Stanley Okey Amadi, P.E., CFM

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Date: 2022.02.17 17:53:32-05'00'

TECHNICAL DRAINAGE STUDY

Parcel 3 at Sunstone Phase 3

FEBRUARY 2022

PREPARED FOR:

Shea Homes Limited Partnership

City of Las Vegas, Nevada

PREPARED BY:

Westwood

Westwood

Parcel 3 at Sunstone Phase 3

Technical Drainage Study

City of Las Vegas, NV

Prepared For:

Shea Homes Limited Partnership
4182 Solace Street
Las Vegas, NV 89135
Phone: (702) 265-9366

Prepared By:

Westwood Professional Services
5725 W. Badura Avenue, Suite 100
Las Vegas, NV 89118
Phone: (702) 284-5300
Fax: (702) 284-5339

02/17/22

Project Number: SHE1901.003
Date: February 2022

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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Parcel 3 at Sunstone Phase 3 Date: Februry 2022

Location of Development: a) Descriptive (Cross Streets): North/South: Sky Pointe Drive

East/West: Log Cabin Way

b) Section: 06 Township: 19 S Range: 60 E

c) APN: APN: 125-06-211-016

Name of Owner: Northland, LLC/Shea Homes Limited Partnership

Telephone No.: (702) 265-9366 Fax No.: E-mail Address: Jeremy.Fritz@sheahomes.com

Address: 4182 Solace Street Las Vegas NV 89135

Contact Person – Name: Stanley Okey Amadi, P.E., CFM Telephone No.: (702) 284-5300

*E-mail Address: stanley.amadi@westwoodps.com Fax No.: (702) 284-5399

Firm: Westwood PS

Address: 5725 W. Badura Ave Las Vegas NV 89118, Suite 100

Type of Land Development/Land Disturbance Process:

☐	Rezoning	☐	Subdivison 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: +/- 166 AC Being Developed/Disturbed: +/- 27 AC

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

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

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

5. Approximate upstream land area which drains to the subject site: 31 +/- acres

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

Kyle Canyon MDS, DS5081 MDS Sunstone (aka Update #5 to Skye Canyon Master), Moccasin and Hualapai US95, DS5135 Sunstone Ph1 Infra, TDS for Sunstone Brightstone Trail, Sunstone Ph1 Mass Grade, DS5248 (Under Review), Parcel 3 at Sunstone Phase 1 & Model Phase (DS5261) Parcel 3 at Sunstone Ph2 (DS5426)

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Easterly toward existing stub provided by Ph1 that route flows north and south.

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

02/17/22

Engineer's Seal

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

*Newly Required Field

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

Local Entity File No.

Revision	Date

REFERENCE: STANDARD FORM 1

Updated 05/01/2008

CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA
STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 5/18/11)

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

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

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

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

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

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

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

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

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

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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Parcel 3 at Sunstone Phase 3	Map ID:
Firm Name: Westwood PS	Engineer: Stanley Okey Amadi, P.E., CFM
Address: 5725 W. Badura Ave	
City: Las Vegas	State: NV Zip: 89118, Suite 100
Phone Number: (702) 284-5300	Fax Number: (702) 284-5399
Property Owner: Northland, LLC/Shea Homes Limited Partnership	
Address: 4182 Solace Street	
City: Las Vegas	State: NV Zip: 89135

Reviewed By:	Date Received:	Date Accepted for Review:

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

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

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

I. GENERAL REQUIREMENT

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.
-	-	Cross-sectional detail for channels, including cutoff wall locations.
X	-	Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations.
X	-	Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
-	N/A	Location and detail of existing, proposed, and future block wall openings. Minimum size is 16" x 48". Wrought iron gate is required for flows > 10 cfs.
X	-	Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.
X	-	Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood walls with 8-inch concrete masonry unit.
X	-	Building and/or lot numbers.
X	-	Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
-	N/A	Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information.

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
-	N/A	For areas in Zone A, AE, AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE.
-	N/A	Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from the Q_{100} flows.
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.
-	N/A	Input and output information for existing conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
-	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.
-	N/A	Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
X	-	Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.
X	-	Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, whichever is greater.
-	N/A	A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. • Field survey data. • Input and output information. • Plotted cross-sections based on survey with proper encroachments. • A map showing the location of the cross-sections. • Analysis of both sub and super-critical flow segments. • A summary table and a discussion of the results in the text of the report.
X	-	Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
X	-	Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.
X	-	The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.
-	N/A	Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:	**STANDARD FORM 2**

Westwood

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Appendix E **Reference Material**
Technical Drainage Study for Parcel 3 at Sunstone Phase 2
- Approval Letters
- Referenced Drainage Exhibits
- Referenced Hydrology
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Appendix F **Reference Material**
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- Approval Letters
- Referenced Drainage Exhibits
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Appendix G **Reference Material**
Technical Drainage Study for Sunstone Phase 1 Infrastructure
- Approval Letter
- Referenced Drainage Exhibits

Appendix H **Zoning & Planning Conditions**

Appendix I **Improvement Plans**

1.0 Introduction

1.1 Project Overview

Shea Homes Limited Partnership is proposing to develop approximately 26.61 ± acres, being the Phase 3 portion of Parcel 3 into a residential subdivision, located within the Sunstone master planned community in the City of Las Vegas, Nevada. The Parcel 3 site is located north Log Cabin Way and west of Sun Village Park Drive (formally Sky Pointe Drive). The project site is identified as *Parcel 3 at Sunstone Phase 3* (hereinafter referred to as the project site or Phase 3). The proposed improvements include single-family lots as well as interior roadways comprising of 36.0-ft private rights-of-way, utilities, and drainage facilities. The improvements will also include sanitary sewer line and associated maintenance access to be installed within downstream area for future development. The sanitary sewer lines will provide service to the subject Phase 3 and have therefore, been incorporated in the design.

1.2 Study Purpose

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

1.3 Site Description

The project site is located within APN 125-06-211-016 and is bound by Parcel 3 at Sunstone Phases 2 and 2b to the west, undeveloped land for the future Phase 4 to the east, and Phase 1 to the south. The current condition of the project site is undeveloped desert terrain with sparse desert shrub typical of southern Nevada.

A total of 140 single-family residential lots are proposed, ranging in size from a minimum of 4715 square feet to a maximum of 9,394 square feet with an overall density of 5.26 dwelling units per acre.

A location map identified as Exhibit A has been included in Appendix A for reference.

The Tentative Map (TM) for the project site (TMP-21-0524) has been approved. A copy of the planning and zoning conditions for project site is included in Appendix H.

1.4 FEMA Flood Zone Designation

The project site boundary has been delineated on the current FEMA FIRM Panel Map 32003C1750E, dated September 27, 2002. Per the FIRM Panel, the project site is located within a FEMA designated Zone 'X' (unshaded). Zone 'X' (unshaded) is described by FEMA as *areas determined to be outside of the 0.2% annual chance floodplain.* Exhibit B, identifying the project site on the FEMA FIRM Map, has been included in Appendix A for reference.

1.5 CCRFCD Facility Information

The project site has been delineated on the current 2018 Clark County Regional Flood Control District (CCRFCD) Las Vegas Valley Flood Control Master Plan Update (2018 MPU, Reference 1) Facility Figures as Exhibit C1, included in Appendix A. Per the 2018 MPU, CCRFCD Facilities Moccasin - (LVMO 0184) and MOLC (0072) are located along Moccasin Road and Log Cabin Way adjacent to the overall Sunstone site. The Phase 3 project site is not adjacent to nor traversed by the mentioned CCRFCD facilities; however, the runoff generated by the project site discharges

into the facility through the existing storm drain stubs on the western portion of Sun Park drive. The MPU Facility Inventory Table (Exhibit C2) is also included in Appendix A.

1.6 CCRFCD Watershed Information

Figure W-2B from the 2018 MPU shows that the project site is in subbasin NW64 and drains east and north. Exhibit C3, identifying the project site on the 2018 MPU hydrologic figure, has been included in Appendix A for reference.

1.7 Referenced Documents

This study was prepared in coordination with various relevant documents, studies and improvement plans previously reviewed and approved by the City of Las Vegas. The following drainage studies and improvement plans were utilized in the preparation of this study. These approved studies have been reviewed and are considered acceptable for reference with exceptions noted in this report. Westwood Professional Services concurs with the referenced data from the studies.

- *Technical Drainage Study for Sunstone Phase 2,* (hereinafter referred to as the Phase 2 Study) prepared by Westwood Professional Services was approved on May 11, 2021. This study addresses the Phase 2 residential development and future drainage pattern of the Phase 2B project site that is assumed to be constructed before the project site. The ultimate condition has been referenced for discharge of the storm drain infrastructure towards the project site. The ultimate condition will be identical for the project site. For the Phase 2 information refer to the reference material in Appendix E. Note that the ultimate condition hydrologic analysis of the entire Sunstone was addressed in the Master Drainage Study. The referenced hydrologic data from the Master Study is also included in Appendix E with other references from the Phase 2 Study.

- *Technical Drainage Study for Sunstone Phase 2B,* (hereinafter referred to as the Phase 2B Study) prepared by Westwood Professional Services was approved on November 9, 2021. This study addresses the Phase 2b residential development and established future drainage patterns of the Phase 2B project site draining towards the project site. Phase 2b is assumed to be constructed before the project site. Thus, the proposed condition of Phase 2b is being used as the existing condition for the project site. The existing condition considers both Phases 2 and 2B to be fully developed. Refer to the reference material in Appendix F.

- *Technical Drainage Study for Sunstone Phase 1 Infrastructure,* (hereinafter referred to as the Infrastructure Study) prepared by Slater Hanifan Group was approved by the City of Las Vegas on September 9, 2019. This study addressed the storm drain infrastructure that conveys flows through the Sunstone development and provided stubs for future storm drain tie-ins. Refer to the reference material in Appendix G.

2.0 Methodology

2.1 Compliance

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

2.2 Hydrologic Modeling

Modeling: The SCS Unit Hydrograph Method (SCS Method) was utilized to determine peak flow rates. The SCS Method utilizes precipitation, drainage area, curve number and lag time parameters to determine peak flow rates. The SCS Method routine within the U.S. Army Corp of Engineers HEC-1 Flood Hydrograph Package program was utilized to model the drainage basins analyzed by this study. Hydrologic models utilized in the analysis of the site have been adopted from the referenced studies.

100-year and 10-year Precipitation: The project site is located inside of the McCarran Airport Rainfall Area. The precipitation values utilized in the referenced HEC-1 models, per CCRFCD Manual Table 505, are 1.58 and 2.77 inches for the 6-hour, 10-year and 100-year storm events, respectively. Referenced tables and figures from the CCRFCD Manual are included in the appendix for the reference studies.

Storm Distribution: Since the drainage area of the contributing watershed is less than 8 square miles, the SDN 3 design storm distribution as taken from Table 503 in the CCRFCD Manual is used. Referenced tables and figures from the CCRFCD Manual are included in the appendix for the reference studies.

Curve Number: The SCS curve number loss rate methodology has been utilized to approximate infiltration for the drainage basins. The soils information for the site has been obtained from the NRCS Web Soil Survey of the Las Vegas Valley Area (hereinafter referred to as the Soil Survey, Reference 3). Exhibit D, included in Appendix A, depicts the project site on a soils map. Per the Soil Survey, the basins delineated for this study lie within the following soil types and associated hydrologic soil group (HSG) for each soil type:

- S Soil Type 314 (Weiser-Wechech association); 80% HSG 'A' and 5% HSG 'B', 15% HSG 'D'

The curve numbers utilized for the basins analyzed in the referenced studies were determined as follows:

- **6 – High Density Residential (4-8 units/acre):** utilized according to existing and proposed density within the range of 4 to 8 units per acre.

Lag Time: The lag time is defined as the time measured from the center of mass of excess rainfall to the time to peak of the outflow hydrograph. The lag time is related to the time of concentration as 0.6 times the time of concentration. The time of concentration is defined as the time required for runoff to flow from the hydraulically most distant point of a basin to the outlet point of the basin. Standard Form 4, as outlined in the CCRFCD Manual, was utilized to determine the lag

times for basins modeled. All the hydrologic computations utilized in this study have been referenced from the pertinent prior approved studies identified in Section 1.7 above.

Storm Centering: The contributing watershed consists of one or more detention basins. Consequently, storm centering is utilized to evaluate "worst-case" hydrologic scenario to determine peak flow rates for drainage facilities. The 2018 MPU identifies three types of storm centering and are defined as follows:

- Storm centering Type A: All detention basins within the watershed are discharging.
- Storm centering Type B: None of the detention basins within the watershed are discharging.
- Storm centering Type C: Some detention basins are discharging while others are not.

Note, per the 2018 MPU the maximum storm centering is approximately 200 square miles.

2.3 Hydraulic Modeling

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

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

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

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

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

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

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

Storm Drain Laterals: A lateral loss computation spreadsheet has been provided for the proposed single-reach laterals. If laterals are not under pressure, the HGL is shown at the top of pipe at the upstream end.

Drainage Easements: Drainage easements conveying surface flows and/or emergency overflows have been analyzed utilizing the FlowMaster Connect Edition Update 3 by Bentley Systems. A submerged weir computation is provided at the upstream end of the drainage easement and a normal depth computation is provided through the drainage easement. Drainage easement design are in conformance with criteria in Section 303.10 and 1600 of the CCRFCD Manual.

The finished floor elevations (FFE) of lots immediately adjacent to the drainage easement are compared to the drainage easement water surface elevation. The FFE of the lots immediately adjacent to the drainage easements designed to convey surface flows are required to be elevated a minimum of 18-inch above the weir or normal depth WSE of the drainage easement, whichever is greater.

Ditches and Swales: The hydraulic computations for recommended ditches and swales (not within a drainage easement) have been performed utilizing the FlowMaster Connect Edition Update 3 by Bentley Systems.

3.0 Existing Drainage Condition

3.1 Definition of Existing Condition

The existing condition considers the improvements by Sunstone Phase 1 drainage and roadway infrastructure, Brightstone Trail, and Sunstone Parcel 3 Phase 1, 2 and 2B as in place and functioning. The existing condition is equivalent to the proposed condition of the Phases 2 & 2B Study with regard to the storm drain stubs and roadway improvements being in place and functioning. Refer to Appendix F for the reference material from the Phase 2B Study.

3.2 Discussion of Existing Condition

The Phase 2b Study addresses the project site's upstream boundary conditions and proposed drainage pattern. The Phase 2b proposed drainage condition has been referenced as the project site's existing drainage condition. Please Refer to Exhibit E, included in Appendix F, for a detailed illustration of the existing condition drainage patterns upstream of the project site.

4.0 Proposed Drainage Condition

4.1 Definition of Proposed Condition

The proposed drainage condition considers the offsite watershed as fully developed as defined for the existing condition. The onsite watershed is developed with the planned residential subdivision and undeveloped east of the project site.

4.2 Discussion of Proposed Condition

Refer to Exhibit E, included in Appendix A, for a detailed illustration of the proposed condition drainage patterns.

The hydrologic analyses for the developed project site have been referenced from the Phase 2 and 2b. Note that the entire Parcel 3 at Sunstone site was analyzed as basins EAA1 thru EAA4, and the Phase 3 portion of the site lies within basin EAA1, EAA2, and EAA3. All subbasin prorates have been referenced from the Phase 2A Study to ensure that drainage patterns were kept similar to those previously approved. Subbasins EAA1*(2g thru 2j), EAA2*(2d thru 2g) and EAA3*(e) were prorated from the referenced parent basin for the purpose of determining specific flows utilized in the hydraulic analyses of street sections and design of conveyance facilities relevant to the site. Note that subbasin EAA3*(2d) has been updated from the previous Phase 2 study to better reflect the lots and street alignment of Phase 3.

4.3 Summary of Proposed Condition Flows

A summary of the proposed condition flow rates, as determined by the referenced HEC-1 models as well as the prorated subbasins are presented in summary tables on Exhibit E in Appendix A.

5.0 Ultimate Drainage Condition

5.1 Definition of Ultimate Condition

The ultimate condition considers the offsite and onsite watershed fully developed which is the same condition of the hydrology adopted from the reference studies.

5.2 Discussion of Ultimate Condition

The ultimate condition of the project site will be identical to ultimate condition of Phase 2 and therefore additional computations have not been provided for the ultimate drainage condition. A referenced exhibit has been provided for the project site's ultimate drainage condition to illustrate anticipated storm drain connections to match established drainage patterns. Refer to Exhibit F included in Appendix F, for a detailed illustration of the ultimate condition drainage patterns and flow rates.

6.0 Street Improvements & Hydraulics

A summary table of the street flow hydraulic computations for the interior roadways has been provided on Exhibit E, in Appendix A. Three hydraulic sections (3-1, 3-2 & 3-3) have been utilized to analyze the streets within Phase 3. All the sections have been determined to convey the most cumulative flows within their respective portions of the site and represent the most conservative flow depth for the design. However, an additional perimeter street section (2-7) is also analyzed along Sandlot Lane at the southeast corner of the site. Section 2-7 indicates a slightly higher flow depth than the interior street sections (3-1 & 3-2); therefore, the flow depth was utilized for the finished floor analysis of the proposed lots. Output files of the street calculations are provided in Appendix C. All the sections have been determined to meet the 100-year and 10-year criteria stated in Section 2.3 per the HCDDM.

7.0 Drainage Facilities

Six drop inlets and two main storm drain systems have been proposed to intercept and convey runoff generated by the project site to maintain the ultimate master planned drainage pattern towards the existing receiving facilities in Sun Park Drive. The storm drain facilities are described in detail below:

Phase 3 (PH3) Mainline: The proposed Phase 3 Mainline storm drain system is analyzed as PH3.WSW and begins with a set of existing drop inlets, facilities PC2-5 and PC2-6 from the Phase 2 development. The system continues east into the project site connecting to the proposed SDMH1 and then continues north along Redwood Desert Drive. Further north on Redwood Desert Drive a lateral from Phase 2b (facilities PC2-e and PC2-f) connects to the PH3 Mainline at proposed SDMH7 and the proposed SDDI#1 also connects to the PH3 mainline at SDMH7. The storm drain then turn east at Sangria Sunrise Avenue and intercepts the flows from SDDI#2, #3 and #4. Note that a lateral storm drain system (DI2.WSW) is proposed to convey flows from SDDI#2, connecting to the back of SDDI#3 to discharge into the PH3 mainline. Due to the proposed sanitary sewer access in the alignment of Sangria Sunrise Avenue, a temporary outlet pipe segment is connected to the PH3 mainline with a concrete collar to ensure that the system adequately daylights pending future development of the downstream phases. Note that the WSPGW storm drain hydraulic analysis for the PH3 mainline includes the temporary outlet pipe segment in order to access the outlet velocity into the daylight swale. The temporary concrete collar connection is analyzed as manhole to capture any associated losses at the bend. The outlet velocity from the storm drain is slightly above 15 fps; however, grouted riprap is proposed for erosion protection at the storm drain outlet. It should be noted that the proposed grouted riprap within the outfall channel is temporary and will be maintained/removed upon development of the future phases of the Parcel 3 at Sunstone project.

The lateral for SDDI#2 is also analyzed with WSPGW and extends thru SDDI#3 to connect to the PH3 mainline system at SDMH9.

Phase 3 South (PH3s) Mainline: The second mainline storm drain facility analyzed as PH3s.WSW is located near the south end of Venetian Brick Place at the southeast corner of the Phase 3 site. The storm drain system comprises of two proposed drop inlets, SDDI#5 & #6 with an 18" and 24" RCP connecting storm drain segments that daylights east to a proposed interim outfall swale. Although CCRFCD recommends on-grade inlets to be a maximum of 20.0-ft, the proposed SDDI#5 & #6 are both sized to be 22.5-ft Type CM2 in order to capture all the flows along Venetian. This was necessary to maintain the master planned drainage patterns and to avoid any bypass flows that could impact the Model Phase. Another temporary outlet pipe segment will also be connected to the mainline with a concrete collar to daylight into the proposed swale pending future development of the downstream phases. Grouted riprap is also proposed at the storm drain system outlet for erosion protection. The riprap is also temporary and will be maintained/removed upon development of the future phases of the Parcel 3 at Sunstone project.

Phase 2b (PH2B) Storm Drain: It is noted that the Phase 2b storm drain model (PH2B) was reanalyzed (PH2B.wsw) to show that the storm drain connection does not cause any backwater to the existing inlet facilities. Note that the HGL has increased still maintains a minimum of 1.0-ft below rim and finished grade elevations and the flow velocity does not exceed 25fps. The resulting storm drain designs for the two mainline and lateral indicate that the HGLs will maintain a minimum of 1-ft below the manhole rims and finished grades and the velocities do not exceed 25 fps per the HCDDM. Note that the recommended storm drain facilities have been designed to accommodate the proposed and ultimate condition worst-case flow rates.

It is worthy to mention that due to the required maintenance access over the proposed sanitary sewer, the sump inlet for the existing lateral (NCR1) to the south Sun Park Drive storm drain has been regraded. A temporary pipe segment and concrete collar have been provided to direct flows from the new sump location to the system. No revision to the lateral storm drain hydraulics is

considered necessary; however, an inlet control nomograph for NCR1 has been provided in Appendix C to demonstrate the regraded sump still provides adequate head to capture the impacting flows. Refer to Exhibit E, provided in Appendix A, for an illustration of the facility locations and a summary table of the facilities.

8.0 Earthen Swales & Ditches

Several swales and ditches have been designed with this project and have been analyzed with the FlowMaster to estimate normal depths of flow and flow velocities. Swale Section D1 analyzes the interim ditch at the outlet of PH3 Mainline system. Section D2 is used to analyze the swale along the eastern boundary of the site within Common Element 'B' (CE 'B') adjacent to the future development. Section D3 is also analyzed for a minor swale graded between pads within the adjacent future development area and is provided to verify that the flow velocity is not erosive. Section D4 analyzes the interim ditch at the outlet of PH3s Mainline system. Additional Sections D5 & D6 were also provided to analyze portion of the proposed sanitary sewer maintenance access that will convey flows. The 100-year flow utilized for Section D5 is assumed to be approximately 12 cfs estimated as one-fourth (0.25*46 cfs) of the flow from subbasin EAA2(h). All the swale and ditch computations indicate that the flow depths are contained, and the flow velocities are non-erosive. A summary table of the swale computations have been provided on Exhibit E included in Appendix A.

9.0 Emergency Overflow

Emergency overflow sections have been analyzed to ensure that the proposed finished floor elevations will be adequately flood protected. Sections EO1 and EO2 analyzes the emergency overflows that will impact the Phase 3 site should the existing sump inlets within the adjacent Phases 2b & 2 become completely clogged. Street section 3-2 was also analyzed for the emergency overflow condition since the Phase 2b flows in the emergency will convey north and east along Redwood Desert Drive and Sangria Sunrise Avenue respectively. Note that the Phase 2 flows will convey south on Redwood Desert Drive and continue east on Sandlot Lane. Thus, emergency overflow calculation is also provided for Section 2-7 and utilized to verify that the pertinent finished floors will be flood protected. The calculations have been provided in Appendix C and a summary table is provided on Exhibit E.

10.0 Finished Floor Elevations

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

The design for the site has not proposed any drainage easements to convey surface flows; however, lots adjacent to drainage easements have been assessed for emergency overflow impacts where with the drainage easement's weir and normal depths whichever is higher. Lots adjacent to flows turning 90 degrees are assessed with the specific energy of the approaching flows. A spreadsheet showing the finished floor analysis and the supplemental assessments have been included in Appendix D. Where necessary for flood protection, solid grouting of walls have been proposed.

It should also be noted that walls adjacent to lots 457-463, 512-517, and 518-533 have all been solid grouted up to three (3) courses above the adjacent finished grades against the trail and no additional finished floor assessments have been provided for the perimeter Common Element "C" since the trail flows are insignificant.

11.0 Conclusions & Recommendations

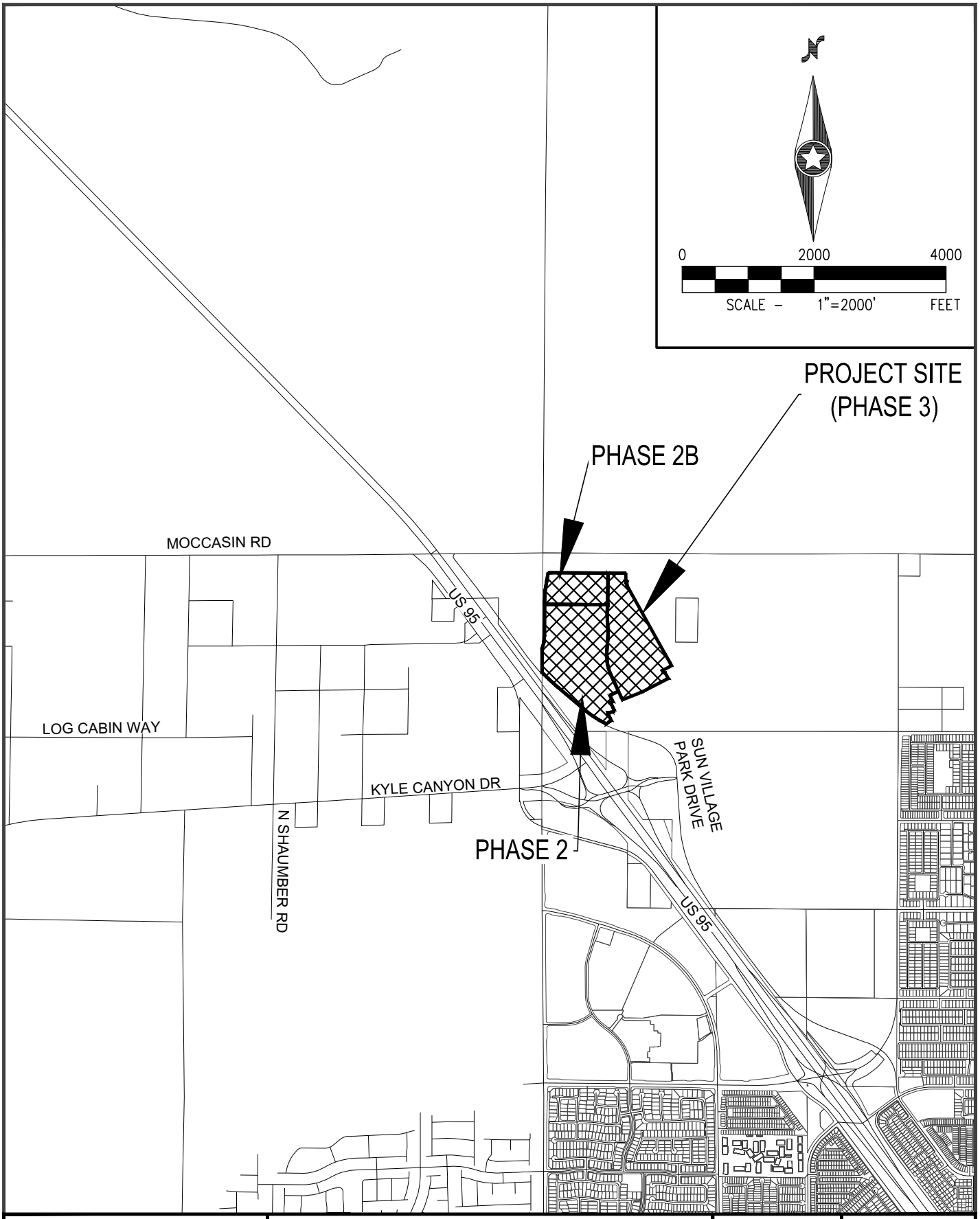
1. This project site is in compliance with the applicable drainage laws as recognized by the state of Nevada and with the CCRFCD Manual.
2. The project site is not located within a FEMA designated Special Flood Hazard Area (SFHA). The project site and the proposed improvements are located within a FEMA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

12.0 References

1. *Las Vegas Valley Flood Control Master Plan Update*. Atkins, 2018.
2. *Hydrologic Criteria and Drainage Design Manual*. Clark County Regional Flood Control District, 1999.
3. *Technical Drainage Study for Parcel 3 at Sunstone Phase 2*. Westwood Professional Services, May 2021.
4. *Technical Drainage Study for Parcel 3 at Sunstone Phase 2b*. Westwood Professional Services, November 2021.
5. *Technical Drainage Study for Sunstone Phase 1 Infrastructure*. Westwood Professional Services, September 2019.

APPENDIX A

Drainage Exhibits



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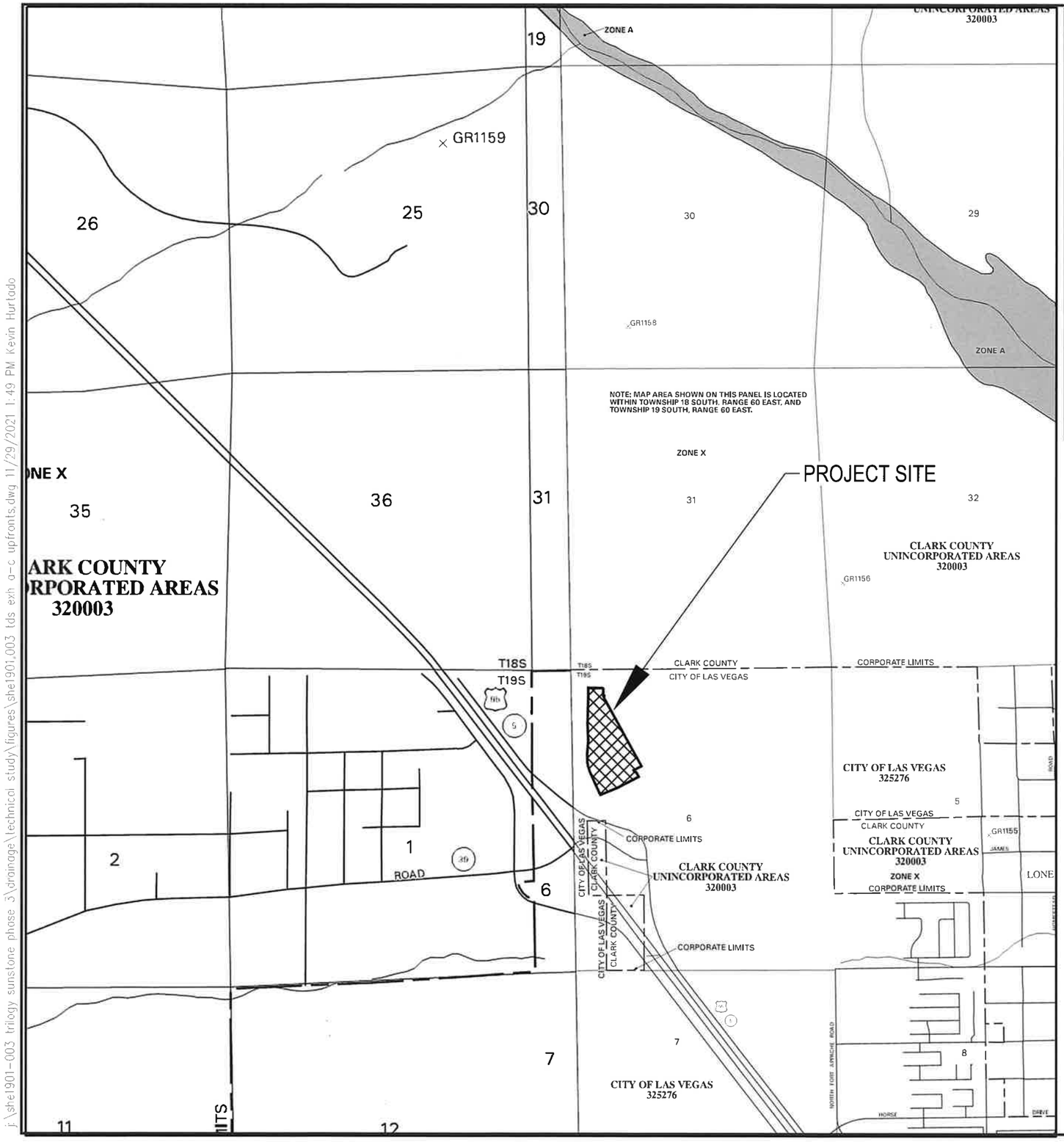
Westwood Professional Services, Inc.

SHLP

PARCEL 3 AT SUNSTONE PHASE 3
LOCATION MAP

DATE: DEC 2021	PROJECT NO. SHE1901.003
DRAFTER: KH	
DESIGNER: KH	EXHIBIT A
CHECKED: SOA	SHEET 1 OF 1



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1750 E

FIRM
FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 1750 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LAS VEGAS, CITY OF	325276	1750	E
CLARK COUNTY	320003	1750	E
UNINCORPORATED AREAS	320003	1750	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
32003C1750 E

MAP REVISED:
SEPTEMBER 27, 2002

Federal Emergency Management Agency

LEGEND

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

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

ZONE A No base flood elevations determined.

ZONE AE Base flood elevations determined.

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

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

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

ZONE A99 Area to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no base flood elevations determined.

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

- Floodplain Boundary
- Floodway Boundary
- Zone D Boundary
- Coastal Barrier Boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- (A)—(A) Cross Section Line
- (23)—(23) Transect Line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4276000M — 1000-meter Universal Transverse Mercator grid values, zone 11
- 600000 FT — 5000-foot grid ticks
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel).
- M1.5 — River Mile

MAP REPOSITORY
Refer to Repository Listing on Index Map

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
AUGUST 16, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
September 27, 2002; to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to delete special flood hazard areas, to change zone designations, to add roads and road names, to incorporate previously issued letters of map revision, to incorporate previously issued letters of map amendment, and to change floodway.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

0 2000 4000

SCALE - 1"=2000' FEET

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Westwood Professional Services, Inc.

NO.	DESCRIPTION	DATE	BY	APP DATE	APP

SHLP

PARCEL 3 AT SUNSTONE PHASE 3
FEMA FIRM PANEL MAP

DATE: DEC 2021
DRAFTER: KH
DESIGNER: KH
CHECKED: SOA
PROJECT NO. SHE1901.003

EXHIBIT B
SHEET 1 OF 1

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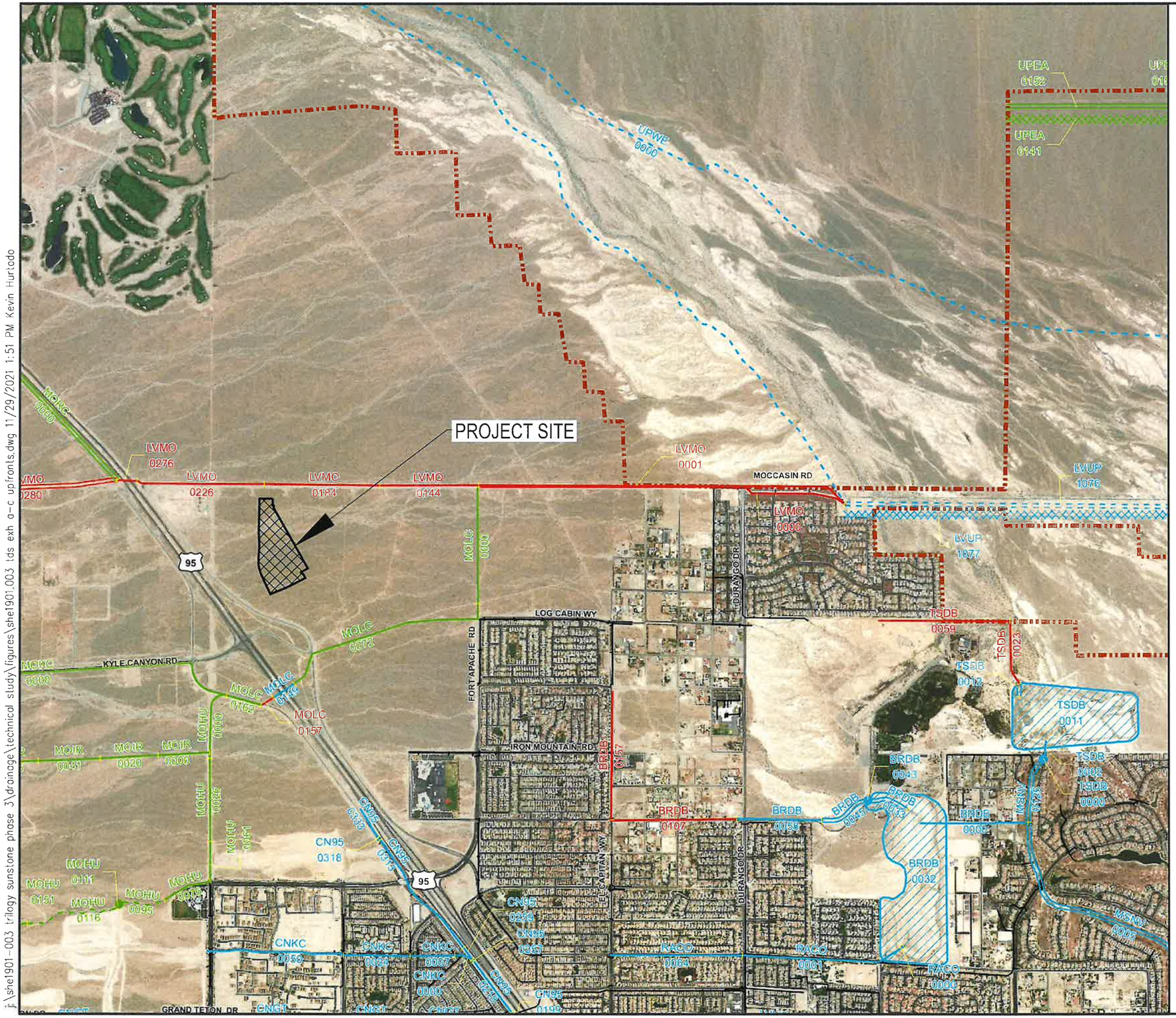

REGIONAL FLOOD CONTROL DISTRICT

2018
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F-6
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

0 2000 4000

SCALE – 1"=2000' FEET

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NO.	DESCRIPTION	DATE	BY	APP DATE	APP

SHLP

PARCEL 3 AT SUNSTONE PHASE 3
2018 CCRFCD MPU FACILITY MAP

DATE:	DEC 2021
DRAFTER:	KH
DESIGNER:	KH
CHECKED:	SOA
PROJECT NO.	SHE1901.003

EXHIBIT C1
SHEET 1 OF 1

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ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
BCHU		**BELTWAY CHANNEL - HUALAPAI**						
0000	E	12' X 5' RCAP	653	205	CBA3-C	WEST3	0.84	1.11
0017	E	8' X 5' RCAP	1218	218	CBA3-C	WEST3	0.84	1.33
0040	E	66" RCP	59	57	DNW26-C	WEST3	0.51	1.04
0042	E	60" RCP	615	57	DNW26-C	WEST3	0.51	1.42
0054	E	54" RCP	615	57	DNW26-C	WEST3	0.51	1.73
BRDB		**BRENT DRAINAGE SYSTEM**						
0000	E	36" RCP WITH 18" ORIFICE PLATE	2170	36	BRDB	WEST3	2.37	0.40
0031	E	45,000 CFS PMF SPILLWAY		45250	DBRDB	WEST3	2.37	
0032	E	450 AC-FT SOUTH ENVIRONMENTAL ENHANCEMENT AREA		1685	DBRDB	WEST3	2.37	
0033	E	ENERGY DISSIPATOR	100	1052	CNW147W	WEST3	1.75	
0043	E	20' X 7' RCBC	125	1052	CNW147W	WEST3	1.75	0.50
0045	E	CONC CHNL 12W 7D 2:1 SS	983	1052	CNW147W	WEST3	1.75	2.00
0058	E	12' X 6' RCB	1686	951	CNW113-C	WEST3	1.47	1.81
0107	P	8' X 6' RCB	2560	951	CNW113-C	WEST3	1.47	2.50
0157	P	12' X 7' RCB	2580	821	CNW56-C	WEST3	0.84	0.25
CN95		**CENTENNIAL PKWY CHANNEL WEST / U.S 95 BRANCH**						
0000	E	20' X 7' RCB	3335	2776	CNWB83-C	WEST3	3.35	2.00
0068	E	20' X 7' RCB	2360	2725	CNW103-C	WEST3	3.04	2.10
0102	E	CONC CHNL 20W 9D 0:1 SS	375	2548	2CNW83-C	WEST3	2.65	1.77
0104	E	2: 12' X 10' RCB	300	2548	2CNW83-C	WEST3	2.65	1.10
0167	E	18' X 8' RCB	3321	2548	2CNW83-C	WEST3	2.65	1.58
0199	E	15' X 9' RCB	427	1467	2CNW72-C	WEST3	1.13	0.41
0218	E	15' X 9' RCB	1227	1467	2CNW72-C	WEST3	1.13	0.82
0257	E	TRANSITION STRUCTURE	59	1467	2CNW72-C	WEST3	1.13	0.77
0259	E	15' X 9' RCB	264	569	CNW74-C	WEST3	0.40	0.77
0313	E	10' X 6' RCB	2580	569	CNW74-C	WEST3	0.40	2.50
0318	E	TRANSITION STRUCTURE	50	569	CNW74-C	WEST3	0.40	1.50
0333	E	5' X 5' RCB	870	259	NW62-S	WEST3	0.18	1.30
CNFR		**CENTENNIAL PKWY CHANNEL WEST / FARM ROAD**						
0000	P	8' X 6' RCB	8350	776	CNW38-C	WEST3	1.05	2.80
CNGT		**CENTENNIAL PKWY CHANNEL WEST / GRAND TETON BRANCH**						
0000	E	10' X 5' RCB	2376	543	CNW74-E	WEST3	0.47	2.56
0020	E	10' X 5' RCB	1570	543	CNW74-E	WEST3	0.47	3.50
0043	E	8' X 6' RCB	2470	543	CNW74-E	WEST3	0.47	3.60
0118	E	8' X 5' RCAP	5472	349	KYLEDET	KYLEDB	58.61	3.72
CNKC		**CENTENNIAL PKWY CHANNEL WEST / KYLE CANYON BRANCH**						
0000	E	12' X 4' RCB	577	954	CNW72-C	WEST3	0.74	4.58
0007	E	10' X 5' RCB	874	954	CNW72-C	WEST3	0.74	3.28
0024	E	8' X 5' RCB	1385	954	CNW72-C	WEST3	0.74	2.10
0050	E	72" RCP	2757	427	NW45-S	WEST3	0.31	3.60
CNWE		**CENTENNIAL PKWY CHANNEL WEST**						
0195	E	CONC CHNL 36W 9D 0:1 SS	1130	3771	CNW3B3-C	WEST3	5.64	0.60
0200	E	CONC CHNL 36W 9D 0:1 SS	1340	3523	CNW2D4-C	WEST3	5.14	1.00
0226	E	2: 16' X 9' RCBC @ RIO VISTA	100	3523	CNW2D4-C	WEST3	5.14	0.51
0241	E	CONC CHNL 36W 9.5D 0:1 SS	405	3325	CNW2D4-C	WEST3	5.14	0.51
0251	E	CONC CHNL 36W 9D 0:1 SS	575	3234	CNW2D3-C	WEST3	4.64	0.51
0271	E	CONC CHNL 32W 10D 0:1 SS	229	3234	CNW2D3-C	WEST3	4.64	0.51
0274	E	32' X 10' RCBC @ TENAYA	142	3234	CNW2D3-C	WEST3	4.64	0.51
0277	E	CONC CHNL 32W 9D 0:1 SS	578	3234	CNW2D3-C	WEST3	4.64	0.64
0297	E	CONC CHNL 32W 8D 0:1 SS	805	2992	CNW2B2-C	WEST3	3.83	1.59
0301	E	2: 15' X 7' RCB	1738	2992	CNW2B2-C	WEST3	3.83	1.30
0334	E	22' X 7' RCB	3410	2992	CNW2B2-C	WEST3	3.83	1.85
0374	E	22' X 7' RCB	703	2822	CNWBD2-N	WEST3	3.45	1.94
EKBU		**ELKHORN SPRINGS AND BUFFALO**						
0000	E	60" RCP	1340	255	NW134-C	WEST3	0.46	0.89
EKDB		**ELKHORN SPRINGS DETENTION BASIN**						
0000	E	GRASS CHNL 15W 5.0D 3.5:1 SS	2375	221	CNW153-C	WEST3	1.41	0.39
0025	E	8' X 3' RCB	160	106	E_KEASIN	WEST3	0.84	0.50
0026	E	48" RCP	1270	106	E_KEASIN	WEST3	0.84	1.23
0049	E	60" RCP	1395	106	E_KEASIN	WEST3	0.84	0.13
0070	E	88 AC-FT ELKHORN SPRINGS DETENTION BASIN		455	CNW133-C	WEST3	0.84	

ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
EKHU		**ELKHORN AND HUALAPAI**						
0000	E	6' X 4' RCAP	980	393	CNW26-C	WEST3	0.51	3.61
0020	E	6' X 5' RCAP	150	393	CNW26-C	WEST3	0.51	2.61
0023	E	8' X 5' RCAP	1200	393	CNW26-C	WEST3	0.51	0.50
GOEC		**GOWAN NORTH - EL CAPITAN BRANCH**						
0176	P	78" RCP	1320	190	CCPFR-C	GOW3A	0.46	1.15
GONO		**GOWAN NORTH SYSTEM**						
0511	P	6' X 5' RCB	1320	326	CCPHW-C	GOW3A	0.60	1.14
LVMD		**LAS VEGAS WASH - MIDDLE**						
2507	E	2: 13' X 9' RCB	2831	1809	CNW168-C	CWEST3	4.43	0.36
2525	E	24' X 8' RCB	1140	1558	CNW159-C	CWEST3	3.92	0.40
2550	E	24' X 8' RCB	1445	1312	CD161-C	CWEST3	3.42	0.40
2574	E	24' X 8' RCB	1430	1312	CD161-C	CWEST3	3.42	0.41
2599	E	CONC CHNL 24W 7.5D 2:1 SS	1577	1266	CNW162-C	CWEST3	3.10	0.51
2632	E	18' X 9' RCB	1443	695	CNW138-C	WEST3	1.16	0.47
2661	E	18' X 9' RCB	3003	695	CNW138-C	WEST3	1.16	0.78
2711	E	16' X 9' RCB	2440	560	CNW139-C	WEST3	0.93	2.00
2737	E	9' X 5' RCB	235	560	CNW139-C	WEST3	0.93	2.25
2763	E	9' X 5' RCB	1565	560	CNW139-C	WEST3	0.93	2.41
2789	E	9' X 5' RCB	910	560	CNW139-C	WEST3	0.93	2.00
MOHU		**MOCCASIN-HUALAPAI BRANCH**						
0000	P0	13' X 6' RCB	1476	924	2CNW33-C	LOWER3	2.08	1.60
0026	P0	11' X 6' RCB	1654	590	CNW45-N	LOWER3	1.25	0.50
0061	P0	9' X 6' RCB	779	560	CNW15-N	LOWER3	1.25	0.50
0076	P0	60" RCP	1000	253	CNW45-C	LOWER3	1.03	3.00
0095	P0	NATURAL WASH	855	283	CNW45-C	LOWER3	1.03	3.00
0111	P0	9' X 5' RCBC @ EGAN CREB DR	184	283	CNW45 C	LOWER3	1.03	6.10
0116	P0	NATURAL WASH	1900	283	CNW45-C	LOWER3	1.03	3.00
0134	P0	54" HDPE @ SHALAMAR	488	72	MOD61	LOWER3	0.86	2.00
MOIR		**MOCCASIN - IRON MOUNTAIN BRANCH**						
0000	P0	66" RCP	1060	410	CNW33-C	LOWER3	0.83	4.50
0020	P0	54" RCP	1161	71	MOD82	LOWER3	0.56	3.20
0041	P0	42" RCP	1236	71	MOD82	LOWER3	0.56	5.60
0065	P0	60" RCP	1099	71	MOD82	LOWER3	0.56	0.40
MOKC		**MOCCASIN AND KYLE CANYON**						
0000	P0	9' X 6' RCB	0140	1072	CNW35-C	LOWER3	2.69	3.40
MOLC		**MOCCASIN - LOG CABIN BRANCH**						
0000	P0	20' X 10' RCB	2206	2265	2CNW64	LOWER3	6.06	0.65
0072	P0	12' X 8' RCB	4493	2265	2CNW64	LOWER3	6.06	2.66
0149	E	13' X 8' RCB	520	1817	CNW62-N	LOWER3	4.88	2.00
0157	P	13' X 8' RCB	238	1817	CNW62-N	LOWER3	4.88	1.40
0162	P0	13' X 8' RCB	435	1817	CNW62-N	LOWER3	4.88	1.60
MSNV		**MOUNTAIN SPAVISTA RANCH**						
0000	E	6: 12' X 5' RCBC @ GRAND TETON	273	639	CNW163-C	CWEST3	1.69	0.40
0065	E	GRASS CHNL 100'W 4.5D 10:1 SS	6325	259	CNW155-C	WEST3	4.46	0.40
0125	E	GRASS CHNL 100'W 4.5D 10:1 SS	1300	66	CNW147E	WEST3	1.59	0.40
RACO		**RACEL STREET COLLECTOR**						
0000	E	14" X 7" RCB BAFFLED ENERGY DISSIPATOR	67	424	CNW111S	WEST3	0.55	0.29
0001	E	78" RCP	3245	424	CNW111S	WEST3	0.55	2.46
0064	E	78" RCP	2650	347	CNW111S	WEST3	0.44	2.09
RCBC		**RANCHO ROAD SYSTEM - BELTWAY CHANNEL**						
0000	E	9' X 5' RCB	1062	173	FADB	WEST3	1.54	1.04
0002	E	54" RCP OUTLET WITH 41" ORIFICE	533	173	FADB	WEST3	1.54	2.39
0003	E	2,341 CFS PMF SPILLWAY		2341	FADBIN	WEST3	1.54	
0004	E	76 AC-FT FORT APACHE DETENTION BASIN		658	FADBIN	WEST3	1.54	
0007	E	ENERGY DISSIPATOR	120	658	FADBIN	WEST3	1.54	
0009	E	12' X 9' RCBC @ FORT APACHE DETENTION BASIN	133	658	FADBIN	WEST3	1.54	1.79
0012	E	CONC CHNL 12W 6:7D 0:1 SS	1937	658	FADDIN	WEST3	1.54	3.15
0048	E	12' X 6' RCBC @ GRAND CANYON	140	559	CMNA1	WEST3	1.27	3.15
0051	E	CONC CHNL 12W 6:7D 0:1 SS	2660	559	CMNA1	WEST3	1.27	3.44
0096	E	1: 10' X 6' AND 1: 6' X 6' RCBC @ HUALAPAI WAY	190	559	CMNA1	WEST3	1.27	1.53
0100	E	CONC CHNL 12W 5.5D 2:1 SS	2065	475	CDMNA1	WEST3	0.43	2.88

ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
RCBC		**RANCHO ROAD SYSTEM - BELTWAY CHANNEL**						
0140	E	CONC CHNL 10W 5D 0:1 SS	2155	476	CDMNA1	WEST3	0.43	1.65
RCHB		**RANCHO ROAD SYSTEM - BELTWAY**						
0053	E	2: 12' X 8' RCBC @ SOUTH RAMP CONNECTOR	85	1465	CCW10C-C	WEST3	3.55	1.40
0054	E	CONC CHNL 21W 8D 0:1 SS	432	1465	CCW10C-C	WEST3	3.55	1.61
0062	E	TRANSITION STRUCTURE	130	1465	CCW10C-C	WEST3	3.55	1.51
0065	E	24' X 7' RCB	480	1465	CCW10C-C	WEST3	3.55	0.00
0074	E	24' X 6' RCB	50	1414	CNWBC6-C	WEST3	3.41	0.50
0075	E	20' X 6' RCBC @ BELTWAY	422	1414	CNWBC6-C	WEST3	3.41	2.61
0083	P	20' X 4' RCB	950	1414	CNWBC6-C	WEST3	3.41	2.49
0101	P	CONC CHNL 20W 5D 0:1 SS	580	1414	CNWBC6-C	WEST3	3.41	2.58
0120	E	20' X 6' RCBC @ GRAND MONTECITO	120	1414	CNWBC6-C	WEST3	3.41	1.00
0122	P	CONC CHNL 16'-20W 5D 0:1 SS	350	1414	CNWBC6-C	WEST3	3.41	1.84
0128	P	CONC CHNL 16W 5.5D 0:1 SS	1012	1414	CNWBC6-C	WEST3	3.41	2.67
0149	P	CONC CHNL 16W 5.5 5D 0:1 SS	87	1115	CNWBC3	WEST3	2.69	2.27
0151	P	CONC CHNL 16W 5D 0:1 SS	1256	1115	CNWBC3	WEST3	2.69	2.65
0171	E	16' X 6' RCBC @ EL CAPITAN WAY	234	1115	CNWBC3	WEST3	2.69	1.75
0175	E	CONC CHNL 14W 7D 0:1 SS	1220	1115	CNWBC3	WEST3	2.69	2.53
0198	E	CONC CHNL 14W 7D 0:1 SS	225	748	CNWEA6-C	WEST3	1.88	2.53
0227	E	12' X 6' RCB	995	788	CNWEA6-C	WEST3	1.88	1.73
0250	E	12' X 6' RCB	4020	786	CNWEA6-C	WEST3	1.88	1.12
0275	E	7' X 6' RCB	2650	536	CNW56-C	WEST3	1.04	3.30
0295	P	7' X 6' RCB	2980	431	CNW53-C	WEST3	0.80	3.60
TSDB		**TULE SPRINGS DRAINAGE SYSTEM**						
00C0	E	2: 10' X 4' RCBC @ ECHO GRANDE	100	25	TULEDB	WEST3	1.37	1.64
00C2	E	36" RCP WITH 22" ORIFICE PLATE	300	25	TULEDB	WEST3	1.37	0.53
0010	E	14,013 CFS PMF SPILLWAY		14013	CTULEDB	WEST3	1.37	
0011	E	117 AC-FT NORTH ENVIRONMENTAL ENHANCEMENT AREA		551	CTULEDB	WEST3	1.37	
0012	E	ENERGY DISSIPATOR	260	333	CNW146-C	WEST3	0.59	
0023	P	78" RCP	1320	333	CNW146-C	WEST3	0.59	0.60
0059	P	72" RCP	2640	333	CNW146-C	WEST3	0.59	1.63

ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVMD		**LAS VEGAS WASH - MOCCASIN**						
0000	P	18' X 9' RCB	7322	2437	CNW130-W	LOWER3	5.42	1.50
0021	P	2: 15' X 10' RCB	7530	11466	2CD130-E	SPR_VD3	21.44	2.10
0114	P	2: 15' X 10' RCB	1515	11160	2CD130-E	SPR_VD3	21.44	2.10
0184	P	2: 15' X 10' RCB	2443	11466	2CD130-E	SPR_VD3	21.44	2.10
0226	P	2: 15' X 10' RCB	2593	11160	2CD130-E	SPR_VD3	21.44	2.10
0276	P	BRIDGE 30W 5.5D 0:1 SS	401	11160	2CD130-E	SPR_VD3	21.44	2.10
0299	P	CONC CHNL 30W 5.5D 0:1 SS	3082	11661	CNW62-C	SPR_VD3	21.71	2.86
LVUP		**UPPER LAS VEGAS WASH**						
0078	E	FLOODWAY	7000	14588	ULWN	LOWER6	229.64	3.24
0078	E	LVWASH CHNL 150W 8.5D 3:1 SS	8000	15544	2CW16-7	LOWER6	196.05	3.80
0077	E	SOIL CEMENT LEVEE 8.5' WITH 3CY/LF CHNL	8000	15544	2CW16-7	LOWER6	196.05	3.82
MOLC		**MOCCASIN - LOG CABIN BRANCH**						
0000	P0	20' X 10' RCB	2206	2265	2CNW64	LOWER3	6.06	0.65
0072	P0	12' X 8' RCB	4493	2265	2CNW64	LOWER3	6.06	2.66
MORC		**RANCHO MOCCASIN**						
0000	P0	CONCRETE CHNL 30W 10D 0:1 SS	3763	11687	CDMNA1	SPR_VD3	33.09	3.20
TSDB		**TULE SPRINGS DRAINAGE SYSTEM**						
0023	P	78" RCP	1320	333	CNW146-C	WEST3	0.59	0.60
0059	P	72" RCP	2640	333	CNW146-C	WEST3	0.59	1.63
UPEA		**UPPER LAS VEGAS WASH - EAST**						
0100	P0	TRANSITION STRUCTURE	316	4121	CT25B-E	SHEEP1	10.82	3.25
0125	P0	CONCRETE CHNL 60W 14.5D 0:1 SS	767	4121	CT25B-E	SHEEP1	10.82	3.25
0126	P0	LVWASH LEVEE E	767	4121	CT25B-E	SHEEP1	10.82	2.47
0126	P0	CONCRETE CHNL 60W 12.5D 0:1 SS	3018	4121	CT25B-E	SHEEP1	10.82	3.01
0127	P0	LVWASH LEVEE E	2627	4121	CT25B-E	SHEEP1	10.82	3.38
0140	P0	LVWASH LEVEE E	7264	4121	CT25B-E	SHEEP1	10.82	3.20
0141	P0	LVWASH LEVEE E	4967	4121	CT25B-E	SHEEP1	10.82	3.50
0151	P0	SOIL CEMENT CHNL 50'W 8'D 4:1 SS	463	4121	CT25B-E	SHEEP1	10.82	2.54
0152	P0	SOIL CEMENT CHNL 50W 8.5D 4:1 SS	4252	4121	CT25B-E	SHEEP1	10.82	3.00
0159	P0	SOIL CEMENT CHNL 50W 8.5D 4:1 SS	5615	4121	CT25B-E	SHEEP1	10.82	3.24
UPWE		**UPPER LAS VEGAS WASH - WEST**						
0000	P	FLOODWAY	30018	11642	2CW16-7	LOWER6	196.05	1.30

**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-11

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

ATKINS
Member of the SNC-Lavalin Group
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NO.	DESCRIPTION	DATE	BY	APP DATE	APP

SHLP

PARCEL 3 AT SUNSTONE PHASE 3
2018 CCRFCD MPU FACILITY SUMMARY TABLE

DATE: DEC 2021
DRAFTER: KH
DESIGNER: KH
CHECKED: SOA
PROJECT NO. SHE1901.003

EXHIBIT C2
SHEET 1 OF 1

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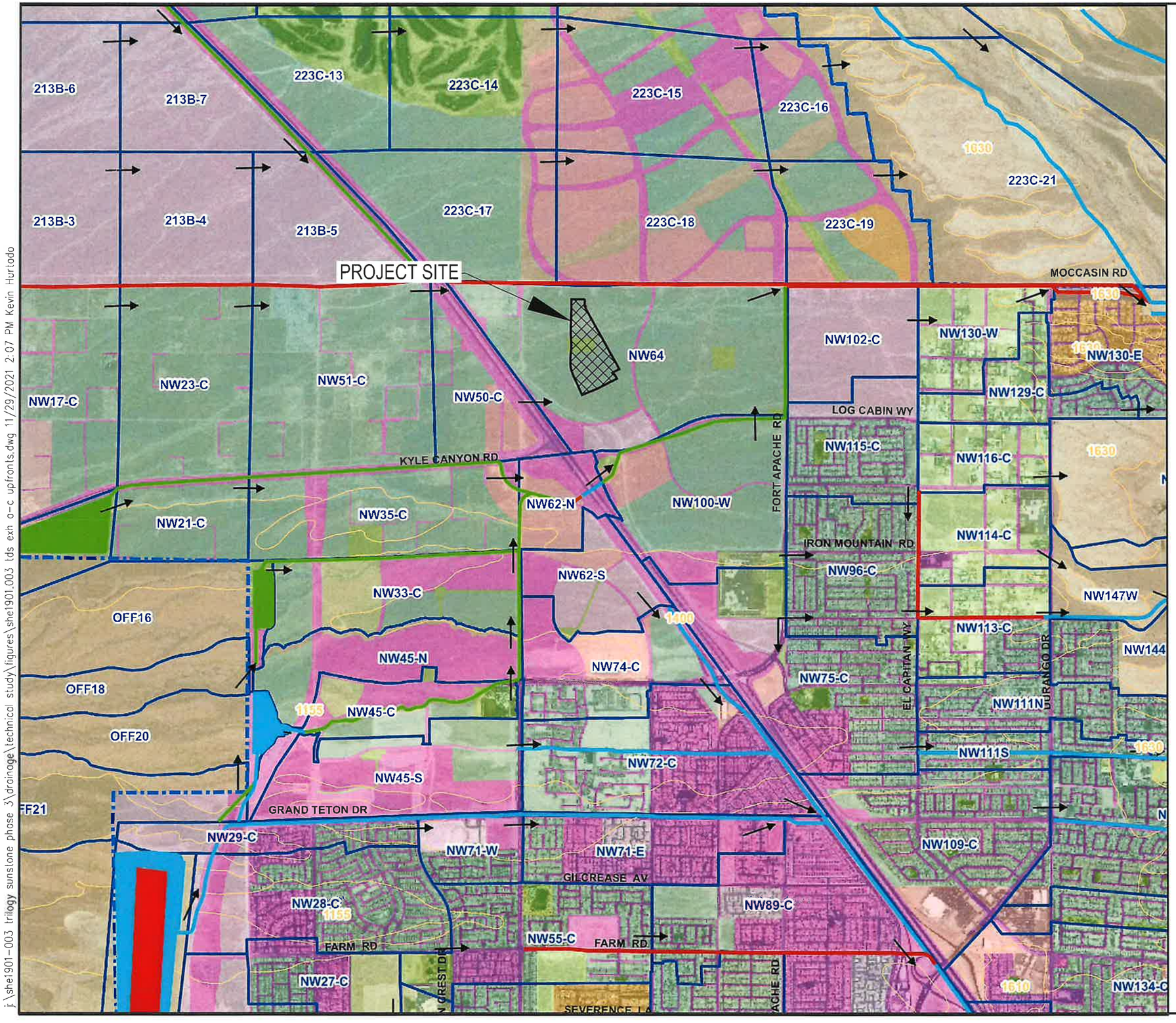

REGIONAL FLOOD CONTROL DISTRICT

2018 Las Vegas Valley Master Plan Update

Figure W-2B
Upper Northern Las Vegas Wash Watershed

Legend

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

0 2000 4000
SCALE – 1"=2000' FEET

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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

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PARCEL 3 AT SUNSTONE PHASE 3
2018 CCRFCD MPU WATERSHED MAP

DATE: DEC 2021
DRAFTER: KH
DESIGNER: KH
CHECKED: SOA
PROJECT NO. SHE1901.003

EXHIBIT C3
SHEET 1 OF 1

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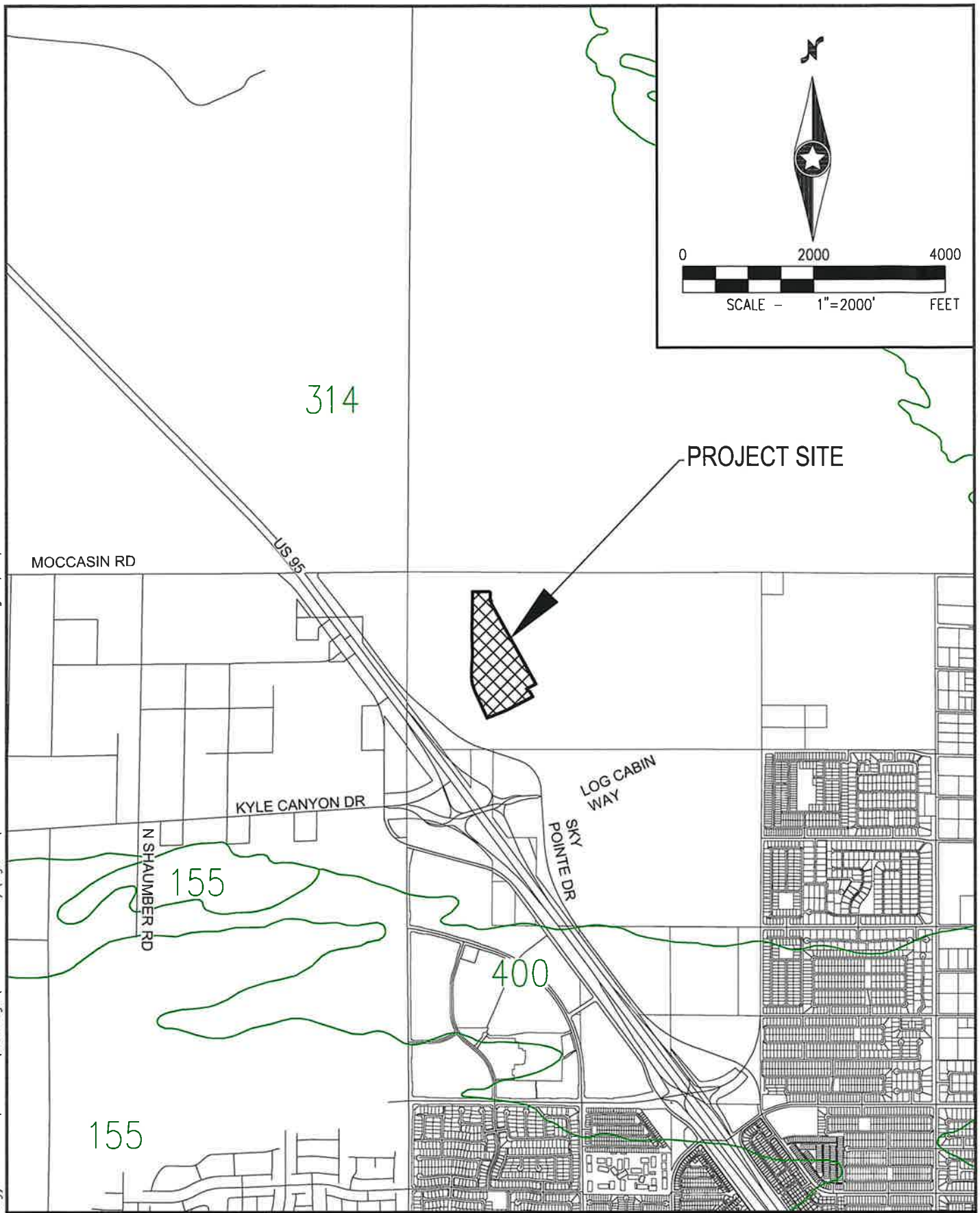

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PARCEL 3 AT SUNSTONE PHASE 3
SOILS MAP

DATE: DEC 2021	PROJECT NO. SHE1901.003
DRAFTER: KH	
DESIGNER: KH	EXHIBIT D
CHECKED: SOA	SHEET 1 OF 1

NOTE
* REFER TO APPENDIX E FOR REFERENCED HYDROLOGY & HYDRAULICS

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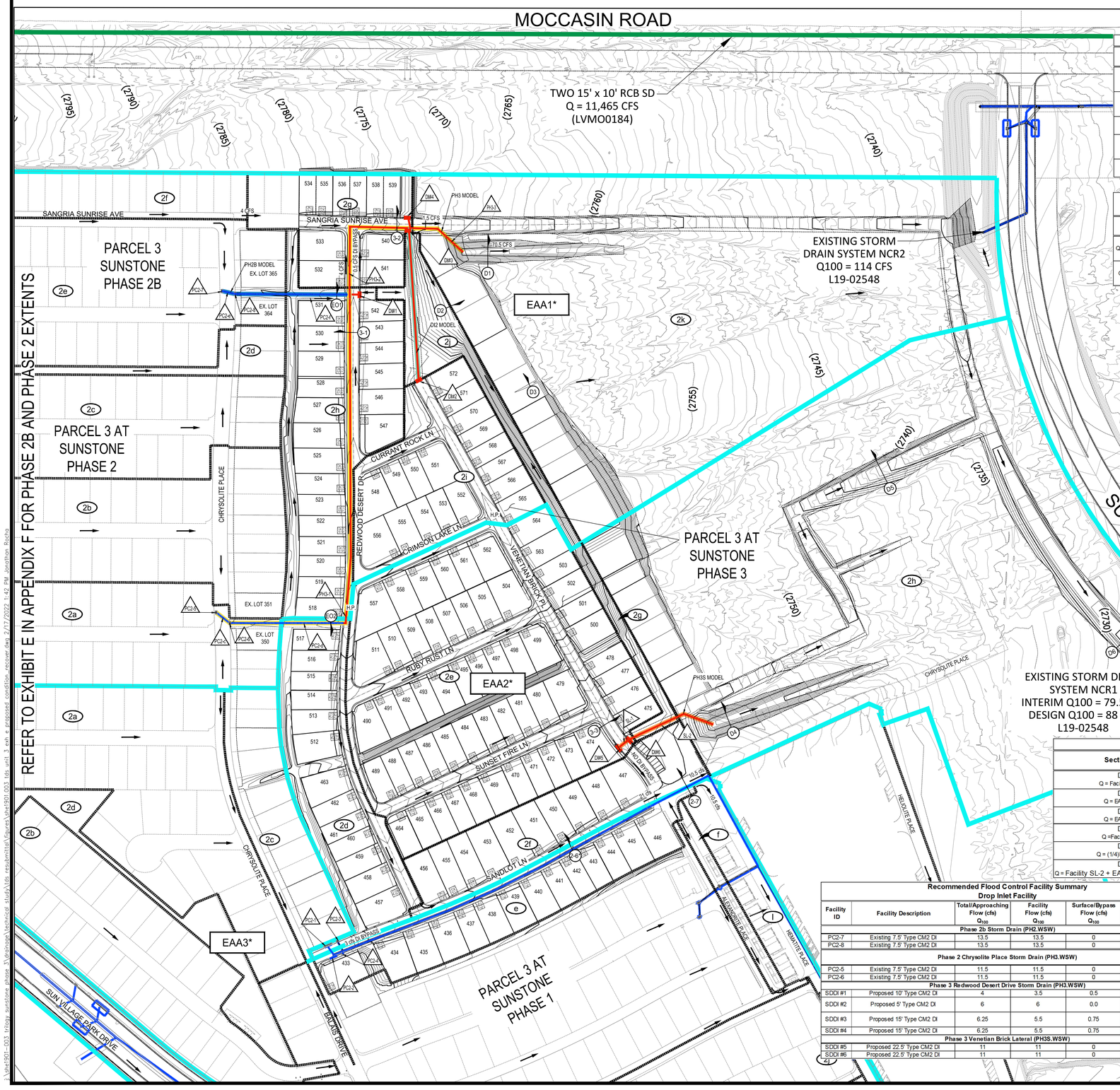
SCALE – 1"=120' FEET



Ultimate Condition 100-Year Street Flow Summary

Section ID	Q_{100} (cfs)	Slope (%)	Depth (ft)	Velocity (fps)	DxV
2-6* Q = (Bypass from Facilities PC2-3 + PC2-4) + EAA3(e) + EAA2(2d)	21	1.42	0.44	3.56	1.6
		3.73	0.40	4.87	1.9
2-7 Q = (Bypass from Facilities PC2-3 + PC2-4) + EAA3(e) + EAA2(2d)	21	0.60	0.50	2.62	1.3
3-1 Q = EAA1(2h)	8	0.60	0.37	1.95	0.7
3-2 Q = [EAA1((2f + 2g + (1/2)(2h)) + (DI#1-Bypass)]	12.5	3.27	0.33	4.13	1.4
3-3 Q = EAA2(2e)	22	0.85	0.47	2.99	1.4
		3.77	0.38	5.00	1.9

Ultimate Condition 100-Year Street Flow Summary Emergency Overflow

Section ID	Q_{100} (cfs)	Slope (%)	Depth (ft)	Velocity (fps)	DxV
2-7 (Emergency Overflow) Q = (Bypass from Facilities PC2-3 + PC2-4 + PC2-5 + PC2-6) + EAA3(e) + EAA2(2d)	44	0.60	0.63	3.51	2.2
3-2 (Emergency Overflow) Q = [EAA1((2f+2g+0.5*(2h)) + (DI#1-Bypass)] + (Facility PC2-7 + PC2-8)	39.5	3.27	0.45	5.70	2.6

LEGEND

- BASIN BOUNDARY
- PRORATED SUBBASIN BOUNDARY
- EXISTING DRAINAGE FACILITY
- PROPOSED DRAINAGE FACILITY
- FUTURE DRAINAGE FACILITY PROPOSED BY OTHERS
- ID — BASIN ID
- ID — PRORATED SUBBASIN ID
- FLOW DIRECTION
- ID — FLOWMASTER SECTION
- ID — FACILITY ID
- PH2B LATERAL WSPGW MODEL
- PH3 MAINLINE WSPGW MODEL
- DI2 LATERAL WSPGW MODEL
- PH3S MAINLINE WSPGW MODEL

Ultimate Condition Flow Rate Summary

Basin/Concentration Point ID	Q_{100} (cfs)	Area (ac)
EAA1*	114	55
EAA2*	82	35.0
EAA3*	102	51.0

Ultimate Condition Prorated Flow Summary

Basin ID	Q_{100} (cfs)	Area (acres)	100-yr Unit Flow (cfs/acre)
EAA1*	114	55.00	2.1
EAA2*	82	35.40	2.3
EAA3*	102	51.20	2.0

Subbasin ID	Q_{100} (cfs)	Area (acres)	100-yr Unit Flow (cfs/acre)
EAA1*(2a)	12	5.64	2.1
EAA1*(2b)	11	5.34	2.1
EAA1*(2c)	11	5.17	2.1
EAA1*(2d)	2	0.76	2.1
EAA1*(2e)	14	6.89	2.1
EAA1*(2f)	4	2.04	2.1
EAA1*(2g)	4	1.99	2.1
EAA1*(2h)	8	4.00	2.1
EAA1*(2i)	6	3.10	2.1
EAA1*(2j)	2	1.16	2.1
EAA1*(2k)	40	18.91	2.1
TOTAL	***114***	***55.00***	

Subbasin ID	Q_{100} (cfs)	Area (acres)	100-yr Unit Flow (cfs/acre)
EAA2*(2d)	7	2.97	2.3
EAA2*(2e)	22	9.36	2.3
EAA2*(2f)	6	2.77	2.3
EAA2*(2g)	1	0.38	2.3
EAA2*(2h)	46	19.92	2.3
TOTAL	***82***	***35.40***	

Subbasin ID	Q_{100} (cfs)	Area (acres)	100-yr Unit Flow (cfs/acre)
EAA3*(2a)	12	6.27	2.0
EAA3*(2b)	11	5.43	2.0
EAA3*(2e)	4	1.96	2.0
EAA3*(2d)	2	1.25	2.0
EAA3*(e)	5	2.61	2.0
EAA3*(2h)	1	0.48	2.0
EAA3*(2i)	3	1.53	2.0
EAA3*(j)	5	2.40	2.0
EAA3*(k)	5	2.64	2.0
EAA3*(l)	2	1.08	2.0
EAA3*(o)	5	2.30	2.0
EAA3*(p)	7	3.34	2.0
EAA3*(q)	5	2.55	2.0
EAA3*(r)	1	0.27	2.0
EAA3*(s)	4	1.95	2.0
EAA3*(t)	1	0.68	2.0
EAA3*(u)	3	1.37	2.0
EAA3*(v)	5	2.56	2.0
EAA3*(w)	3	1.47	2.0
EAA3*(x)	3	1.33	2.0
EAA3*(y)	3	1.61	2.0
EAA3*(z)	2	0.91	2.0
TOTAL	***92***	***45.99***	

Proposed Condition Drainage Emergency Overflow Hydraulic Summary

Section ID	Q_{100} (cfs)	Width (ft)	Type of Analysis	Depth (ft)	Velocity (fps)
EO1 Q = Facility PC2-7 + PC2-8	27	30	Normal Depth	1.39	4.60
			Weir	1.41	N/A
EO2 Q = Facility PC2-5 + PC2-6	23	25	Normal Depth	0.58	3.37
			Weir	0.61	N/A

Proposed Condition Hydraulic Section Summary

Section ID	Section Description	Q_{100} (cfs)	Slope (%)	Depth (ft)	Velocity (fps)
D1 Q = Facility PH3-3	Earthen-lined Trapezoidal Channel, w/10' BW & 3:1 SS	70.5	0.89	1.07	4.99
D2 Q = EAA1*(2j)	Earthen-lined V-ditch, 3:1 & 2:1 SS	2.0	0.89	0.58	2.35
			2.50	0.48	3.45
D3 Q = EAA1*(2j)	Earthen-lined V-ditch, 3:1 & 2:1 SS	2	3.42	0.42	3.76
D4 Q =Facility SL-2	Earthen-lined Trapezoidal Channel, w/10' BW & 3:1 SS	22	1.16	0.51	3.73
D5 Q = (1/4)EAA1*(2h)	Earthen-lined Trapezoidal Channel, w/24' BW, 3:1 & 5:1 SS	12	1.28	0.21	2.31
			4.71	0.14	3.45
D6 Q = Facility SL-2 + EAA2*(2g+gh) + 10.5 cfs	Earthen-lined Trapezoidal Channel, w/24' BW, 3:1 & 5:1 SS	79.5	0.52	0.83	3.49
			1.51	0.61	4.93

Recommended Flood Control Facility Summary Drop Inlet Facility

Facility ID	Facility Description	Total/Approaching Flow (cfs) Q_{100}	Facility Flow (cfs) Q_{100}	Surface/Bypass Flow (cfs) Q_{100}	Notes
Phase 2b Storm Drain (PH2.WSW)					
PC2-7	Existing 7.5' Type CM2 DI	13.5	13.5	0	Sump Inlet
PC2-8	Existing 7.5' Type CM2 DI	13.5	13.5	0	Sump Inlet
Phase 2 Chrysolite Place Storm Drain (PH3.WSW)					
PC2-5	Existing 7.5' Type CM2 DI	11.5	11.5	0	Sump Inlet
PC2-6	Existing 7.5' Type CM2 DI	11.5	11.5	0	Sump Inlet
Phase 3 Redwood Desert Drive Storm Drain (PH3.WSW)					
SDDI #1	Proposed 10' Type CM2 DI	4	3.5	0.5	
SDDI #2	Proposed 5' Type CM2 DI	6	6	0.0	Sump Inlet. Modelled as DI2.wsw lateral
SDDI #3	Proposed 15' Type CM2 DI	6.25	5.5	0.75	Modelled as DI2.wsw lateral
SDDI #4	Proposed 15' Type CM2 DI	6.25	5.5	0.75	
Phase 3 Venetian Brick Lateral (PH3S.WSW)					
SDDI #5	Proposed 22.5' Type CM2 DI	11	11	0	
SDDI #6	Proposed 22.5' Type CM2 DI	11	11	0	

Recommended Flood Control Facility Summary SD Mainline Facility

Facility ID	Facility Description	Facility Flow (cfs), Q_{100}			Notes
Phase 2 Storm Drain (PH3.WSW)					
PC2-c	Existing 18" RCP	11.5			
PC2-d	Existing 24" RCP	23			
Phase 3 Redwood Desert Drive Storm Drain (PH3.WSW)					
PH3-1	Proposed 24"-30" RCP	23			
PH3-2	Proposed 30" RCP	53.5			
PH3-3	Proposed 30"-36" RCP	70.5			Portion of 36" RCP for temp. outlet. To be extend with future phases.
Phase 2b Storm Drain (PH2B.WSW)					
PC2-e	Existing 18" RCP	13.5			
PC2-f	Existing 24" RCP	27			
Phase 3 Venetian Brick Lateral (PH3S.WSW)					
SL-1	Proposed 18" RCP	11			
SL-2	Proposed 24" RCP	22			
Phase 2 Sandlot Lane Storm Drain (PH2-SL.WSW)					
PC2-1	Existing 20' Type CM2 DI & 18" RCP	16.5	13	3.5	
PC2-2	Existing 20' Type CM2 DI & 18" RCP	16.5	13	3.5	
PC2-3	Existing 5' Type CM2 DI & 18" RCP	3.5	2.5	1	
PC2-4	Existing 5' Type CM2 DI & 18" RCP	3.5	2.5	1	

Westwood
5725 W. Badura Ave.
Suite 100
Las Vegas, NV 89118
Phone (702) 284-5300
westwoodps.com
Westwood Professional Services, Inc.

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

SHLP

PARCEL 3 AT SUNSTONE PHASE 3
PROPOSED DRAINAGE CONDITION

DATE: FEB 2022
DRAFTER: KH
DESIGNER: KH
CHECKED: SOA
PROJECT NO.
SHE1901.003

EXHIBIT E
SHEET 1 OF 1

E:\she1901-003 trilogy sunstone phase 3\drainage\technical study\1ds_resubmittal\figures\she1901.003.1ds_unit 3 exh_e proposed condition_recover.dwg 2/17/2022 1:42 PM Jonathon Rocha

APPENDIX B

Street & Hydraulic Sections

Street Flow Computations – 100-Yr

Worksheet for 2-7

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.60 %
Discharge	21.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.35	0.38
0+01.33	0.06
0+01.33	0.00
0+02.50	0.13
0+02.50	0.17
0+15.50	0.38
0+28.50	0.17
0+28.50	0.13
0+29.67	0.00
0+29.67	0.06
0+30.65	0.38
0+31.00	0.38
0+36.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+36.00, 0.48)	0.016

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

Results	
Normal Depth	0.50 ft
Roughness Coefficient	0.016
Elevation	0.50 ft
Elevation Range	0.00 to 0.48 ft
Flow Area	8.0 ft²
Wetted Perimeter	36.47 ft
Hydraulic Radius	0.22 ft

Worksheet for 2-7

Results	
Top Width	36.00 ft
Normal Depth	0.50 ft
Critical Depth	0.50 ft
Critical Slope	0.63 %
Velocity	2.62 ft/s
Velocity Head	0.11 ft
Specific Energy	0.61 ft
Froude Number	0.979
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.50 ft
Critical Depth	0.50 ft
Channel Slope	0.60 %
Critical Slope	0.63 %

Worksheet for 2-7

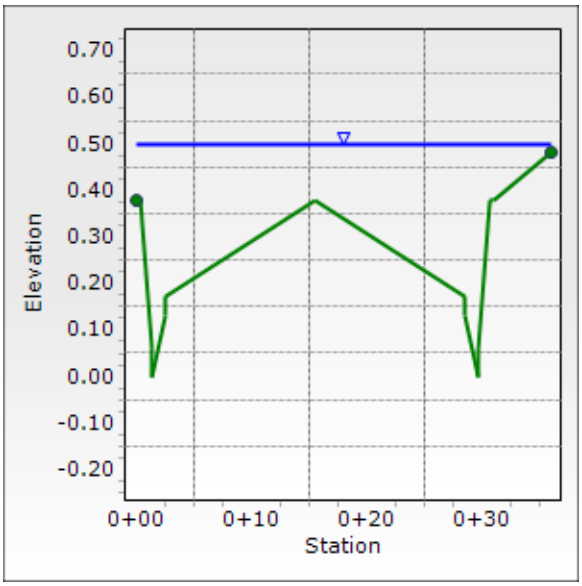
Messages:

Water Surface Elevation exceeds lowest end station by 0.124484865046877ft.

Cross Section for 2-7

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.60 %
Normal Depth	0.50 ft
Discharge	21.00 cfs



Worksheet for 3-1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.60 %
Discharge	8.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.00	0.38
0+05.00	0.38
0+05.38	0.38
0+06.50	0.00
0+07.50	0.08
0+07.50	0.12
0+20.50	0.38
0+33.50	0.12
0+33.50	0.08
0+34.50	0.00
0+35.62	0.38
0+36.00	0.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+36.00, 0.38)	0.016

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

Results	
Normal Depth	0.37 ft
Roughness Coefficient	0.016
Elevation	0.37 ft
Elevation Range	0.00 to 0.48 ft
Flow Area	4.1 ft²
Wetted Perimeter	29.11 ft
Hydraulic Radius	0.14 ft
Top Width	28.90 ft

Worksheet for 3-1

Results	
Normal Depth	0.37 ft
Critical Depth	0.36 ft
Critical Slope	0.73 %
Velocity	1.95 ft/s
Velocity Head	0.06 ft
Specific Energy	0.43 ft
Froude Number	0.910
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.37 ft
Critical Depth	0.36 ft
Channel Slope	0.60 %
Critical Slope	0.73 %

Worksheet for 3-1

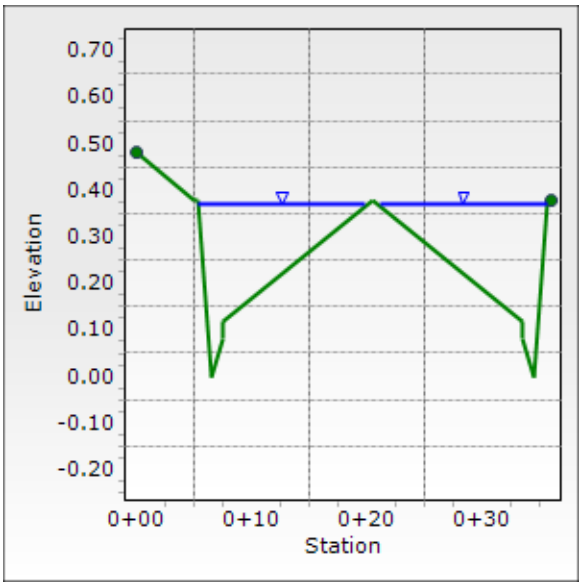
Messages:

Flow is divided.

Cross Section for 3-1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.60 %
Normal Depth	0.37 ft
Discharge	8.00 cfs



Worksheet for 3-2

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	3.27 %
Discharge	12.50 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.00	0.38
0+05.00	0.38
0+05.38	0.38
0+06.50	0.00
0+07.50	0.08
0+07.50	0.12
0+20.50	0.38
0+33.50	0.12
0+33.50	0.08
0+34.50	0.00
0+35.62	0.38
0+36.00	0.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+36.00, 0.38)	0.016

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

Results	
Normal Depth	0.33 ft
Roughness Coefficient	0.016
Elevation	0.33 ft
Elevation Range	0.00 to 0.48 ft
Flow Area	3.0 ft²
Wetted Perimeter	24.82 ft
Hydraulic Radius	0.12 ft
Top Width	24.62 ft

Worksheet for 3-2

Results	
Normal Depth	0.33 ft
Critical Depth	0.41 ft
Critical Slope	0.69 %
Velocity	4.13 ft/s
Velocity Head	0.26 ft
Specific Energy	0.59 ft
Froude Number	2.073
Flow Type	Supercritical

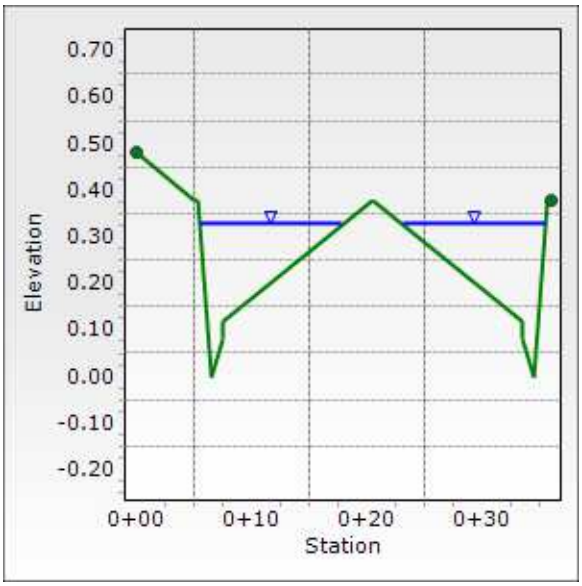
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.33 ft
Critical Depth	0.41 ft
Channel Slope	3.27 %
Critical Slope	0.69 %

Cross Section for 3-2

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	3.27 %
Normal Depth	0.33 ft
Discharge	12.50 cfs



Worksheet for 3-3 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	3.77 %
Discharge	22.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.00	0.38
0+05.00	0.38
0+05.38	0.38
0+06.50	0.00
0+07.50	0.08
0+07.50	0.12
0+20.50	0.38
0+33.50	0.12
0+33.50	0.08
0+34.50	0.00
0+35.62	0.38
0+36.00	0.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+36.00, 0.38)	0.016

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

Results	
Normal Depth	0.38 ft
Roughness Coefficient	0.016
Elevation	0.38 ft
Elevation Range	0.00 to 0.48 ft
Flow Area	4.4 ft²
Wetted Perimeter	30.14 ft
Hydraulic Radius	0.15 ft
Top Width	29.93 ft

Worksheet for 3-3 (max%)

Results	
Normal Depth	0.38 ft
Critical Depth	0.49 ft
Critical Slope	0.62 %
Velocity	5.00 ft/s
Velocity Head	0.39 ft
Specific Energy	0.77 ft
Froude Number	2.301
Flow Type	Supercritical

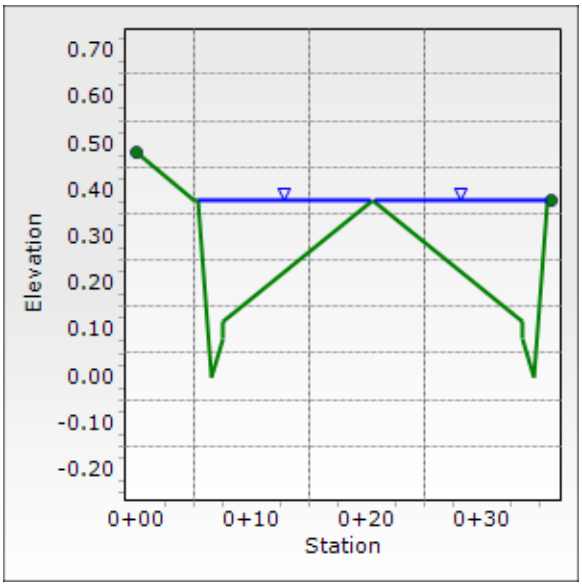
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.38 ft
Critical Depth	0.49 ft
Channel Slope	3.77 %
Critical Slope	0.62 %

Cross Section for 3-3 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	3.77 %
Normal Depth	0.38 ft
Discharge	22.00 cfs



Worksheet for 3-3 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.85 %
Discharge	22.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.00	0.38
0+05.00	0.38
0+05.38	0.38
0+06.50	0.00
0+07.50	0.08
0+07.50	0.12
0+20.50	0.38
0+33.50	0.12
0+33.50	0.08
0+34.50	0.00
0+35.62	0.38
0+36.00	0.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+36.00, 0.38)	0.016

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

Results	
Normal Depth	0.47 ft
Roughness Coefficient	0.016
Elevation	0.47 ft
Elevation Range	0.00 to 0.48 ft
Flow Area	7.4 ft²
Wetted Perimeter	35.63 ft
Hydraulic Radius	0.21 ft
Top Width	35.32 ft

Worksheet for 3-3 (min%)

Results	
Normal Depth	0.47 ft
Critical Depth	0.49 ft
Critical Slope	0.62 %
Velocity	2.99 ft/s
Velocity Head	0.14 ft
Specific Energy	0.61 ft
Froude Number	1.156
Flow Type	Supercritical

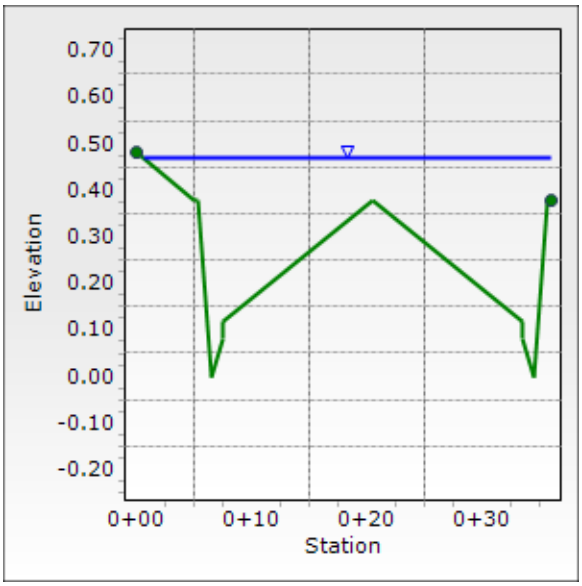
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.47 ft
Critical Depth	0.49 ft
Channel Slope	0.85 %
Critical Slope	0.62 %

Cross Section for 3-3 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.85 %
Normal Depth	0.47 ft
Discharge	22.00 cfs



Emergency Overflow Computations

Worksheet for 2-7 (Emergency Overflow)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.60 %
Discharge	44.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.35	0.38
0+01.33	0.06
0+01.33	0.00
0+02.50	0.13
0+02.50	0.17
0+15.50	0.38
0+28.50	0.17
0+28.50	0.13
0+29.67	0.00
0+29.67	0.06
0+30.65	0.38
0+31.00	0.38
0+36.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+36.00, 0.48)	0.016

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

Results	
Normal Depth	0.63 ft
Roughness Coefficient	0.016
Elevation	0.63 ft
Elevation Range	0.00 to 0.48 ft
Flow Area	12.5 ft²
Wetted Perimeter	36.72 ft
Hydraulic Radius	0.34 ft

Worksheet for 2-7 (Emergency Overflow)

Results	
Top Width	36.00 ft
Normal Depth	0.63 ft
Critical Depth	0.64 ft
Critical Slope	0.54 %
Velocity	3.51 ft/s
Velocity Head	0.19 ft
Specific Energy	0.82 ft
Froude Number	1.051
Flow Type	Supercritical

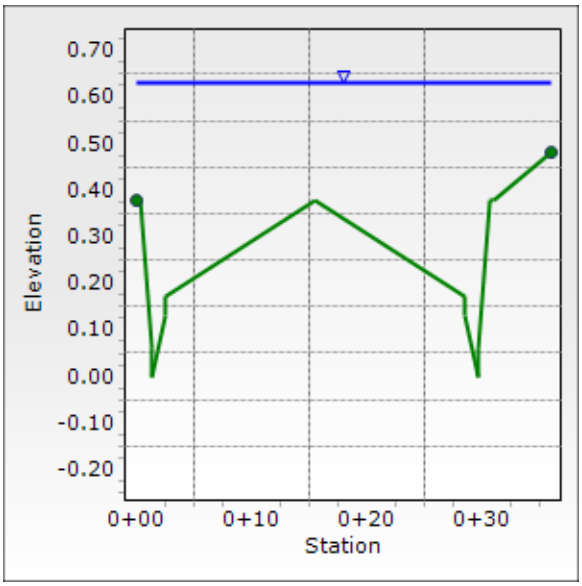
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.63 ft
Critical Depth	0.64 ft
Channel Slope	0.60 %
Critical Slope	0.54 %

Cross Section for 2-7 (Emergency Overflow)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.60 %
Normal Depth	0.63 ft
Discharge	44.00 cfs



Worksheet for 3-2 (Emergency Overflow)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	3.27 %
Discharge	39.50 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.00	0.38
0+05.00	0.38
0+05.38	0.38
0+06.50	0.00
0+07.50	0.08
0+07.50	0.12
0+20.50	0.38
0+33.50	0.12
0+33.50	0.08
0+34.50	0.00
0+35.62	0.38
0+36.00	0.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+36.00, 0.38)	0.016

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

Results	
Normal Depth	0.45 ft
Roughness Coefficient	0.016
Elevation	0.45 ft
Elevation Range	0.00 to 0.48 ft
Flow Area	6.9 ft²
Wetted Perimeter	35.00 ft
Hydraulic Radius	0.20 ft
Top Width	34.71 ft

Worksheet for 3-2 (Emergency Overflow)

Results	
Normal Depth	0.45 ft
Critical Depth	0.60 ft
Critical Slope	0.55 %
Velocity	5.70 ft/s
Velocity Head	0.51 ft
Specific Energy	0.96 ft
Froude Number	2.252
Flow Type	Supercritical

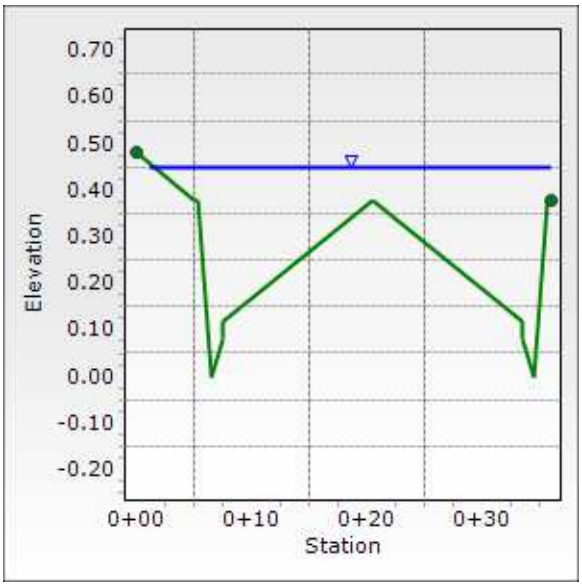
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.45 ft
Critical Depth	0.60 ft
Channel Slope	3.27 %
Critical Slope	0.55 %

Cross Section for 3-2 (Emergency Overflow)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	3.27 %
Normal Depth	0.45 ft
Discharge	39.50 cfs



Worksheet for EO1 Emergency Overflow (Normal Depth)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	1.42	%
Discharge	27.00	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	6.00
0+00.00	1.00
0+02.00	0.00
0+04.00	1.00
0+06.00	1.04
0+10.00	1.12
0+30.00	3.00
0+30.00	6.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 6.00)	(0+00.00, 1.00)	0.013
(0+00.00, 1.00)	(0+06.00, 1.04)	0.025
(0+06.00, 1.04)	(0+10.00, 1.12)	0.013
(0+10.00, 1.12)	(0+30.00, 3.00)	0.025
(0+30.00, 3.00)	(0+30.00, 6.00)	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	1.39	ft
Roughness Coefficient	0.022	
Elevation	1.39	ft
Elevation Range	0.00 to 6.00	ft
Flow Area	5.9	ft^2
Wetted Perimeter	13.70	ft
Hydraulic Radius	0.43	ft
Top Width	12.82	ft
Normal Depth	1.39	ft

Worksheet for EO1 Emergency Overflow (Normal Depth)

Results	
Critical Depth	1.45 ft
Critical Slope	0.96 %
Velocity	4.60 ft/s
Velocity Head	0.33 ft
Specific Energy	1.71 ft
Froude Number	1.198
Flow Type	Supercritical

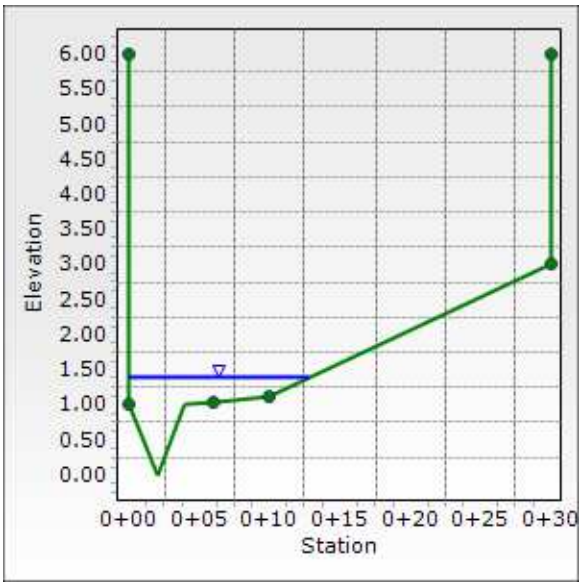
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

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	1.39 ft
Critical Depth	1.45 ft
Channel Slope	1.42 %
Critical Slope	0.96 %

Cross Section for EO1 Emergency Overflow (Normal Depth)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.42 %
Normal Depth	1.39 ft
Discharge	27.00 cfs



Worksheet for EO1 (Weir)

Project Description	
Solve For	Headwater Elevation

Input Data	
Discharge	27.00 cfs
Crest Elevation	0.00 ft
Tailwater Elevation	1.39 ft
Crest Surface Type	Gravel
Crest Breadth	5.00 ft
Crest Length	30.00 ft

Results	
Headwater Elevation	1.41 ft
Headwater Height Above Crest	1.41 ft
Tailwater Height Above Crest	1.39 ft
Weir Coefficient	3.07 ft^(1/2)/s
Submergence Factor	0.176
Adjusted Weir Coefficient	0.54 ft^(1/2)/s
Flow Area	42.2 ft²
Velocity	0.64 ft/s
Wetted Perimeter	32.82 ft
Top Width	30.00 ft

Worksheet for EO2 - (Normal Depth)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.86 %
Discharge	23.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	7.00
0+00.00	0.95
0+09.50	0.00
0+15.50	0.00
0+25.00	0.95
0+25.00	7.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 7.00)	(0+00.00, 0.95)	0.013
(0+00.00, 0.95)	(0+09.50, 0.00)	0.025
(0+09.50, 0.00)	(0+15.50, 0.00)	0.013
(0+15.50, 0.00)	(0+25.00, 0.95)	0.025
(0+25.00, 0.95)	(0+25.00, 7.00)	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	0.58 ft
Roughness Coefficient	0.022
Elevation	0.58 ft
Elevation Range	0.00 to 7.00 ft
Flow Area	6.8 ft²
Wetted Perimeter	17.63 ft
Hydraulic Radius	0.39 ft
Top Width	17.57 ft
Normal Depth	0.58 ft
Critical Depth	0.56 ft
Critical Slope	0.95 %

Worksheet for EO2 - (Normal Depth)

Results	
Velocity	3.37 ft/s
Velocity Head	0.18 ft
Specific Energy	0.76 ft
Froude Number	0.955
Flow Type	Subcritical

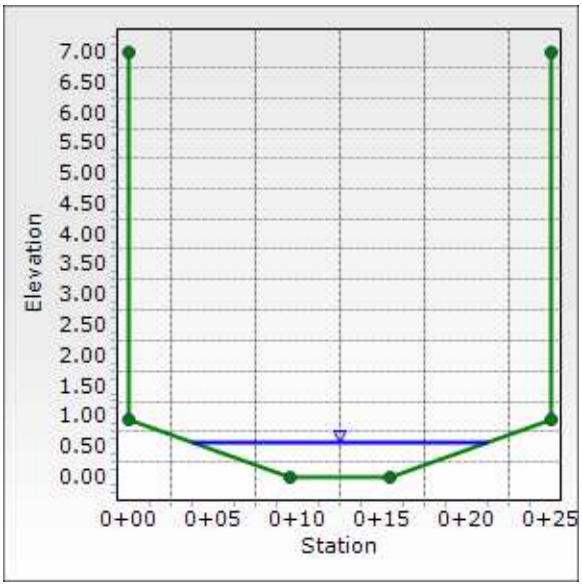
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.58 ft
Critical Depth	0.56 ft
Channel Slope	0.86 %
Critical Slope	0.95 %

Cross Section for EO2 - (Normal Depth)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.86 %
Normal Depth	0.58 ft
Discharge	23.00 cfs



Worksheet for EO2 - (Weir)

Project Description	
Solve For	Headwater Elevation

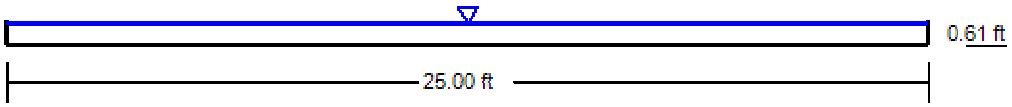
Input Data	
Discharge	23.00 cfs
Crest Elevation	0.00 ft
Tailwater Elevation	0.58 ft
Crest Surface Type	Gravel
Crest Breadth	5.00 ft
Crest Length	25.00 ft

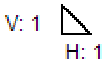
Results	
Headwater Elevation	0.61 ft
Headwater Height Above Crest	0.61 ft
Tailwater Height Above Crest	0.58 ft
Weir Coefficient	2.73 ft^(1/2)/s
Submergence Factor	0.706
Adjusted Weir Coefficient	1.93 ft^(1/2)/s
Flow Area	15.3 ft²
Velocity	1.51 ft/s
Wetted Perimeter	26.22 ft
Top Width	25.00 ft

Cross Section for EO2 - (Weir)

Project Description	
Solve For	Headwater Elevation

Input Data	
Discharge	23.00 cfs
Headwater Elevation	0.61 ft
Crest Elevation	0.00 ft
Tailwater Elevation	0.58 ft
Crest Surface Type	Gravel
Crest Breadth	5.00 ft
Crest Length	25.00 ft





Ditch Sizing Computations

Worksheet for D1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	0.89 %
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Bottom Width	10.00 ft
Discharge	70.50 cfs

Results	
Normal Depth	1.07 ft
Flow Area	14.1 ft²
Wetted Perimeter	16.77 ft
Hydraulic Radius	0.84 ft
Top Width	16.42 ft
Critical Depth	1.04 ft
Critical Slope	0.99 %
Velocity	4.99 ft/s
Velocity Head	0.39 ft
Specific Energy	1.46 ft
Froude Number	0.948
Flow Type	Subcritical

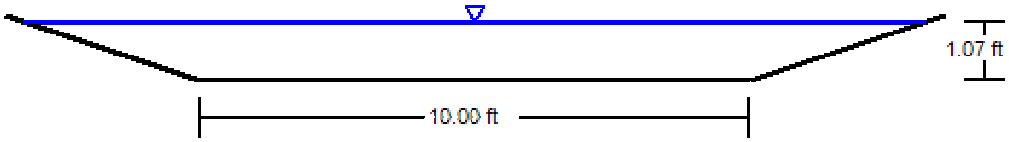
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

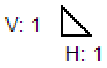
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.07 ft
Critical Depth	1.04 ft
Channel Slope	0.89 %
Critical Slope	0.99 %

Cross Section for D1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	0.89 %
Normal Depth	1.07 ft
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Bottom Width	10.00 ft
Discharge	70.50 cfs





Worksheet for D2 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	0.89 %
Left Side Slope	2.000 H:V
Right Side Slope	3.000 H:V
Discharge	2.00 cfs

Results	
Normal Depth	0.58 ft
Flow Area	0.9 ft²
Wetted Perimeter	3.15 ft
Hydraulic Radius	0.27 ft
Top Width	2.92 ft
Critical Depth	0.52 ft
Critical Slope	1.58 %
Velocity	2.35 ft/s
Velocity Head	0.09 ft
Specific Energy	0.67 ft
Froude Number	0.765
Flow Type	Subcritical

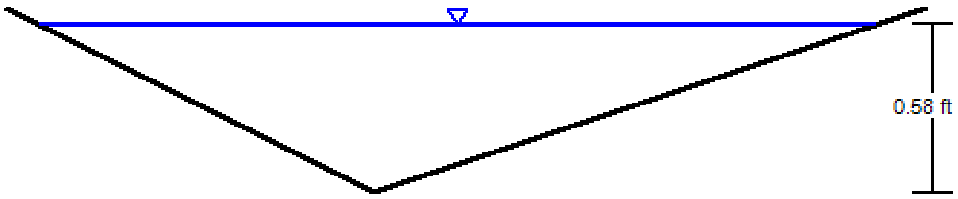
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

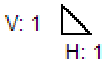
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.58 ft
Critical Depth	0.52 ft
Channel Slope	0.89 %
Critical Slope	1.58 %

Cross Section for D2 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	0.89 %
Normal Depth	0.58 ft
Left Side Slope	2.000 H:V
Right Side Slope	3.000 H:V
Discharge	2.00 cfs





Worksheet for D2 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	2.50 %
Left Side Slope	2.000 H:V
Right Side Slope	3.000 H:V
Discharge	2.00 cfs

Results	
Normal Depth	0.48 ft
Flow Area	0.6 ft²
Wetted Perimeter	2.60 ft
Hydraulic Radius	0.22 ft
Top Width	2.41 ft
Critical Depth	0.52 ft
Critical Slope	1.58 %
Velocity	3.45 ft/s
Velocity Head	0.19 ft
Specific Energy	0.67 ft
Froude Number	1.242
Flow Type	Supercritical

