 0.27 | 1.19 | STB-2B |
| 3 | 2 | 7.00% | 4.63 | 0.20 | 0.93 | STB-3 |
| 4 | 3 | 2.40% | 2.81 | 0.27 | 0.76 | STB-4 |

# FIGURE 8: ULTIMATE CONDITION BASIN MAP
## STREET B
## (DESERT FOOTHILLS TO SUMMERLIN PARKWAY)

| | |
|---|---|
| W.O.#: | 7851-MISC-19 |
| DATE: | March 13, 2019 |
| BY: | JYA |
| SCALE: | 1" = 200' |
| SHEET | 1 OF 1 |

2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NV 89146-5148

H:\7851\Street B-Desert Foothills to Summerlin Pkwy\Drainage\1_TDS\A Figures\Figure 8 - Ultimate Drainage Map.dwg;rachelr; Mar 13, 2019 - 3:22pm

# Worksheet for Section 2B

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 5.69 | % |
| Discharge | 5.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.00 | 0.50 |
| 0+00.50 | 0.50 |
| 0+00.50 | 0.00 |
| 0+02.00 | 0.13 |
| 0+02.00 | 0.17 |
| 0+14.00 | 0.41 |
| 0+26.00 | 0.17 |
| 0+26.00 | 0.13 |
| 0+27.50 | 0.00 |
| 0+27.50 | 0.50 |
| 0+28.00 | 0.50 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013 |
| (0+02.00, 0.13) | (0+26.00, 0.13) | 0.016 |
| (0+26.00, 0.13) | (0+28.00, 0.50) | 0.013 |

## Options

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

# Worksheet for Section 2B

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 0.27 | ft |
| Elevation Range | 0.00 to 0.50 ft | | |
| Flow Area | | 1.14 | ft² |
| Wetted Perimeter | | 13.80 | ft |
| Hydraulic Radius | | 0.08 | ft |
| Top Width | | 13.16 | ft |
| Normal Depth | | 0.27 | ft |
| Critical Depth | | 0.35 | ft |
| Critical Slope | | 0.00726 | ft/ft |
| Velocity | | 4.40 | ft/s |
| Velocity Head | | 0.30 | ft |
| Specific Energy | | 0.57 | ft |
| Froude Number | | 2.64 | |
| Flow Type | Supercritical | | |

## GVF Input Data

| | | |
|---|---|---|
| Downstream Depth | 0.00 | ft |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.27 | ft |
| Critical Depth | 0.35 | ft |
| Channel Slope | 5.69 | % |
| Critical Slope | 0.00726 | ft/ft |

# Cross Section for Section 2B

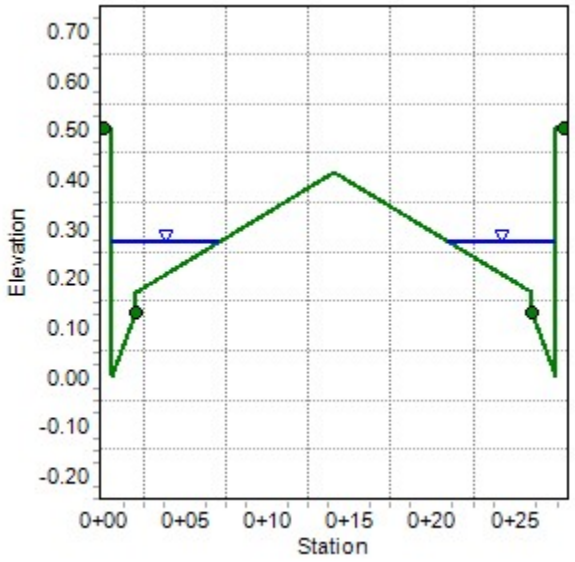
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 5.69 | % |
| Normal Depth | 0.27 | ft |
| Discharge | 5.00 | ft³/s |

## Cross Section Image



# Worksheet for Section 3

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 7.00 | % |
| Discharge | 2.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.00 | 0.50 |
| 0+00.50 | 0.50 |
| 0+00.50 | 0.00 |
| 0+02.00 | 0.13 |
| 0+02.00 | 0.17 |
| 0+14.00 | 0.41 |
| 0+26.00 | 0.17 |
| 0+26.00 | 0.13 |
| 0+27.50 | 0.00 |
| 0+27.50 | 0.50 |
| 0+28.00 | 0.50 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013 |
| (0+02.00, 0.13) | (0+26.00, 0.13) | 0.016 |
| (0+26.00, 0.13) | (0+28.00, 0.50) | 0.013 |

## Options

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

# Worksheet for Section 3

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 0.20 | ft |
| Elevation Range | 0.00 to 0.50 ft | | |
| Flow Area | | 0.43 | ft² |
| Wetted Perimeter | | 6.18 | ft |
| Hydraulic Radius | | 0.07 | ft |
| Top Width | | 5.69 | ft |
| Normal Depth | | 0.20 | ft |
| Critical Depth | | 0.28 | ft |
| Critical Slope | | 0.00726 | ft/ft |
| Velocity | | 4.63 | ft/s |
| Velocity Head | | 0.33 | ft |
| Specific Energy | | 0.53 | ft |
| Froude Number | | 2.96 | |
| Flow Type | Supercritical | | |

## GVF Input Data

| | | |
|---|---|---|
| Downstream Depth | 0.00 | ft |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.20 | ft |
| Critical Depth | 0.28 | ft |
| Channel Slope | 7.00 | % |
| Critical Slope | 0.00726 | ft/ft |

# Cross Section for Section 3

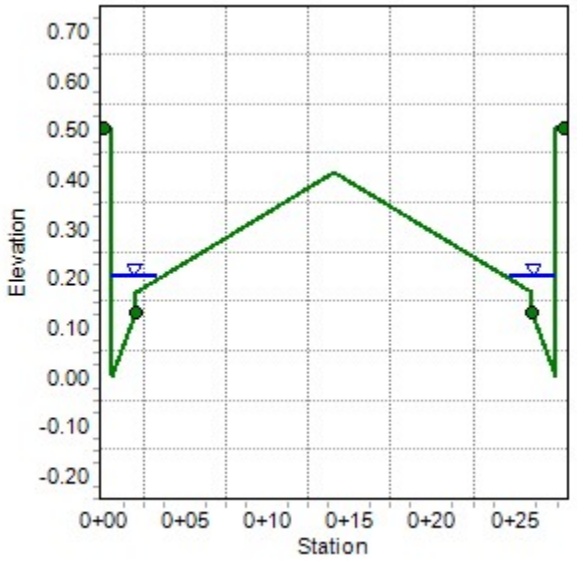
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 7.00 | % |
| Normal Depth | 0.20 | ft |
| Discharge | 2.00 | ft³/s |

## Cross Section Image



# Worksheet for Section 4

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.40 | % |
| Discharge | 3.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.00 | 0.50 |
| 0+00.50 | 0.50 |
| 0+00.50 | 0.00 |
| 0+02.00 | 0.13 |
| 0+02.00 | 0.17 |
| 0+14.00 | 0.41 |
| 0+26.00 | 0.17 |
| 0+26.00 | 0.13 |
| 0+27.50 | 0.00 |
| 0+27.50 | 0.50 |
| 0+28.00 | 0.50 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013 |
| (0+02.00, 0.13) | (0+26.00, 0.13) | 0.016 |
| (0+26.00, 0.13) | (0+28.00, 0.50) | 0.013 |

## Options

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

# Worksheet for Section 4

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 0.27 | ft |
| Elevation Range | 0.00 to 0.50 ft | | |
| Flow Area | | 1.07 | ft² |
| Wetted Perimeter | | 13.26 | ft |
| Hydraulic Radius | | 0.08 | ft |
| Top Width | | 12.63 | ft |
| Normal Depth | | 0.27 | ft |
| Critical Depth | | 0.31 | ft |
| Critical Slope | | 0.00773 | ft/ft |
| Velocity | | 2.81 | ft/s |
| Velocity Head | | 0.12 | ft |
| Specific Energy | | 0.39 | ft |
| Froude Number | | 1.70 | |
| Flow Type | Supercritical | | |

## GVF Input Data

| | | |
|---|---|---|
| Downstream Depth | 0.00 | ft |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.27 | ft |
| Critical Depth | 0.31 | ft |
| Channel Slope | 2.40 | % |
| Critical Slope | 0.00773 | ft/ft |

# Cross Section for Section 4

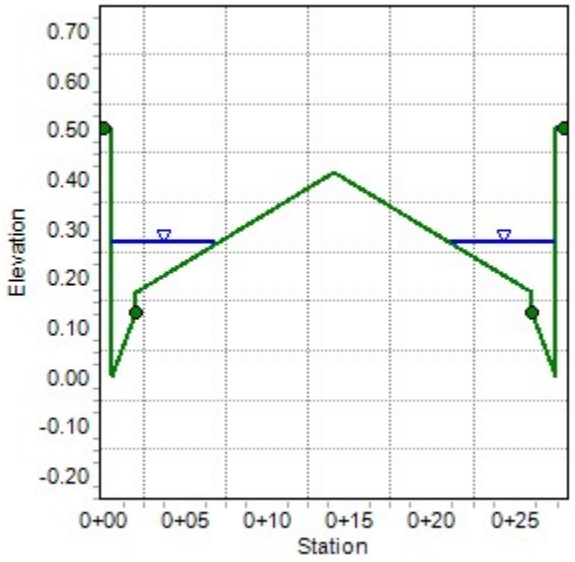
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.40 | % |
| Normal Depth | 0.27 | ft |
| Discharge | 3.00 | ft³/s |

## Cross Section Image



# REFERENCES

Technical Drainage Study for Summerlin West
Village 21 Desert Foothills Drive (Redpoint to Summerlin Parkway),
DS#5052, VTN (2018 and 2019) and addenda

Approval Letters
Standard Form 4
Figure 8: Ultimate Condition Basin Map
HEC-1 Summary for 100 year Ultimate Condition
Normal Depth Calculation for Section 3
*Sheet UT8 - Utility Lateral Sheet 8 for Storm Drain Lateral 5 (Parcel L)
Figure 9: Proposed Storm Drain Facilities Map
Standard Form 6 for Lateral 5

Actus

# Technical Drainage Study for

# Summerlin West Village 21
# Desert Foothills Drive
# (Redpoint to Summerlin Parkway)

*Las Vegas, Nevada*

*Prepared for:*
Howard Hughes Company, LLC

*Submitted to:*
City of Las Vegas
Public Works

| CITY OF LAS VEGAS<br>INTER-OFFICE MEMORANDUM | | | | DATE:<br>June 25, 2019 |
|---|---|---|---|---|
| TO:<br>**Land Development Services**<br>Department of Building & Safety | | | | FROM:<br>Albert Sung, P.E.<br>Flood Control Project Engineer<br>Department of Public Works |
| **SUBJECT:** | Drainage Study for:<br>**Summerlin West Village 21 - Desert Foothills Drive (Redpoint Drive to Summerlin Parkway)** | | | **COPIES TO:**<br>VTN Nevada |
| **Cross Streets:** | Desert Foothills Dr. from Redpoint Drive to Summerlin Parkway | | | Howard Hughes Company, LLC |
| **File Number:** | F:\Depot\DSMemos\DS5052E.doc | | | Bart Anderson, P.E., DevCo |
| **Parcel Number:** | 137-26-101-001 | | | CCRFCD |
| **Zoning Action:** | N/A | | | |
| **FEMA Flood Zone** | YES | NO X | | |
| **Proposed Storm Drain** | YES X | NO | | |

| HISTORY | DATE RECEIVED | DATE REVIEWED | COMMENTS | REVIEW FEES | FEES PAID Payment Trn # |
|---|---|---|---|---|---|
| 1st Submittal | 10/24/2018 | 11/8/2018 | Not Approved | $400.00 | 500378: $400 |
| 2nd Submittal | 2/4/2018 | 2/21/2018 | Conditional Approval | $400.00 | 502878: $400 |
| 3rd Submittal | 4/25/2019 | 5/9/2019 | Not Approved | $400.00 | 3105168: $400 |
| 4th Submittal | 5/15/2019 | 6/11/2019 | Conditional Approval | $400.00 | 3133317: $400 |
| CCRFCD | 6/20/2019 | 6/25/2019 | Concurrence Recv'd | N/C | N/C |
| | | | **TOTAL FEES (LDDRS):** | **$1,600.00** | **----** |

**REMARKS:**

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

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

1. The project proposes to build temporary drainage facilities including drainage berms/swales along the west side of the proposed *Desert Foothills Drive*. Prior to final plan approval the developer must complete a ***Maintenance & Liability Agreement*** for the interim drainage improvements and post a minimum maintenance bond of $50,000 or 50-percent of the construction cost for the improvements, whichever is greater. The engineer must submit an estimate of the quantities for constructing the facilities and an exhibit that adequately shows the location and limits of the drainage facilities to *City of Las Vegas Flood Control* for approval. Once the drainage study is conditionally approved, the engineer should contact the *City's Land Development Section* (229-6371) to begin the agreement process.

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

2. Since the street and the associated storm drain facilities will eventually be accepted by the *City of Las Vegas*, the engineer/developer must coordinate with *City of Las Vegas Streets & Sanitation Department* for their review and approval prior to the final acceptance of the subject improvement plans.

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

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

**END OF REMARKS**
WSP/AYS

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

# REGIONAL FLOOD CONTROL DISTRICT

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

***BOARD OF DIRECTORS***

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**Dr. Lois Tarkanian**
City of Las Vegas

**Mayor Rodney Woodbury**
City of Boulder City

June 20, 2019

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

**DISTRICT CONCURRENCE:** **SUMMERLIN WEST VILLAGE 21-DESERT FOOTHILLS DR (REDPOINT DR TO SUMMERLIN PKWY) (DS5052D) (RFCD No. 19-11227)**

Dear Mr. Kwon:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated October 24, 2018, Addendum No. 1 dated January 30, 2019, Addendum No. 2 dated April 25, 2019, Addendum No. 3 dated May 14, 2019 for above-mentioned project as submitted by VTN NEVADA. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas Department of Public Works dated June 11, 2019.

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

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

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

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

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

BY: _____
Ching C. Wang, P.E.
Senior Civil Engineer

CCW:cr

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

P:\Letters and Memos\Local Drainage\Land Development & Drainage\2019\L-19-11227as_built.doc

600 S. Grand Central Parkway, Suite 300 • Las Vegas, Nevada 89106-4511
(702) 685-0000 • FAX: (702) 685-0001
Website: http://www.regionalflood.org

# STANDARD FORM 4

**DEVELOPMENT:** Desert Foothills (Street A to Summerlin Pkwy)

**CONDITION:** Existing/Interim/Ultimate

**W.O. #** 7851-5.6 **CALCULATED BY:** JYA

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

| Non-Urban: | | Urban | |
|---|---|---|---|
| $V1 = 1.48 * S^{1/2}$ | $V2 = 2.94 * S^{1/2}$ | $V1 = 2.02 * S^{1/2}$ | $V2 = 3.06 * S^{1/2}$ |

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

$$k = 0.0132 C_n - 0.39 \qquad T_c = T_i + T_t$$

| SUB-BASIN DATA | | | | | INITIAL/OVERLAND TIME (Ti) | | | TRAVEL TIME (Tt) | | | | | Tc CHECK (URBANIZED BASINS) | | FINAL Tc | LAG TIME | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIG. (1) | Cn | K (2) | AREA Ac. (3) | AREA Mi^2 | LENGTH Ft (4) | SLOPE % (5) | Ti Min. (6) | LENGTH Ft. (7) | SLOPE % (8) | V1 fps (9a) | V2 fps (9b) | Tt Min. (10) | TOTAL LENGTH (11) | Tc Min. (12) | Min. | TLAG Hr. | |
| **UNDEVELOPED BASINS** | | | | | | | | | | | | | | | | | |
| EX | 87.6 | 0.767 | 5.18 | 0.0081 | 200 | 3.0 | 5.88 | 1565 | 2.6 | 2.4 | 4.7 | 7.30 | 1765 | 19.81 | 13.18 | 0.132 | |
| OFF0 | 86.3 | 0.749 | 401.38 | 0.6272 | 883 | 12.5 | 8.09 | 14154 | 6.8 | 3.9 | 7.7 | 31.88 | 15037 | 93.54 | 39.97 | 0.400 | |
| OFF1 | 87.8 | 0.769 | 14.36 | 0.0224 | 430 | 6.9 | 6.50 | 1510 | 2.7 | 2.4 | 4.8 | 6.89 | 1940 | 20.78 | 13.39 | 0.134 | |
| OFF2 | 87.8 | 0.769 | 6.33 | 0.0099 | 100 | 8.3 | 2.95 | 1117 | 4.3 | 3.1 | 6.1 | 4.40 | 1217 | 16.76 | 7.35 | 0.073 | |
| OFF3 | 88.0 | 0.771 | 9.27 | 0.0145 | 100 | 8.3 | 2.92 | 1055 | 3.9 | 2.9 | 5.8 | 4.45 | 1155 | 16.42 | 7.37 | 0.074 | |
| **DEVELOPED BASINS** | | | | | | | | | | | | | | | | | |
| ON | 98.0 | 0.904 | 5.18 | 0.0081 | 40 | 2.0 | 1.77 | 1674 | 1.7 | 2.7 | 4.0 | 7.99 | 1714 | 19.52 | 9.77 | 0.098 | |
| P | 92.2 | 0.826 | 3.02 | 0.0047 | 100 | 1.0 | 4.93 | 450 | 3.3 | 3.7 | 5.6 | 2.03 | 550 | 13.06 | 6.96 | 0.070 | |
| Q | 92.2 | 0.826 | 3.17 | 0.0050 | 100 | 1.0 | 4.93 | 611 | 1.1 | 2.2 | 3.3 | 4.42 | 711 | 13.95 | 9.34 | 0.093 | |
| R | 92.2 | 0.826 | 3.07 | 0.0048 | 100 | 1.0 | 4.93 | 624 | 1.3 | 2.3 | 3.5 | 4.24 | 724 | 14.02 | 9.17 | 0.092 | |
| S | 93.4 | 0.843 | 6.33 | 0.0099 | 100 | 1.0 | 4.63 | 864 | 6.1 | 5.0 | 7.6 | 2.47 | 964 | 15.36 | 7.10 | 0.071 | |
| G | 92.8 | 0.835 | 11.43 | 0.0179 | 100 | 1.0 | 4.76 | 720 | 6.1 | 5.0 | 7.6 | 2.15 | 820 | 14.56 | 6.92 | 0.069 | |
| L | 94.8 | 0.861 | 7.44 | 0.0116 | 100 | 1.0 | 4.30 | 943 | 5.1 | 4.6 | 6.9 | 2.90 | 1043 | 15.79 | 7.20 | 0.072 | |
| COS-3 | 88.0 | 0.772 | 5.90 | 0.0092 | 60 | 16.2 | 1.81 | 1186 | 5.1 | 3.4 | 6.7 | 4.20 | 1246 | 16.92 | 6.01 | 0.060 | Min TLAG=0.10 |
| ST1 | 98.0 | 0.904 | 1.58 | 0.0025 | 20 | 2.0 | 1.25 | 910 | 6.0 | 5.0 | 7.5 | 2.59 | 930 | 15.17 | 3.84 | 0.038 | Min TLAG=0.05 |
| DES3 | 98.0 | 0.904 | 3.73 | 0.0058 | 20 | 2.0 | 1.25 | 1919 | 3.6 | 3.8 | 5.8 | 6.25 | 1939 | 20.77 | 7.51 | 0.075 | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

```
1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998              *                    *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                    *         609 SECOND STREET            *
 *                                      *                    *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   05SEP18  TIME  17:38:23  *                    *          (916) 756-1104              *
 *                                      *                    *                                      *
 ****************************************                    ****************************************

                                        X     X  XXXXXXX   XXXXX          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     X  XXXXXXX   XXXXX         XXX
```

