Stanley Okey Amadi, P.E., CFM

Digitally signed by Stanley Okey Amadi, P.E., CFM
DN: C=US, E=Stanley.amadi@westwoodps.com, O=Westwood PS, CN="Stanley Okey Amadi, P.E., CFM"
Date: 2022.05.18 17:27:32-04'00'

TECHNICAL DRAINAGE STUDY

Parcel 3 at Sunstone Phase 4A

MAY 2022

PREPARED FOR:

Shea Homes Limited Partnership

City of Las Vegas, Nevada

PREPARED BY:

Westwood

Westwood

Parcel 3 at Sunstone Phase 4A

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



05/17/22

Project Number: SHE1901.004
Date: May 2022

Stanley Okey Amadi, P.E. CFM
NV Professional Engineer No. 21724
Assisted by: Caitlyn Alcantara, P.E.

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Parcel 3 at Sunstone Phase 4A Date: May 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: 125-06-211-017

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

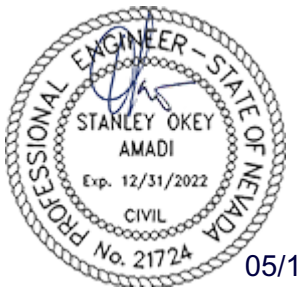
4. Proposed type of development (Residential, Commercial, Etc.): Residential

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, Parcel 3 at Sunstone Phase 1 & Model Phase (DS5261) Parcel 3 at Sunstone Ph2 (DS5426), Parcel 3 at Sunstone Ph3 (DS5549)

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

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



05/17/22

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

Westwood

May 17, 2022

Mr. Albert Sung, P.E.
City of Las Vegas Public Works
495 S. Main Street
Las Vegas, NV 89103

Re: Technical Drainage Study for Parcel 3 at Sunstone Phase 4A
Project No. SHE1901.004

Dear Mr. Sung:

This letter certifies that all items provided on the Technical Drainage Study for Parcel 3 at Sunstone Phase 4A submittal CD match the paper version bound into the study.

Please contact me if you have any questions.

Sincerely,

WESTWOOD PROFESSIONAL SERVICES

Caitlyn Alcantara

Caitlyn Alcantara,
Water Resources Department

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 4A	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.
-	N/A	Cross-sectional detail for channels, including cutoff wall locations.
X	-	Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations.
X	-	Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
-	N/A	Location and detail of existing, proposed, and future block wall openings. Minimum size is 16" x 48". Wrought iron gate is required for flows > 10 cfs.
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	N/A	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.)
-	N/A	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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1.0 Introduction

1.1 Project Overview

Shea Homes Limited Partnership is proposing to develop approximately 28.84 ± acres, being the Phase 4A portion of Parcel 3 at Sunstone into a residential subdivision, located within the Sunstone master planned community in the City of Las Vegas, Nevada. The Parcel 3 Phase 4A site is located north of 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 4A* (hereinafter referred to as the project site or Phase 4A). 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 preliminary grading for the streets and lots for future development and a full build out of some select roads within the future development area.

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 Assessor's Parcel Number (APN) 125-06-211-017 and is bound by Parcel 3 at Sunstone Phase 3 to the west, Sun Park Drive to the east, undeveloped land 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 150 single-family residential lots are proposed, ranging in size from a minimum of 3,800 square feet to a maximum of 10,201 square feet with an overall density of 6.0 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 (22-0039-TMP1) has been approved. A copy of the planning and zoning conditions for project site is included in Appendix G.

1.4 FEMA Flood Zone Designation

The project site boundary has been delineated on the current FEMA FIRM Panel Map 32003C1735E, 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 4 project site is not adjacent to nor traversed by the mentioned CCRFCD facilities; however, the runoff generated by the project site discharges

into the facilities 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 3,* (hereinafter referred to as the Phase 3 Study) prepared by Westwood Professional Services was approved on March 29, 2022. This study addresses the Phase 3 residential development and future drainage pattern of the Phase 3 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 3 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 3 Study.

- *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 Criteria 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.

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.

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). Although, the hydrologic analysis of the site is referenced from the prior approved studies, Exhibit D, included in Appendix A for informational purposes, 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.

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 drains 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 their hydraulic gradient line (HGL) at a minimum of 1-ft below the 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 & Common Elements: Drainage easements and common elements 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, 2B, and 3 as in place and functioning. The existing condition is equivalent to the proposed condition of the Phase 3 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 3 Study.

3.2 Discussion of Existing Condition

The Phase 3 Study addresses the project site's upstream boundary conditions and proposed drainage pattern. The Phase 3 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 partially developed with the planned residential subdivision to the west, partially undeveloped to the east, and newly graded in the south. For the partially undeveloped east side improvements the streets are fully built out up to the southeast intersection of Bloodstone Place and Sandlot Lane, there are no residential developments planned.

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 3. Note that the entire Parcel 3 at Sunstone site was analyzed as basins EAA1 thru EAA4, and the Phase 4A portion of the site lies within basin EAA1, EAA2, and EAA4. All subbasin prorates have been referenced from the Phase 3 Study to ensure that drainage patterns were kept similar to those previously approved. Subbasins EAA1*(2j and 4a thru 4b) and EAA2*(2g and 4a thru 4f) were prorated or modified 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.

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 the 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 the anticipated storm drain connections to match established drainage patterns. Refer to Exhibit F included in Appendix A 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. Eight hydraulic sections (4-1 thru 4-8) have been utilized to analyze the streets within Phase 4A. An additional two hydraulic sections (4-9 & 4-10) have been provided to analyze future storm drain developments in Phase 4B. 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. Output files of the hydraulic 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

Seven drop inlets and two mainline storm drain systems have been proposed to intercept and convey runoff generated by the project site and to connect to the four existing facilities from the Phase 3 and Sun Park Drive. Also one model has been provided to confirm that the future connection to the facilities in Sun Park Drive will be viable. The storm drain facilities are described in detail below:

Phase 4 North (PH4N) Mainline: The proposed Phase 4a storm drain system is analyzed as PH4N.WSW and begins with a set of existing drop inlets, facilities DI#3 and DI#4 from the Phase 3 development, connecting to PH3.WSW. The system continues east into the project site connecting to the proposed SDMH1 and then continues on Sangria Sunrise Avenue. Further east on Bloodstone Place, a lateral (Ph4N-L) connects to PH4N at SDMH 7. The PH4N facility then continues east through Facility P4-5 and connects to the existing the NRC2 model.

The lateral model (PH4N-L) starts with facilities P4-1a and P4-1b and continues east on Peach Sangria Lane then turns north onto Bloodstone Place where it connects to the north mainline, PH4N.

Phase 4 South (PH4S) Mainline: The second mainline storm drain facility is analyzed in both the proposed (PH4S-P) and the ultimate (PH4S). The storm drain system which starts at PH3S comprises of two proposed drop inlets, DI#5 & #6 and continues east through Garnet Fire Lane. The storm drain system continues north and passes thru Facility P4-10 and collects Facility P4-8 (both in sump). Then the storm drain continues east thru common elements and Facility P4-12. The storm drain continues going southeast onto Bloodstone Lane, collecting Facility P4-14 and discharging at Facility P4-16 in to proposed condition.

In the ultimate condition the facility will continue south, collecting Facility F4-17 then turns east on to and unnamed future street, collecting F4-20 and finally connecting to existing NRC1.

8.0 Earthen Ditches

A section has been provided for the outlet of Facility P4-17, which recommends 12-inch riprap pad for 30-ft downstream of the pipe outlet. The ditch (Facility P4-17) provided to convey the flows to storm drain system NCR1 is not erosive and therefore does not require riprap. One hydraulic section has been provided to analyze the common elements, Section CE. Minimum and maximum slopes have been used and one (1) cfs has been utilized conservatively for the areas

estimated by proration. 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 and F 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 EO4-1 and EO4-2 analyzes the emergency overflows that will impact the Phase 4A site should the proposed sump inlets become completely clogged. Note that these computations are provided for both the proposed and the ultimate condition, however, an emergency overflow has not been provided for Facility 4-20 as it is not built with this submittal. 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 measured on the high side of the lot, and 6-inches above the top of curb at the high side of the lot, whichever is higher.

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 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.

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 not 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 measured 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. *Soil Survey of Las Vegas Valley Area, Nevada*. U.S. Department of Agriculture, Soil Conservation Service.
4. *Technical Drainage Study for Parcel 3 at Sunstone Phase 2*. Westwood Professional Services, November 2021.
5. *Technical Drainage Study for Sunstone Phase 1 Infrastructure*. Westwood Professional Services, September 2019.

List of Appendices

Appendix A **Drainage Exhibits**
- Exhibit A – Location Map
- Exhibit B – FEMA FIRM Map
- Exhibit C1 – CCRFCD MPU Facilities Map
- Exhibit C2 – CCRFCD MPU Facilities Inventory
- Exhibit C3 – CCRFCD MPU Hydrologic Map
- Exhibit D – Soils Map
- Exhibit E – Proposed Condition Drainage Map
- Exhibit F – Ultimate Condition Drainage Map

Appendix B **Street & Hydraulic Sections**
- Street Flow Computations – 100-Year
- Emergency Overflow Computations
- Common Element Computations

Appendix C **Storm Drain Analyses**
- Inlet Sizing Computations
- Inlet Control Nomographs
- WSPG Model-NORTH
- WSPG Model-SOUTH
- Lateral Sizing Computations
- Ditch Sizing Computations

Appendix D **Finished Floor Analyses**

Appendix E **Reference Material**
Technical Drainage Study for Parcel 3 at Sunstone Phase 3
- Approval Letters
- Referenced Drainage Exhibits
- Referenced Hydraulics
- Referenced Improvement plans

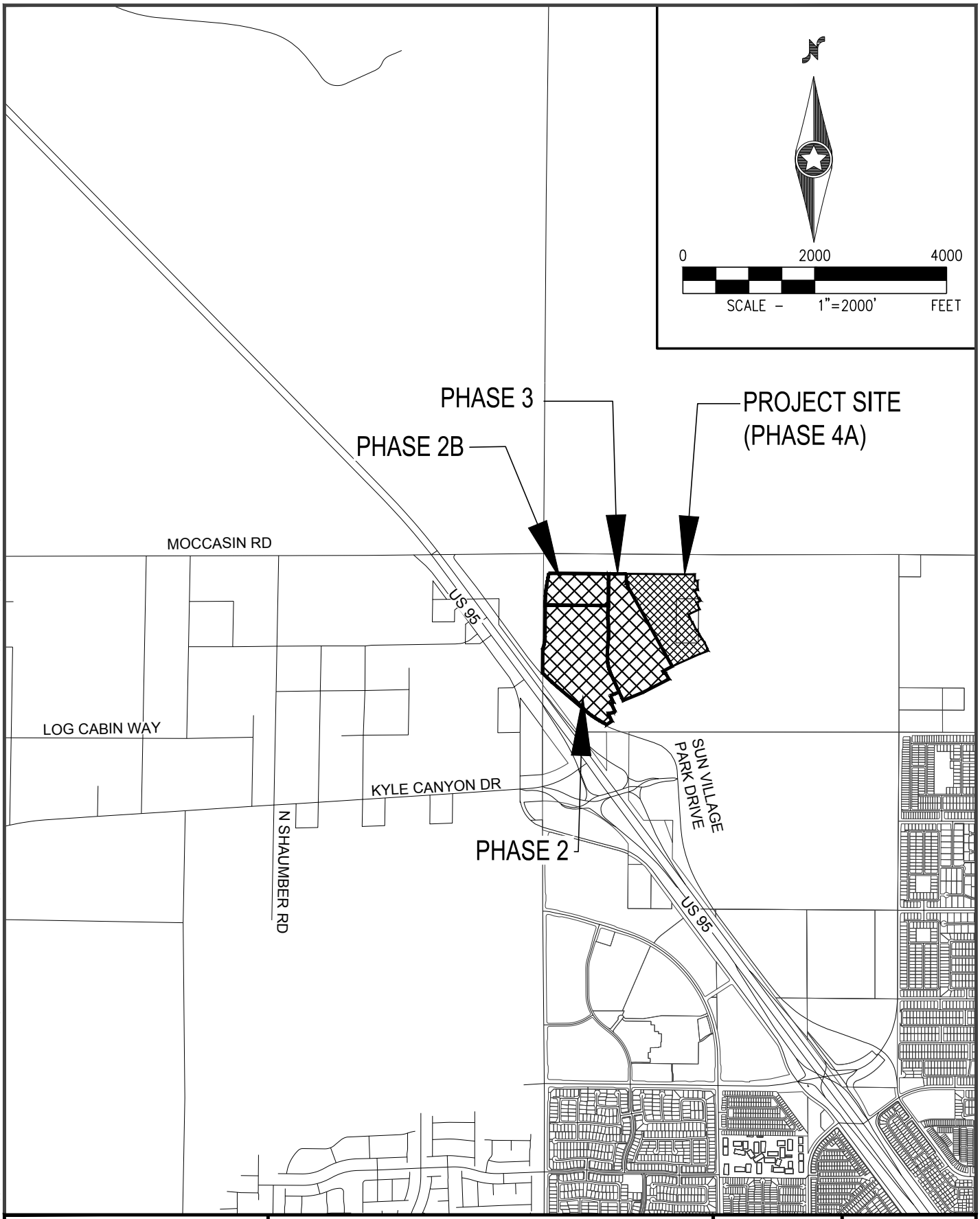
Appendix F **Reference Material**
Technical Drainage Study for Sunstone Phase 1 Infrastructure
- Approval Letter
- Referenced Drainage Exhibits
- Referenced Hydraulics
- Referenced Improvement plans

Appendix G **Zoning & Planning Conditions**

Appendix H **Improvement Plans**

APPENDIX A

Drainage Exhibits



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Westwood

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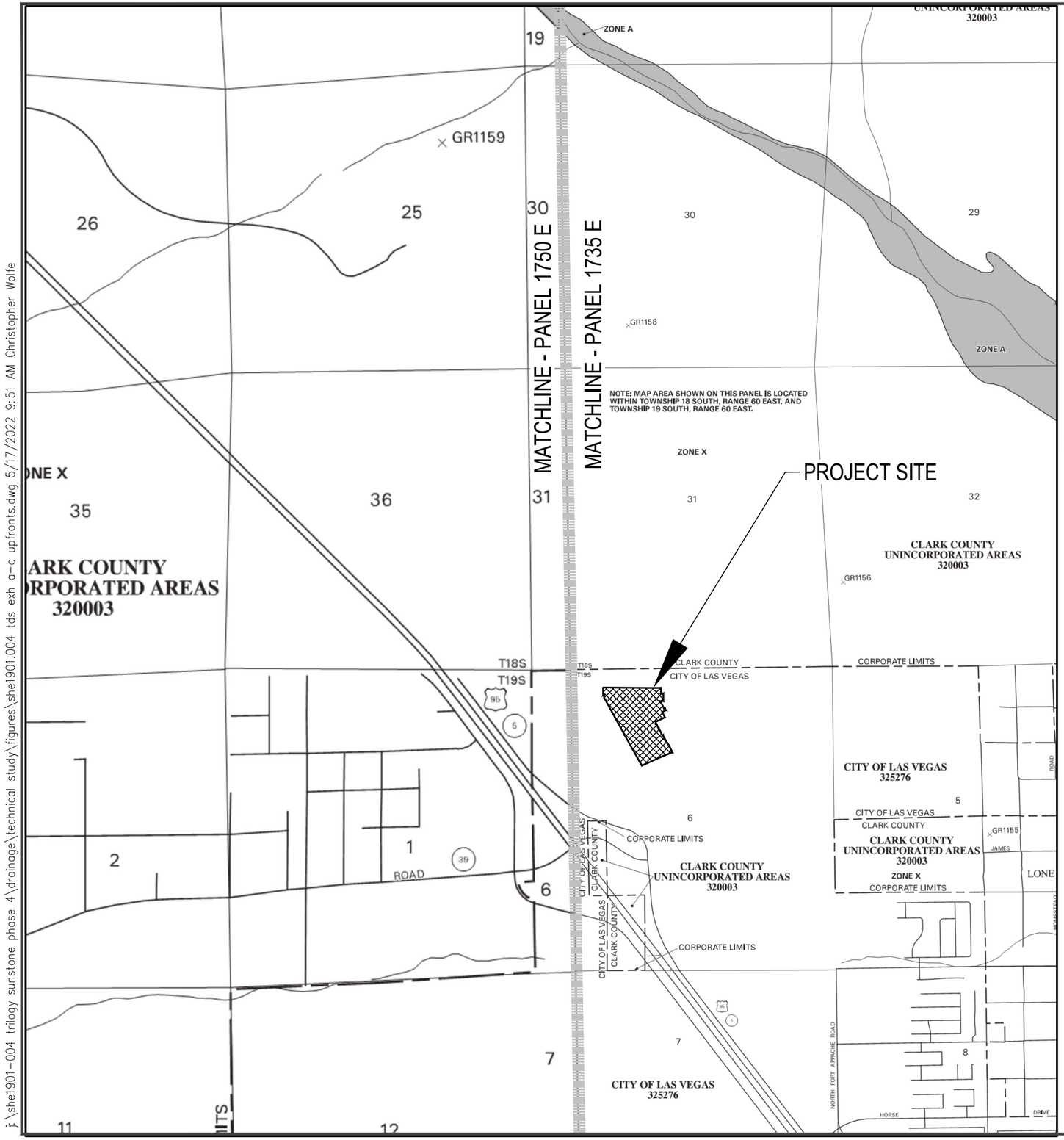
westwoodps.com

Westwood Professional Services, Inc.