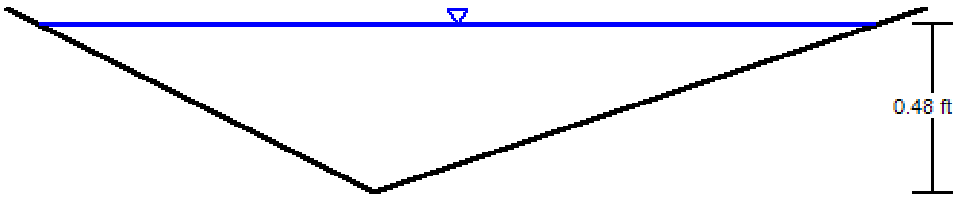
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

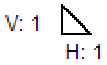
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.48 ft
Critical Depth	0.52 ft
Channel Slope	2.50 %
Critical Slope	1.58 %

Cross Section for D2 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	2.50 %
Normal Depth	0.48 ft
Left Side Slope	2.000 H:V
Right Side Slope	3.000 H:V
Discharge	2.00 cfs





Worksheet for D3

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	3.42 %
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Discharge	2.00 cfs

Results	
Normal Depth	0.42 ft
Flow Area	0.5 ft²
Wetted Perimeter	2.66 ft
Hydraulic Radius	0.20 ft
Top Width	2.53 ft
Critical Depth	0.49 ft
Critical Slope	1.56 %
Velocity	3.76 ft/s
Velocity Head	0.22 ft
Specific Energy	0.64 ft
Froude Number	1.443
Flow Type	Supercritical

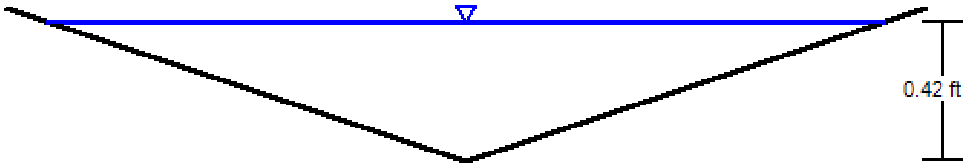
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

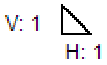
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.42 ft
Critical Depth	0.49 ft
Channel Slope	3.42 %
Critical Slope	1.56 %

Cross Section for D3

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	3.42 %
Normal Depth	0.42 ft
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Discharge	2.00 cfs





Worksheet for D4

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	1.16 %
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Bottom Width	10.00 ft
Discharge	22.00 cfs

Results	
Normal Depth	0.51 ft
Flow Area	5.9 ft²
Wetted Perimeter	13.23 ft
Hydraulic Radius	0.45 ft
Top Width	13.07 ft
Critical Depth	0.50 ft
Critical Slope	1.21 %
Velocity	3.73 ft/s
Velocity Head	0.22 ft
Specific Energy	0.73 ft
Froude Number	0.979
Flow Type	Subcritical

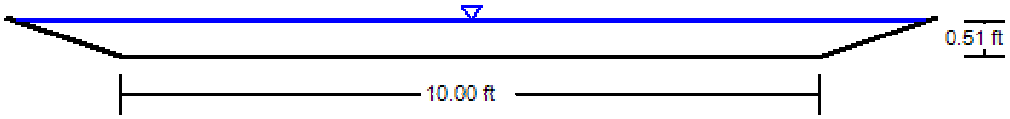
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

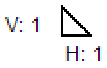
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.51 ft
Critical Depth	0.50 ft
Channel Slope	1.16 %
Critical Slope	1.21 %

Cross Section for D4

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	1.16 %
Normal Depth	0.51 ft
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Bottom Width	10.00 ft
Discharge	22.00 cfs





Worksheet for D5 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	1.28 %
Left Side Slope	3.000 H:V
Right Side Slope	5.000 H:V
Bottom Width	24.00 ft
Discharge	12.00 cfs

Results	
Normal Depth	0.21 ft
Flow Area	5.2 ft²
Wetted Perimeter	25.73 ft
Hydraulic Radius	0.20 ft
Top Width	25.67 ft
Critical Depth	0.20 ft
Critical Slope	1.59 %
Velocity	2.31 ft/s
Velocity Head	0.08 ft
Specific Energy	0.29 ft
Froude Number	0.907
Flow Type	Subcritical

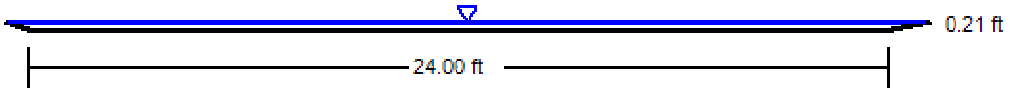
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

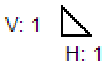
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.21 ft
Critical Depth	0.20 ft
Channel Slope	1.28 %
Critical Slope	1.59 %

Cross Section for D5 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	1.28 %
Normal Depth	0.21 ft
Left Side Slope	3.000 H:V
Right Side Slope	5.000 H:V
Bottom Width	24.00 ft
Discharge	12.00 cfs





Worksheet for D5 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	4.71 %
Left Side Slope	3.000 H:V
Right Side Slope	5.000 H:V
Bottom Width	24.00 ft
Discharge	12.00 cfs

Results	
Normal Depth	0.14 ft
Flow Area	3.5 ft²
Wetted Perimeter	25.17 ft
Hydraulic Radius	0.14 ft
Top Width	25.13 ft
Critical Depth	0.20 ft
Critical Slope	1.59 %
Velocity	3.45 ft/s
Velocity Head	0.18 ft
Specific Energy	0.33 ft
Froude Number	1.634
Flow Type	Supercritical

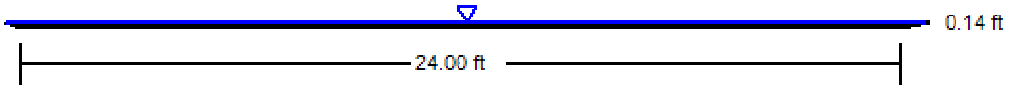
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

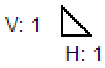
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.14 ft
Critical Depth	0.20 ft
Channel Slope	4.71 %
Critical Slope	1.59 %

Cross Section for D5 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	4.71 %
Normal Depth	0.14 ft
Left Side Slope	3.000 H:V
Right Side Slope	5.000 H:V
Bottom Width	24.00 ft
Discharge	12.00 cfs





Worksheet for D6 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	0.52 %
Left Side Slope	3.000 H:V
Right Side Slope	5.000 H:V
Bottom Width	24.00 ft
Discharge	79.50 cfs

Results	
Normal Depth	0.83 ft
Flow Area	22.7 ft²
Wetted Perimeter	30.88 ft
Hydraulic Radius	0.74 ft
Top Width	30.66 ft
Critical Depth	0.67 ft
Critical Slope	1.08 %
Velocity	3.49 ft/s
Velocity Head	0.19 ft
Specific Energy	1.02 ft
Froude Number	0.715
Flow Type	Subcritical

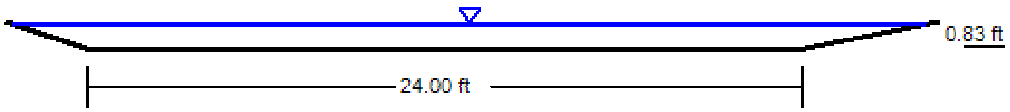
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

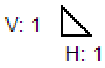
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.83 ft
Critical Depth	0.67 ft
Channel Slope	0.52 %
Critical Slope	1.08 %

Cross Section for D6 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	0.52 %
Normal Depth	0.83 ft
Left Side Slope	3.000 H:V
Right Side Slope	5.000 H:V
Bottom Width	24.00 ft
Discharge	79.50 cfs





Worksheet for D6 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	1.51 %
Left Side Slope	3.000 H:V
Right Side Slope	5.000 H:V
Bottom Width	24.00 ft
Discharge	79.50 cfs

Results	
Normal Depth	0.61 ft
Flow Area	16.1 ft²
Wetted Perimeter	29.03 ft
Hydraulic Radius	0.55 ft
Top Width	28.87 ft
Critical Depth	0.67 ft
Critical Slope	1.08 %
Velocity	4.93 ft/s
Velocity Head	0.38 ft
Specific Energy	0.99 ft
Froude Number	1.165
Flow Type	Supercritical

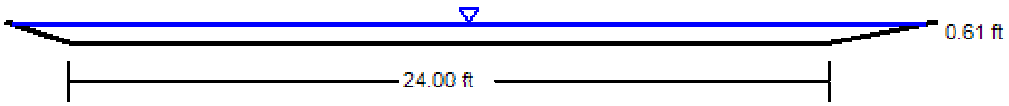
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

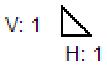
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.61 ft
Critical Depth	0.67 ft
Channel Slope	1.51 %
Critical Slope	1.08 %

Cross Section for D6 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.025	
Channel Slope	1.51	%
Normal Depth	0.61	ft
Left Side Slope	3.000	H:V
Right Side Slope	5.000	H:V
Bottom Width	24.00	ft
Discharge	79.50	cfs





APPENDIX C

Storm Drain Analyses

Inlet Sizing Computations

Curb Inlet Sizing Computation

Project Name & Number:	**Sunstone Parcel 3 - Ph-3**	
Date:	**2/17/2022**	Westwood
By:	**SOA**	

	Notes:		
	Facility ID:	SDDI #1	
	Drainage Condition:	Proposed	
	Source of Flow:	Q100 = 1/2 * EAA1* (2h)	
	Inlet Type:	Type CM2 (Continuous Grade)	
	Inlet Length:	10.-ft	
	Number of Grates	3	
	Input:	**Variable:**	**Input:**
	Street Flow (cfs)	Q	4.0
	Longitudinal Slope (ft/ft)	S_o	0.0060
	Manning's Coefficient	n	0.016
	Street Flow Velocity (fps)	V	1.95
	Street Flow Depth (ft)	D	0.37
	Street Cross Slope (ft/ft)	S_x	0.02
	Grate Width (ft)	W	1.5
	Grate Depression (in)	D_g	2.0
	Length of Grate (ft)	L_g	7.25
	Length of Curb Opening (ft)	L_c	9.50
	Clogging Factor - Grate (%)	CF_g	50%
	Clogging Factor - Curb (%)	CF_c	50%
	Effective Grate Length (ft)	L_{ge}	3.6
	Effective Curb Opening Length (ft)	L_{ce}	4.75
	Output (Grate):	**Equation:**	**Output (Grate):**
[1]	R_f - Frontal Flow Factor	1-0.09*(V-V_x) if V>V_x; else Frontal Flow Factor=1	1.00
[2]	V_o - Splash Over Velocity (fps)	V_x=p+q*Lg-r*L_{ge}^2+sy*L_{ge}^3 ; where	7.81
		p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate)	
[1]	E - Grate Flow Ratio	Frontal Flow/Side Flow	0.35
[2]	Q_w - Frontal Flow (cfs)	$Q_w = Q[1-(1-(W/T))^{2.67}]$	1.39
[1]	Q_s - Side Flow (cfs)	Q_s = Q-Qw	2.6
	T - Side Flow Spread (ft)	$(D-D_g)/S_x$	10.17
[1]	R_s - Side Flow Factor	$1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$	0.44
[1]	Q_{gi} - Intercepted Flow (cfs)	$(R_f*E+R_s*(1-E))*Q$	2.5
	Output (Curb):	**Equation:**	**Output (Curb):**
[1]	S_e - Equivalent Cross Slope (ft/ft)	S_x+S_g*E	0.059
	Q_{sx} - Remaining Flow After Grate Interception (cfs)	$Q-Q_{gi}$	1.472
	S_g - Gutter Cross Slope (ft/ft)	D_g/W	0.111
[1]	L_t - Effective Interception Length (ft)	$0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$	9.98
[1]	Q_{ci} - Intercepted Flow (cfs)	$(1-(1-L_{ce}/L_t)^{1.8})*Q_{sx}$	1.0
		or Q_{sx} if L_t is less than L_{ce}	
	Output (Combination):	**Equation:**	**Output (Combination):**
	Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	**3.5**
	Bypass Flow (cfs)	Street Flow - Total Intercepted Flow	**0.5**

[1] Formula referenced from the CCRFCD Manual

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

Curb Inlet Sizing Computation

Project Name & Number:	**Sunstone Parcel 3 - Ph-3**
Date:	**2/16/2022**
By:	**SOA**

Westwood

Notes:		
Facility ID:	SDDI #2	
Drainage Condition	Proposed	
Source of Flow	Q100 = *EAA1(2i)	
Design Flow (cfs)	6.0	
Inlet Type:	Type CM2 (Sump)	
Inlet Length:	5.-ft	
Number of Grates:	1	
Input:	**Variable:**	**Input:**
Depth at Inlet (ft)	D	0.67
Grate Width (ft)	W	1.50
Length of Grate (ft)	L_g	2.25
Length of Curb Opening (ft)	L_c	4.50
Height of Curb Opening (ft)	H	0.50
Weir Coef. - Curb Opening	W_c	2.3
Weir Coef. - Grate	W_g	3.0
Orifice Coef.	O_c	0.67
Grate Coef.	G_c	0.60
Clogging Factor - Grate (%)	CF_g	50
Clogging Factor - Curb (%)	CF_c	50
Output (Grate):	**Equation:**	**Output (Grate):**
Effective Weir Length (ft)	$2*W+L_g$	5.25
Adjusted Effective Weir Length (ft)	$2*(1-CF_g/100)*W+(1-CF_g/100)*L_g$	2.63
Grate Open Area (sf)	$W*L_g$	3.38
Adjusted Grate Open Area (sf)	Grate Open Area * $G_c*(1-CF_g/100)$	1.01
Controlling Flow Type (weir/orifice)	If D<1.792*(Adj. Grate Open Area/Adj. Eff. Length)	weir
	use weir, else orifice	
Intercepted Flow (cfs)	weir: $W_g*(\text{Adj. Eff. Weir Length})*D^{1.5}$	4.3
	orifice: $O_c*(\text{Adj. Grate Open Area})*(64.4*D)^{0.5}$	
Output (Curb):	**Equation:**	**Output (Curb):**
Effective Weir Length (ft)	L+1.8*W	7.20
Adjusted Effective Weir Length (ft)	$L+1.8(1-CF_c/100)*W$	5.91
Curb Open Area (sf)	L*H	2.25
Adjusted Curb Open Area (sf)	Curb Open Area * $(1-CF_c/100)$	1.13
Controlling Flow Type (weir/orifice)	If D<H, weir, else orifice	orifice
Intercepted Flow (cfs)	weir: $W_c*(\text{Adj. Eff. Weir Length})*D^{1.5}$	4.92
	orifice: $O_c*(\text{Adj. Curb Open Area})*(64.4*(D-H/2))^{0.5}$	
Output (Total):	**Equation:**	**Output (Total):**
Capacity Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	**9.2**

Curb Inlet Sizing Computation

Project Name & Number:	**Sunstone Parcel 3 - Ph-3**
Date:	**2/17/2022**
By:	**SOA**

Westwood

	Notes:		
	Facility ID:	SDDI #3&4	
	Drainage Condition:	Proposed	
	Source of Flow:	Q100 = 1/2*[EAA1{(2f+2g+0.5*(2h)}+DI#1-Bypass]	
	Inlet Type:	Type CM2 (Continuous Grade)	
	Inlet Length:	15.-ft	
	Number of Grates	5	
	Input:	**Variable:**	**Input:**
	Street Flow (cfs)	Q	6.25
	Longitudinal Slope (ft/ft)	S_o	0.0327
	Manning's Coefficient	n	0.016
	Street Flow Velocity (fps)	V	4.13
	Street Flow Depth (ft)	D	0.33
	Street Cross Slope (ft/ft)	S_x	0.02
	Grate Width (ft)	W	1.5
	Grate Depression (in)	D_g	2.0
	Length of Grate (ft)	L_g	12.25
	Length of Curb Opening (ft)	L_c	14.50
	Clogging Factor - Grate (%)	CF_g	50%
	Clogging Factor - Curb (%)	CF_c	50%
	Effective Grate Length (ft)	L_{ge}	6.1
	Effective Curb Opening Length (ft)	L_{ce}	7.25
	Output (Grate):	**Equation:**	**Output (Grate):**
[1]	R_f - Frontal Flow Factor	1-0.09*(V-V_x) if V>V_x; else Frontal Flow Factor=1	1.00
[2]	V_o - Splash Over Velocity (fps)	V_x=p+q*Lg-r*L_{ge}^2+sy*L_{ge}^3 ; where	15.33
		p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate)	
[1]	E - Grate Flow Ratio	Frontal Flow/Side Flow	0.42
[2]	Q_w - Frontal Flow (cfs)	$Q_w = Q[1-(1-(W/T))^{2.67}]$	2.61
[1]	Q_s - Side Flow (cfs)	Q_s = Q-Qw	3.6
	T - Side Flow Spread (ft)	$(D-D_g)/S_x$	8.17
[1]	R_s - Side Flow Factor	$1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$	0.40
[1]	Q_{gi} - Intercepted Flow (cfs)	$(R_f*E+R_s*(1-E))*Q$	4.1
	Output (Curb):	**Equation:**	**Output (Curb):**
[1]	S_e - Equivalent Cross Slope (ft/ft)	S_x+S_g*E	0.066
	Q_{sx} - Remaining Flow After Grate Interception (cfs)	$Q-Q_{gi}$	2.176
	S_g - Gutter Cross Slope (ft/ft)	D_g/W	0.111
[1]	L_t - Effective Interception Length (ft)	$0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$	18.12
[1]	Q_{ci} - Intercepted Flow (cfs)	$(1-(1-L_{ce}/L_t)^{1.8})*Q_{sx}$	1.3
		or Q_{sx} if L_t is less than L_{ce}	
	Output (Combination):	**Equation:**	**Output (Combination):**
	Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	**5.5**
	Bypass Flow (cfs)	Street Flow - Total Intercepted Flow	**0.75**

[1] Formula referenced from the CCRFCD Manual

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

Curb Inlet Sizing Computation

Project Name & Number:	**Sunstone Parcel 3 - Ph-3**
Date:	**2/17/2022**
By:	**KH**

Westwood

	Notes:		
	Facility ID:	SDDI #5&6	
	Drainage Condition:	Proposed	
	Source of Flow:	Q100 = 1/2 * EAA2*(2e)	
	Inlet Type:	Type CM2 (Continuous Grade)	
	Inlet Length:	22.5-ft	
	Number of Grates	8	
	Input:	**Variable:**	**Input:**
	Street Flow (cfs)	Q	11.0
	Longitudinal Slope (ft/ft)	S_o	0.0085
	Manning's Coefficient	n	0.016
	Street Flow Velocity (fps)	V	2.99
	Street Flow Depth (ft)	D	0.47
	Street Cross Slope (ft/ft)	S_x	0.02
	Grate Width (ft)	W	1.5
	Grate Depression (in)	D_g	2.0
	Length of Grate (ft)	L_g	19.75
	Length of Curb Opening (ft)	L_c	22.00
	Clogging Factor - Grate (%)	CF_g	50%
	Clogging Factor - Curb (%)	CF_c	50%
	Effective Grate Length (ft)	L_{ge}	9.9
	Effective Curb Opening Length (ft)	L_{ce}	11.00
	Output (Grate):	**Equation:**	**Output (Grate):**
[1]	R_f - Frontal Flow Factor	1-0.09*(V-V_x) if V>V_x; else Frontal Flow Factor=1	1.00
[2]	V_o - Splash Over Velocity (fps)	V_x=p+q*Lg-r*L_{ge}^2+sy*L_{ge}^3 ; where	64.89
		p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate)	
[1]	E - Grate Flow Ratio	Frontal Flow/Side Flow	0.24
[2]	Q_w - Frontal Flow (cfs)	$Q_w = Q[1-(1-(W/T))^{2.67}]$	2.67
[1]	Q_s - Side Flow (cfs)	Q_s = Q-Qw	8.3
	T - Side Flow Spread (ft)	$(D-D_g)/S_x$	15.17
[1]	R_s - Side Flow Factor	$1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$	0.78
[1]	Q_{gi} - Intercepted Flow (cfs)	$(R_f*E+R_s*(1-E))*Q$	9.2
	Output (Curb):	**Equation:**	**Output (Curb):**
[1]	S_e - Equivalent Cross Slope (ft/ft)	S_x+S_g*E	0.047
	Q_{sx} - Remaining Flow After Grate Interception (cfs)	$Q-Q_{gi}$	1.811
	S_g - Gutter Cross Slope (ft/ft)	D_g/W	0.111
[1]	L_t - Effective Interception Length (ft)	$0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$	13.80
[1]	Q_{ci} - Intercepted Flow (cfs)	$(1-(1-L_{ce}/L_t)^{1.8})*Q_{sx}$	1.7
		or Q_{sx} if L_t is less than L_{ce}	
	Output (Combination):	**Equation:**	**Output (Combination):**
	Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	**11.00**
	Bypass Flow (cfs)	Street Flow - Total Intercepted Flow	**0.00**

[1] Formula referenced from the CCRFCD Manual

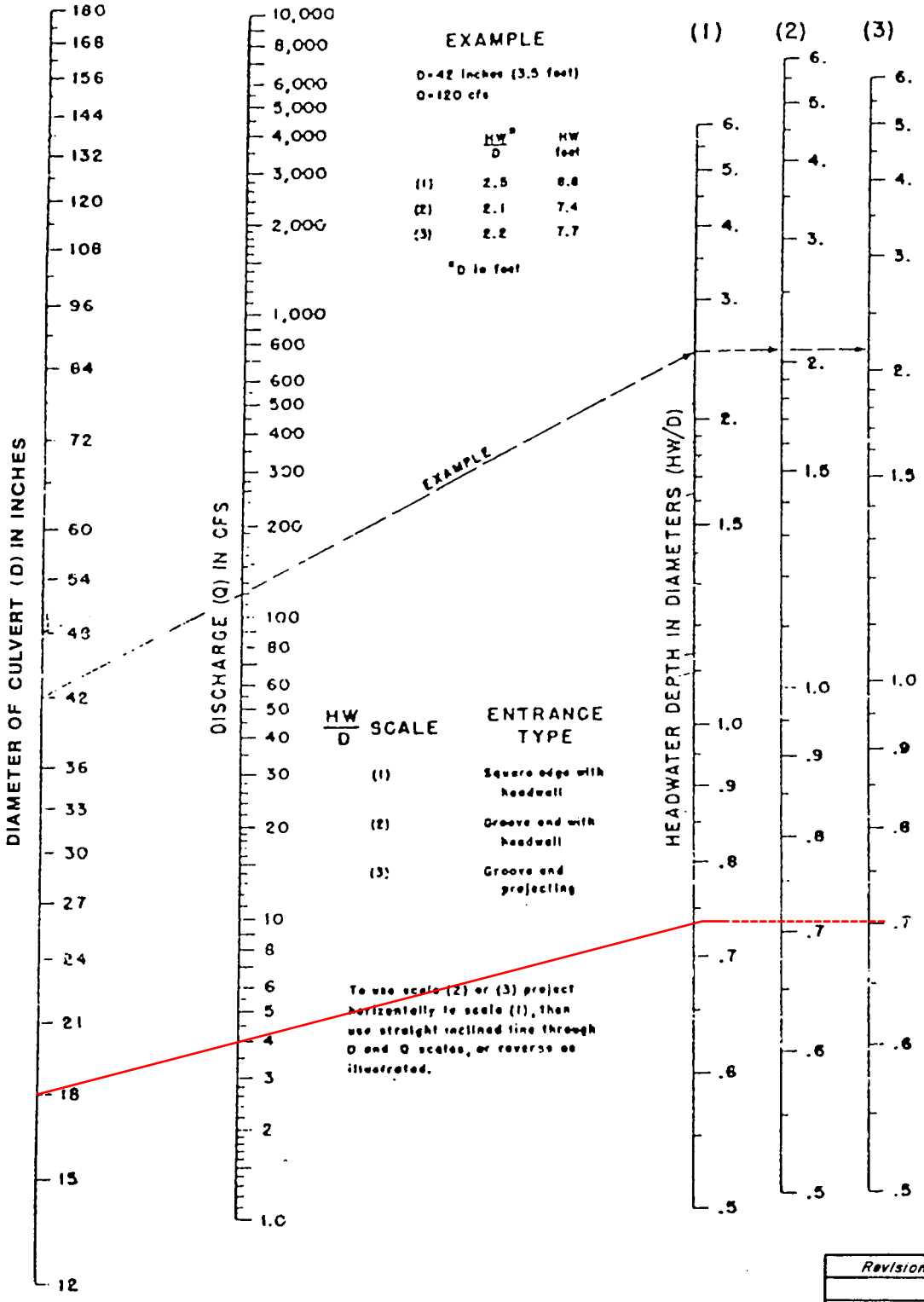
[2] Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

Inlet Control Nomographs

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH – INLET CONTROL RCP

SDDI 1: Q=4 CFS



HW/D	.75
D	18
HW	1.125

Revision	Date

WRC ENGINEERING

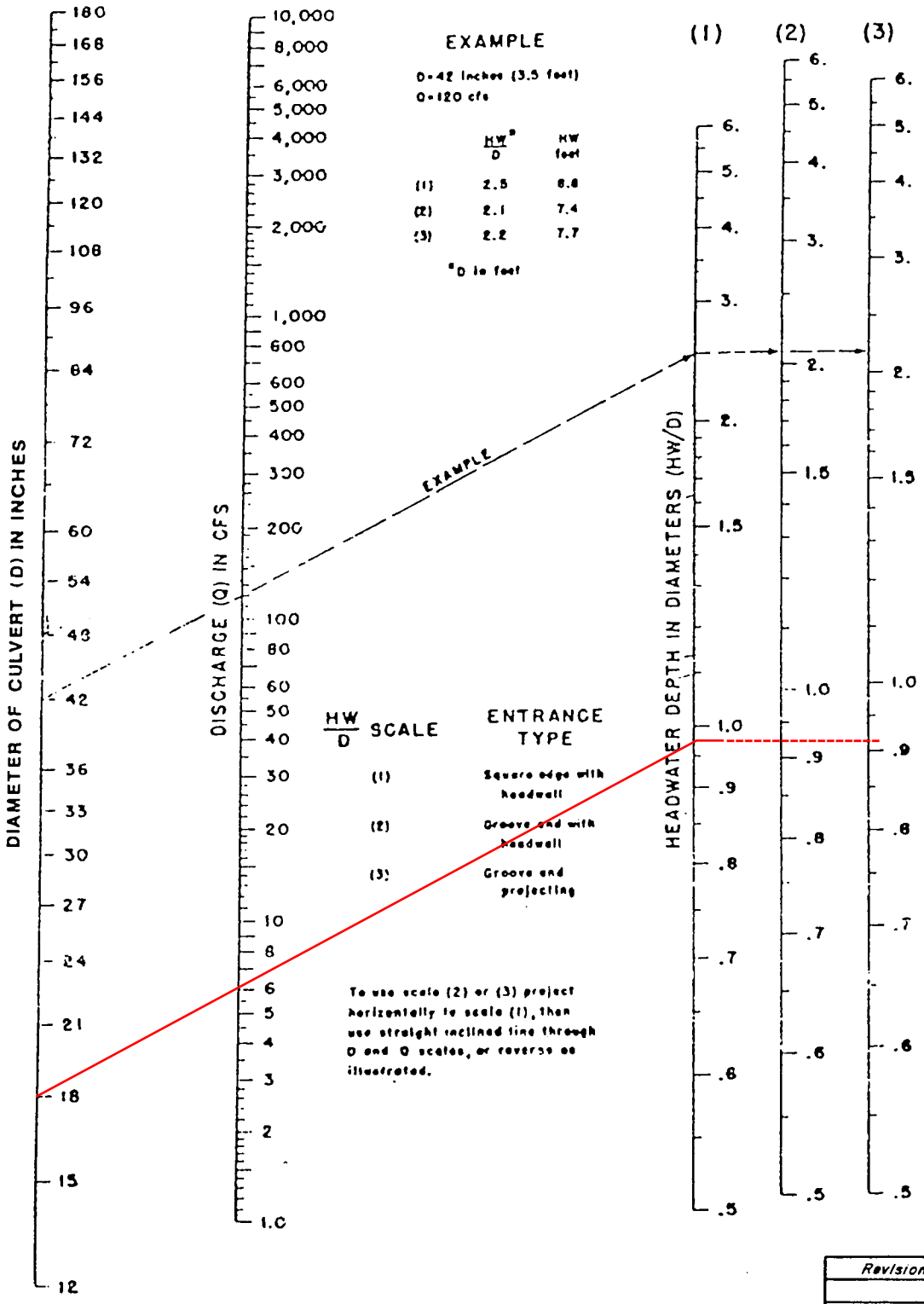
REFERENCE: USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH – INLET CONTROL RCP

SDDI 2: Q=6 CFS



HW/D	.97
D	18
HW	1.5

Revision	Date

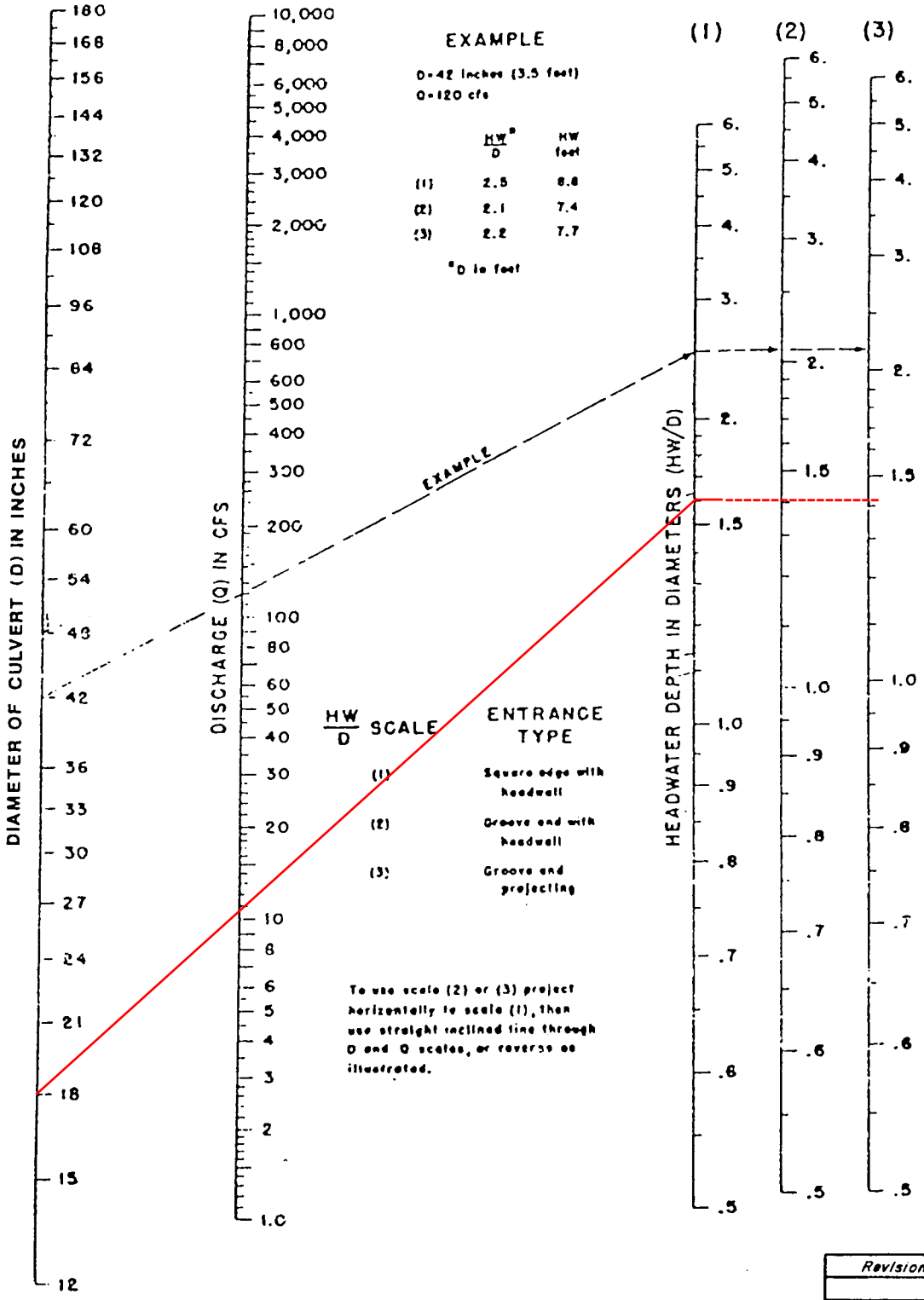
WRC ENGINEERING

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

FIGURE 1005

NOMOGRAPH – INLET CONTROL RCP

SDDI 3: Q=11.5 CFS



HW/D	1.6
D	18
HW	2.4

Revision	Date

WRC ENGINEERING

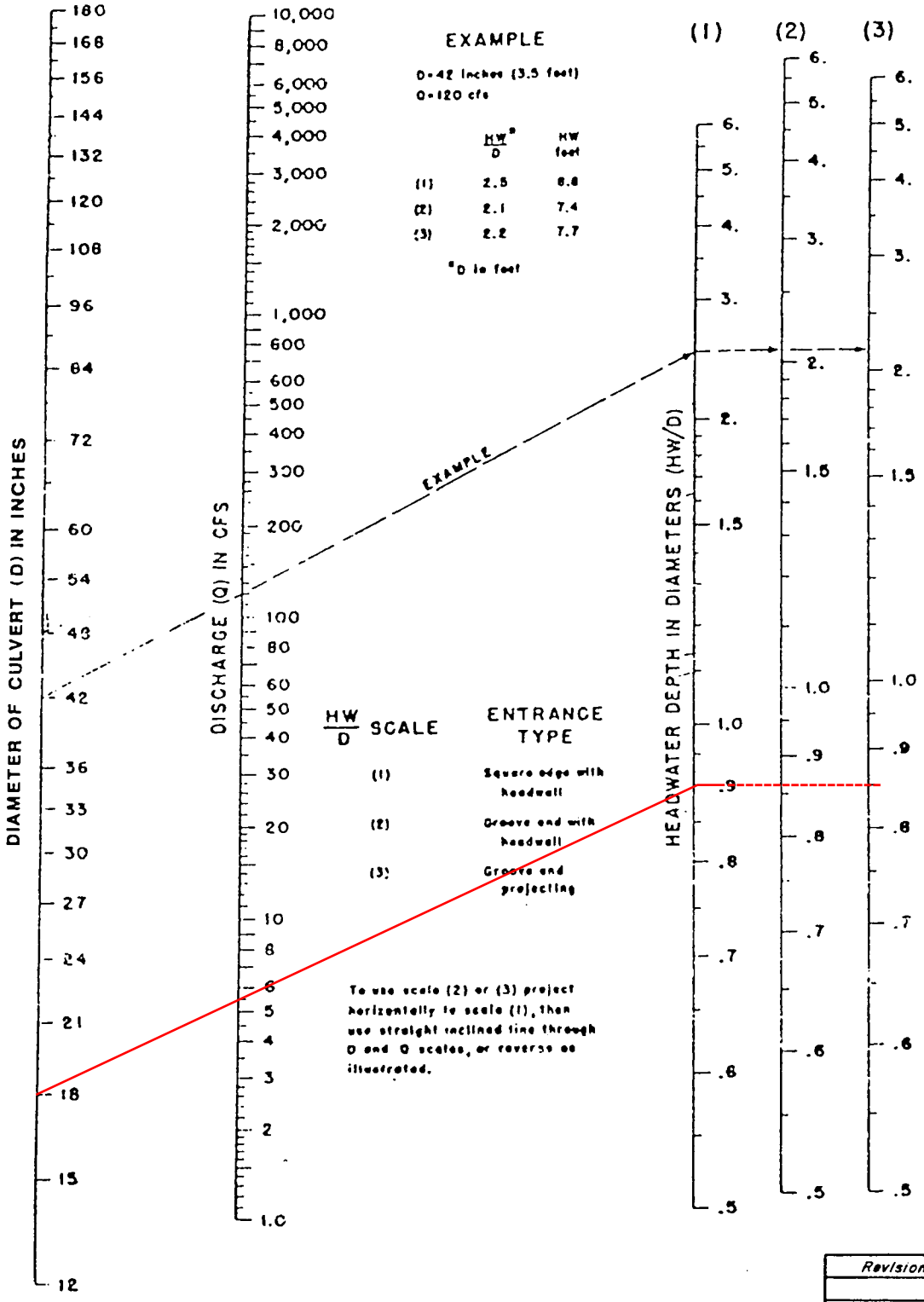
REFERENCE: USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH – INLET CONTROL RCP

SDDI 4: Q=5.5 CFS



HW/D	.9
D	18
HW	1.4

Revision	Date

WRC ENGINEERING

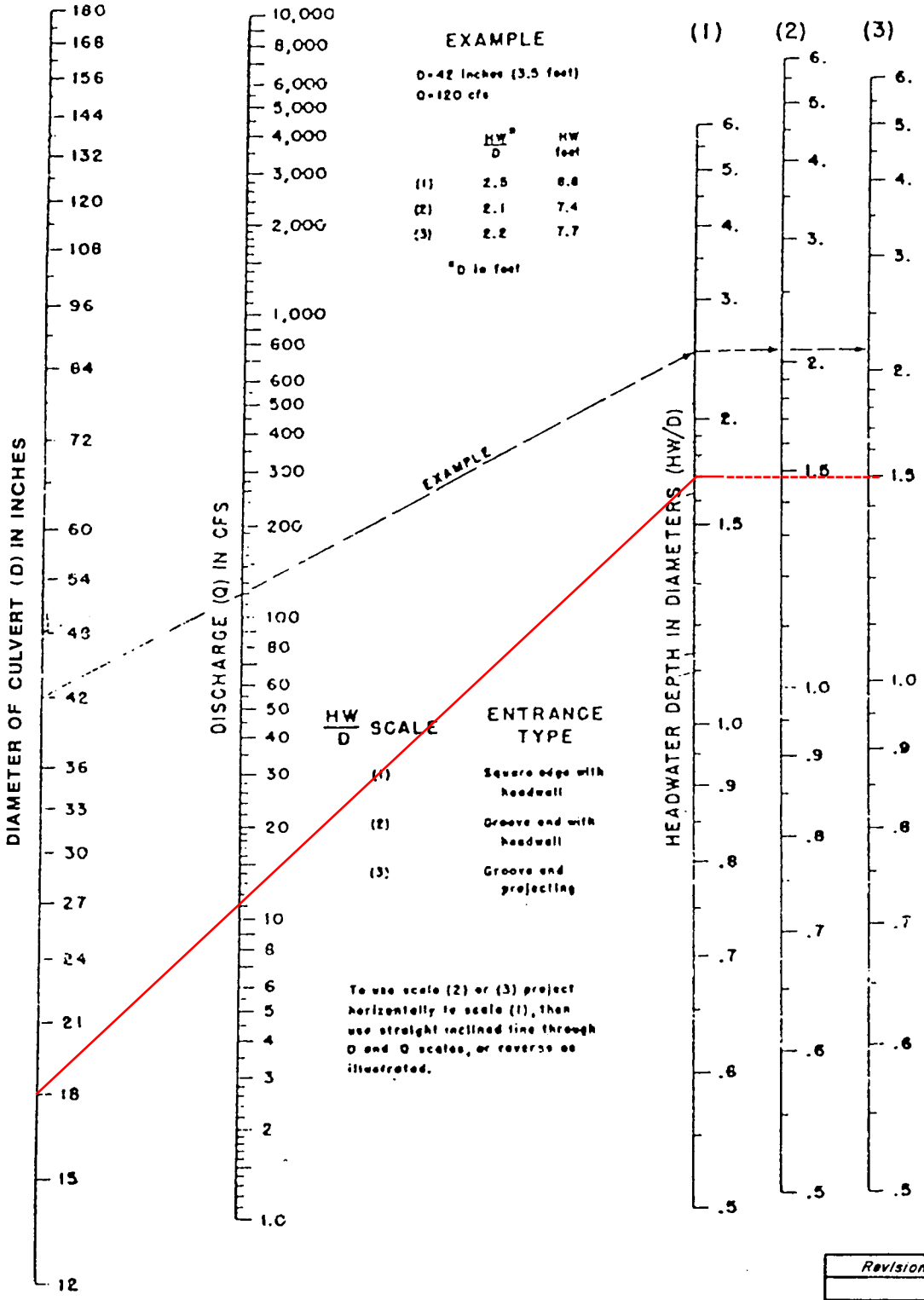
REFERENCE: USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH – INLET CONTROL RCP

SDDI 5: Q=11 CFS



HW/D	1.7
D	18
HW	2.6

Revision	Date

WRC ENGINEERING

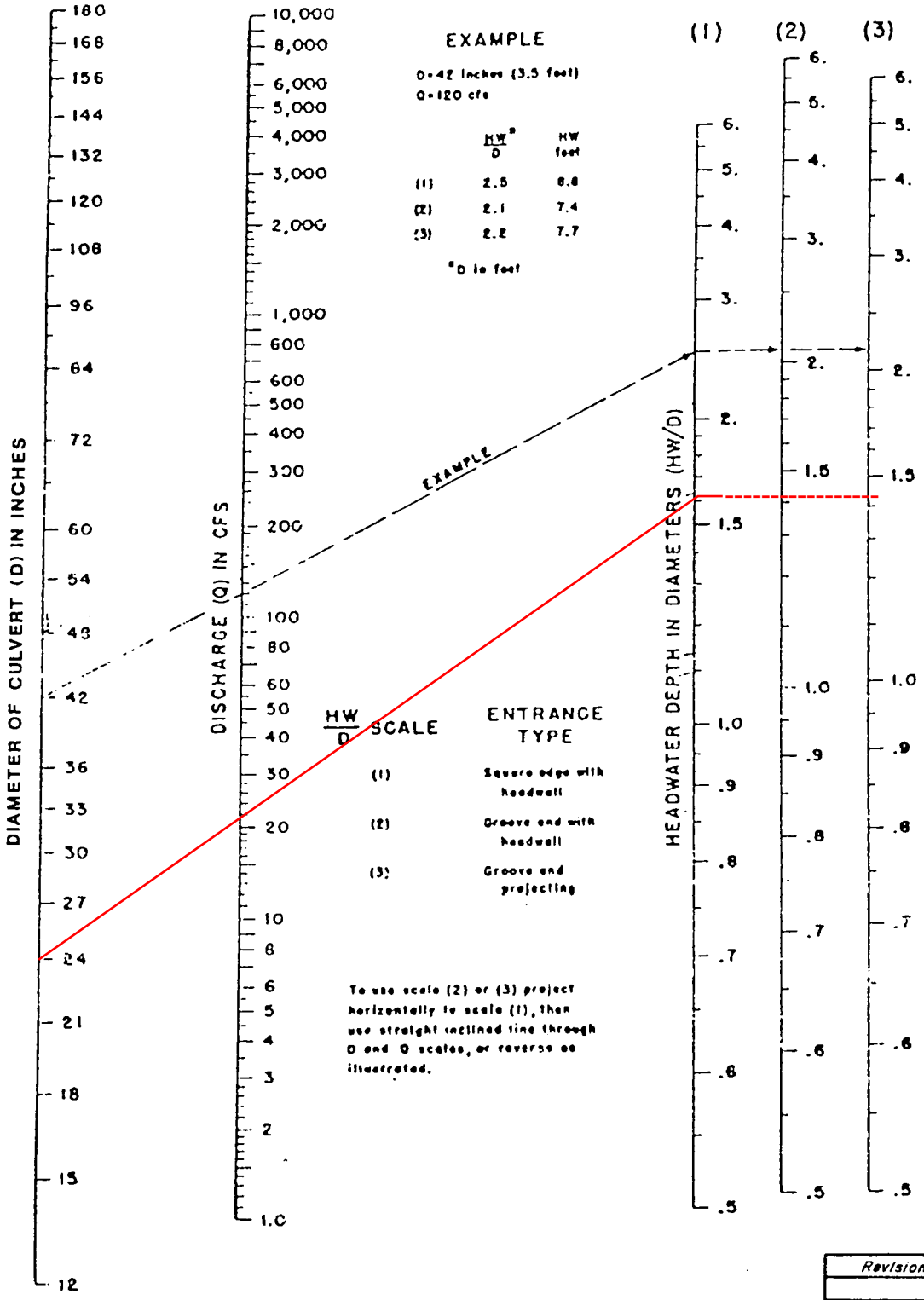
REFERENCE: USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH – INLET CONTROL RCP

SDDI 6: Q=22 CFS



HW/D 1.6

D 24

HW 3.2

Revision	Date

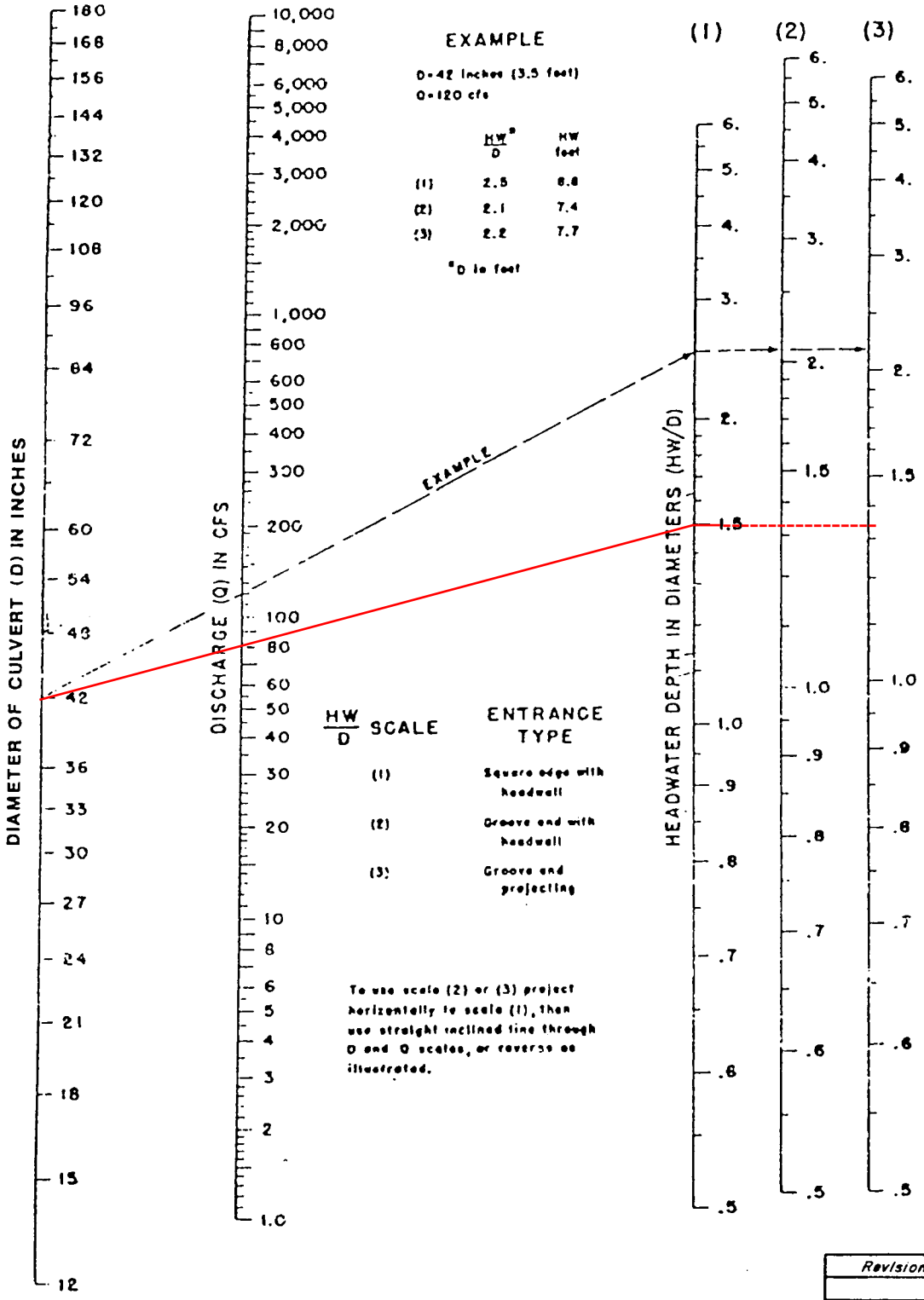
WRC ENGINEERING

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

FIGURE 1005

NOMOGRAPH – INLET CONTROL RCP

INLET @ NCR1: Q=79.5 CFS



HW/D	1.5
D	42
HW	5.3

Revision	Date

WRC ENGINEERING

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

FIGURE 1005

WSPG Model

Proposed Condition WSPG Summary

PHASE 3 STORM DRAIN (PH3.WSW): Mainline from Ex. SDDI (Facility PC2-5) to Proposed Outfall Channel (Sangria Sunrise Ave/Facility PH3-3)

WSPG Station	Equivalent Roadway Station	Improvement Plan Sheet	Storm Drain Dimension	Invert Elevation (ft)	Q_{100} (cfs)	WSE (ft)	Velocity (ft/s)	FG Elevation	Facility Description	HGL Check[1]
1 - 'HGL Check' reflects the minimum 1-ft below finished grade.										
913.71	N/A	P-1	36" RCP	2758.98	70.50	2760.69	16.90	N/A	Outlet	N/A
994.98	10+20.61	P-1	36" RCP	2761.34	70.50	2763.06	16.87	2768.96	Concrete Collar	OK
995.00			36" RCP	2761.36	70.50	2763.08	16.83	2768.96		OK
1055.61	21+47.39	P-1	36" RCP	2763.28	70.50	2765.06	16.19	2776.01	SDMH 9	OK
1060.61			30" RCP	2763.78	53.50	2765.41	15.76	2776.01	SDMH 9 / Connection DI3 & 4 laterals	OK
1203.36	20+04.74	P-1	30" RCP	2768.41	53.50	2770.60	11.73	2780.67	SDMH 8	OK
1203.37			30" RCP	2768.42	53.50	2770.63	11.65	2780.67	SDMH 8	OK
1203.38			30" RCP	2768.43	53.50	2770.67	11.55	2780.67	SDMH 8	OK
1203.39			30" RCP	2768.44	53.50	2770.71	11.44	2780.67	SDMH 8	OK
1203.40			30" RCP	2768.45	53.50	2770.79	11.20	2780.67	SDMH 8	OK
1208.40	10+09.26	P-2	30" RCP	2768.45	53.50	2771.00	10.90	2780.67	SDMH 8	OK
1364.37	11+70.22	P-2	30" RCP	2769.63	53.50	2773.65	10.90	2781.78	SDMH 7	OK
1369.37			30" RCP	2769.64	23.00	2776.71	4.69	2781.78	SDMH 7 / Connection DI1 & PC2-F laterals	OK
1640.24	14+45.92	P-3	30" RCP	2772.32	23.00	2777.56	4.69	2783.43	SDMH 6	OK
1645.24			30" RCP	2772.33	23.00	2777.59	4.69	2783.43	SDMH 6	OK
1940.96	17+46.64	P-3	30" RCP	2773.82	23.00	2778.52	4.69	2785.23	SDMH 5	OK
1945.96			30" RCP	2773.83	23.00	2778.56	4.69	2785.23	SDMH 5	OK
1988.99	17+94.99	P-3	30" RCP	2774.07	23.00	2778.69	4.69	2785.53	SDMH 4	OK
1993.99			24" RCP	2774.57	23.00	2778.26	7.32	2785.53	SDMH 4	OK
2037.02	18+43.33	P-3	24" RCP	2774.80	23.00	2778.70	7.32	2785.82	SDMH 3	OK
2042.02			24" RCP	2774.81	23.00	2778.80	7.32	2785.82	SDMH 3	OK
2085.05	18+91.67	P-3	24" RCP	2775.05	23.00	2779.25	7.32	2786.10	SDMH 2	OK
2090.05			24" RCP	2775.06	23.00	2779.35	7.32	2786.10	SDMH 2	OK
2144.44	19+51.36	P-4	24" RCP	2775.29	23.00	2779.95	7.32	2786.26	SDMH 1	OK
2144.45			24" RCP	2775.30	23.00	2779.99	7.32	2786.26	SDMH 1	OK
2144.46			24" RCP	2775.31	23.00	2780.03	7.32	2786.26	SDMH 1	OK
2144.47			24" RCP	2775.32	23.00	2780.07	7.32	2786.26	SDMH 1	OK
2144.48			24" RCP	2775.33	23.00	2780.12	7.32	2786.26	SDMH 1	OK
2144.49			24" RCP	2775.34	23.00	2780.14	7.32	2786.26	SDMH 1	OK

Proposed Condition WSPG Summary

PHASE 3 STORM DRAIN (PH3.WSW): Mainline from Ex. SDDI (Facility PC2-5) to Proposed Outfall Channel (Sangria Sunrise Ave/Facility PH3-3)

WSPG Station	Equivalent Roadway Station	Improvement Plan Sheet	Storm Drain Dimension	Invert Elevation (ft)	Q_{100} (cfs)	WSE (ft)	Velocity (ft/s)	FG Elevation	Facility Description	HGL Check[1]
1 - 'HGL Check' reflects the minimum 1-ft below finished grade.										
2149.49	4+13.9	P-5	24" RCP	2775.35	23.00	2780.23	7.32	2786.26	SDMH 1	OK
2422.12	1+41.2	SHE1901-002 PHASE 2 SD-2	24" RCP	2776.72	23.00	2783.09	7.32	2787.75	EX. SDDI (FACILITY PC2-6)	OK
2422.13			24" RCP	2776.73	23.00	2783.13	7.32	2787.75	EX. SDDI (FACILITY PC2-6)	OK
2422.14			24" RCP	2776.74	23.00	2783.16	7.32	2787.75	EX. SDDI (FACILITY PC2-6)	OK
2426.12	1+37.1	SHE1901-002 PHASE 2 SD-2	18" RCP	2777.22	11.50	2784.39	6.51	2787.75	EX. SDDI (FACILITY PC2-6)	OK
2463.25	1+00.	SHE1901-002 PHASE 2 SD-2	18" RCP	2778.31	11.50	2784.84	6.51	2787.29	EX. SDDI (FACILITY PC2-5)	OK