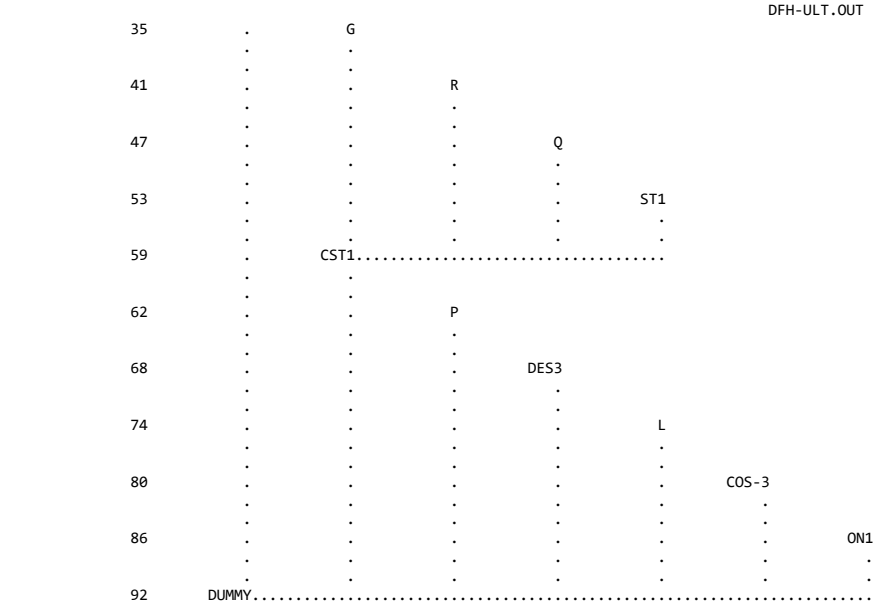
THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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

1 HEC-1 INPUT PAGE 1

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

                        *DIAGRAM
 *** FREE ***
             1          ID    ULTIMATE CONDITION HYDROLOGIC MODEL
             2          ID    INPUT FILE DATE = SEPTEMBER 25, 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    * SUMMERLIN WEST VILLAGE 21                           *
             9          ID    * DESERT FOOTHILLS DRIVE - FAR HILLS TO SUMMERLIN PKWY  *
            10          ID    ********************************************************
            11          ID
            12          ID
            13          ID  JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)
            14          ID
            15          ID  100-YEAR,  6-HOUR STORM,  SDN3
            16          ID
            17          IT       5       0       0     300
            18          IO       5       0       0
            19          IN       5       0       0
            20          JR    PREC    1.00
                        *

            21          KK       S
            22          KM   MIXED USE MF PARCEL
            23          BA  0.0099
            24          PB     3.4
            25          PC       0    0.02   0.057    0.07   0.087   0.108   0.124    0.13    0.13   0.130
            26          PC    0.13    0.13    0.13   0.133    0.14   0.142   0.148   0.158   0.172   0.181
            27          PC    0.19   0.197   0.199     0.2   0.201   0.204   0.214   0.229   0.241   0.249
            28          PC   0.251   0.256    0.27   0.278   0.281   0.283   0.295   0.322   0.352   0.409
            29          PC   0.499    0.59    0.71   0.744   0.781   0.812   0.819   0.835   0.851   0.856
            30          PC    0.86   0.868   0.876   0.888    0.91   0.926   0.937    0.95    0.97   0.976
            31          PC   0.982   0.985   0.987   0.989    0.99   0.993   0.993   0.994   0.995   0.998
            32          PC   0.998   0.999       1
            33          LS       0    93.4
            34          UD   0.071
                        *

            35          KK       G
            36          KM   MULTIFAMILY PARCEL
            37          BA  0.0179
            38          PB    3.41
            39          LS       0    92.8
            40          UD   0.069
                        *

            41          KK       R
            42          KM   MIXED USE SFA PARCEL
            43          PB     3.4
```

```
             44          BA  0.0048
             45          LS       0    92.2
             46          UD   0.092
                         *
1                                          HEC-1 INPUT                                          PAGE  2

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


             47          KK       Q
             48          KM   MIXED USE SFA PARCEL
             49          BA  0.0050
             50          PB     3.4
             51          LS       0    92.2
             52          UD   0.093
                         *

             53          KK     ST1
             54          KM   STREET C
             55          BA  0.0025
             56          PB     3.4
             57          LS       0    98.0
             58          UD   0.050
                         *

             59          KK    CST1
             60          KM   COMBINE G, R, Q, AND ST1
             61          HC       4
                         *

             62          KK       P
             63          KM   MIXED USE SFA PARCEL
             64          BA  0.0047
             65          PB     3.4
             66          LS       0    92.2
             67          UD   0.070
                         *

             68          KK    DES3
             69          KM   STREET J TO STREET B
             70          BA  0.0058
             71          PB     3.4
             72          LS       0    98.0
             73          UD   0.075
                         *

             74          KK       L
             75          KM   SINGLE FAMILY DETACHED PARCEL
             76          BA  0.0116
             77          PB     3.4
             78          LS       0    94.8
             79          UD   0.072
                         *

             80          KK   COS-3
             81          KM   COMMUNITY OPEN SPACE
             82          BA   .0092
             83          PB    3.39
             84          LS       0    88.0
             85          UD   0.100
                         *
1                                          HEC-1 INPUT                                          PAGE  3

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


             86          KK     ON1
             87          KM   DESERT FOOTHILLS DRIVE
             88          BA  0.0081
             89          PB     3.4
             90          LS       0    98.0
             91          UD   0.098
                         *

             92          KK   DUMMY
             93          KM   COMBINE S, CST1, P, DES3, L, COS-3, AND ON1
             94          HC       7
                         *
             95          ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

     21           S
                  .
                  .
```




(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN   1998              *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   05SEP18  TIME  17:38:23   *
*                                       *
*****************************************
```

```
*************************************
*                                   *
*    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 = SEPTEMBER 25, 2018
DESIGN STORM = 100-YEAR 6-HR STORM
STORM DISTRIBUTION = SDN #3
MODELED BY VTN (JYA)

```
*********************************************************
* SUMMERLIN WEST VILLAGE 21                             *
* DESERT FOOTHILLS DRIVE - FAR HILLS TO SUMMERLIN PKWY  *
*********************************************************
```

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

100-YEAR,  6-HOUR STORM,  SDN3

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

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

                  COMPUTATION INTERVAL     .08 HOURS
                       TOTAL TIME BASE   24.92 HOURS

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

```
      JP          MULTI-PLAN OPTION
                       NPLAN           1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                      RATIOS OF PRECIPITATION
                     1.00
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 | | | | | |
| + | S | .01 | 1 | FLOW | 25. |
| | | | | TIME | 3.50 |
| HYDROGRAPH AT | | | | | |
| + | G | .02 | 1 | FLOW | 44. |
| | | | | TIME | 3.50 |
| HYDROGRAPH AT | | | | | |
| + | R | .00 | 1 | FLOW | 11. |
| | | | | TIME | 3.50 |
| HYDROGRAPH AT | | | | | |
| + | Q | .00 | 1 | FLOW | 11. |
| | | | | TIME | 3.50 |
| HYDROGRAPH AT | | | | | |
| + | ST1 | .00 | 1 | FLOW | 7. |
| | | | | TIME | 3.50 |
| 4 COMBINED AT | | | | | |
| + | CST1 | .03 | 1 | FLOW | 74. |
| | | | | TIME | 3.50 |
| HYDROGRAPH AT | | | | | |
| + | P | .00 | 1 | FLOW | 11. |
| | | | | TIME | 3.50 |
| HYDROGRAPH AT | | | | | |
| + | DES3 | .01 | 1 | FLOW | 15. |
| | | | | TIME | 3.50 |
| HYDROGRAPH AT | | | | | |
| + | L | .01 | 1 | FLOW | 30. |
| | | | | TIME | 3.50 |
| HYDROGRAPH AT | | | | | |
| + | COS-3 | .01 | 1 | FLOW | 18. |
| | | | | TIME | 3.50 |
| HYDROGRAPH AT | | | | | |
| + | ON1 | .01 | 1 | FLOW | 20. |
| | | | | TIME | 3.50 |
| 7 COMBINED AT | | | | | |
| + | DUMMY | .08 | 1 | FLOW | 192. |
| | | | | TIME | 3.50 |

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

# Worksheet for Section 3

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 1.50 | % |
| Discharge | 7.0 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.00 | 0.50 |
| 0+00.50 | 0.50 |
| 0+00.50 | 0.00 |
| 0+02.00 | 0.13 |
| 0+02.00 | 0.17 |
| 0+40.67 | 0.94 |
| 0+40.67 | 1.44 |
| 0+46.33 | 1.33 |
| 0+46.33 | 0.83 |
| 0+74.00 | 0.28 |
| 0+74.00 | 0.24 |
| 0+75.50 | 0.11 |
| 0+75.50 | 0.61 |
| 0+76.00 | 0.61 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013 |
| (0+02.00, 0.13) | (0+40.67, 0.94) | 0.016 |
| (0+40.67, 0.94) | (0+46.33, 0.83) | 0.013 |
| (0+46.33, 0.83) | (0+74.00, 0.24) | 0.016 |
| (0+74.00, 0.24) | (0+76.00, 0.61) | 0.013 |

# Worksheet for Section 3

## Options

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

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 0.40 | ft |
| Elevation Range | 0.00 to 1.44 ft | | |
| Flow Area | | 2.48 | ft² |
| Wetted Perimeter | | 21.13 | ft |
| Hydraulic Radius | | 0.12 | ft |
| Top Width | | 20.35 | ft |
| Normal Depth | | 0.40 | ft |
| Critical Depth | | 0.44 | ft |
| Critical Slope | | 0.00712 | ft/ft |
| Velocity | | 2.82 | ft/s |
| Velocity Head | | 0.12 | ft |
| Specific Energy | | 0.52 | ft |
| Froude Number | | 1.42 | |
| Flow Type | Supercritical | | |

## GVF Input Data

| | | |
|---|---|---|
| Downstream Depth | 0.00 | ft |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.40 | ft |
| Critical Depth | 0.44 | ft |
| Channel Slope | 1.50 | % |
| Critical Slope | 0.00712 | ft/ft |

# Cross Section for Section 3

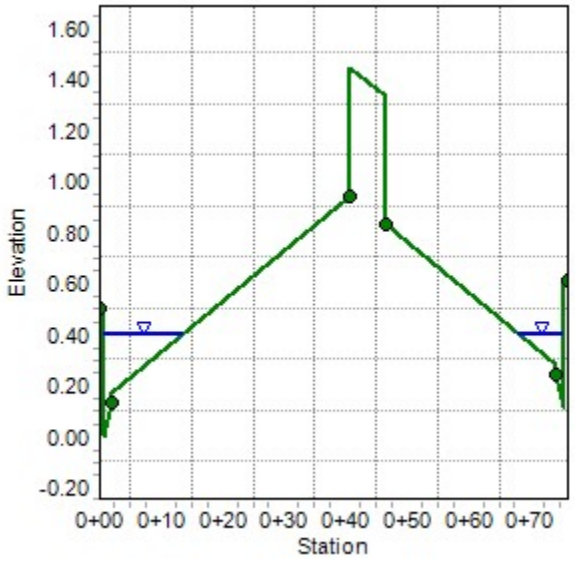
## Project Description

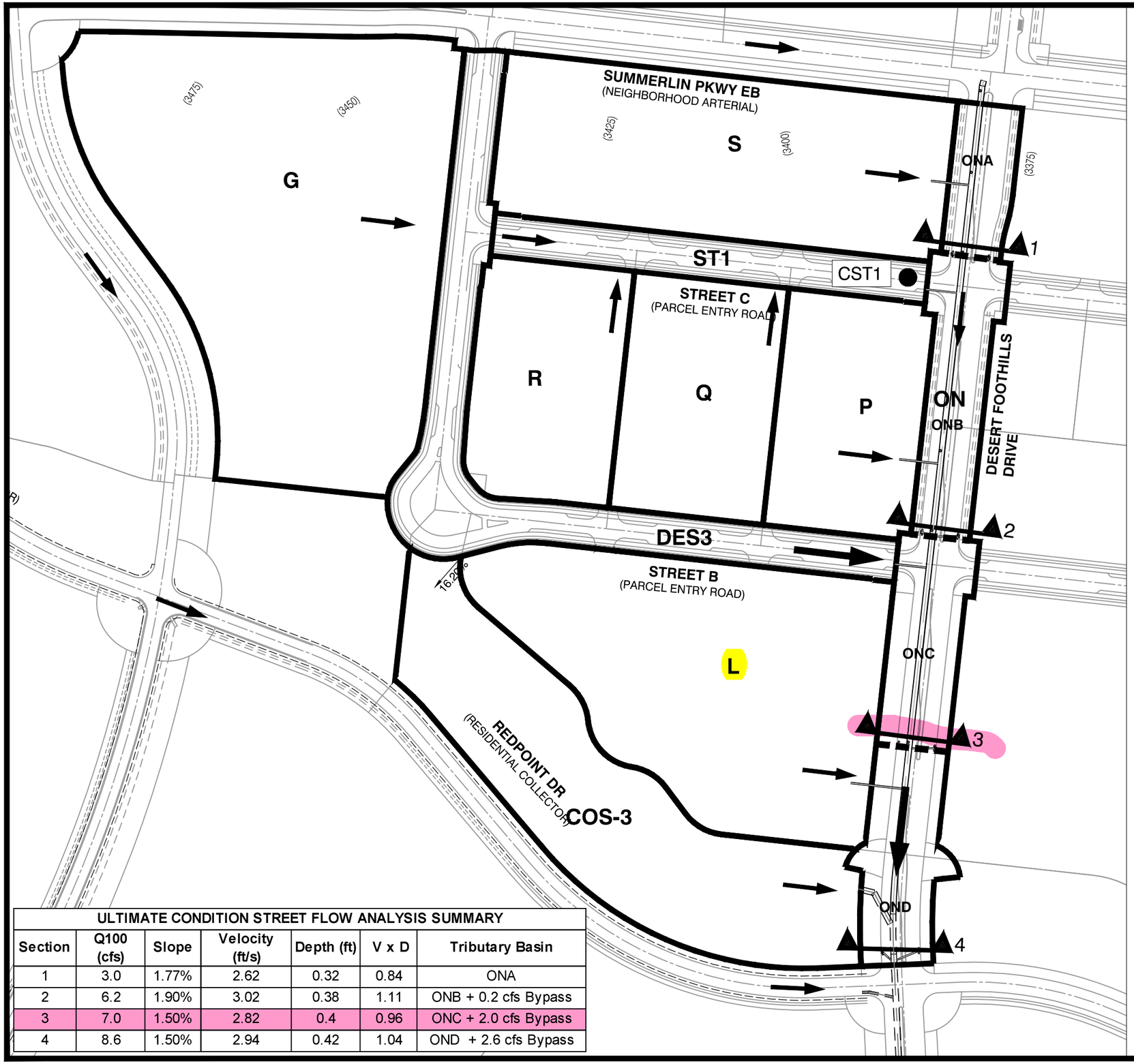
| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 1.50 | % |
| Normal Depth | 0.40 | ft |
| Discharge | 7.0 | ft³/s |

## Cross Section Image





GRAPHIC SCALE

200 0 100 200 400

1" = 200'

LEGEND

BASIN BOUNDARY

A BASIN DESIGNATION

CROSS SECTION

CONCENTRATION POINT

**ULTIMATE CONDITION STREET FLOW ANALYSIS SUMMARY**

| Section | Q100 (cfs) | Slope | Velocity (ft/s) | Depth (ft) | V x D | Tributary Basin |
|---|---|---|---|---|---|---|
| 1 | 3.0 | 1.77% | 2.62 | 0.32 | 0.84 | ONA |
| 2 | 6.2 | 1.90% | 3.02 | 0.38 | 1.11 | ONB + 0.2 cfs Bypass |
| 3 | 7.0 | 1.50% | 2.82 | 0.4 | 0.96 | ONC + 2.0 cfs Bypass |
| 4 | 8.6 | 1.50% | 2.94 | 0.42 | 1.04 | OND + 2.6 cfs Bypass |

**ULTIMATE CONDITION HEC-1 SUMMARY TABLE**

| BASIN ID | AREA (ac) | Q100 (CFS) |
|---|---|---|
| S | 6.33 | 25 |
| G | 11.43 | 44 |
| R | 3.07 | 11 |
| Q | 3.17 | 11 |
| ST1 | 1.58 | 7 |
| CST1 | - | 74 |
| P | 3.02 | 11 |
| DES3 | 3.73 | 15 |
| L | 7.44 | 30 |
| COS-3 | 5.9 | 18 |
| ON | 5.18 | 20 |

**PRORATED SUBBASIN SUMMARY ULTIMATE CONDITION**

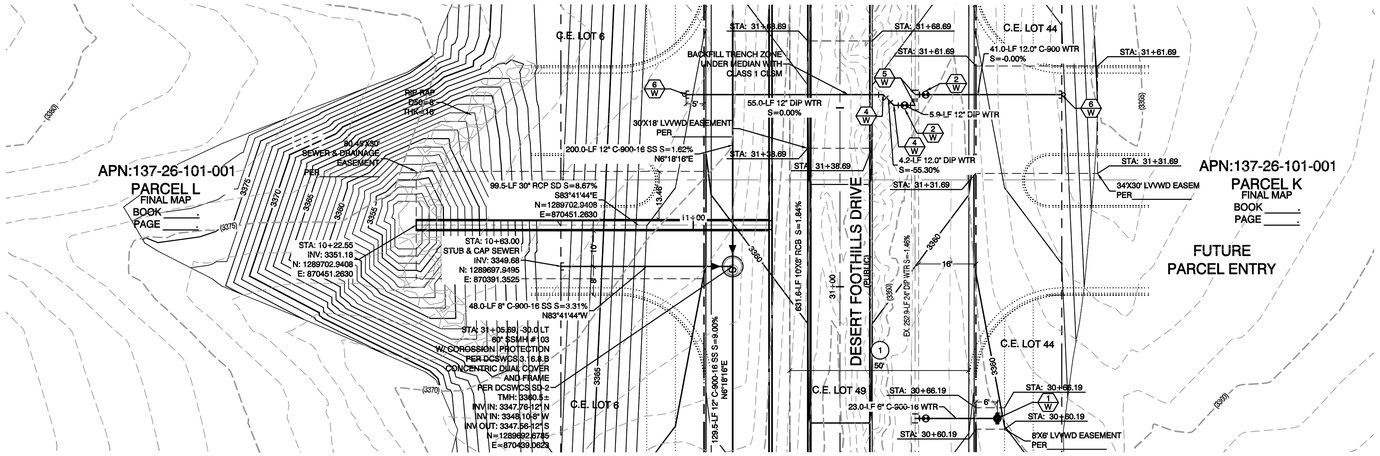
| BASIN | BASIN AREA | | Q100 |
|---|---|---|---|
| ON | 5.18 | | 20 |
| **SUBBASIN** | **SUB AREA** | **SUB AREA** | **Q100** |
| ONA | 0.85 | 16.4% | 3 |
| ONB | 1.54 | 29.7% | 6 |
| ONC | 1.36 | 26.3% | 5 |
| OND | 1.43 | 27.6% | 6 |
| **TOTAL** | **5.18** | **100.0%** | **20** |