SHEA HOMES LIMITED PARTNERSHIP

PARCEL 3 AT SUNSTONE PHASE 4A
LOCATION MAP

DATE: MAY 2022	PROJECT NO. SHE1901.004
DRAFTER: CW	
DESIGNER: CW	EXHIBIT A
CHECKED: SA	SHEET 1 OF 1



NFIP

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, 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

NFIP

PANEL 1735 E

FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY,
NEVADA AND
INCORPORATED AREAS

PANEL 1735 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY, UNINCORPORATED AREAS	320003	1735	E
LAS VEGAS, CITY OF	325276	1735	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
32003C1735 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.

0 2000 4000

SCALE – 1"=2000' FEET

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Fax (702) 284-5399
westwoodps.com
Westwood Professional Services, Inc.

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

SHEA HOMES LIMITED PARTNERSHIP

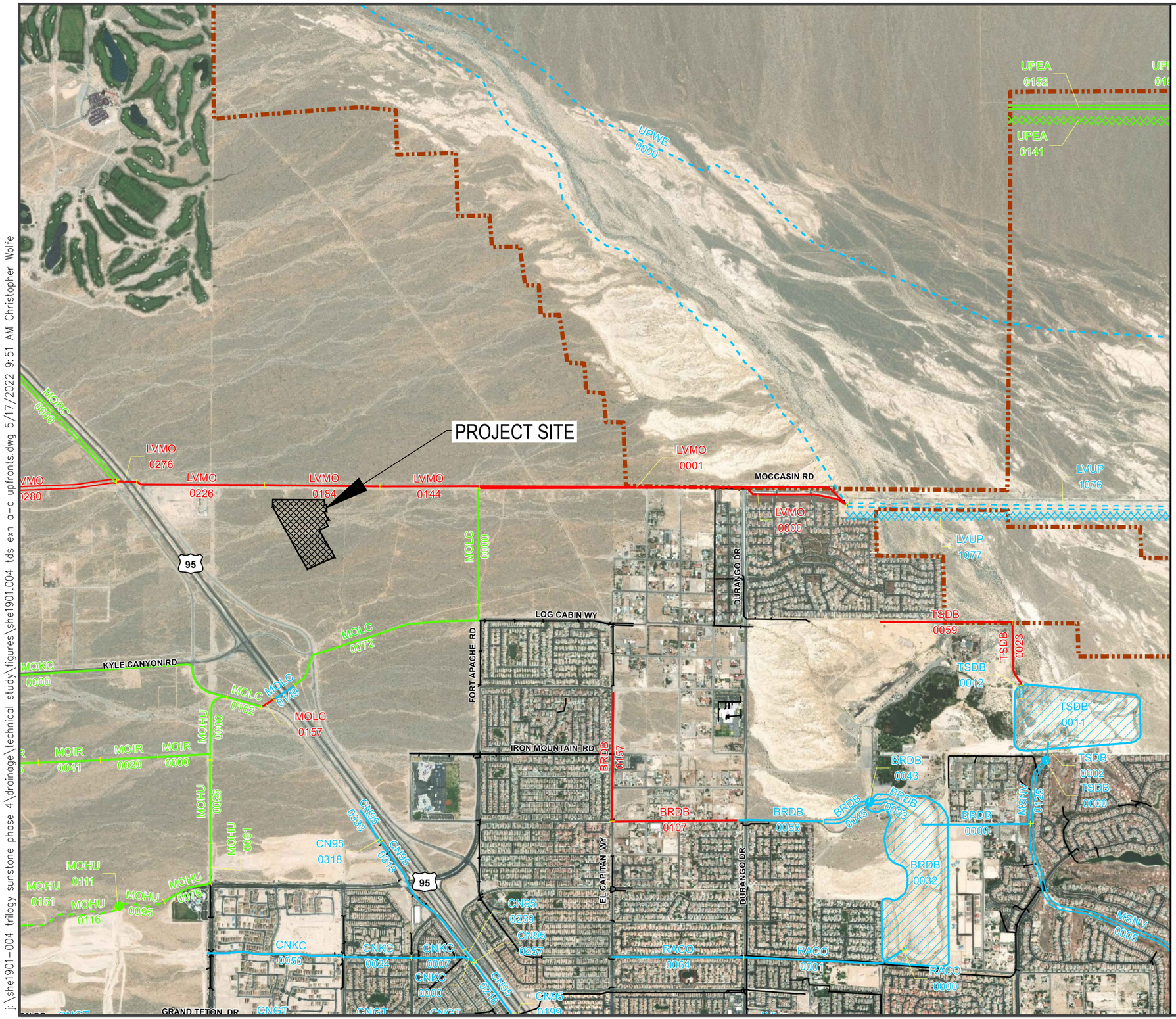
PARCEL 3 AT SUNSTONE PHASE 4A
FEMA FIRM PANEL MAP

DATE: FEB 2022
DRAFTER: CW
DESIGNER: CW
CHECKED: SA

PROJECT NO.
SHE1901.004

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.

SHEA HOMES LIMITED PARTNERSHIP

PARCEL 3 AT SUNSTONE PHASE 4A
2018 CCRFCD FACILITY MAP

DATE: MAY 2022
DRAFTER: CW
DESIGNER: CW
CHECKED: SA

PROJECT NO.
SHE1901.004

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	853	206	DBA3-C	WEST3	0.84	1.11
0017	E	8' X 5' RCAP	1216	218	CBA3-C	WEST3	0.84	1.33
0040	E	66" RCP	60	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	1.23
BRDB		**BRENT DRAINAGE SYSTEM**						
0000	E	36" RCP WITH 18" ORIFICE PLATE	2170	36	BRDB	WEST3	2.37	0.40
0031	E	45,080 CFS PMF SPILLWAY		45080	CBRDB	WEST3	2.37	
0032	E	450 AC-FT SOUTH ENVIRONMENTAL ENHANCEMENT AREA		1685	CBRDB	WEST3	2.37	
0033	E	ENERGY DISSIPATOR	100	1052	CNW147W	WEST3	1.75	
0043	E	20' X 7' RCBC	135	1052	CNW147W	WEST3	1.75	0.50
0045	E	CONC CHNL 12'W 7'D 2:1 SS	983	1052	CNW147W	WEST3	1.75	2.00
0058	E	12' X 6' RCB	1688	951	CNW113-C	WEST3	1.47	1.81
0107	P	8' X 6' RCB	2560	951	CNW113-C	WEST3	1.47	2.40
0157	P	12' X 7' RCB	2580	621	CNW96-C	WEST3	0.84	0.25
CN95		**CENTENNIAL PKWY CHANNEL WEST / U.S 95 BRANCH**						
0000	E	20' X 7' RCB	3335	2778	CNWBB3-C	WEST3	3.35	2.00
0068	E	20' X 7' RCB	2300	2725	CNW103-C	WEST3	3.04	2.10
0102	E	CONC CHNL 20'W 9'D 0:1 SS	375	2548	2CNW89-C	WEST3	2.65	1.77
0104	E	2: 12' X 10' RCB	300	2548	2CNW89-C	WEST3	2.65	1.10
0167	E	16' X 8' RCB	3521	2548	2CNW89-C	WEST3	2.65	1.58
0199	E	15' X 9' RCB	407	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	284	599	CNW74-C	WEST3	0.40	0.77
0313	E	10' X 6' RCB	2680	599	CNW74-C	WEST3	0.40	2.50
0318	E	TRANSITION STRUCTURE	60	599	CNW74-C	WEST3	0.40	1.50
0333	E	5' X 5' RCB	670	259	NW62-S	WEST3	0.16	1.50
CNFR		**CENTENNIAL PKWY CHANNEL WEST / FARM ROAD**						
0000	P	8' X 6' RCB	8350	776	CNW89-C	WEST3	1.05	2.00
CNGT		**CENTENNIAL PKWY CHANNEL WEST / GRAND TETON BRANCH**						
0000	E	10' X 5' RCB	2376	543	CNW71-E	WEST3	0.47	2.58
0020	E	10' X 5' RCB	1570	543	CNW71-E	WEST3	0.47	3.50
0043	E	8' X 6' RCB	2470	543	CNW71-E	WEST3	0.47	3.60
0118	E	6' 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	377	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	2.40
0050	E	72" RCP	2757	437	NW45-S	WEST3	0.31	3.60
CNWE		**CENTENNIAL PKWY CHANNEL WEST**						
0195	E	CONC CHNL 36'W 9'D 0:1 SS	1130	3771	CNW3B3-C	WEST3	5.64	0.60
0200	E	CONC CHNL 36'W 9'D 0:1 SS	1340	3523	CNW2D4-C	WEST3	5.14	1.00
0226	E	2: 18' X 8.5' RCBC @ RIO VISTA	100	3523	CNW2D4-C	WEST3	5.14	0.51
0241	E	CONC CHNL 36'W 9.5'D 0:1 SS	405	3523	CNW2D4-C	WEST3	5.14	0.51
0251	E	CONC CHNL 36'W 9'D 0:1 SS	575	3234	CNW2D3-C	WEST3	4.64	0.51
0271	E	CONC CHNL 32'W 10'D 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 32'W 9'D 0:1 SS	579	3234	CNW2D3-C	WEST3	4.64	0.64
0287	E	CONC CHNL 32'W 8'D 0:1 SS	865	2992	CNW2B2-C	WEST3	3.83	1.59
0301	E	2: 15' X 7' RCB	1738	2992	CNW2B2-C	WEST3	3.83	1.30
0304	E	22' X 7' RCB	3410	2992	CNW2B2-C	WEST3	3.83	1.85
0314	E	22' X 7' RCB	703	2822	CNWBD2-N	WEST3	3.45	1.94
EKBU		**ELKHORN SPRINGS AND BUFFALO**						
0000	E	60" RCP	1046	255	NW134-C	WEST3	0.46	0.89
EKDB		**ELKHORN SPRINGS DETENTION BASIN**						
0000	E	GRASS CHNL 15'W 5.8'D 3.5:1 SS	2575	221	CNW150-C	WEST3	1.41	0.39
0025	E	4' X 3' RCB	160	106	ELKBASIN	WEST3	0.84	0.50
0026	E	48" RCP	1270	106	ELKBASIN	WEST3	0.84	1.23
0049	E	60" RCP	1095	106	ELKBASIN	WEST3	0.84	0.13
0070	E	48 AC-FT ELKHORN SPRINGS DETENTION BASIN		456	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**						
0003	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	3.61
0023	E	8' X 5' RCAP	1200	393	CNW26-C	WEST3	0.51	0.90
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	1808	CNW168-C	CWEST3	4.43	0.36
2525	E	24' X 8' RCB	1140	1598	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 24'W 7'D 2:1 SS	1577	1268	CNW162-C	CWEST3	3.10	0.51
2632	E	18' X 5' RCB	1443	695	CNW138-C	WEST3	1.16	0.47
2661	E	18' X 5' RCB	3003	695	CNW138-C	WEST3	1.16	0.78
2711	E	10' X 5' RCB	2440	560	CNW139-C	WEST3	0.93	2.00
2737	E	8' X 5' RCB	265	560	CNW139-C	WEST3	0.93	2.25
2763	E	6' X 5' RCB	1565	560	CNW139-C	WEST3	0.93	2.41
2789	E	6' 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	1.80
0026	P0	11' X 6' RCB	1654	560	CNW45-N	LOWER3	1.25	0.50
0061	P0	9' X 6' RCB	779	560	CNW45-N	LOWER3	1.25	0.50
0076	P0	60" RCP	1000	263	CNW45-C	LOWER3	1.03	3.00
0095	P0	NATURAL WASH	865	263	CNW45-C	LOWER3	1.03	3.00
0111	P0	6' X 5' RCBC @ EGAN CREB DR	164	263	CNW45-C	LOWER3	1.03	6.10
0116	P0	NATURAL WASH	1900	263	CNW45-C	LOWER3	1.03	3.00
0151	P0	54" RCPC @ SHAUMBER	438	72	MODB1	LOWER3	0.86	2.00
MOIR		**MOCCASIN - IRON MOUNTAIN BRANCH**						
0000	P0	60" RCP	1060	410	CNW33-C	LOWER3	0.83	4.50
0020	P0	54" RCP	1161	71	MODB2	LOWER3	0.56	3.20
0041	P0	42" RCP	1236	71	MODB2	LOWER3	0.56	5.00
0065	P0	60" RCP	1099	71	MODB2	LOWER3	0.56	0.40
MOKC		**MOCCASIN AND KYLE CANYON**						
0000	P0	9' X 6' RCB	6140	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	288	1817	CNW62-N	LOWER3	4.88	1.40
0162	P0	13' X 6' RCB	435	1817	CNW62-N	LOWER3	4.88	1.80
MSNV		**MOUNTAIN SPA/VISTA RANCH**						
0000	E	6: 12' X 5' RCBC @ GRAND TETON	273	639	CNW163-C	CWEST3	1.69	0.40
0005	E	GRASS CHNL 100'W 4.5'D 10:1 SS	6325	259	CNW155-C	WEST3	4.46	0.40
0125	E	GRASS CHNL 100'W 4.5'D 10:1 SS	1300	66	CNW147E	WEST3	1.55	0.40
RACO		**RACEL STREET COLLECTOR**						
0000	E	14' X 7' RCB BAFFLED ENERGY DISSIPATOR	87	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	DNW111S	WEST3	0.44	2.09
RCBC		**RANCHO ROAD SYSTEM - BELTWAY CHANNEL**						
0000	E	6' X 5' RCB	1062	173	FADB	WEST3	1.54	1.04
0002	E	54" RCP OUTLET WITH 41" ORIFICE	503	173	FADB	WEST3	1.54	2.38
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	100	658	FADBIN	WEST3	1.54	
0009	E	12' X 6' RCBC @ FORT APACHE DETENTION BASIN	133	658	FADBIN	WEST3	1.54	1.79
0012	E	CONC CHNL 12'W 6'-7'D 0:1 SS	1937	658	FADBIN	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 12'W 6'-8'D 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	1.93
0100	E	CONC CHNL 12'W 5.5'D 0:1 SS	2085	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 10'W 5'D 0:1 SS	2155	475	CDMNA1	WEST3	0.43	1.65
RCHB		**RANCHO ROAD SYSTEM - BELTWAY**						
0053	E	2: 12' X 8' RCBC @ SOUTH RAMP CONNECTOR	85	1465	CDW1C1-C	WEST3	3.55	1.40
0054	E	CONC CHNL 21'W 8'D 0:1 SS	432	1465	CDW1C1-C	WEST3	3.55	1.51
0062	E	TRANSITION STRUCTURE	130	1465	CDW1C1-C	WEST3	3.55	1.51
0065	E	24' X 7' RCB	480	1465	CDW1C1-C	WEST3	3.55	0.30
0074	E	24' X 6' RCB	50	1414	CNWBC6-C	WEST3	3.41	0.30
0075	E	20' X 6' RCBC @ BELTWAY	428	1414	CNWBC6-C	WEST3	3.41	2.81
0083	P	20' X 4' RCB	950	1414	CNWBC6-C	WEST3	3.41	2.49
0101	P	CONC CHNL 20'W 5'D 0:1 SS	980	1414	CNWBC6-C	WEST3	3.41	2.38
0120	E	20' X 6' RCBC @ GRAND MONTECITO	120	1414	CNWBC6-C	WEST3	3.41	1.00
0122	P	CONC CHNL 16'-20'W 6'D 0:1 SS	350	1414	CNWBC6-C	WEST3	3.41	1.84
0130	P	CONC CHNL 16'W 5.5'D 0:1 SS	1012	1414	CNWBC6-C	WEST3	3.41	2.67
0149	P	CONC CHNL 16'W 5-5.5'D 0:1 SS	87	1115	CNWBC3	WEST3	2.99	2.27
0151	P	CONC CHNL 16'W 5'D 0:1 SS	1255	1115	CNWBC3	WEST3	2.99	2.65
0171	E	16' X 6' RCBC @ EL CAPITAN WAY	234	1115	CNWBC3	WEST3	2.99	1.75
0175	E	CONC CHNL 14'W 7'D 0:1 SS	1220	1115	CNWBC3	WEST3	2.99	2.93
0198	E	CONC CHNL 14'W 7'D 0:1 SS	225	788	CNWBA6-C	WEST3	1.88	2.93
0227	E	12' X 6' RCB	995	788	CNWBA6-C	WEST3	1.88	1.73
0250	E	12' X 6' RCB	4020	788	CNWBA6-C	WEST3	1.88	1.12
0275	E	7' X 6' RCB	2650	535	CNW66-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**						
0000	E	2: 10' X 4' RCBC @ ECHO GRANDE	100	25	TULEDB	WEST3	1.37	1.04
0002	E	36" RCP WITH 22" ORIFICE PLATE	320	25	TULEDB	WEST3	1.37	0.33
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	CNW148-C	WEST3	0.59	
0023	P	78" RCP	1320	333	CNW148-C	WEST3	0.59	0.80
0059	P	72" RCP	2640	333	CNW148-C	WEST3	0.59	1.03

ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVMO		**LAS VEGAS WASH - MOCCASIN**						
0000	P	18' X 9' RCB	7322	2437	CNW130-W	LOWER3	6.42	1.80
0001	P	2: 17' X 10' RCB	7530	11465	2C213B-5	SPRING5	71.44	2.10
0144	P	2: 15' X 10' RCB	1915	11465	2C213B-5	SPRING5	71.44	3.10
0184	P	2: 15' X 10' RCB	2440	11465	2C213B-5	SPRING5	71.44	3.10
0226	P	2: 15' X 10' RCB	2500	11465	2C213B-5	SPRING5	71.44	3.10
0276	P	BRIDGE 30'W 9.5'D	400	11465	2C213B-5	SPRING5	71.44	3.10
0280	P	CONC CHNL 16'W 5.5'D 0:1 SS	3500	1501	CNW23-C	SPRING3	5.71	2.86
LVUP		**UPPER LAS VEGAS WASH**						
0976	E	FLOODWAY	7000	14989	ULWIN	LOWER5	200.04	0.71
1076	E	UNLINED CHNL 300'W 8.5'D 3:1 SS	9200	15544	2C116-7	LOWER5	195.05	0.80
1077	E	SOIL CEMENT LEVEE 8.5' WITH 300'W CHNL	9200	15544	2C116-7	LOWER5	195.05	0.82
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	CONC CHNL 34'W 13'D 0:1 SS	3700	11467	C213B-7	SPRING5	63.96	1.00
TSDB		**TULE SPRINGS DRAINAGE SYSTEM**						
0023	P	78" RCP	1320	333	CNW148-C	WEST3	0.59	0.80
0059	P	72" RCP	2640	333	CNW148-C	WEST3	0.59	1.03
UPEA		**UPPER LAS VEGAS WASH - EAST**						
0100	P0	TRANSITION STRUCTURE	315	4121	C125B-5	SHEEP4	10.83	0.25
0105	P0	CONC CHNL 60'W 6.5'D 4:1 SS	787	4121	C125B-5	SHEEP4	10.83	0.25
0106	P0	UNLINED LEVEE 6.5'	787	4121	C125B-5	SHEEP4	10.83	2.47
0120	P0	CONC CHNL 60'W 5'D 4:1 SS	3318	4121	C125B-5	SHEEP4	10.83	3.61
0121	P0	UNLINED LEVEE 6'	2831	4121	C125B-5	SHEEP4	10.83	3.36
0140	P0	UNLINED LEVEE 8'	7395	4121	C125B-5	SHEEP4	10.83	2.39
0141	P0	UNLINED LEVEE 8'	4100	4121	C125B-5	SHEEP4	10.83	0.90
0151	P0	SOIL CEMENT CHNL 50'-60'W 5'D 4:1 SS	469	4121	C125B-5	SHEEP4	10.83	2.64
0152	P0	SOIL CEMENT CHNL 50'W 5'D 4:1 SS	4330	4121	C125B-5	SHEEP4	10.83	0.90
0160	P0	SOIL CEMENT CHNL 50'W 5'D 4:1 SS	5614	4121	C125B-5	SHEEP4	10.83	2.24
UPWE		**UPPER LAS VEGAS WASH - WEST**						
0000	E	FLOODWAY	30000	15544	2C116-7	LOWER5	195.05	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
Corrugated Metal Arch Pipe Culvert.....CMAP
Corrugated Metal Pipe Culvert.....CMPC
High Density Polyethylene.....HDPE
Horizontal Elliptical Reinforced Concrete Pipe.....HERCP
Reinforced Concrete Arch Pipe.....RCAP
Reinforced Concrete Arch Culvert.....RCAC
Reinforced Concrete Box.....RCB
Reinforced Concrete Box Culvert.....RCBC
Reinforced Concrete Pipe.....RCP
Reinforced Concrete Pipe Culvert.....RCPC
Storm Sewer Pipe.....SSP

ATKINS
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Westwood Professional Services, Inc.

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

SHEA HOMES LIMITED PARTNERSHIP

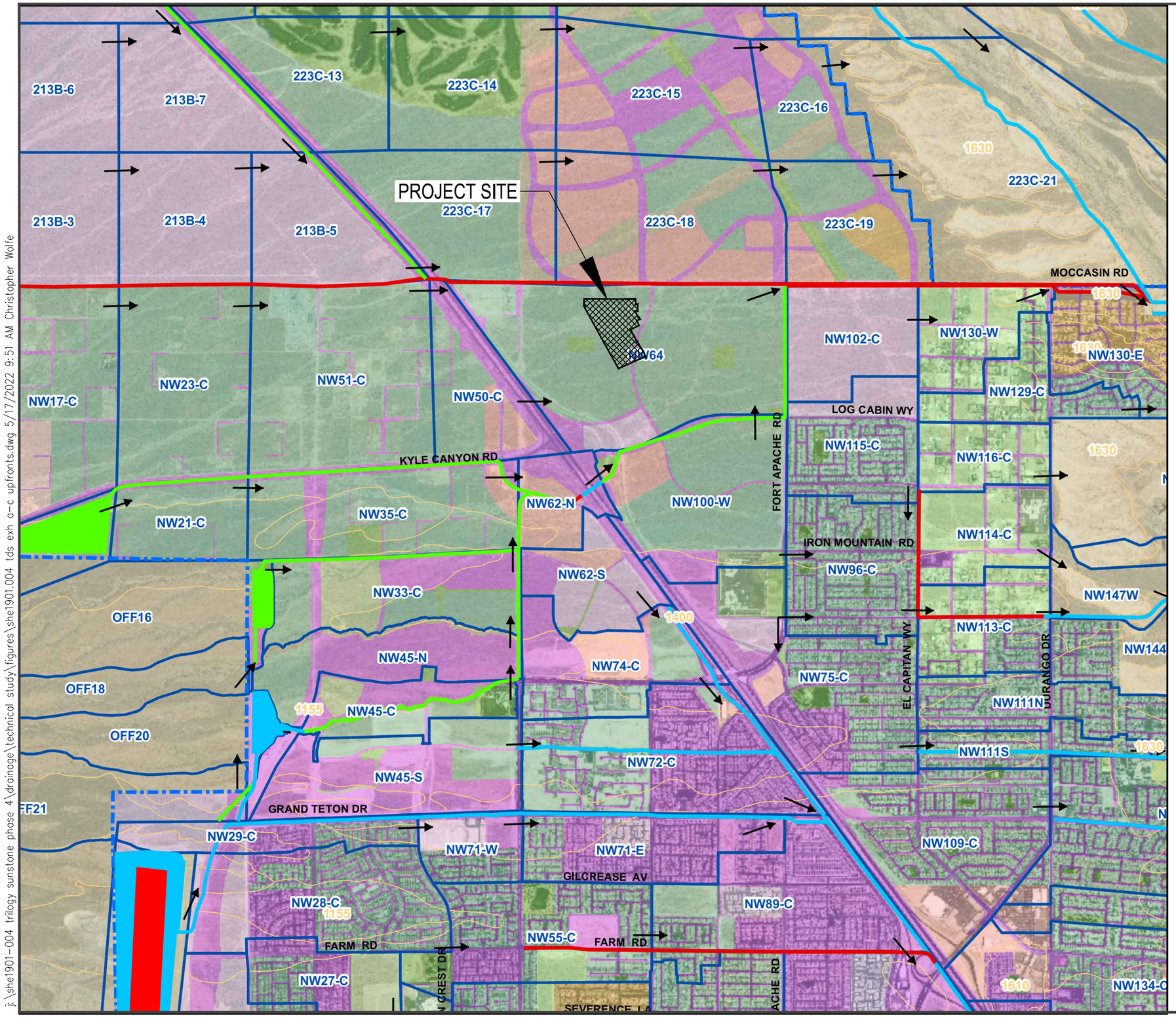
PARCEL 3 AT SUNSTONE PHASE 4A

2018 CCRFCD FACILITY SUMMARY TABLE

DATE: MAY 2022
DRAFTER: CW
DESIGNER: CW
CHECKED: SA
PROJECT NO. SHE1901.004

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 (NodeID flow(cfs))
- Concentration Points
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Ultimate Development Boundary
- Watershed
- Subbasins (BasinID)
- Soils (MUSYM)
- 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

SHEA HOMES LIMITED PARTNERSHIP

PARCEL 3 AT SUNSTONE PHASE 4A

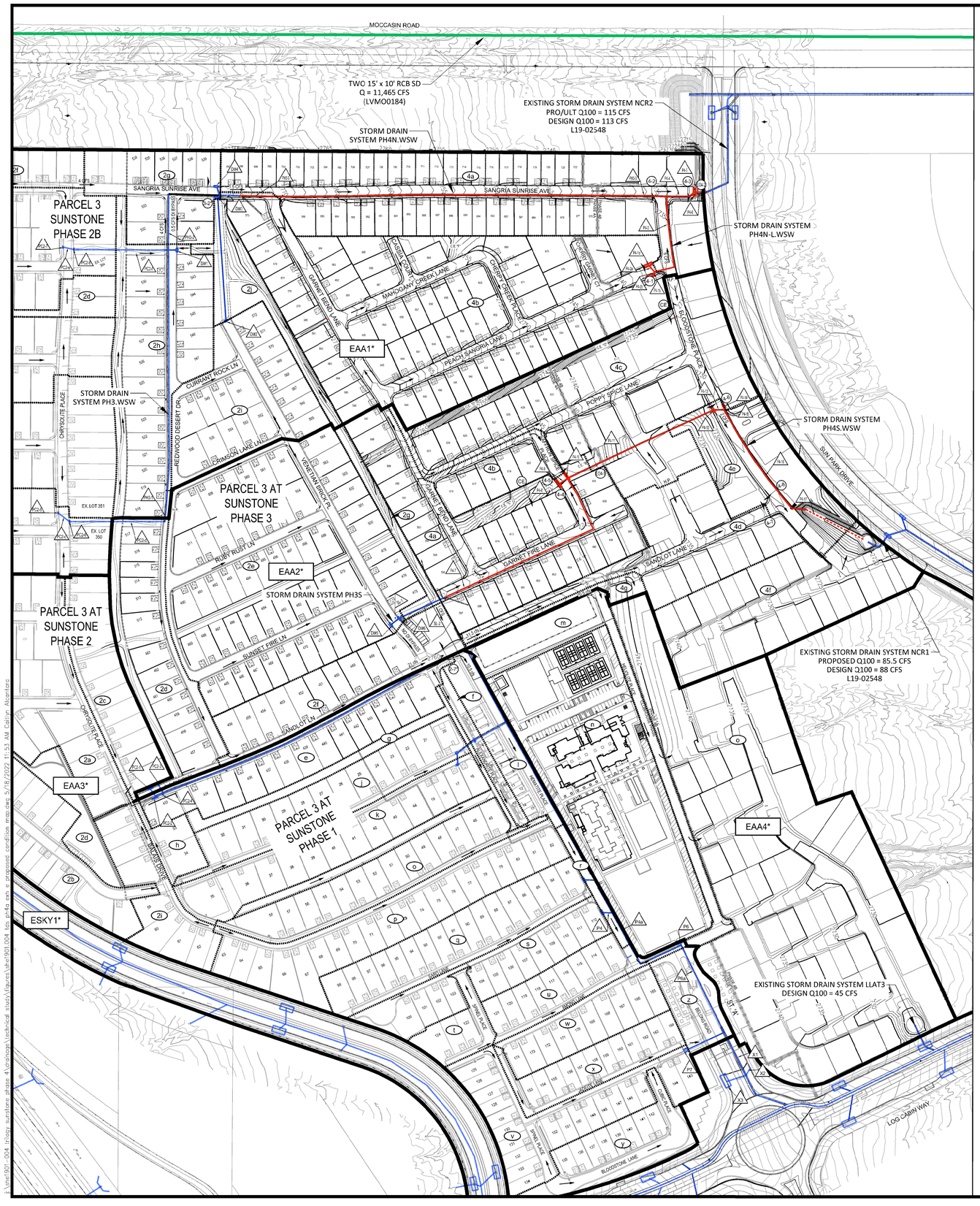
2018 CCRFCD MPU WATERSHED MAP

DATE: MAY 2022
DRAFTER: CW
DESIGNER: CW
CHECKED: SA

PROJECT NO.
SHE1901.004

EXHIBIT C3

SHEET 1 OF 1



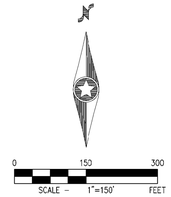
Proposed/Ultimate Condition Flow Rate Summary		
Basin/Concentration Point ID	**Q_{100} (cfs)**	**Area (ac)**
EAA1*	114	55
EAA2*	82	35.0
EAA3*	102	51.0
EAA4*	45	21.0

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

Proposed/Ultimate Condition Flow Rate Summary		
Basin/Concentration Point ID	**Q_{100} (cfs)**	**Area (ac)**
EAA1*	112	54.52
EAA2*	89	38.2
EAA3*	92	46.4
EAA4*	50	23.47

Note: The boundary lines for the referenced parent basins (EAA1, EAA2, EAA3, and EAA4) have been adjusted to match the grading. Therefore, the combined subbasin flows and areas do not match the referenced parent basins.