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T1 SHE1901-003: PARCEL 3 AT SUNSTONE PHASE 3
T2 PH3 SD MAINLINE-EX. FACILITY PC2-5 TO SANGRIA SUNRISE OUTLET
T3 DOWNSTREAM WSE FROM FLOWMASTER SECTION
SO    913.71 2758.98  36                          2760.160
R     994.98 2761.34  36      .013                                      15.0
R     994.99 2761.35  36      .013                                      15.0
R     995.00 2761.36  36      .013                                      12.0
R    1055.61 2763.28  36      .013
JX   1060.61 2763.78  30 18 18.013   11.5      5.5  2764.78 2764.78  69.0-79.0
R    1203.36 2768.41  30      .013                                      15.0
R    1203.37 2768.42  30      .013                                      15.0
R    1203.38 2768.43  30      .013                                      15.0
R    1203.39 2768.44  30      .013                                      15.0
R    1203.40 2768.45  30      .013                                      15.0
R    1208.40 2768.45  30      .013                                      15.0   1
R    1364.37 2769.63  30      .013
JX   1369.37 2769.64  30 24 18.013   27.0      3.5  2770.14 2770.64  90.0-90.0
R    1640.24 2772.32  30      .013
R    1645.24 2772.33  30      .013                                       0.0   1
R    1940.96 2773.82  30      .013
R    1945.96 2773.83  30      .013                                      -1.0   1
R    1988.99 2774.07  30      .013
JX   1993.99 2774.57  24      .013                                      -2.0   1
R    2037.02 2774.80  24      .013
R    2042.02 2774.81  24      .013                                      -2.0   1
R    2085.05 2775.05  24      .013
R    2090.05 2775.06  24      .013                                      -2.0   1
R    2144.44 2775.29  24      .013                                     -15.0
R    2144.45 2775.30  24      .013                                     -15.0
R    2144.46 2775.31  24      .013                                     -15.0
R    2144.47 2775.32  24      .013                                     -15.0
R    2144.48 2775.33  24      .013                                     -15.0
R    2144.49 2775.34  24      .013                                      -9.0
R    2149.49 2775.35  24      .013                                       0.0   1
R    2422.12 2776.72  24      .013                                     -15.0
R    2422.13 2776.73  24      .013                                     -15.0
R    2422.14 2776.74  24      .013                                     -11.0
JX   2426.12 2777.22  18 18   .013   11.5           2770.14          90.0
R    2463.25 2778.31  18      .013
SH   2463.25 2778.31  18
CD  36  4   1   0.000   3.000    0.000 0.000 0.000  0.0000.00  0.00
CD  30  4   1   0.000   2.500    0.000 0.000 0.000  0.0000.00  0.00
CD  24  4   1   0.000   2.000    0.000 0.000 0.000  0.0000.00  0.00
CD  18  4   1   0.000   1.500    0.000 0.000 0.000  0.0000.00  0.00
Q            11.500
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FILE: PH3.WSW W S P G W - EDIT LISTING - Version 14.10 Date: 2-17-2022 Time: 8:39:56

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	36	4	1		3.000														
CD	30	4	1		2.500														
CD	24	4	1		2.000														
CD	18	4	1		1.500														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
SHE1901-003: PARCEL 3 AT SUNSTONE PHASE 3

HEADING LINE NO 2 IS -
PH3 SD MAINLINE-EX. FACILITY PC2-5 TO SANGRIA SUNRISE OUTLET

HEADING LINE NO 3 IS -
DOWNSTREAM WSE FROM FLOWMASTER SECTION

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	913.710	2758.980	36	2760.160

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	994.980	2761.340	36	.013	.000	.000	15.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	994.990	2761.350	36	.013	.000	.000	15.000	0

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	995.000	2761.360	36	.013	.000	.000	12.000	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1055.610	2763.280	36	.013	.000	.000	.000	0

ELEMENT NO 6 IS A JUNCTION * * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1060.610	2763.780	30	18	18	.013	11.500	5.500	2764.780	2764.780	69.000	-79.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1203.360	2768.410	30	.013	.000	.000	15.000	0

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1203.370	2768.420	30	.013	.000	.000	15.000	0

ELEMENT NO 9 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1203.380	2768.430	30	.013	.000	.000	15.000	0

ELEMENT NO 10 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1203.390	2768.440	30	.013	.000	.000	15.000	0

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ELEMENT NO  11 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             1203.400 2768.450   30              .013                           .000     .000    15.000     0
ELEMENT NO  12 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             1208.400 2768.450   30              .013                           .000     .000    15.000     1
                                              W S P G W                                                          PAGE NO   3
                       WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO  13 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             1364.370 2769.630   30              .013                           .000     .000      .000     0
ELEMENT NO  14 IS A JUNCTION         *         *     *     *               *                    *                *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                             1369.370 2769.640   30    24    18   .013    27.000     3.500  2770.140  2770.640  90.000  -90.000
                                                                                          RADIUS    ANGLE
                                                                                            .000    .000
ELEMENT NO  15 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             1640.240 2772.320   30              .013                           .000     .000      .000     0
ELEMENT NO  16 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             1645.240 2772.330   30              .013                           .000     .000      .000     1
ELEMENT NO  17 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             1940.960 2773.820   30              .013                           .000     .000      .000     0
ELEMENT NO  18 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             1945.960 2773.830   30              .013                           .000     .000    -1.000     1
ELEMENT NO  19 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             1988.990 2774.070   30              .013                           .000     .000      .000     0
ELEMENT NO  20 IS A JUNCTION         *         *     *     *               *                    *                *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                             1993.990 2774.570   24     0     0   .013      .000      .000      .000      .000    .000   -2.000
                                                                                          RADIUS    ANGLE
                                                                                            .000    .001
ELEMENT NO  21 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2037.020 2774.800   24              .013                           .000     .000      .000     0
ELEMENT NO  22 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2042.020 2774.810   24              .013                           .000     .000    -2.000     1
                                              W S P G W                                                          PAGE NO   4
                       WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO  23 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2085.050 2775.050   24              .013                           .000     .000      .000     0
ELEMENT NO  24 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2090.050 2775.060   24              .013                           .000     .000    -2.000     1
ELEMENT NO  25 IS A REACH            *         *     *
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                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2144.440 2775.290   24              .013                           .000     .000   -15.000     0
ELEMENT NO  26 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2144.450 2775.300   24              .013                           .000     .000   -15.000     0
ELEMENT NO  27 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2144.460 2775.310   24              .013                           .000     .000   -15.000     0
ELEMENT NO  28 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2144.470 2775.320   24              .013                           .000     .000   -15.000     0
ELEMENT NO  29 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2144.480 2775.330   24              .013                           .000     .000   -15.000     0
ELEMENT NO  30 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2144.490 2775.340   24              .013                           .000     .000    -9.000     0
ELEMENT NO  31 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2149.490 2775.350   24              .013                           .000     .000      .000     1
ELEMENT NO  32 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2422.120 2776.720   24              .013                           .000     .000   -15.000     0
ELEMENT NO  33 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2422.130 2776.730   24              .013                           .000     .000   -15.000     0
ELEMENT NO  34 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2422.140 2776.740   24              .013                           .000     .000   -11.000     0
ELEMENT NO  35 IS A JUNCTION          *         *     *     *               *                  *                *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                             2426.120 2777.220   18    18     0   .013    11.500      .000  2770.140      .000  90.000     .000
                                                                                          RADIUS    ANGLE
                                                                                            .000    .000
                                                  W S P G W                                                        PAGE NO   5
                        WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO  36 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2463.250 2778.310   18              .013                           .000     .000      .000     0
ELEMENT NO  37 IS A SYSTEM HEADWORKS                *                     *
                  U/S DATA   STATION    INVERT  SECT                                W S ELEV
                             2463.250 2778.310   18                                   .000
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Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 2-17-2022 Time: 8:39:57

SHE1901-003: PARCEL 3 AT SUNSTONE PHASE 3
PH3 SD MAINLINE-EX. FACILITY PC2-5 TO SANGRIA SUNRISE OUTLET
DOWNSTREAM WSE FROM FLOWMASTER SECTION

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
913.710	2758.980	1.713	2760.693	70.50	16.90	4.44	2765.13	.00	2.66	2.97	3.000	.000	.00	1 .0
81.270	.0290					.0288	2.34	1.71	2.51	1.71	.013	.00	.00	PIPE
994.980	2761.340	1.716	2763.056	70.50	16.87	4.42	2767.48	.00	2.66	2.97	3.000	.000	.00	1 .0
.010	1.0000					.0287	.00	1.72	2.51	.66	.013	.00	.00	PIPE
994.990	2761.350	1.717	2763.067	70.50	16.85	4.41	2767.48	.00	2.66	2.97	3.000	.000	.00	1 .0
.010	1.0000					.0286	.00	1.72	2.50	.66	.013	.00	.00	PIPE
995.000	2761.360	1.719	2763.079	70.50	16.83	4.40	2767.48	.00	2.66	2.97	3.000	.000	.00	1 .0
60.610	.0317					.0272	1.65	1.72	2.50	1.66	.013	.00	.00	PIPE
1055.610	2763.280	1.775	2765.055	70.50	16.19	4.07	2769.13	.00	2.66	2.95	3.000	.000	.00	1 .0
JUNCT STR	.1000					.0276	.14	1.77	2.35		.013	.00	.00	PIPE
1060.610	2763.780	1.632	2765.412	53.50	15.76	3.86	2769.27	.00	2.34	2.38	2.500	.000	.00	1 .0
17.523	.0324					.0290	.51	1.63	2.33	1.58	.013	.00	.00	PIPE
1078.133	2764.348	1.646	2765.994	53.50	15.61	3.78	2769.78	.00	2.34	2.37	2.500	.000	.00	1 .0
50.970	.0324					.0271	1.38	1.65	2.29	1.58	.013	.00	.00	PIPE
1129.103	2766.001	1.717	2767.719	53.50	14.88	3.44	2771.16	.00	2.34	2.32	2.500	.000	.00	1 .0
28.437	.0324					.0241	.69	1.72	2.11	1.58	.013	.00	.00	PIPE
1157.540	2766.924	1.794	2768.718	53.50	14.19	3.13	2771.84	.00	2.34	2.25	2.500	.000	.00	1 .0
18.501	.0324					.0216	.40	1.79	1.93	1.58	.013	.00	.00	PIPE

SHE1901-003: PARCEL 3 AT SUNSTONE PHASE 3
PH3 SD MAINLINE-EX. FACILITY PC2-5 TO SANGRIA SUNRISE OUTLET
DOWNSTREAM WSE FROM FLOWMASTER SECTION

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1176.041	2767.524	1.878	2769.401	53.50	13.53	2.84	2772.24	.00	2.34	2.16	2.500	.000	.00	1 .0
12.771	.0324					.0194	.25	1.88	1.76	1.58	.013	.00	.00	PIPE
1188.812	2767.938	1.969	2769.907	53.50	12.90	2.58	2772.49	.00	2.34	2.04	2.500	.000	.00	1 .0
8.853	.0324					.0175	.16	1.97	1.60	1.58	.013	.00	.00	PIPE
1197.665	2768.225	2.072	2770.297	53.50	12.30	2.35	2772.65	.00	2.34	1.88	2.500	.000	.00	1 .0
5.695	.0324					.0160	.09	2.07	1.43	1.58	.013	.00	.00	PIPE
1203.360	2768.410	2.192	2770.602	53.50	11.73	2.14	2772.74	.00	2.34	1.64	2.500	.000	.00	1 .0
.010	1.0000					.0153	.00	2.19	1.24	.61	.013	.00	.00	PIPE
1203.370	2768.420	2.212	2770.632	53.50	11.65	2.11	2772.74	.00	2.34	1.60	2.500	.000	.00	1 .0
.010	1.0000					.0151	.00	2.21	1.21	.61	.013	.00	.00	PIPE
1203.380	2768.430	2.235	2770.665	53.50	11.55	2.07	2772.74	.00	2.34	1.54	2.500	.000	.00	1 .0
.010	1.0000					.0150	.00	2.24	1.17	.61	.013	.00	.00	PIPE
1203.390	2768.440	2.266	2770.706	53.50	11.44	2.03	2772.74	.00	2.34	1.46	2.500	.000	.00	1 .0
.010	1.0000					.0148	.00	2.27	1.13	.61	.013	.00	.00	PIPE
1203.400	2768.450	2.340	2770.790	53.50	11.20	1.95	2772.74	.00	2.34	1.22	2.500	.000	.00	1 .0
1.825	.0000					.0150	.03	2.34	1.00	.00	.013	.00	.00	PIPE
1205.225	2768.450	2.457	2770.907	53.50	10.94	1.86	2772.77	.00	2.34	.65	2.500	.000	.00	1 .0
1.809	.0000					.0160	.03	2.46	.70	.00	.013	.00	.00	PIPE

SHE1901-003: PARCEL 3 AT SUNSTONE PHASE 3
PH3 SD MAINLINE-EX. FACILITY PC2-5 TO SANGRIA SUNRISE OUTLET
DOWNSTREAM WSE FROM FLOWMASTER SECTION

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1207.034	2768.450	2.500	2770.950	53.50	10.90	1.84	2772.79	.00	2.34	.00	2.500	.000	.00	1 .0
1.366	.0000					.0169	.02	2.50	.00	.00	.013	.00	.00	PIPE
1208.400	2768.450	2.548	2770.998	53.50	10.90	1.84	2772.84	.00	2.34	.00	2.500	.000	.00	1 .0
155.970	.0076					.0170	2.65	2.55	.00	2.50	.013	.00	.00	PIPE
1364.370	2769.630	4.022	2773.652	53.50	10.90	1.84	2775.50	.00	2.34	.00	2.500	.000	.00	1 .0
JUNCT STR	.0020					.0101	.05	4.02	.00		.013	.00	.00	PIPE
1369.370	2769.640	7.070	2776.709	23.00	4.69	.34	2777.05	.00	1.63	.00	2.500	.000	.00	1 .0
270.870	.0099					.0031	.85	7.07	.00	1.34	.013	.00	.00	PIPE
1640.240	2772.320	5.241	2777.561	23.00	4.69	.34	2777.90	.00	1.63	.00	2.500	.000	.00	1 .0
5.000	.0020					.0031	.02	5.24	.00	2.50	.013	.00	.00	PIPE
1645.240	2772.330	5.264	2777.594	23.00	4.69	.34	2777.94	.00	1.63	.00	2.500	.000	.00	1 .0
295.720	.0050					.0031	.93	5.26	.00	1.68	.013	.00	.00	PIPE
1940.960	2773.820	4.704	2778.524	23.00	4.69	.34	2778.86	.00	1.63	.00	2.500	.000	.00	1 .0
5.000	.0020					.0031	.02	4.70	.00	2.50	.013	.00	.00	PIPE
1945.960	2773.830	4.728	2778.558	23.00	4.69	.34	2778.90	.00	1.63	.00	2.500	.000	.00	1 .0
43.030	.0056					.0031	.14	4.73	.00	1.62	.013	.00	.00	PIPE
1988.990	2774.070	4.623	2778.693	23.00	4.69	.34	2779.03	.00	1.63	.00	2.500	.000	.00	1 .0
JUNCT STR	.1000					.0067	.03	4.62	.00		.013	.00	.00	PIPE

SHE1901-003: PARCEL 3 AT SUNSTONE PHASE 3
PH3 SD MAINLINE-EX. FACILITY PC2-5 TO SANGRIA SUNRISE OUTLET
DOWNSTREAM WSE FROM FLOWMASTER SECTION

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1993.990	2774.570	3.689	2778.259	23.00	7.32	.83	2779.09	.00	1.71	.00	2.000	.000	.00	1 .0
43.030	.0053					.0103	.44	3.69	.00	2.00	.013	.00	.00	PIPE
2037.020	2774.800	3.904	2778.704	23.00	7.32	.83	2779.54	.00	1.71	.00	2.000	.000	.00	1 .0
5.000	.0020					.0103	.05	3.90	.00	2.00	.013	.00	.00	PIPE
2042.020	2774.810	3.993	2778.803	23.00	7.32	.83	2779.64	.00	1.71	.00	2.000	.000	.00	1 .0
43.030	.0056					.0103	.44	3.99	.00	2.00	.013	.00	.00	PIPE
2085.050	2775.050	4.198	2779.248	23.00	7.32	.83	2780.08	.00	1.71	.00	2.000	.000	.00	1 .0
5.000	.0020					.0103	.05	4.20	.00	2.00	.013	.00	.00	PIPE
2090.050	2775.060	4.287	2779.347	23.00	7.32	.83	2780.18	.00	1.71	.00	2.000	.000	.00	1 .0
54.390	.0042					.0103	.56	4.29	.00	2.00	.013	.00	.00	PIPE
2144.440	2775.290	4.660	2779.950	23.00	7.32	.83	2780.78	.00	1.71	.00	2.000	.000	.00	1 .0
.010	1.0000					.0103	.00	4.66	.00	.43	.013	.00	.00	PIPE
2144.450	2775.300	4.691	2779.991	23.00	7.32	.83	2780.82	.00	1.71	.00	2.000	.000	.00	1 .0
.010	1.0000					.0103	.00	4.69	.00	.43	.013	.00	.00	PIPE
2144.460	2775.310	4.723	2780.033	23.00	7.32	.83	2780.86	.00	1.71	.00	2.000	.000	.00	1 .0
.010	1.0000					.0103	.00	4.72	.00	.43	.013	.00	.00	PIPE
2144.470	2775.320	4.754	2780.074	23.00	7.32	.83	2780.91	.00	1.71	.00	2.000	.000	.00	1 .0
.010	1.0000					.0103	.00	4.75	.00	.43	.013	.00	.00	PIPE

SHE1901-003: PARCEL 3 AT SUNSTONE PHASE 3
PH3 SD MAINLINE-EX. FACILITY PC2-5 TO SANGRIA SUNRISE OUTLET
DOWNSTREAM WSE FROM FLOWMASTER SECTION

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2144.480	2775.330	4.785	2780.115	23.00	7.32	.83	2780.95	.00	1.71	.00	2.000	.000	.00	1 .0
.010	1.0000					.0103	.00	4.79	.00	.43	.013	.00	.00	PIPE
2144.490	2775.340	4.800	2780.140	23.00	7.32	.83	2780.97	.00	1.71	.00	2.000	.000	.00	1 .0
5.000	.0020					.0103	.05	4.80	.00	2.00	.013	.00	.00	PIPE
2149.490	2775.350	4.883	2780.233	23.00	7.32	.83	2781.07	.00	1.71	.00	2.000	.000	.00	1 .0
272.630	.0050					.0103	2.82	4.88	.00	2.00	.013	.00	.00	PIPE
2422.120	2776.720	6.373	2783.093	23.00	7.32	.83	2783.93	.00	1.71	.00	2.000	.000	.00	1 .0
2422.130	2776.730	6.404	2783.134	23.00	7.32	.83	2783.97	.00	1.71	.00	2.000	.000	.00	1 .0
.010	1.0000					.0103	.00	6.40	.00	.43	.013	.00	.00	PIPE
2422.140	2776.740	6.424	2783.164	23.00	7.32	.83	2784.00	.00	1.71	.00	2.000	.000	.00	1 .0
JUNCT STR	.1206					.0112	.04	6.42	.00		.013	.00	.00	PIPE
2426.120	2777.220	7.172	2784.393	11.50	6.51	.66	2785.05	.00	1.29	.00	1.500	.000	.00	1 .0
37.130	.0294					.0120	.45	7.17	.00	.87	.013	.00	.00	PIPE
2463.250	2778.310	6.528	2784.838	11.50	6.51	.66	2785.50	.00	1.29	.00	1.500	.000	.00	1 .0

Proposed Condition WSPG Summary
DI2 LATERAL MODEL - FROM SDMH9 TO FACILITY SDDI#2

WSPG Station	Equivalent Roadway Station	Improvement Plan Sheet	Storm Drain Dimension	Invert Elevation (ft)	Q_{100} (cfs)	WSE (ft)	Velocity (ft/s)	FG Elevation	Facility Description	HGL Check[1]
1 - 'HGL Check' reflects the minimum 1-ft below finished grade.										
1000.00	9+83.18	P-8	18" RCP	2764.78	11.50	2765.92	7.96	2776.01	SDMH 9	N/A
1004.58	9+87.76	P-8	18" RCP	2764.89	11.50	2766.18	7.10	2775.62	SDDI 3	OK
1004.60			18" RCP	2764.89	11.50	2766.19	7.05	2775.62		OK
1004.61			18" RCP	2764.89	11.50	2766.20	7.04	2775.62		OK
1004.62			18" RCP	2764.89	11.50	2766.20	7.03	2775.62		OK
1008.58	9+91.86	P-8	18" RCP	2764.89	6.00	2767.33	3.40	2775.62		OK
1361.61	13+44.89	P-8	18" RCP	2771.95	6.00	2772.90	5.11	2779.15	SDDI 2	OK

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T1 SHE1901-003: PARCEL 3 AT SUNSTONE PHASE 3
T2 DI2 LATERAL - FROM SDMH9 TO FACILITY SDDI#2
T3 DOWNSTREAM WSE FROM MAINLINE PH3 MODEL
SO   1000.00 2764.78  18                          2765.410
R    1004.58 2764.89  18      .013                                      -15.0
R    1004.59 2764.89  18      .013                                      -15.0
R    1004.60 2764.89  18      .013                                      -15.0
R    1004.61 2764.89  18      .013                                      -15.0
R    1004.62 2764.89  18      .013                                       -8.0
JX   1008.58 2764.89  18 18   .013    5.5           2764.89          90.0
R    1008.59 2764.90  18      .013                                      -15.0
R    1008.60 2764.91  18      .013                                      -12.0
R    1361.61 2771.95  18      .013
SH   1361.61 2771.95  18
CD  36  4   1   0.000   3.000    0.000 0.000 0.000  0.0000.00  0.00
CD  30  4   1   0.000   2.500    0.000 0.000 0.000  0.0000.00  0.00
CD  24  4   1   0.000   2.000    0.000 0.000 0.000  0.0000.00  0.00
CD  18  4   1   0.000   1.500    0.000 0.000 0.000  0.0000.00  0.00
Q             6.000
```

FILE: DI2.WSW W S P G W - EDIT LISTING - Version 14.10 Date: 2-17-2022 Time: 8:28:53

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	36	4	1		3.000														
CD	30	4	1		2.500														
CD	24	4	1		2.000														
CD	18	4	1		1.500														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
SHE1901-003: PARCEL 3 AT SUNSTONE PHASE 3

HEADING LINE NO 2 IS -
DI2 LATERAL - FROM SDMH9 TO FACILITY SDDI#2

HEADING LINE NO 3 IS -
DOWNSTREAM WSE FROM MAINLINE PH3 MODEL

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1000.000	2764.780	18	2765.410

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1004.580	2764.890	18	.013	.000	.000	-15.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1004.590	2764.890	18	.013	.000	.000	-15.000	0

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1004.600	2764.890	18	.013	.000	.000	-15.000	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1004.610	2764.890	18	.013	.000	.000	-15.000	0

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1004.620	2764.890	18	.013	.000	.000	-8.000	0

ELEMENT NO 7 IS A JUNCTION * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1008.580	2764.890	18	18	0	.013	5.500	.000	2764.890	.000	90.000	.000

RADIUS	ANGLE
.000	.000

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

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1008.590	2764.900	18	.013	.000	.000	-15.000	0

ELEMENT NO 9 IS A REACH * * *

	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
		1008.600	2764.910	18	.013	.000	.000	-12.000	0

ELEMENT NO 10 IS A REACH * * *

	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
		1361.610	2771.950	18	.013	.000	.000	.000	0

ELEMENT NO 11 IS A SYSTEM HEADWORKS * *

	U/S DATA	STATION	INVERT	SECT	W S ELEV
		1361.610	2771.950	18	.000

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 2-17-2022 Time: 8:28:54

SHE1901-003: PARCEL 3 AT SUNSTONE PHASE 3
DI2 LATERAL - FROM SDMH9 TO FACILITY SDDI#2
DOWNSTREAM WSE FROM MAINLINE PH3 MODEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	2764.780	1.143	2765.923	11.50	7.96	.98	2766.91	.00	1.29	1.28	1.500	.000	.00	1 .0
1.399	.0240					.0136	.02	1.14	1.32	.93	.013	.00	.00	PIPE
1001.399	2764.813	1.164	2765.978	11.50	7.81	.95	2766.93	.00	1.29	1.25	1.500	.000	.00	1 .0
2.378	.0240					.0127	.03	1.16	1.27	.93	.013	.00	.00	PIPE
1003.777	2764.871	1.224	2766.094	11.50	7.45	.86	2766.96	.00	1.29	1.16	1.500	.000	.00	1 .0
.803	.0240					.0116	.01	1.22	1.14	.93	.013	.00	.00	PIPE
1004.580	2764.890	1.293	2766.183	11.50	7.10	.78	2766.97	.00	1.29	1.03	1.500	.000	.00	1 .0
.010	.0000					.0110	.00	1.29	1.00	.00	.013	.00	.00	PIPE
1004.600	2764.890	1.304	2766.194	11.50	7.05	.77	2766.97	.00	1.29	1.01	1.500	.000	.00	1 .0
.010	.0000					.0109	.00	1.30	.98	.00	.013	.00	.00	PIPE
1004.610	2764.890	1.306	2766.196	11.50	7.04	.77	2766.97	.00	1.29	1.01	1.500	.000	.00	1 .0
.010	.0000					.0109	.00	1.31	.97	.00	.013	.00	.00	PIPE
1004.620	2764.890	1.308	2766.198	11.50	7.03	.77	2766.97	.00	1.29	1.00	1.500	.000	.00	1 .0
JUNCT STR	.0000					.0071	.03	1.31	.97		.013	.00	.00	PIPE
1008.580	2764.890	2.441	2767.331	6.00	3.40	.18	2767.51	.00	.95	.00	1.500	.000	.00	1 .0
.010	1.0000					.0033	.00	2.44	.00	.24	.013	.00	.00	PIPE
1008.600	2764.910	2.437	2767.346	6.00	3.40	.18	2767.53	.00	.95	.00	1.500	.000	.00	1 .0
56.148	.0199					.0032	.18	2.44	.00	.66	.013	.00	.00	PIPE

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 2-17-2022 Time: 8:28:54

SHE1901-003: PARCEL 3 AT SUNSTONE PHASE 3
DI2 LATERAL - FROM SDMH9 TO FACILITY SDDI#2
DOWNSTREAM WSE FROM MAINLINE PH3 MODEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1064.748	2766.030	1.500	2767.530	6.00	3.40	.18	2767.71	.00	.95	.00	1.500	.000	.00	1 .0
7.103	.0199					.0030	.02	1.50	.00	.66	.013	.00	.00	PIPE
1071.851	2766.171	1.361	2767.532	6.00	3.56	.20	2767.73	.00	.95	.87	1.500	.000	.00	1 .0
1.989	.0199					.0030	.01	1.36	.45	.66	.013	.00	.00	PIPE
1073.840	2766.211	1.280	2767.491	6.00	3.74	.22	2767.71	.00	.95	1.06	1.500	.000	.00	1 .0
HYDRAULIC JUMP														
1073.840	2766.211	.664	2766.875	6.00	7.95	.98	2767.86	.00	.95	1.49	1.500	.000	.00	1 .0
166.039	.0199					.0199	3.31	.66	1.97	.66	.013	.00	.00	PIPE
1239.879	2769.522	.664	2770.186	6.00	7.95	.98	2771.17	.00	.95	1.49	1.500	.000	.00	1 .0
53.823	.0199					.0196	1.06	.66	1.97	.66	.013	.00	.00	PIPE
1293.703	2770.596	.670	2771.266	6.00	7.86	.96	2772.22	.00	.95	1.49	1.500	.000	.00	1 .0
34.441	.0199					.0181	.62	.67	1.93	.66	.013	.00	.00	PIPE
1328.144	2771.282	.695	2771.977	6.00	7.49	.87	2772.85	.00	.95	1.50	1.500	.000	.00	1 .0
13.293	.0199					.0159	.21	.69	1.80	.66	.013	.00	.00	PIPE
1341.437	2771.548	.721	2772.269	6.00	7.14	.79	2773.06	.00	.95	1.50	1.500	.000	.00	1 .0
7.548	.0199					.0140	.11	.72	1.68	.66	.013	.00	.00	PIPE
1348.984	2771.698	.748	2772.447	6.00	6.81	.72	2773.17	.00	.95	1.50	1.500	.000	.00	1 .0
4.846	.0199					.0124	.06	.75	1.57	.66	.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1353.830	2771.795	.777	2772.572	6.00	6.49	.65	2773.23	.00	.95	1.50	1.500	.000	.00	1 .0
3.248	.0199					.0109	.04	.78	1.46	.66	.013	.00	.00	PIPE
1357.078	2771.860	.807	2772.667	6.00	6.19	.59	2773.26	.00	.95	1.50	1.500	.000	.00	1 .0
2.166	.0199					.0096	.02	.81	1.35	.66	.013	.00	.00	PIPE
1359.244	2771.903	.839	2772.742	6.00	5.90	.54	2773.28	.00	.95	1.49	1.500	.000	.00	1 .0
1.376	.0199					.0085	.01	.84	1.26	.66	.013	.00	.00	PIPE
1360.620	2771.930	.872	2772.802	6.00	5.63	.49	2773.29	.00	.95	1.48	1.500	.000	.00	1 .0
.755	.0199					.0075	.01	.87	1.17	.66	.013	.00	.00	PIPE
1361.375	2771.945	.908	2772.853	6.00	5.37	.45	2773.30	.00	.95	1.47	1.500	.000	.00	1 .0
.235	.0199					.0066	.00	.91	1.08	.66	.013	.00	.00	PIPE
1361.610	2771.950	.946	2772.896	6.00	5.11	.41	2773.30	.00	.95	1.45	1.500	.000	.00	1 .0

Proposed Condition WSPG Summary
PHASE 2B LATERAL (PH2B.WSW): FROM FACILITY PC2-7 &TO SDMH 7

WSPG Station	Equivalent Roadway Station	Improvement Plan Sheet	Storm Drain Dimension	Invert Elevation (ft)	Q_{100} (cfs)	WSE (ft)	Velocity (ft/s)	FG Elevation	Facility Description	HGL Check[1]
1 - 'HGL Check' reflects the minimum 1-ft below finished grade.										
1000.00	4+02.54	P-6	24" RCP	2770.21	27.00	2776.71	8.59	2781.78	SDMH 7	OK
1267.21	1+31.82	SHE1901-002 Phase 2B PP-1	24" RCP	2773.30	27.00	2780.57	8.59	2784.41	Facility PC2-8	OK
1271.21	1+27.8	SHE1901-002 Phase 2B PP-1	18" RCP	2773.80	13.50	2782.28	7.64	2784.41		OK
1308.34	10+00.01	SHE1901-002 Phase 2B PP-1	18" RCP	2774.20	13.50	2782.89	7.64	2784.41	Facility PC2-7	OK

```
T1 SHE1901-002: PARCEL 3 AT SUNSTONE PHASE 2B
T2 PH2 LATERAL - FROM FACILITY PC2-7 &TO SDMH 7
T3 DOWNSTREAM WSE FROM MAINLINE PH3 MODEL
SO   1000.0002770.210 24                          2776.710
R    1267.2102773.300 24      .013                                      13.0
JX   1271.2102773.800 18 18   .015   13.5           2773.800         90.0
R    1308.3402774.200 18      .013
SH   1308.3402774.200 18
CD   1  3   0   0.000  12.000    7.500 0.000 0.000  0.0000.00  0.00
CD  18  4   1   0.000   1.500    0.000 0.000 0.000  0.0000.00  0.00
CD  24  4   1   0.000   2.000    0.000 0.000 0.000  0.0000.00  0.00
Q            13.500
```

FILE: PH2B.WSW W S P G W - EDIT LISTING - Version 14.10 Date: 2-17-2022 Time: 8:28:35

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	3	0	.000	12.000	7.500	.000	.000	.00										
CD	18	4	1		1.500														
CD	24	4	1		2.000														

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
SHE1901-002: PARCEL 3 AT SUNSTONE PHASE 2B
HEADING LINE NO 2 IS -
PH2 LATERAL - FROM FACILITY PC2-7 &TO SDMH 7
HEADING LINE NO 3 IS -
DOWNSTREAM WSE FROM MAINLINE PH3 MODEL

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1000.000	2770.210	24	2776.710

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1267.210	2773.300	24	.013	.000	.000	13.000	0

ELEMENT NO 3 IS A JUNCTION * * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1271.210	2773.800	18	18	0	.015	13.500	.000	2773.800	.000	90.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1308.340	2774.200	18	.013	.000	.000	.000	0

ELEMENT NO 5 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1308.340	2774.200	18	.000

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 2-17-2022 Time: 8:28:36

SHE1901-002: PARCEL 3 AT SUNSTONE PHASE 2B
PH2 LATERAL - FROM FACILITY PC2-7 &TO SDMH 7
DOWNSTREAM WSE FROM MAINLINE PH3 MODEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	2770.210	6.500	2776.710	27.00	8.59	1.15	2777.86	.00	1.81	.00	2.000	.000	.00	1 .0
267.210	.0116					.0142	3.81	6.50	.00	2.00	.013	.00	.00	PIPE
1267.210	2773.300	7.265	2780.565	27.00	8.59	1.15	2781.71	.00	1.81	.00	2.000	.000	.00	1 .0
JUNCT STR	.1250					.0205	.08	7.27	.00		.015	.00	.00	PIPE
1271.210	2773.800	8.479	2782.279	13.50	7.64	.91	2783.18	.00	1.37	.00	1.500	.000	.00	1 .0
37.130	.0108					.0165	.61	8.48	.00	1.50	.013	.00	.00	PIPE
1308.340	2774.200	8.692	2782.892	13.50	7.64	.91	2783.80	.00	1.37	.00	1.500	.000	.00	1 .0

Proposed Condition WSPG Summary

SOUTH LATERAL (PH3S.WSW): From SDDI#5 to Proposed Outfall (Facility SL-2)

WSPG Station	Equivalent Roadway Station	Improvement Plan Sheet	Storm Drain Dimension	Invert Elevation (ft)	Q_{100} (cfs)	WSE (ft)	Velocity (ft/s)	FG Elevation	Facility Description	HGL Check[1]
1 - 'HGL Check' reflects the minimum 1-ft below finished grade.										
926.99	N/A	P-7	24" RCP	2747.08	22.00	2748.10	13.63	N/A	Outlet	N/A
1000.45	1+98.18	P-7	24" RCP	2749.68	22.00	2750.71	13.50	2758.34	Concrete Collar	OK
1000.47			24" RCP	2749.70	22.00	2750.73	13.46	2758.34		OK
1142.46	+56.19	P-7	24" RCP	2754.76	22.00	2756.44	7.83	2760.04	SDDI#6	OK
1146.46	+52.19	P-7	18" RCP	2755.26	11.00	2757.88	6.22	2760.04		OK
1173.56	+25.	P-7	18" RCP	2755.42	11.00	2758.18	6.22	2760.09	SDDI#5	OK