# FIGURE 8: ULTIMATE CONDITION BASIN MAP
## DESERT FOOTHILLS DRIVE
## (REDPOINT DR TO SUMMERLIN PKWY)

| | |
|---|---|
| W.O.#: | 7851-5.1 |
| DATE: | AUGUST 2018 |
| BY: | JYA/AH |
| SCALE: | 1" = 400' |
| SHEET | 1 OF 1 |

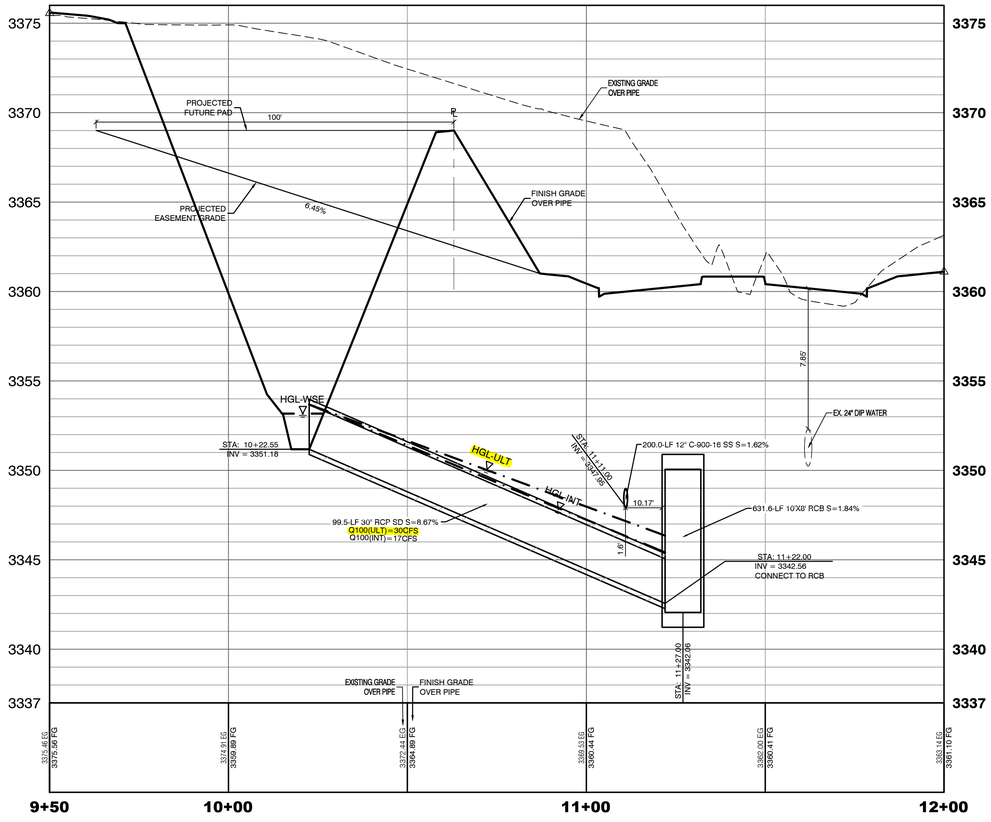

2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NV 89146-5148

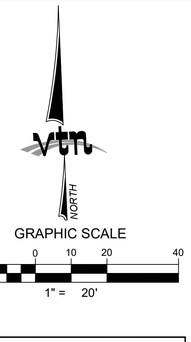

H:\7851\Desert Foothills-Street A to Summerlin Pkwy\Drainage\A Figures\Figure 8 - Ultimate Drainage Map.dwg;jayson; Oct 22, 2018 - 12:57pm

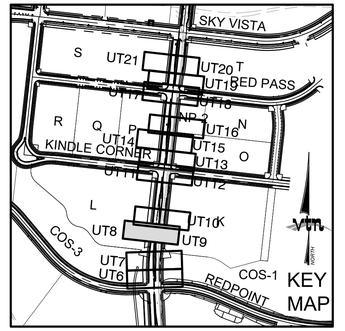



**DESERT FOOTHILLS**
(PUBLIC)

**PROFILE SCALES:**
HORIZ. = 1"=20'
VERT. = 1"=4'




## CONSTRUCTION NOTES

### WATER

| | | PUBLIC |
|---|---|---|
| | FIRE HYDRANT ASSEMBLY: (PER UDACS PLATE NO. 30, 39, 40 & 41) INCLUDING 24" X 6" TAPPING SLEEVE WITH 6" TAPPING VALVE PER UDACS PLATE NO. 34 & SECTION 2.24.01B | 3 EA. |
| | 12" GATE VALVE (PER UDACS PLATE 30 & 39) | 9 EA. |
| | 12" 45° VERTICAL BEND (PER UDACS PLATE 31) | 12 EA. |
| | 12" 45° BEND (PER UDACS PLATE 31) | 6 EA. |
| | 24"X12" TAPPING SLEEVE W/12" TAPPING VALVE (PER UDACS PLATE 30, 34 & 39 & PER SECTION 2.24.01B) | 9 EA. |
| | 12" CAP & BLOW OFF (PER UDACS PLATE 36) | 9 EA. |
| | 1.5" TYPE K SOFT COPPER WATER LATERAL SERVICE WITH 1.5" SUMMERLIN COUNCIL METER PER IRRIGATION MASTER PLAN AND UDACS PLATE #4 (IRRIGATION) AND 1.5" RPPA PER UDACS PLATE #8 | 2 EA. |
| | 12"X1.5" TAPPING SLEEVE W/1.5" TAPPING VALVE (PER UDACS PLATE 30, 34 & 39 & PER SECTION 2.24.01B) | 2 EA. |
| | 6" C-900 WATER MAIN PER UDACS 2.06.01 & PLATE 17 | 109 LF. |
| | 12" C-900 WATER MAIN PER UDACS 2.06.01 & PLATE 17 | 155 LF. |
| | 12" DIP WATER MAIN PER UDACS 2.06.01 & PLATE 17 | 448 LF. |
| | WATER POINT OF CONNECTION | |

### SEWER

| | | PUBLIC |
|---|---|---|
| | STANDARD MANHOLE PER SD-1A & 1B W/ SINGLE 24" LID | 9 EA. |
| | 8" C-900-16 SANITARY SEWER MAIN | 184 LF. |
| | 12" C-900-16 SANITARY SEWER MAIN | 1,711 LF. |
| | SEWER POINT OF CONNECTION | |

## UTILITY CROSSING NOTE:

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

## ENGINEER DISCLAIMER NOTE:

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

## TYPICAL WATER NOTES

1. MAINTAIN A MINIMUM OF 12-INCHES VERTICAL SEPARATION AT ALL POINTS OF UTILITY CROSSINGS.
2. MAINTAIN A MINIMUM OF 3-FEET PARALLEL SEPARATION FROM ADJACENT UTILITIES.
   ANY EXCAVATION AT THE BACK OF A CURB MUST REMAIN OPEN FOR INSPECTION OF THE COPPER SERVICE
3. LATERALS. ANY COPPER SERVICE LATERAL WHICH IS KINKED, BENT OR OTHERWISE DAMAGED MUST BE REPLACED FROM THE MAIN TO THE ANGLE METER STOP.
   CAUTION MUST BE EXERCISED NEAR ANY EXCAVATION AROUND AN EXISTING FIRE HYDRANT IN ORDER TO AVOID DISTURBING THE THRUST BLOCK AND SURROUNDING SOIL SUPPORTING THE THRUST BLOCK. THIS PREVENTS THE
4. POSSIBILITY OF THE HYDRANT SEPARATING FROM THE LATERAL. PROVIDE A DETAIL OF THE PROPOSED INSTALLATION SHOWING ADEQUATE CLEARANCES TO AVOID DISTURBING EXISTING LVVWD FACILITIES.

## SIGHT VISIBILITY ZONES:

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

## WATER LINE MARKER BALLS NOTE

INSTALL PIPELINE MARKER BALLS IN TRENCH ABOVE EACH HORIZONTAL ELBOW FITTING, PER UDACS PLATE No. 15

**APPROVED FOR CONSTRUCTION**

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

PROJECT: 136301 FIRST APPROVED DATE: ____.

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

## EASEMENT REFERENCE LEGEND

| | |
|---|---|
| 1 | 50' WIDE LAS VEGAS VALLEY WATER DISTRICT EASEMENT GRANTED PER OR: 20070529:0001401. STA:28+75.21 TO STA:44+06.10 |

## SANITATION SEWER NOTES

1. ALL SEWER STATIONING IS BASED ON CENTER OF PIPE LENGTHS FROM MANHOLE TO MANHOLE AND IS NOT RELATIVE IN ANY WAY TO STREET CENTERLINE STATIONING. STREET CENTERLINE STATIONING IS SHOWN ON PLAN FOR ROAD REFERENCE ONLY.
2. ALL MANHOLES ARE 48" SIZED MANHOLES PER DCSWCS SD-1, UNLESS OTHERWISE NOTED ON PLAN.
3. ALL MANHOLES ARE TO BE CONSTRUCTED PER DCSWCS SD-1A AND SD-1B.
4. ALL MANHOLE COVERS AND FRAMES ARE TO BE CONSTRUCTED PER DCSWCS SD-2.
5. ALL MANHOLE COLLARS ARE TO BE CONSTRUCT PER DCSWCS SD-4.
6. ALL SEWER LATERAL CONNECTIONS TO SEWER MAINS ARET TO BE CONSTRUCTED PER DCSWCS SD-22 UNLESS OTHERWISE NOTED ON PLAN.

## WATER CONSTRUCTION NOTES

ALL DIMENSIONS TO UTILITIES ARE TO CENTERLINE OF PIPE UNLESS INDICATED OTHERWISE.

CONTRACTOR SHALL VARIFY HORIZONTAL AND VERTICAL LOCATION OF EXISTING UTILITIES AND NOTIFY THE DESIGN ENGINEER IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION.

ALL EXISTING UTILITY STRUCTURES WITHIN CONSTRUCTION AREA SHALL BE ADJUSTED TO MATCH FINISH GRADE (I.E. WV. BOX, MH, ANNODE BOX, FH, TEL BOX, ETC.)

1. WATER LINE STATIONING IS BASED ON THE CENTERLINE OF STREET RIGHT OF WAY
2. WATER LINE SHALL BE C-900 PVC APPROVED BY THE LAS VEGAS VALLEY WATER DISTRICT.
3. EXISTING ASPHALT SHALL BE REMOVED AND REPLACED PER CITY OF LAS VEGAS SPECIFICATIONS. BACKFILL AND INSTALL PERMANENT PATCH PER CITY STANDARD FOR THIS PLAN.
4. SEE SHEET **NT** FOR PUBLIC UTILITY NOTES AND GENERAL WATER CONSTRUCTION NOTES.
5. ALL WATER LINE IN STREET RIGHT OF WAY IS PUBLIC WATER SYSTEM AND MUST BE INSPECTED BY THE LAS VEGAS VALLEY WATER DISTRICT.

## WATER PRESSURE ZONE:

WATER SERVICE LOCATED IN THE 3550 PRESSURE ZONE.

## WATER MAIN COVER NOTE:

ALL NEW WATER MAIN TO HAVE MINIMUM DEPTH OF COVER PER UDACS SECTION 2.08

## WATERLINE TRENCH NOTE:

CONSTRUCT WATERLINE TRENCH SECTION AND BACKFILL PER UDACS PLATE NO. 17.

## LAS VEGAS FIRE & RESCUE APPROVAL

BY: _____ DATE: _____.

APPROVAL OF THESE PLANS SHALL NOT BE CONSTRUED TO BE A PERMIT FOR, OR AN APPROVAL OF, ANY VIOLATION OF ANY OF THE PROVISIONS OF THE STATE OR COUNTY LAWS. FIRE FLOW **1500** GPM AT 20 P.S.I. RESIDUAL.

## WATER MAIN JOINT DEFLECTION

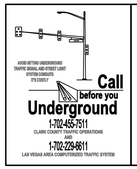
PVC PIPE SHALL BE DEFLECTED AT THE JOINT ONLY. THE MAXIMUM ALLOWABLE DEFLECTION SHALL BE ONE (1) DEGREE PER JOINT WITH A MINIMUM RADIUS OF CURVATURE OF 1,150 FEET, PER UDACS 2.07.01 AND 2.07.02.

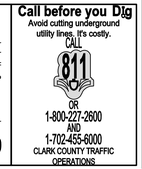
FOR CHANGES IN DIRECTION EXCEEDING THE MAXIMUM ALLOWABLE JOINT DEFLECTION, FITTINGS SHALL BE USED.

## FIRE HYDRANT MARKER NOTES

BLUE COLORED REFLECTIVE RAISED PAVEMENT MARKERS ARE TO BE INSTALLED:

1. ON ROADWAYS WITH NO PARKING PERMITTED ON HYDRANT SIDE; LOCATE MARKER 8' FROM FACE OF CURB ON HYDRANT SIDE.
2. ON ROADWAYS WITH PARKING PERMITTED ON HYDRANT SIDE; LOCATE MARKER 16' FROM FACE OF CURB ON HYDRANT SIDE.






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

**CITY OF LAS VEGAS**

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

| REV | DATE | BY | REVISION |
|---|---|---|---|
| | | | |

**UTILITY LATERAL SHEET 8**

**SUMMERLIN WEST VILLAGE 21**
**DESERT FOOTHILLS DRIVE**
**REDPOINT TO SKY VISTA**

DRAWN BY: BCC — 08/02/2018
DESIGNED BY: BCC — 08/02/2018
CHECKED BY: WJM — 05/02/2019
PROJECT NO: 7851
SCALE: HORIZ. 1"=20' VERT. 1"=4'

PROFESSIONAL ENGINEER STATE OF NEVADA
WILLIAM J. MEYER
EXP: 12/31/19
CIVIL
No. 15745

SHEET
**UT8**
22 OF 40 SHEETS
DRAWING NO.
**L19-00350**

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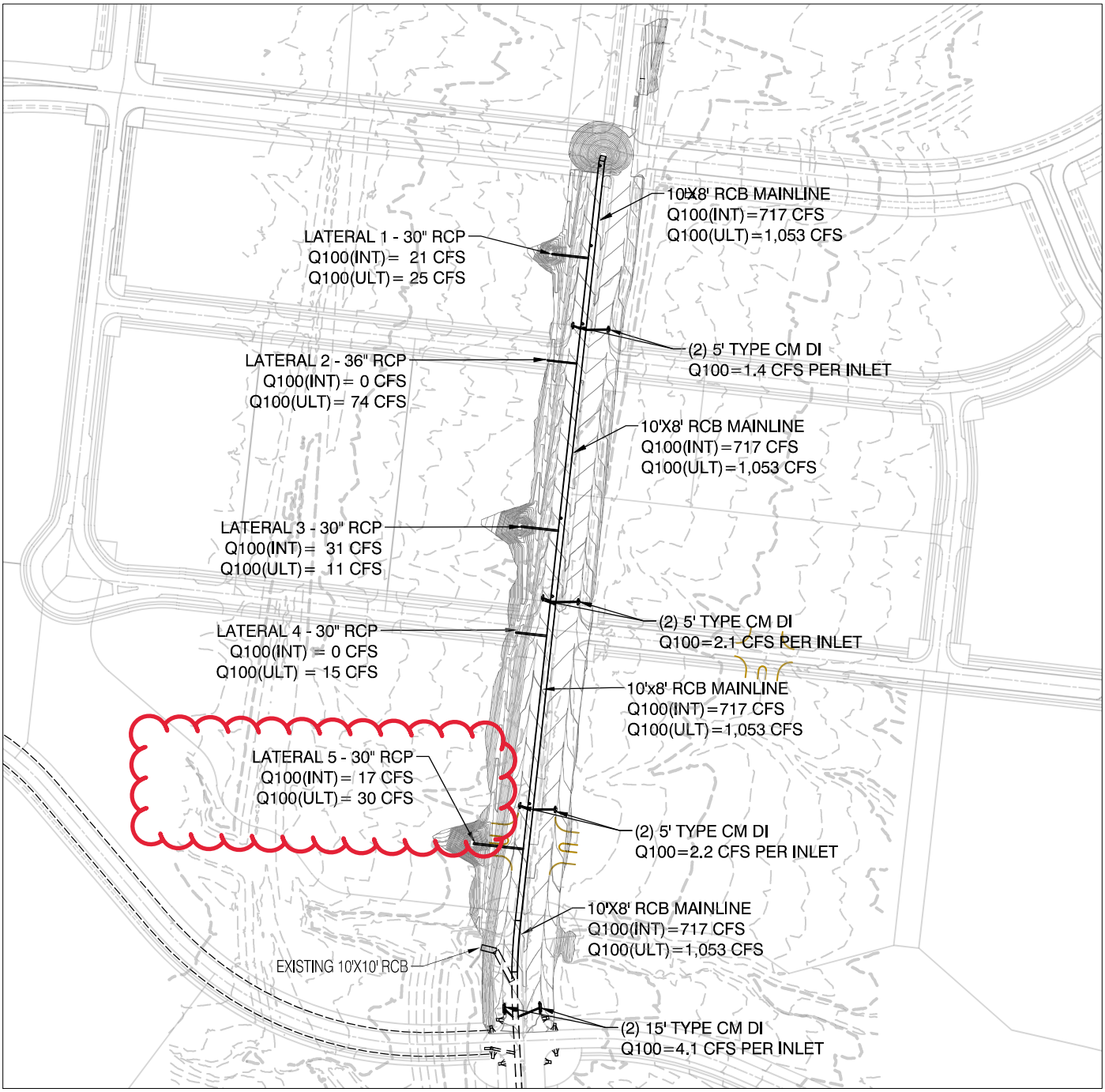
107V7663



GRAPHIC SCALE

300 0 150 300 600

1" = 300'

H:\7851\Desert Foothills-Street A to Summerlin Pkwy\Drainage\2_ADD#1\A Figures\Figure 9 - Storm Drain Facilities Map.dwg

2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NV 89146-5148

**SUMMERLIN WEST VILLAGE 21**
**DESERT FOOTHILLS DRIVE**
**(STREET A TO SUMMERLIN PARKWAY)**

**FIGURE 9:**
**PROPOSED STORM DRAIN FACILITIES MAP**

| | | |
|---|---|---|
| SCALE | HORZ. | 1" = 300' |
| | VERT. | N/A |
| W.O. NO. | | 7851-5.6 |
| DRAWN BY: | | JYA |
| DATE: | | DEC 2018 |
| SHEET | 1 | OF 1 |

**Starting HGL and EGL**

| Tailwater Elevation | Outlet Invert Elevation | Tailwater Depth (ft) | Critical Depth-Dc (ft) | Pipe Diameter-D (ft) | (Dc+D)/2 (ft) | Starting HGL (ft) | Hv (ft) | Starting EGL (ft) |
|---|---|---|---|---|---|---|---|---|
| 3345.94 | 3341.23 | 4.71 | 1.43 | 2.5 | 1.967 | 3345.940 | 0.58 | 3346.52 |

$$Sf = \frac{\Phi Hv}{R^{1.33}} \qquad \Phi = \frac{2g\,(n^2)}{2.21}$$

# STANDARD FORM 6

**DEVELOPMENT:** Desert Foothills (Redpoint to Summerlin)
**CALCULATED BY:** JYA **WO#** 7851-5.6
**STORM DRAIN SEGMENT:** Lateral 5
**DESCRIPTION:** 100-Year Ultimate Condition