Proposed/Ultimate Condition Prorated Flow Summary			
Basin ID	**Q_{100} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/acre)**
EAA1*	112	54.52	2.1
EAA2*	89	38.20	2.3
EAA3*	92	46.40	2.0
EAA4*	50	23.47	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
EAA1*(2g)	4	1.99	2.1
EAA1*(2h)	8	4.00	2.1
EAA1*(2i)	6	3.10	2.1
EAA1*(2j)	2	1.09	2.1
EAA1*(4a)	15	7.51	2.1
EAA1*(4b)	23	10.99	2.1
TOTAL	***111***	***54.52***	
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*(4a)	13	5.37	2.3
EAA2*(4b)	3	1.09	2.3
EAA2*(4c)	16	6.79	2.3
EAA2*(4d)	7	2.94	2.3
EAA2*(4e)	6	2.37	2.3
EAA2*(4f)	9	3.88	2.3
EAA2*(4g)	1	0.31	2.3
TOTAL	***89***	***38.23***	
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*(f)	1	0.39	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***	***46.38***	
Subbasin ID	**Q_{100} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/acre)**
EAA4*(m)	3	1.60	2.1
EAA4*(n)	14	6.59	2.1
EAA4*(o)	33	15.28	2.1
TOTAL	***50***	***23.47***	



NOTES:

- ALL FACILITIES AND SUBBASINS NOT DENOTED BY A '4' IS REFERENCED

LEGEND

- BASIN BOUNDARY
- PRORATED SUBBASIN BOUNDARY
- EXISTING DRAINAGE FACILITY
- PROPOSED DRAINAGE FACILITY
- PROPOSED DITCH
- FUTURE DRAINAGE FACILITY
- ID — BASIN ID
- ID — PRORATED SUBBASIN ID
- ID — CONCENTRATION POINT ID
- FLOW DIRECTION
- ID — FLOWMASTER SECTION
- ID — FACILITY ID

Proposed Condition Drainage Emergency Overflow Hydraulic Summary					
Section ID	**Q_{100} (cfs)**	**Width (ft)**	**Type of Analysis**	**Depth (ft)**	**Velocity (fps)**
EO4-1 Q = Facility P4-8 + Facility P4-10	15	55	Normal Depth	1.09	3.55
			Weir	1.10	N/A
EO4-2 Q = Facility P4-5	24.5	36	Normal Depth	0.73	11.83
			Weir	0.75	N/A

Proposed Condition Drainage					
Section ID	**Description**	**Q_{100} (cfs)**	**Slope (%)**	**Depth (ft)**	**Velocity (fps)**
CE Q=Areas of CEs are about 0.41ac=1cfs	55-ft Common Element Ditch	1	1.00	0.37	1.87
			5.28	0.27	3.49
Facility P4-17	14-ft Charnel, 10-ft BW, 2:1SS	51	1.00	0.89	4.89

Recommended Flood Control Facility Summary					
Phase 4 (PH4N.WSW)					
Facility ID	**Facility Description**	**Total/Approaching Flow (cfs) Q_{100}**	**Facility Flow (cfs) Q_{100}**	**Surface/Bypass Flow (cfs) Q_{100}**	**Notes**
P4-5	Proposed 12.5' Type CM2 DI	22.5	22.5	0	Sump Inlet
Facility ID	**Facility Description**	**Facility Flow (cfs), Q_{100}**			**Notes**
PH3-3	Proposed 36" RCP	70.5			
P4-4	Proposed 42" RCP	90.5			
P4-6	Proposed 48" RCP	113			
Phase 4 (PH4N-L.WSW)					
Facility ID	**Facility Description**	**Total/Approaching Flow (cfs) Q_{100}**	**Facility Flow (cfs) Q_{100}**	**Surface/Bypass Flow (cfs) Q_{100}**	**Notes**
P4-1a	Proposed 17.5' Type CM2 DI	12.5	10	2.5	
P4-1b	Proposed 17.5' Type CM2 DI	12.5	10	2.5	
Facility ID	**Facility Description**	**Facility Flow (cfs), Q_{100}**			**Notes**
P4-2a	Proposed 18" RCP	10			
P4-2b	Proposed 18" RCP	10			
P4-3	Proposed 24" RCP	20			
Phase 4 (PH4S-P.WSW)					
Facility ID	**Facility Description**	**Total/Approaching Flow (cfs) Q_{100}**	**Facility Flow (cfs) Q_{100}**	**Surface/Bypass Flow (cfs) Q_{100}**	**Notes**
P4-8	Proposed 5' Type CM2 DI	7.5	7.5	0	Sump Inlet
P4-10	Proposed 5' Type CM2 DI	7.5	7.5	0	Sump Inlet
P4-12	Proposed 15' Type CM2 DI	8	7	1	
P4-14	Proposed 15' Type CM2 DI	8	7	1	
Facility ID	**Facility Description**	**Facility Flow (cfs), Q_{100}**			**Notes**
SL-2	Proposed 24" RCP	22			
P4-7	Proposed 24" RCP	22			
P4-9	Proposed 18" RCP	6			
P4-11	Proposed 30" RCP	37			
P4-13	Proposed 30" RCP	44			
P4-15	Proposed 18" RCP	7			
P4-16	Proposed 36" RCP	51			

Ultimate Condition 100-Year Street Flow Summary						
Section ID	**Q_{100} (cfs)**	**Slope (%)**	**Depth (ft)**	**Velocity (fps)**	**DxV**
4-1 Q = EAA2(2j+4b)	25	0.76	0.49	3.02	1.5
		5.06	0.38	5.77	2.2
4-2 Q = Facility DI#4 Bypass+EAA1(4a)	17.5	0.57	0.46	2.43	1.1
		3.27	0.36	4.49	1.6
4-3 Q = (Facility DI#4+P4-1a+P4-1b) Bypass+EAA1(2j+4a)	22.5	0.76	0.48	2.90	1.4
4-4 Q = EAA2(4a)	12	1.98	0.35	3.38	1.2
		5.95	0.30	5.14	1.5
4-5 Q = EAA2(4b)	3	2.87	0.22	2.84	0.6
		5.46	0.21	3.65	0.8
4-6 Q = EAA2(4c)	16	0.80	0.43	2.65	1.1
		5.46	0.33	5.32	1.8
4-7 Q = 1/2 of (Facility PC2-3 & PC2-4 Bypass + EAA2(2b+2f+2g) + EAA3(e)) + EAA2(4d)	18.5	0.80	0.45	2.77	1.2
		3.29	0.37	4.54	1.7
4-8 Q = Facility P4-13 & P4-15 Bypass + EAA2(4e)	7.0	0.52	0.36	1.79	0.6
		1.51	0.31	2.68	0.8
4-9 Q = Section 4-7 + Section 4-8	25.5	0.52	0.52	2.72	1.4
		1.33	0.46	3.65	1.7
4-10 Q = Facility P4-16 Bypass+EAA2(4f)	23.5	3.26	0.39	4.81	1.9

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NO.	DESCRIPTION	DATE	BY	APP.	APP. DATE

CITY OF LAS VEGAS, NV

SHEA HOMES LIMITED PARTNERSHIP

PARCEL 3 AT SUNSTONE PHASE 4A
PROPOSED CONDITION MAP

SHE1901.004 TDS PH4A EXH E

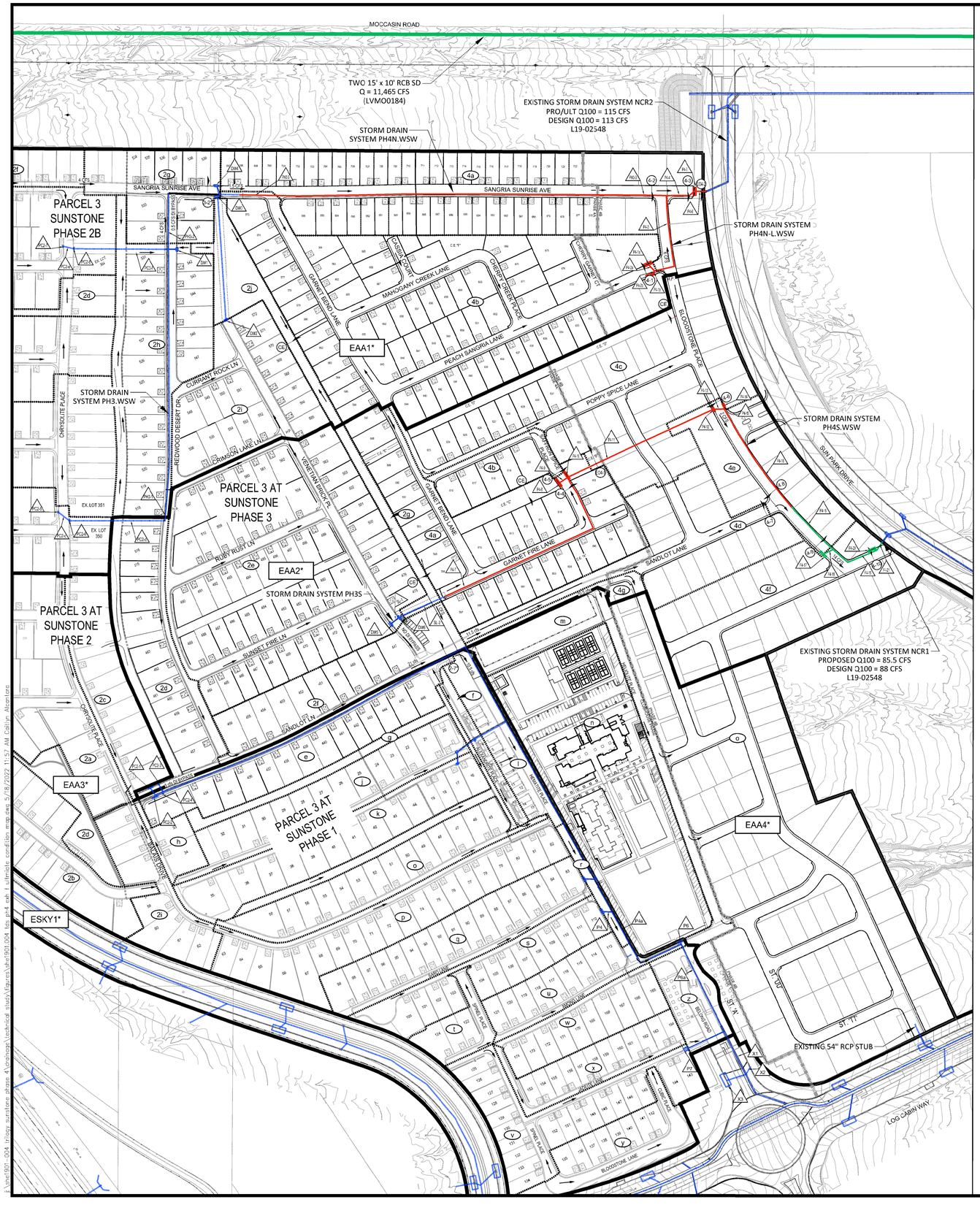
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DATE: MAY 2022
DRAFTER: CAA
DESIGNER: CAA
CHECKED: SA

PROJECT NO.
SHE1901.004

EXHIBIT E
SHEET EXH E OF 1

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Proposed/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
EAA4*	45	21.0

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

Proposed/Ultimate Condition Flow Rate Summary		
Basin/Concentration Point ID	Q_{100} (cfs)	Area (ac)
EAA1*	112	54.52
EAA2*	89	38.2
EAA3*	92	46.4
EAA4*	50	23.47

Note: The boundary lines for the referenced parent basins (EAA1, EAA2, EAA3, and EAA4) have been adjusted to match the grading. Therefore, the combined subbasin flows and areas do not match the referenced parent basins.

Proposed/Ultimate Condition Prorated Flow Summary			
Basin ID	Q_{100} (cfs)	Area (acres)	100-yr Unit Flow (cfs/acre)
EAA1*	112	54.52	2.1
EAA2*	89	38.20	2.3
EAA3*	92	46.40	2.0
EAA4*	50	23.47	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
EAA1*(2g)	4	1.99	2.1
EAA1*(2h)	8	4.00	2.1
EAA1*(2i)	6	3.10	2.1
EAA1*(2j)	2	1.09	2.1
EAA1*(4a)	15	7.51	2.1
EAA1*(4b)	23	10.99	2.1
TOTAL	***111***	***54.52***	
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*(4a)	13	5.37	2.3
EAA2*(4b)	3	1.09	2.3
EAA2*(4c)	16	6.79	2.3
EAA2*(4d)	7	2.94	2.3
EAA2*(4e)	6	2.37	2.3
EAA2*(4f)	9	3.88	2.3
EAA2*(4g)	1	0.31	2.3
TOTAL	***89***	***38.23***	
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*(f)	1	0.39	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***	***46.38***	
Subbasin ID	**Q_{100} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/acre)**
EAA4*(m)	3	1.60	2.1
EAA4*(n)	14	6.59	2.1
EAA4*(o)	33	15.28	2.1
TOTAL	***50***	***23.47***	

0 150 300
SCALE – 1"=150' FEET

NOTES:
- ALL FACILITIES AND SUBBASINS NOT DENOTED BY A '4' IS REFERENCED

LEGEND
- BASIN BOUNDARY
- PRORATED SUBBASIN BOUNDARY
- EXISTING DRAINAGE FACILITY
- PROPOSED DRAINAGE FACILITY
- PROPOSED DITCH
- FUTURE DRAINAGE FACILITY
- ID — BASIN ID
- ID — PRORATED SUBBASIN ID
- ID — CONCENTRATION POINT ID
- FLOW DIRECTION
- ID — FLOWMASTER SECTION
- ID — FACILITY ID

Ultimate Condition 100-Year Street Flow Summary					
Section ID	Q_{100} (cfs)	Slope (%)	Depth (ft)	Velocity (fps)	DxV
4-1 Q = EAA2(2j+4b)	25	0.76	0.49	3.02	1.5
		5.06	0.38	5.77	2.2
4-2 Q = Facility DI#4 Bypass+EAA1(4a)	17.5	0.57	0.46	2.43	1.1
		3.27	0.36	4.49	1.6
4-3 Q = (Facility DI#4+P4-1a+P4-1b) Bypass+EAA1(2j+4a)	22.5	0.76	0.48	2.90	1.4
4-4 Q = EAA2(4a)	12	1.98	0.35	3.38	1.2
		5.95	0.30	5.14	1.5
4-5 Q = EAA2(4b)	3	2.87	0.22	2.84	0.6
		5.46	0.21	3.65	0.8
4-6 Q = EAA2(4c)	16	0.80	0.43	2.65	1.1
		5.46	0.33	5.32	1.8
4-7 Q = 1/2 of (Facility PC2-3 & PC2-4 Bypass + EAA2(2b+2f+2g) + EAA3(e)) + EAA2(4d)	18.5	0.80	0.45	2.77	1.2
		3.29	0.37	4.54	1.7
4-8 Q = Facility P4-13 & P4-15 Bypass + 5AA2(4e)	7.0	0.52	0.36	1.79	0.6
		1.51	0.31	2.68	0.8
4-9 Q = Section 4-7 + Section 4-8	25.5	0.52	0.52	2.72	1.4
		1.33	0.46	3.65	1.7
4-10 Q = Facility P4-16 Bypass+EAA2(4f)	23.5	3.26	0.39	4.81	1.9

Proposed Condition Drainage Emergency Overflow Hydraulic Summary					
Section ID	Q_{100} (cfs)	Width (ft)	Type of Analysis	Depth (ft)	Velocity (fps)
EO4-1 Q = Facility P4-8 + Facility P4-10	15	55	Normal Depth	1.09	3.55
			Weir	1.10	N/A
EO4-2 Q = Facility P4-5	24.5	36	Normal Depth	0.73	11.83
			Weir	0.75	N/A

Proposed Condition Drainage					
Section ID	Description	Q_{100} (cfs)	Slope (%)	Depth (ft)	Velocity (fps)
CE Q=Areas of CEs are about 0.41ac=1cfs	55-ft Common Element Ditch	1	1.00	0.37	1.87
			5.28	0.27	3.49
Facility P4-17	14-ft Channel, 10-ft BW, 2:1SS	51	1.00	0.89	4.89

Recommended Flood Control Facility Summary					
Phase 4 (PH4N.WSW)					
Facility ID	Facility Description	Total/Approaching Flow (cfs) Q_{100}	Facility Flow (cfs) Q_{100}	Surface/Bypass Flow (cfs) Q_{100}	Notes
P4-5	Proposed 12.5' Type CM2 DI	22.5	22.5	0	Sump Inlet
Facility ID	Facility Description	Facility Flow (cfs), Q_{100}			Notes
PH3-3	Proposed 36" RCP	70.5			
P4-4	Proposed 42" RCP	90.5			
P4-6	Proposed 48" RCP	113			
Phase 4 (PH4N-L.WSW)					
Facility ID	Facility Description	Total/Approaching Flow (cfs) Q_{100}	Facility Flow (cfs) Q_{100}	Surface/Bypass Flow (cfs) Q_{100}	Notes
P4-1a	Proposed 17.5' Type CM2 DI	12.5	10	2.5	
P4-1b	Proposed 17.5' Type CM2 DI	12.5	10	2.5	
Facility ID	Facility Description	Facility Flow (cfs), Q_{100}			Notes
P4-2a	Proposed 18" RCP	10			
P4-2b	Proposed 18" RCP	10			
P4-3	Proposed 24" RCP	20			
Phase 4 (PH4S.WSW)					
Facility ID	Facility Description	Total/Approaching Flow (cfs) Q_{100}	Facility Flow (cfs) Q_{100}	Surface/Bypass Flow (cfs) Q_{100}	Notes
P4-8	Proposed 5' Type CM2 DI	7.5	7.5	0	Sump Inlet
P4-10	Proposed 5' Type CM2 DI	7.5	7.5	0	Sump Inlet
P4-12	Proposed 15' Type CM2 DI	8	7	1	
P4-14	Proposed 15' Type CM2 DI	8	7	1	
P4-17	Future 17.5' Type CM2 DI	12.75	11	1.75	
P4-20	Future 12.5' Type CM2 DI	23.5	23.5	0	Sump Inlet
Facility ID	Facility Description	Facility Flow (cfs), Q_{100}			Notes
SL-2	Proposed 24" RCP	22			
P4-7	Proposed 24" RCP	22			
P4-9	Proposed 18" RCP	6			
P4-11	Proposed 30" RCP	37			
P4-13	Proposed 30" RCP	44			
P4-15	Proposed 18" RCP	7			
F4-16	Future 36" RCP	51			
F4-18	Future 36" RCP	11			
F4-19	Future 36" RCP	62			
F4-21	Future 42" RCP	85.5			