```
T1 SHE1901-003: PARCEL 3 AT SUNSTONE PHASE 3
T2 PH3S LATERAL - FROM FACILITY SDDI#5 TO SL-2 OUTFALL
T3 DOWNSTREAM WSE FROM FLOWMASTER SECTION
SO    926.9902747.080 24                          2747.650
R    1000.4502749.680 24      .013                                      -15.0
R    1000.4602749.690 24      .013                                      -15.0
R    1000.4702749.700 24      .013                                      -15.0
R    1142.4602754.760 24      .013                                       -9.0
JX   1146.4602755.260 18 18   .013  11.0            2755.260         90.0
R    1173.5602755.420 18      .013
SH   1173.5602755.420 18
CD  18  4   1   0.000   1.500    0.000 0.000 0.000  0.0000.00  0.00
CD  24  4   1   0.000   2.000    0.000 0.000 0.000  0.0000.00  0.00
Q            11.000
```

FILE: PH3S.WSW W S P G W - EDIT LISTING - Version 14.10 Date: 2-16-2022 Time: 6:25:36

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

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

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
SHE1901-003: PARCEL 3 AT SUNSTONE PHASE 3

HEADING LINE NO 2 IS -
PH3S LATERAL - FROM FACILITY SDDI#5 TO SL-2 OUTFALL

HEADING LINE NO 3 IS -
DOWNSTREAM WSE FROM FLOWMASTER SECTION

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	926.990	2747.080	24	2747.650

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1000.450	2749.680	24	.013	.000	.000	-15.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1000.460	2749.690	24	.013	.000	.000	-15.000	0

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1000.470	2749.700	24	.013	.000	.000	-15.000	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1142.460	2754.760	24	.013	.000	.000	-9.000	0

ELEMENT NO 6 IS A JUNCTION * * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1146.460	2755.260	18	18	0	.013	11.000	.000	2755.260	.000	90.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1173.560	2755.420	18	.013	.000	.000	.000	0

ELEMENT NO 8 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1173.560	2755.420	18	.000

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 2-16-2022 Time: 6:25:36

SHE1901-003: PARCEL 3 AT SUNSTONE PHASE 3
PH3S LATERAL - FROM FACILITY SDDI#5 TO SL-2 OUTFALL
DOWNSTREAM WSE FROM FLOWMASTER SECTION

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
926.990	2747.080	1.022	2748.102	22.00	13.63	2.88	2750.99	.00	1.68	2.00	2.000	.000	.00	1 .0
73.460	.0354					.0347	2.55	1.02	2.67	1.02	.013	.00	.00	PIPE
1000.450	2749.680	1.029	2750.709	22.00	13.50	2.83	2753.54	.00	1.68	2.00	2.000	.000	.00	1 .0
.010	1.0000					.0342	.00	1.03	2.64	.42	.013	.00	.00	PIPE
1000.470	2749.700	1.032	2750.732	22.00	13.46	2.81	2753.54	.00	1.68	2.00	2.000	.000	.00	1 .0
34.263	.0356					.0333	1.14	1.03	2.62	1.02	.013	.00	.00	PIPE
1034.733	2750.921	1.046	2751.967	22.00	13.23	2.72	2754.69	.00	1.68	2.00	2.000	.000	.00	1 .0
41.086	.0356					.0306	1.26	1.05	2.56	1.02	.013	.00	.00	PIPE
1075.819	2752.385	1.087	2753.471	22.00	12.62	2.47	2755.94	.00	1.68	1.99	2.000	.000	.00	1 .0
21.077	.0356					.0270	.57	1.09	2.38	1.02	.013	.00	.00	PIPE
1096.896	2753.136	1.129	2754.266	22.00	12.03	2.25	2756.51	.00	1.68	1.98	2.000	.000	.00	1 .0
13.501	.0356					.0239	.32	1.13	2.21	1.02	.013	.00	.00	PIPE
1110.397	2753.617	1.175	2754.792	22.00	11.47	2.04	2756.83	.00	1.68	1.97	2.000	.000	.00	1 .0
9.485	.0356					.0211	.20	1.17	2.05	1.02	.013	.00	.00	PIPE
1119.882	2753.955	1.222	2755.178	22.00	10.94	1.86	2757.03	.00	1.68	1.95	2.000	.000	.00	1 .0
6.968	.0356					.0187	.13	1.22	1.90	1.02	.013	.00	.00	PIPE
1126.850	2754.204	1.273	2755.477	22.00	10.43	1.69	2757.16	.00	1.68	1.92	2.000	.000	.00	1 .0
5.225	.0356					.0166	.09	1.27	1.75	1.02	.013	.00	.00	PIPE

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 2-16-2022 Time: 6:25:36

SHE1901-003: PARCEL 3 AT SUNSTONE PHASE 3
PH3S LATERAL - FROM FACILITY SDDI#5 TO SL-2 OUTFALL
DOWNSTREAM WSE FROM FLOWMASTER SECTION

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS) / SF Ave	Vel Head / HF	Energy Grd.El. / SE Dpth	Super Elev / Froude N	Critical Depth / Norm Dp	Flow Top Width / "N"	Height/Dia.-FT / X-Fall	Base Wt or I.D. / ZR	ZL	No Wth Prs/Pip / Type Ch
1132.075	2754.390	1.327	2755.717	22.00	9.94	1.53	2757.25	.00	1.68	1.89	2.000	.000	.00	1 .0
3.911	.0356				.0147	.06	1.33	1.62	1.02	.013	.00	.00		PIPE
1135.986	2754.529	1.385	2755.914	22.00	9.48	1.40	2757.31	.00	1.68	1.85	2.000	.000	.00	1 .0
2.869	.0356				.0131	.04	1.38	1.49	1.02	.013	.00	.00		PIPE
1138.855	2754.632	1.447	2756.079	22.00	9.04	1.27	2757.35	.00	1.68	1.79	2.000	.000	.00	1 .0
1.990	.0356				.0118	.02	1.45	1.37	1.02	.013	.00	.00		PIPE
1140.844	2754.702	1.515	2756.217	22.00	8.62	1.15	2757.37	.00	1.68	1.71	2.000	.000	.00	1 .0
1.198	.0356				.0106	.01	1.51	1.24	1.02	.013	.00	.00		PIPE
1142.042	2754.745	1.590	2756.335	22.00	8.22	1.05	2757.38	.00	1.68	1.62	2.000	.000	.00	1 .0
.418	.0356				.0096	.00	1.59	1.12	1.02	.013	.00	.00		PIPE
1142.460	2754.760	1.675	2756.435	22.00	7.83	.95	2757.39	.00	1.68	1.48	2.000	.000	.00	1 .0
JUNCT STR	.1250				.0100	.04	1.68	1.00		.013	.00	.00		PIPE
1146.460	2755.260	2.624	2757.884	11.00	6.22	.60	2758.49	.00	1.27	.00	1.500	.000	.00	1 .0
27.100	.0059				.0110	.30	2.62	.00	1.50	.013	.00	.00		PIPE
1173.560	2755.420	2.761	2758.181	11.00	6.22	.60	2758.78	.00	1.27	.00	1.500	.000	.00	1 .0

Lateral Sizing Computations

Project Name:	Parcel 3 at Sunstone Phase 3
Project Number:	SHE1901.003
Date:	2/17/2022
By:	JSR

Westwood

STORM DRAIN HYDRAULIC CALCULATIONS

CONDUIT DATA							FLOW DATA							LOSS	HGL		COMMENTS	
STATION		SIZE / TYPE	n	INVERTS		LENGTH	A	R	Φ	Q	V	H_V =	S_f	PIPE	PIPE		PRESS. FLOW?	OTHER
FROM	TO		Manning's Roughness	D / S ELEV.	U / S ELEV.		(FT^2)	(FT)		(CFS)	(FPS)	$V^2/2g$ (FT)	(FT/FT)	H_f (FT)	D/S HGL ELEV.	U/S HGL ELEV.		
1000	1022.50	ROUND 18" RCP	0.013	2770.64	2771.98	22.50	1.767	0.375	0.004925	3.5	1.98	0.0609	0.001106	0.025	2776.71	2776.73	Yes	SDMH7 to SDDI#1
1000	1023.18	ROUND 18" RCP	0.013	2764.78	2765.24	23.18	1.767	0.375	0.004925	5.5	3.11	0.1504	0.002730	0.063	2765.41	2765.47	No	SDMH9 to SDDI #4

$Sf = \Phi Hv / R^{1.33}$

$\Phi = 2g (n^2) / 2.21$

1 - Where pipes are not under pressure, assume U/S HGL is at top of pipe

Outlet Protection Assessment

Pipe Culvert Outlet Protection Computation

Westwood

Project Name:	Parcel 3 at Sunstone Phase 3
Project Number:	SHE1901-003
Date:	2/16/2022
By:	JSR
Facility ID	PH3

Equations:

$(d_{50}/D)*(Y_t/D)^{1.2}/(Q/D^{2.5}) = 0.023$ — Equation 760*

$D_a = 1/2(D+Y_n)$ (used in place of D if Fr>1) — Equation 762*

$L = (1/(2 \tan \theta))(A_t/Y_t-W)$ — Equation 764*

$A_t = Q/V$ — Equation 765*

Known Information:

Q =	70.5	Flow (cfs)
D =	2.5	Diameter of Pipe (ft)
V =	5	Allowable downstream velocity (typ=5 ft/s)
Fr =	2.0	Froude Number (0 if full)
Y_n =	2.0	Normal Depth of flow in Pipe Culvert (ft)*
		* Not necessary if Fr<1 (Enter 0 if unknown)
Y_t =	1.2	Tailwater Depth (Enter 0.4D if unknown)
D_a =	2.2	Only replaced as D, if Fr>=1

Riprap Erosion Protection Check (Figure 712):

Applicable only if $Q/D^{2.5} \leq 6$

$Q/D^{2.5}$ =	***9.55***	← ***Figure 712 Not Applicable***
$Q/D^{1.5}$ =	21.24	
Y_t/D	0.53	
1/(2 tan θ)=	2.8	Expansion factor for circular conduits (Figure 714)

Solve For:

A_t = 14.1	Req'd Area of flow at allowable velocity (ft2)
Y_t = 1.18	Tailwater Depth (ft)

D_{50} = 1.20	**Average Size Riprap (ft)**
D_{50} = 14	**Average Size Riprap (in)**

L = 26.5	**Length of Protection (ft)**
	For: D<3.5-ft, L_{min}=3D.
***L = 22.3**	**For: D>=3.5-ft, L_{min}>= 4D.**
	$L_{max(required)}$=10D
****L(max) = 26.0**	**** For $Q/D^{2.5}$ > 6.0:**
	L_{max} = 10D+D/4, for every whole number $Q/D^{2.5}$ > 6

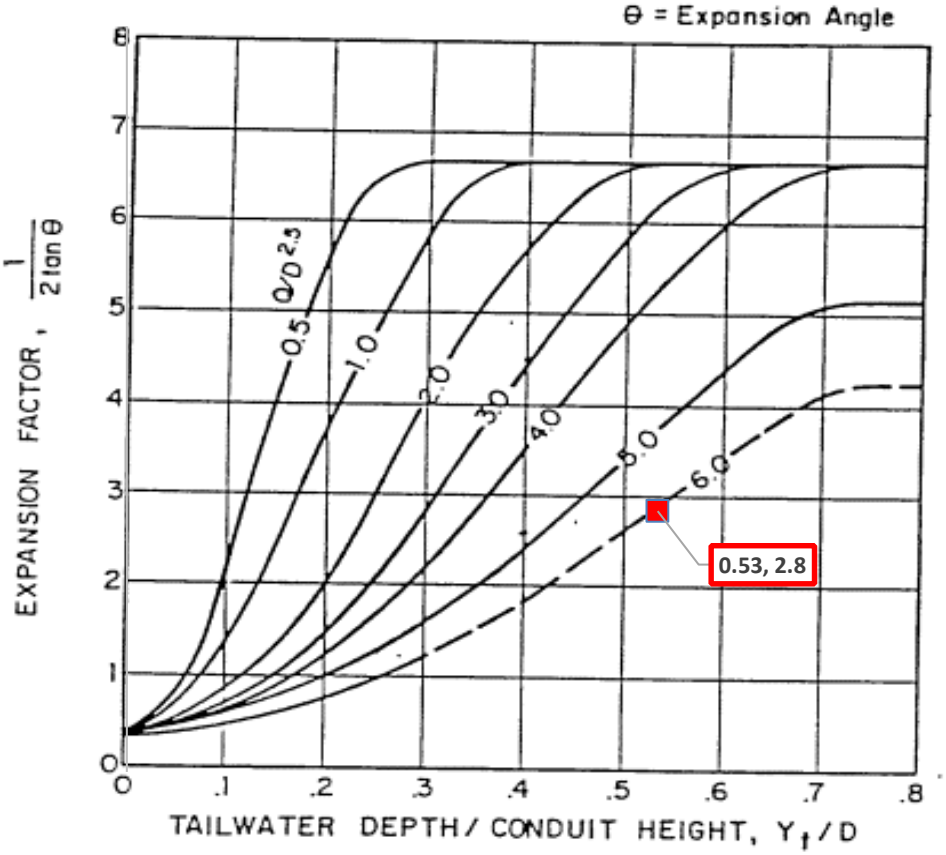
Notes:

Provide D_{50} = Grouted 12-inch riprap for a length of 26-ft

* Equations taken from the Clark County Regional Flood Control District - Hydrologic Criteria and Drainage Design Manual

5740 S. Arville St., Suite 216 - Las Vegas, NV 89118
Ph. 702-284-5300 - Fx. 702-284-5399

EXPANSION FACTOR FOR CIRCULAR CONDUITS



Revision	Date

WRC ENGINEERING

REFERENCE:
USDCM, DRCOG, March 1969 (with modifications)

FIGURE 714

Worksheet for PH3 Outlet Tailwater

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	0.89 %
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Bottom Width	10.00 ft
Discharge	70.50 cfs

Results	
Normal Depth	1.18 ft
Flow Area	16.0 ft²
Wetted Perimeter	17.47 ft
Hydraulic Radius	0.92 ft
Top Width	17.09 ft
Critical Depth	1.04 ft
Critical Slope	1.43 %
Velocity	4.41 ft/s
Velocity Head	0.30 ft
Specific Energy	1.48 ft
Froude Number	0.803
Flow Type	Subcritical

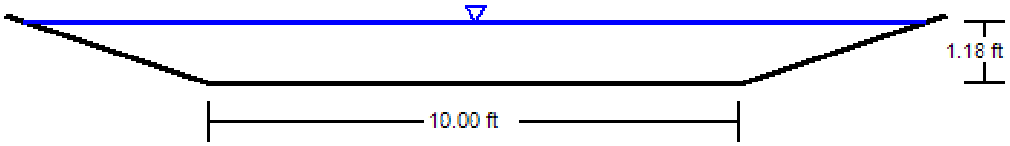
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

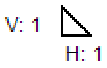
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.18 ft
Critical Depth	1.04 ft
Channel Slope	0.89 %
Critical Slope	1.43 %

Cross Section for PH3 Outlet Tailwater

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	0.89 %
Normal Depth	1.18 ft
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Bottom Width	10.00 ft
Discharge	70.50 cfs





Westwood

Pipe Culvert Outlet Protection Computation

Project Name:	Parcel 3 at Sunstone Phase 3
Project Number:	SHE1901-003
Date:	2/16/2022
By:	KH
Facility ID	PH3S

Equations:

$(d_{50}/D)*(Y_t/D)^{1.2}/(Q/D^{2.5}) = 0.023$ — Equation 760*

$D_a = 1/2(D+Y_n)$ (used in place of D if Fr>1) — Equation 762*

$L = (1/(2 \tan \theta))(A_t/Y_t-W)$ — Equation 764*

$A_t = Q/V$ — Equation 765*

Known Information:

Q =	22	Flow (cfs)
D =	2.0	Diameter of Pipe (ft)
V =	5	Allowable downstream velocity (typ=5 ft/s)
Fr =	2.7	Froude Number (0 if full)
Y_n =	1.0	Normal Depth of flow in Pipe Culvert (ft)*
		* Not necessary if Fr<1 (Enter 0 if unknown)
Y_t =	0.5	Tailwater Depth (Enter 0.4D if unknown)
D_a =	1.5	Only replaced as D, if Fr>=1

Riprap Erosion Protection Check (Figure 712):

Applicable only if $Q/D^{2.5} \leq 6$

$Q/D^{2.5}$ =	***7.85***	← ***Figure 712 Not Applicable***
$Q/D^{1.5}$ =	11.86	
Y_t/D	0.30	
1/(2 tan θ)=	1.3	Expansion factor for circular conduits (Figure 714)

Solve For:

A_t = 4.4	Req'd Area of flow at allowable velocity (ft2)
Y_t = 0.45	Tailwater Depth (ft)

D_{50} = 1.63	**Average Size Riprap (ft)**
D_{50} = 20	**Average Size Riprap (in)**

L = 10.1	**Length of Protection (ft)**
	For: D<3.5-ft, L_{min}=3D.
***L = 10.1**	**For: D>=3.5-ft, L_{min}>= 4D.**
	$L_{max(required)}$=10D
****L(max) = 20.5**	**** For $Q/D^{2.5}$ > 6.0:**
	L_{max} = 10D+D/4, for every whole number $Q/D^{2.5}$ > 6

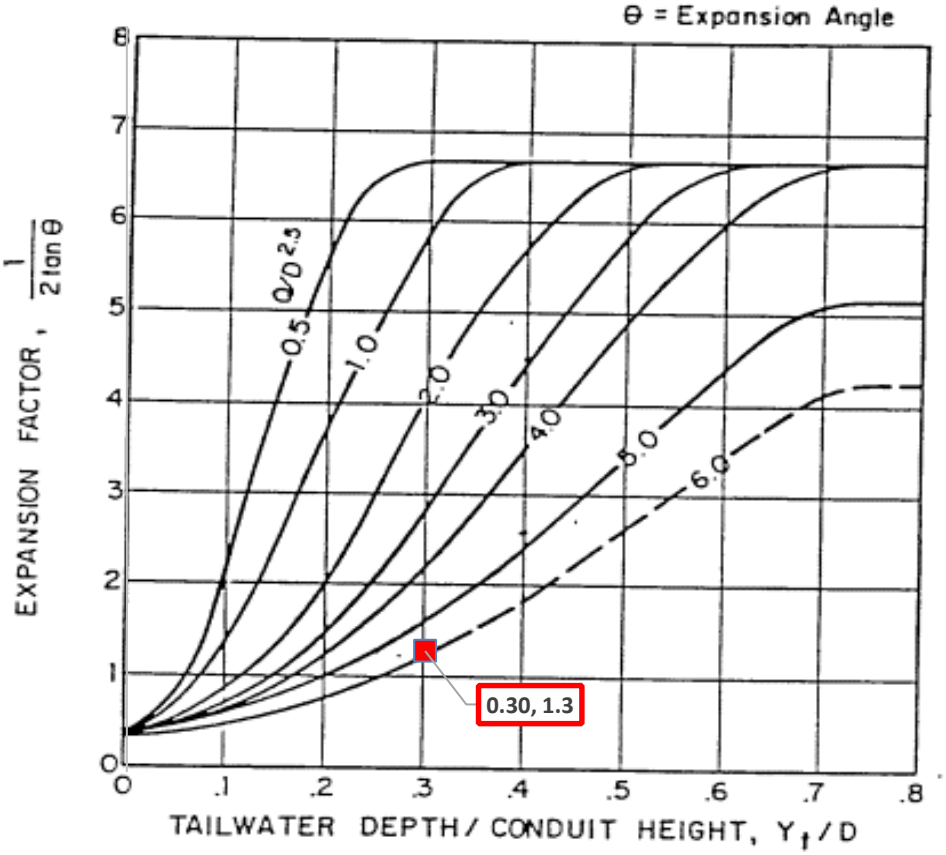
Notes:

Provide D_{50} = 12-inch riprap for a length of 21-ft

* Equations taken from the Clark County Regional Flood Control District - Hydrologic Criteria and Drainage Design Manual

5740 S. Arville St., Suite 216 - Las Vegas, NV 89118
Ph. 702-284-5300 - Fx. 702-284-5399

EXPANSION FACTOR FOR CIRCULAR CONDUITS



Revision	Date

WRC ENGINEERING

REFERENCE:
USDCM, DRCOG, March 1969 (with modifications)

FIGURE 714

Worksheet for PH3S Outlet Tailwater

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	1.16 %
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Bottom Width	10.00 ft
Discharge	22.00 cfs

Results	
Normal Depth	0.57 ft
Flow Area	6.6 ft²
Wetted Perimeter	13.59 ft
Hydraulic Radius	0.49 ft
Top Width	13.41 ft
Critical Depth	0.50 ft
Critical Slope	1.75 %
Velocity	3.31 ft/s
Velocity Head	0.17 ft
Specific Energy	0.74 ft
Froude Number	0.829
Flow Type	Subcritical

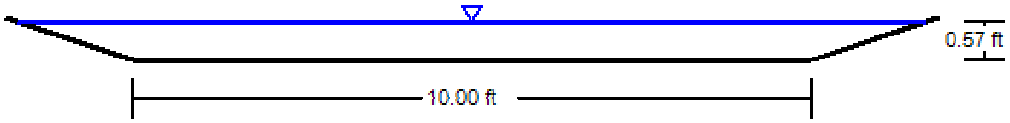
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

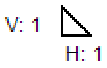
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.57 ft
Critical Depth	0.50 ft
Channel Slope	1.16 %
Critical Slope	1.75 %

Cross Section for PH3S Outlet Tailwater

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	1.16 %
Normal Depth	0.57 ft
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Bottom Width	10.00 ft
Discharge	22.00 cfs





APPENDIX D

Finished Floor Analysis

Parcel 3 at Sunstone Phase 3 - SHE1901.003 FINISHED FLOOR - CITY OF LAS VEGAS JURISDICTION										
INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C[1] (ft)	F/L[2] (ft)	D_{100} (ft)	Flowline $F.F._{min}$[3] (ft)	T/C + 6" $F.F._{min}$[4] (ft)	$F.F._{Design}$ (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
433	2-7	2781.34	2780.96	0.5	2781.96	2781.84	2783.4	OK	OK	
434	2-7	2774.92	2774.54	0.5	2775.54	2775.42	2776.7	OK	OK	
435	2-7	2772.85	2772.47	0.5	2773.47	2773.35	2774.7	OK	OK	
436	2-7	2771.88	2771.50	0.5	2772.50	2772.38	2773.7	OK	OK	
437	2-7	2770.99	2770.61	0.5	2771.61	2771.49	2772.8	OK	OK	
438	2-7	2770.30	2769.92	0.5	2770.92	2770.80	2772.1	OK	OK	
439	2-7	2769.48	2769.10	0.5	2770.10	2769.98	2771.3	OK	OK	
440	2-7	2768.66	2768.28	0.5	2769.28	2769.16	2770.5	OK	OK	
441	2-7	2767.63	2767.25	0.5	2768.25	2768.13	2769.4	OK	OK	
442	2-7	2766.43	2766.05	0.5	2767.05	2766.93	2768.2	OK	OK	
443	2-7	2765.17	2764.79	0.5	2765.79	2765.67	2767.0	OK	OK	
444	2-7	2763.82	2763.44	0.5	2764.44	2764.32	2765.6	OK	OK	
445	2-7	2762.40	2762.02	0.5	2763.02	2762.90	2764.2	OK	OK	
446	2-7	2761.08	2760.70	0.5	2761.70	2761.58	2762.9	OK	OK	
447	2-7	2761.32	2760.94	0.5	2761.94	2761.82	2763.0	OK	OK	
448	2-7	2762.78	2762.40	0.5	2763.40	2763.28	2764.5	OK	OK	
449	2-7	2764.51	2764.13	0.5	2765.13	2765.01	2766.2	OK	OK	
450	2-7	2765.89	2765.51	0.5	2766.51	2766.39	2767.6	OK	OK	
451	2-7	2767.51	2767.13	0.5	2768.13	2768.01	2769.2	OK	OK	
452	2-7	2768.63	2768.25	0.5	2769.25	2769.13	2770.3	OK	OK	
453	2-7	2769.50	2769.12	0.5	2770.12	2770.00	2771.2	OK	OK	
454	2-7	2770.23	2769.85	0.5	2770.85	2770.73	2771.9	OK	OK	
455	2-7	2770.91	2770.53	0.5	2771.53	2771.41	2772.6	OK	OK	
456	2-7	2771.55	2771.17	0.5	2772.17	2772.05	2773.1	OK	OK	
457	2-7	2772.70	2772.32	0.5	2773.32	2773.20	2774.5	OK	OK	
458	2-7	2773.50	2773.12	0.5	2774.12	2774.00	2775.3	OK	OK	
459	2-7	2774.16	2773.78	0.5	2774.78	2774.66	2776.0	OK	OK	
460	2-7	2774.75	2774.37	0.5	2775.37	2775.25	2776.6	OK	OK	
461	2-7	2775.50	2775.12	0.5	2776.12	2776.00	2777.3	OK	OK	
462	2-7	2776.44	2776.06	0.5	2777.06	2776.94	2778.2	OK	OK	
463	2-7	2777.51	2777.13	0.5	2778.13	2778.01	2779.3	OK	OK	
464	2-7	2774.25	2773.87	0.5	2774.87	2774.75	2775.7	OK	OK	
465	2-7	2773.48	2773.10	0.5	2774.10	2773.98	2775.3	OK	OK	

Parcel 3 at Sunstone Phase 3 - SHE1901.003 FINISHED FLOOR - CITY OF LAS VEGAS JURISDICTION										
INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C[1] (ft)	F/L[2] (ft)	D_{100} (ft)	Flowline $F.F._{min}$[3] (ft)	T/C + 6" $F.F._{min}$[4] (ft)	$F.F._{Design}$ (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
466	2-7	2772.37	2771.99	0.5	2772.99	2772.87	2774.2	OK	OK	
467	2-7	2771.37	2770.99	0.5	2771.99	2771.87	2773.2	OK	OK	
468	2-7	2770.38	2770.00	0.5	2771.00	2770.88	2772.2	OK	OK	
469	2-7	2769.27	2768.89	0.5	2769.89	2769.77	2771.1	OK	OK	
470	2-7	2767.94	2767.56	0.5	2768.56	2768.44	2769.7	OK	OK	
471	2-7	2766.83	2766.45	0.5	2767.45	2767.33	2768.6	OK	OK	
472	2-7	2765.83	2765.45	0.5	2766.45	2766.33	2767.6	OK	OK	
473	2-7	2764.84	2764.46	0.5	2765.46	2765.34	2766.6	OK	OK	
474	2-7	2763.75	2763.37	0.5	2764.37	2764.25	2765.6	OK	OK	
475	2-7	2762.04	2761.66	0.5	2762.66	2762.54	2763.7	OK	OK	
476	2-7	2763.19	2762.81	0.5	2763.81	2763.69	2764.9	OK	OK	
477	2-7	2764.83	2764.45	0.5	2765.45	2765.33	2766.5	OK	OK	
478	2-7	2766.56	2766.18	0.5	2767.18	2767.06	2768.3	OK	OK	
479	2-7	2763.25	2762.87	0.5	2763.87	2763.75	2765.8	OK	OK	
480	2-7	2765.17	2764.79	0.5	2765.79	2765.67	2766.9	OK	OK	
481	2-7	2766.17	2765.79	0.5	2766.79	2766.67	2767.9	OK	OK	
482	2-7	2767.17	2766.79	0.5	2767.79	2767.67	2768.9	OK	OK	
483	2-7	2768.16	2767.78	0.5	2768.78	2768.66	2769.9	OK	OK	
484	2-7	2769.38	2769.00	0.5	2770.00	2769.88	2771.1	OK	OK	
485	2-7	2770.49	2770.11	0.5	2771.11	2770.99	2772.2	OK	OK	
486	2-7	2771.48	2771.10	0.5	2772.10	2771.98	2773.2	OK	OK	
487	2-7	2772.48	2772.10	0.5	2773.10	2772.98	2774.2	OK	OK	
488	2-7	2773.48	2773.10	0.5	2774.10	2773.98	2775.2	OK	OK	
489	2-7	2774.25	2773.87	0.5	2774.87	2774.75	2775.6	OK	OK	
490	2-7	2780.80	2780.42	0.5	2781.42	2781.30	2782.6	OK	OK	
491	2-7	2780.44	2780.06	0.5	2781.06	2780.94	2782.2	OK	OK	
492	2-7	2779.93	2779.55	0.5	2780.55	2780.43	2781.7	OK	OK	
493	2-7	2779.47	2779.09	0.5	2780.09	2779.97	2781.3	OK	OK	
494	2-7	2779.01	2778.63	0.5	2779.63	2779.51	2780.8	OK	OK	
495	2-7	2778.45	2778.07	0.5	2779.07	2778.95	2780.3	OK	OK	
496	2-7	2778.00	2777.62	0.5	2778.62	2778.50	2779.8	OK	OK	
497	2-7	2777.54	2777.16	0.5	2778.16	2778.04	2779.3	OK	OK	
498	2-7	2776.84	2776.46	0.5	2777.46	2777.34	2778.6	OK	OK	

Parcel 3 at Sunstone Phase 3 - SHE1901.003 FINISHED FLOOR - CITY OF LAS VEGAS JURISDICTION										
INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C[1] (ft)	F/L[2] (ft)	D_{100} (ft)	Flowline $F.F._{min}$[3] (ft)	T/C + 6" $F.F._{min}$[4] (ft)	$F.F._{Design}$ (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
499	2-7	2775.75	2775.37	0.5	2776.37	2776.25	2777.6	OK	OK	
500	2-7	2771.08	2770.70	0.5	2771.70	2771.58	2772.8	OK	OK	
501	2-7	2774.28	2773.90	0.5	2774.90	2774.78	2776.0	OK	OK	
502	2-7	2778.29	2777.91	0.5	2778.91	2778.79	2780.0	OK	OK	
503	2-7	2780.79	2780.41	0.5	2781.41	2781.29	2782.5	OK	OK	
504	2-7	2776.90	2776.52	0.5	2777.52	2777.40	2778.6	OK	OK	
505	2-7	2777.28	2776.90	0.5	2777.90	2777.78	2779.0	OK	OK	
506	2-7	2777.73	2777.35	0.5	2778.35	2778.23	2779.4	OK	OK	
507	2-7	2778.19	2777.81	0.5	2778.81	2778.69	2779.9	OK	OK	
508	2-7	2778.65	2778.27	0.5	2779.27	2779.15	2780.4	OK	OK	
509	2-7	2779.16	2778.78	0.5	2779.78	2779.66	2780.9	OK	OK	
510	2-7	2779.66	2779.28	0.5	2780.28	2780.16	2781.4	OK	OK	
511	2-7	2780.49	2780.11	0.5	2781.11	2780.99	2782.2	OK	OK	
512	2-7	2779.14	2778.76	0.5	2779.76	2779.64	2780.9	OK	OK	
513	2-7	2780.45	2780.07	0.5	2781.07	2780.95	2782.3	OK	OK	
514	2-7	2782.05	2781.67	0.5	2782.67	2782.55	2783.9	OK	OK	
515	2-7	2783.92	2783.54	0.5	2784.54	2784.42	2785.7	OK	OK	
516	2-7	2785.50	2785.12	0.5	2786.12	2786.00	2787.3	OK	OK	
517	2-7	2786.35	2785.97	0.5	2786.97	2786.85	2788.2	OK	OK	
518	2-7	2786.50	2786.12	0.5	2787.12	2787.00	2788.5	OK	OK	
519	2-7	2786.31	2785.93	0.5	2786.93	2786.81	2788.2	OK	OK	
520	2-7	2786.00	2785.62	0.5	2786.62	2786.50	2787.9	OK	OK	
521	2-7	2785.70	2785.32	0.5	2786.32	2786.20	2787.6	OK	OK	
522	2-7	2785.42	2785.04	0.5	2786.04	2785.92	2787.3	OK	OK	
523	2-7	2785.12	2784.74	0.5	2785.74	2785.62	2787.0	OK	OK	
524	2-7	2784.82	2784.44	0.5	2785.44	2785.32	2786.7	OK	OK	
525	2-7	2784.52	2784.14	0.5	2785.14	2785.02	2786.5	OK	OK	
526	2-7	2784.17	2783.79	0.5	2784.79	2784.67	2786.1	OK	OK	
527	2-7	2783.81	2783.43	0.5	2784.43	2784.31	2785.8	OK	OK	
528	2-7	2783.45	2783.07	0.5	2784.07	2783.95	2785.4	OK	OK	
529	2-7	2783.15	2782.77	0.5	2783.77	2783.65	2785.1	OK	OK	
530	2-7	2782.79	2782.41	0.5	2783.41	2783.29	2784.7	OK	OK	
531	2-7	2782.43	2782.05	0.5	2783.05	2782.93	2784.4	OK	OK	

Parcel 3 at Sunstone Phase 3 - SHE1901.003 FINISHED FLOOR - CITY OF LAS VEGAS JURISDICTION										
INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C[1] (ft)	F/L[2] (ft)	D_{100} (ft)	Flowline $F.F._{min}$[3] (ft)	T/C + 6" $F.F._{min}$[4] (ft)	$F.F._{Design}$ (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
532	2-7	2781.89	2781.51	0.5	2782.51	2782.39	2783.8	OK	OK	
533	2-7	2781.50	2781.12	0.5	2782.12	2782.00	2783.5	OK	OK	
534	2-7	2784.85	2784.47	0.5	2785.47	2785.35	2786.4	OK	OK	
535	2-7	2783.54	2783.16	0.5	2784.16	2784.04	2786.4	OK	OK	
536	2-7	2782.23	2781.85	0.5	2782.85	2782.73	2783.8	OK	OK	
537	2-7	2780.92	2780.54	0.5	2781.54	2781.42	2783.8	OK	OK	
538	2-7	2779.61	2779.23	0.5	2780.23	2780.11	2781.1	OK	OK	
539	2-7	2778.30	2777.92	0.5	2778.92	2778.80	2781.1	OK	OK	
540	2-7	2781.03	2780.65	0.5	2781.65	2781.53	2782.7	OK	OK	
541	2-7	2781.86	2781.48	0.5	2782.48	2782.36	2783.7	OK	OK	
542	2-7	2782.37	2781.99	0.5	2782.99	2782.87	2784.2	OK	OK	
543	2-7	2782.67	2782.29	0.5	2783.29	2783.17	2784.5	OK	OK	
544	2-7	2782.97	2782.59	0.5	2783.59	2783.47	2784.8	OK	OK	
545	2-7	2783.33	2782.95	0.5	2783.95	2783.83	2785.2	OK	OK	
546	2-7	2783.69	2783.31	0.5	2784.31	2784.19	2785.5	OK	OK	
547	2-7	2784.15	2783.77	0.5	2784.77	2784.65	2785.9	OK	OK	
548	2-7	2784.08	2783.70	0.5	2784.70	2784.58	2786.1	OK	OK	
549	2-7	2783.69	2783.31	0.5	2784.31	2784.19	2785.5	OK	OK	
550	2-7	2783.11	2782.73	0.5	2783.73	2783.61	2784.8	OK	OK	
551	2-7	2782.59	2782.21	0.5	2783.21	2783.09	2784.6	OK	OK	
552	2-7	2783.72	2783.34	0.5	2784.34	2784.22	2785.2	OK	OK	
553	2-7	2783.99	2783.61	0.5	2784.61	2784.49	2785.8	OK	OK	
554	2-7	2784.37	2783.99	0.5	2784.99	2784.87	2786.1	OK	OK	
555	2-7	2784.82	2784.44	0.5	2785.44	2785.32	2786.5	OK	OK	
556	2-7	2785.40	2785.02	0.5	2786.02	2785.90	2787.1	OK	OK	
557	2-7	2785.74	2785.36	0.5	2786.36	2786.24	2787.6	OK	OK	
558	2-7	2785.39	2785.01	0.5	2786.01	2785.89	2787.2	OK	OK	
559	2-7	2784.91	2784.53	0.5	2785.53	2785.41	2786.7	OK	OK	
560	2-7	2784.43	2784.05	0.5	2785.05	2784.93	2786.2	OK	OK	
561	2-7	2784.03	2783.65	0.5	2784.65	2784.53	2786.0	OK	OK	
562	2-7	2783.70	2783.32	0.5	2784.32	2784.20	2785.9	OK	OK	
563	2-7	2782.71	2782.33	0.5	2783.33	2783.21	2784.4	OK	OK	
564	2-7	2783.43	2783.05	0.5	2784.05	2783.93	2785.1	OK	OK	

Parcel 3 at Sunstone Phase 3 - SHE1901.003
FINISHED FLOOR - CITY OF LAS VEGAS JURISDICTION

INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C[1] (ft)	F/L[2] (ft)	D_{100} (ft)	Flowline $F.F._{min}$[3] (ft)	T/C + 6" $F.F._{min}$[4] (ft)	$F.F._{Design}$ (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
565	2-7	2783.43	2783.05	0.5	2784.05	2783.93	2785.4	OK	OK	
566	2-7	2783.21	2782.83	0.5	2783.83	2783.71	2785.1	OK	OK	
567	2-7	2782.96	2782.58	0.5	2783.58	2783.46	2784.8	OK	OK	
568	2-7	2782.74	2782.36	0.5	2783.36	2783.24	2784.6	OK	OK	
569	2-7	2782.51	2782.13	0.5	2783.13	2783.01	2784.4	OK	OK	
570	2-7	2782.29	2781.91	0.5	2782.91	2782.79	2784.0	OK	OK	
571	2-7	2781.89	2781.51	0.5	2782.51	2782.39	2783.6	OK	OK	
572	2-7	2781.26	2780.88	0.5	2781.88	2781.76	2783.0	OK	OK	

Where:

1: Top of Curb at High Side of Lot

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

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

4: City of Las Vegas minimum allowable finished floor elevation = T.C. @ high side of lot + 6-inches

5: These lots have an adjacent solid grouted wall that protects the FF.

City of Las Vegas Finished Floor Criteria:

-The finished floor shall be set a vertical distance above the gutter flowline of at least twice the depth of flow in the gutter flowline up to a maximum of 18 inches above the WSEL in the street. Per HCDDM, Section 304.4.

-The finished floor shall be set a vertical distance of at least 6-inches above the highest adjacent top of curb. Per HCDDM, Section 1602.

Supplemental Finish Floor Checks

Adjacent/Perimeter Street Check									
Lot Number	Street	High TC[1]	High FL[2]	Section	Flow Depth[3]	Min FF[4]	Design FF	Check	Solid Grout
433	SANDLOT LANE	2779.70	2779.32	2-7	0.50	2780.32	2783.4	OK	No
446	ALEXANDRIA PLACE	2760.52	2760.14	2-7	0.50	2761.14	2762.9	OK	No
447	ALEXANDRIA PLACE	2661.37	2660.99	2-7	0.50	2661.99	2763.0	OK	No
456	REDWOOD DESERT DR	2773.60	2773.22	2-7	0.50	2774.22	2773.1	CHECK	Yes
457	SANDLOT LANE	2774.50	2774.12	2-7	0.50	2775.12	2774.5	CHECK	Yes
464	REDWOOD DESERT DR	2774.59	2774.21	2-7	0.50	2775.21	2775.7	OK	No
474	VENETIAN BRICK PL	2761.91	2761.53	2-7	0.50	2762.53	2765.6	OK	No
479	VENETIAN BRICK PL	2766.27	2765.89	2-7	0.50	2766.89	2765.8	CHECK	Yes
489	REDWOOD DESERT DR	2777.80	2777.42	2-7	0.50	2778.42	2775.6	CHECK	Yes
490	REDWOOD DESERT DR	2780.27	2779.89	2-7	0.50	2780.89	2782.6	OK	No
499	VENETIAN BRICK PL	2772.89	2772.51	2-7	0.50	2773.51	2777.6	OK	No
504	VENETIAN BRICK PL	2780.44	2780.06	2-7	0.50	2781.06	2778.6	CHECK	Yes
511	REDWOOD DESERT DR	2785.85	2785.47	2-7	0.50	2786.47	2782.2	CHECK	Yes
533	SANGRIA SUNRISE AVE	2784.41	2784.03	2-7	0.50	2785.03	2783.5	CHECK	Yes
540	SANGRIA SUNRISE AVE	2779.38	2779.00	2-7	0.50	2780.00	2782.7	OK	No
547	CURRANT ROCK LN	2783.71	2783.33	2-7	0.50	2784.33	2785.9	OK	No
548	REDWOOD DESERT DR	2785.26	2784.88	2-7	0.50	2785.88	2786.1	OK	No
551	VENETIAN BRICK PL	2782.76	2782.38	2-7	0.50	2783.38	2784.6	OK	No
552	VENETIAN BRICK PL	2783.18	2782.80	2-7	0.50	2783.80	2785.2	OK	No
556	REDWOOD DESERT DR	2785.76	2785.38	2-7	0.50	2786.38	2787.1	OK	No
557	REDWOOD DESERT DR	2786.46	2786.08	2-7	0.50	2787.08	2787.6	OK	No
562	VENETIAN BRICK PL	2783.42	2783.04	2-7	0.50	2784.04	2785.9	OK	No

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

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

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

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

Emergency Overflow Finish Floor Checks

Drainage Easements Check - Emergency Overflow							
Lot Number	High TC/FL[1]	Section	Flow Depth[2]	Min FF[3]	Design FF	Check	Solid Grout
517	2786.35	EO2	0.60	2786.95	2788.20	OK	No
518	2786.50	EO2	0.60	2787.10	2788.50	OK	No
531	2782.43	EO1	1.41	2783.84	2784.40	OK	No
532	2781.89	EO1	1.41	2783.30	2783.80	OK	No

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

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

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

Finished Floor Check - Emergency Overflow							
Lot Number	High TC[1]	High FL[2]	Section	Flow Depth[3]	Min FF[4]	Design FF	Check
434	2774.92	2774.54	2-7 (Emergency Overflow)	0.63	2775.17	2776.70	OK
435	2772.85	2772.47	2-7 (Emergency Overflow)	0.63	2773.10	2774.70	OK
436	2771.88	2771.50	2-7 (Emergency Overflow)	0.63	2772.13	2773.70	OK
437	2770.99	2770.61	2-7 (Emergency Overflow)	0.63	2771.24	2772.80	OK
438	2770.30	2769.92	2-7 (Emergency Overflow)	0.63	2770.55	2772.10	OK
439	2769.48	2769.10	2-7 (Emergency Overflow)	0.63	2769.73	2771.30	OK
440	2768.66	2768.28	2-7 (Emergency Overflow)	0.63	2768.91	2770.50	OK
441	2767.63	2767.25	2-7 (Emergency Overflow)	0.63	2767.88	2769.40	OK
442	2766.43	2766.05	2-7 (Emergency Overflow)	0.63	2766.68	2768.20	OK
443	2765.17	2764.79	2-7 (Emergency Overflow)	0.63	2765.42	2767.00	OK
444	2763.82	2763.44	2-7 (Emergency Overflow)	0.63	2764.07	2765.60	OK
445	2762.40	2762.02	2-7 (Emergency Overflow)	0.63	2762.65	2764.20	OK
446	2761.08	2760.70	2-7 (Emergency Overflow)	0.63	2761.33	2762.90	OK
447	2761.32	2760.94	2-7 (Emergency Overflow)	0.63	2761.57	2763.00	OK
448	2762.78	2762.40	2-7 (Emergency Overflow)	0.63	2763.03	2764.50	OK
449	2764.51	2764.13	2-7 (Emergency Overflow)	0.63	2764.76	2766.20	OK
450	2765.89	2765.51	2-7 (Emergency Overflow)	0.63	2766.14	2767.60	OK
451	2767.51	2767.13	2-7 (Emergency Overflow)	0.63	2767.76	2769.20	OK
452	2768.63	2768.25	2-7 (Emergency Overflow)	0.63	2768.88	2770.30	OK
453	2769.50	2769.12	2-7 (Emergency Overflow)	0.63	2769.75	2771.20	OK
454	2770.23	2769.85	2-7 (Emergency Overflow)	0.63	2770.48	2771.90	OK
455	2770.91	2770.53	2-7 (Emergency Overflow)	0.63	2771.16	2772.60	OK
456	2771.55	2771.17	2-7 (Emergency Overflow)	0.63	2771.80	2773.10	OK
457	2772.70	2772.32	2-7 (Emergency Overflow)	0.63	2772.95	2774.50	OK
458	2773.50	2773.12	2-7 (Emergency Overflow)	0.63	2773.75	2775.30	OK
459	2774.16	2773.78	2-7 (Emergency Overflow)	0.63	2774.41	2776.00	OK
460	2774.75	2774.37	2-7 (Emergency Overflow)	0.63	2775.00	2776.60	OK
461	2775.50	2775.12	2-7 (Emergency Overflow)	0.63	2775.75	2777.30	OK
462	2776.44	2776.06	2-7 (Emergency Overflow)	0.63	2776.69	2778.20	OK
463	2777.51	2777.13	2-7 (Emergency Overflow)	0.63	2777.76	2779.30	OK
464	2774.25	2773.87	2-7 (Emergency Overflow)	0.63	2774.50	2775.70	OK
465	2773.48	2773.10	2-7 (Emergency Overflow)	0.63	2773.73	2775.30	OK
466	2772.37	2771.99	2-7 (Emergency Overflow)	0.63	2772.62	2774.20	OK
467	2771.37	2770.99	2-7 (Emergency Overflow)	0.63	2771.62	2773.20	OK
468	2770.38	2770.00	2-7 (Emergency Overflow)	0.63	2770.63	2772.20	OK
469	2769.27	2768.89	2-7 (Emergency Overflow)	0.63	2769.52	2771.10	OK
470	2767.94	2767.56	2-7 (Emergency Overflow)	0.63	2768.19	2769.70	OK
471	2766.83	2766.45	2-7 (Emergency Overflow)	0.63	2767.08	2768.60	OK
472	2765.83	2765.45	2-7 (Emergency Overflow)	0.63	2766.08	2767.60	OK
473	2764.84	2764.46	2-7 (Emergency Overflow)	0.63	2765.09	2766.60	OK
474	2763.75	2763.37	2-7 (Emergency Overflow)	0.63	2764.00	2765.60	OK
475	2762.04	2761.66	2-7 (Emergency Overflow)	0.63	2762.29	2763.70	OK

476	2763.19	2762.81	2-7 (Emergency Overflow)	0.63	2763.44	2764.90	OK
477	2764.83	2764.45	2-7 (Emergency Overflow)	0.63	2765.08	2766.50	OK
478	2766.56	2766.18	2-7 (Emergency Overflow)	0.63	2766.81	2768.30	OK
479	2763.25	2762.87	2-7 (Emergency Overflow)	0.63	2763.50	2765.80	OK
480	2765.17	2764.79	2-7 (Emergency Overflow)	0.63	2765.42	2766.90	OK
481	2766.17	2765.79	2-7 (Emergency Overflow)	0.63	2766.42	2767.90	OK
482	2767.17	2766.79	2-7 (Emergency Overflow)	0.63	2767.42	2768.90	OK
483	2768.16	2767.78	2-7 (Emergency Overflow)	0.63	2768.41	2769.90	OK
484	2769.38	2769.00	2-7 (Emergency Overflow)	0.63	2769.63	2771.10	OK
485	2770.49	2770.11	2-7 (Emergency Overflow)	0.63	2770.74	2772.20	OK
486	2771.48	2771.10	2-7 (Emergency Overflow)	0.63	2771.73	2773.20	OK
487	2772.48	2772.10	2-7 (Emergency Overflow)	0.63	2772.73	2774.20	OK
488	2773.48	2773.10	2-7 (Emergency Overflow)	0.63	2773.73	2775.20	OK
489	2774.25	2773.87	2-7 (Emergency Overflow)	0.63	2774.50	2775.60	OK
490	2780.80	2780.42	2-7 (Emergency Overflow)	0.63	2781.05	2782.60	OK
491	2780.44	2780.06	2-7 (Emergency Overflow)	0.63	2780.69	2782.20	OK
492	2779.93	2779.55	2-7 (Emergency Overflow)	0.63	2780.18	2781.70	OK
493	2779.47	2779.09	2-7 (Emergency Overflow)	0.63	2779.72	2781.30	OK
494	2779.01	2778.63	2-7 (Emergency Overflow)	0.63	2779.26	2780.80	OK
495	2778.45	2778.07	2-7 (Emergency Overflow)	0.63	2778.70	2780.30	OK
496	2778.00	2777.62	2-7 (Emergency Overflow)	0.63	2778.25	2779.80	OK
497	2777.54	2777.16	2-7 (Emergency Overflow)	0.63	2777.79	2779.30	OK
498	2776.84	2776.46	2-7 (Emergency Overflow)	0.63	2777.09	2778.60	OK
499	2775.75	2775.37	2-7 (Emergency Overflow)	0.63	2776.00	2777.60	OK
500	2771.08	2770.70	2-7 (Emergency Overflow)	0.63	2771.33	2772.80	OK
501	2774.28	2773.90	2-7 (Emergency Overflow)	0.63	2774.53	2776.00	OK
502	2778.29	2777.91	2-7 (Emergency Overflow)	0.63	2778.54	2780.00	OK
503	2780.79	2780.41	2-7 (Emergency Overflow)	0.63	2781.04	2782.50	OK
504	2776.90	2776.52	2-7 (Emergency Overflow)	0.63	2777.15	2778.60	OK
505	2777.28	2776.90	2-7 (Emergency Overflow)	0.63	2777.53	2779.00	OK
506	2777.73	2777.35	2-7 (Emergency Overflow)	0.63	2777.98	2779.40	OK
507	2778.19	2777.81	2-7 (Emergency Overflow)	0.63	2778.44	2779.90	OK
508	2778.65	2778.27	2-7 (Emergency Overflow)	0.63	2778.90	2780.40	OK
509	2779.16	2778.78	2-7 (Emergency Overflow)	0.63	2779.41	2780.90	OK
510	2779.66	2779.28	2-7 (Emergency Overflow)	0.63	2779.91	2781.40	OK
511	2780.49	2780.11	2-7 (Emergency Overflow)	0.63	2780.74	2782.20	OK
512	2779.14	2778.76	2-7 (Emergency Overflow)	0.63	2779.39	2780.90	OK
513	2780.45	2780.07	2-7 (Emergency Overflow)	0.63	2780.70	2782.30	OK
514	2782.05	2781.67	2-7 (Emergency Overflow)	0.63	2782.30	2783.90	OK
515	2783.92	2783.54	2-7 (Emergency Overflow)	0.63	2784.17	2785.70	OK
516	2785.50	2785.12	2-7 (Emergency Overflow)	0.63	2785.75	2787.30	OK
517	2786.35	2785.97	2-7 (Emergency Overflow)	0.63	2786.60	2788.20	OK
532	2781.89	2781.51	2-7 (Emergency Overflow)	0.63	2782.14	2783.80	OK
533	2781.50	2781.12	2-7 (Emergency Overflow)	0.63	2781.75	2783.50	OK
534	2784.85	2784.47	2-7 (Emergency Overflow)	0.63	2785.10	2786.40	OK

535	2783.54	2783.16	2-7 (Emergency Overflow)	0.63	2783.79	2786.40	OK
536	2782.23	2781.85	2-7 (Emergency Overflow)	0.63	2782.48	2783.80	OK
537	2780.92	2780.54	2-7 (Emergency Overflow)	0.63	2781.17	2783.80	OK
538	2779.61	2779.23	2-7 (Emergency Overflow)	0.63	2779.86	2781.10	OK
539	2778.30	2777.92	2-7 (Emergency Overflow)	0.63	2778.55	2781.10	OK
540	2781.03	2780.65	2-7 (Emergency Overflow)	0.63	2781.28	2782.70	OK
541	2781.86	2781.48	2-7 (Emergency Overflow)	0.63	2782.11	2783.70	OK

1: High TC is the elevation at the high side of the lot

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

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

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

Specific Energy Check							
Lot Number	High TC[1]	High FL[2]	Section	Specific Energy[3]	Min FF[4]	Design FF	Check
435	2772.85	2772.47	3-2 (Emergency Overflow) SE	0.96	2773.43	2774.70	OK
436	2771.88	2771.50	3-2 (Emergency Overflow) SE	0.96	2772.46	2773.70	OK
475	2762.04	2761.66	3-2 (Emergency Overflow) SE	0.96	2762.62	2763.70	OK
476	2763.19	2762.81	3-2 (Emergency Overflow) SE	0.96	2763.77	2764.90	OK
477	2764.83	2764.45	3-2 (Emergency Overflow) SE	0.96	2765.41	2766.50	OK
501	2774.28	2773.90	3-2 (Emergency Overflow) SE	0.96	2774.86	2776.00	OK
502	2778.29	2777.91	3-2 (Emergency Overflow) SE	0.96	2778.87	2780.00	OK
536	2782.23	2781.85	3-2 (Emergency Overflow) SE	0.96	2782.81	2783.80	OK
537	2780.92	2780.54	3-2 (Emergency Overflow) SE	0.96	2781.50	2783.80	OK
565	2783.43	2783.05	3-2 (Emergency Overflow) SE	0.96	2784.01	2785.40	OK
566	2783.21	2782.83	3-2 (Emergency Overflow) SE	0.96	2783.79	2785.10	OK
570	2782.29	2781.91	3-2 (Emergency Overflow) SE	0.96	2782.87	2784.00	OK
571	2781.89	2781.51	3-2 (Emergency Overflow) SE	0.96	2782.47	2783.60	OK

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

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

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

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

APPENDIX E

Reference Material

Technical Drainage Study for Parcel 3 at Sunstone Phase 2,
by Westwood

Approval Letters

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: May 11, 2021
TO: **Land Development Services** Department of Building & Safety				FROM: Jennifer Shinn, P.E. Flood Control, Engr. Associate Department of Public Works
SUBJECT:	Drainage Study for:			**COPIES TO:**
Parcel 3 at Sunstone Phase 2				Westwood Professional Services
Cross Streets:	Sky Pointe Drive and Log Cabin Way			Shea Homes
File Number:	F:\Depot\DSMemos\DS05426B.doc			Bart Anderson, P.E., DevCo
Parcel Number:	125-06-211-011			CCRFCD
Zoning Action:	20-0380-TMP1			
FEMA Flood Zone	YES	NO	**X**	
Proposed Storm Drain	YES **X**	NO		

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	3/1/2021	3/30/2021	See Comments Below	$400.00	4187626: $400
2nd Submittal	4/26/2021	5/11/2021	Conditionally Approved	$400.00	4258175: $400
			TOTAL FEES (LDDRS):	**$800.00**	**----**

REMARKS:

***** The Conditional Approval of this Drainage Study is to allow the engineer/developer to submit the Improvement Plans to City Land Development Only**

***** Do not submit the Drainage Study to Clark County Regional Flood Control District (CCRFCD) prior to the Structural Design and Calculations being approved by the City Building & Safety Department**

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

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

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

   Please note that effective April 6, 2020, only electronic submittals to the CCRFCD will be accepted for regional concurrence. Contact cwang@regionalflood.org for direction.

   When it's applicable, structural calculations of facilities must be approved by the City prior to submittal to the Clark County Regional Flood Control District for their review and concurrence.

2. The study assumes the storm drain infrastructure proposed by the Technical Drainage Studies for Sunstone Phase 1 Infrastructure, Brightstone Trail, and Parcel 3 at Sunstone Phase 1 & Model

Phase are in place and functioning. Substantial completion of the Sunstone Phase 1 Infrastructure facilities is required prior to residential occupancy permits. It is noted that the drainage study for Brightstone Trail was conditionally approved on 4/22/2021.

3. The substantial completion of the developer's Moccasin facility prior to any residential occupancy permits within the Sunstone development is required.
4. All storm drain inlets that are more than 10'-deep require a special structural detail and calculations. Submit structural design and calculations to City Building & Safety Department for review and approval prior to the final approval of the drainage study.
5. This study proposes Sandlot Lane will be rough graded to subgrade and the storm drain system constructed. Please note that for future, full development of Sandlot Lane, the storm drain main shall be located 3 feet from the lip of gutter and standard clearances from other utilities shall be provided.
6. This study addresses the development of Phase 2A and rough grading of 2B. An update is required to address the full development of Phase 2B.
7. 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. The minimum width for a public drainage easement is 10' if the 100-year flow is less than 20 CFS.

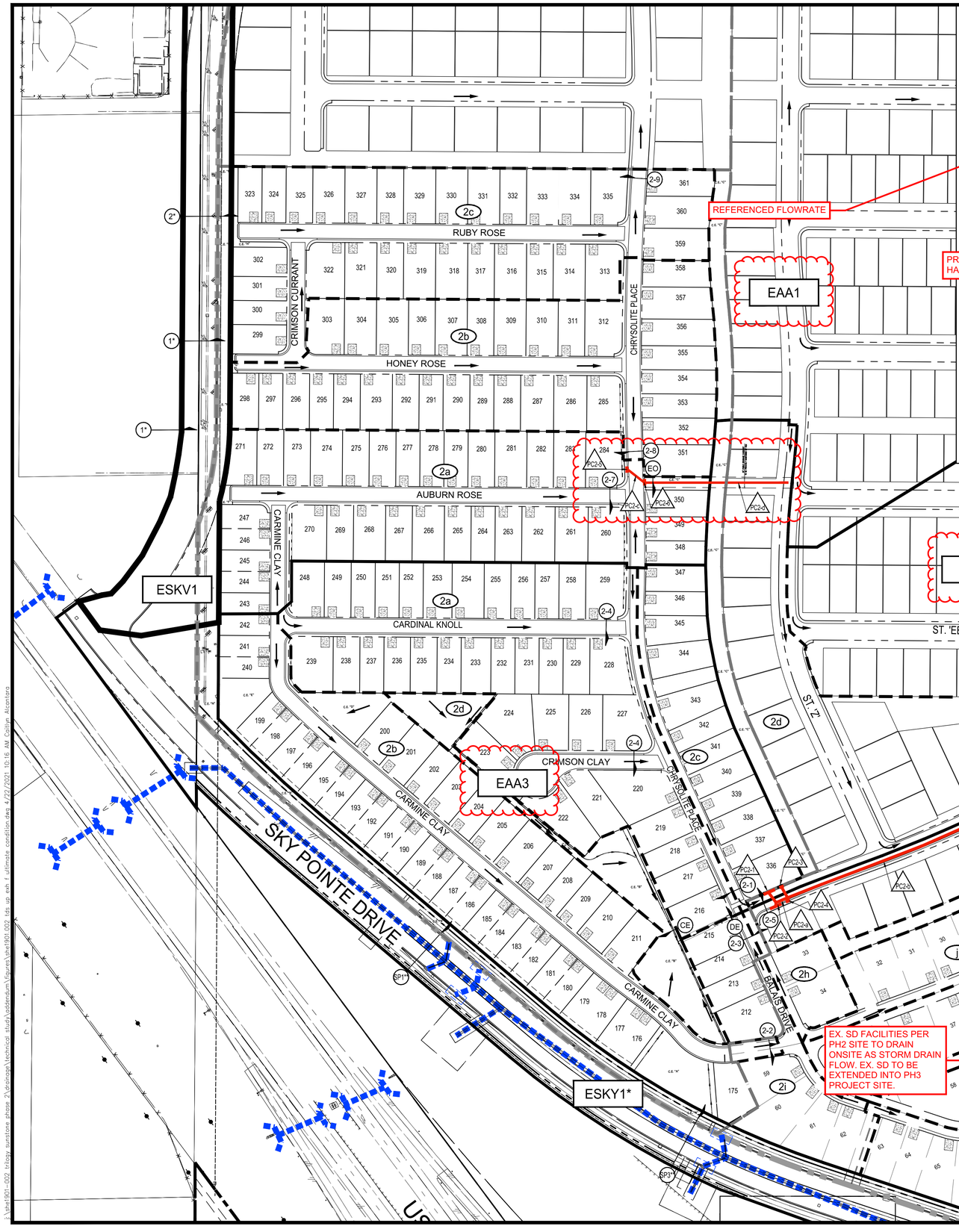
NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Update and accepted by the City of Las Vegas Flood Control Section. Additionally, conditional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

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

END OF REMARKS
JKS

T/R/S: T19S/R60E/S06
AREA G-06

Referenced Drainage Exhibits



Ultimate Condition Prorated Flow Summary

Basin ID	Q_{100} (cfs)	Area (acres)	100-yr Unit Flow (cfs/acre)
EAA1*	114	55.00	2.1
EAA2*	82	35.40	2.3
EAA3*	102	51.20	2.0
EAA4*	45	21.00	2.1
Subbasin ID	**Q_{100} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/acre)**
EAA1*(2a)	11	5.17	2.1
EAA1*(2b)	11	5.34	2.1
EAA1*(2c)	11	5.17	2.1
TOTAL	***33***	***15.68***	
Subbasin ID	**Q_{100} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/acre)**
EAA2*(2d)	13	5.75	2.3
TOTAL	***13***	***5.75***	
Subbasin ID	**Q_{100} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/acre)**
EAA3*(2a)	12	6.25	2.0
EAA3*(2b)	12	6.13	2.0
EAA3*(2c)	4	1.96	2.0
EAA3*(2d)	2	1.07	2.0
EAA3*(e)	5	2.61	2.0
EAA3*(2h)	1	0.48	2.0
EAA3*(2i)	3	1.53	2.0
EAA3*(j)	5	2.40	2.0
EAA3*(k)	5	2.64	2.0
EAA3*(l)	2	1.08	2.0
EAA3*(o)	5	2.30	2.0
EAA3*(p)	7	3.34	2.0
EAA3*(q)	5	2.55	2.0
EAA3*(r)	1	0.27	2.0
EAA3*(s)	4	1.95	2.0
EAA3*(t)	1	0.68	2.0
EAA3*(u)	3	1.37	2.0
EAA3*(v)	5	2.56	2.0
EAA3*(w)	3	1.47	2.0
EAA3*(x)	3	1.33	2.0
EAA3*(y)	3	1.61	2.0
EAA3*(z)	2	0.91	2.0
TOTAL	***93***	***46.49***	
Subbasin ID	**Q_{100} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/acre)**
EAA4*(m)	2	0.77	2.1
EAA4*(n)	13	5.90	2.1
EAA4*(bb)	0	0.09	2.1
EAA4*(cc)	1	0.41	2.1
EAA4*(dd)	2	1.03	2.1
TOTAL	***18***	***8.20***	

*referenced from *Skye Canyon Master Drainage Study Update #5*

Note the prorates provided only account for the sub areas impacting the developed areas

Ultimate Condition Flow Rate Summary

Basin/Concentration Point ID	Area (ac)	Q_{100} (cfs)
EAA1*	114	55
EAA2*	82.0	35
EAA3*	102.0	51
EAA4*	45.0	21
ESKV1*	3.9	11
ESKY1*	8.2	23

Ultimate Condition 100-Year Street Flow Summary

Section ID	Q_{100} (cfs)	Slope (%)	Depth (ft)	Velocity (fps)	DxV
2-1 Q = EAA3(2a+2c)	16	1.21	0.40	3.11	1.2
		1.80	0.38	3.54	1.3
2-2 Q = EAA3(2b+2d)	14	1.34	0.38	3.07	1.2
		2.86	0.34	4.13	1.4
2-3 Q = EAA3(2b+2d+2h+2i)	18	1.00	0.42	3.04	1.3
2-4 Q = EAA3(2a)	12	3.73	0.31	4.40	1.4
		4.85	0.30	4.86	1.5
2-5 Q = EAA3 (2a+2b+2c+2d+2h+2i)	34	3.74	0.42	5.95	2.5
2-6 Q = Bypass from Facities PC2-3 & PC2-4 + EAA3 (e) + EAA2(2d)	21	1.42	0.44	3.56	1.6
		3.73	0.40	4.87	1.9
2-7 Q = EAA1(2a)	12	0.99	0.37	2.60	0.5
		3.99	0.30	4.42	0.7
2-8 Q = EAA1(2b)	11	1.02	0.37	2.63	1.0
		3.57	0.31	4.23	1.3
2-9 Q = EAA1(2c)	11	1.63	0.35	3.13	1.1
		4.13	0.30	4.47	1.3

Ultimate Condition Hydraulic Section Summary

Section ID	Q_{100} (cfs)	Slope (%)	Depth (ft)	Velocity (fps)
CE Q =EAA3*(2d)	2	1.00	0.67	2.22
		9.82	0.44	5.23

Ultimate Condition Drainage Emergency Overflow Hydraulic Summary

Section ID	Q_{100} (cfs)	Width (ft)	Type of Analysis	Depth (ft)	Velocity (fps)
EO Q = Facility PC2-5 + PC2-6	23	25	Normal Depth	0.41	2.65
			Weir	0.46	1.99

Referenced 100-Year Flow Section Summary

Section ID	Q_{100} (cfs)	Section Description	Slope (%)	Depth (ft)	Velocity (fps)
A* Q = Referenced	6	Half Street Section	0.60	0.43	2.03
Section 1* Q = Referenced	223	18' Earthen lined trapezoidal channel, 2:1 SS	0.40	2.18	4.57
Section 2* Q = Referenced	223	18' Earthen lined trapezoidal channel, D50 = 12in grouted, 2:1 SS	8.82	0.89	12.68
SP1** Q = Referenced	4	Sky Pointe Half Street Section	1.50	0.37	2.85
SP3** Q = Referenced	4	Sky Pointe Half Street Section	2.90	0.34	3.68

*Referenced from BrightStone Trail Study

*Referenced from Sunstone Phase 1 Infrastructure Study

Ultimate Condition Drainage Easement Hydraulic Summary

Section ID	Q_{100} (cfs)	Width (ft)	Type of Analysis	Depth (ft)	Velocity (fps)
DE Q =EAA3*(2d)	2	10	Normal Depth	0.37	7.28
			Weir	0.43	0.47

Recommended Flood Control Facility Summary

Facility ID	Facility Description	Total/Approaching Flow (cfs) Q_{100}	Facility Flow (cfs) Q_{100}	Surface/Bypass Flow (cfs) Q_{100}	Notes
Phase 2 Sandlot Lane Storm Drain (PH2-SL.WSW)					
PC2-1	Proposed 20' Type CM2 DI & 18" RCP	17	13	4	
PC2-2	Proposed 20' Type CM2 DI & 18" RCP	17	13	4	
PC2-3	Proposed 5' Type CM2 DI & 18" RCP	4	2.5	1.5	
PC2-4	Proposed 5' Type CM2 DI & 18" RCP	4	2.5	1.5	
Phase 2 Chrysolite Place Storm Drain (PH2-CP.WSW)					
PC2-5	Proposed 7.5' Type CM2 DI	11	11	0	Sump Inlet
PC2-6	Proposed 7.5' Type CM2 DI	11	11	0	Sump Inlet
Facility ID	**Facility Description**	**Facility Flow (cfs), Q_{100}**			**Notes**
Phase 2 Sandlot Lane Storm Drain (PH2-SL.WSW)					
PC2-a	Proposed 18" RCP	26			
PC2-b	Proposed 18" RCP	31			
PCx1	Existing 24" RCP	31			
PCx2	Existing 24" RCP	31			
Phase 2 Chrysolite Place Storm Drain (PH2-CP.WSW)					
PC2-c	Proposed 24" RCP	11			
PC2-d	Proposed 24" RCP	22			

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

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.
1					

SHLP

PARCEL 3 AT SUNSTONE PHASE 2

ULTIMATE DRAINAGE CONDITION

DATE: APRIL 2021

DRAFTER: CAA

DESIGNER: CAA

CHECKED: SOA

PROJECT NO.
SHE1901.002

EXHIBIT F

SHEET 1 OF 1

J:\she1901.002 Ivory sunstone phase 2\Drainage\Technical study\Addendum\Figures\she1901.002 fig acc ext 1 ultimate condition.dgn 1/22/2021 10:16 AM Gillian Monterio

Referenced Hydrology

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
TIME OF CONCENTRATION

Project Name & Number: Skye Canyon MDS UP5 - Eastland
Description:
By: CWB
Date: 12/17/2018

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check Urbanized Basins		Tlag
DESIG:	DEV./EX. (D or E)	CN	K [1]	AREA Ac	AREA Mi^2 [2]	INITIAL LENGTH Feet	SLOPE %	Ti Min [3]	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY FPS [4]	V2 VELOCITY FPS [5]	Tt Min [6]	Tc Calc. [7]	Total Length Feet [8]	Tc Check [9]	Tlag Hours [10]
EAA1	D	90.10	0.799	55.00	0.0859	105	1.00	5.55	3598	2.3	3.05	4.62	13.91	19.45	3703	30.572	0.195
EAA2	D	90.10	0.799	35.40	0.0553	105	1.00	5.55	2452	2.6	3.26	4.94	9.13	14.68	2557	24.206	0.147
EAA3	D	90.10	0.799	51.20	0.0800	105	1.00	5.55	3578	1.9	2.76	4.18	15.28	20.82	3683	30.461	0.208
EAA4	D	90.10	0.799	21.00	0.0328	358	3.07	7.05	1655	0.9	1.93	2.92	10.92	17.97	2013	21.183	0.180
EBRT1	D	98.00	0.904	1.80	0.0028	20	1.00	1.58	1361	3.1	3.55	5.38	5.01	6.60	1381	17.672	0.066
ECOM1A	D	95.00	0.864	9.90	0.0155	50	1.00	3.00	1317	2.1	2.95	4.47	5.88	8.88	1367	17.594	0.089
ECOM1B	D	95.00	0.864	13.70	0.0214	50	1.00	3.00	1286	2.2	2.98	4.52	5.69	8.70	1336	17.422	0.087
ECOM2	D	95.00	0.864	4.70	0.0073	50	1.00	3.00	575	2.4	3.15	4.77	2.91	5.91	625	13.472	0.059
ECOM3	D	90.10	0.799	6.40	0.0100	50	1.00	3.83	747	1.3	2.34	3.54	4.73	8.55	797	14.428	0.086
ECOM4	D	90.10	0.799	5.50	0.0086	50	1.00	3.83	874	2.3	3.06	4.63	4.07	7.90	924	15.133	0.079
ECR1	D	97.40	0.896	7.80	0.0122	33	2.00	1.68	2468	1.3	2.27	3.43	13.22	14.90	2501	23.894	0.149
EFA1	D	98.00	0.904	2.70	0.0042	37	2.00	1.71	1491	0.5	1.43	2.16	13.47	15.17	1528	18.489	0.152
EFA2	D	98.00	0.904	2.40	0.0038	51	2.00	2.00	981	0.5	1.43	2.16	9.54	11.54	1032	15.733	0.115
EFA3	D	98.00	0.904	2.50	0.0039	32	2.00	1.59	1116	0.5	1.43	2.16	10.58	12.17	1148	16.378	0.122
EFA4	D	98.00	0.904	2.80	0.0044	79	2.00	2.49	1220	0.5	1.43	2.16	11.38	13.87	1299	17.217	0.139
EFA5	D	98.00	0.904	0.90	0.0014	40	2.00	1.77	266	4.5	4.29	6.50	1.03	2.81	306	11.700	0.050
EFA6A	D	98.00	0.904	2.50	0.0039	83	2.00	2.56	671	1.8	2.70	4.09	3.78	6.34	754	14.189	0.063
EFA6B	D	98.00	0.904	5.70	0.0089	27	2.00	1.46	1852	2.3	3.04	4.61	7.63	9.08	1879	20.439	0.091
EFP2	D	95.00	0.864	1.00	0.0016	50	1.00	3.00	110	12.7	7.21	10.92	0.25	3.26	160	10.889	0.050
EIRN1	D	92.20	0.827	1.90	0.0030	14	2.00	1.46	1317	3.0	3.52	5.34	4.92	6.38	1331	17.394	0.064
ELOG1	D	98.00	0.904	4.30	0.0067	51	2.00	2.00	934	1.8	2.73	4.13	4.81	6.81	985	15.472	0.068
ELOG2	D	97.90	0.902	12.10	0.0189	45	2.00	1.89	2847	2.9	3.41	5.17	10.02	11.91	2892	26.067	0.119
EMLA1	D	90.10	0.799	3.20	0.0050	50	1.00	3.83	344	4.9	4.49	6.80	1.28	5.10	394	12.189	0.051
EMR1	D	79.90	0.665	17.40	0.0272	191	1.00	10.83	2364	3.0	3.48	5.26	8.30	19.13	2555	24.194	0.191
EMR2	D	81.70	0.688	19.20	0.0300	304	1.00	12.92	2237	2.5	3.19	4.84	8.59	21.51	2541	24.117	0.215
ENP	D	55.30	0.340	3.50	0.0055	79	1.00	12.16	620	1.3	2.29	3.48	4.21	16.37	699	13.883	0.139
EOHR1	D	97.50	0.897	10.10	0.0158	21	2.00	1.33	2845	2.3	3.05	4.62	11.19	12.52	2866	25.922	0.125
EPA	D	90.10	0.799	17.10	0.0267	107	1.00	5.60	1441	1.6	2.56	3.87	7.31	12.91	1548	18.600	0.129
EPB1	D	82.20	0.695	31.60	0.0494	110	1.00	7.65	1930	1.8	2.72	4.12	8.86	16.50	2040	21.333	0.165
EPB2	D	82.20	0.695	46.40	0.0725	100	1.00	7.29	2604	1.7	2.63	3.98	11.99	19.28	2704	25.022	0.193
EPC	D	90.10	0.799	20.20	0.0316	95	1.00	5.28	1389	1.7	2.66	4.02	6.82	12.09	1484	18.244	0.121
EPD	D	90.10	0.799	28.90	0.0452	152	1.00	6.67	1237	0.7	1.73	2.61	9.53	16.20	1389	17.717	0.162
EPE1	D	90.10	0.799	12.50	0.0195	133	1.00	6.24	1126	1.2	2.17	3.28	7.03	13.27	1259	16.994	0.133

Referenced Basin

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN  1998               *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   18DEC18  TIME  12:41:55  *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (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
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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

1 HEC-1 INPUT PAGE 1

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

              *DIAGRAM
    1         ID     SLATER HANIFAN GROUP
    2         ID     LENNAR HOMES
    3         ID     SKYE CANYON
    4         ID     MASTER DRAINAGE STUDY - UPDATE #5
    5         ID     ULTIMATE DRAINAGE CONDITION - REVISED EAST AREA
    6         ID     INCLUDES FULL WATERSHED WITH AREA UPSTREAM OF DB1, DB2 AND 157DB
    7         ID
    8         ID     RETURN PERIOD ------- 100-YEAR
    9         ID     DISTRIBUTION -------- 6-HOUR SDN3
   10         ID     PROJECT NO. --------- EST1801-000
   11         ID     FILENAME ------------ ULT3.H1
   12         ID     DATE ---------------- December 2018
   13         ID     MODELED BY ---------- SMJ, updated by LKL
   14         ID
   15         ID        SIX HOUR DEPTH-AREA REDUCTION FACTORS
   16         ID        DRAINAGE AREA (MI^2)    DARF
   17         ID        0.0-0.49                1.00
   18         ID        0.5-0.99                0.98
   19         ID        1.0-1.99                0.97
   20         ID        2.0-3.99                0.93
   21         ID        4.0-5.99                0.91
   22         ID        6.0-7.99                0.90
   23         ID
   24         IT      5       0       0    2000
   25         IO      5       0       0
   26         IN      5       0       0
   27         JR   PREC    1.00    0.98    0.97    0.93    0.91    0.90
              *

   28         KK   WUS95
   29         KM   KYLE CANYON INTERCHANGE - WEST HALF
   30         BA   .0133
   31         PB    2.77
   32         PC      0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
   33         PC  0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
   34         PC  0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
   35         PC  0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   36         PC  0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   37         PC  0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
   38         PC  0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
   39         PC  0.998   0.999   1.000
   40         LS      0    98.0
   41         UD  0.082
              *

   42         KK  DHD01B
   43         KM   FACILITY E-9
   44         KM   FLOW SPLIT AT VTN CULVERT 1
   45         KM   FLOW SPLITS TO BETWEEN NB AND SB ROADS OF US-95
   46         KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
```

```
1400          PB    2.77
1401          LS       0    98.0
1402          UD   0.050
              *

1403          KK     EC1
1404          HC       5
              *

1405          KK  NW50-C
1406          KM   PROPOSED ULTIMATE CONDITION MPA BASIN
1407          BA   .1677
1408          PB    2.77
1409          LS       0    87.8
1410          UD   0.179
              *

1411          KK   WGC1
1412          KM   WEST BASIN, WEST OF US95
1413          BA   .0130
1414          PB    2.77
1415          LS       0    92.0
1416          UD   0.091
              *
```