**Phi Index**

| n Value | Phi |
|---|---|
| 0.013 | 0.004925 |

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

| Segment Number | Segment Type | Starting Station | Ending Station | Diameter (ft) | D/S Invert | U/S Invert | Length (ft) | Area (sq, ft) | Phi | Flow (cfs) | Slope (%) | Velocity (fps) | Hv (ft) | Sf (ft/ft) | Ave. Sf (ft/ft) | Hf (ft) | Hj (ft) | Hm (ft) | Hb (ft) | Hi (ft) | H_ (ft) | H Total (ft) | U/S EGL Elevation | U/S HGL Elevation | Pressure Flow ? | D/S EGL of U/S Segment | Final U/S EGL | Final U/S HGL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | PIPE | 10+00.00 | 10+99.45 | 2.5 | 3341.23 | 3351.18 | 99.5 | 4.91 | 0.00492 | 30.0 | 10.00 | 6.11 | 0.58 | 0.00534 | 0.00534 | 0.53 | | | | | | 0.53 | 3347.05 | 3346.47 | Yes | 3354.26 | 3354.26 | 3353.68 |
| 2 | INLET | 10+99.45 | 10+99.45 | 2.5 | 3351.18 | 3351.18 | 0.0 | 4.91 | 0.00492 | 30.0 | N/A | 6.11 | 0.58 | 0.00534 | 0.00534 | 0.00 | | | | | | 0.00 | 3354.26 | 3353.68 | | | | |

**Manholes/Transition Losses**

| | Straight Through Manhole | | | | Junction Manhole | | | | | Bend Losses | | | | Inlet Losses | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Segment Number | Deflection Angle | Km | Hv (ft) | Hm (ft) | Junction Angle | Kj | D/S Hv (ft) | U/S Hv (ft) | Hj (ft) | Bend Angle | Kb | Hv (ft) | Hb (ft) | Ki | Hv (ft) | Hi (ft) |
| 1 | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | |

| HGL Criteria Check | | | |
|---|---|---|---|
| Segment Description | TMH Elevation | Cover (ft) | Criteria Met? |
| PIPE | | | |
| INLET | 3369 | 15.32 | Yes |

# REFERENCES

Technical Drainage Study for Summerlin Village 21 Redpoint Drive Improvements (Fox Hills Drive to Desert Foothills Drive), DS 5088, GCW (2019) and addenda

Approval Letter
Normal Depth Calculation for Section B (Original Submittal)
Figure 5 Interim Condition Drainage Map *(Response to Comments)*
Grading Plans and Details Diversion Berm *(Response to Comments)*

| **CITY OF LAS VEGAS**<br>**INTER-OFFICE MEMORANDUM** | | | **DATE:**<br><br>**March 12, 2019** |
|---|---|---|---|
| **TO:**<br>**Land Development Services**<br>Department of Building & Safety | | | **FROM:**<br>Albert Sung, P.E.<br>Flood Control Project Engineer<br>Department of Public Works |
| **SUBJECT:** | Drainage Study for:<br>**Summerlin West Village 21 – Redpoint Drive Improvements (Desert Foothills Drive to Fox Hill Drive)** | | **COPIES TO:**<br>GCW Inc. |
| **Cross Streets:** | Desert Foothill Drive and Far Hill Drive | | Howard Hughes Company, LLC |
| **File Number:** | F:\Depot\DSMemos\DS5088B.doc | | Bart Anderson, P.E., DevCo |
| **Parcel Number:** | 137-26-101-001; 137-22-101-001 | | |
| **Zoning Action:** | FMP-74490 | | |
| **FEMA Flood Zone** | YES | NO **X** | |
| **Proposed Storm Drain** | YES **X** | NO | |

| HISTORY | DATE RECEIVED | DATE REVIEWED | COMMENTS | REVIEW FEES | FEES PAID Payment Trn # |
|---|---|---|---|---|---|
| 1st Submittal | 1/17/2019 | 2/7/2019 | Not Approved | $400.00 | 502418: $400 |
| 2nd Submittal | 2/26/2019 | 3/12/2019 | See Comments Below | $400.00 | 503373: $400 |
| | | | **TOTAL FEES (LDDRS):** | **$800.00** | **----** |

**REMARKS:**

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

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

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

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

2. The subject drainage study is premised on the fully developed (ie constructed) *Desert Foothills Drive* (*Far Hills* to *Redpoint*). The subject improvement plans will not be approved prior to the buildout of *Desert Foothills Drive* (*Far Hills* to *Redpoint*) and the associated facilities.

3. The flow in the storm drain exceeds the maximum velocity allowed (25 fps) per the *CCRFCD Hydrologic & Hydraulic Design Manual*. The Engineer must provide a detail showing additional sacrificial concrete (1-inch minimum) on the plans. A Special Construction Note must be added to the Grading Plans and the Plan and Profile Sheet that calls out the special construction requirement for the additional sacrificial concrete.

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

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

**END OF REMARKS**
WSP/AYS

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

# RESPONSE TO COMMENTS FOR THE TECHNICAL DRAINAGE STUDY FOR SUMMERLIN VILLAGE 21 REDPOINT DRIVE IMPROVEMENTS (FOX HILL DRIVE TO DESERT FOOTHILLS DRIVE)

**62021-206**

**February 2019**

**Prepared for:**

**Hughes Howard Company, LLC**
**10801 Charleston Blvd., 3Rd Floor**
**Las Vegas, Nevada 89146**
**Phone: (702) 791-4300**

GCW 50 YEARS
ENGINEERS \ SURVEYORS 1969-2019

# Worksheet for Section B

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Roughness Coefficient | 0.025 | |
| Channel Slope | 1.00 | % |
| Left Side Slope | 50.00 | ft/ft (H:V) |
| Right Side Slope | 3.00 | ft/ft (H:V) |
| Bottom Width | 50.00 | ft |
| Discharge | 1040.00 | ft³/s |

## Results

| | | |
|---|---|---|
| Normal Depth | 1.69 | ft |
| Flow Area | 159.94 | ft² |
| Wetted Perimeter | 139.77 | ft |
| Hydraulic Radius | 1.14 | ft |
| Top Width | 139.47 | ft |
| Critical Depth | 1.75 | ft |
| Critical Slope | 0.00864 | ft/ft |
| Velocity | 6.50 | ft/s |
| Velocity Head | 0.66 | ft |
| Specific Energy | 2.35 | ft |
| Froude Number | 1.07 | |
| 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 | 1.69 | ft |
| Critical Depth | 1.75 | ft |
| Channel Slope | 1.00 | % |

# Worksheet for Section B

## GVF Output Data

| | | |
|---|---|---|
| Critical Slope | 0.00864 | ft/ft |

# Cross Section for Section B

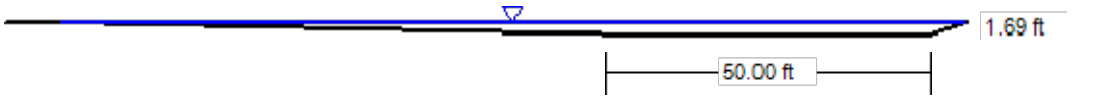
## Project Description

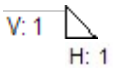
| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

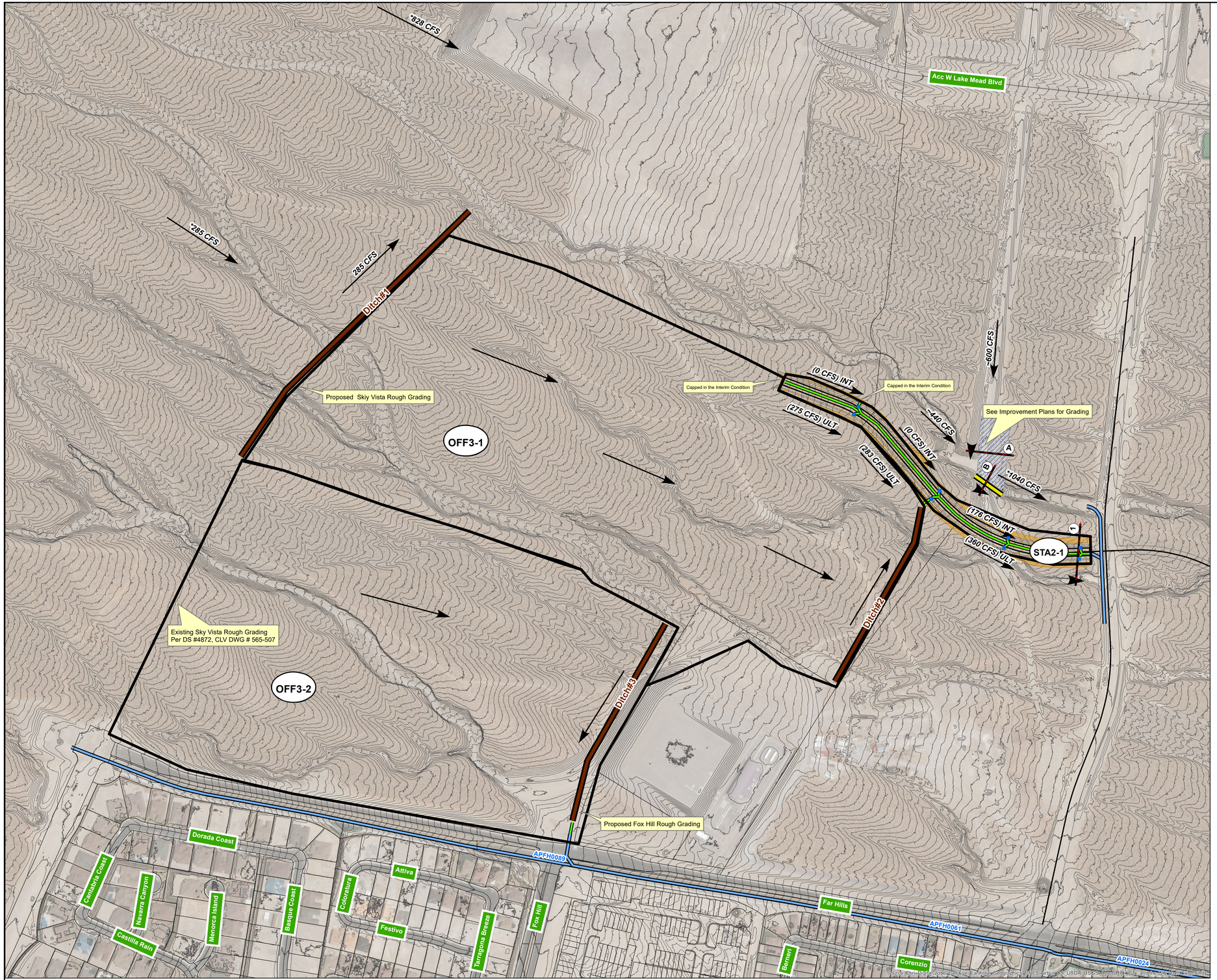
## Input Data

| | | |
|---|---|---|
| Roughness Coefficient | 0.025 | |
| Channel Slope | 1.00 | % |
| Normal Depth | 1.69 | ft |
| Left Side Slope | 50.00 | ft/ft (H:V) |
| Right Side Slope | 3.00 | ft/ft (H:V) |
| Bottom Width | 50.00 | ft |
| Discharge | 1040.00 | ft³/s |

## Cross Section Image






NORTH

200 100 0 200 400 600 Feet

1 in = 200 ft

## Legend

- Drop Inlet
- Ditches
- Section
- Berm
- Flow Direction
- Interim Subbasins
- 2-ft Contours 2016

## SD Pipes

- Existing
- Proposed

(XX CFS) SD Flowrate
XX CFS Surface Flowrate

**INTERIM CONDITIONS PRORATED FLOW SUMMARY**

| Reference Basin | Area (acres) | $Q_{100}$ (cfs) |
|---|---|---|
| OFF3 | 146.86 | 390 |
| STA2 | 2.77 | 12 |

**Offsite Prorated Basins**

| Subbasin ID | $Q_{100}$ (cfs) | Area (acres) | Reference | Ratio |
|---|---|---|---|---|
| OFF3-1 | 176 | 66.2 | OFF3 | 0.45 |
| OFF3-2 | 156 | 58.7 | OFF3 | 0.40 |
| STA2-1 | 15 | 3.5 | STA2 | 1.26 |

* REFERENCED FROM DESERT FOOTHILS STUDY

**INTERIM CONDITIONS 100-YEAR DITCH CHARACTERISTICS**

| Section | Slope (%) | $Q_{100}$ (cfs) | Depth of flow (ft) | Left Side Slope (H:V) | Right Side Slope (H:V) | Velocity (ft/s) | Bottom Width (ft) |
|---|---|---|---|---|---|---|---|
| Ditch #1 | 2.0 | 285 | 2.74 | 3.0 | 3.0 | 7.86 | 5 |
| Ditch #2 | 1.1 | 176 | 2.52 | 3.0 | 3.0 | 5.55 | 5 |
| Ditch #3 | 0.5 | 156 | 2.89 | 3.0 | 3.0 | 3.96 | 5 |
| A | 2 | 600 | 0.97 | 130 | 3.0 | 5.96 | 40 |
| B | 1 | 1040 | 1.69 | 50 | 3.0 | 6.5 | 50 |

**100-YEAR FLOW CHARACTERISTICS ULTIMATE CONDITIONS**

| Cross Section | Slope (%) | $Q_{100}$ (cfs) | Depth (ft) / HW Elevation | Velocity (ft/s) | D*V | NOTE |
|---|---|---|---|---|---|---|
| (1) | 2.3 | 15 | 0.41 | 3.9 | 1.6 | ST2-1 (Min Slope) |
| (1) | 8.0 | 15 | 0.35 | 6.3 | 2.2 | ST2-1 (Max Slope) |

NOTE: SUBBASINS ARE PRORATED BASED ON BASIN DELINEATION REFERENCED FROM THE DESERT FOOTHILLS STUDY.

DATE:

| REV | DATE | DESCRIPTION | DATE | AGEN APP | DATE | GCW APP |
|---|---|---|---|---|---|---|
| | | | | | | |

PROJECT NO. 62021-206

DESIGN:
DRAWN:
CHECK:

PLOT DATE: 02/21/2019
PLOT TIME: 3:18:33 PM


GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com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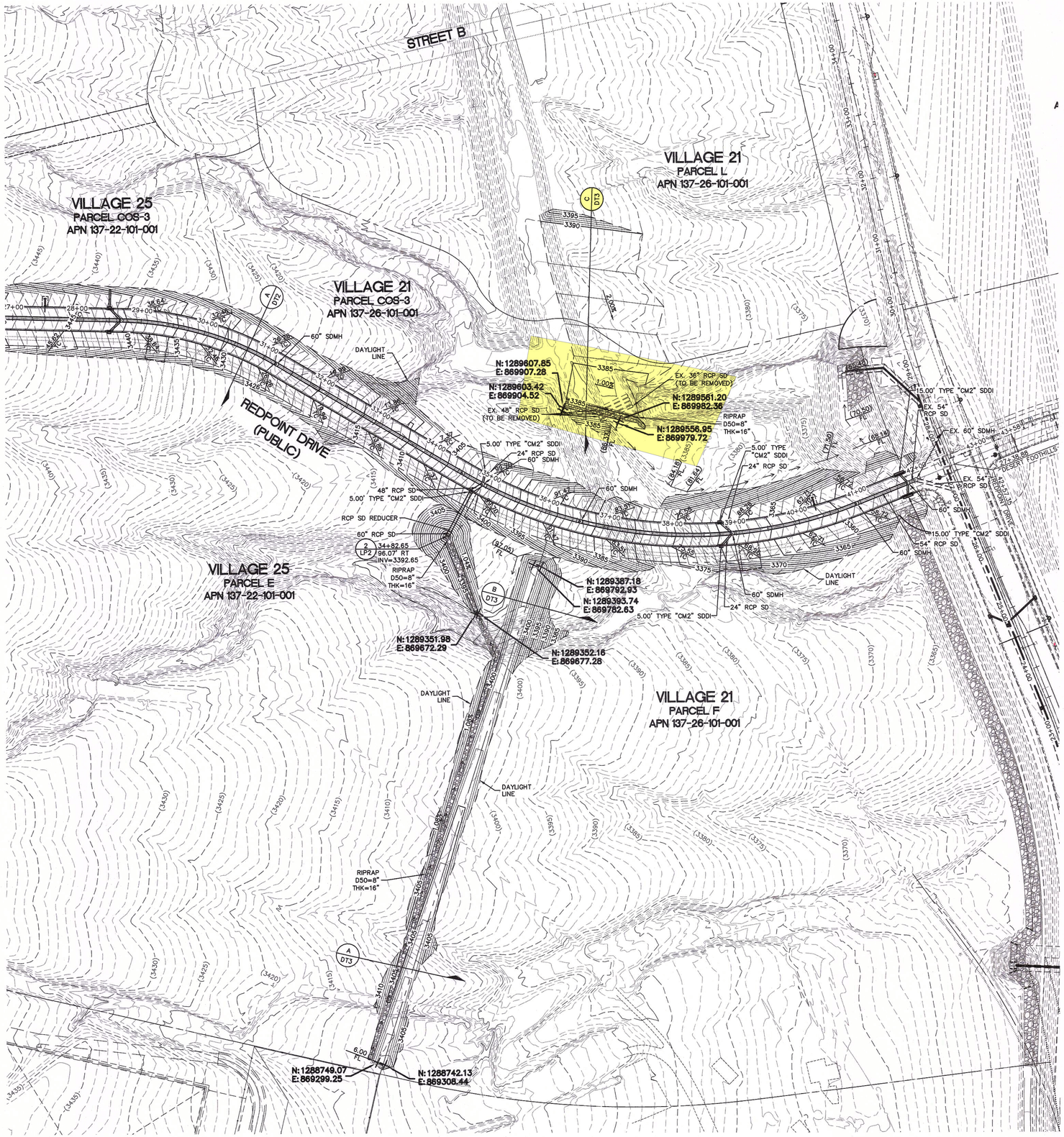
medalat

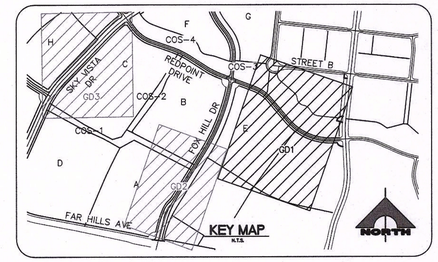
SUMMERLIN DEVELOPMENT, LLC

SUMMERLIN V21 REDPOINT DRIVE (DFHD TO FOX)

INTERIM CONDITION DRAINAGE MAP

DRAWING
**FIG5**
1 OF 1 SHTS




NORTH

80 0 80 160
SCALE FEET

**OFF-SITE FLOOD CONTROL NOTE:**

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

## BASIS OF BEARINGS AND COORDINATES

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.

## BENCHMARK

| BM # | DESCRIPTION | NAVD 88 DATUM | NAVD 88 DATUM |
|---|---|---|---|
| CLV BM No. 7LV09345W6 | FND RIVET AND PLATE IN TOP OF CURB SE CORNER OF DESERT MOON RD. AND SKY VISTA DR. T20S,R59E,S34 | 3318.31 (FEET) | 1,011.422 (METERS) |

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811 or 1-800-227-2600
AND CLARK COUNTY TRAFFIC OPERATIONS 1-702-455-6000

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

FAST
Call before you UnderGround
1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

CLV #

STATE OF NEVADA
PROFESSIONAL ENGINEER
MICHAEL FANG
No. 24464
CIVIL
DATE: 3/25/19

FOR AGENCY REVIEW - NOT FOR CONSTRUCTION

| REV | DATE | DESCRIPTION | DATE | AGEN APP | DATE | GOW APP |
|---|---|---|---|---|---|---|
| | | | | | | |

PROJECT NO. 62021-206
DESIGN: LG
DRAWN: AS
CHECK: LG
PLOT DATE: 02-25-19
PLOT TIME: 14:08:52


GCW
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com


I: \Projects\600\62021-206\GWG\production\62021-206_GD1.dwg
Andrew Park-Murray

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 21 REDPOINT DRIVE IMPROVEMENTS
FOX HILL DRIVE TO DESERT FOOTHILLS DRIVE

GRADING PLAN 1

DRAWING
GD1
6 OF 27 SHTS

## DRAINAGE CHANNEL #2

SCALE: 1"=10'

DWG GD1

C
-




## BERM #1

SCALE: N.T.S.