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CITY OF LAS VEGAS, NV

SHEA HOMES LIMITED PARTNERSHIP

PARCEL 3 AT SUNSTONE PHASE 4A

SHE1901.004 TDS PH4 EXH F ULTIMATE CONDITION MAP

S 16
T 19S
R 61E

DATE: MAY 2022
DRAFTER: CAA
DESIGNER: CAA
CHECKED: SA

PROJECT NO.
SHE1901.004

EXHIBIT F
SHEET 1 OF 1

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APPENDIX B

Street & Hydraulic Sections

Street Flow Computations – 100-Yr

Worksheet for 4-1 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.76	%
Discharge	25.00	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	0.49	ft
Roughness Coefficient	0.016	
Elevation	0.49	ft
Elevation Range	0.00 to 0.48	ft
Flow Area	8.3	ft²
Wetted Perimeter	36.34	ft
Hydraulic Radius	0.23	ft
Top Width	36.00	ft

Worksheet for 4-1 (min%)

Results	
Normal Depth	0.49 ft
Critical Depth	0.51 ft
Critical Slope	0.60 %
Velocity	3.02 ft/s
Velocity Head	0.14 ft
Specific Energy	0.63 ft
Froude Number	1.111
Flow Type	Supercritical

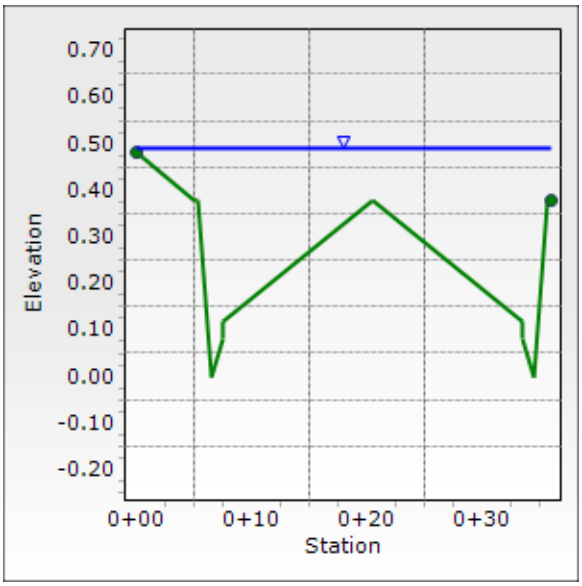
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

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	0.49 ft
Critical Depth	0.51 ft
Channel Slope	0.76 %
Critical Slope	0.60 %

Cross Section for 4-1 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.76 %
Normal Depth	0.49 ft
Discharge	25.00 cfs



Worksheet for 4-1 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	5.06 %
Discharge	25.00 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	4.3 ft²
Wetted Perimeter	29.93 ft
Hydraulic Radius	0.14 ft
Top Width	29.71 ft

Worksheet for 4-1 (max%)

Results	
Normal Depth	0.38 ft
Critical Depth	0.51 ft
Critical Slope	0.60 %
Velocity	5.77 ft/s
Velocity Head	0.52 ft
Specific Energy	0.89 ft
Froude Number	2.661
Flow Type	Supercritical

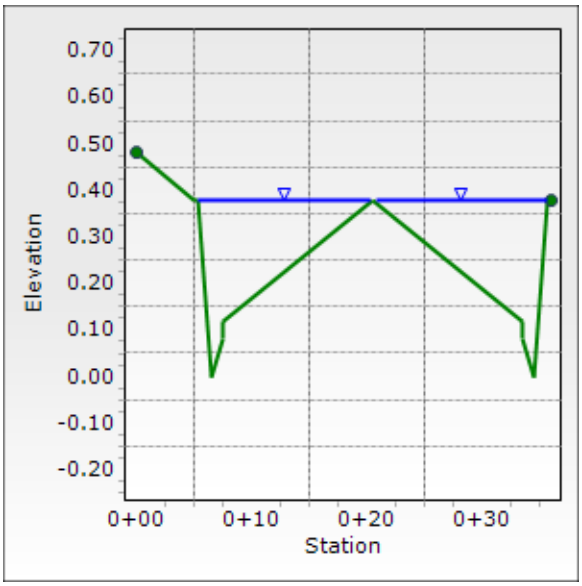
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Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

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	0.51 ft
Channel Slope	5.06 %
Critical Slope	0.60 %

Cross Section for 4-1 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	5.06 %
Normal Depth	0.38 ft
Discharge	25.00 cfs



Worksheet for 4-2 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.57 %
Discharge	17.50 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	0.46 ft
Roughness Coefficient	0.016
Elevation	0.46 ft
Elevation Range	0.00 to 0.48 ft
Flow Area	7.2 ft²
Wetted Perimeter	35.42 ft
Hydraulic Radius	0.20 ft
Top Width	35.12 ft

Worksheet for 4-2 (min%)

Results	
Normal Depth	0.46 ft
Critical Depth	0.45 ft
Critical Slope	0.65 %
Velocity	2.43 ft/s
Velocity Head	0.09 ft
Specific Energy	0.55 ft
Froude Number	0.945
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	0.46 ft
Critical Depth	0.45 ft
Channel Slope	0.57 %
Critical Slope	0.65 %

Worksheet for 4-2 (min%)

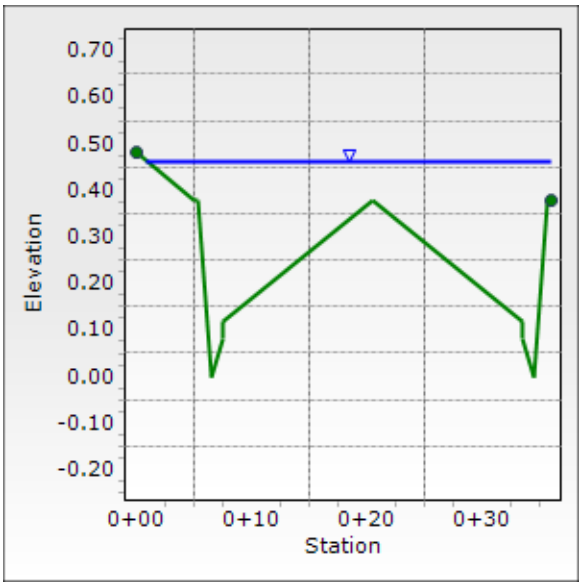
Messages:

Water Surface Elevation exceeds lowest end station by 0.0823075415065528ft.

Cross Section for 4-2 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.57 %
Normal Depth	0.46 ft
Discharge	17.50 cfs



Worksheet for 4-2 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	3.27 %
Discharge	17.50 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	0.36 ft
Roughness Coefficient	0.016
Elevation	0.36 ft
Elevation Range	0.00 to 0.48 ft
Flow Area	3.9 ft²
Wetted Perimeter	28.33 ft
Hydraulic Radius	0.14 ft
Top Width	28.12 ft

Worksheet for 4-2 (max%)

Results	
Normal Depth	0.36 ft
Critical Depth	0.45 ft
Critical Slope	0.65 %
Velocity	4.49 ft/s
Velocity Head	0.31 ft
Specific Energy	0.67 ft
Froude Number	2.124
Flow Type	Supercritical

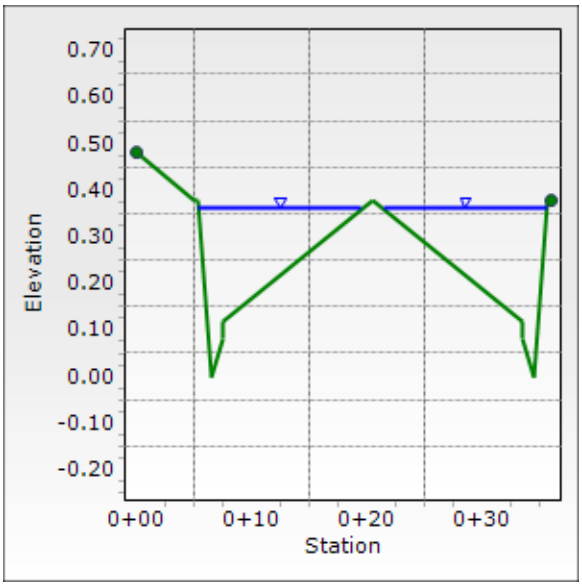
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.36 ft
Critical Depth	0.45 ft
Channel Slope	3.27 %
Critical Slope	0.65 %

Cross Section for 4-2 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	3.27 %
Normal Depth	0.36 ft
Discharge	17.50 cfs



Worksheet for 4-3

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.76	%
Discharge	22.50	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	0.48	ft
Roughness Coefficient	0.016	
Elevation	0.48	ft
Elevation Range	0.00 to 0.48	ft
Flow Area	7.8	ft^2
Wetted Perimeter	36.21	ft
Hydraulic Radius	0.21	ft
Top Width	35.89	ft

Worksheet for 4-3

Results	
Normal Depth	0.48 ft
Critical Depth	0.49 ft
Critical Slope	0.62 %
Velocity	2.90 ft/s
Velocity Head	0.13 ft
Specific Energy	0.61 ft
Froude Number	1.099
Flow Type	Supercritical

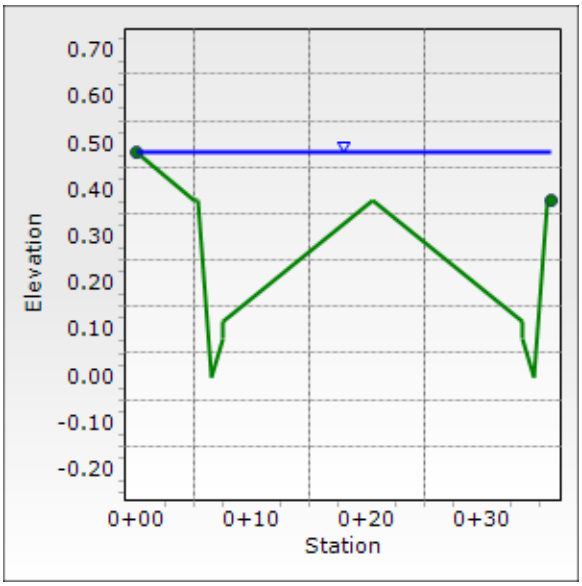
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Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

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	0.49 ft
Channel Slope	0.76 %
Critical Slope	0.62 %

Cross Section for 4-3

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.76 %
Normal Depth	0.48 ft
Discharge	22.50 cfs



Worksheet for 4-4 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	1.98	%
Discharge	12.00	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	0.35	ft
Roughness Coefficient	0.016	
Elevation	0.35	ft
Elevation Range	0.00 to 0.48	ft
Flow Area	3.6	ft²
Wetted Perimeter	26.99	ft
Hydraulic Radius	0.13	ft
Top Width	26.78	ft

Worksheet for 4-4 (min%)

Results	
Normal Depth	0.35 ft
Critical Depth	0.40 ft
Critical Slope	0.69 %
Velocity	3.38 ft/s
Velocity Head	0.18 ft
Specific Energy	0.52 ft
Froude Number	1.634
Flow Type	Supercritical

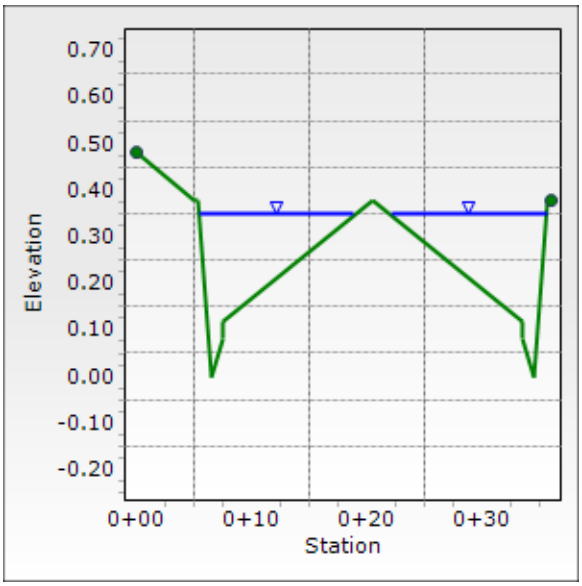
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Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.35 ft
Critical Depth	0.40 ft
Channel Slope	1.98 %
Critical Slope	0.69 %

Cross Section for 4-4 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.98 %
Normal Depth	0.35 ft
Discharge	12.00 cfs



Worksheet for 4-4 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	5.95	%
Discharge	12.00	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	0.30	ft
Roughness Coefficient	0.016	
Elevation	0.30	ft
Elevation Range	0.00 to 0.48	ft
Flow Area	2.3	ft²
Wetted Perimeter	21.61	ft
Hydraulic Radius	0.11	ft
Top Width	21.42	ft

Worksheet for 4-4 (max%)

Results	
Normal Depth	0.30 ft
Critical Depth	0.40 ft
Critical Slope	0.69 %
Velocity	5.14 ft/s
Velocity Head	0.41 ft
Specific Energy	0.71 ft
Froude Number	2.746
Flow Type	Supercritical

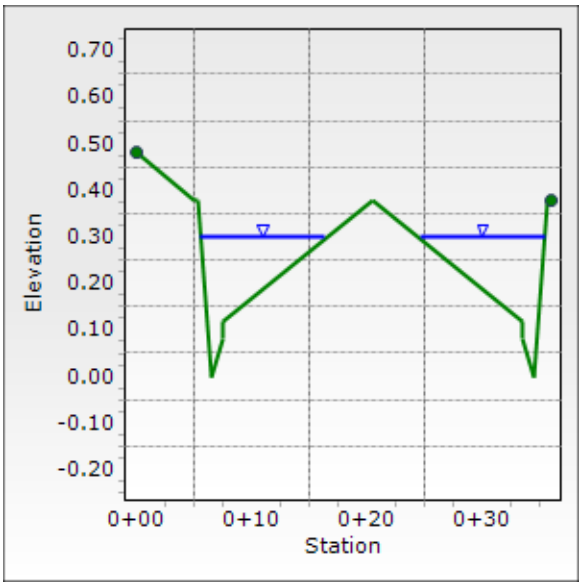
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Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.30 ft
Critical Depth	0.40 ft
Channel Slope	5.95 %
Critical Slope	0.69 %

Cross Section for 4-4 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	5.95 %
Normal Depth	0.30 ft
Discharge	12.00 cfs



Worksheet for 4-5 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	2.87 %
Discharge	3.00 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	0.22 ft
Roughness Coefficient	0.016
Elevation	0.22 ft
Elevation Range	0.00 to 0.48 ft
Flow Area	1.1 ft²
Wetted Perimeter	13.89 ft
Hydraulic Radius	0.08 ft
Top Width	13.73 ft

Worksheet for 4-5 (min%)

Results	
Normal Depth	0.22 ft
Critical Depth	0.27 ft
Critical Slope	0.83 %
Velocity	2.84 ft/s
Velocity Head	0.12 ft
Specific Energy	0.35 ft
Froude Number	1.801
Flow Type	Supercritical

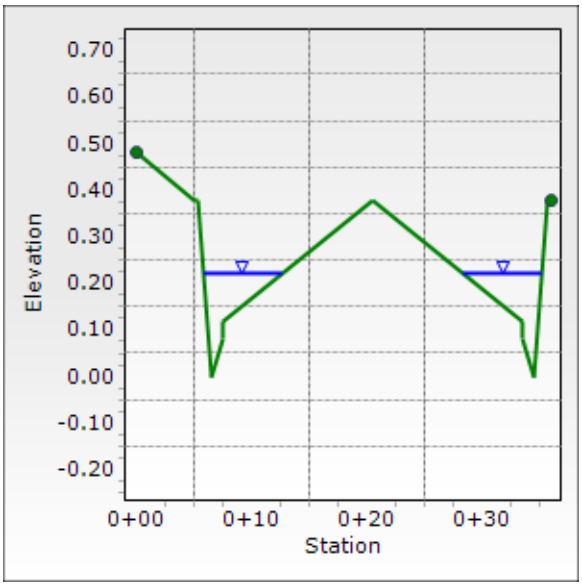
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.22 ft
Critical Depth	0.27 ft
Channel Slope	2.87 %
Critical Slope	0.83 %