1 HEC-1 INPUT PAGE 39

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

1417          KK   WC44C
1418          HC       2
              *

1419          KK   ESKY1
1420          BA  0.0128
1421          LS       0    98.0
1422          UD   0.162
              *

1423          KK   EMLA1
1424          BA  0.0050
1425          LS       0    90.1
1426          UD   0.051
              *

1427          KK   ECOM3
1428          BA  0.0100
1429          LS       0    90.1
1430          UD   0.086
              *

1431          KK   ECOM4
1432          BA  0.0086
1433          LS       0    90.1
1434          UD   0.079
              *

1435          KK    EC2A
1436          HC       5
              *

1437          KK    EPI1
1438          BA  0.0134
1439          LS       0    90.1
1440          UD   0.077
              *

1441          KK   ELOG1
1442          BA  0.0067
1443          LS       0    98.0
1444          UD   0.068
              *

1445          KK     EC2
1446          HC       4
              *

1447          KK    EAA3
1448          BA  0.0800
1449          LS       0    90.1
1450          UD   0.208
              *
```

1 HEC-1 INPUT PAGE 40

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

1451          KK     EC3
1452          HC       2
```

```
             *

1453         KK    EAA4
1454         BA  0.0328
1455         LS       0    90.1
1456         UD   0.180
             *

1457         KK     EC4
1458         HC       2
             *

1459         KK    ECR1
1460         BA  0.0122
1461         LS       0    97.4
1462         UD   0.149
             *

1463         KK    EAA2
1464         BA  0.0553
1465         LS       0    90.1
1466         UD   0.147
             *

1467         KK     EPC
1468         BA  0.0316
1469         LS       0    90.1
1470         UD   0.121
             *

1471         KK     EC5
1472         HC       3
             *

1473         KK    EPF1
1474         BA  0.0211
1475         LS       0    90.1
1476         UD   0.109
             *

1477         KK     EC6
1478         HC       3
             *

1479         KK   ELOG2
1480         BA  0.0189
1481         LS       0    97.9
1482         UD   0.119
             *
```



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

1483         KK     EC8
1484         HC       2
             *

1485         KK  RETC2B
1486         KM   RETRIEVE FLOW FROM VTN CULVERT 2
1487         KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
1488         DR  DCHD2B
             *

1489         KK   95-5A
1490         KM   US95 BASIN BETWEEN LOG CABIN AND IRON MOUNTAIN
1491         BA   .0063
1492         PB    2.77
1493         LS       0    92.6
1494         UD   0.075
             *

1495         KK   95-5B
1496         KM   US95 BASIN BETWEEN LOG CABIN AND IRON MOUNTAIN
1497         BA   .0059
1498         LS       0    92.6
1499         UD   0.073
             *

1500         KK   95-6A
1501         KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
1502         BA   .0104
1503         LS       0    92.8
1504         UD   0.091
             *

1505         KK   95-6B
1506         KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
1507         BA   .0074
```

```
1614          BA  0.0494
1615          LS       0    82.2
1616          UD   0.165
              *
```



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

1617          KK    EC8A
1618          HC       2
              *

1619          KK    EFA2
1620          BA  0.0038
1621          LS       0    98.0
1622          UD   0.115
              *

1623          KK    EC17
1624          HC       3
              *

1625          KK     EPA
1626          BA  0.0267
1627          LS       0    90.1
1628          UD   0.129
              *

1629          KK    EPB2
1630          BA  0.0725
1631          LS       0    82.2
1632          UD   0.193
              *

1633          KK    EC8B
1634          HC       2
              *

1635          KK   EC21A
1636          HC       2
              *

1637          KK   ESKV1
1638          BA  0.0061
1639          LS       0    98.0
1640          UD   0.141
              *

1641          KK    OFFZ
1642          BA  0.0481
1643          LS       0    78.7
1644          UD   0.175
              *

1645          KK    EC19
1646          HC       2
              *
```



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

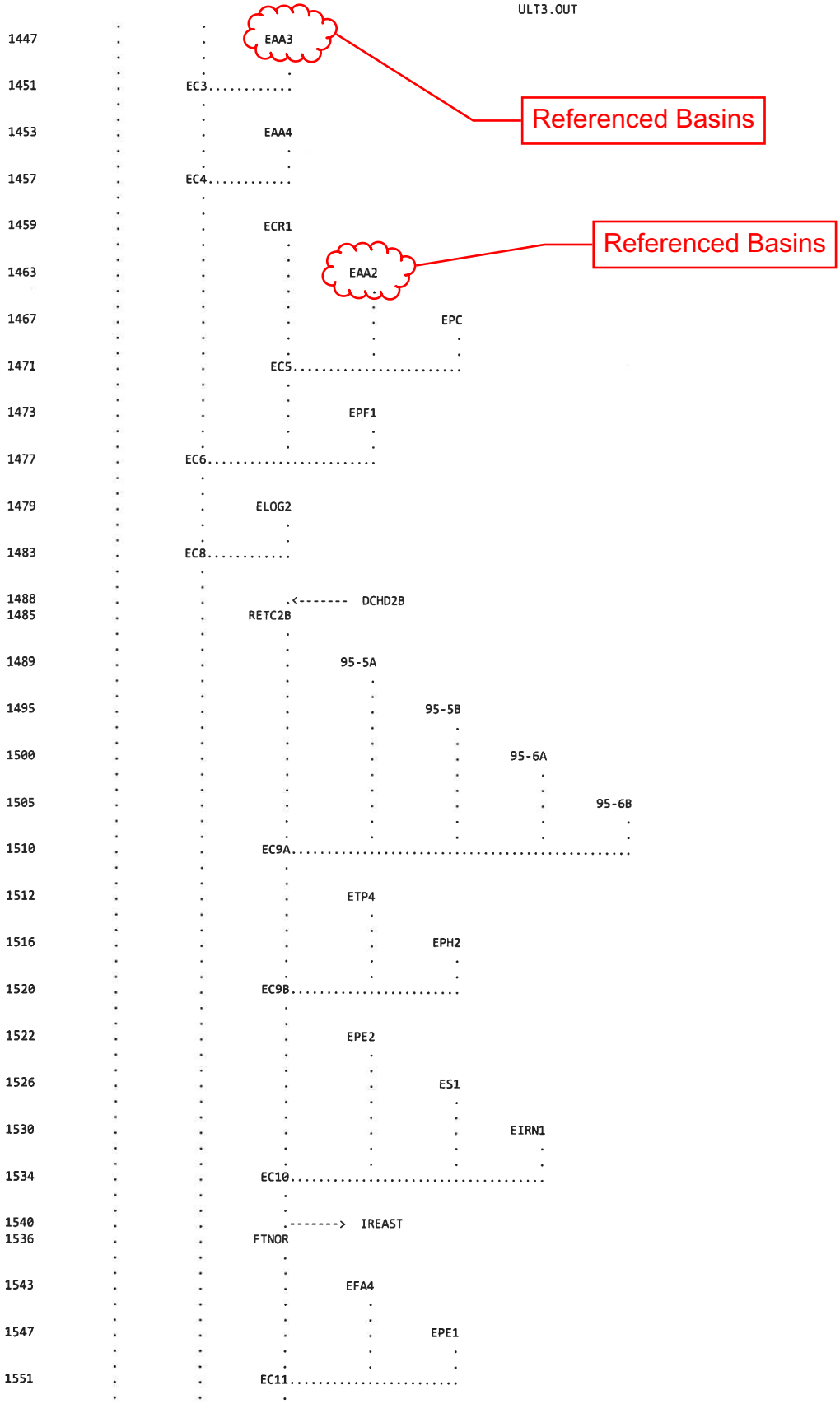
1647          KK    EMR1
1648          BA  0.0272
1649          LS       0    79.9
1650          UD   0.191
              *

1651          KK    EAA1
1652          BA  0.0859
1653          LS       0    90.1
1654          UD   0.195
              *

1655          KK    EC20
1656          HC       3
              *

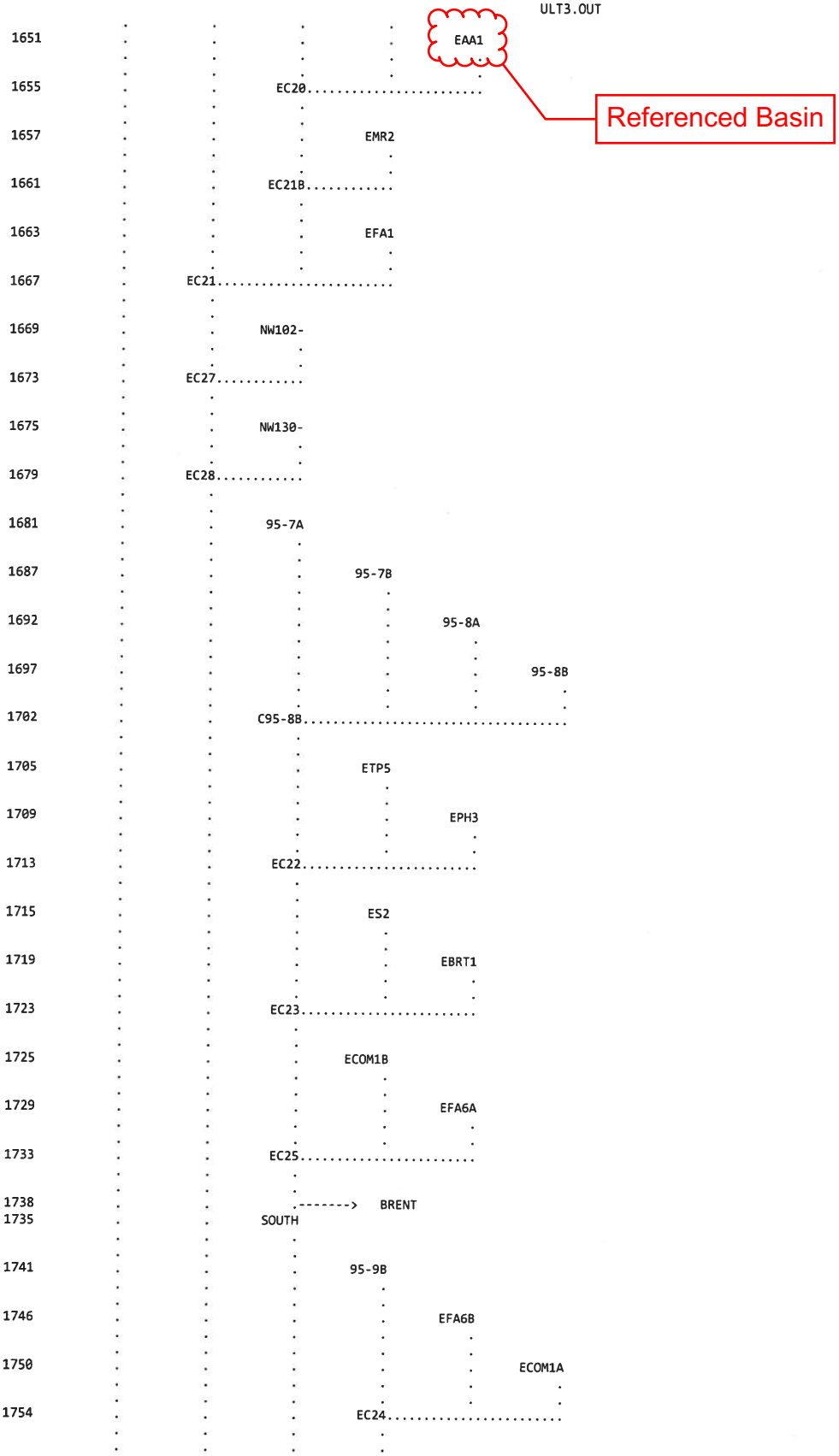
1657          KK    EMR2
1658          BA  0.0300
1659          LS       0    81.7
1660          UD   0.215
              *

1661          KK   EC21B
1662          HC       2
              *
```



Referenced Basins

Referenced Basins


1651
EAA1
1655
EC20
1657
EMR2
1661
EC21B
1663
EFA1
1667
EC21
1669
NW102-
1673
EC27
1675
NW130-
1679
EC28
1681
95-7A
1687
95-7B
1692
95-8A
1697
95-8B
1702
C95-8B
1705
ETP5
1709
EPH3
1713
EC22
1715
ES2
1719
EBRT1
1723
EC23
1725
ECOM1B
1729
EFA6A
1733
EC25
1738
1735
SOUTH
BRENT
1741
95-9B
1746
EFA6B
1750
ECOM1A
1754
EC24
Referenced Basin

				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	95-4B	.01	1	FLOW	13.	13.	13.	12.	12.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	EUS95	.01	1	FLOW	34.	33.	33.	32.	31.	31.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
5 COMBINED AT										
+	EC1	4.96	1	FLOW	2331.	2268.	2238.	2116.	2054.	2020.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	NW50-C	.17	1	FLOW	212.	205.	202.	190.	184.	181.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	WGC1	.01	1	FLOW	23.	22.	22.	21.	20.	20.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+	WC44C	.18	1	FLOW	232.	225.	222.	208.	202.	199.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	ESKY1	.01	1	FLOW	23.	23.	22.	21.	21.	21.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	EMLA1	.00	1	FLOW	10.	9.	9.	9.	8.	8.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	ECOM3	.01	1	FLOW	17.	16.	16.	15.	15.	14.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	ECOM4	.01	1	FLOW	15.	14.	14.	13.	13.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
5 COMBINED AT										
+	EC2A	.22	1	FLOW	286.	278.	274.	259.	251.	247.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	EPI1	.01	1	FLOW	23.	23.	22.	21.	20.	20.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	ELOG1	.01	1	FLOW	15.	14.	14.	14.	13.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
4 COMBINED AT										
+	EC2	5.20	1	FLOW	2646.	2575.	2540.	2401.	2330.	2292.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	EAA3	.08	1	FLOW	102.	100.	98.	93.	90.	89.
				TIME	3.58	3.58	3.58	3.67	3.67	3.67
2 COMBINED AT										
+	EC3	5.28	1	FLOW	2748.	2674.	2639.	2493.	2420.	2380.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	EAA4	.03	1	FLOW	45.	44.	43.	41.	40.	39.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT										
+	EC4	5.31	1	FLOW	2794.	2718.	2682.	2534.	2460.	2420.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	ECR1	.01	1	FLOW	22.	22.	21.	20.	20.	20.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	EAA2	.06	1	FLOW	82.	80.	78.	74.	72.	71.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	EPC	.03	1	FLOW	48.	47.	46.	43.	42.	42.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT										
+	EC5	.10	1	FLOW	152.	148.	146.	138.	134.	132.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58

Referenced Basin

Project Site Basin

+	EC17	5.84	1	FLOW	3269.	3177.	3133.	2953.	2862.	2814.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	EPA	.03	1	FLOW	40.	39.	39.	37.	36.	35.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	EPB2	.07	1	FLOW	67.	65.	64.	59.	57.	56.
				TIME	3.58	3.58	3.58	3.67	3.67	3.67
2 COMBINED AT										
+	EC8B	.10	1	FLOW	108.	104.	102.	96.	92.	91.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT										
+	EC21A	5.94	1	FLOW	3376.	3281.	3235.	3048.	2955.	2904.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	ESKV1	.01	1	FLOW	11.	11.	11.	10.	10.	10.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	OFFZ	.05	1	FLOW	39.	38.	37.	34.	32.	32.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT										
+	EC19	.05	1	FLOW	50.	49.	48.	44.	43.	42.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	EMR1	.03	1	FLOW	22.	22.	21.	20.	19.	18.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT										
+	EAA1	.09	1	FLOW	114.	111.	109.	103.	100.	99.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT										
+	EC20	.17	1	FLOW	187.	181.	178.	167.	161.	159.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	EMR2	.03	1	FLOW	26.	26.	25.	23.	22.	22.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT										
+	EC21B	.20	1	FLOW	212.	205.	202.	189.	182.	179.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	EFA1	.00	1	FLOW	8.	7.	7.	7.	7.	7.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT										
+	EC21	6.14	1	FLOW	3596.	3494.	3445.	3244.	3144.	3091.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	NW102-	.20	1	FLOW	269.	263.	259.	246.	240.	236.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT										
+	EC27	6.34	1	FLOW	3844.	3736.	3683.	3471.	3364.	3308.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	NW130-	.16	1	FLOW	92.	88.	86.	78.	75.	73.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT										
+	EC28	6.49	1	FLOW	3923.	3811.	3757.	3537.	3427.	3369.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	95-7A	.01	1	FLOW	14.	14.	13.	13.	13.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	95-7B	.01	1	FLOW	16.	15.	15.	15.	14.	14.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	95-8A	.01	1	FLOW	11.	11.	11.	10.	10.	10.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	95-8B	.00	1	FLOW	7.	7.	7.	6.	6.	6.

Project Site Basin

Referenced Hydraulics

Worksheet for Section 2-6: FULL STREET 100-YR (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.42 %
Discharge	20.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.35	0.38
0+01.33	0.06
0+01.33	0.00
0+02.50	0.13
0+02.50	0.17
0+15.50	0.38
0+28.50	0.17
0+28.50	0.13
0+29.67	0.00
0+29.67	0.06
0+30.65	0.38
0+31.00	0.38
0+36.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+02.50, 0.13)	0.013
(0+02.50, 0.13)	(0+28.50, 0.13)	0.016
(0+28.50, 0.13)	(0+36.00, 0.48)	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	0.44 ft
Roughness Coefficient	0.015
Elevation	0.44 ft
Elevation Range	0.00 to 0.48 ft
Flow Area	5.7 ft²

REFERENCED STREET SECTION

Worksheet for Section 2-6: FULL STREET 100-YR (min%)

Results	
Wetted Perimeter	34.36 ft
Hydraulic Radius	0.17 ft
Top Width	33.98 ft
Normal Depth	0.44 ft
Critical Depth	0.49 ft
Critical Slope	0.58 %
Velocity	3.50 ft/s
Velocity Head	0.19 ft
Specific Energy	0.63 ft
Froude Number	1.504
Flow Type	Supercritical

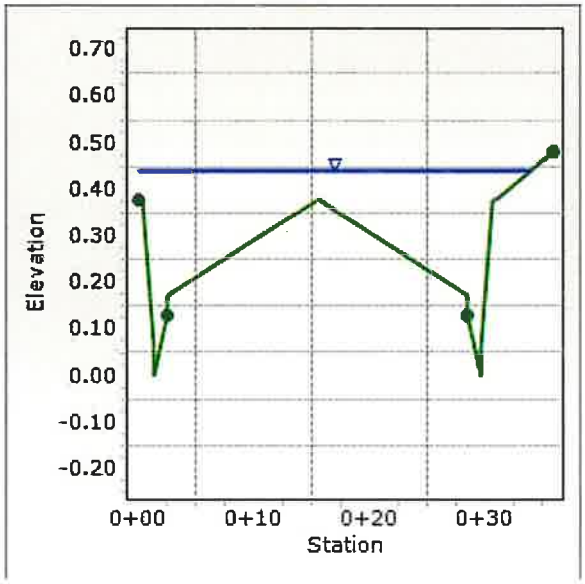
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.44 ft
Critical Depth	0.49 ft
Channel Slope	1.42 %
Critical Slope	0.58 %

Cross Section for Section 2-6: FULL STREET 100-YR (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.42 %
Normal Depth	0.44 ft
Discharge	20.00 cfs



Worksheet for Section 2-6: FULL STREET 100-YR (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	3.73 %
Discharge	20.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+00.35	0.38
0+01.33	0.06
0+01.33	0.00
0+02.50	0.13
0+02.50	0.17
0+15.50	0.38
0+28.50	0.17
0+28.50	0.13
0+29.67	0.00
0+29.67	0.06
0+30.65	0.38
0+31.00	0.38
0+36.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+02.50, 0.13)	0.013
(0+02.50, 0.13)	(0+28.50, 0.13)	0.016
(0+28.50, 0.13)	(0+36.00, 0.48)	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	0.39 ft
Roughness Coefficient	0.015
Elevation	0.39 ft
Elevation Range	0.00 to 0.48 ft
Flow Area	4.2 ft²

Worksheet for Section 2-6: FULL STREET 100-YR (max%)

Results	
Wetted Perimeter	31.98 ft
Hydraulic Radius	0.13 ft
Top Width	31.64 ft
Normal Depth	0.39 ft
Critical Depth	0.49 ft
Critical Slope	0.60 %
Velocity	4.78 ft/s
Velocity Head	0.36 ft
Specific Energy	0.75 ft
Froude Number	2.318
Flow Type	Supercritical

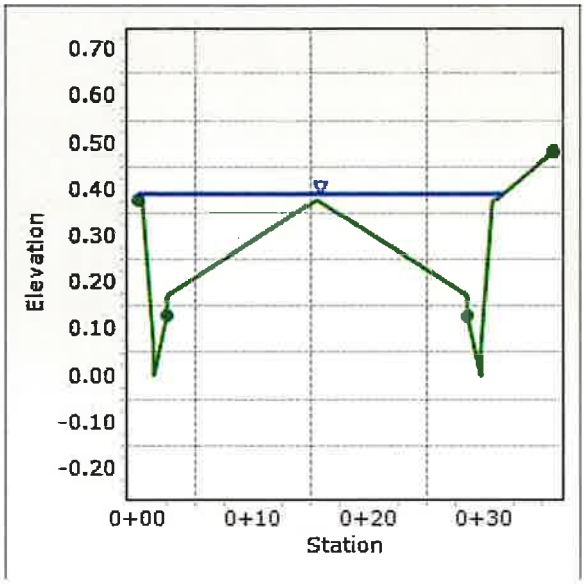
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.39 ft
Critical Depth	0.49 ft
Channel Slope	3.73 %
Critical Slope	0.60 %

Cross Section for Section 2-6: FULL STREET 100-YR (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	3.73 %
Normal Depth	0.39 ft
Discharge	20.00 cfs



Ultimate Condition WSPG Summary
PHASE 2A STORM DRAIN - CHRYSOLITE PLACE (PH2A-CP)

WSPG Station	Equivalent Roadway Station	Improvement Plan Sheet	Storm Drain Dimension	Invert Elevation (ft)	Q_{100} (cfs)	WSE (ft)	Velocity (ft/s)	FG Elevation	Facility Description	HGL Check[1]
										1 - 'HGL Check' reflects the minimum 1-ft below finished grade.
1000.00		SD-2	24" RCP	2775.38	23.00	2777.09	8.06	2782.00		OK
1267.21	1+41.2	SD-2	24" RCP	2776.72	23.00	2780.00	7.32	2787.75		OK
1267.21	1+41.2	SD-2	2.5' x 10' RCB	2776.72	23.00	2781.15	2.08	2787.75		OK
1268.54		SD-2	2.5' x 10' RCB	2776.89	23.00	2781.14	2.16	2787.75	Facility PC2-6 (SDDI#6)	OK
1269.87		SD-2	2.5' x 10' RCB	2777.05	11.50	2781.25	1.10	2787.75		OK
1271.20	1+37.1	SD-2	2.5' x 10' RCB	2777.22	11.50	2781.25	1.14	2787.75		OK
1271.20	1+37.1	SD-2	18" RCP	2777.22	11.50	2781.25	6.51	2787.75		OK
1308.33	1+00.	SD-2	18" RCP	2778.31	11.50	2781.70	6.51	2787.29	Facility PC2-5 (SDDI#5)	OK
1308.33	1+00.	SD-2	18" RCP	2778.31	11.50	2781.70	6.51	2787.29		OK

REFERENCED WSPG MODEL PROVIDED FOR COMPARISON AND INCLUDED IN PH3 STORM DRAIN MODEL.

```
T1 SHE1901.002: TRILOGY AT SUNSTONE PHASE 2A
T2 PHASE 2A STORM DRAIN - CHRYSOLITE PLACE (PH2A-CP)
T3 FROM OUTLET TO SDDI#5
SO   1000.0002775.380 24                          0.000
R    1267.2102776.720 24      .013                                  14.0
WE   1267.2102776.720  1
R    1268.5402776.887  1      .015                                  14.0
JX   1269.8702777.053  1  1   .015   11.5          2777.053        90.0
R    1271.2002777.220  1      .015                                  13.0
WX   1271.2002777.220 18
R    1308.3302778.310 18      .013
SH   1308.3302778.310 18
CD  18  4   1   0.000   1.500    0.000 0.000 0.000  0.0000.00  0.00
CD   1  3   0   0.000  10.000    2.500 0.000 0.000  0.0000.00  0.00
CD  24  4   1   0.000   2.000    0.000 0.000 0.000  0.0000.00  0.00
Q           11.500
```

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	18	4	1		1.500														
CD	1	3	0	.000	10.000	2.500	.000	.000	.00										
CD	24	4	1		2.000														

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SHE1901.002: TRILOGY AT SUNSTONE PHASE 2A

HEADING LINE NO 2 IS -

PHASE 2A STORM DRAIN - CHRYSOLITE PLACE (PH2A-CP)

HEADING LINE NO 3 IS -

FROM OUTLET TO SDDI#5

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1000.000	2775.380	24	.000

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1267.210	2776.720	24	.013	.000	.000	14.000	0

ELEMENT NO 3 IS A WALL ENTRANCE *

U/S DATA	STATION	INVERT	SECT	FP
	1267.210	2776.720	1	.500

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1268.540	2776.887	1	.015	.000	.000	14.000	0

ELEMENT NO 5 IS A JUNCTION * * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1269.870	2777.053	1	1	0	.015	11.500	.000	2777.053	.000	90.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1271.200	2777.220	1	.015	.000	.000	13.000	0

ELEMENT NO 7 IS A WALL EXIT *

U/S DATA	STATION	INVERT	SECT
	1271.200	2777.220	18

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1308.330	2778.310	18	.013	.000	.000	.000	0

ELEMENT NO 9 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1308.330	2778.310	18	.000

SHE1901.002: TRILOGY AT SUNSTONE PHASE 2A
PHASE 2A STORM DRAIN - CHRYSOLITE PLACE (PH2A-CP)
FROM OUTLET TO SDDI#5

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1080.000	2775.380	1.706	2777.086	23.00	8.06	1.01	2778.09	.00	1.71	1.42	2.000	.000	.00	1 .0
3.622	.0050					.0094	.03	1.71	1.00	2.00	.013	.00	.00	PIPE
1083.622	2775.398	1.813	2777.211	23.00	7.68	.92	2778.13	.00	1.71	1.16	2.000	.000	.00	1 .0
21.524	.0050					.0094	.20	1.81	.84	2.00	.013	.00	.00	PIPE
1025.147	2775.506	1.991	2777.497	23.00	7.32	.83	2778.33	.00	1.71	.26	2.000	.000	.00	1 .0
1.648	.0050					.0098	.02	1.99	.37	2.00	.013	.00	.00	PIPE
1026.794	2775.514	2.000	2777.514	23.00	7.32	.83	2778.35	.00	1.71	.00	2.000	.000	.00	1 .0
240.416	.0050					.0100	2.41	2.00	.00	2.00	.013	.00	.00	PIPE
1267.210	2776.720	3.279	2779.999	23.00	7.32	.83	2780.83	.00	1.71	.00	2.000	.000	.00	1 .0
WALL	ENTRANCE													
1267.210	2776.720	4.426	2781.146	23.00	2.08	.07	2781.21	.00	1.38	2.50	10.000	2.500	.00	0 .0
1.330	.1256					.0005	.00	4.43	.17	.51	.015	.00	.00	BOX
1268.540	2776.887	4.254	2781.141	23.00	2.16	.07	2781.21	.00	1.38	2.50	10.000	2.500	.00	0 .0
JUNCT STR	.1248					.0003	.00	4.25	.18		.015	.00	.00	BOX
1269.870	2777.053	4.197	2781.250	11.50	1.10	.02	2781.27	.00	.87	2.50	10.000	2.500	.00	0 .0
1.330	.1256					.0001	.00	4.20	.09	.32	.015	.00	.00	BOX
1271.200	2777.220	4.029	2781.249	11.50	1.14	.02	2781.27	.00	.87	2.50	10.000	2.500	.00	0 .0
WALL	EXIT													

SHE1901.002: TRILOGY AT SUNSTONE PHASE 2A
PHASE 2A STORM DRAIN - CHRYSOLITE PLACE (PH2A-CP)
FROM OUTLET TO SDDI#5

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1271.200	2777.220	4.030	2781.250	11.50	6.51	.66	2781.91	.00	1.29	.00	1.500	.000	.00	1 .0
37.130	.0294					.0120	.45	4.03	.00	.87	.013	.00	.00	PIPE
1308.330	2778.310	3.385	2781.695	11.50	6.51	.66	2782.35	.00	1.29	.00	1.500	.000	.00	1 .0

SHE1901.002: TRILOGY AT SUNSTONE PHASE 2A

PHASE 2A STORM DRAIN - CHRYSOLITE PLACE (PH2A-CP)

FROM OUTLET TO SDDI#5