DWG GD1

B
-




## DRAINAGE CHANNEL #1

SCALE: N.T.S.

DWG GD1

A
-

CLV #

ENGINEER - STATE OF NEVADA
MICHAEL FANG
Exp. 06/30/2019
No. 24487
PROFESSIONAL
CIVIL

DATE: 2/25/19

| REV | DATE | DESCRIPTION | DATE | AGEN APP | DATE | GCW APP |
|---|---|---|---|---|---|---|
| | | | | | | |

FOR AGENCY REVIEW - NOT FOR CONSTRUCTION

PROJECT NO.
62021-206

DESIGN: LG
DRAWN: AS
CHECK: LG
PLOT DATE: 02-25-19
PLOT TIME: 14:39:56

GCW
ENGINEERS \ SURVEYORS
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gcwengineering.com

F:\Projects\62021-206\DWG\production\62021-206_SECTIONS.dwg
Andrew Port-Murray

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 21 REDPOINT DRIVE IMPROVEMENTS
FOX HILL DRIVE TO DESERT FOOTHILLS DRIVE

BERM TYPICAL SECTIONS

DRAWING
DT3
23 OF 27 SHTS

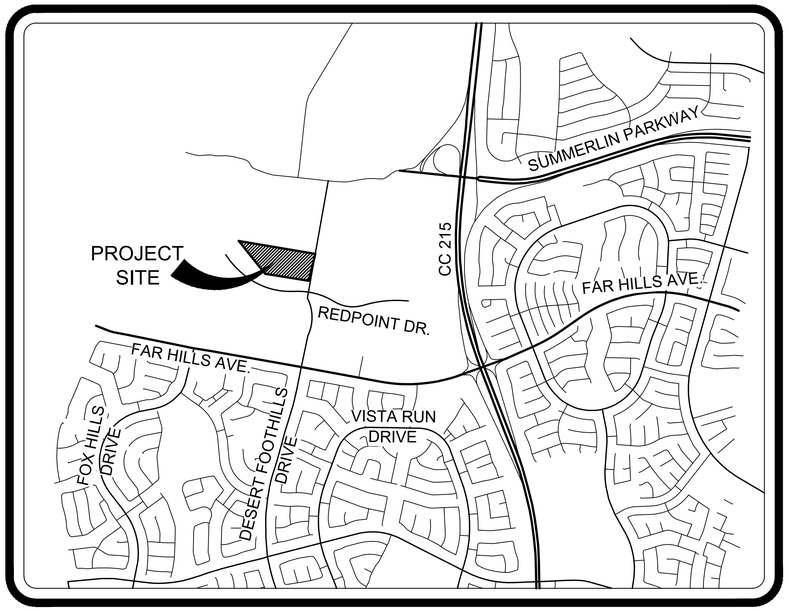
# GRADING PLANS AND DETAILS

# CASCADES

SUMMERLIN VILLAGE 21
PARCEL L
PREPARED FOR:

## WILLIAM LYON HOMES

APN: 137-27-510-001
CITY OF LAS VEGAS, NEVADA




VICINITY MAP
SCALE: NTS

INDEX


| SHEET # | SHEET TITLE |
|---|---|
| C1 | COVER SHEET |
| C2 | NOTES SHEET |
| C3 | GRADING PLAN 1 |
| C4 | GRADING PLAN 2 |
| C5 | GRADING PLAN 3 |
| C6 | GRADING PLAN 4 |
| C7 | DETAILS |
| C8 | PLAN & PROFILE - C.E. D STORM DRAIN |


## PROJECT TEAM

### DEVELOPER

WILLIAM LYON HOMES
1980 FESTIVAL PLAZA DRIVE, SUITE 500
LAS VEGAS, NV 89134
PH: 702-263-8200

### CIVIL ENGINEER

ACTUS
ATTN:: DARRYL LATTIMORE, P.E.
3283 E. WARM SPRINGS RD., SUITE 300
LAS VEGAS, NV 89120
T: 702-586-9296
E-MAIL: DARRYL.LATTIMORE@ACTUS-NV.COM

### OWNER

HOWARD HUGHES COMPANY LLC
10801 W CHARLESTON BLVD
SUITE 300
LAS VEGAS, NV 89135
702-791-4000

## UTILITY CONTACTS

### POWER

NV ENERGY
ATTN: NEW DEVELOPMENT
7155 LINDELL ROAD
LAS VEGAS, NEVADA 89118

### WATER

LAS VEGAS VALLEY WATER DISTRICT
ATTN: ENGINEERING SERVICES
1001 S VALLEY VIEW BLVD
LAS VEGAS, NV 89107
T: 702-870-2011

### SEWER

CITY OF LAS VEGAS PUBLIC WORKS
ATTN: ENGINEERING PLANNING
333 N. RANCHO DRIVE 7TH FLOOR
LAS VEGAS, NEVADA 89106
PHONE: 702-229-2178

### GAS

SOUTHWEST GAS CORPORATION
ATTN: ENGINEERING SERVICES
6355 SHATZ STREET
NORTH LAS VEGAS, NV 89115

### TELEPHONE

CENTRAL TELEPHONE D/B/A CENTURY LINK
6700 VIA AUSTI PARKWAY
LAS VEGAS, NEVADA 89119

### DISPOSAL

REPUBLIC SERVICES, INC.
770 E. SAHARA AVE. - P.O. BOX 98508
LAS VEGAS, NEVADA 89193-8508

### CABLE

COX COMMUNICATIONS LAS VEGAS, INC.
1700 VEGAS DRIVE
LAS VEGAS, NEVADA 89106

## BASIS OF BEARING

SOUTH 89°51'25" EAST, BEING THE BEARING OF NORTH LINE OF SECTION 27, TOWNSHIP 21 SOUTH, RANGE 59 EAST, M.D.M., CITY LAS VEGAS, CLARK COUNTY, NEVADA AS PER MAP RECORDED IN FILE 123, PAGE 36 OF PARCEL MAPS, IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDERS.

## LEGAL DESCRIPTION

PARCEL E IS A PORTION OF THE REMAINDER OF LOT 1 MAPPED WITH THE PARCEL MAP RECORDED IN FILE 123 PAGE 36 OF PARCEL MAPS, AND RECORDED MAY 1, 2018.

APN# 137-26-101-001
PARCEL E WILL BE ESTABLISHED AS A SEPARATE LEGAL PARCEL BY THE HOWARD HUGHES CORPORATION WITH THE VILLAGE 21 UNIT 2 FINAL MAP.

## BENCHMARK

CITY OF LAS VEGAS BENCHMARK

MONUMENT ID: SLV0926W6

RIVET AND PLATE IN TOP OF CURB @ SE CORNER OF CARRIAGE HILL & FAR HILLS

ELEVATION:
FEET = 3229.29' (NAVD88)
METERS = 984.29 M (NAVD88)

## DEDICATION NOTE

ALL EASEMENTS, RIGHT-OF-WAY, AND OTHER DEDICATIONS WITHIN THIS PLAN SET ARE GRANTED PER NFM# x UNLESS OTHERWISE NOTED

## DISCLAIMER NOTE

THE UNDERGROUND UTILITIES AS SHOWN HEREON HAVE BEEN LOCATED FROM OBSERVED FIELD SURVEY EVIDENCE AND EXISTING DRAWINGS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING; PLANS PROVIDED BY THE CLIENT, UTILITY COMPANIES, AND MUNICIPAL AGENCIES. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

SUMMERLIN

SUMMERLIN RESIDENTIAL DESIGN REVIEW COMMITTEE DATE

THIS SIGNATURE IS LIMITED TO APPROVAL OF THESE DOCUMENTS FOR CONFORMANCE TO THE DESIGN INTENT OF THE APPLICABLE DESIGN CRITERIA. NEITHER SUMMERLIN NOR THE SUMMERLIN RESIDENTIAL DESIGN REVIEW COMMITTEE ASSUMES RESPONSIBILITY FOR PLAN CONFORMANCE WITH APPLICABLE LAWS, ORDINANCES, AND CODES.

ALLEN PAVELKA PE, PE# 9029 DATE
CITY ENGINEER - CITY OF LAS VEGAS

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

CITY OF LAS VEGAS PLANNING DEPARTMENT DATE

THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT

LAS VEGAS FIRE & RESCUE DATE

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

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

SOUTHWEST GAS CORPORATION DATE

CENTRAL TELEPHONE DBA CENTURY LINK DATE

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

COX COMMUNICATIONS LAS VEGAS, INC DATE

APPROVED FOR CONSTRUCTION

**Las Vegas Valley Water District Engineering Services**

**Project No.** X **First Approved Date:**
**LVVWD Approved Fire Flow** 1,500 **GPM at 20 PSI Residual**
**Maximum Available Fire Sprinkler Flow** N/A **GPM**
(SHEETS: ? )


Actus
3283 E. Warm Springs Rd., Suite 300
Las Vegas, NV 89120
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Engineering - Surveying - Consulting - Planning


COVER SHEET
CASCADES
WILLIAM LYON HOMES
CITY OF LAS VEGAS, NEVADA

| BY | DESCRIPTION | DATE |
|---|---|---|
| A | | |

DARRYL C. LATTIMORE
EXP: 12/31/19
CIVIL
No. 17516
PROFESSIONAL ENGINEER
STATE OF NEVADA

7/16/2019

| | |
|---|---|
| DATE | 07/14/2019 |
| DRAWN | RLS |
| DESIGNED | RLS |
| CHECKED | DCL |
| PROJECT # | WLH011901 |

SHEET TITLE
COVER & NOTES

SHEET NUMBER
C1

N/A SHEET --- OF 8


Plot Stamp: 7/16/2019 2:03:07 PM - Ryan Sicrer
File: P:\WLH011901 - V21 Parcel L\Civil_CD\WLH011901-CD-COVR.dwg, Tab: C1 - Cover

## CITY OF LAS VEGAS GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST ISSUE; THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST REVISED EDITION; THE "SUMMERLIN IMPROVEMENT STANDARDS" FOR WORK IN THE SUMMERLIN AREA; AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY; THE UNIFORM BUILDING CODE; AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".
2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CLV PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE PLANS. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCE'S WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.
3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE BUILT TO REMAIN IN PLACE, FROM DAMAGE, AND REPAIR SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER AND OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS, ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.
5. TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. MIX DESIGNS TO BE APPROVED BY THE CITY, PRIOR TO THE USE ON THE PROJECT.
6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.
7. EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTRUDED-TYPE CURB.
8. AC PAVEMENT TO BE ONE-HALF INCH (½") ABOVE LIP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS AND CROSS GUTTERS.
9. CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.
10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.
11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF THE TRANSITIONS TO BE AS SHOWN ON PLANS.
12. ALL GRADING WORK SHALL CONFORM TO THE SOILS REPORT AS PREPARED BY THE ( COMPANY , _ REPORT #, DATE ) APPROVED BY THE CITY ENGINEER, AND AS SHOWN ON THESE PLANS.
13. EXACT LOCATION OF ALL SAWCUT LINES MAY BE ADJUSTED OR DETERMINED IN THE FIELD BY A CITY OF LAS VEGAS ENGINEER IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES RELOCATIONS.
14. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH N.R.S. STATUTE NO. 625.380 & CITY OF LAS VEGAS TITLE 18, APPENDIX D.
15. UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC., SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APRONS, FLOWLINES, AND CROSS GUTTERS UNLESS WRITTEN APPROVAL IS GRANTED BY THE UTILITY COMPANY AND THE CITY ENGINEER.

WALL NOTES:

16. ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVIL PLANS FOR THE PURPOSE OF REVIEWING GRADING RELATIONSHIPS, FLOOD CONTROL AND SIGHT DISTANCE AT INTERSECTIONS. NEW WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE BUILDING DEPARTMENT.
17. ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHT OF WAY.
18. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.
19. MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF NDOT OR THE CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.
20. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC, THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO OFFSITE INSPECTION AND TESTING CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.
21. SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAPS SHALL BE PROVIDED TO THE CITY AND APPROVED PRIOR TO ACCEPTANCE OF FACILITY VIDEO INSPECTION. THE MAP(S) SHALL INCLUDE THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES AND TRANSITION STRUCTURES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN AND AT THE CONNECTION TO A DROP INLET, THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXIT THE PUBLIC RIGHT-OF-WAY, AND STORM DRAIN MAIN ALIGNMENT, INCLUDING DEFLECTION POINTS. THE LOCATION SHALL BE DESCRIBED BY COORDINATES WHICH SHALL BE BASED ON THE OFFICIAL HORIZONTAL AND VERTICAL CONTROL NETWORKS OF THE CITY OF LAS VEGAS. FINAL LOCATION MAPS MUST BE SEALED AND CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CENTAINTIES OF ±0.09 METERS (± 0.3 FEET) HORIZONTALLY AND VERTICALLY. A SEPARATE ELECTRONIC COMMA DELIMITED FILE FOR THE SANITARY SEWER AND STORM DRAIN COORDINATES SHALL ALSO ACCOMPANY THE SANITARY SEWER AND STORM DRAIN LOCATION MAP(S).
22. CCTV VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST EDITION.
23. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

## CITY OF LAS VEGAS GRADING NOTES

1. IN THE EVENT THAT ANY UNFORESEEN CONDITIONS NOT COVERED BY THESE NOTES ARE ENCOUNTERED DURING GRADING OPERATIONS, THE OWNER/ENGINEER SHALL BE IMMEDIATELY NOTIFIED FOR DIRECTION.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM ALL NECESSARY CUTS AND FILLS WITHIN THE LIMITS OF THIS PROJECT AND THE RELATED OFF-SITE WORK, SO AS TO GENERATE THE DESIRED SUBGRADE, FINISH GRADES AND SLOPES SHOWN.
3. CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL EXCAVATION. ADEQUATE SHORING SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR TO PREVENT UNDERMINING OF ANY ADJACENT FEATURES OR FACILITIES AND/OR CAVING OF THE EXCAVATION.
4. THE CONTRACTOR IS WARNED THAT AN EARTHWORK BALANCE WAS NOT NECESSARILY THE INTENT OF THIS PROJECT, ANY ADDITIONAL MATERIAL REQUIRED OR LEFTOVER MATERIAL FOLLOWING EARTHWORK OPERATIONS BECOMES THE RESPONSIBILITY OF THE CONTRACTOR.
5. THE GRADING CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE OWNER TO PROVIDE FOR THE REQUIREMENTS OF THE PROJECT STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ASSOCIATED PERMIT.
6. CONTRACTOR SHALL GRADE TO THE LINES AND ELEVATIONS SHOWN ON THE PLANS WITHIN THE FOLLOWING HORIZONTAL AND VERTICAL TOLERANCES AND DEGREES OF COMPACTION, IN THE AREAS INDICATED: HORIZONTAL VERTICAL COMPACTION A. PAVEMENT AREA SUBGRADE 0.1'+ +0.0' TO -0.1' SEE SOILS REPORT B. ENGINEERED FILL 0.5'+ +0.1' TO -0.1' SEE SOILS REPORT COMPACTION TESTING WILL BE PERFORMED BY THE OWNER OR HIS REPRESENTATIVE.
7. ALL CUT AND FILL SLOPES SHALL BE PROTECTED UNTIL EFFECTIVE EROSION CONTROL HAS BEEN ESTABLISHED.
8. THE USE OF POTABLE WATER WITHOUT A SPECIAL PERMIT FOR BUILDING OR CONSTRUCTION PURPOSES INCLUDING CONSOLIDATION OF BACKFILL OR DUST CONTROL IS PROHIBITED. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR CONSTRUCTION WATER.
9. THE CONTRACTOR SHALL MAINTAIN THE STREETS, SIDEWALKS AND ALL OTHER PUBLIC RIGHT-OF-WAY IN A CLEAN, SAFE AND USABLE CONDITION. ALL SPILLS OF SOIL, ROCK OR CONSTRUCTION DEBRIS SHALL BE PROMPTLY REMOVED FROM THE PUBLICLY OWNED PROPERTY DURING CONSTRUCTION AND UPON COMPLETION OF THE PROJECT. ALL ADJACENT PROPERTY, PRIVATE OR PUBLIC SHALL BE MAINTAINED IN A CLEAN, SAFE AND USABLE CONDITION.
10. IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED THAT IS NOT SHOWN ON THESE DRAWINGS, THE OWNER AGREES TO PROVIDE AND INSTALL SUCH ITEM AT HIS OWN EXPENSE AND AT THE DIRECTION OF THE CITY ENGINEER. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERMS, ROAD SIGNS AND BARRICADES, ETC.