Cross Section for 4-5 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	2.87 %
Normal Depth	0.22 ft
Discharge	3.00 cfs



Worksheet for 4-5 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	5.46	%
Discharge	3.00	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	0.21	ft
Roughness Coefficient	0.016	
Elevation	0.21	ft
Elevation Range	0.00 to 0.48	ft
Flow Area	0.8	ft²
Wetted Perimeter	11.92	ft
Hydraulic Radius	0.07	ft
Top Width	11.76	ft

Worksheet for 4-5 (max%)

Results	
Normal Depth	0.21 ft
Critical Depth	0.27 ft
Critical Slope	0.83 %
Velocity	3.65 ft/s
Velocity Head	0.21 ft
Specific Energy	0.41 ft
Froude Number	2.438
Flow Type	Supercritical

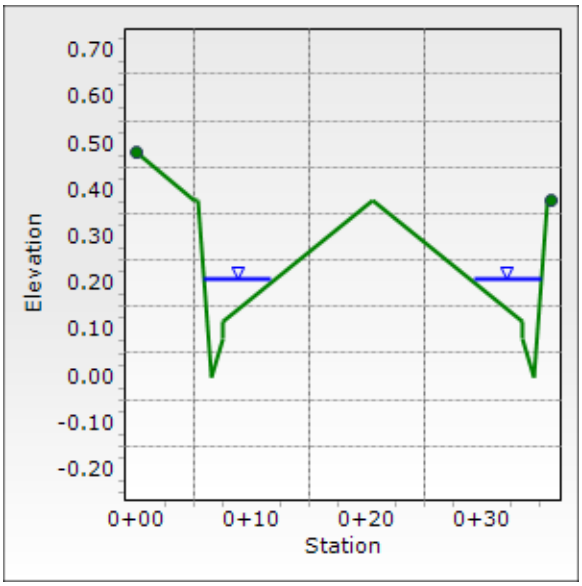
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Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.21 ft
Critical Depth	0.27 ft
Channel Slope	5.46 %
Critical Slope	0.83 %

Cross Section for 4-5 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	5.46 %
Normal Depth	0.21 ft
Discharge	3.00 cfs



Worksheet for 4-6 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.80	%
Discharge	16.00	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	0.43	ft
Roughness Coefficient	0.016	
Elevation	0.43	ft
Elevation Range	0.00 to 0.48	ft
Flow Area	6.0	ft²
Wetted Perimeter	33.69	ft
Hydraulic Radius	0.18	ft
Top Width	33.42	ft

Worksheet for 4-6 (min%)

Results	
Normal Depth	0.43 ft
Critical Depth	0.44 ft
Critical Slope	0.66 %
Velocity	2.65 ft/s
Velocity Head	0.11 ft
Specific Energy	0.54 ft
Froude Number	1.096
Flow Type	Supercritical

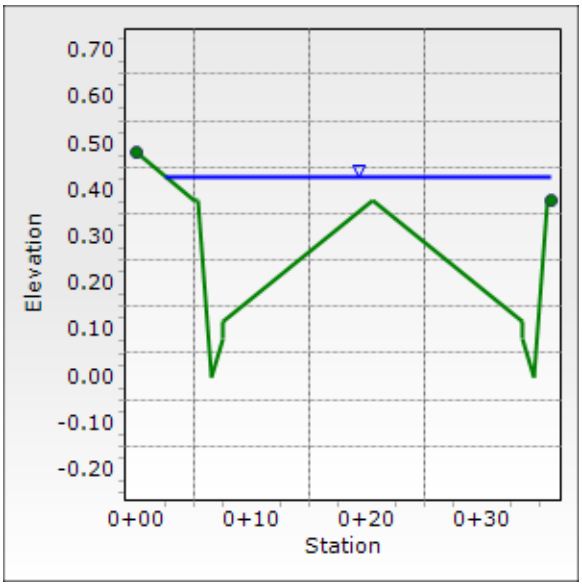
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

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	0.43 ft
Critical Depth	0.44 ft
Channel Slope	0.80 %
Critical Slope	0.66 %

Cross Section for 4-6 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.80 %
Normal Depth	0.43 ft
Discharge	16.00 cfs



Worksheet for 4-6 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	5.46	%
Discharge	16.00	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	0.33	ft
Roughness Coefficient	0.016	
Elevation	0.33	ft
Elevation Range	0.00 to 0.48	ft
Flow Area	3.0	ft²
Wetted Perimeter	24.73	ft
Hydraulic Radius	0.12	ft
Top Width	24.53	ft

Worksheet for 4-6 (max%)

Results	
Normal Depth	0.33 ft
Critical Depth	0.44 ft
Critical Slope	0.66 %
Velocity	5.32 ft/s
Velocity Head	0.44 ft
Specific Energy	0.77 ft
Froude Number	2.677
Flow Type	Supercritical

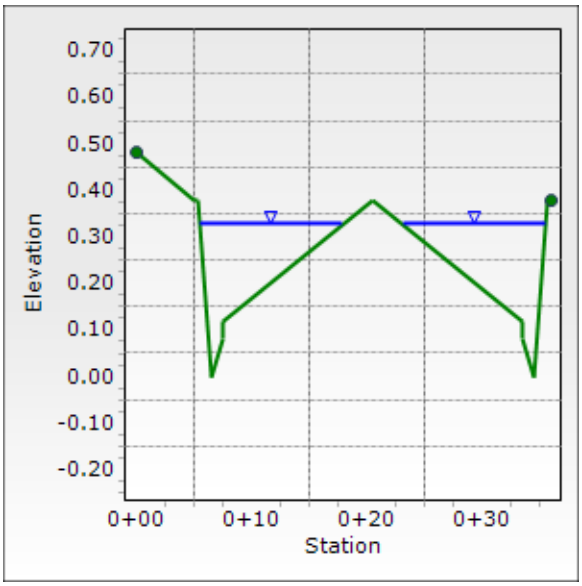
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

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	0.44 ft
Channel Slope	5.46 %
Critical Slope	0.66 %

Cross Section for 4-6 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	5.46 %
Normal Depth	0.33 ft
Discharge	16.00 cfs



Worksheet for 4-7 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.80	%
Discharge	18.50	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	6.7	ft²
Wetted Perimeter	34.63	ft
Hydraulic Radius	0.19	ft
Top Width	34.34	ft

Worksheet for 4-7 (min%)

Results	
Normal Depth	0.45 ft
Critical Depth	0.46 ft
Critical Slope	0.64 %
Velocity	2.77 ft/s
Velocity Head	0.12 ft
Specific Energy	0.57 ft
Froude Number	1.109
Flow Type	Supercritical

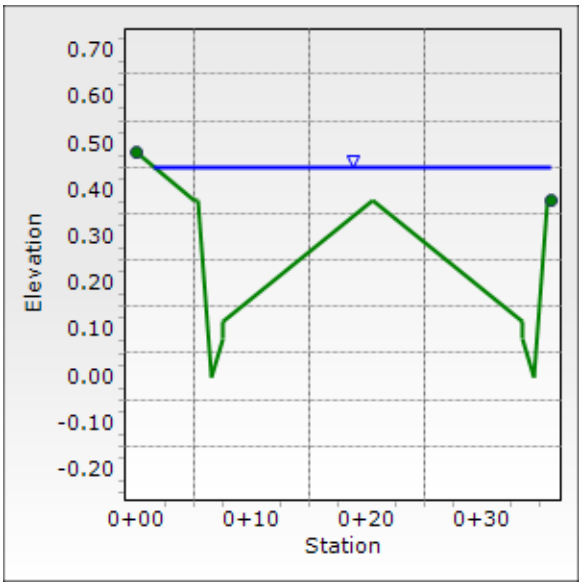
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

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	0.46 ft
Channel Slope	0.80 %
Critical Slope	0.64 %

Cross Section for 4-7 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.80 %
Normal Depth	0.45 ft
Discharge	18.50 cfs



Worksheet for 4-7 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	3.29	%
Discharge	18.50	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	0.37	ft
Roughness Coefficient	0.016	
Elevation	0.37	ft
Elevation Range	0.00 to 0.48	ft
Flow Area	4.1	ft^2
Wetted Perimeter	28.96	ft
Hydraulic Radius	0.14	ft
Top Width	28.75	ft

Worksheet for 4-7 (max%)

Results	
Normal Depth	0.37 ft
Critical Depth	0.46 ft
Critical Slope	0.64 %
Velocity	4.54 ft/s
Velocity Head	0.32 ft
Specific Energy	0.69 ft
Froude Number	2.129
Flow Type	Supercritical

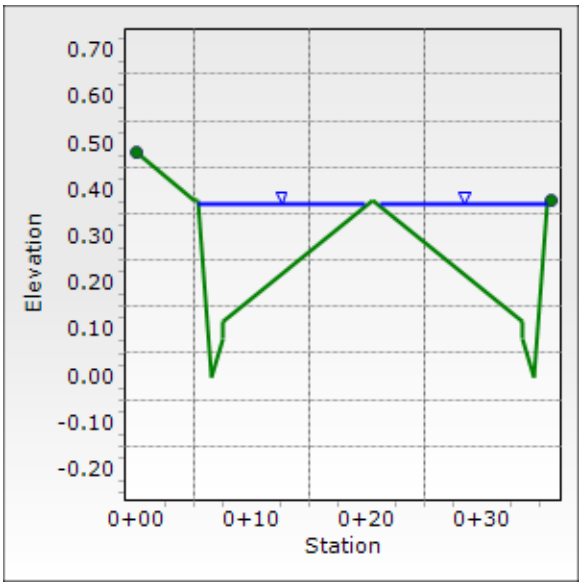
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.37 ft
Critical Depth	0.46 ft
Channel Slope	3.29 %
Critical Slope	0.64 %

Cross Section for 4-7 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	3.29 %
Normal Depth	0.37 ft
Discharge	18.50 cfs



Worksheet for 4-8 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.52 %
Discharge	7.00 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	0.36 ft
Roughness Coefficient	0.016
Elevation	0.36 ft
Elevation Range	0.00 to 0.48 ft
Flow Area	3.9 ft²
Wetted Perimeter	28.36 ft
Hydraulic Radius	0.14 ft
Top Width	28.15 ft

Worksheet for 4-8 (min%)

Results	
Normal Depth	0.36 ft
Critical Depth	0.34 ft
Critical Slope	0.74 %
Velocity	1.79 ft/s
Velocity Head	0.05 ft
Specific Energy	0.41 ft
Froude Number	0.847
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	0.36 ft
Critical Depth	0.34 ft
Channel Slope	0.52 %
Critical Slope	0.74 %

Worksheet for 4-8 (min%)

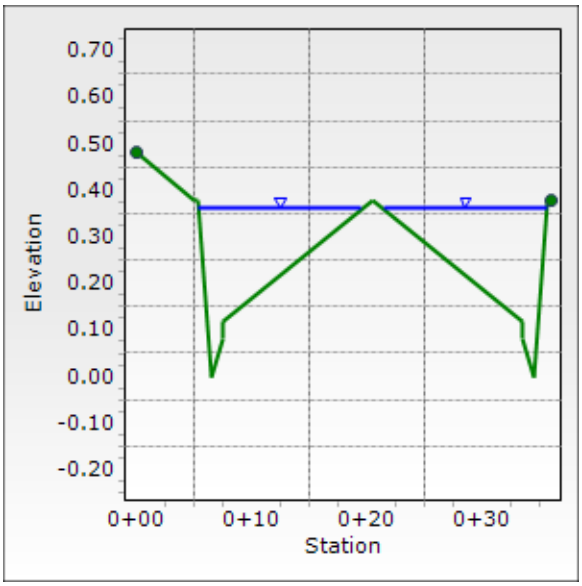
Messages:

Flow is divided.

Cross Section for 4-8 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.52 %
Normal Depth	0.36 ft
Discharge	7.00 cfs



Worksheet for 4-8 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.51 %
Discharge	7.00 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	0.31 ft
Roughness Coefficient	0.016
Elevation	0.31 ft
Elevation Range	0.00 to 0.48 ft
Flow Area	2.6 ft²
Wetted Perimeter	22.96 ft
Hydraulic Radius	0.11 ft
Top Width	22.77 ft

Worksheet for 4-8 (max%)

Results	
Normal Depth	0.31 ft
Critical Depth	0.34 ft
Critical Slope	0.74 %
Velocity	2.68 ft/s
Velocity Head	0.11 ft
Specific Energy	0.42 ft
Froude Number	1.392
Flow Type	Supercritical

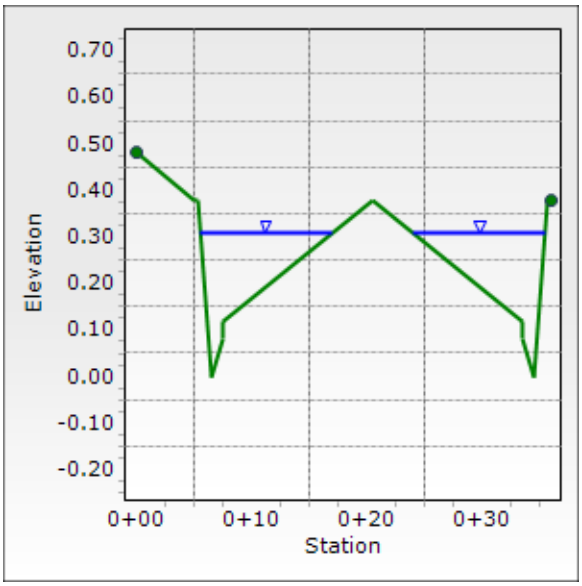
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.31 ft
Critical Depth	0.34 ft
Channel Slope	1.51 %
Critical Slope	0.74 %

Cross Section for 4-8 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.51 %
Normal Depth	0.31 ft
Discharge	7.00 cfs



Worksheet for 4-9 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.52	%
Discharge	25.50	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	0.52	ft
Roughness Coefficient	0.016	
Elevation	0.52	ft
Elevation Range	0.00 to 0.48	ft
Flow Area	9.4	ft^2
Wetted Perimeter	36.40	ft
Hydraulic Radius	0.26	ft
Top Width	36.00	ft

Worksheet for 4-9 (min%)

Results	
Normal Depth	0.52 ft
Critical Depth	0.51 ft
Critical Slope	0.60 %
Velocity	2.72 ft/s
Velocity Head	0.11 ft
Specific Energy	0.64 ft
Froude Number	0.937
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	0.52 ft
Critical Depth	0.51 ft
Channel Slope	0.52 %
Critical Slope	0.60 %

Worksheet for 4-9 (min%)

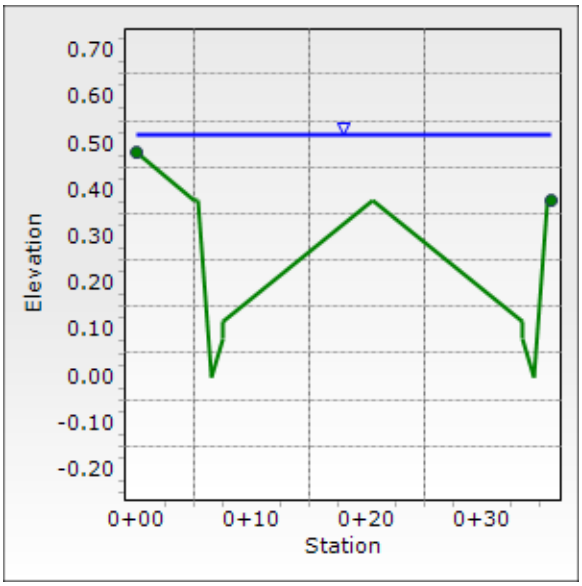
Messages:

Water Surface Elevation exceeds lowest end station by 0.14320826824313ft.