```
1000.00   .I          W H     E                                    .   R
1006.29   .I          CW H     E                                   .   R
1012.58   .                                                        .
1018.88   .                                                        .
1025.17   . I          C H      E                                  .   R
1031.46   . I          C  H      E                                 .   R
1037.75   .                                                        .
1044.05   .                                                        .
1050.34   .                                                        .
1056.63   .                                                        .
1062.92   .                                                        .
1069.22   .                                                        .
1075.51   .                                                        .
1081.80   .                                                        .
1088.09   .                                                        .
1094.39   .                                                        .
1100.68   .                                                        .
1106.97   .                                                        .
```

1113.26 . .

1119.56 . .

1125.85 . .

1132.14 . .

1138.43 . .

1144.73 . .

1151.02 . .

1157.31 . .

1163.60 . .

1169.90 . .

1176.19 . .

1182.48 . .

1188.77 . .

1195.07 . .

1201.36 . .

1207.65 . .

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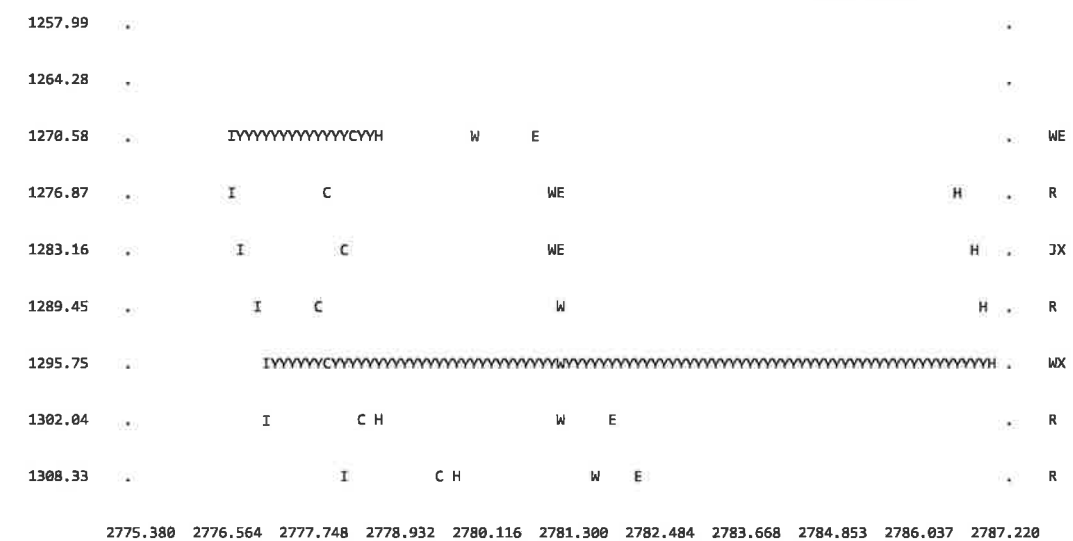
1245.41 . .

1251.70 . .



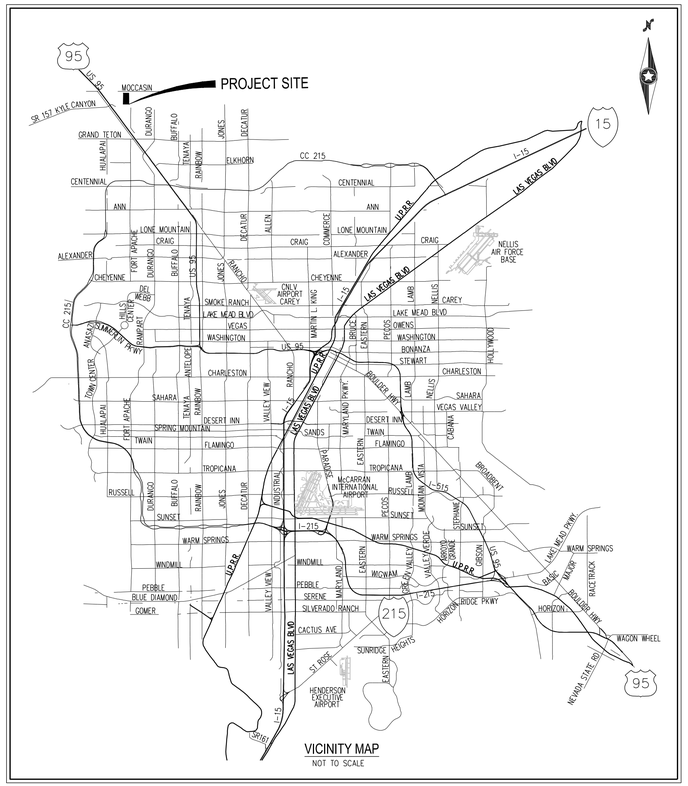
N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   S = SUPER-ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

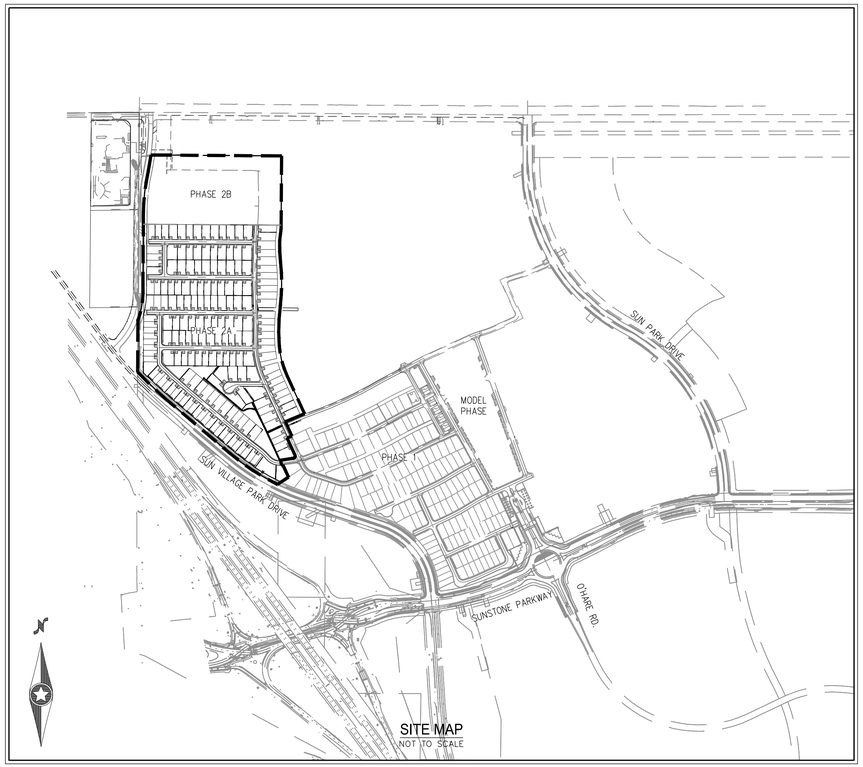
Referenced Improvement Plans

SHLP

IMPROVEMENT PLANS
FOR
PARCEL 3 AT SUNSTONE
PHASE 2

CITY OF LAS VEGAS, NEVADA
RESIDENTIAL SUBDIVISION
APN: 125-06-211-011





SHEET INDEX

Sheet List Table

Sheet Number	Sheet Description	Sheet Title
1	C-1	COVER SHEET
2	C-2	NOTES SHEET
3	C-3	QUANTITIES SHEET
4	MG	MASTER GRADING PLAN
5	G-1	GRADING PLAN I
6	G-2	GRADING PLAN II
7	G-3	GRADING PLAN III
8	G-4	GRADING PLAN IV
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10	G-6	GRADING PLAN VI
11	G-7	GRADING PLAN VII
12	G-8	GRADING PLAN VIII
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17	G-13	GRADING PLAN XIII
18	P-1	SANDLOT LANE 10+00 TP 15+00
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21	SD-2	CHRYSOLITE LATERALS
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23	D-2	DETAIL SHEET II

APPROVALS

CLV ENGINEERING OFFICE

CLV FIRE & RESCUE

CLV PLANNING DEPARTMENT

CENTRAL TELEPHONE CO. DBA CENTURYLINK — DATE

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

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES
PROJECT NO. ###### FIRST APPROVED DATE:
LVVWD APPROVED FIRE FLOW 1,500 GPM AT 20 PSI RESIDUAL
MAXIMUM AVAILABLE FIRE SPRINKLER FLOW 20 GPM

SHEETS: ADD FIELD

NV ENERGY — DATE

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

SOUTHWEST GAS CORPORATION — DATE

COX COMMUNICATIONS LAS VEGAS, INC. — DATE

LEGAL DESCRIPTION

BEING ALL OF PARCEL 3 OF THAT CERTAIN PARENT FINAL MAP ENTITLED "SUNSTONE" ON FILE IN BOOK 161, PAGE 40 OF PLATS, OFFICIAL RECORDS CLARK COUNTY, NEVADA, LYING WITHIN THE NORTHWEST QUARTER OF SECTION 6, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M. CITY OF LAS VEGAS, CLARK COUNTY, NEVADA

BENCHMARK

MONUMENT ID: USDA (1934) 19

U.S. DEPARTMENT OF AGRICULTURE BRASS DISC AT SOUTHWEST CORNER OF U.S. 95 AND KYLE CANYON ROAD

ELEVATION = 2817.61 FEET, 858.810 METERS
NAVD 88 DATUM

PER THE CITY OF LAS VEGAS BENCHMARK BOOK–
2008 ADJUSTMENT (UPDATED 05/24/2010)

BASIS OF BEARINGS

NORTH 00°01'50" WEST, BEING THE BEARING OF THE EAST LINE OF THE NORTHEAST QUARTER (NE1/4) OF SECTION 6, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 151, PAGE 14 OF SURVEYS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

FEMA FLOOD ZONE INFORMATION

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATION ZONE X, UNSHADED (AREA OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN), PER FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1750E, UPDATED SEPTEMBER 27, 2002.

TOTAL DISTURBED AREA

50.76 ACRES

M.O.U. ITEMS

1. TMP-20-0380, 12/24/2020

DEVIATIONS FROM STANDARDS

NONE

SWPPP NOTE

NOTE: ALL LAND SURFACE AREA DISTURBANCES OVER 1 ACRE REQUIRE A STORMWATER DISCHARGE PERMIT ISSUED BY THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP). A PHASED CONSTRUCTION UNIT IN A CONTIGUOUS SUBDIVISION IS CONSIDERED UNDER CONSTRUCTION UNTIL ALL STRIPPED SURFACE AREAS HAVE BEEN COVERED BY PAVING, BUILDING CONSTRUCTION OR PLANTING. A STORMWATER DISCHARGE PERMIT APPLICATION AND ASSOCIATED INFORMATION MAY BE DOWNLOADED FROM THE WEB SITE: HTTP://WWW.STATE.NV.US/SWPC/STORMOI.HTM PROJECTS THAT DISTURB MORE THAN ONE ACRE OF LAND MUST SUBMIT TO NDEP A "NOTICE OF INTENT" FOR INCLUSION UNDER STORMWATER PERMIT NO. NVR100000 ALONG WITH THE APPROPRIATE FILLING FEE.

PROJECT INFORMATION

ACREAGE (GROSS):	= 34.05 AC
ACREAGE (NET):	= 32.77 AC
DENSITY (LOTS/NET ACRE):	= 5.7 DU/NET AC
ZONING:	= SUNSTONE R-1 TRILOGY SUNSTONE R-TH
TOTAL NO. OF RESIDENTIAL LOTS	= 187
TOTAL NO. OF COMMON ELEMENTS *	= 9

EARTHWORK SUMMARY (UNADJUSTED)

CUT	93,616 CY.
FILL	143,322 CY.
NET	49,706(FILL) CY.

GEOTECHNICAL ENGINEER

PREPARED BY: SOUTHWEST GEOTECHNICAL
ADDRESS: 5275 ARVILLE ST. #108
PHONE: 702-323-6000
PROJECT No. 182187
DATED: 4/25/18

UPDATED
PROJECT No. 205210
DATED: 02/27/20

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

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

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

OWNER
NORTHLAND, LLC
C/O NINETY FIVE MGT, LLC
ATTN D HENSLEY
11411 SOUTHERN HIGHLANDS #300
LAS VEGAS, NV 89141

DEVELOPER
SH ACQ 2020, LLC
8800 N. GAINEY CENTER DRIVE
SUITE 350
SCOTTSDALE, AZ 85258
CONTACT: ROB IZER
PHONE: (602)318-0539

ENGINEER
WESTWOOD PROFESSIONAL SERVICES
5740 S. ARVILLE STREET, SUITE 216
LAS VEGAS, NV 89118
PH: (702) 284-5300
FX: (702) 284-5399
CONTACT: DERICK YORO

Westwood
Phone (702) 284-5300
Fax (702) 284-5399
5725 W. Badura Ave.
Suite 100
Las Vegas, NV 89118
westwoodps.com
Westwood Professional Services, Inc.

NO.	DESCRIPTION	DATE	BY	APP.	APP. DATE

CITY OF LAS VEGAS, NEVADA

SHLP

PARCEL 3 AT SUNSTONE PHASE 2
COVER SHEET

T 19 S
R 60 E

DATE: 4/22/21
DRAFTER: EE
DESIGNER: JA
CHECKED: MJ
PROJECT NO.
SHE1901-002

PROFESSIONAL ENGINEER - STATE OF NEVADA
DERICK D.J YORO
Exp: 06/30/2022
CIVIL
No. 16396
4/22/21

C-1
SHEET 1 OF 23

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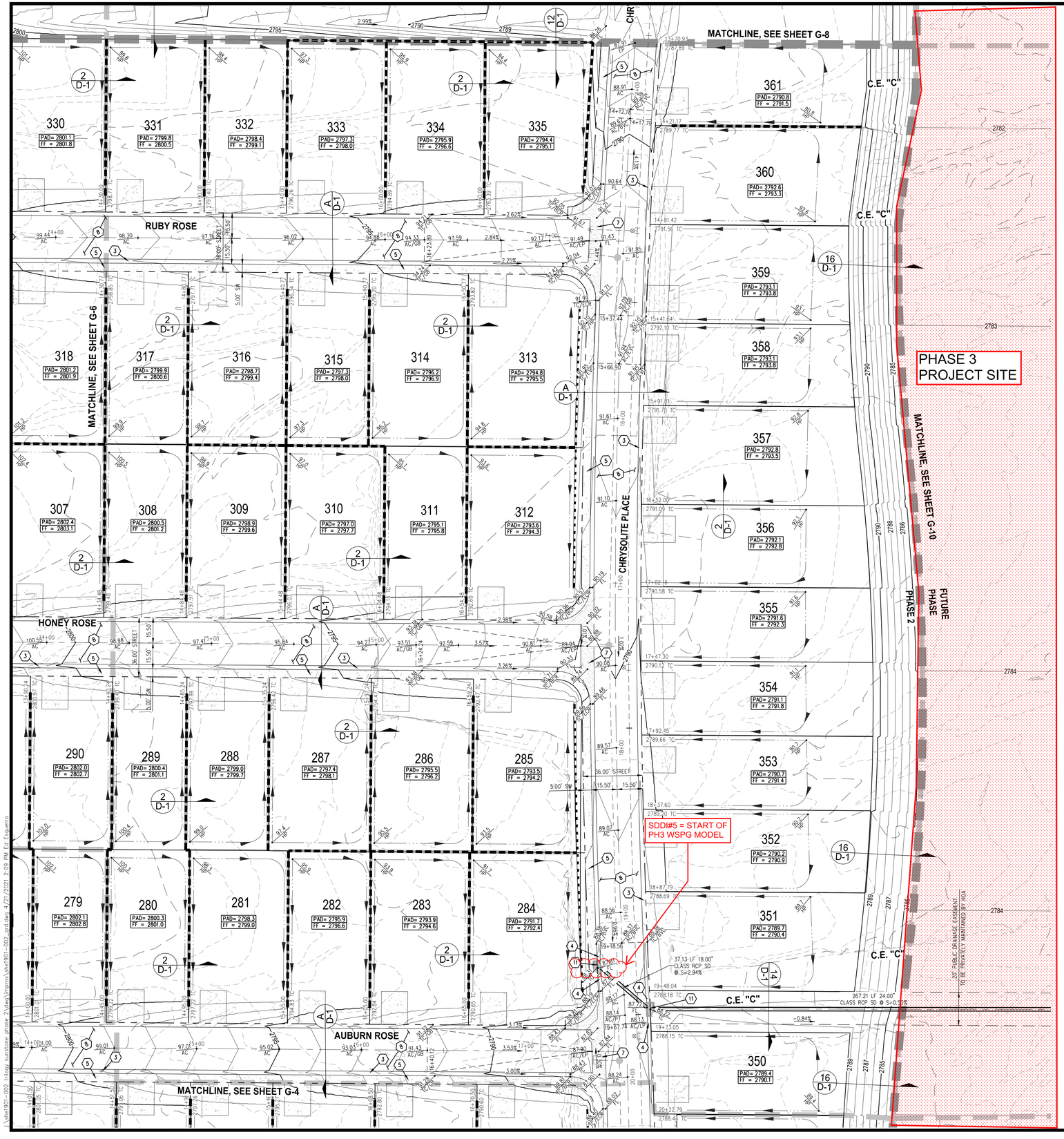


SCALE – 1"=30' (0, 30, 60 FEET)

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

SURVEY NOTE

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

ELEVATION NOTE

ADD 2700 TO ALL SPOT GRADES WHERE THE HUNDREDS AND THOUSANDS PLACES ARE OMITTED FOR ACTUAL ELEVATION (I.E. 01.00 REPRESENTS 2701.00)

SOILS REPORT

SOILS REPORT BY SOUTHWEST GEOTECHNICAL

PROJECT NO. 182187 DATED 04/25/18

UPDATED SOILS REPORT BY SOUTHWEST GEOTECHNICAL

PROJECT NO. 205210 DATED 02/27/20

EARTHWORKS

EARTHWORK QUANTITIES (RAW):
CUT= 93,616 CU YDS
FILL= 143,322 CU YDS

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

DISCLAIMER NOTE

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

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

GRADING NOTES

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

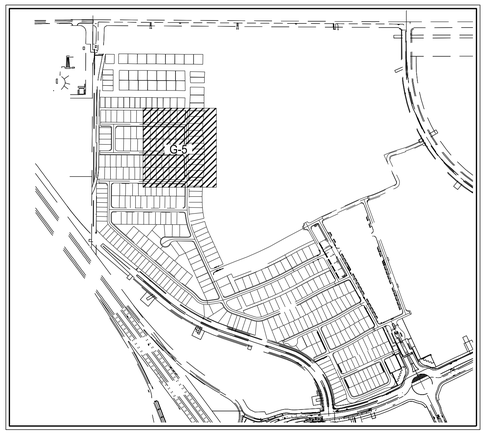
LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDELINES

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

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

FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATION ZONE X, UNSHADED (AREA OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN), PER FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1750E, UPDATED SEPTEMBER 27, 2002.



GRADING NOTES

(P) CONTRACTOR SHALL PROTECT IN PLACE EXISTING IMPROVEMENTS (IE.UTILITY STRUCTURE, CURB & GUTTER) IN PLACE DURING CONSTRUCTION. ANY DAMAGE TO EXISTING STRUCTURES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPAIR OR REPLACE AT NO COST TO OWNER. (ANY LANDSCAPING REMOVED DURING CONSTRUCTION SHALL BE REPLACED IN KIND.)

1. MATCH EXISTING IMPROVEMENTS
2. CONSTRUCT "L" TYPE CURB & GUTTER PER CCAUSD #216
3. CONSTRUCT ROLL TYPE CURB & GUTTER PER CCAUSD # 217.S1
4. CONSTRUCT "L" TO ROLL CURB TRANSITION PER DETAIL 7 ON SHEET D-1
5. CONSTRUCT 5' SIDEWALK PER CCAUSD #234
6. CONSTRUCT SIDEWALK UNDERDRAIN AND DRAINAGE OUTLET PER CCAUSD #236 AND DETAIL 8.
7. CONSTRUCT CROSS GUTTER PER CCAUSD #228
8. CONSTRUCT 2" AC OVER 4" TYPE II AGGREGATE BASE, SEE SOILS REPORTS
9. CONSTRUCT 48" TYPE II SDMH PER CCAUSD #401 & 405
10. CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=5' (1 GRATE), DEPTH PER PLAN
11. CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=7.5' (2 GRATE), DEPTH PER PLAN
12. CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=20' (7 GRATE), DEPTH PER PLAN
13. CONSTRUCT SD COLLAR PER DETAIL 13 ON SHEET D-1

BENCHMARK

MONUMENT ID: USDA (1934) 19

U.S. DEPARTMENT OF AGRICULTURE BRASS DISC AT SOUTHWEST CORNER OF U.S. 95 AND KYLE CANYON ROAD

ELEVATION = 2817.61 FEET, 858.810 METERS
NAVD 88 DATUM

PER THE CITY OF LAS VEGAS BENCHMARK BOOK– 2008 ADJUSTMENT (UPDATED 05/24/2010)

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NORTH 00°01'50" WEST, BEING THE BEARING OF THE EAST LINE OF THE NORTHEAST QUARTER (NE1/4) OF SECTION 6, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 151, PAGE 14 OF SURVEYS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

NOTE

ALL PRIVATE STREETS ARE P.U.E., PUBLIC SEWER EASEMENTS, AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY H.O.A.

QUANTITIES

			PRIVATE
1.	48" TYPE II STORM DRAIN MANHOLE	EA	9
2.	5.0' TYPE "CM2" DROP INLET	EA	2
3.	7.5' TYPE "CM2" DROP INLET	EA	2
5.	20.0' TYPE "CM2" DROP INLET	EA	2
6.	18" RCP CLASS IV STORM DRAIN	LF	94
7.	24" RCP CLASS IV STORM DRAIN	LF	1,076
8.	8' WIDE CONCRETE VALLEY GUTTER W/10" TYPE I AGGREGATE BASE	SF	4,444
9.	RIPRAP D50=8", THK=16"	SF	140
10.	CONCRETE COLLAR	EA	1
11.	SIDEWALK UNDERDRAIN	EA	1
11.	BRICK AND MORTAR RCP PLUG	EA	1

FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY DSS426 ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

DERICK YORO, P.E. 16396 DATE

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

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

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

Westwood
Phone (702) 284-5300
Fax (702) 284-5399
5725 W. Badura Ave. Suite 100
Las Vegas, NV 89118
westwoodps.com
Westwood Professional Services, Inc.

NO.	DESCRIPTION	DATE	BY	APP.	APP. DATE

CITY OF LAS VEGAS, NEVADA

SHLP

T 19 S
R 60 E

PARCEL 3 AT SUNSTONE PHASE 2
GRADING PLAN V

DATE: 4/22/21
DRAFTER: EE
DESIGNER: JA
CHECKED: MJ

PROJECT NO.
SHE1901-002

DERICK D.J YORO, No. 16396, STATE OF NEVADA, PROFESSIONAL ENGINEER, CIVIL, Exp. 06/30/2022
4/22/21

G-5
SHEET 9 OF 23

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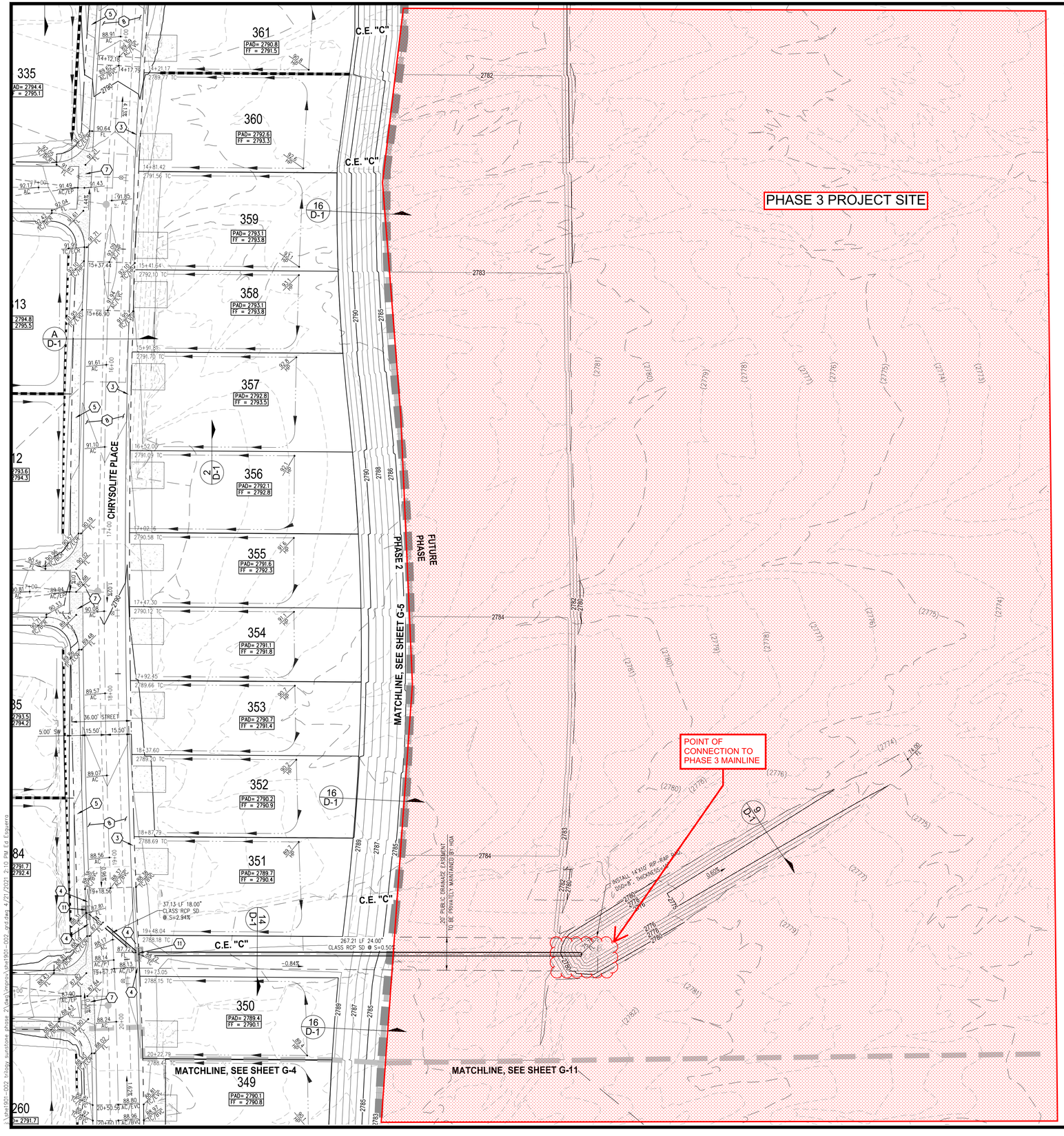
PHASE 3 PROJECT SITE
POINT OF CONNECTION TO PHASE 3 MAINLINE
C.E. "C"
C.E. "C"
C.E. "C"
CHRYSOLITE PLACE
FUTURE PHASE
PHASE 2
MATCHLINE, SEE SHEET G-5
MATCHLINE, SEE SHEET G-4
MATCHLINE, SEE SHEET G-11
20' PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED BY HOA
INSTALL 14"W/10" RIP-RAP D50=8" THICKNESS=16"
267.21 LF 24.00" CLASS RCP SD @ S=0.50%
37.13 LF 18.00" CLASS RCP SD @ S=2.94%
-0.84%
0.60%
335 PAD= 2794.4 FF = 2795.1
361 PAD= 2790.8 FF = 2791.5
360 PAD= 2792.6 FF = 2793.3
359 PAD= 2793.1 FF = 2793.8
358 PAD= 2793.1 FF = 2793.8
357 PAD= 2792.8 FF = 2793.5
356 PAD= 2792.1 FF = 2792.8
355 PAD= 2791.6 FF = 2792.3
354 PAD= 2791.1 FF = 2791.8
353 PAD= 2790.7 FF = 2791.4
352 PAD= 2790.2 FF = 2790.9
351 PAD= 2789.7 FF = 2790.4
350 PAD= 2789.4 FF = 2790.1
349 PAD= 2790.1 FF = 2790.8
313 PAD= 2794.8 FF = 2795.5
312 PAD= 2793.6 FF = 2794.3
285 PAD= 2793.5 FF = 2794.2
284 PAD= 2791.7 FF = 2792.4
260 PAD= 2791.7
36.00' STREET
5.00' SW
15.50'
15.50'
2782
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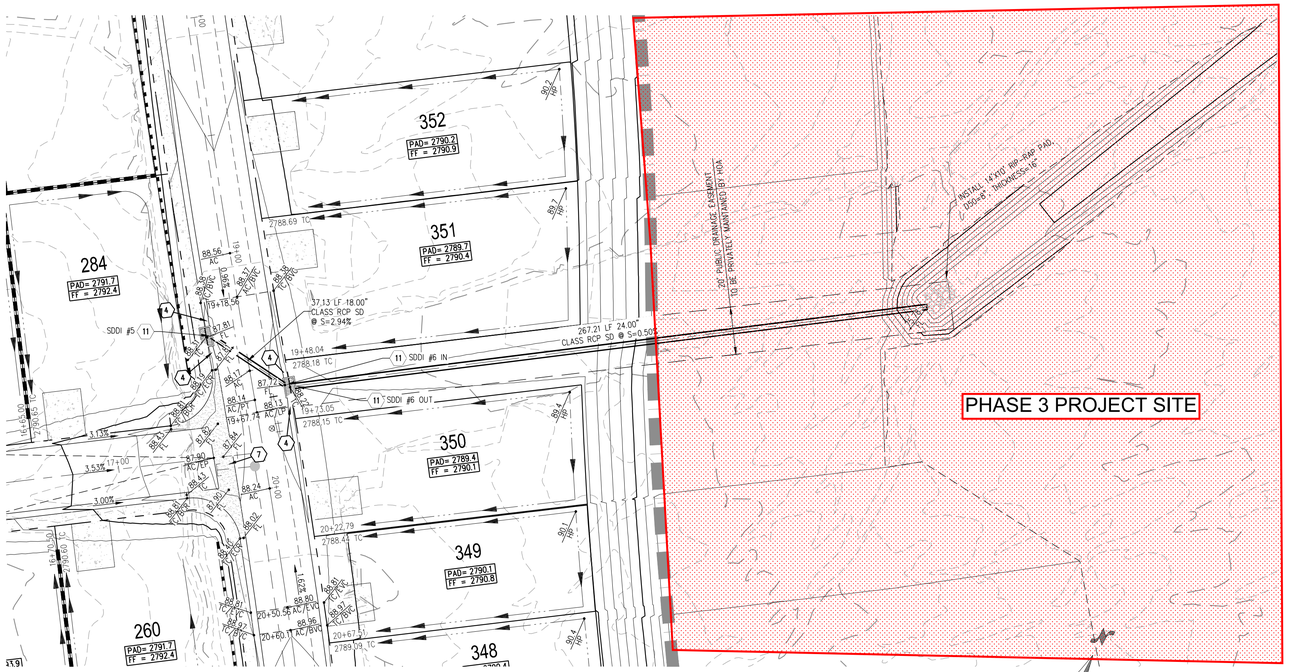
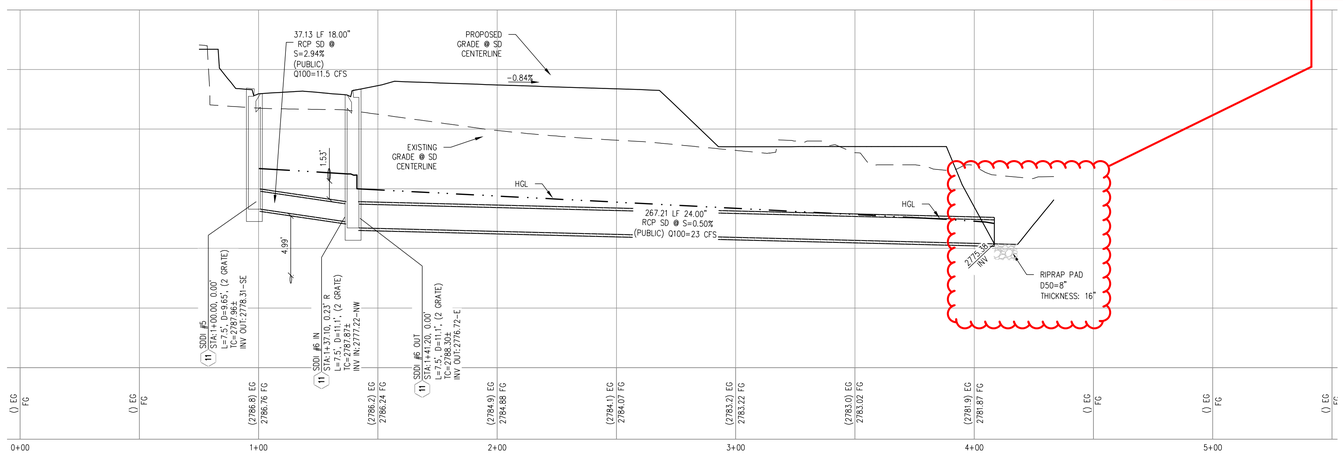


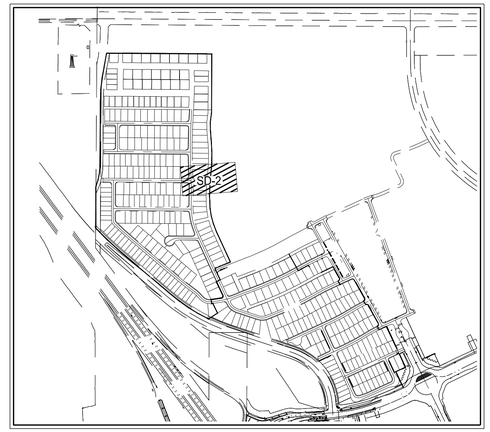
CHRYSOLITE LATERALS - PLAN VIEW
SCALE: 1"= 30'

0 30 60
SCALE – 1"=30' FEET

Connection to proposed storm drain (SDMH 1) for extension into Phase 3 site



CHRYSOLITE LATERALS - PROFILE VIEW
HORIZ: 1" = 30'
VERT: 1" = 6'



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

GRADING NOTES

(P) CONTRACTOR SHALL PROTECT IN PLACE EXISTING IMPROVEMENTS (IE.UTILITY STRUCTURE, CURB & GUTTER) IN PLACE DURING CONSTRUCTION. ANY DAMAGE TO EXISTING STRUCTURES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPAIR OR REPLACE AT NO COST TO OWNER. (ANY LANDSCAPING REMOVED DURING CONSTRUCTION SHALL BE REPLACED IN KIND.)

1. MATCH EXISTING IMPROVEMENTS
2. CONSTRUCT "L" TYPE CURB & GUTTER PER CCAUSD #216
3. CONSTRUCT ROLL TYPE CURB & GUTTER PER CCAUSD # 217.S1
4. CONSTRUCT "L" TO ROLL CURB TRANSITION PER DETAIL -- ON SHEET D-2
5. CONSTRUCT 5' SIDEWALK PER CCAUSD #234
6. CONSTRUCT SIDEWALK UNDERDRAIN AND DRAINAGE OUTLET PER CCAUSD #236 AND DETAIL---
7. CONSTRUCT CROSS GUTTER PER CCAUSD #228
8. CONSTRUCT 2" AC OVER 4" TYPE II AGGREGATE BASE, SEE SOILS REPORTS
9. CONSTRUCT 48" TYPE II SDMH PER CCAUSD #401 & 405
10. CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=5' (1 GRATE), DEPTH PER PLAN
11. CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=7.5' (2 GRATE), DEPTH PER PLAN
12. CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=20' (7 GRATE), DEPTH PER PLAN
13. CONSTRUCT SD COLLAR PER DETAIL 13 ON SHEET D-1

BENCHMARK

MONUMENT ID: USDA (1934) 19

U.S. DEPARTMENT OF AGRICULTURE BRASS DISC AT SOUTHWEST CORNER OF U.S. 95 AND KYLE CANYON ROAD

ELEVATION = 2817.61 FEET, 858.810 METERS
NAVD 88 DATUM

PER THE CITY OF LAS VEGAS BENCHMARK BOOK– 2008 ADJUSTMENT (UPDATED 05/24/2010)

BASIS OF BEARINGS

NORTH 00°01'50" WEST, BEING THE BEARING OF THE EAST LINE OF THE NORTHEAST QUARTER (NE1/4) OF SECTION 6, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 151, PAGE 14 OF SURVEYS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

ELEVATION NOTE

ADD 2700 TO ALL SPOT GRADES WHERE THE HUNDREDS AND THOUSANDS PLACES ARE OMITTED FOR ACTUAL ELEVATION (I.E. 01.00 REPRESENTS 2701.00)

FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATION ZONE X, UNSHADED (AREA OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN), PER FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1750E, UPDATED SEPTEMBER 27, 2002.

SURVEY NOTE

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

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

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

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

Westwood
Phone (702) 284-5300
Fax (702) 284-5399
5725 W. Badura Ave. Suite 100
Las Vegas, NV 89118
westwoodps.com
Westwood Professional Services, Inc.

NO.	DESCRIPTION	DATE	BY	APP.	APP. DATE

CITY OF LAS VEGAS, NEVADA

SHLP

PARCEL 3 AT SUNSTONE PHASE 2
CHRYSOLITE LATERALS

S 6 T 19 S R 60 E

DATE: 4/22/21
DRAFTER: EE
DESIGNER: JA
CHECKED: MJ
PROJECT NO.
SHE1901-002

PROFESSIONAL ENGINEER STATE OF NEVADA
DERRICK D.J ORO
Exp. 06/30/2022
CIVIL
No. 16396
4/22/21

SD-2
SHEET 21 OF 23

J:\she1901-002 (ridge sunstone phase 2\dwg\Vertex\she1901-002 xrip.dwg 4/21/2021 2:12 PM Ed Esguerra

APPENDIX F

Reference Material

Technical Drainage Study for Parcel 3 at Sunstone Phase 2B, by Westwood

Approval Letters

CITY OF LAS VEGAS **INTER-OFFICE MEMORANDUM**				**DATE:** **November 9, 2021**
TO: **Land Development Services** Department of Building & Safety				**FROM:** Jennifer Shinn, P.E. Flood Control, Engr. Associate Department of Public Works
SUBJECT:	Drainage Study for: **Parcel 3 at Sunstone Phase 2B**			**COPIES TO:** Westwood Professional Services
Cross Streets:	NEQ Sky Pointe Drive and Log Cabin Way			Northland, LLC/Shea Homes
File Number:	F:\Depot\DSMemos\DS5494B.doc			Bart Anderson, P.E., DevCo
Parcel Number:	125-06-211-015			
Zoning Action:	20-0380-TMP1			
FEMA Flood Zone	YES	NO **X**		
Proposed Storm Drain	YES **X**	NO		

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	9/13/2021	10/12/2021	See Comments Below	$400.00	4450745: $400
2nd Submittal	10/19/2021	11/9/2021		N/C	N/A
			TOTAL FEES (LDDRS):	**$400.00**	**----**

REMARKS:

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

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

1. The subject study considers the improvements by Sunstone Phase 1 Drainage and Roadway Infrastructure, Brightstone Trail, and Sunstone Parcel 3 Phase 2A as in place and functioning. Substantial completion of the referenced infrastructure is required prior to issuing occupancy permits for Parcel 3 at Sunstone Phase 3B.

2. All storm drain inlets that are more than 10'-deep require a special structural detail and calculations. Submit structural design and calculations to *City Building & Safety Department* for review and approval prior to the final approval of the drainage study.

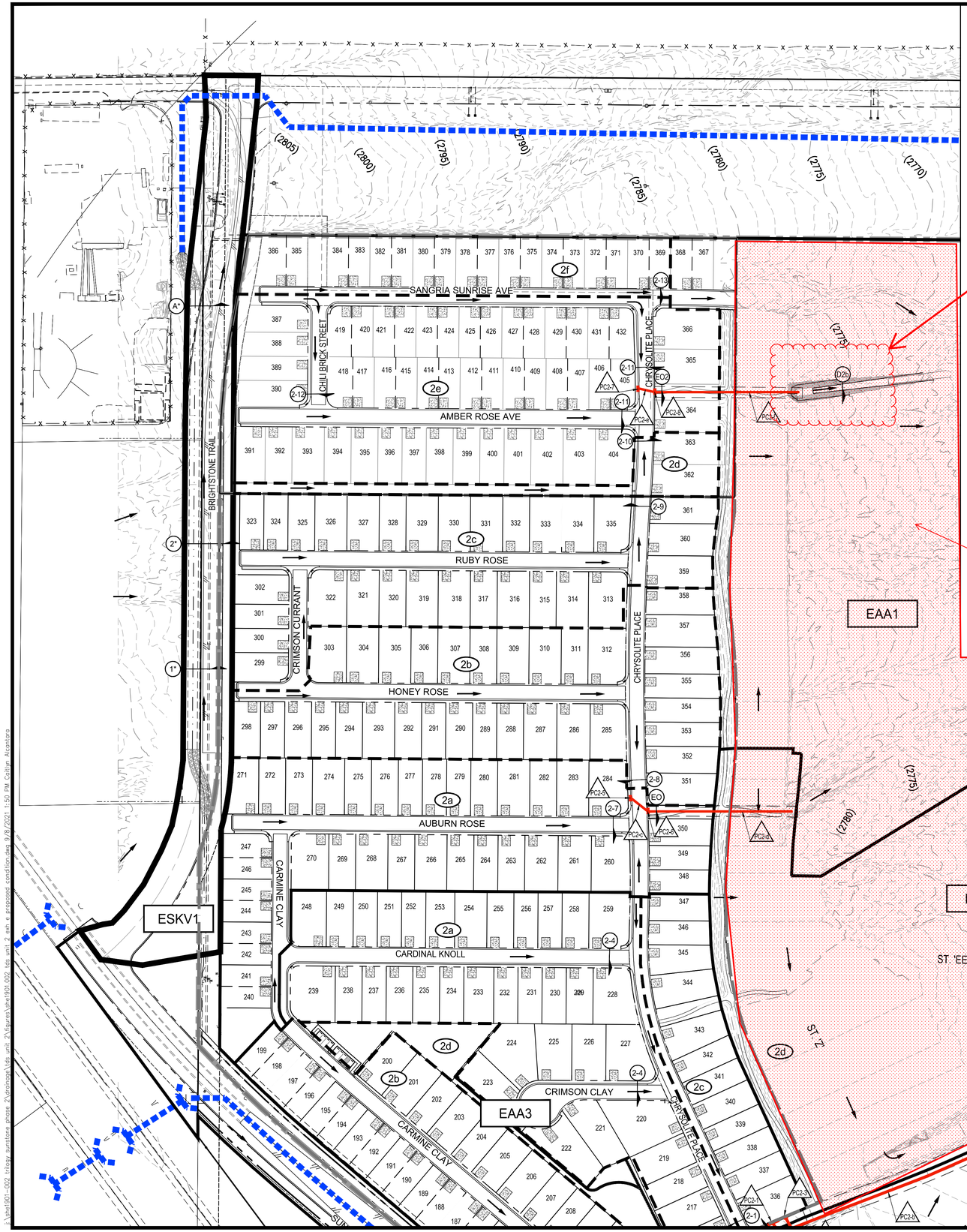
NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Update and accepted by the *City of Las Vegas Flood Control Section.* Additionally, conditional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

END OF REMARKS
JKS

T/R/S: T19S/R60E/06
AREA G-06

Referenced Drainage Exhibits



Proposed Condition 100-Year Street Flow Summary

Section ID	Q_{100} (cfs)	Slope (%)	Depth (ft)	Velocity (fps)	DxV
2-10 Q = EAA1(2c+2d)	13	3.18	0.33	4.21	1.4
2-11 Q = EAA1(2e)	14	2.04	0.36	3.63	1.3
		5.14	0.31	5.16	1.6
2-12 (superelevated) Q = 1/2 of EAA1(2e)	7	1.13	0.42	3.17	1.3
2-13 (half street) Q = EAA1(2f)	4	1.83	0.31	3.05	0.9
		2.95	0.29	3.67	1.1

Referenced 100-Year Flow Section Summary

Section ID	Q_{100} (cfs)	Section Description	Slope (%)	Depth (ft)	Velocity (fps)
A* Q = Referenced	6	Half Street Section	0.60	0.43	2.03
Section 1* Q = Referenced	223	18' Earthen lined trapezoidal channel, 2:1 SS	0.40	2.18	4.57
Section 2* Q = Referenced	223	18' Earthen lined trapezoidal channel, D50 = 12in grouted, 2:1 SS	8.82	0.89	12.68

*Referenced from BrightStone Trail Study

Proposed Condition Drainage Emergency Overflow Hydraulic Summary

Section ID	Q_{100} (cfs)	Width (ft)	Type of Analysis	Depth (ft)	Velocity (fps)
EO2 Q = Facility PC2-7 + PC2-8	27	20	Normal Depth	0.59	7.72
			Weir	0.64	2.12

Recommended Flood Control Facility Summary

Facility ID	Facility Description	Total/Approaching Flow (cfs) Q_{100}	Facility Flow (cfs) Q_{100}	Surface/Bypass Flow (cfs) Q_{100}	Notes
Phase 2B Storm Drain (PH2B.WSW)					
PC2-7	Proposed 7.5' Type CM2 DI	13.5	13.5	0	Sump Inlet
PC2-8	Proposed 7.5' Type CM2 DI	13.5	13.5	0	Sump Inlet
Facility ID	**Facility Description**	**Facility Flow (cfs), Q_{100}**			**Notes**
Phase 2 Storm Drain (PH2B.WSW)					
PC2-e	Proposed 18" RCP	13.5			
PC2-f	Proposed 24" RCP	27			

Proposed Condition Hydraulic Section Summary

Section ID	Section Description	Q_{100} (cfs)	Slope (%)	Depth (ft)	Velocity (fps)
D2b Q =Facility PC2-f	Earthen-lined Trapezoidal Channel, w/10' BW & 2:1 SS	27	0.71	0.68	3.52

LEGEND

- BASIN BOUNDARY
- PRORATED SUBBASIN BOUNDARY
- EXISTING DRAINAGE FACILITY
- PROPOSED DRAINAGE FACILITY
- REMOVED/ABANDONED DRAINAGE FACILITY
- ID — BASIN ID
- ID — PRORATED SUBBASIN ID
- FLOW DIRECTION
- ID — FLOWMASTER SECTION
- ID — FACILITY ID

SCALE – 1"=100' FEET (0, 100, 200)

Ultimate Condition Flow Rate Summary

Basin/Concentration Point ID	Area (ac)	Q_{100} (cfs)
EAA1*	114	55
EAA2*	82.0	35
EAA3*	102.0	51
EAA4*	45.0	21
ESKV1*	3.9	11
ESKV1*	8.2	23

Ultimate Condition Prorated Flow Summary

Basin ID	Q_{100} (cfs)	Area (acres)	100-yr Unit Flow (cfs/acre)
EAA1*	114	55.00	2.1
EAA2*	82	35.40	2.3
EAA3*	102	51.20	2.0
EAA4*	45	21.00	2.1
Subbasin ID	**Q_{100} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/acre)**
EAA1*(2a)	12	5.64	2.1
EAA1*(2b)	11	5.34	2.1
EAA1*(2c)	11	5.17	2.1
EAA1*(2d)	2	0.76	2.1
EAA1*(2e)	14	6.89	2.1
EAA1*(2f)	4	2.04	2.1
Subbasin ID	**Q_{100} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/acre)**
EAA2*(2d)	13	5.75	2.3
TOTAL	***13***	***5.75***	
Subbasin ID	**Q_{100} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/acre)**
EAA3*(2a)	12	6.27	2.0
EAA3*(2b)	11	5.43	2.0
EAA3*(2c)	4	1.96	2.0
EAA3*(2d)	2	1.25	2.0
EAA3*(e)	5	2.61	2.0
EAA3*(2h)	1	0.48	2.0
EAA3*(2i)	3	1.53	2.0
EAA3*(j)	5	2.40	2.0
EAA3*(k)	5	2.64	2.0
EAA3*(l)	2	1.08	2.0
EAA3*(o)	5	2.30	2.0
EAA3*(p)	7	3.34	2.0
EAA3*(q)	5	2.55	2.0
EAA3*(r)	1	0.27	2.0
EAA3*(s)	4	1.95	2.0
EAA3*(t)	1	0.68	2.0
EAA3*(u)	3	1.37	2.0
EAA3*(v)	5	2.56	2.0
EAA3*(w)	3	1.47	2.0
EAA3*(x)	3	1.33	2.0
EAA3*(y)	3	1.61	2.0
EAA3*(z)	2	0.91	2.0
TOTAL	***92***	***45.99***	
Subbasin ID	**Q_{100} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/acre)**
EAA4*(m)	2	0.77	2.1
EAA4*(n)	13	5.90	2.1
EAA4*(bb)	0	0.09	2.1
EAA4*(cc)	1	0.41	2.1
EAA4*(dd)	2	1.03	2.1
TOTAL	***18***	***8.20***	

*referenced from *Skye Canyon Master Drainage Study Update #5*
Note the prorates provided only account for the sub areas impacting the developed areas

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

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.
1					

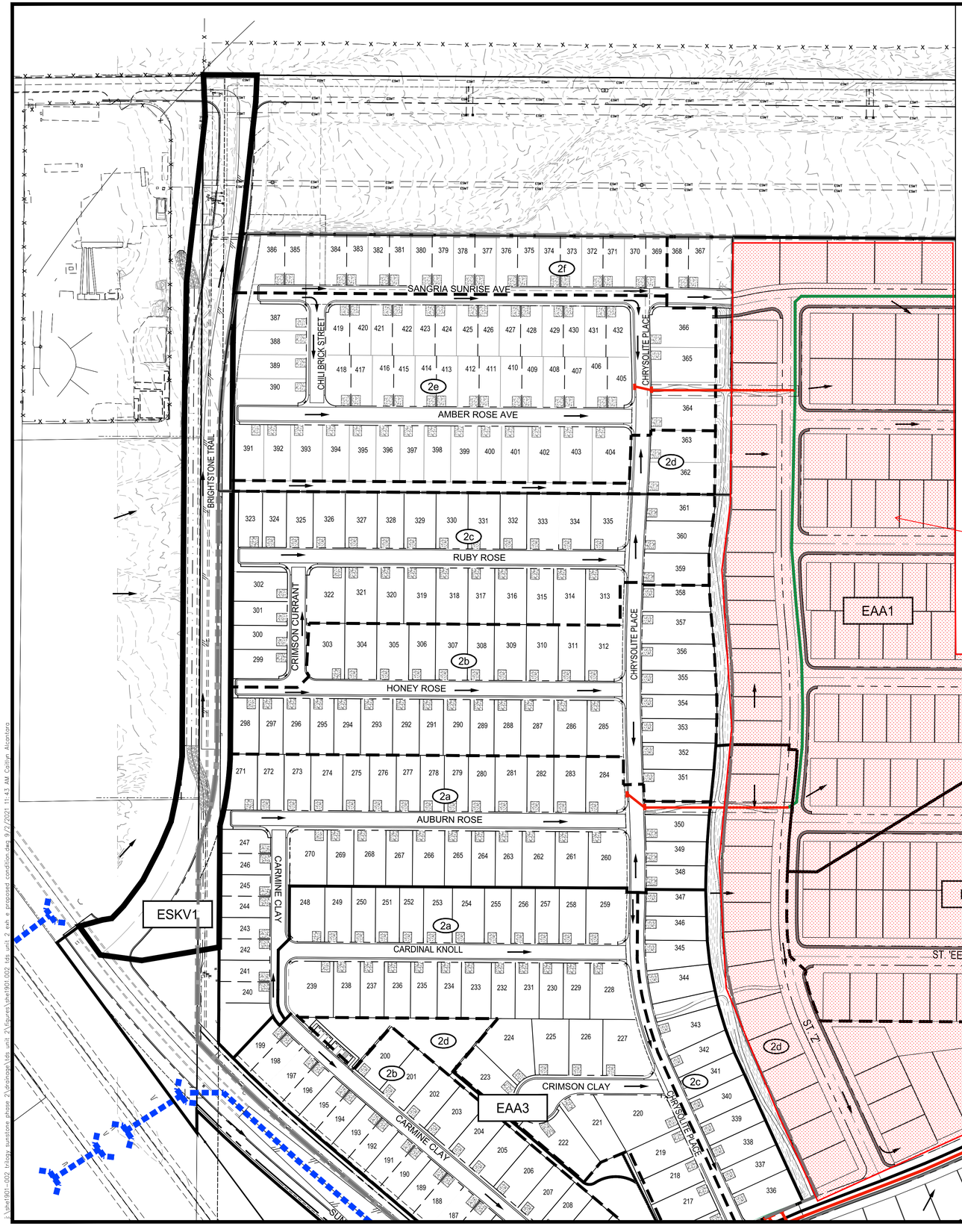
SHLP

PARCEL 3 AT SUNSTONE PHASE 2B
PROPOSED DRAINAGE CONDITION

DATE: SEPT 2021
DRAFTER: CAA
DESIGNER: CAA
CHECKED: SOA
PROJECT NO.
SHE1901.002

EXHIBIT E
SHEET 1 OF 1

J:\she1901.002 Indigo sunstone phase 2\drainage\Map and Plot\Plots\she1901.002 dp exh e proposed conditions.dwg 9/9/2021 1:50 PM Collin Montano



0 100 200
SCALE – 1"=100' FEET

LEGEND

- BASIN BOUNDARY
- PRORATED SUBBASIN BOUNDARY
- EXISTING DRAINAGE FACILITY
- PROPOSED DRAINAGE FACILITY
- REMOVED/ABANDONED DRAINAGE FACILITY
- FUTURE DRAINAGE FACILITY
- ID — BASIN ID
- ID — PRORATED SUBBASIN ID
- FLOW DIRECTION
- ID — FLOWMASTER SECTION
- ID — FACILITY ID

Ultimate Condition Flow Rate Summary

Basin/Concentration Point ID	Area (ac)	Q_{100} (cfs)
EAA1*	114	55
EAA2*	82.0	35
EAA3*	102.0	51
EAA4*	45.0	21
ESKV1*	3.9	11
ESKY1*	8.2	23

Ultimate Condition Prorated Flow Summary

Basin ID	Q_{100} (cfs)	Area (acres)	100-yr Unit Flow (cfs/acre)
EAA1*	114	55.00	2.1
EAA2*	82	35.40	2.3
EAA3*	102	51.20	2.0
EAA4*	45	21.00	2.1
Subbasin ID	**Q_{100} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/acre)**
EAA1*(2a)	12	5.64	2.1
EAA1*(2b)	11	5.34	2.1
EAA1*(2c)	11	5.17	2.1
EAA1*(2d)	2	0.76	2.1
EAA1*(2e)	14	6.89	2.1
EAA1*(2f)	4	2.04	2.1
Subbasin ID	**Q_{100} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/acre)**
EAA2*(2d)	13	5.75	2.3
TOTAL	***13***	***5.75***	
Subbasin ID	**Q_{100} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/acre)**
EAA3*(2a)	12	6.27	2.0
EAA3*(2b)	11	5.43	2.0
EAA3*(2c)	4	1.96	2.0
EAA3*(2d)	2	1.25	2.0
EAA3*(e)	5	2.61	2.0
EAA3*(2h)	1	0.48	2.0
EAA3*(2i)	3	1.53	2.0
EAA3*(j)	5	2.40	2.0
EAA3*(k)	5	2.64	2.0
EAA3*(l)	2	1.08	2.0
EAA3*(o)	5	2.30	2.0
EAA3*(p)	7	3.34	2.0
EAA3*(q)	5	2.55	2.0
EAA3*(r)	1	0.27	2.0
EAA3*(s)	4	1.95	2.0
EAA3*(t)	1	0.68	2.0
EAA3*(u)	3	1.37	2.0
EAA3*(v)	5	2.56	2.0
EAA3*(w)	3	1.47	2.0
EAA3*(x)	3	1.33	2.0
EAA3*(y)	3	1.61	2.0
EAA3*(z)	2	0.91	2.0
TOTAL	***92***	***45.99***	
Subbasin ID	**Q_{100} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/acre)**
EAA4*(m)	2	0.77	2.1
EAA4*(n)	13	5.90	2.1
EAA4*(bb)	0	0.09	2.1
EAA4*(cc)	1	0.41	2.1
EAA4*(dd)	2	1.03	2.1
TOTAL	***18***	***8.20***	

*referenced from *Skye Canyon Master Drainage Study Update #5*
Note the prorates provided only account for the sub areas impacting the developed areas

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

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.
1					

SHLP

PARCEL 3 AT SUNSTONE PHASE 2B
ULTIMATE DRAINAGE CONDITION

DATE: SEPT 2021
DRAFTER: CAA
DESIGNER: CAA
CHECKED: SOA
PROJECT NO.
SHE1901.002

EXHIBIT F
SHEET 1 OF 1

J:\she1901-002 lv\hpy sunstone phase 2\Variance\Map exh\ PV\planes\she1901-002 hpy exh ii prorated condition.dwg 9/7/2021 11:43 AM Gaitan Alcantara

Referenced Hydraulics

Proposed Condition WSPG Summary

PHASE 2B STORM DRAIN (PH2B.WSW): FROM FACILITIES PC2-7 & PC2-8 BTWN LOTS 34/35

WSPG Station	Storm Drain Dimension	Invert Elevation (ft)	Q_{100} (cfs)	WSE (ft)	Velocity (ft/s)	FG Elevation	Facility Description	HGL Check[1]
1 - 'HGL Check' reflects the minimum 1-ft below finished grade.								
1000.00	24" RCP	2770.21	27.00	2772.21	8.59	2775.00		OK
1263.21	24" RCP	2773.30	27.00	2775.96	8.59	2784.41	Facility PC2-8	OK
1263.21	7.5' x 12' RCB	2773.30	27.00	2777.67	0.82	2784.41		OK
1264.21	7.5' x 12' RCB	2773.43	27.00	2777.66	0.85	2784.41		OK
1265.21	7.5' x 12' RCB	2773.55	13.50	2777.68	0.44	2784.41		OK
1267.21	7.5' x 12' RCB	2773.80	13.50	2777.68	0.46	2784.41		OK
1267.21	18" RCP	2773.80	13.50	2777.68	7.64	2784.41		OK
1295.00	18" RCP	2774.20	13.50	2778.14	7.64	2784.41	Facility PC2-7	OK
1295.00	18" RCP	2774.20	13.50	2778.14	7.64	2784.41		OK

REFERENCED WSPG MODEL PROVIDED FOR COMPARISON AS THE MODEL HAS BEEN UPDATED WITH NEW WSE TO CHECK FOR CRITERIA REQUIREMENTS. PLEASE REFER TO APPENDIX C FOR THE UPDATED WSPG MODEL.

```
T1 SHE1901-002: PARCEL 3 AT SUNSTONE PHASE 2B
T2 PHASE 2B STORM DRAIN (PH2B.WSW)
T3 FROM FACILITIES PC2-7 & PC2-8 BTWN LOTS 34/35
SO   1000.0002770.210 24                          2772.210
R    1263.2102773.300 24      .013
WE   1263.2102773.300  1
R    1264.2102773.425  1      .015
JX   1265.2102773.550  1  1   .015   13.5           2773.550         90.0
R    1267.2102773.800  1      .015                                     13.0
WX   1267.2102773.800 18
R    1295.0002774.200 18      .013
SH   1295.0002774.200 18
CD   1  3   0   0.000  12.000    7.500 0.000 0.000  0.0000.00  0.00
CD  18  4   1   0.000   1.500    0.000 0.000 0.000  0.0000.00  0.00
CD  24  4   1   0.000   2.000    0.000 0.000 0.000  0.0000.00  0.00
Q           13.500
```

FILE: PH2B.WSW W S P G W - EDIT LISTING - Version 14.10 Date: 9- 1-2021 Time: 3:37:14

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	3	0	.000	12.000	7.500	.000	.000	.00										
CD	18	4	1		1.500														
CD	24	4	1		2.000														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SHE1901-002: PARCEL 3 AT SUNSTONE PHASE 2B

HEADING LINE NO 2 IS -

PHASE 2B STORM DRAIN (PH2B.WSW)

HEADING LINE NO 3 IS -

FROM FACILITIES PC2-7 & PC2-8 BTWN LOTS 34/35

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1000.000	2770.210	24	2772.210

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1263.210	2773.300	24	.013	.000	.000	.000	0

ELEMENT NO 3 IS A WALL ENTRANCE *

U/S DATA	STATION	INVERT	SECT	FP
	1263.210	2773.300	1	.500

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1264.210	2773.425	1	.015	.000	.000	.000	0

ELEMENT NO 5 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1265.210	2773.550	1	1	0	.015	13.500	.000	2773.550	.000	90.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1267.210	2773.800	1	.015	.000	.000	13.000	0

ELEMENT NO 7 IS A WALL EXIT *

U/S DATA	STATION	INVERT	SECT
	1267.210	2773.800	18

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1295.000	2774.200	18	.013	.000	.000	.000	0

ELEMENT NO 9 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1295.000	2774.200	18	.000

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 9- 1-2021 Time: 3:37:43

SHE1901-002: PARCEL 3 AT SUNSTONE PHASE 2B

PHASE 2B STORM DRAIN (PH2B.WSW)

FROM FACILITIES PC2-7 & PC2-8 BTWN LOTS 34/35

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	2770.210	2.000	2772.210	27.00	8.59	1.15	2773.36	.00	1.81	.00	2.000	.000	.00	1 .0
263.210	.0117					.0142	3.75	2.00	.00	2.00	.013	.00	.00	PIPE
1263.210	2773.300	2.659	2775.959	27.00	8.59	1.15	2777.11	.00	1.81	.00	2.000	.000	.00	1 .0
WALL	ENTRANCE													
1263.210	2773.300	4.365	2777.665	27.00	.82	.01	2777.68	.00	.74	7.50	12.000	7.500	.00	0 .0
1.000	.1250					.0000	.00	4.36	.07	.26	.015	.00	.00	BOX
1264.210	2773.425	4.239	2777.664	27.00	.85	.01	2777.68	.00	.74	7.50	12.000	7.500	.00	0 .0
JUNCT STR	.1250					.0000	.00	4.24	.07		.015	.00	.00	BOX
1265.210	2773.550	4.131	2777.681	13.50	.44	.00	2777.68	.00	.47	7.50	12.000	7.500	.00	0 .0
1.536	.1250					.0000	.00	4.13	.04	.17	.015	.00	.00	BOX
1266.746	2773.742	3.939	2777.681	13.50	.46	.00	2777.68	.00	.47	7.50	12.000	7.500	.00	0 .0
.464	.1250					.0000	.00	3.94	.04	.17	.015	.00	.00	BOX
1267.210	2773.800	3.881	2777.681	13.50	.46	.00	2777.68	.00	.47	7.50	12.000	7.500	.00	0 .0
WALL	EXIT													
1267.210	2773.800	3.881	2777.681	13.50	7.64	.91	2778.59	.00	1.37	.00	1.500	.000	.00	1 .0
27.790	.0144					.0165	.46	3.88	.00	1.37	.013	.00	.00	PIPE
1295.000	2774.200	3.940	2778.140	13.50	7.64	.91	2779.05	.00	1.37	.00	1.500	.000	.00	1 .0

♠

♠

SHE1901-002: PARCEL 3 AT SUNSTONE PHASE 2B

PHASE 2B STORM DRAIN (PH2B.WSW)

FROM FACILITIES PC2-7 & PC2-8 BTWN LOTS 34/35

1000.00	.I	CH	E	.	R
1006.02	.			.	
1012.04	.			.	
1018.06	.			.	
1024.08	.			.	
1030.10	.			.	
1036.12	.			.	
1042.14	.			.	
1048.16	.			.	
1054.18	.			.	
1060.20	.			.	
1066.22	.			.	
1072.24	.			.	
1078.27	.			.	

1084.29 . .

1090.31 . .

1096.33 . .

1102.35 . .

1108.37 . .

1114.39 . .

1120.41 . .

1126.43 . .

1132.45 . .

1138.47 . .

1144.49 . .

1150.51 . .

1156.53 . .

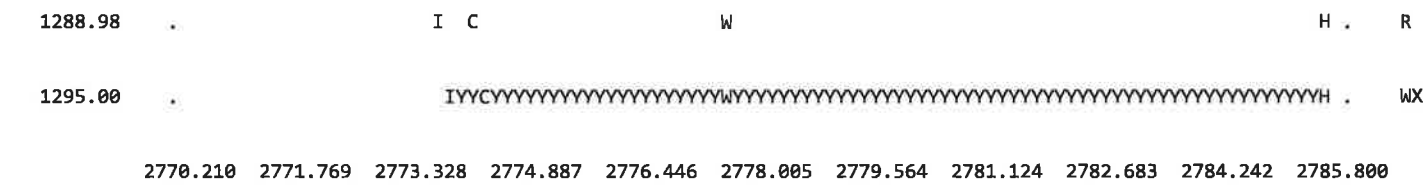
1162.55 . .

1168.57 . .

1174.59 . .

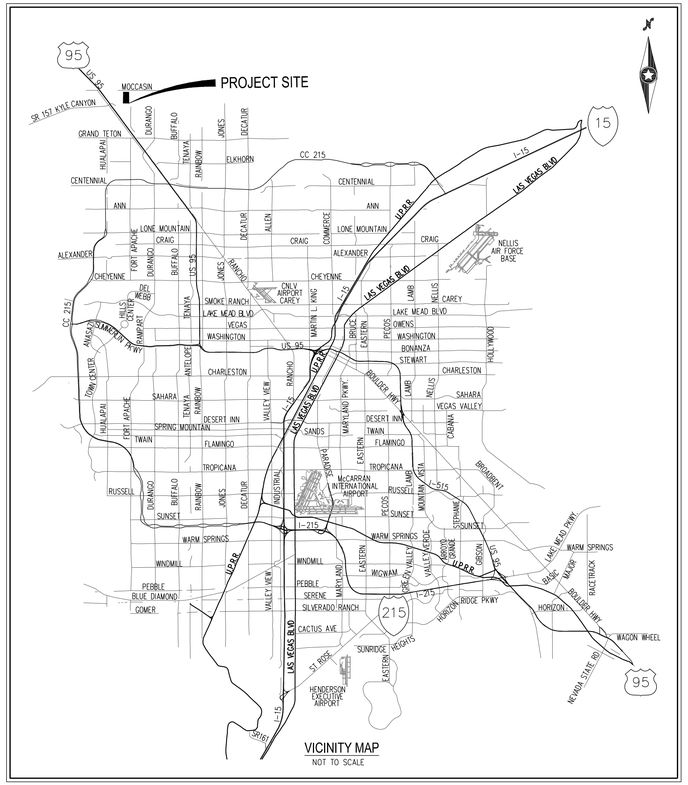
1180.61 . .