## CITY OF LAS VEGAS SEWER NOTES

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

## DISCLAIMER NOTE

THE UNDERGROUND UTILITIES AS SHOWN HEREON HAVE BEEN LOCATED FROM OBSERVED FIELD SURVEY EVIDENCE AND EXISTING DRAWINGS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING; PLANS PROVIDED BY THE CLIENT, UTILITY COMPANIES, AND MUNICIPAL AGENCIES. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

## CITY OF LAS VEGAS STREETLIGHT NOTES

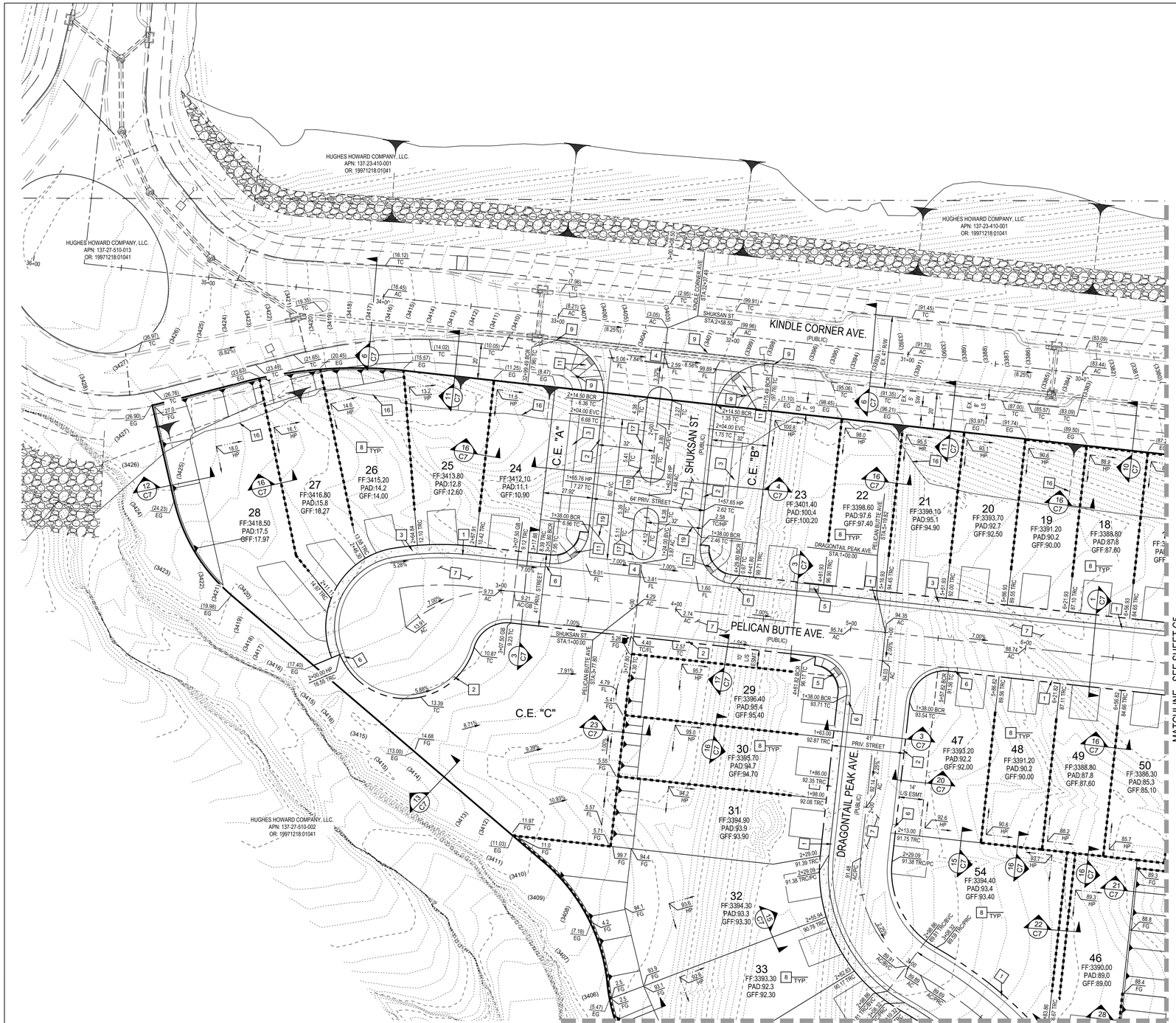
1. ALL STREET LIGHTING INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE STREET LIGHTING PLANS, THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", LATEST REVISION (USS), AND THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE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

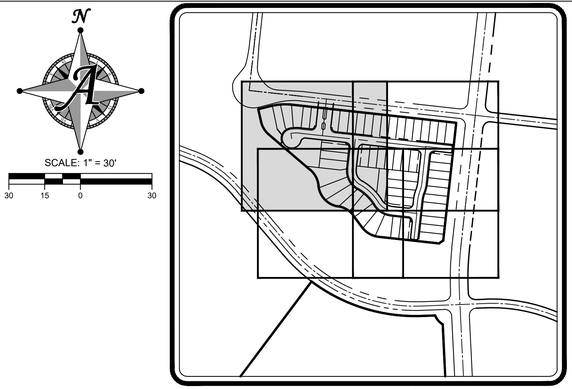
## CITY OF LAS VEGAS TRAFFIC NOTES

1. ALL CONSTRUCTION SIGNING, BARRICADING, AND TRAFFIC DELINEATION SHALL CONFORM TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", LATEST EDITION.
2. THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE PLANNING DEPARTMENT PRIOR TO CONSTRUCTION.
3. BEFORE ANY WORK IS STARTED IN THE RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ALL ADVANCE WARNING SIGNS FOR THE CONSTRUCTION ZONE. THE CONTRACTOR SHALL INSTALL TEMPORARY STOP SIGNS AT ALL NEW STREET ENCROACHMENTS INTO EXISTING CITY STREETS WHERE WARRANTED IMMEDIATELY AFTER FIRST GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN SAID SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.
4. WHEN A DESIGNATED "SAFE ROUTE TO SCHOOL" IS ENCROACHED UPON BY A CONSTRUCTION WORK ZONE AND PUBLIC WORKS STAFF IDENTIFIES A NEED FOR STUDENTS TO BE ASSISTED IN THE SAFE CROSSING THROUGH THAT WORK ZONE, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A QUALIFIED "CROSSING GUARD". THE GUARD SHALL BE PRESENT FOR THE FULL DURATION OF TIME THAT CHILDREN ARE LIKELY TO BE PRESENT.
5. IF THE IMPROVEMENTS NECESSITATE THE OBLITERATION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL OR RELOCATION OF ANY EXISTING TRAFFIC PAVEMENT MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED WITH LIKE MATERIALS TO THE SATISFACTION OF THE CITY ENGINEER.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL PERMANENT SIGNS SHOWN ON THE PLANS. ALL NEW TRAFFIC SIGNS SHALL BE FABRICATED WITH DIAMOND GRADE VIP CLASS 6 REFLECTIVE SHEETING AND APPROVED EQUAL. ALL NEW TRAFFIC SIGNS, EXCEPT STREETNAME SIGNS, SHALL BE MOUNTED ON BREAKAWAY SUPPORTS, SHALL HAVE 3M SERIES 1160 OR APPROVED EQUIVALENT ANTI-GRAFFITI PROTECTIVE OVERLAY FILM; SCHOOL ZONE SIGNS SHALL HAVE 3M SERIES 1150 ANTI-GRAFFITI PROTECTIVE OVERLAY FILM. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CURRENT CITY STANDARDS. ALL OTHER SIGNS SHALL HAVE 3M SERIES 3200 UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.
7. WHEN A PROPOSED STREET LIGHT STANDARD IS LOCATED WITHIN FIVE (5') FEET OF ANY PROPOSED SIGN SHOWN ON THE PLANS TO BE MOUNTED ON A SIGNPOST, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGNPOST SHALL BE ELIMINATED.
8. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ONTO THE PORTIONS OF THE ROAD(S) BEING IMPROVED HERE UNDER, REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER OFF-SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.
9. STREET SIGNS AND STOPS SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR PLACEMENT OF STREET NAME SIGNS.
10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO INSURE THE SAFETY OF PUBLIC IN AREAS OF CONSTRUCTION. THE CONTRACTOR SHALL HAVE A CERTIFIED ATSSA TRAFFIC CONTROL TECHNICIAN OR IMSA WORK ZONE SAFETY SPECIALIST SET UP, MAINTAIN AND/OR REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHT OF WAY.
11. WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE EXPEDITED TO COMPLETION SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO THE TRAVELING PUBLIC.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING CITIZENS AREA TRANSIT (C.A.T.) IF THE CONSTRUCTION INTERRUPTS OR RELOCATES A BUS STOP OR HAS AN ADVERSE EFFECT ON BUS SERVICE ON THAT STREET TO ARRANGE FOR TEMPORARY RELOCATION OF STOP.
13. GUARDS SHALL BE OBTAINED BY CONTACTING THE METROPOLITAN POLICE DEPARTMENT SPECIAL EVENTS UNIT (PHONE # 828-3442) WHO WILL PROVIDE OFFICERS PROPERLY TRAINED IN TRAFFIC CONTROL. FEES FOR THE USE OF THESE OFFICERS SHALL BE SET BY METRO AND WILL BE PAID BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.
14. ANY WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS OTHERWISE DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.
15. THE CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGH THE PROJECT'S OFFSITE INSPECTOR PRIOR TO INITIATING PAVING TO RECEIVE DIRECTION FOR ANY PERMANENT OR TEMPORARY MODIFICATIONS TO THE APPROVED DRAWINGS REGARDING FINAL PAVEMENT TRANSITIONS, MARKINGS AND SIGNING THAT ARE REQUIRED TO MATCH ADJACENT ROADWAY SEGMENTS. THE CONTRACTOR SHALL PROVIDE A DRAWING FOR APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPICTING ANY ADJUSTMENTS TO THE FINAL PAVEMENT MARKINGS AND SIGNAGE, WHICH MAY INCLUDE OMITTING, ADDING OR MODIFYING PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SUCH THAT ADEQUATE TRANSITIONS AND LANE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE CONSTRUCTED.

## LAS VEGAS FIRE & RESCUE GENERAL NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE ORDINANCE # 6325 FOR HYDRANT SPECIFICATIONS AND HYDRANT INSTALLATION SPECIFICATIONS.
2. ONLY FIRE HYDRANTS THAT ARE ON THE LAS VEGAS VALLEY WATER DISTRICT'S - APPROVED PRODUCTS LIST ARE ALLOWED TO BE INSTALLED.
3. A PERMIT IS REQUIRED FROM LAS VEGAS FIRE AND RESCUE FOR THE INSTALLATION OF ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND THE CONTRACTORS MATERIAL TEST CERTIFICATE FOR THE UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK.
4. ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS ACCESS ROADS SHALL BE MAINTAINED BEFORE COMMENCEMENT OF ANY COMBUSTIBLE CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW.
5. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF STREET ADJACENT TO THE FIRE HYDRANTS.
6. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED WITH THE USE OF A TRIPLE NO. 320A WHERE POLE IS INSTALLED BEHIND SIDEWALK, AND SHALL AT NO TIME COMPLETELY ENCLOSE THE STREET LIGHTING POLE.
7. AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE TRAFFIC ENGINEERING DIVISION PRIOR TO ANY PRE-FINAL INSPECTION AS A MINIMUM. DRAWING NEEDS TO BE PROVIDED IN PDF AND DWG FORMAT AS-BUILT AND SIGNED BY THE PREPARER.
8. PAINTING OF THE CURBS, FIRE HYDRANTS, PADS, PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE, AND ALL OTHER WORK NECESSARY PER PLANS SHALL BE COMPLETED BEFORE APPROVAL BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION.
9. PRIVATE FIRE HYDRANTS SHALL BE PAINTED RED.
10. PRIOR TO THE FINAL OCCUPANCY, A FIRE FLOW TEST MUST BE WITNESSED BY LAS VEGAS FIRE AND RESCURE, FIRE PREVENTION DIVISION TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW.
11. FIRE HYDRANT SPACING SHALL BE AS FOLLOWS:
    - RESIDENTIAL - 500 FT UNSPRINKLERED; 600 FT SPRINKLERED
    - COMMERCIAL - 300 FT SPRINKLERED; 400 FT SPRINKLERED
12. WHERE NEW WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT MAXIMUM 1,000 FOOT SPACING, TO PROVIDE FOR TRANSPORTATION HAZARDS. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 500 FT ON AN ALTERNATING BASIS.
13. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE REQUIRED RADIUS OF A CUL-DE-SAC OR WITHIN 20 FEET OF THE PERIMETER OF THE RADIUS OF THE CUL-DE-SAC.
14. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FEET OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREET LIGHT OR ANY OTHER OBSTRUCTION.
15. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FEET, AS MEASURED BY AN APPROVED ROUTE.
16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FEET, AS MEASURED BY AN APPROVED ROUTE.
17. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FEET.
18. TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE ARE 4 OR MORE FIRE HYDRANTS/SPRINKLER LEAD-INS INSTALLED ON A SINGLE SYSTEM. SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS CAN BE OUT OF SERVICE DUE TO A BREAK IN A WATER MAIN.
19. ALL FIRE APPARATUS ACCESS ROADS SHALL BE PAVED TO PROVIDE ALL-WEATHER DRIVING CAPABILITIES, AND SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF THE FIRE APPARATUS.
20. THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 12%. ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 6% FOR 25 FEET PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6%.
21. THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 52 FEET OUTSIDE AND 28 FEET INSIDE TURNING RADIUS.
22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13 FEET 6 INCHES.
23. FIRE DEPARTMENT ACCESS ROADS SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 40 FEET FLOW-LINE TO FLOW-LINE WITH PARALLEL PARKING PERMITTED ON BOTH SIDES. NOT LESS THAN 32 FEET WIDE, FLOW-LINE TO FLOW-LINE WHERE PARKING IS PERMITTED ONLY ON ONE SIDE OF THE FIRE APPARATUS ACCESS ROAD. NOT LESS THAN 24 FEET WIDE, FLOW-LINE TO FLOW-LIN




SCALE: 1" = 30'
30 15 0 30

## GRADING CONSTRUCTION NOTES

1. CONSTRUCT 30" MODIFIED ROLL CURB AND GUTTER PER CCAUSD #217.1
2. CONSTRUCT "L" CURB AND GUTTER PER CCAUSD #216
3. CONSTRUCT 5' WIDE SIDEWALK PER CCAUSD #234
4. CONSTRUCT 8' CROSS GUTTER PER CCAUSD #228
5. CONSTRUCT SIDEWALK RAMP PER CCAUSD #235 CASE I. "A" & "B" = 8' UNLESS OTHERWISE NOTED
6. CONSTRUCT 5' TRANSITION "L" CURB TO TYPE 30" MODIFIED ROLL CURB PER DETAIL "26" ON SHEET C7
7. INSTALL 2" AC OVER 4" TYPE II AGGREGATE BASE
8. CONSTRUCT PAD PER TYPICAL PAD SECTION DETAIL "27" ON SHEET C7
9. MATCH EX. ASPHALT, CURB, SIDEWALK, GUTTER, OR VALLEY GUTTER. SAW CUT CLEAN EDGE FOR CONNECTION.
10. INSTALL CALL BOX FOR ENTRY GATES
11. CONSTRUCT SIDEWALK RAMP PER CCAUSD #235 CASE II. "A" & "B" = 6.5' UNLESS OTHERWISE NOTED
12. CONNECT TO EX. SD LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX. SD)
13. CONSTRUCT CONCRETE LINED DRAINAGE EASEMENT PER CCAUSD #425.S1
14. CONSTRUCT SIDEWALK DRAIN PER CCAUSD #236
15. EXISTING RIP-RAP CHANNEL TO BE REMOVED.
16. EXISTING SCARP TO BE REMOVED
17. INSTALL TYPE "A" ISLAND CURB PER CCAUSD #219
18. CONSTRUCT 15' TYPE "CM" DROP INLET PER CCAUSD #422 & 421 (6 - GRATES, L=17.5', W=5.33')
19. CONSTRUCT GATES PER LANDSCAPE PLANS & DETAILS

## LEGEND

| PROPOSED | EXISTING | DESCRIPTION |
|---|---|---|
| | | PUBLIC R/W LINE |
| | | PRIVATE R/W LINE |
| | | BOUNDARY LINE |
| | | EASEMENT LINE |
| CUT FILL | | MATCH LINE |
| | | CUT / FILL LINE |
| | | CENTERLINE |
| | | EDGE OF ASPHALT |
| | | CURB & GUTTER |
| | | RETAINING WALL |
| | | SAWCUT LINE |
| | | FLOWLINE |
| 2500 | (2500) | GRADE BREAK |
| 2503 | (2503) | MAJOR CONTOUR - 5' |
| | | MINOR CONTOUR - 1' |
| | | FENCE |
| | | SCARP |
| | | CONCRETE SURFACE |
| | | PROPOSED ASPHALT PAVEMENT |
| | | REMOVE AND REPLACE ASPHALT |
| | | RIP-RAP |
| XXXX.XX DESC | XXXX.XX DESC | ELEVATION GRADE TAG |
| 1.00% | (1.00%) | GRADE SLOPE TAG |
| 1 C5 | | SECTION MARKER - DETAIL NUMBER ABOVE SHEET NUMBER |
| | | SIGHT VISIBILITY ZONE |

### COMMON ABBREVIATIONS

| | | | |
|---|---|---|---|
| FF | - FINISHED FLOOR | TRC | - TOP OF 30" ROLL CURB |
| TC | - TOP OF CURB | AC | - TOP OF PAVEMENT |
| FL | - FLOWLINE GRADE | EP | - EDGE OF PAVEMENT |
| TB | - TOP OF BERM | TRW | - TOP OF RETAINING WALL |
| TF | - TOP OF WALL FOOTER | PRIV. | - PRIVATE |
| ST. | - STREET | TYP. | - TYPICAL |
| ESMT | - EASEMENT | R/W | - RIGHT-OF-WAY |
| TMH | - TOP OF MANHOLE (RIM ELEV.) | DG | - DESIGN GRADE |

## SIGHT VISIBILITY ZONE NOTE

NO WALLS, FENCES SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT, OTHER THAT TRAFFIC CONTROL DEVICES, FIRE HYDRANTS, TREES, AND STREET LIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT, MEASURED FROM TOP OF CURB, OR WHERE NO CURB EXISTS, A HEIGHT OF 27 INCHES MEASURED FROM THE TOP OF ADJACENT ASPHALT, GRAVEL OR PAVEMENT STREET SURFACE. THIS RESTRICTION EXTENDS ALONG THE SIGHT VISIBILITY LINE THROUGH LANDSCAPED MEDIANS.

PLEASE REFER TO TRAFFIC SHEET ? FOR SIGHT VISIBILITY ZONE DIMENSIONS.

## GRADING NOTES

1. ACTUS SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES IN THE PLANS OR CONDITIONS IN THE FILED.
2. FOR ROADWAY WIDENING AND HALF STREET IMPROVEMENTS, THE CONTRACTOR SHALL VERIFY CROSS SLOPES FROM EXISTING PAVEMENT SAWCUT LINE TO PROPOSED EDGE OF PAVEMENT OR PROJECTED LIP OF CURB PRIOR TO SUBGRADE PREPARATION AND CONSTRUCTION OF PROPOSED CURB LINE. IF MINIMUM OR MAXIMUM CROSS SLOPES DO NOT MEET AGENCY STANDARDS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER.
3. WALL DETAILS ARE FOR REFERENCE ONLY AND DO NOT CONSTITUTE A STRUCTURAL DESIGN.
4. CONSTRUCTION OF BLOCK WALLS REQUIRE A SEPARATE BUILDING PERMIT AND APPROVAL BY THE BUILDING DEPARTMENT.

## ESTIMATED QUANTITIES

NOTE: QUANTITIES SHOWN ARE RAW QUANTITIES AND APPROXIMATE. CONTRACTOR TO DETERMINE HIS OWN QUANTITIES FOR GRADING PURPOSES.

WORK UNDER THIS PLAN CONSTITUTES GRADING IN ACCORDANCE WITH 2012 IBC; ENGINEERING REPORTS AND CERTIFICATIONS IN CONFORMANCE WITH IBC SHALL BE FILED WITH THE CITY OF LAS VEGAS PRIOR TO CITY OF LAS VEGAS APPROVAL AT FINAL INSPECTION.

CUT: ? CY
FILL: ? CY
BALANCE: ? CY (CUT)

## ENGINEER'S CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED UPDATED DRAINAGE STUDY CLV# N/A ON FILE WITH THE CITY OF LAS VEGAS.

DARRYL LATTIMORE, P.E. DATE

Call before you Dig
Avoid cutting underground utility lines. It's costly.
CALL 811 OR 1-800-227-2600

AVOID HITTING UNDERGROUND POWER LINES. IT'S COSTLY
CALL BEFORE YOU DO UNDERGROUND
Call before you Underground 1-702-432-5300
FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (FAST)

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

## LINE & CURVE DATA NOTE

PLEASE REFER TO TRAFFIC SHEETS FOR LINE AND CURVE DATA.

## BENCHMARK

CITY OF LAS VEGAS BENCHMARK
MONUMENT ID: SLV052WS
RIVET AND PLATE IN TOP OF CURB @ SE CORNER OF CARRIAGE HILL & FAR HILLS
ELEVATION: FEET = 3229.29' (NAVD88) METERS = 984.29 M (NAVD88)

## BASIS OF BEARING

SOUTH 89°51'25" EAST, BEING THE BEARING OF NORTH LINE OF SECTION 27, TOWNSHIP 21 SOUTH, RANGE 59 EAST, M.D.M., CITY LAS VEGAS, CLARK COUNTY, NEVADA AS PER MAP RECORDED IN FILE 123, PAGE 36 OF PARCEL MAPS, IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDERS.