Cross Section for 4-9 (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.52 %
Normal Depth	0.52 ft
Discharge	25.50 cfs



Worksheet for 4-9 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.33 %
Discharge	25.50 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	0.46 ft
Roughness Coefficient	0.016
Elevation	0.46 ft
Elevation Range	0.00 to 0.48 ft
Flow Area	7.0 ft²
Wetted Perimeter	35.09 ft
Hydraulic Radius	0.20 ft
Top Width	34.79 ft

Worksheet for 4-9 (max%)

Results	
Normal Depth	0.46 ft
Critical Depth	0.51 ft
Critical Slope	0.60 %
Velocity	3.65 ft/s
Velocity Head	0.21 ft
Specific Energy	0.66 ft
Froude Number	1.438
Flow Type	Supercritical

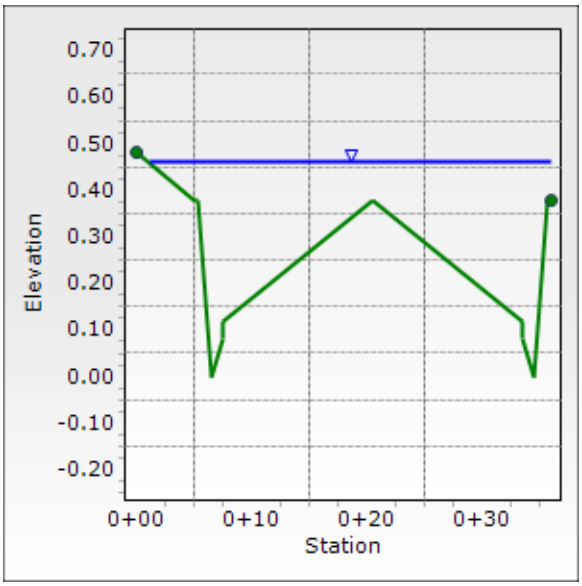
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.46 ft
Critical Depth	0.51 ft
Channel Slope	1.33 %
Critical Slope	0.60 %

Cross Section for 4-9 (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.33 %
Normal Depth	0.46 ft
Discharge	25.50 cfs



Worksheet for 4-10

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	3.26 %
Discharge	23.50 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	0.39 ft
Roughness Coefficient	0.016
Elevation	0.39 ft
Elevation Range	0.00 to 0.48 ft
Flow Area	4.9 ft²
Wetted Perimeter	31.87 ft
Hydraulic Radius	0.15 ft
Top Width	31.64 ft

Worksheet for 4-10

Results	
Normal Depth	0.39 ft
Critical Depth	0.50 ft
Critical Slope	0.61 %
Velocity	4.81 ft/s
Velocity Head	0.36 ft
Specific Energy	0.75 ft
Froude Number	2.158
Flow Type	Supercritical

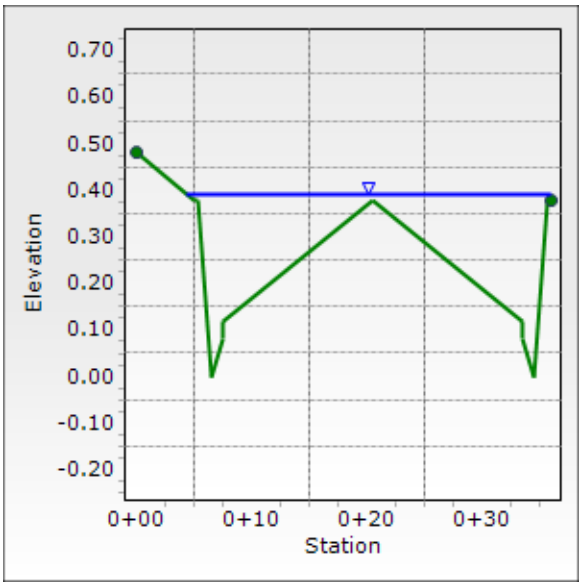
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.39 ft
Critical Depth	0.50 ft
Channel Slope	3.26 %
Critical Slope	0.61 %

Cross Section for 4-10

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	3.26 %
Normal Depth	0.39 ft
Discharge	23.50 cfs



Emergency Overflow Computations

Worksheet for EO4-1 (Normal Depth)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.80 %
Discharge	15.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	10.70
0+53.50	0.00
0+55.00	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 10.70)	(0+55.00, 0.50)	0.025

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	1.09 ft
Roughness Coefficient	0.025
Elevation	1.09 ft
Elevation Range	0.00 to 10.70 ft
Flow Area	4.2 ft²
Wetted Perimeter	7.72 ft
Hydraulic Radius	0.55 ft
Top Width	6.94 ft
Normal Depth	1.09 ft
Critical Depth	0.99 ft
Critical Slope	1.27 %
Velocity	3.55 ft/s
Velocity Head	0.20 ft
Specific Energy	1.28 ft
Froude Number	0.804
Flow Type	Subcritical

GVF Input Data

Worksheet for EO4-1 (Normal Depth)

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	1.09 ft
Critical Depth	0.99 ft
Channel Slope	0.80 %
Critical Slope	1.27 %

Worksheet for EO4-1 (Normal Depth)

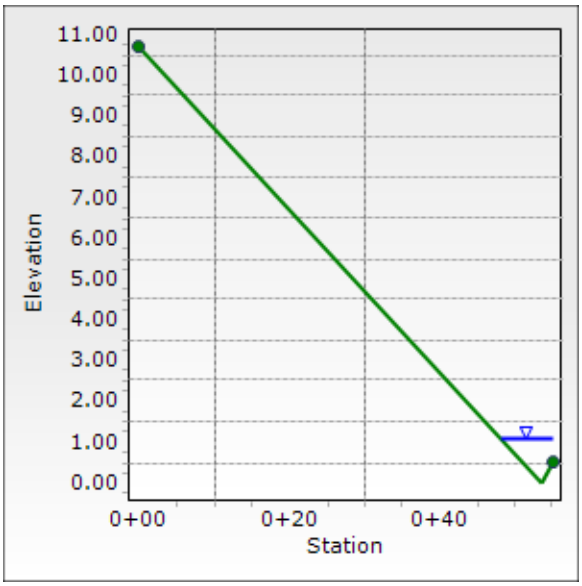
Messages:

Water Surface Elevation exceeds lowest end station by 0.588584864724258ft.

Cross Section for EO4-1 (Normal Depth)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.80 %
Normal Depth	1.09 ft
Discharge	15.00 cfs



Worksheet for EO4-2 (Normal Depth)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	14.76 %
Discharge	24.50 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	10.70
0+53.50	0.00
0+55.00	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 10.70)	(0+55.00, 0.50)	0.025

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	0.73 ft
Roughness Coefficient	0.025
Elevation	0.73 ft
Elevation Range	0.00 to 10.70 ft
Flow Area	2.1 ft²
Wetted Perimeter	5.56 ft
Hydraulic Radius	0.37 ft
Top Width	5.17 ft
Normal Depth	0.73 ft
Critical Depth	1.23 ft
Critical Slope	1.20 %
Velocity	11.83 ft/s
Velocity Head	2.17 ft
Specific Energy	2.91 ft
Froude Number	3.294
Flow Type	Supercritical

GVF Input Data

Worksheet for EO4-2 (Normal Depth)

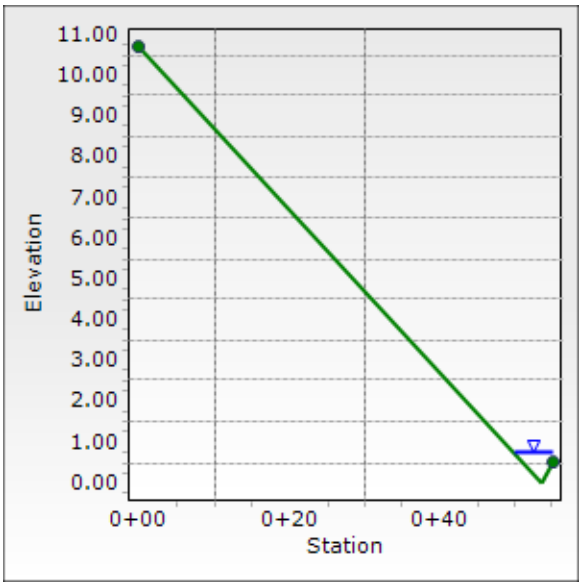
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

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	0.73 ft
Critical Depth	1.23 ft
Channel Slope	14.76 %
Critical Slope	1.20 %

Cross Section for EO4-2 (Normal Depth)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	14.76 %
Normal Depth	0.73 ft
Discharge	24.50 cfs



Worksheet for EO4-1 (Weir)

Project Description	
Solve For	Headwater Elevation

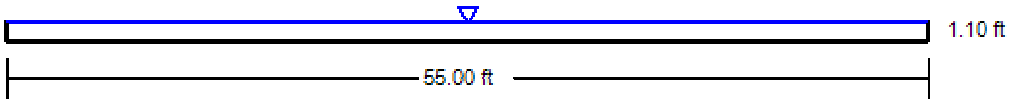
Input Data	
Discharge	15.00 cfs
Crest Elevation	0.00 ft
Tailwater Elevation	1.09 ft
Crest Surface Type	Gravel
Crest Breadth	10.00 ft
Crest Length	55.00 ft

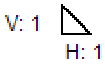
Results	
Headwater Elevation	1.10 ft
Headwater Height Above Crest	1.10 ft
Tailwater Height Above Crest	1.09 ft
Weir Coefficient	2.85 ft^(1/2)/s
Submergence Factor	0.083
Adjusted Weir Coefficient	0.24 ft^(1/2)/s
Flow Area	60.3 ft²
Velocity	0.25 ft/s
Wetted Perimeter	57.19 ft
Top Width	55.00 ft

Cross Section for EO4-1 (Weir)

Project Description	
Solve For	Headwater Elevation

Input Data	
Discharge	15.00 cfs
Headwater Elevation	1.10 ft
Crest Elevation	0.00 ft
Tailwater Elevation	1.09 ft
Crest Surface Type	Gravel
Crest Breadth	10.00 ft
Crest Length	55.00 ft





Worksheet for EO4-2 (Weir)

Project Description	
Solve For	Headwater Elevation

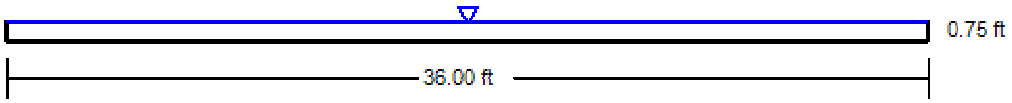
Input Data	
Discharge	24.50 cfs
Crest Elevation	0.00 ft
Tailwater Elevation	0.73 ft
Crest Surface Type	Paved
Crest Breadth	0.50 ft
Crest Length	36.00 ft

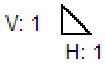
Results	
Headwater Elevation	0.75 ft
Headwater Height Above Crest	0.75 ft
Tailwater Height Above Crest	0.73 ft
Weir Coefficient	3.09 ft^(1/2)/s
Submergence Factor	0.342
Adjusted Weir Coefficient	1.06 ft^(1/2)/s
Flow Area	26.9 ft²
Velocity	0.91 ft/s
Wetted Perimeter	37.49 ft
Top Width	36.00 ft

Cross Section for EO4-2 (Weir)

Project Description	
Solve For	Headwater Elevation

Input Data	
Discharge	24.50 cfs
Headwater Elevation	0.75 ft
Crest Elevation	0.00 ft
Tailwater Elevation	0.73 ft
Crest Surface Type	Paved
Crest Breadth	0.50 ft
Crest Length	36.00 ft





Common Element Computations

Worksheet for CE (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.00 %
Discharge	1.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	10.70
0+53.50	0.00
0+55.00	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 10.70)	(0+55.00, 0.50)	0.025

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	0.025
Elevation	0.37 ft
Elevation Range	0.00 to 10.70 ft
Flow Area	0.5 ft²
Wetted Perimeter	3.02 ft
Hydraulic Radius	0.18 ft
Top Width	2.92 ft
Normal Depth	0.37 ft
Critical Depth	0.33 ft
Critical Slope	1.73 %
Velocity	1.87 ft/s
Velocity Head	0.05 ft
Specific Energy	0.42 ft
Froude Number	0.772
Flow Type	Subcritical

GVF Input Data

Worksheet for CE (min%)

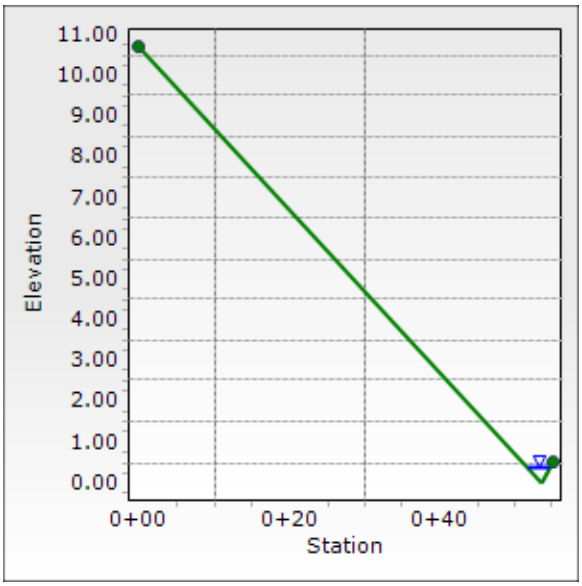
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

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	0.33 ft
Channel Slope	1.00 %
Critical Slope	1.73 %

Cross Section for CE (min%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.00 %
Normal Depth	0.37 ft
Discharge	1.00 cfs



Worksheet for CE (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	5.28 %
Discharge	1.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	10.70
0+53.50	0.00
0+55.00	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 10.70)	(0+55.00, 0.50)	0.025

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

Results	
Normal Depth	0.27 ft
Roughness Coefficient	0.025
Elevation	0.27 ft
Elevation Range	0.00 to 10.70 ft
Flow Area	0.3 ft²
Wetted Perimeter	2.21 ft
Hydraulic Radius	0.13 ft
Top Width	2.14 ft
Normal Depth	0.27 ft
Critical Depth	0.33 ft
Critical Slope	1.73 %
Velocity	3.49 ft/s
Velocity Head	0.19 ft
Specific Energy	0.46 ft
Froude Number	1.684
Flow Type	Supercritical

GVF Input Data

Worksheet for CE (max%)

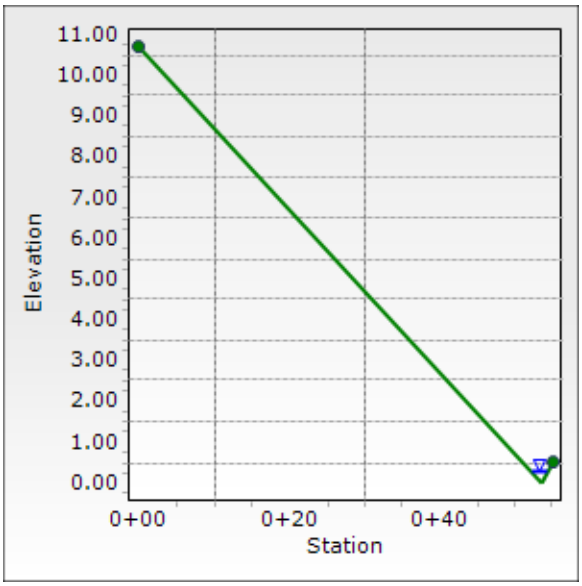
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

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	0.27 ft
Critical Depth	0.33 ft
Channel Slope	5.28 %
Critical Slope	1.73 %

Cross Section for CE (max%)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	5.28 %
Normal Depth	0.27 ft
Discharge	1.00 cfs



APPENDIX C

Storm Drain Analyses

Inlet Sizing Computations

Worksheet for Facility P4-1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	3.29 %
Discharge	25.00 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	0.40 ft
Roughness Coefficient	0.016
Elevation	0.40 ft
Elevation Range	0.00 to 0.48 ft
Flow Area	5.1 ft²
Wetted Perimeter	32.17 ft
Hydraulic Radius	0.16 ft
Top Width	31.94 ft

Worksheet for Facility P4-1

Results	
Normal Depth	0.40 ft
Critical Depth	0.51 ft
Critical Slope	0.60 %
Velocity	4.93 ft/s
Velocity Head	0.38 ft
Specific Energy	0.78 ft
Froude Number	2.178
Flow Type	Supercritical