```
1186.63    .                                                                .
1192.65    .                                                                .
1198.67    .                                                                .
1204.69    .                                                                .
1210.71    .                                                                .
1216.73    .                                                                .
1222.76    .                                                                .
1228.78    .                                                                .
1234.80    .                                                                .
1240.82    .                                                                .
1246.84    .                                                                .
1252.86    .                                                                .
1258.88    .                                                                .
1264.90    .              IYYYYYYYYYYCH   W       E                         .   WE
1270.92    .              I    C                  W                     H    .   R
1276.94    .               I    C                 W                      H   .   JX
1282.96    .                 I  C                 W                       H  .   R
```



N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   S = SUPER-ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

Referenced Improvement Plans

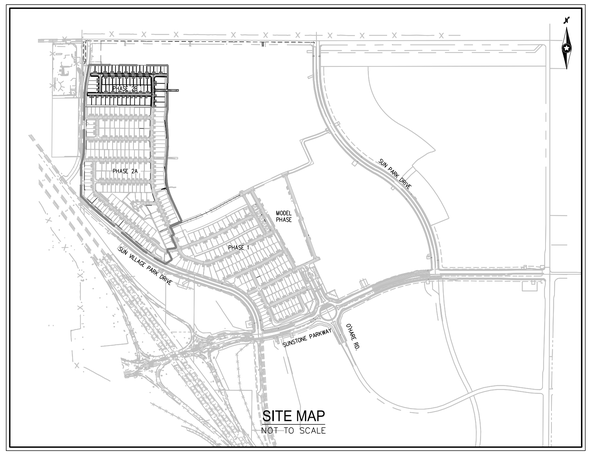


SHLP

IMPROVEMENT PLANS FOR

PARCEL 3 AT SUNSTONE PHASE 2B

CITY OF LAS VEGAS, NEVADA
RESIDENTIAL SUBDIVISION
APN: 125-06-211-015



SHEET INDEX

SHEET LIST TABLE

NO.	SHEET	TITLE
1	C-1	COVER SHEET
2	C-2	NOTES SHEET
3	C-3	QUANTITIES SHEET
4	MG	MASTER GRADING PLAN
5	G-1	GRADING PLAN I
6	G-2	GRADING PLAN II
7	G-3	GRADING PLAN III
8	D-1	DETAIL SHEET I
9	PP-1	PLAN AND PROFILE I

APPROVALS

CLV ENGINEERING OFFICE

CLV FIRE & RESCUE

CLV PLANNING DEPARTMENT

CENTRAL TELEPHONE CO. DBA CENTURYLINK DATE

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

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES
PROJECT NO. ###### FIRST APPROVED DATE:
LVVWD APPROVED FIRE FLOW 1,500 GPM AT 20 PSI RESIDUAL
MAXIMUM AVAILABLE FIRE SPRINKLER FLOW 20 GPM

SHEETS: ADD FIELD

NV ENERGY DATE

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

SOUTHWEST GAS CORPORATION SWG UID DATE

COX COMMUNICATIONS LAS VEGAS, INC. DATE

OWNER

NORTHLAND, LLC
C/O NINETY FIVE MGT, LLC
ATTN D HENSLEY
11411 SOUTHERN HIGHLANDS #300
LAS VEGAS, NV 89141

DEVELOPER

SH ACQ 2020, LLC
8800 N. GAINEY CENTER DRIVE
SUITE 350
SCOTTSDALE, AZ 85258
CONTACT: ROB IZER
PHONE: (602)318-0539

ENGINEER

WESTWOOD PROFESSIONAL SERVICES
5725 BADURA AVENUE, SUITE 100
LAS VEGAS, NV 89118
PH: (702) 284-5300
FX: (702) 284-5399
CONTACT: DERICK YORO

LEGAL DESCRIPTION

BEING ALL OF PARCEL 3 OF THAT CERTAIN PARENT FINAL MAP ENTITLED "SUNSTONE" ON FILE IN BOOK 161, PAGE 40 OF PLATS, OFFICIAL RECORDS CLARK COUNTY, NEVADA, LYING WITHIN THE NORTHWEST QUARTER OF SECTION 6, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M. CITY OF LAS VEGAS, CLARK COUNTY, NEVADA

BENCHMARK

MONUMENT ID: USDA (1934) 19

U.S. DEPARTMENT OF AGRICULTURE BRASS DISC AT SOUTHWEST CORNER OF U.S. 95 AND KYLE CANYON ROAD

ELEVATION = 2817.61 FEET, 858.810 METERS
NAVD 88 DATUM

PER THE CITY OF LAS VEGAS BENCHMARK BOOK-
2008 ADJUSTMENT (UPDATED 05/24/2010)

BASIS OF BEARINGS

NORTH 00°01'50" WEST, BEING THE BEARING OF THE EAST LINE OF THE NORTHEAST QUARTER (NE1/4) OF SECTION 6, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA; AS SHOWN BY MAP THEREOF IN FILE 151, PAGE 14 OF SURVEYS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

TOTAL DISTURBED AREA

10.92 ACRES

M.O.U. ITEMS

1. TMP-20-0380, 12/24/2020

DEVIATIONS FROM STANDARDS

NONE

SWPPP NOTE

NOTE: ALL LAND SURFACE AREA DISTURBANCES OVER 1 ACRE REQUIRE A STORMWATER DISCHARGE PERMIT ISSUED BY THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP). A PHASED CONSTRUCTION UNIT IN A CONTIGUOUS SUBDIVISION IS CONSIDERED UNDER CONSTRUCTION UNTIL ALL STRIPPED SURFACE AREAS HAVE BEEN COVERED BY PAVING, BUILDING CONSTRUCTION OR PLANTING. A STORMWATER DISCHARGE PERMIT APPLICATION AND ASSOCIATED INFORMATION MAY BE DOWNLOADED FROM THE WEB SITE; HTTP://WWW.STATE.NV.US/BWPC/STORM01.HTM PROJECTS THAT DISTURB MORE THAN ONE ACRE OF LAND MUST SUBMIT TO NDEP A "NOTICE OF INTENT" FOR INCLUSION UNDER STORMWATER PERMIT NO. NVR100000 ALONG WITH THE APPROPRIATE FILLING FEE.

FEMA FLOOD ZONE INFORMATION

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE "X", UNSHADED (AREA OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN), PER FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1750E, UPDATED SEPTEMBER 27, 2002.

PROJECT INFORMATION

ACREAGE (GROSS):	= 10.43 AC
ACREAGE (NET):	= 10.15 AC
DENSITY (LOTS/NET ACRE):	= 7.00 DU/NET AC
ZONING:	= SUNSTONE R-1 TRILOGY SUNSTONE R-TH
TOTAL NO. OF RESIDENTIAL LOTS	= 71
TOTAL NO. OF COMMON ELEMENTS *	= 7

EARTHWORK SUMMARY (UNADJUSTED)

CUT	13,091 CY.
FILL	6,833 CY.
NET	6,258 CY. (CUT)

GEOTECHNICAL ENGINEER

PREPARED BY: SOUTHWEST GEOTECHNICAL
ADDRESS: 5275 ARVILLE ST. #108
PHONE: 702-323-6000
PROJECT No. 182187
DATED: 4/25/18

UPDATED
PROJECT No. 205210
DATED: 03/02/21

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

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

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

Westwood
5725 W. Badura Ave.
Suite 100
Las Vegas, NV 89118
Phone (702) 284-5300
westwoodps.com
Westwood Professional Services, Inc.

NO.	DESCRIPTION	DATE	BY	APP.	APP. DATE

CITY OF LAS VEGAS, NEVADA

SHLP

PARCEL 3 AT SUNSTONE PHASE 2B
COVER SHEET

S:6 T:19 R:60 E

DATE: 9/8/21
DRAFTER: BD
DESIGNER: EE
CHECKED: ----

PROJECT NO.
SHE1901-002

PROFESSIONAL ENGINEER STATE OF NEVADA
DERICK D.J. YORO
Exp: 06/30/2022
CIVIL
No. 16396
9/8/21

C-1
SHEET 1 OF 9

__-_____

J:\she1901-002 trilogy sunstone phase 2\dwg\improv\phase 2b\she1901-002b cvr.dwg 9/8/2021 11:52 AM Ed Esguerra

PROJECT SITE

SANGRIA SUNRISE AVE (PRIVATE)

SANGRIA SUNRISE AVE (PRIVATE)

AMBER ROSE AVE (PRIVATE)

CHRYSOLITE PLACE (PRIVATE)

C.E. "M"

C.E. "J"

C.E. "I"

MATCHLINE, SEE SHEET G-2

MATCHLINE, SEE SHEET G-3

PARCEL 3 AT SUNSTONE PHASE 2A
(L21-01024, 107Y5148-2A)

SCALE – 1"=30' 0 30 60 FEET

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

SURVEY NOTE

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

ELEVATION NOTE

ADD 2700 TO ALL SPOT GRADES WHERE THE HUNDREDS AND THOUSANDS PLACES ARE OMITTED FOR ACTUAL ELEVATION (I.E. 01.00 REPRESENTS 2701.00)

SOILS REPORT

SOILS REPORT BY ADD FIELD
ADD FIELD
PROJECT NO. ADD FIELD DATED ADD FIELD

UPDATED SOILS REPORT BY ADD FIELD
ADD FIELD
PROJECT NO. ADD FIELD DATED ADD FIELD

EARTHWORKS

EARTHWORK QUANTITIES (RAW):
CUT= ADD FIELD CU YDS
FILL= ADD FIELD CU YDS

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

DISCLAIMER NOTE

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

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

GRADING NOTES

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

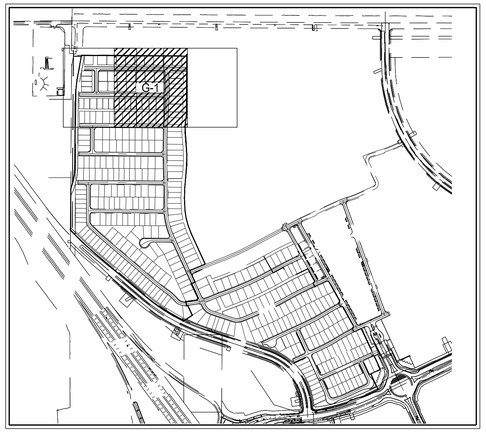
LAS VEGAS VALLEY CONSTRUCTION SITE BMP

G STORM DRAIN
RE-ANALYZED AS PH2B
WSPGW MODEL FOR
REVISED HGL AT SD
CONNECTION.

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

FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1750E, DATED NOVEMBER 27, 2002. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.



GRADING NOTES

(P) CONTRACTOR SHALL PROTECT IN PLACE EXISTING IMPROVEMENTS (E.UTILITY STRUCTURE, CURB & GUTTER) IN PLACE DURING CONSTRUCTION. ANY DAMAGE TO EXISTING STRUCTURES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPAIR OR REPLACE AT NO COST TO OWNER. (ANY LANDSCAPING REMOVED DURING CONSTRUCTION SHALL BE REPLACED IN KIND.)

1. CONSTRUCT CASE I SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOME OR EQUIVALENT PER CCAUSD #235
2. CONSTRUCT "L" TYPE CURB & GUTTER PER CCAUSD #216
3. CONSTRUCT ROLL TYPE CURB & GUTTER PER CCAUSD #217.S1
4. CONSTRUCT "L" TO ROLL CURB TRANSITION PER DETAIL 7 ON SHEET D-1
5. CONSTRUCT 5' SIDEWALK PER CCAUSD #234
6. CONSTRUCT SIDEWALK UNDERDRAIN AND DRAINAGE OUTLET PER CCAUSD #236 AND DETAIL ##.
7. CONSTRUCT CROSS GUTTER PER CCAUSD #228
8. CONSTRUCT 2" AC OVER 4" TYPE II AGGREGATE BASE, SEE SOILS REPORTS
9. CONSTRUCT 48" TYPE II SDMH PER CCAUSD #401 & 405
10. CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=7.5' (2 GRATE), DEPTH PER PLAN

BENCHMARK

MONUMENT ID: USDA (1934) 19

U.S. DEPARTMENT OF AGRICULTURE BRASS DISC AT SOUTHWEST CORNER OF U.S. 95 AND KYLE CANYON ROAD

ELEVATION = 2817.61 FEET, 858.810 METERS
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NORTH 00°01'56" WEST, BEING THE BEARING OF THE EAST LINE OF THE NORTHEAST QUARTER (NE1/4) OF SECTION 6, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 151, PAGE 14 OF SURVEYS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

NOTE

ALL PRIVATE STREETS ARE P.U.E., PUBLIC SEWER EASEMENTS, AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY H.O.A.

QUANTITIES

			PRIVATE
1.	7.5' TYPE "CM2" DROP INLET	EA	2
2.	18" RCP CLASS IV STORM DRAIN	LF	28
3.	24" RCP CLASS IV STORM DRAIN	LF	264
4.	8' WIDE CONCRETE VALLEY GUTTER W/10" TYPE I AGGREGATE BASE	SF	1,192
5.	RIPRAP D50=6", THK=12"	SF	180
6.	RIPRAP D50=10", THK=20"	SF	200
7.	SIDEWALK UNDERDRAIN	EA	1

FLOOD CERTIFICATION

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

DERICK YORO, P.E. 16396 DATE

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

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

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

Westwood
Westwood Professional Services, Inc.
5725 W. Badura Ave. Suite 100 Las Vegas, NV 89118
Phone (702) 284-5300
westwoodps.com

NO.	DESCRIPTION	DATE	BY	APP.	APP. DATE

CITY OF LAS VEGAS, NEVADA

SHLP

PARCEL 3 AT SUNSTONE PHASE 2B
GRADING PLAN I

S19 S
R60 E

DATE: 9/8/21
DRAFTER: BD
DESIGNER: EE
CHECKED: ----

PROJECT NO.
SHE1901-002

PROFESSIONAL ENGINEER STATE OF NEVADA DERICK D.J YORO Exp: 06/30/2022 CIVIL No. 16396 9/8/21

G-1
SHEET 5 OF 9

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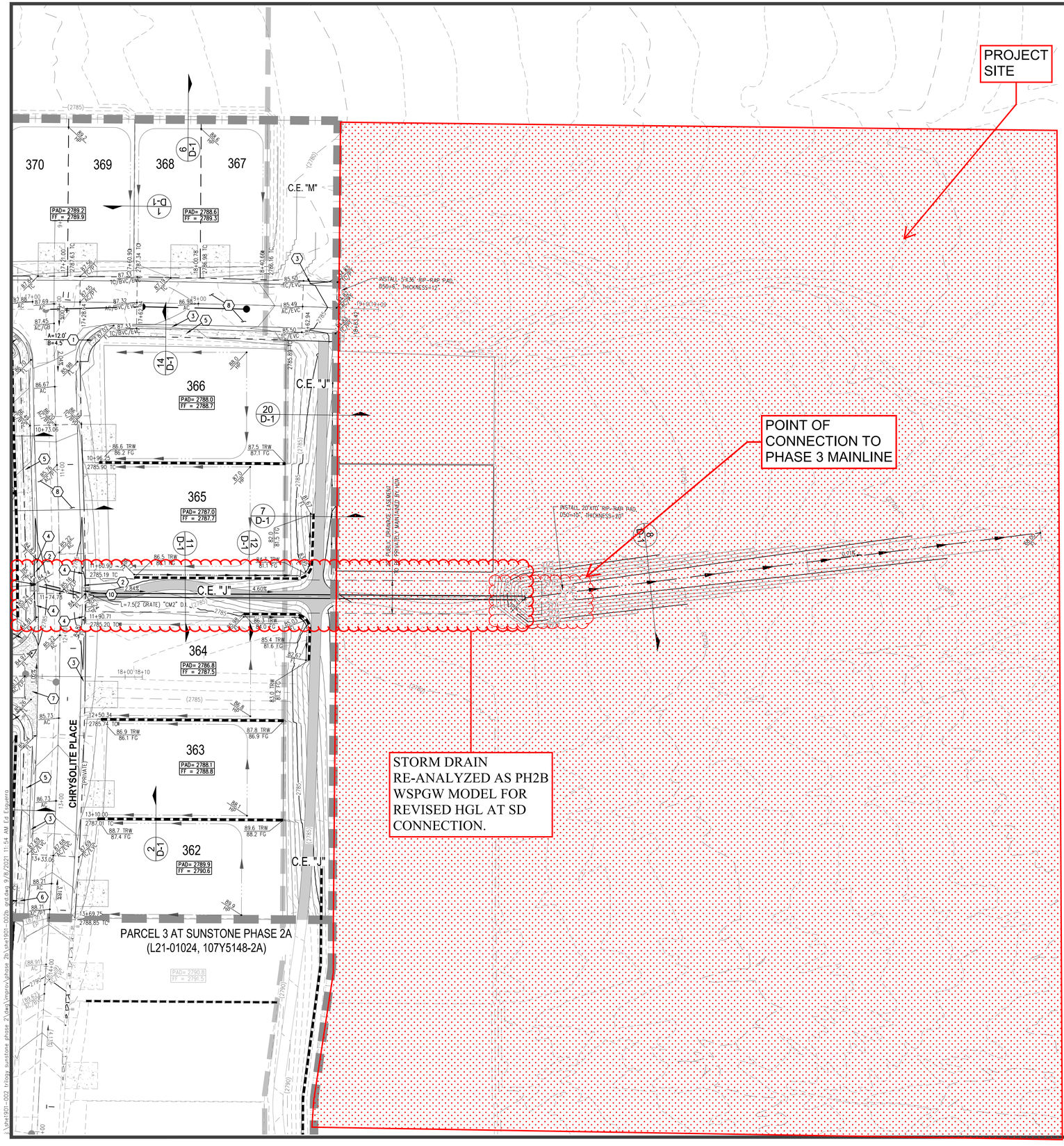
I:\she1901-002 trilogy sunstone phase 2\dwg\vesprov\phase 2b\she1901-002b grd.dwg 9/8/2021 11:53 AM Ed Esguerra



0 30 60
SCALE – 1"=30' FEET

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

SURVEY NOTE

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

ELEVATION NOTE

ADD 2700 TO ALL SPOT GRADES WHERE THE HUNDREDS AND THOUSANDS PLACES ARE OMITTED FOR ACTUAL ELEVATION (I.E. 01.00 REPRESENTS 2701.00)

SOILS REPORT

SOILS REPORT BY ADD FIELD
ADD FIELD
PROJECT NO. ADD FIELD DATED ADD FIELD

UPDATED SOILS REPORT BY ADD FIELD
ADD FIELD
PROJECT NO. ADD FIELD DATED ADD FIELD

EARTHWORKS

EARTHWORK QUANTITIES (RAW):
CUT= ADD FIELD CU YDS
FILL= ADD FIELD CU YDS

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

DISCLAIMER NOTE

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

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

GRADING NOTES

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

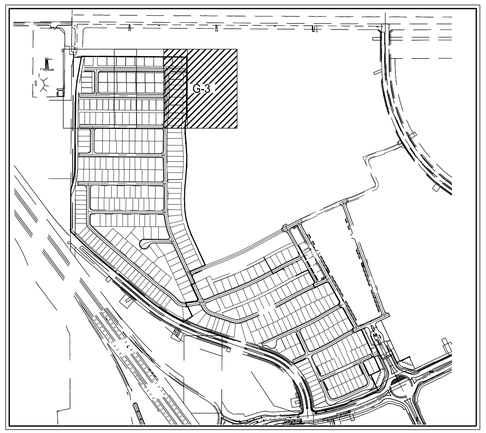
LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDELINES

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

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

FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1750E, DATED NOVEMBER 27, 2002. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.



GRADING NOTES

(P) CONTRACTOR SHALL PROTECT IN PLACE EXISTING IMPROVEMENTS (IE.UTILITY STRUCTURE, CURB & GUTTER) IN PLACE DURING CONSTRUCTION. ANY DAMAGE TO EXISTING STRUCTURES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPAIR OR REPLACE AT NO COST TO OWNER. (ANY LANDSCAPING REMOVED DURING CONSTRUCTION SHALL BE REPLACED IN KIND.)

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(3) CONSTRUCT ROLL TYPE CURB & GUTTER PER CCAUSD #217.S1
(4) CONSTRUCT "L" TO ROLL CURB TRANSITION PER DETAIL 7 ON SHEET D-1
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(7) CONSTRUCT CROSS GUTTER PER CCAUSD #228
(8) CONSTRUCT 2" AC OVER 4" TYPE II AGGREGATE BASE, SEE SOILS REPORTS
(9) CONSTRUCT 48" TYPE II SDMH PER CCAUSD #401 & 405
(10) CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=7.5' (2 GRATE), DEPTH PER PLAN

BENCHMARK

MONUMENT ID: USDA (1934) 19

U.S. DEPARTMENT OF AGRICULTURE BRASS DISC AT SOUTHWEST CORNER OF U.S. 95 AND KYLE CANYON ROAD

ELEVATION = 2817.61 FEET, 858.810 METERS
NAVD 88 DATUM

PER THE CITY OF LAS VEGAS BENCHMARK BOOK–
2008 ADJUSTMENT (UPDATED 05/24/2010)

BASIS OF BEARINGS

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DERICK YORO, P.E. 16396 DATE

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

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

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

Westwood
5725 W. Badura Ave.
Suite 100
Las Vegas, NV 89118
Phone (702) 284-5300
westwoodps.com
Westwood Professional Services, Inc.

NO.	DESCRIPTION	DATE	BY	APP.	APP. DATE

CITY OF LAS VEGAS, NEVADA

SHLP

PARCEL 3 AT SUNSTONE PHASE 2B
GRADING PLAN III

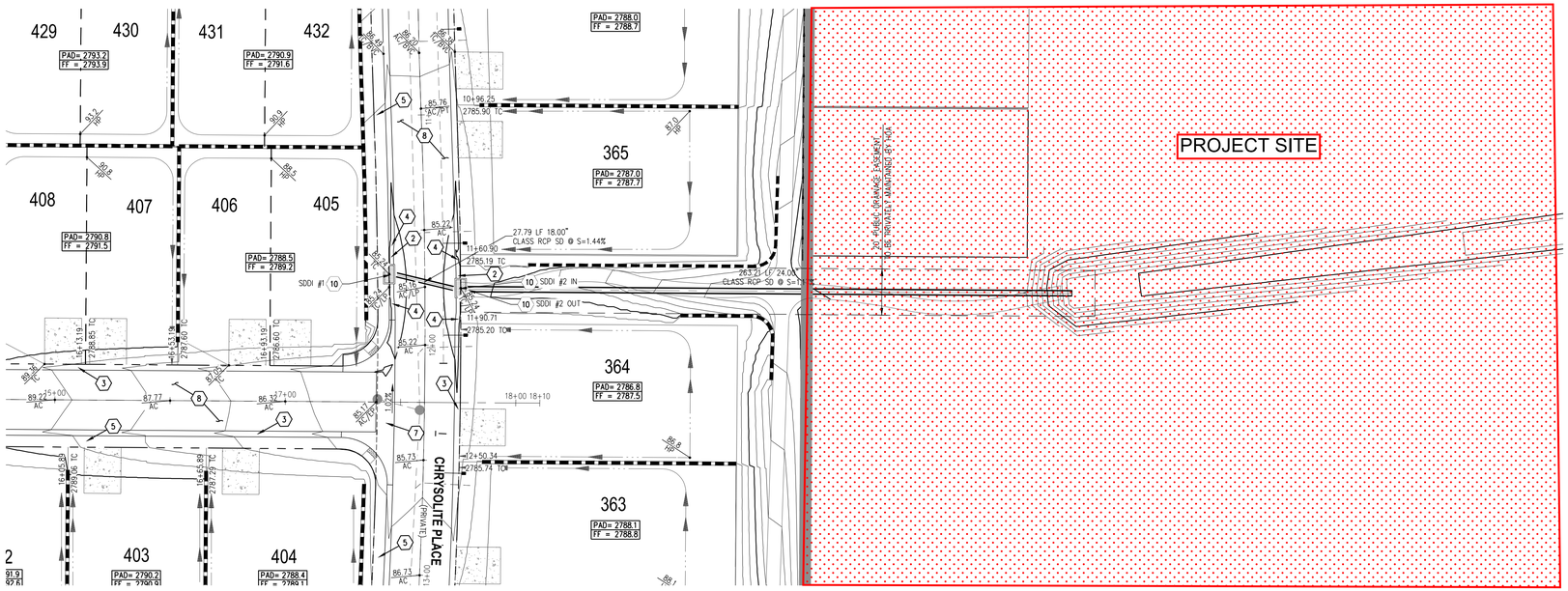
S:6 T:19 S R:60 E

DATE: 9/8/21
DRAFTER: BD
DESIGNER: EE
CHECKED: ----
PROJECT NO. SHE1901-002

PROFESSIONAL ENGINEER STATE OF NEVADA DERICK D.J YORO Exp: 06/30/2022 CIVIL No. 16396
9/8/21

G-3
SHEET 7 OF 9

J:\she1901-002 trilogy sunstone phase 2\dwg\improv\phase 2b\she1901-002b grd.dwg 9/8/2021 11:54 AM Ed Esparro



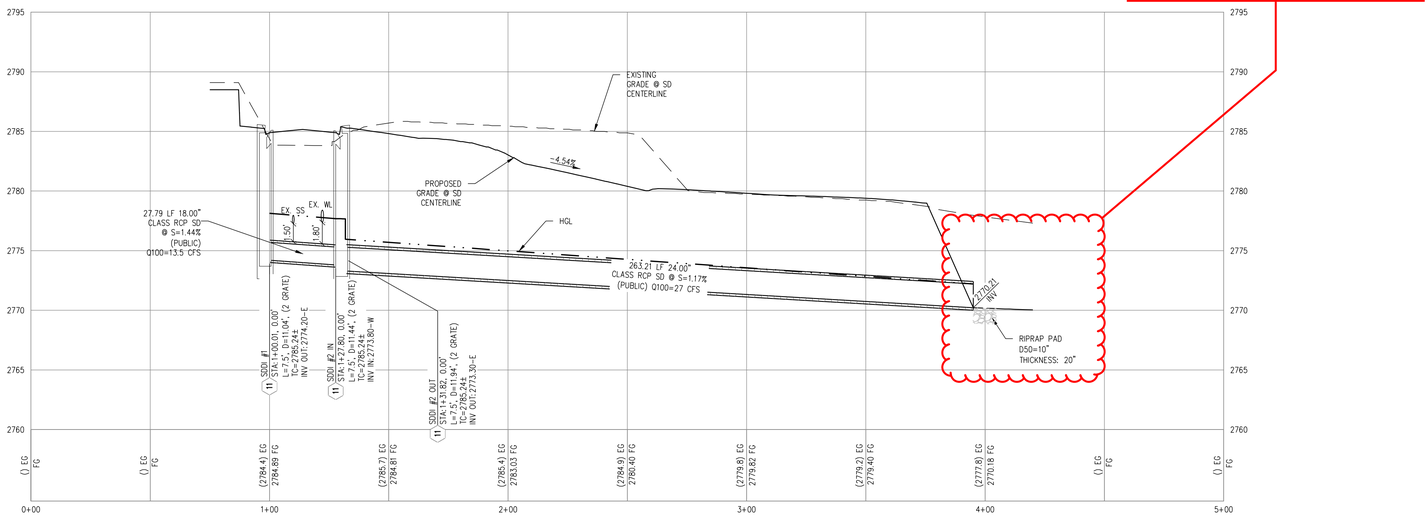
CHRYSOLITE LATERALS - PLAN VIEW

SCALE: 1"= 30'

0 30 60

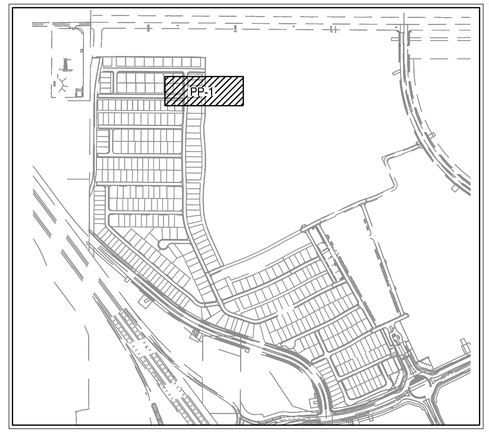
SCALE – 1"=30' FEET

Connection to proposed storm drain (SDMH 7) for extension into Phase 3 site



CHYRSOLITE LATERALS - PROFILE VIEW

HORIZ: 1" = 30'
VERT: 1" = 6'



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

WATER NOTES

1. INSTALL 1" COPPER SERVICE WITH 3/4" METER PER UDACS PLATE NO. 1
2. INSTALL 1" COPPER SERVICE W/ 1" IRRIGATION METER AND 1" RPPA PER UDACS PLATE NO. 4 & 8.
3. INSTALL 8"X6" TEE PER UDACS PLATE NO. 31
4. FIRE HYDRANT ASSEMBLY WITH 6" GATE VALVE PER UDACS PLATE NO. 40
5. INSTALL 8"X6" TEE WITH THRUST BLOCKS PER UDACS PLATE NO. 31
6. INSTALL MECHANICAL 8"X12" TAPPING SLEEVE WITH TAPPING VALVE PER UDACS PLATE NO. 34
7. INSTALL MECHANICAL 6"X12" TAPPING SLEEVE WITH TAPPING VALVE PER UDACS PLATE NO. 34
8. INSTALL FIRE HYDRANT ASSEMBLY PER UDACS PLATE NO. 40
9. INSTALL 6" GATE VALVE WITH VALVE BOX PER UDACS PLATE NO. 30 & 39
10. INSTALL 8" GATE VALVE WITH VALVE BOX PER UDACS PLATE NO. 30 & 39
11. INSTALL 8"X6" REDUCER PER UDACS PLATE NO. 30
12. INSTALL CAP AND 2" BLOWOFF VALVE PER UDACS PLATE NO. 36
13. INSTALL 1° HORIZONTAL DEFLECTION PER UDACS SEC. 2.07
14. INSTALL 5° HORIZONTAL BEND PER UDACS PLATE NO. 31 (SIZE SHALL MATCH WATER MAIN SIZE)
15. INSTALL 11.25° HORIZONTAL BEND PER UDACS PLATE NO. 31 (SIZE SHALL MATCH WATER MAIN SIZE)
16. INSTALL 22.5° HORIZONTAL BEND PER UDACS PLATE NO. 31 (SIZE SHALL MATCH WATER MAIN SIZE)
17. INSTALL 45° HORIZONTAL BEND PER UDACS PLATE NO. 31 (SIZE SHALL MATCH WATER MAIN SIZE)
18. FIELD VERIFY, REMOVE EX CAP & BLOW-OFF, AND CONNECT TO EXISTING WATERLINE
19. INSTALL 1° VERTICAL DEFLECTION PER UDACS SEC. 2.07
20. INSTALL 8" 5° VERTICAL BEND PER UDACS PLATE NO. 31
21. INSTALL 8" 11.25° VERTICAL BEND PER UDACS PLATE NO. 31

SEWER NOTES

1. INSTALL 48" DIAMETER SANITARY SEWER MANHOLE WITH WATERTIGHT JOINTS PER DCSWCS SD-1, SD-3, AND SD-4, WITH SINGLE 24" LID
2. INSTALL 8" SDR-35 PVC SANITARY SEWER PER DCSWCS SD-15 & SD-17
3. INSTALL 4" PVC SANITARY SEWER LATERAL PER DCSWCS SD-17, SD-20, AND SD-23
4. INSTALL 8" C-900 SANITARY SEWER PER DCSWCS SD-15 & SD-17
5. INSTALL 8" CAP WITH THRUST BLOCK PER DCSWCS SECTION 2.2.5
6. INSTALL 48" DIAMETER SANITARY SEWER MANHOLE WITH WATERTIGHT JOINTS PER DCSWCS SD-1, SD-4, SD-5, WITH SINGLE 24" LID PER SD-3 AND CORROSION PROTECTION PER 3.16.8.

APPROVAL

LAS VEGAS FIRE AND RESCUE DATE

GRADING NOTES

P. CONTRACTOR SHALL PROTECT IN PLACE EXISTING IMPROVEMENTS (IE.UTILITY STRUCTURE, CURB & GUTTER) IN PLACE DURING CONSTRUCTION. ANY DAMAGE TO EXISTING STRUCTURES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPAIR OR REPLACE AT NO COST TO OWNER. (ANY LANDSCAPING REMOVED DURING CONSTRUCTION SHALL BE REPLACED IN KIND.)

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SURVEY NOTE

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

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 139262 FIRST APPROVED DATE:

Westwood
Phone (702) 284-5300
5725 W. Badura Ave.
Suite 100
Las Vegas, NV 89118
westwoodps.com
Westwood Professional Services, Inc.

NO.	DESCRIPTION	DATE	BY	APP.	APP. DATE

CITY OF LAS VEGAS, NEVADA

SHLP

PARCEL 3 AT SUNSTONE PHASE 2B
PLAN AND PROFILE I

S6 T19 S R60 E

DATE: 9/8/21
DRAFTER: BD
DESIGNER: EE
CHECKED: ----

PROJECT NO.
SHE1901-002

PROFESSIONAL ENGINEER – STATE OF NEVADA – DERICK D.J. YORO – No. 16396 – Exp. 06/30/2022 – CIVIL – 9/8/21

PP-1
SHEET 9 OF 9

J:\she1901-002 trilogy sunstone phase 2\dwg\improx\phase 2b\she1901-002b pp.dwg 9/8/2021 11:54 AM Ed Esguerra

APPENDIX G

Reference Material

Technical Drainage Study for Sunstone Phase 1 Infrastructure, by SHG

Approval Letters

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: August 5, 2021
TO: **Land Development Services** Department of Public Works				FROM: Jennifer Shinn, P.E. Flood Control, Engr. Associate Department of Public Works
SUBJECT:	Drainage Study for:			**COPIES TO:**
SUNSTONE - Phase 1 Infrastructure Update #2				Slater Hanifan Group
Cross Streets:	Fort Apache Road & Moccasin Road			Eastland Co., LLC
File Number:	F:\PW_Flood\DSMEMOS\DS5135D.docx			Bart Anderson, P.E., DevCo
Parcel Number:	125-06-501-001			CCRFCD
Zoning Action:	Eastland Development Agreement			CCPW
FEMA Flood Zone	YES	NO **X**		NDOT
Proposed Storm Drain	YES **X**	NO		NVEnergy

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Transaction #
1st Submittal	5/6/2019	6/24/2019	See Comments Below	$400.00	3122585: $400
2nd Submittal	8/8/2019	9/5/2019	See Comments Below	$400.00	3524616: $400
3rd Submittal	2/4/2020 & 4/15/2020	3/3/2020 & 5/15/2020	Approved	$100.00	3732002: $100
4th Submittal	7/21/2021	8/5/2021	Approved	$100.00	4401743: $100
			TOTAL FEES (LDDRS):	**$1000.00**	**----**

REMARKS:

4th Submittal: Update #2 to revise storm drain due to as-built conditions of the Moccasin Regional Facility and dry utility conflict in Sky Pointe Drive.

3rd Submittal: Update #1 to revise storm drain to avoid conflict with future sewer.

SUNSTONE – Phase 1 Infrastructure Improvements as well as the Master Study (DS5081) are predicated upon the completion of the ultimate condition offsite drainage facilities impacting the SUNSTONE development being in place prior to issuance of certificates of occupancy. Permits for development within Designated Builder Parcels shall not be issued if the associated Master Plan facilities are not under construction.

The Master 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 Nevada Department of Transportation concurrence.

The SUNSTONE – Phase 1 Infrastructure includes storm drain facilities that are sized based upon the design parameter of US-95 being a flow cut-off. **This Study assumes ultimate condition offsite drainage facilities impacting the SUNSTONE development will be in place prior to issuance of**

certificates of occupancy. The ultimate condition infrastructure drainage facilities that are assumed to be in place include:

- The Moccasin Master Plan Regional Facility – Upper Las Vegas Wash to west of US-95. This includes the Interim Collection Facility west of US-95.
- Skye Canyon Detention Basin #2.
- Skye Canyon Phase 3A regional Facility – Skye Canyon Park Dr. to Iron Mountain Rd.
- The US-95 Local Facility – Brent Lane to Kyle Canyon Interchange. This connects into the existing MPU Facility along US-95.

The construction of these Ultimate Facilities will make the west side of US 95 a 100-yr cutoff through the reach south of the Moccasin Master Plan Regional Facility crossing, thereby meeting the full intent of the CCRFCD Master Plan.

Changes and timing of the corresponding infrastructure improvements that protect the SUNSTONE Development shall require Updating the Master Drainage Study Phasing.

1. The SUNSTONE - Phase 1 Infrastructure Improvements include the following roadways:
   - Sky Point Drive (Edgestone Dr.) – Log Cabin to Hualapai
   - Log Cabin Way (Sunstone Parkway) – US-95 to Skye Canyon Park Dr.
   - North Connector (Sunbridge Point Dr.) – Log Cabin to Moccasin
   - Skye Canyon Park Drive (Sun Park Dr.) – Iron Mountain to Log Cabin
   - O'Hare Road – Log Cabin to Skye Canyon Park Dr.
   - South Park – (Entry Roads 1 & 2) adjacent to the South Park
2. The Storm Drain System design includes lateral stubs at most Designated Builder Parcels that will convey the 100-year Ultimate flows from each parcel. Technical Drainage Studies are required for each of the Designated Builder Parcels and shall provide on-site collection for the 100-year facilities

3. Technical drainage studies are required for each of the Designated Builder Parcels. The technical drainage studies for the Designated Builder Parcels shall not be submitted until the conditional approval of the pertinent infrastructure drainage study is obtained. Final approval for the infrastructure drainage study shall be obtained prior to conditional approval of the impacted Builder Parcels drainage studies.

4. Building permits for the homes within the individual Designated Builder Parcels shall not be issued until construction of the street and flood control infrastructure around the Designated Builder Parcels is substantially complete or interim protection is provided per the approved technical drainage study.

5. The interim channels adjacent to the infrastructure roadways are the Maintenance responsibility of the Master Developer.

6. Provide a legal description of the proposed drainage facilities located outside of dedicated public right-of-way prior to recordation of the parent final map.

7. The project proposes to build temporary drainage facilities including drainage berms/swales over the *Phase 1 Infrastructure* site. Interim drainage facilities are normally shown on the Improvement Plans, bonded for construction, and bonded under a separate Maintenance Agreement. As an alternative to including interim drainage improvements that are privately maintained as a part of the *Phase I Infrastructure*, and prior to the final plan approval for each set of improvement plans that will be bonded separately, the Improvement Plans shall show concrete pads and rip-rap berms at the culvert stubs for interim flows, and the developer must complete a ***Maintenance and Liability Agreement*** and bond for 100% of the costs. The Maintenance Bond shall include exhibits showing the interim drainage improvements at each culvert and the associated costs to complete the improvements. This shall be in the form of a 50% cash bond and a 50% standard bond for Maintenance. The cash bond

gives the City the ability to perform work and draw down funds as needed in the interim condition. The engineer must submit an estimate of the quantities for the construction of 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 berms/swales are no longer necessary and can be removed.

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
PBJ/JKS

T/R/S: T19S/R60E/6 & 7
AREA G-6 & 7

REGIONAL FLOOD CONTROL DISTRICT

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

BOARD OF DIRECTORS

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Clark County

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City of Boulder City

March 26, 2020

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

DISTRICT CONCURRENCE: SUNSTONE - PHASE I INFRASTRUCTURE (DS5135B) (RFCD No. 20-12445)

Dear Mr. Kwon:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated May 6, 2019, Addendum No. 1 dated August 8, 2019, and Addendum No. 2 dated March 18, 2020 for above-mentioned project as submitted by SLATER HANIFAN GROUP. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas Department of Public Works dated March 24, 2020.

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

> 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.

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*.

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

Please be aware that as additional information becomes available and/or restudies of Flood Insurance Studies are performed, information submitted by SLATER HANIFAN GROUP 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:jb

c: Lant K. Leavitt, P.E., Slater Hanifan Group

P:\Letters and Memos\Local Drainage\Land Development & Drainage\2020\L-20-12445as_built.doc

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
1263 S. Stewart Street
Carson City, Nevada 89712

STEVE SISOLAK
Governor

KRISTINA L. SWALLOW, P.E., *Director*

In Reply, Refer to:

October 22, 2019

Lant K. Leavitt, P.E.
5740 S. Arville St., Suite 216
Las Vegas, NV 89118

TECHNICAL DRAINAGE STUDY
Sunstone Drainage Study Ph 1 Infrastructure
Clark County

Dear Mr. Leavitt:

The Nevada Department of Transportation (NDOT) Hydraulics Section has received and reviewed the following document(s) for the above-referenced project.

Document:	**Dated:**
Transmittal Letter from Lant K. Leavitt, P.E., SHG	May 6, 2019
City of Las Vegas Inter-Office Memorandum	Sept. 9, 2019
Technical Drainage Study Sunstone Phase 1 Infrastructure, stamped by Lant K. Leavitt, P.E.	May 6, 2019
Technical Drainage Study Addendum Sunstone Phase 1 Infrastructure, stamped by Lant K. Leavitt, P.E.	Aug. 8, 2019
Improvement Plans for Log Cabin, Skye Pointe Drive, Skye Canyon Park, OHare, Entry Roads, IM and TP and North Connector, all stamped by Joshua L. Johnson on May 5, 2019.	May 5, 2019

The drainage design information presented in the reviewed document(s):

X	is acceptable in concept. Final Hydraulic Section approval will be based on review of final design documents submitted with the NDOT Right-Of-Way Occupancy Permit application that must be submitted for this project.
	is acceptable in concept. Final Hydraulic Section approval will be based on review of final design documents submitted with the NDOT Right-Of-Way Occupancy Permit application that must be submitted for this project. The following comments should be addressed with the permit application:
	must be supplemented or modified to satisfy the following comment(s) before preliminary Hydraulic Section approval can be granted:

All submittals regarding this project must be forwarded through (or copied to) the local NDOT District permitting office. All pertinent drainage design documents (including those previously submitted for preliminary review) must be submitted to the local NDOT District permitting office with the Right-Of-Way Occupancy Permit Application. All plans and reports must be signed and stamped by a Nevada registered civil engineer.

No liability is assumed by the Department in performing this review. Verification and acceptance of all background information, design data and conclusions is the responsibility of the consulting engineer.

Please call me at (775) 888-7621 should you have any questions.

Sincerely,

Brian A. Matthews, P.E.
Professional Engineering Specialist

c: Charles Molisee, District I Permits
Mike Alameda, Associate Engineer Right of Way Carson City
Linda Olguin, District I Permits
Mario Gomez, District 1 Assistant Engineer
Michael Yates, District 1 Assistant Engineer
Dave Facemyer, LV Permits

Referenced Drainage Exhibits

Proposed Condition 10-Year Street Flow Summary

Section ID	Q_{10} (cfs)	Slope (%)	Depth (ft)	Velocity (fps)	DxV	Dry Lane (ft)
LC1 (Q = ELOG1(a))	5	4.06	0.28	3.83	1.1	20.5
LC2 (Q = Combined Bypass from LC1 Facilities + ELOG1(b)))	4	4.06	0.27	3.67	1.0	21.0
LC3 (Q = Combined Bypass from LC2 Facilities + ELOG1(c) + ELOG2(a))	6	1.75	0.33	2.85	0.9	18.0
LC4 (Q = Combined Bypass from LC3 Facilities + ELOG2(b))	3	4.10	0.25	3.53	0.9	22.0
LC5 (Q = Combined Bypass from LC4 Facilities + ELOG2(c))	4	2.95	0.28	3.22	0.9	20.5
LC6 (Q = Combined Bypass from LC5 Facilities + ELOG2(d))	5	3.83	0.29	3.74	1.1	20.0
LC7a (Q = Bypass from LC6 Facilities + ELOG2(e))	2	3.83	0.27	3.59	1.0	21.0
LC7b (Q = Bypass from LC6 Facilities + ELOG2(f))	3	3.75	0.30	3.84	1.2	19.5
SC1* (Q = EFA4(a))	3	0.46	0.40	1.64	0.7	14.5
SC2* (Q = Bypass from SC1 + Combined Bypass from OH3 + EFA4(b) + EFA3(a))	14.5	0.46	0.61	2.37	1.4	21.5
SC3* (Q = EFA3(b))	1	0.22	0.33	3.89	1.3	35.5
SC4* (Q = EFA3(c))	1	0.65	0.28	1.52	0.4	38.0

Proposed Condition 100-Year Street Flow Summary

Section ID	Q_{100} (cfs)	Slope (%)	Depth (ft)	Velocity (fps)	DxV
LC1 (Q = ELOG1(a))	10	4.06	0.34	4.41	1.5
LC2 (Q = Combined Bypass from LC1 Facilities + ELOG1(b)))	7	4.06	0.31	4.09	1.3
LC3 (Q = Combined Bypass from LC2 Facilities + ELOG1(c) + ELOG2(a))	12	1.75	0.40	3.32	1.3
LC4 (Q = Combined Bypass from LC3 Facilities + ELOG2(b))	9	4.10	0.33	4.34	1.4
LC5 (Q = Combined Bypass from LC4 Facilities + ELOG2(c))	11	2.95	0.36	3.97	1.4
LC6 (Q = Combined Bypass from LC5 Facilities + ELOG2(d))	13	3.83	0.37	4.57	1.7
LC7a (Q = Bypass from LC6 Facilities + ELOG2(e))	5.5	3.83	0.35	4.40	1.5
LC7b (Q = Bypass from LC6 Facilities + ELOG2(f))	7.5	3.75	0.38	4.68	1.8
ER1 (Q = EPC + EOHR1(d))	26	1.5	0.51	3.72	1.9
		3.6	0.45	5.23	2.4
ER2 (Q = EOHR1(e))	2	0.6	0.29	1.48	0.4
		2.7	0.23	2.79	0.6
SP1* (Q = ESKY1(a))	4	1.5	0.37	2.85	1.1
SP2* (Q = Bypass from Facility SP1 + EMLA1 + ESKY1b)	12	2.9	0.45	4.73	2.1
SP3* (Q =Bypass from Facility SP1a + ESKY1(b))	4	2.9	0.34	3.68	1.3
SP4a* (Q = Bypass from Facility SP3a + EMLA1 + ESKY1(c))	14	2.9	0.47	4.90	2.3
SP4b* (Q = Bypass from Facility SP3b + ESKY1(g))	4	2.9	0.34	3.68	1.3
SC1* (Q = EFA4(a))	5	0.46	0.45	1.85	0.8
SC2* (Q = Bypass from SC1 + Combined Bypass from OH3 + EFA4(b) + EFA3(a))	14.5	0.46	0.61	2.37	1.4
SC3* (Q = EFA3(b))	3	0.22	0.44	1.24	0.5
SC4* (Q = EFA3(c))	2	0.65	0.34	1.73	0.6
OH1 (Q = EPC + EPG + EOHR1(a))	70	2.63	0.61	6.19	3.8
OH2 (Q = Combined Bypass from OH1 Facilities + EOHR1(b))	39	4.37	0.49	6.18	3.0
OH3 (Q = Combined Bypass from OH2 Facilities + EOHR1(c))	36	3.76	0.49	5.73	2.8
OH4 (Q = EPC + EPG + EOHR1(a+d))	68	0.95	0.7	4.50	3.2
		2.63	0.61	6.12	3.7
NC2a* (Q = ECR1(b))	3	2.06	0.27	2.64	0.7
NC2b* (Q = ECR1(e))	4	2.06	0.29	2.79	0.8
NC4a* (Q = ECR1(c))	2	1	0.27	1.83	0.5
NC4b* (Q = EOR1(f) + Facility NC2b Bypass)	5	1	0.34	2.19	0.7

*HALF STREET SECTION

Recommended Flood Control Facility Summary

Facility ID	Facility Description	Total/Approaching Flow (cfs) Q_{100}/Q_{10}	Facility Flow (cfs) Q_{100}/Q_{10}	Surface/Bypass Flow (cfs) Q_{100}/Q_{10}	Notes
LC1	5' Type CM2 DI & 18" RCP	5/2.5	3/2	2/1	
LC2	12.5' Type CM2 DI & 18" RCP	3.5/2	3/2	0/0	
LC3	5' Type CM2 DI & 18" RCP	6/3	3/2	3/1	
LC4	5' Type CM2 DI	4.5/1.5	2/2	2/0	
LC5	5' Type CM2 DI	5.5/2	3/1	3/1	
LC6	5' Type CM2 DI & 18" RCP	6.5/2.5	3/2	4/1	
LC7a	10' Type CM2 DI	5.5/2	5/2	1/0	
LC7b	15' Type CM2 DI & 18" RCP	7.5/3	6/3	1/0	
LC8	5' Type CM2 DI & 18" RCP	2/0	2/0	0/0	Sump Inlet
SC1	5' Type CM2 DI & 18" RCP	5/3	3/2	2/1	
SC2	7.5' Type CM2 DI & 18" RCP	14.5/ NA	14.5/ NA	0/0	Sump Inlet
SC3	5' Type CM2 DI & 18" RCP	3/1	2/1	1/0	
SC4	7.5' Type CM2 DI & 18" RCP	2/1	2/1	0/0	
Facility ID	**Facility Description**	**Total/Approaching Flow (cfs) Q_{100}**	**Facility Flow (cfs) Q_{100}**	**Surface/Bypass Flow (cfs) Q_{100}**	**Notes**
OH1	15' Type CM2 DI & 18" RCP	35	18	17	
OH2	12.5' Type CM2 DI & 18" RCP	19.5	6	13	
OH3	20' Type CM2 DI & 18" RCP	18	14	4	
NC1a	5' Type CM2 DI & 18" RCP	2.5	2.5	0	Sump Inlet
NC1b	5' Type CM2 DI & 18" RCP	2.5	2.5	0	Sump Inlet
NC2a	7.5' Type CM2 DI	3	3	0	
NC2b	5' Type CM2 DI & 18" RCP	4	3	1	
NC3a	7.5' Type CM2 DI	3	3	0	Sump Inlet
NC3b	5' Type CM2 DI & 18" RCP	6	6	0	Sump Inlet
NC4a	5' Type CM2 DI & 18" RCP	2	2	0	
NC4b	5' Type CM2 DI & 18" RCP	5	3	2	
SP1a	5' Type CM2 DI & 18" RCP	4	2	2	
SP1b	5' Type CM2 DI & 18" RCP	4	2	2	
SP2a	7.5' Type CM2 DI	12	12	0	Sump Inlet
SP2b	5' Type CM2 DI & 18" RCP	6	6	0	Sump Inlet
SP3a	5' Type CM2 DI	4	2	2	
SP3b	5' Type CM2 DI & 18" RCP	4	2	2	
SP4a	5' Type CM2 DI & 18" RCP	14	5	9	
SP4b	5' Type CM2 DI & 18" RCP	4	2	2	

Prorated Flow Summary

Basin ID	Q_{100} (cfs)	Q_{10} (cfs)	Area (acres)	100-yr Unit Flow (cfs/acre)	10-yr Unit Flow (cfs/acre)
ESKY1	23	13	8.2	2.8	1.6
ELOG1	15	8	4.3	3.5	1.9
ELOG2	35	19	12.1	2.9	1.6
EOHR1	29	16	10.1	2.9	1.6
EFA3	7	4	2.5	2.8	1.6
EFA4	8	5	2.8	2.9	1.8
ECR1	22	12	7.8	2.8	1.5
EMR2	26	8	19.2	1.4	0.4
Subbasin ID	**Q_{100} (cfs)**	**Q_{10} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/acre)**	**10-yr Unit Flow (cfs/acre)**
ESKY1(a)	4	2	1.4	2.8	1.6
ESKY1(b)	2	1	0.8	2.8	1.6
ESKY1(c)	2	1	0.7	2.8	1.6
ESKY1(d)	3	2	1.1	2.8	1.6
ESKY1(e)	4	3	1.6	2.8	1.6
ESKY1(f)	2	1	0.7	2.8	1.6
ESKY1(g)	2	1	0.7	2.8	1.6
ESKY1(h)	4	2	1.3	2.8	1.6
TOTAL	***23***	***13***	***8.2***		
ELOG1(a)	10	5	2.7	3.5	1.9
ELOG1(b)	3	2	0.9	3.5	1.9
ELOG1(c)	2	1	0.7	3.5	1.9
TOTAL	***15***	***8***	***4.3***		
ELOG2(a)	9	5	3.1	2.9	1.6
ELOG2(b)	3	1	1.0	2.9	1.6
ELOG2(c)	7	4	2.5	2.9	1.6
ELOG2(d)	7	4	2.4	2.9	1.6
ELOG2(e)	2	1	0.8	2.9	1.6
ELOG2(f)	4	2	1.4	2.9	1.6
ELOG2(g)	2	1	0.6	2.9	1.6
ELOG2(h)	1	1	0.4	2.9	1.6
TOTAL	***35***	***19***	***12.1***		
EOHR1(a)	6	3	2.2	2.9	1.6
EOHR1(b)	5	3	1.6	2.9	1.5
EOHR1(c)	10	6	3.6	2.9	1.5
EOHR1(d)	6	3	1.93	2.9	1.5
EOHR1(e)	2	1	0.78	2.9	1.6
TOTAL	***29***	***16***	***10.1***		
EFA3(a)	1	1	0.5	2.8	1.6
EFA3(b)	3	1	0.9	2.8	1.6
EFA3(c)	2	1	0.7	2.8	1.6
EFA3(d)	1	1	0.4	2.8	1.6
TOTAL	***7***	***4***	***2.5***		
EFA4(a)	5	3	1.6	2.9	1.8
EFA4(b)	3	2	1.2	2.9	1.8
TOTAL	***8***	***5***	***2.8***		
ECR1(a)	2	1	0.6	2.8	1.5
ECR1(b)	3	2	1.0	2.8	1.5
ECR1(c)	2	1	0.9	2.8	1.5
ECR1(d)	3	2	1.2	2.8	1.5
ECR1(e)	4	2	1.3	2.8	1.5
ECR1(f)	4	2	1.5	2.8	1.5
ECR1(g)	4	2	1.3	2.8	1.5
TOTAL	***22***	***12***	***7.8***		
EMR2(a)	3	1	2.0	1.4	0.4
EMR2(b)	23	7	17.2	1.4	0.4
TOTAL	***26***	***8***	***19.2***		

LEGEND

- BASIN BOUNDARY
- PRO-RATED SUBBASIN BOUNDARY
- ID — BASIN ID
- ID — PRO-RATED SUBBASIN ID
- FLOW DIRECTION
- ID — FLOWMASTER SECTION
- ID — FACILITY ID
- PROPOSED DRAINAGE FACILITY
- EXISTING DRAINAGE FACILITY

MOCCASIN ROAD
EMR1
EMR2
EFA1
EFA2
EFA3
EFA4
ESKV1
EAA1
APPROXIMATE PROJECT SITE LOCATION
SD system to collect flow from basin EAA1
SD system to collect flow from basin EAA2
NORTH COLLECTOR ROAD STORM DRAIN MODEL (NCR2.WSW)
NORTH COLLECTOR ROAD STORM DRAIN MODEL (NCR3.WSW)
NORTH COLLECTOR ROAD STORM DRAIN MODEL (NCR1.WSW)
NORTH COLLECTOR ROAD LATERAL STORM DRAIN SYSTEM (NLAT1.WSW)
NORTH COLLECTOR ROAD
EAA2
ECR1
EPA
EPB2
ENP
EPC
EPB1
EAA4
EAA3
SKYE POINTE DRIVE
SKYE POINTE DRIVE LATERAL STORM DRAIN MODEL (SLAT2.WSW)
SKYE POINTE DRIVE STORM DRAIN MODEL (SPD.WSW)
SKYE POINTE DRIVE LATERAL STORM DRAIN MODEL (SLAT1.WSW)
ECOM4
ESKY1
EMLA1
ECOM3
LOG CABIN WAY LATERAL STORM DRAIN MODEL (LLAT3.WSW)
LOG CABIN WAY LATERAL STORM DRAIN MODEL (LLAT2.WSW)
LOG CABIN WAY LATERAL STORM DRAIN MODEL (LLAT1.WSW)
LOG CABIN WAY
MAINLINE MOCCASIN REGIONAL STORM DRAIN
LOG CABIN WAY LATERAL STORM DRAIN MODEL (LLAT4.WSW)
LOG CABIN WAY LATERAL STORM DRAIN MODEL (LLAT5.WSW)
ELOG2
EPF1
EPD
EPF2
EPG
ELOG1
EPI1
EPI2
EOHR1
O'HARE ROAD
OHARE STORM DRAIN MODEL (OHA.WSW)
OHARE LATERAL STORM DRAIN MODEL (OLAT1.WSW)
OHARE LATERAL STORM DRAIN MODEL (OLAT2.WSW)
SKYE CANYON PARK DRIVE
SKYE CANYON PARK STORM DRAIN MODEL (SCP.WSW)
SCP STORM DRAIN LATERAL (CLAT.WSW & CLAT-P.WSW)
ESP
EPH1
EPJ
EPE1
EPE2

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

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

CITY OF LAS VEGAS

EASTLAND COMPANY, LLC

SUNSTONE PHASE 1
CROSS SECTION AND FACILITIES MAP

DATE: AUG 2019
DRAFTER: CAA
DESIGNER: CAA
CHECKED: LKL
PROJECT NO. EST1905-000

EXHIBIT E
SHEET 1 OF 1

I:\est1905-000 sunstone ph1 fds\drainage\technical study\addendum\figures\est1905-000 fds add exhibit e cross sections and facilities map.dwg 8/7/2019 10:08 AM Caitlyn Alcantara

APPENDIX H

Zoning & Planning Conditions

SHE 1901-003

LAS VEGAS CITY COUNCIL

CAROLYN G. GOODMAN
Mayor

STAVROS S. ANTHONY
Mayor Pro Tem

MICHELE FIORE
CEDRIC CREAR
BRIAN KNUDSEN
VICTORIA SEAMAN
OLIVIA DIAZ

JORGE CERVANTES
City Manager

DEPARTMENT OF PLANNING

SETH T. FLOYD

DIRECTOR OF
COMMUNITY DEVELOPMENT

CITY HALL
495 S. MAIN ST.
3RD FLOOR
LAS VEGAS, NV 89101

702.229.6301 | VOICE
702.464.2545 | FAX
711 | TTY

cityoflasvegas
lasvegasnevada.gov

October 13, 2021

Mr. Efraim Balizan
Northland LLC
9275 W. Russell Road, Ste. 400
Las Vegas, Nevada 89148

RE: 21-0524-TMP1
PLANNING COMMISSION MEETING OF OCTOBER 12, 2021

Dear Applicant:

The Planning Commission at a regular meeting held on ***October 12, 2021*** voted to ***APPROVE*** a request FOR A 134-LOT SINGLE-FAMILY DETACHED AND SIX-LOT SINGLE-FAMILY ATTACHED RESIDENTIAL SUBDIVISION on a portion of 35.66 acres located on the south side of Moccasin Road between Sun Village Park Drive and Sun Park Drive (APN 125-06-211-016), T-D (Traditional Development) Zone [AQ (Age Qualified) Sunstone Special Land Use Designation], Ward 6 (Fiore).

This approval is subject to the following conditions:

Planning

1. Approval of the Tentative Map shall be for no more than four (4) years. If a Final Map is not recorded on all or a portion of the area embraced by the Tentative Map within four (4) years of the approval of the Tentative Map, this action is void.

2. Street names must be provided in accordance with the City's Street Naming Regulations.

3. A fully operational fire protection system, including fire apparatus roads, fire hydrants and water supply, shall be installed and shall be functioning prior to construction of any combustible structures.

4. In conjunction with creation, declaration and recordation of the subject common-interest community, and prior to recordation of the Covenants, Codes and Restrictions ("CC&R"), or conveyance of any unit within the community, the Developer is required to record a Declaration of Private Maintenance Requirements ("DPMR") as a covenant on all associated properties, and on behalf of all current and future property owners. The DPMR is to include a listing of all

privately owned and/or maintained infrastructure improvements, along with assignment of maintenance responsibility for each to the common interest community or the respective individual property owners, and is to provide a brief description of the required level of maintenance for privately maintained components. The DPMR must be reviewed and approved by the City of Las Vegas Department of Field Operations prior to recordation, and must include a statement that all properties within the community are subject to assessment for all associated costs should private maintenance obligations not be met, and the City of Las Vegas be required to provide for said maintenance. Also, the CC&R are to include a statement of obligation of compliance with the DPMR. Following recordation, the Developer is to submit copies of the recorded DPMR and CC&R documents to the City of Las Vegas Department of Field Operations.

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

Public Works

6. Private streets must be granted and labeled on the Final Map for this site as Public Utility Easements (P.U.E.), Public Sewer Easements, and Public Drainage Easements with private surface maintenance by the Homeowner's Association.

7. In accordance with condition #10 of TMP-76718 and section 3.04 of the Sunstone Development Agreement, if not already constructed or guaranteed by the master developer, a minimum two lanes of asphalt pavement on village streets providing the main access to this site and a working sanitary sewer connection shall be provided prior to a final inspection of any dwelling units within this Tentative Map. Complete construction of Village streets shall conform to section 3.04 of the Sunstone Development Agreement. All existing paving damaged or removed by this development shall be restored at its original location and to its original width concurrent with development of this site.

8. Grant a Public Sewer Easement over the sewer going through the remnant lot and the Not A Part (N.A.P.) parcel. Per the Sunstone Master Sewer Study, Parcel 3 shall drain to Sun Park Drive. No structures and no trees or vegetation taller than three feet shall be allowed within any Public Sewer Easements.

9. Concurrent with development, construct sewer laterals for future lots across the N.A.P. Parcel 3, unless otherwise allowed by the City Engineer.

10. A Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works prior to the issuance of any building or grading permits or submittal of any construction drawings, whichever may occur first. Provide and improve all drainageways recommended in the approved drainage plan/study. The developer of this site shall be responsible to construct such neighborhood or local drainage facility improvements as are recommended by the City of Las Vegas Neighborhood Drainage Studies and approved Drainage Plan/Study concurrent with development of this site.

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

12. Site development to comply with all applicable conditions of approval for the Sunstone master Tentative Map (TMP-76718).

This action by the Planning Commission on **October 12, 2021** is final unless a written appeal is filed with the City Clerk within seven days of the date of the Planning Commission's decision as allowed by code or there is a review action filed by the City Council within the same time period. For additional information on appeals or review requests submitted please access https://www.lasvegasnevada.gov/Business/Permits-Licenses/Building-Permits/Permit-Application-Status, or contact the Department of Planning and Development at 702.229.6301 after ***October 19, 2021***.

No building permits or business licenses related to these items shall be issued prior to the expiration of the required seven day waiting period, or until any filed appeal is resolved pursuant to LVMC Title 19.18.

Sincerely,

Eric McCammond
Senior Management Analyst
Case Planning Division

EM:nl

cc:

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APPENDIX I

Improvement Plans