## DEDICATION NOTE

ALL EASEMENTS, RIGHT-OF-WAY, AND OTHER DEDICATIONS WITHIN THIS PLAN SET ARE GRANTED PER NFM #____-_____-_____ UNLESS OTHERWISE NOTED

## PRIVATE STREET NOTE

ALL PRIVATE STREETS ARE P.U.E., PUBLIC SEWER EASEMENTS, AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY THE HOA PER THE APPROVED FINAL MAP FOR THE PROJECT.

## COMMON LOT NOTE

ALL COMMON LOTS ARE TO BE PUBLIC DRAINAGE, PEDESTRIAN ACCESS, UTILITY, SEWER, AND PRIVATE LANDSCAPE EASEMENTS OVER THEIR ENTIRETY TO BE PRIVATELY MAINTAINED BY THE HOA PER THE APPROVED FINAL MAP FOR THE PROJECT.

## FLOOD ZONE DESCRIPTION

THIS SITE IS LOCATED IN ZONE "X", AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN, PER THE FLOOD INSURANCE RATE MAP COMMUNITY PANEL 32003C2150E CLARK COUNTY, NEVADA DATED SEPTEMBER 27, 2002.

FLOOD DESIGNATION PROVIDED BY FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)

## DISCLAIMER NOTE

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## SOILS NOTE

ALL GRADING SHALL CONFORM TO GEOTECHNICAL REPORT
BY: GEOTEK RESIDENTIAL, LLC
ORIGINAL PROJECT NUMBER: 14658-LVR
DATED: MARCH 5, 2019
UPDATED APRIL 17, 2019

## STORM DRAIN CONNECTION NOTE

WHEN CONNECTING TO EXISTING RCP, CONTRACTOR SHALL REMOVE THE EXISTING RCP TO THE NEAREST BELL CONNECTION, CONNECT NEW RCP TO EXISTING RCP AND MATCH EXISTING PIPE SLOPE.


Actus
3283 E. Warm Springs Rd., Suite 300
Las Vegas, NV 89120
www.Actus-NV.com
(702) 586-9266
Engineering - Surveying - Consulting - Planning


GRADING PLAN 1
CASCADES
WILLIAM LYON HOMES
CITY OF LAS VEGAS, NEVADA

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |

7/16/2019

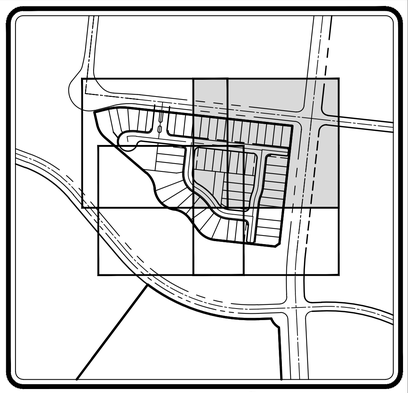
| | |
|---|---|
| DATE | 07/14/2019 |
| DRAWN | RLS |
| DESIGNED | RLS |
| CHECKED | DCL |
| PROJECT # | WLH011901 |

SHEET TITLE
GRADING

SHEET NUMBER
C3

N/A SHEET 3 OF 8


Plot Stamp: 7/16/2019 2:03:12 PM - Ryan Sicner
File: P:\WLH\01901 - V21 Parcel L\Civil_CD\WLH01901-C03-GRAD.dwg, Tab: C3 - Grading 1



KEY MAP
SCALE: NTS

## GRADING CONSTRUCTION NOTES

1. CONSTRUCT 30" MODIFIED ROLL CURB AND GUTTER PER CCAUSD #217.1
2. CONSTRUCT "L" CURB AND GUTTER PER CCAUSD #216
3. CONSTRUCT 5' WIDE SIDEWALK PER CCAUSD #234
4. CONSTRUCT 8' CROSS GUTTER PER CCAUSD #228
5. CONSTRUCT SIDEWALK RAMP PER CCAUSD #235 CASE I. "A" & "B" = 8' UNLESS OTHERWISE NOTED
6. CONSTRUCT 5' TRANSITION "L" CURB TO TYPE 30" MODIFIED ROLL CURB PER DETAIL "26" ON SHEET C7
7. INSTALL 2" AC OVER 4" TYPE II AGGREGATE BASE
8. CONSTRUCT PAD PER TYPICAL PAD SECTION DETAIL "27" ON SHEET C7
9. MATCH EX. ASPHALT, CURB, SIDEWALK, GUTTER, OR VALLEY GUTTER. SAW CUT CLEAN EDGE FOR CONNECTION.
10. INSTALL CALL BOX FOR ENTRY GATES
11. CONSTRUCT SIDEWALK RAMP PER CCAUSD #235 CASE II. "A" & "B" = 6.5' UNLESS OTHERWISE NOTED
12. CONNECT TO EX. SD LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX. SD)
13. CONSTRUCT CONCRETE LINED DRAINAGE EASEMENT PER CCAUSD #425.S1
14. CONSTRUCT SIDEWALK DRAIN PER CCAUSD #236
15. EXISTING RIP-RAP CHANNEL TO BE REMOVED.
16. EXISTING SCARP TO BE REMOVED
17. INSTALL TYPE "A" ISLAND CURB PER CCAUSD #219
18. CONSTRUCT 15' TYPE "CM" DROP INLET PER CCAUSD #422 & 421 (6 - GRATES, L=17.5', W=5.33')
19. CONSTRUCT GATES PER LANDSCAPE PLANS & DETAILS

## LEGEND

| PROPOSED | EXISTING | DESCRIPTION |
|---|---|---|
| | | PUBLIC R/W LINE |
| | | PRIVATE R/W LINE |
| | | BOUNDARY LINE |
| | | EASEMENT LINE |
| | | MATCH LINE |
| CUT / FILL | | CUT / FILL LINE |
| | | CENTERLINE |
| | | EDGE OF ASPHALT |
| | | CURB & GUTTER |
| | | RETAINING WALL |
| | | SAWCUT LINE |
| | | FLOWLINE |
| | | GRADE BREAK |
| 2500 | (2500) | MAJOR CONTOUR - 5' |
| 2503 | (2503) | MINOR CONTOUR - 1' |
| | | FENCE |
| | | SCARP |
| | | CONCRETE SURFACE |
| | | PROPOSED ASPHALT PAVEMENT |
| | | REMOVE AND REPLACE ASPHALT |
| | | RIP-RAP |
| XXXX.XX DESC | XXXX.XX DESC | ELEVATION GRADE TAG |
| 1.00% | (1.00%) | GRADE SLOPE TAG |
| | C5 | SECTION MARKER - DETAIL NUMBER ABOVE SHEET NUMBER |
| | | SIGHT VISIBILITY ZONE |

### COMMON ABBREVIATIONS

| | | | |
|---|---|---|---|
| FF | - FINISHED FLOOR | TRC | - TOP OF 30" ROLL CURB |
| TC | - TOP OF CURB | AC | - TOP OF PAVEMENT |
| FL | - FLOWLINE GRADE | EP | - EDGE OF PAVEMENT |
| TB | - TOP OF BERM | TRW | - TOP OF RETAINING WALL |
| TF | - TOP OF WALL FOOTER | PRIV. | - PRIVATE |
| ST. | - STREET | TYP. | - TYPICAL |
| ESMT | - EASEMENT | R/W | - RIGHT-OF-WAY |
| TMH | - TOP OF MANHOLE (RIM ELEV.) | DG | - DESIGN GRADE |

## SIGHT VISIBILITY ZONE NOTE

NO WALLS, FENCES SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT, OTHER THAT TRAFFIC CONTROL DEVICES, FIRE HYDRANTS, TREES, AND STREET LIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT, MEASURED FROM TOP OF CURB, OR WHERE NO CURB EXISTS, A HEIGHT OF 27 INCHES MEASURED FROM THE TOP OF ADJACENT ASPHALT, GRAVEL OR PAVEMENT STREET SURFACE. THIS RESTRICTION EXTENDS ALONG THE SIGHT VISIBILITY LINE THROUGH LANDSCAPED MEDIANS.

PLEASE REFER TO TRAFFIC SHEET ? FOR SIGHT VISIBILITY ZONE DIMENSIONS.

## GRADING NOTES

1. ACTUS SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES IN THE PLANS OR CONDITIONS IN THE FIELD.
2. FOR ROADWAY WIDENING AND HALF STREET IMPROVEMENTS, THE CONTRACTOR SHALL VERIFY CROSS SLOPES FROM EXISTING PAVEMENT SAWCUT LINE TO PROPOSED EDGE OF PAVEMENT OR PROJECTED LIP OF CURB PRIOR TO SUBGRADE PREPARATION AND CONSTRUCTION OF PROPOSED CURB LINE. IF MINIMUM OR MAXIMUM CROSS SLOPES DO NOT MEET AGENCY STANDARDS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER.
3. WALL DETAILS ARE FOR REFERENCE ONLY AND DO NOT CONSTITUTE A STRUCTURAL DESIGN.
4. CONSTRUCTION OF BLOCK WALLS REQUIRE A SEPARATE BUILDING PERMIT AND APPROVAL BY THE BUILDING DEPARTMENT.

## ESTIMATED QUANTITIES

NOTE: QUANTITIES SHOWN ARE RAW QUANTITIES AND APPROXIMATE. CONTRACTOR TO DETERMINE HIS OWN QUANTITIES FOR GRADING PURPOSES.

WORK UNDER THIS PLAN CONSTITUTES GRADING IN ACCORDANCE WITH 2012 IBC; ENGINEERING REPORTS AND CERTIFICATIONS IN CONFORMANCE WITH IBC SHALL BE FILED WITH THE CITY OF LAS VEGAS PRIOR TO CITY OF LAS VEGAS APPROVAL AT FINAL INSPECTION.

CUT: ? CY
FILL: ? CY
BALANCE: ? CY (CUT)

## ENGINEER'S CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED UPDATED DRAINAGE STUDY CLVI# N/A ON FILE WITH THE CITY OF LAS VEGAS.

DARRYL LATTIMORE, P.E. DATE

## LINE & CURVE DATA NOTE

PLEASE REFER TO TRAFFIC SHEETS FOR LINE AND CURVE DATA.

## BENCHMARK

CITY OF LAS VEGAS BENCHMARK
MONUMENT ID: SLV0926W6
RIVET AND PLATE IN TOP OF CURB @ SE CORNER OF CARRIAGE HILL & FAR HILLS
ELEVATION: FEET = 3229.29' (NAVD88) METERS = 984.29 M (NAVD88)

## BASIS OF BEARING

SOUTH 89°51'25" EAST, BEING THE BEARING OF NORTH LINE OF SECTION 27, TOWNSHIP 21 SOUTH, RANGE 59 EAST, M.D.M., CITY LAS VEGAS, CLARK COUNTY, NEVADA AS PER MAP RECORDED IN FILE 123, PAGE 36 OF PARCEL MAPS, IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDERS.

## DEDICATION NOTE

ALL EASEMENTS, RIGHT-OF-WAY, AND OTHER DEDICATIONS WITHIN THIS PLAN SET ARE GRANTED PER NFM #__-_______ UNLESS OTHERWISE NOTED

## PRIVATE STREET NOTE

ALL PRIVATE STREETS ARE P.U.E., PUBLIC SEWER EASEMENTS, AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY THE HOA PER THE APPROVED FINAL MAP FOR THE PROJECT.

## COMMON LOT NOTE

ALL COMMON LOTS ARE TO BE PUBLIC DRAINAGE, PEDESTRIAN ACCESS, UTILITY, SEWER, AND PRIVATE LANDSCAPE EASEMENTS OVER THEIR ENTIRETY TO BE PRIVATELY MAINTAINED BY THE HOA PER THE APPROVED FINAL MAP FOR THE PROJECT.

## FLOOD ZONE DESCRIPTION

THIS SITE IS LOCATED IN ZONE "X", AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN, PER THE FLOOD INSURANCE RATE MAP COMMUNITY PANEL 32003C1150E CLARK COUNTY, NEVADA DATED SEPTEMBER 27, 2002.

FLOOD DESIGNATION PROVIDED BY FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)

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## SOILS NOTE

ALL GRADING SHALL CONFORM TO GEOTECHNICAL REPORT
BY: GEOTEK RESIDENTIAL, LLC
ORIGINAL PROJECT NUMBER: 14658-LVR
DATED: MARCH 5, 2019
UPDATED APRIL 17, 2019

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AVOID HITTING UNDERGROUND UTILITY LINES, GAS LINES AND STREET LIGHT SYSTEM CONDUIT. IT'S COSTLY
CALL BEFORE YOU DIG UNDERGROUND
Call before you Dig
Underground
1-702-432-5300
FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (FAST)

Call before you Dig
Avoid cutting underground utility lines. It's costly.
CALL
811
OR
1-800-227-2600

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


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GRADING PLAN 2
CASCADES
WILLIAM LYON HOMES
CITY OF LAS VEGAS, NEVADA

| BY | DESCRIPTION | DATE |
|---|---|---|
| A | | |

DARRYL C. LATTIMORE
STATE OF NEVADA
No. 17516
EXP: 12/31/19
CIVIL
7/16/2019

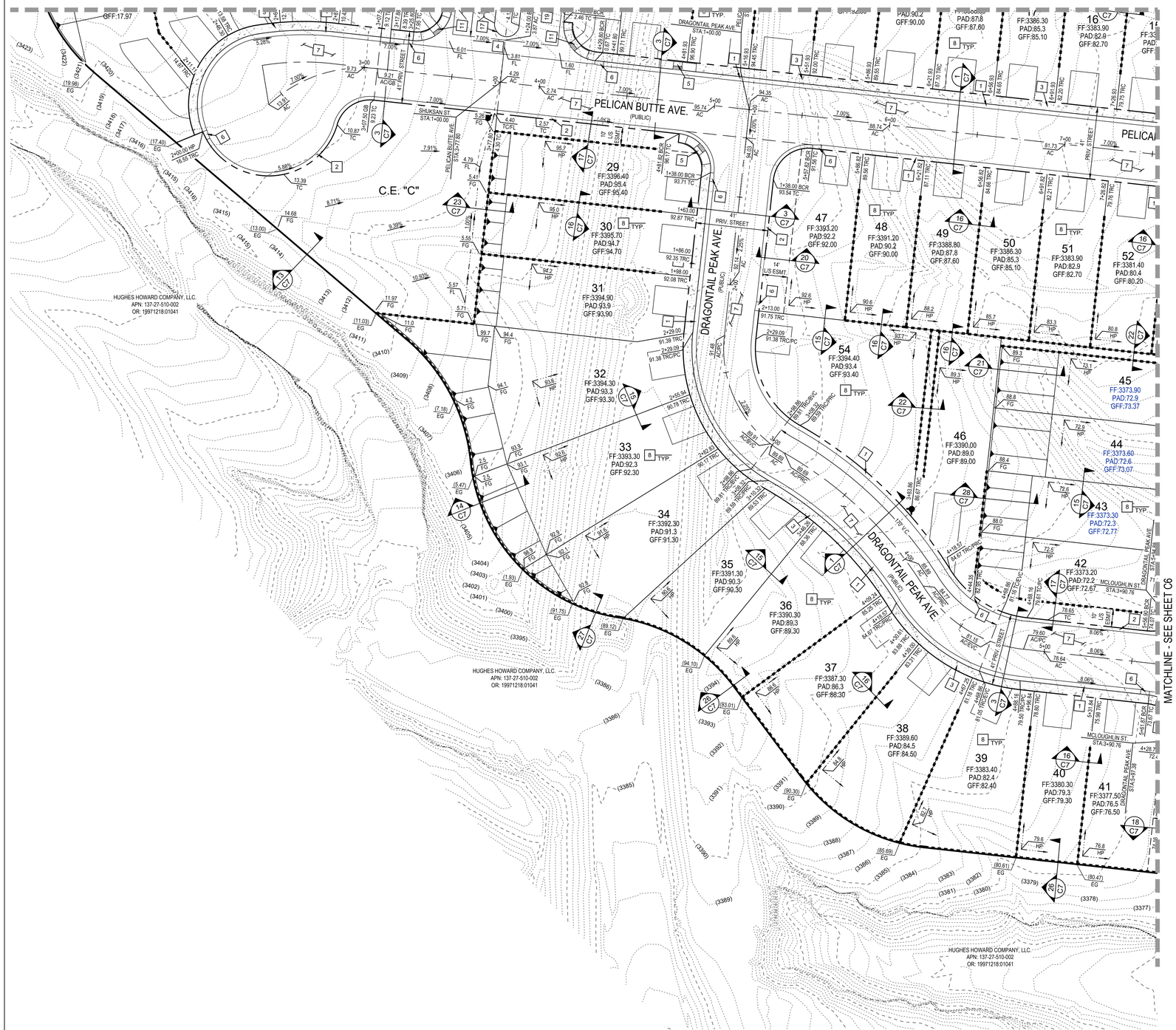
| | |
|---|---|
| DATE | 07/14/2019 |
| DRAWN | RLS |
| DESIGNED | RLS |
| CHECKED | DCL |
| PROJECT # | WLH011901 |

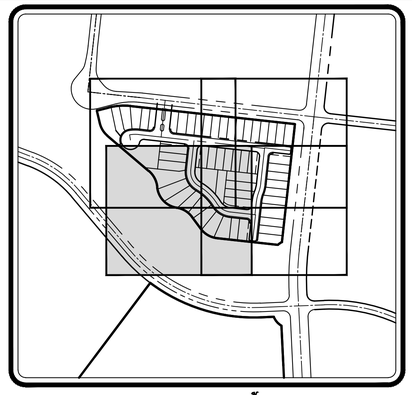
SHEET TITLE
GRADING

SHEET NUMBER
C4

N/A SHEET 4 OF 8

Plot Stamp: 7/16/2019 2:03:16 PM - Ryan Sicner
File: P:\WLH011901 - V21 Parcel L\Civil_CD\WLH011901-CD-GRAD.dwg, Tab: C4 - Grading





KEY MAP
SCALE: NTS

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## LEGEND

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| | | | CENTERLINE |
| | | | EDGE OF ASPHALT |
| | | | CURB & GUTTER |
| | | | RETAINING WALL |
| | | | SAWCUT LINE |
| | | | FLOWLINE |
| | | | GRADE BREAK |
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| | | | FENCE |
| | | | SCARP |
| | | | CONCRETE SURFACE |
| | | | PROPOSED ASPHALT PAVEMENT |
| | | | REMOVE AND REPLACE ASPHALT |
| | | | RIP-RAP |
| | XXXX.XX DESC | XXXX.XX DESC | ELEVATION GRADE TAG |
| | 1.00% | (1.00%) | GRADE SLOPE TAG |
| | | C5 | SECTION MARKER - DETAIL NUMBER ABOVE SHEET NUMBER |
| | | | SIGHT VISIBILITY ZONE |

### COMMON ABBREVIATIONS

| | | | |
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| TB | - TOP OF BERM | TRW | - TOP OF RETAINING WALL |
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CUT: ? CY
FILL: ? CY
BALANCE: ? CY (CUT)

## ENGINEER'S CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED UPDATED DRAINAGE STUDY CLV# N/A ON FILE WITH THE CITY OF LAS VEGAS.

DARRYL LATTIMORE, P.E. DATE

## LINE & CURVE DATA NOTE

PLEASE REFER TO TRAFFIC SHEETS FOR LINE AND CURVE DATA.

## BENCHMARK

CITY OF LAS VEGAS BENCHMARK
MONUMENT ID: SLV0926W6
RIVET AND PLATE IN TOP OF CURB @ SE CORNER OF CARRIAGE HILL & FAR HILLS
ELEVATION: FEET = 3229.29' (NAVD88) METERS = 984.29 M (NAVD88)

## BASIS OF BEARING

SOUTH 89°51'25" EAST, BEING THE BEARING OF NORTH LINE OF SECTION 27, TOWNSHIP 21 SOUTH, RANGE 59 EAST, M.D.M., CITY LAS VEGAS, CLARK COUNTY, NEVADA AS PER MAP RECORDED IN FILE 123, PAGE 36 OF PARCEL MAPS, IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDERS.

## DEDICATION NOTE

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## FLOOD ZONE DESCRIPTION

THIS SITE IS LOCATED IN ZONE "X", AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN, PER THE FLOOD INSURANCE RATE MAP COMMUNITY PANEL 32003C2150E CLARK COUNTY, NEVADA DATED SEPTEMBER 27, 2002.

FLOOD DESIGNATION PROVIDED BY FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)

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## SOILS NOTE

ALL GRADING SHALL CONFORM TO GEOTECHNICAL REPORT
BY: GEOTEK RESIDENTIAL, LLC
ORIGINAL PROJECT NUMBER: 14658-LVR
DATED: MARCH 5, 2019
UPDATED APRIL 17, 2019

## STORM DRAIN CONNECTION NOTE

WHEN CONNECTING TO EXISTING RCP, CONTRACTOR SHALL REMOVE THE EXISTING RCP TO THE NEAREST BELL CONNECTION, CONNECT NEW RCP TO EXISTING RCP AND MATCH EXISTING PIPE SLOPE.


Actus
3283 E. Warm Springs Rd., Suite 300
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www.Actus-NV.com
(702) 586-9266
Engineering - Surveying - Consulting - Planning


GRADING PLAN 3
CASCADES
WILLIAM LYON HOMES
CITY OF LAS VEGAS, NEVADA

| BY | DATE | DESCRIPTION |
|---|---|---|
| A | | |

DARRYL C. LATTIMORE
EXP: 12/31/19
CIVIL
No. 17516
STATE OF NEVADA
PROFESSIONAL ENGINEER
7/16/2019

| | |
|---|---|
| DATE | 07/14/2019 |
| DRAWN | RLS |
| DESIGNED | RLS |
| CHECKED | DCL |
| PROJECT # | WLH011901 |

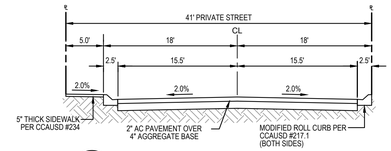
SHEET TITLE
GRADING

SHEET NUMBER
C5

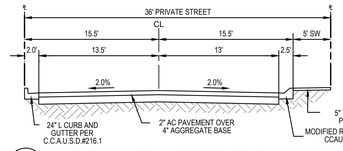
N/A SHEET 5 OF 8


Plot Stamp: 7/16/2019 2:03:21 PM - Ryan Sicner
File: P:\WLH011901 - V21 Parcel L\Civil_CD\WLH011901-CD-GRAD.dwg, Tab: C5 - Grading 3

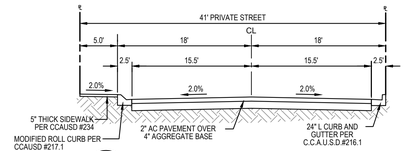
MATCHLINE - SEE SHEET C4
MATCHLINE - SEE SHEET C5
PELICAN BUTTE AVE.
(PUBLIC)
DESERT FOOTHILLS DR.
(PUBLIC)
MCLOUGHLIN ST
(PUBLIC)
DRAGONTAIL PEAK AVE.
(PUBLIC)
C.E.D.
HUGHES HOWARD COMPANY, LLC.
APN: 137-27-112-003
OR: 19971218:01041
HUGHES HOWARD COMPANY, LLC.
APN: 137-27-510-002
OR: 19971218:01041
EX. 344.7 LF 15"WSR PVC SD @ (1.64%) (PUBLIC)
EX. 79.3 LF 10"WSR RCP SD @ (1.64%) (PUBLIC)
EX. 141.6 LF 10"WSR RCP SD @ (1.64%) (PUBLIC)
EX. 17.4 LF 24" RCP SD @ (-7.97%) (PUBLIC)
EX. SDMH#EX, SSMH #9
STA: 32+07.86 -17.0'± L
RIM: (3361.7±)
EX. 45.1 LF 24" RCP SD @ (-10.00%) (PUBLIC)
EX. 58.5 LF 30" RCP SD @ (-8.74%) (PUBLIC) TO BE REMOVED
EX. 35.5 LF 30" RCP SD @ (-8.74%) (PUBLIC) TO BE REMOVED
EX. SSMH
EX. 8" W
EX. 8" SW
EX. 8" LS
EX. 24" LS
EX. 40' SW
EX. 40' LS
EX. 76' R/W
EX. 24" SD
EX. 18" SD @ (1.84%) (PUBLIC)
EX. 30" SD @ (1.84%) (PUBLIC)
EX. 24" SD @ (1.84%) (PUBLIC)
EX. 18" SD @ (1.84%) (PUBLIC)
EX. 30" SD @ (1.84%) (PUBLIC)
EX. 24" SD @ (1.84%) (PUBLIC)
EX. 18" SD @ (1.84%) (PUBLIC)
EX. SSMH
EX. SSMH
EX. SSMH



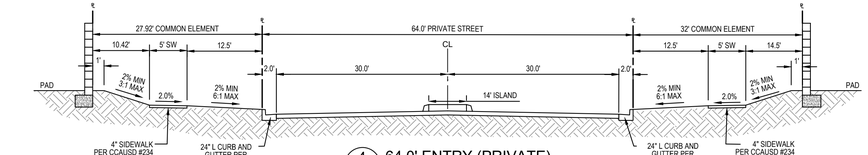

1 - 41.0' (PRIVATE) STREET SECTION
NOT TO SCALE



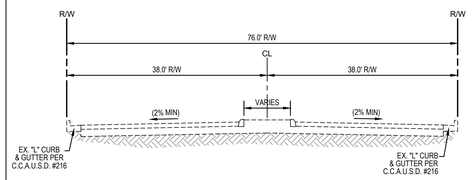

2 - 36.0' (PRIVATE) STREET SECTION
NOT TO SCALE



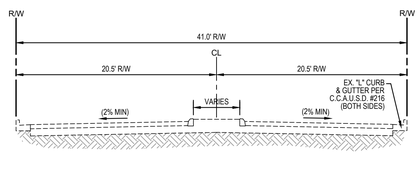

3 - 41.0' (PRIVATE) STREET SECTION
NOT TO SCALE



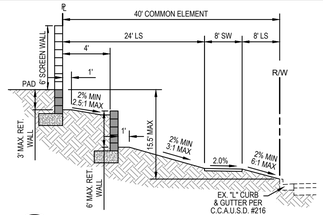

4 - 64.0' ENTRY (PRIVATE)
NOT TO SCALE



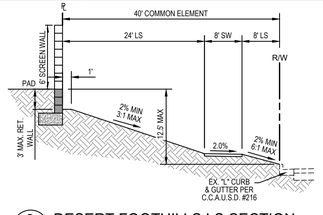

5 - 76.0' DESERT FOOTHILLS DRIVE R/W (PUBLIC)
NOT TO SCALE



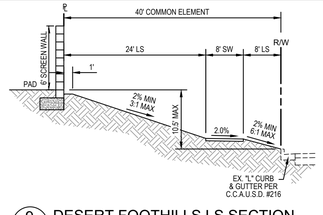

6 - 41.0' KINDLE CORNER AVE. R/W (PUBLIC)
NOT TO SCALE



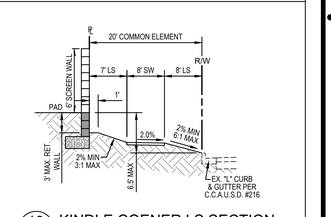

7 - DESERT FOOTHILLS LS SECTION
NOT TO SCALE



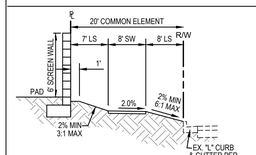

8 - DESERT FOOTHILLS LS SECTION
NOT TO SCALE



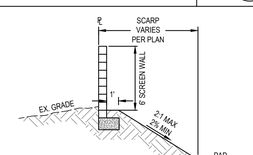

9 - DESERT FOOTHILLS LS SECTION
NOT TO SCALE



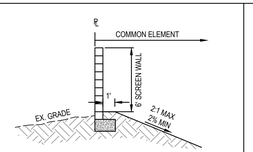

10 - KINDLE COENER LS SECTION
NOT TO SCALE



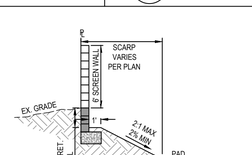

11 - KINDLE COENER LS SECTION
NOT TO SCALE



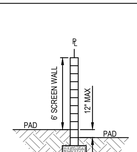

12 - WEST PROPERTY SECTION
NOT TO SCALE



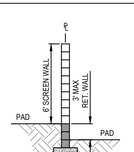

13 - WEST PROPERTY SECTION
NOT TO SCALE



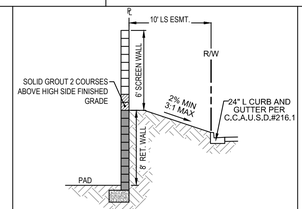

14 - WEST PROPERTY SECTION
NOT TO SCALE



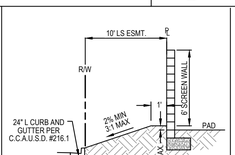

15 - INTERIOR SECTION
NOT TO SCALE



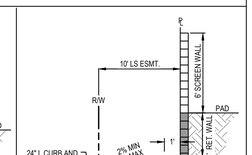

16 - INTERIOR SECTION
NOT TO SCALE




17 - INTERIOR SECTION
NOT TO SCALE




18 - INTERIOR SECTION
NOT TO SCALE

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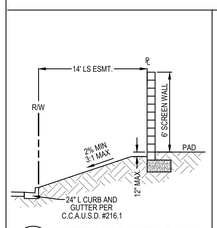


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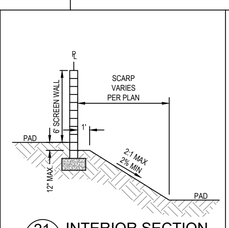
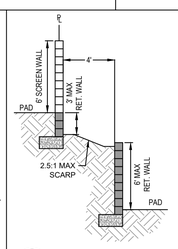
NOT TO SCALE




21 - INTERIOR SECTION
NOT TO SCALE

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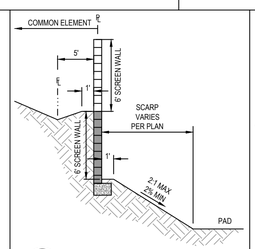
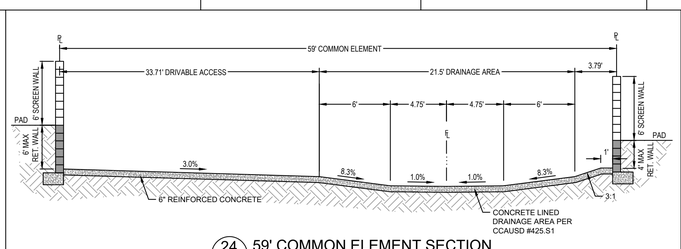
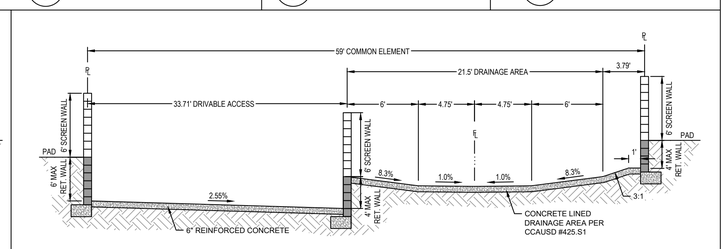
NOT TO SCALE



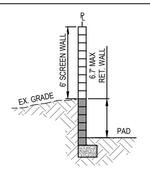

23 - INTERIOR SECTION
NOT TO SCALE



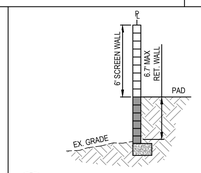

24 - 59' COMMON ELEMENT SECTION
NOT TO SCALE



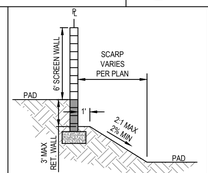

25 - 59' COMMON ELEMENT SECTION
NOT TO SCALE




26 - WEST PERIMETER SECTION
NOT TO SCALE




27 - WEST PERIMETER SECTION
NOT TO SCALE




28 - INTERIOR SECTION
NOT TO SCALE

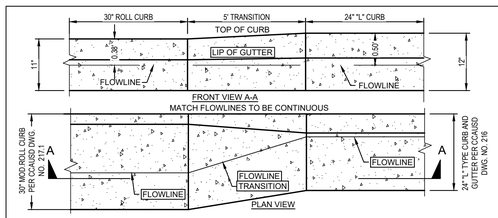
## WALL NOTES

1. WALL DETAILS ARE FOR REFERENCE ONLY AND DO NOT CONSTITUTE A STRUCTURAL DESIGN.
2. CONSTRUCTION OF BLOCK WALLS REQUIRE A SEPARATE BUILDING PERMIT AND APPROVAL BY THE BUILDING DEPARTMENT.
3. ALL RETAINING WALLS SHALL BE WATER-PROOFED.

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL SYSTEMS CONDUIT. IT'S COSTLY
CALL BEFORE YOU DO UNDERGROUND
Call before you
Underground
1-702-432-5300
FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (FAST)

Call before you Dig
Avoid cutting underground utility lines. It's costly.
CALL
811
OR
1-800-227-2600

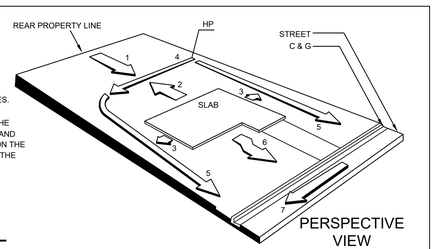
AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929




26 - 5' CURB TRANSITION - 'L' CURB TO 30" ROLL CURB
NOT TO SCALE

1. SLOPE FROM REAR TO SWALE (MIN. 2%)
2. SLOPE FROM HOUSE TO SWALE (MIN. 5%)
3. SLOPE FROM HOUSE TO SIDE SWALE (MIN. 5%)
4. REAR SWALE (10' MIN. FROM REAR OF HOUSE) (MIN. 1%)
5. SIDE SWALE (MIN. 1%)
6. SLOPE FROM HOUSE TO BACK OF CURB (MIN. 2%)
7. SLOPE OF STREET

A. INDICATED GRADES OTHER THAN TC, FG & GUTTER FL ARE ROUGH GRADES. (0.1' LOWER THAN FINISHED GRADE).
B. THE ROUGH GRADING PLANS SHALL BE ON THE JOB SITE AT ALL TIMES. THE ROUGH GRADING SHALL BE FINISHED IN CONFORMANCE WITH THE LINES AND GRADES SHOWN ON THE PLANS. THE GRADING QUANTITIES ARE BASED ON THE ELEVATION AND DETAILS SHOWN ON THE PLANS. ANY DEVIATIONS FROM THE PLANS WILL RESULT IN QUANTITY CHANGES.
C. CARE SHALL BE EXERCISED IN GRADING CORNER LOTS.
D. ROUGH PAD ELEVATIONS SHALL BE GRADED TO WITHIN 0.1' OF THE PAD ELEVATIONS SHOWN ON THE PLANS.




27 - TYPE "A" PAD GRADING DETAIL TYP
NOT TO SCALE

Actus
3283 E. Warm Springs Rd., Suite 300
Las Vegas, NV 89120
www.Actus-NV.com
(702) 586-9266
Engineering - Surveying - Consulting - Planning

DETAILS
CASCADES
WILLIAM LYON HOMES
CITY OF LAS VEGAS, NEVADA

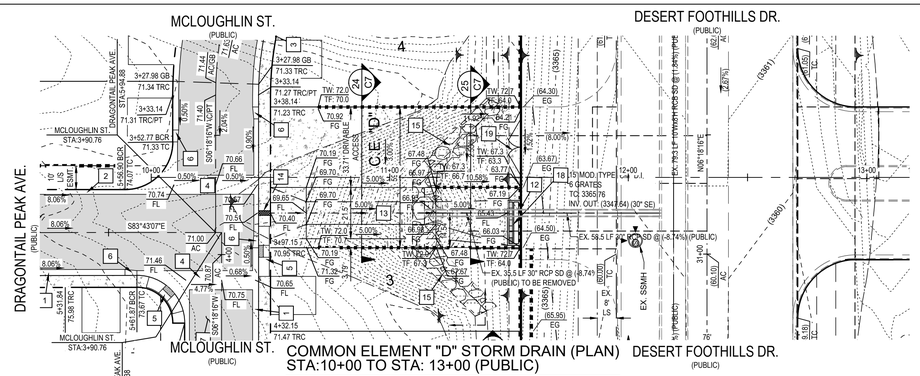
| BY | DESCRIPTION | DATE |
|---|---|---|
| A | | |

DARRYL C. LATTIMORE
EXP: 12/31/19
CIVIL
PROFESSIONAL ENGINEER STATE OF NEVADA
No. 17516
7/16/2019

| | |
|---|---|
| DATE | 07/14/2019 |
| DRAWN | RLS |
| DESIGNED | RLS |
| CHECKED | DCL |
| PROJECT # | WLH011901 |

SHEET TITLE
DETAILS
SHEET NUMBER
C7
N/A
SHEET 7 OF 8

Plot Stamp: 7/16/2019 2:03:35 PM - Ryan Sicrer
File: P:\WLH011901 - V21 Parcel L\Civil_CD\WLH011901-CD-DTLS.dwg, Tab: C7 - Details


MCLOUGHLIN ST.
(PUBLIC)
DESERT FOOTHILLS DR.
(PUBLIC)
DRAGONTAIL PEAK AVE.
(PUBLIC)
MCLOUGHLIN ST.
STA:3+90.76
DRAGONTAIL PEAK AVE.
STA:5+97.38
3+27.98 GB
71.34 TRC
3+33.14
71.27 TRC/PT
3+38.14'
71.23 TRC
3+33.14
71.31 TRC/PT
3+52.77 BCR
71.33 TC
74.07 TRC
70.92
FG
70.66
FL
0.00%
70.74
FL
70.54
FL
70.40
FL
71.00
AC
71.46
FL
70.75
FL
71.44
AC/GB
71.40
FL
70.19
FG
69.70
FG
69.65
FL
70.19
FG
71.39
FG
70.65
FL
4+32.15
71.47 TRC
3+97.15
70.95 TRC
4+31.84
75.58 TRC
5+46.87 BCR
73.67 TC
5+67.87 BCR
74.07 TC
S83°43'07"E
S88°18'16"W
S88°18'16"W
8.06%
8.06%
8.06%
4.00%
2.65%
4.50%
0.50%
5.00%
5.00%
5.00%
5.00%
0.68%
10+00
11+00
12+00
13+00
TW: 72.0
TF: 70.5
TW: 72.0
TF: 70.5
TW: 72.0
TF: 70.5
TW: 72.0
TF: 70.5
TW: 72.7
TF: 64.0
TW: 67.3
TF: 66.7
TW: 67.3
TF: 63.1
TW: 72.7
TF: 64.0
TW: 67.3
TF: 63.77
TW: 72.7
TF: 64.0
TW: 67.48
TF: 67.48
TW: 67.48
TF: 67.48
(64.30)
EG
(63.67)
EG
(64.43)
FL
(64.50)
EG
(65.95)
EG
(8.00%)
(2.82%)
(3.00%)
(3.00%)
(3.00