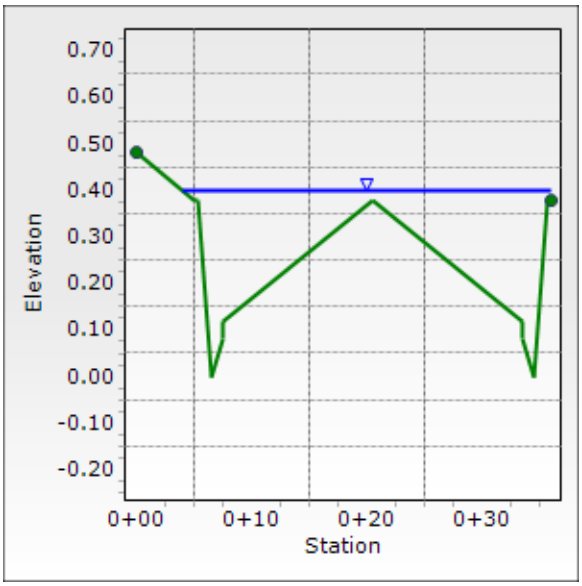
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.40 ft
Critical Depth	0.51 ft
Channel Slope	3.29 %
Critical Slope	0.60 %

Cross Section for Facility P4-1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	3.29 %
Normal Depth	0.40 ft
Discharge	25.00 cfs



Curb Inlet Sizing Computation

Project Name & Number:	**Sunstone Parcel 3 - Ph-4**
Date:	**5/17/2022**
By:	**CAA**

Westwood

	Notes:		
	Facility ID:	Facility P4-1a & P4-1b	
	Drainage Condition:	Proposed	
	Source of Flow:	Q100 = 1/2 EAA1(4b+2j)	
	Inlet Type:	Type CM2 (Continuous Grade)	
	Inlet Length:	17.5-ft	
	Number of Grates	6	
	Input:	**Variable:**	**Input:**
	Street Flow (cfs)	Q	12.5
	Longitudinal Slope (ft/ft)	S_o	0.0329
	Manning's Coefficient	n	0.016
	Street Flow Velocity (fps)	V	4.93
	Street Flow Depth (ft)	D	0.40
	Street Cross Slope (ft/ft)	S_x	0.02
	Grate Width (ft)	W	1.5
	Grate Depression (in)	D_g	2.0
	Length of Grate (ft)	L_g	14.75
	Length of Curb Opening (ft)	L_c	17.00
	Clogging Factor - Grate (%)	CF_g	50%
	Clogging Factor - Curb (%)	CF_c	50%
	Effective Grate Length (ft)	L_{ge}	7.4
	Effective Curb Opening Length (ft)	L_{ce}	8.50
	Output (Grate):	**Equation:**	**Output (Grate):**
[1]	R_f - Frontal Flow Factor	1-0.09*(V-V_x) if V>V_x; else Frontal Flow Factor=1	1.00
[2]	V_o - Splash Over Velocity (fps)	V_x=p+q*Lg-r*L_{ge}^2+sy*L_{ge}^3 ; where	24.99
		p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate)	
[1]	E - Grate Flow Ratio	Frontal Flow/Side Flow	0.31
[2]	Q_w - Frontal Flow (cfs)	$Q_w = Q[1-(1-(W/T))^{2.67}]$	3.84
[1]	Q_s - Side Flow (cfs)	Q_s = Q-Qw	8.7
	T - Side Flow Spread (ft)	$(D-D_g)/S_x$	11.67
[1]	R_s - Side Flow Factor	$1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$	0.43
[1]	Q_{gi} - Intercepted Flow (cfs)	$(R_f*E+R_s*(1-E))*Q$	7.5
	Output (Curb):	**Equation:**	**Output (Curb):**
[1]	S_e - Equivalent Cross Slope (ft/ft)	S_x+S_g*E	0.054
	Q_{sx} - Remaining Flow After Grate Interception (cfs)	$Q-Q_{gi}$	4.953
	S_g - Gutter Cross Slope (ft/ft)	D_g/W	0.111
[1]	L_t - Effective Interception Length (ft)	$0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$	29.00
[1]	Q_{ci} - Intercepted Flow (cfs)	$(1-(1-L_{ce}/L_t)^{1.8})*Q_{sx}$	2.3
		or Q_{sx} if L_t is less than L_{ce}	
	Output (Combination):	**Equation:**	**Output (Combination):**
	Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	**10.00**
	Bypass Flow (cfs)	Street Flow - Total Intercepted Flow	**2.50**

[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-4**
Date:	**5/17/2022**
By:	**CAA**

Westwood

Notes:		
Facility ID:	Facility 4-5	
Drainage Condition	Proposed	
Source of Flow	Q100 = (Facility DI#4+P4-1a+P4-1b) Bypass+EAA1(2j+4a)	
Design Flow (cfs)	Q100=1.5+17+2.5+2.5=22.5cfs	
Inlet Type:	Type CM2 (Sump)	
Inlet Length:	12.5-ft	
Number of Grates:	4	
Input:	**Variable:**	**Input:**
Depth at Inlet (ft)	D	0.67
Grate Width (ft)	W	1.50
Length of Grate (ft)	L_g	9.75
Length of Curb Opening (ft)	L_c	12.00
Height of Curb Opening (ft)	H	0.50
Weir Coef. - Curb Opening	W_c	2.3
Weir Coef. - Grate	W_g	3.0
Orifice Coef.	O_c	0.67
Grate Coef.	G_c	0.60
Clogging Factor - Grate (%)	CF_g	50
Clogging Factor - Curb (%)	CF_c	50
Output (Grate):	**Equation:**	**Output (Grate):**
Effective Weir Length (ft)	$2*W+L_g$	12.75
Adjusted Effective Weir Length (ft)	$2*(1-CF_g/100)*W+(1-CF_g/100)*L_g$	6.38
Grate Open Area (sf)	$W*L_g$	14.63
Adjusted Grate Open Area (sf)	Grate Open Area * $G_c*(1-CF_g/100)$	4.39
Controlling Flow Type (weir/orifice)	If D<1.792*(Adj. Grate Open Area/Adj. Eff. Length)	weir
	use weir, else orifice	
Intercepted Flow (cfs)	weir: $W_g*(\text{Adj. Eff. Weir Length})*D^{1.5}$	10.4
	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	14.70
Adjusted Effective Weir Length (ft)	$L+1.8(1-CF_c/100)*W$	13.41
Curb Open Area (sf)	L*H	6.00
Adjusted Curb Open Area (sf)	Curb Open Area * $(1-CF_c/100)$	3.00
Controlling Flow Type (weir/orifice)	If D<H, weir, else orifice	orifice
Intercepted Flow (cfs)	weir: $W_c*(\text{Adj. Eff. Weir Length})*D^{1.5}$	13.13
	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)	**23.5**

Worksheet for Facility P4-12 & P4-15

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.51 %
Discharge	16.00 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	0.39 ft
Roughness Coefficient	0.016
Elevation	0.39 ft
Elevation Range	0.00 to 0.48 ft
Flow Area	4.9 ft²
Wetted Perimeter	31.87 ft
Hydraulic Radius	0.15 ft
Top Width	31.64 ft

Worksheet for Facility P4-12 & P4-15

Results	
Normal Depth	0.39 ft
Critical Depth	0.44 ft
Critical Slope	0.66 %
Velocity	3.27 ft/s
Velocity Head	0.17 ft
Specific Energy	0.56 ft
Froude Number	1.468
Flow Type	Supercritical

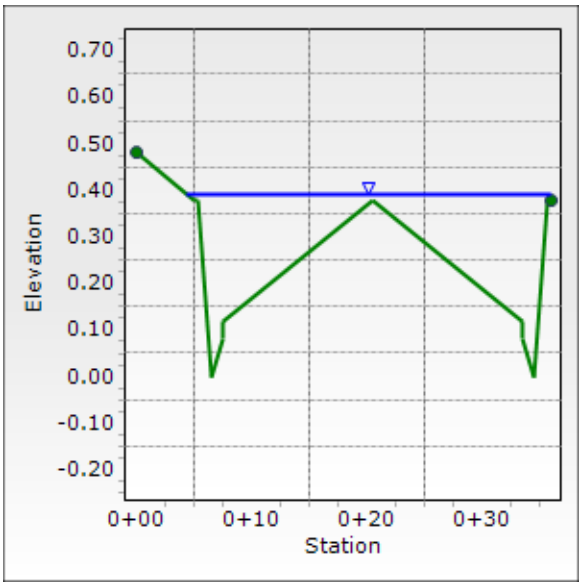
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.39 ft
Critical Depth	0.44 ft
Channel Slope	1.51 %
Critical Slope	0.66 %

Cross Section for Facility P4-12 & P4-15

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.51 %
Normal Depth	0.39 ft
Discharge	16.00 cfs



Curb Inlet Sizing Computation

Project Name & Number:	**Sunstone Parcel 3 - Ph-4**
Date:	**5/17/2022**
By:	**CAA**

Westwood

Notes:		
Facility ID:	Facility P4-8 & P4-10	
Drainage Condition	Proposed	
Source of Flow	Q100 = 1/2 of EAA2(4a+4b)	
Design Flow (cfs)	7.5	
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-4**
Date:	**5/17/2022**
By:	**CAA**

Westwood

	Notes:		
	Facility ID:	Facility P4-12 & P4-15	
	Drainage Condition:	Proposed	
	Source of Flow:	Q100 = 1/2 of EAA2(4c)=1//2(16)=8cfs	
	Inlet Type:	Type CM2 (Continuous Grade)	
	Inlet Length:	15.-ft	
	Number of Grates	5	
	Input:	**Variable:**	**Input:**
	Street Flow (cfs)	Q	8.0
	Longitudinal Slope (ft/ft)	S_o	0.0151
	Manning's Coefficient	n	0.016
	Street Flow Velocity (fps)	V	3.27
	Street Flow Depth (ft)	D	0.39
	Street Cross Slope (ft/ft)	S_x	0.02
	Grate Width (ft)	W	1.5
	Grate Depression (in)	D_g	2.0
	Length of Grate (ft)	L_g	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	0.32
[2]	Q_w - Frontal Flow (cfs)	$Q_w = Q[1-(1-(W/T))^{2.67}]$	2.56
[1]	Q_s - Side Flow (cfs)	Q_s = Q-Qw	5.4
	T - Side Flow Spread (ft)	$(D-D_g)/S_x$	11.17
[1]	R_s - Side Flow Factor	$1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$	0.51
[1]	Q_{gi} - Intercepted Flow (cfs)	$(R_f*E+R_s*(1-E))*Q$	5.3
	Output (Curb):	**Equation:**	**Output (Curb):**
[1]	S_e - Equivalent Cross Slope (ft/ft)	S_x+S_g*E	0.056
	Q_{sx} - Remaining Flow After Grate Interception (cfs)	$Q-Q_{gi}$	2.693
	S_g - Gutter Cross Slope (ft/ft)	D_g/W	0.111
[1]	L_t - Effective Interception Length (ft)	$0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$	17.52
[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)	**7**
	Bypass Flow (cfs)	Street Flow - Total Intercepted Flow	**1**

[1] Formula referenced from the CCRFCD Manual

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

Worksheet for Facility P4-17

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.33 %
Discharge	25.50 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	0.46 ft
Roughness Coefficient	0.016
Elevation	0.46 ft
Elevation Range	0.00 to 0.48 ft
Flow Area	7.0 ft²
Wetted Perimeter	35.09 ft
Hydraulic Radius	0.20 ft
Top Width	34.79 ft

Worksheet for Facility P4-17

Results	
Normal Depth	0.46 ft
Critical Depth	0.51 ft
Critical Slope	0.60 %
Velocity	3.65 ft/s
Velocity Head	0.21 ft
Specific Energy	0.66 ft
Froude Number	1.438
Flow Type	Supercritical

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

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.46 ft
Critical Depth	0.51 ft
Channel Slope	1.33 %
Critical Slope	0.60 %

Worksheet for Facility P4-17

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	1.00 %
Left Side Slope	2.000 H:V
Right Side Slope	2.000 H:V
Bottom Width	10.00 ft
Discharge	51.00 cfs

Results	
Normal Depth	0.89 ft
Flow Area	10.4 ft²
Wetted Perimeter	13.96 ft
Hydraulic Radius	0.75 ft
Top Width	13.54 ft
Critical Depth	0.88 ft
Critical Slope	1.04 %
Velocity	4.89 ft/s
Velocity Head	0.37 ft
Specific Energy	1.26 ft
Froude Number	0.983
Flow Type	Subcritical

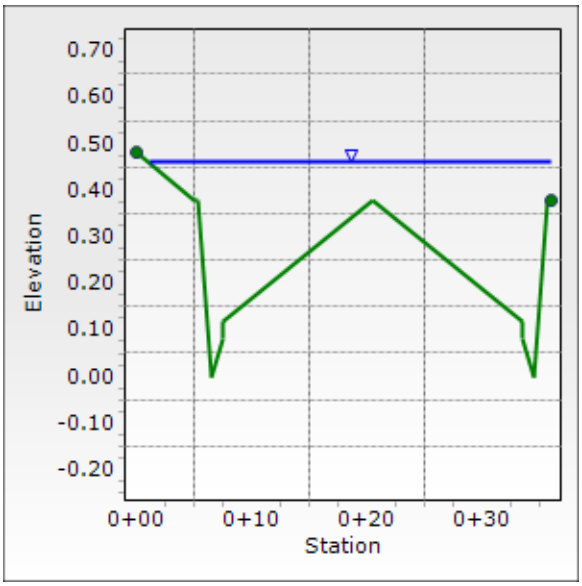
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

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	0.89 ft
Critical Depth	0.88 ft
Channel Slope	1.00 %
Critical Slope	1.04 %

Cross Section for Facility P4-17

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.33 %
Normal Depth	0.46 ft
Discharge	25.50 cfs



Curb Inlet Sizing Computation

Project Name & Number:	**Sunstone Parcel 3 - Ph-4**
Date:	**5/17/2022**
By:	**CAA**

Westwood

	Notes:		
	Facility ID:	Facility P4-17	
	Drainage Condition:	Proposed	
	Source of Flow:	Q100 = 1/2 of (Section 4-7 & Section 4-8) = 1/2(24.5) = 12.25cfs	
	Inlet Type:	Type CM2 (Continuous Grade)	
	Inlet Length:	17.5-ft	
	Number of Grates	6	
	Input:	**Variable:**	**Input:**
	Street Flow (cfs)	Q	12.75
	Longitudinal Slope (ft/ft)	S_o	0.0133
	Manning's Coefficient	n	0.016
	Street Flow Velocity (fps)	V	3.65
	Street Flow Depth (ft)	D	0.46
	Street Cross Slope (ft/ft)	S_x	0.02
	Grate Width (ft)	W	1.5
	Grate Depression (in)	D_g	2.0
	Length of Grate (ft)	L_g	14.75
	Length of Curb Opening (ft)	L_c	17.00
	Clogging Factor - Grate (%)	CF_g	50%
	Clogging Factor - Curb (%)	CF_c	50%
	Effective Grate Length (ft)	L_{ge}	7.4
	Effective Curb Opening Length (ft)	L_{ce}	8.50
	Output (Grate):	**Equation:**	**Output (Grate):**
[1]	R_f - Frontal Flow Factor	1-0.09*(V-V_x) if V>V_x; else Frontal Flow Factor=1	1.00
[2]	V_o - Splash Over Velocity (fps)	V_x=p+q*Lg-r*L_{ge}^2+sy*L_{ge}^3 ; where	24.99
		p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate)	
[1]	E - Grate Flow Ratio	Frontal Flow/Side Flow	0.25
[2]	Q_w - Frontal Flow (cfs)	$Q_w = Q[1-(1-(W/T))^{2.67}]$	3.19
[1]	Q_s - Side Flow (cfs)	Q_s = Q-Qw	9.6
	T - Side Flow Spread (ft)	$(D-D_g)/S_x$	14.67
[1]	R_s - Side Flow Factor	$1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$	0.56
[1]	Q_{gi} - Intercepted Flow (cfs)	$(R_f*E+R_s*(1-E))*Q$	8.6
	Output (Curb):	**Equation:**	**Output (Curb):**
[1]	S_e - Equivalent Cross Slope (ft/ft)	S_x+S_g*E	0.048
	Q_{sx} - Remaining Flow After Grate Interception (cfs)	$Q-Q_{gi}$	4.185
	S_g - Gutter Cross Slope (ft/ft)	D_g/W	0.111
[1]	L_t - Effective Interception Length (ft)	$0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$	22.19
[1]	Q_{ci} - Intercepted Flow (cfs)	$(1-(1-L_{ce}/L_t)^{1.8})*Q_{sx}$	2.4
		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	**1.75**

[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-4**
Date:	**5/17/2022**
By:	**CAA**

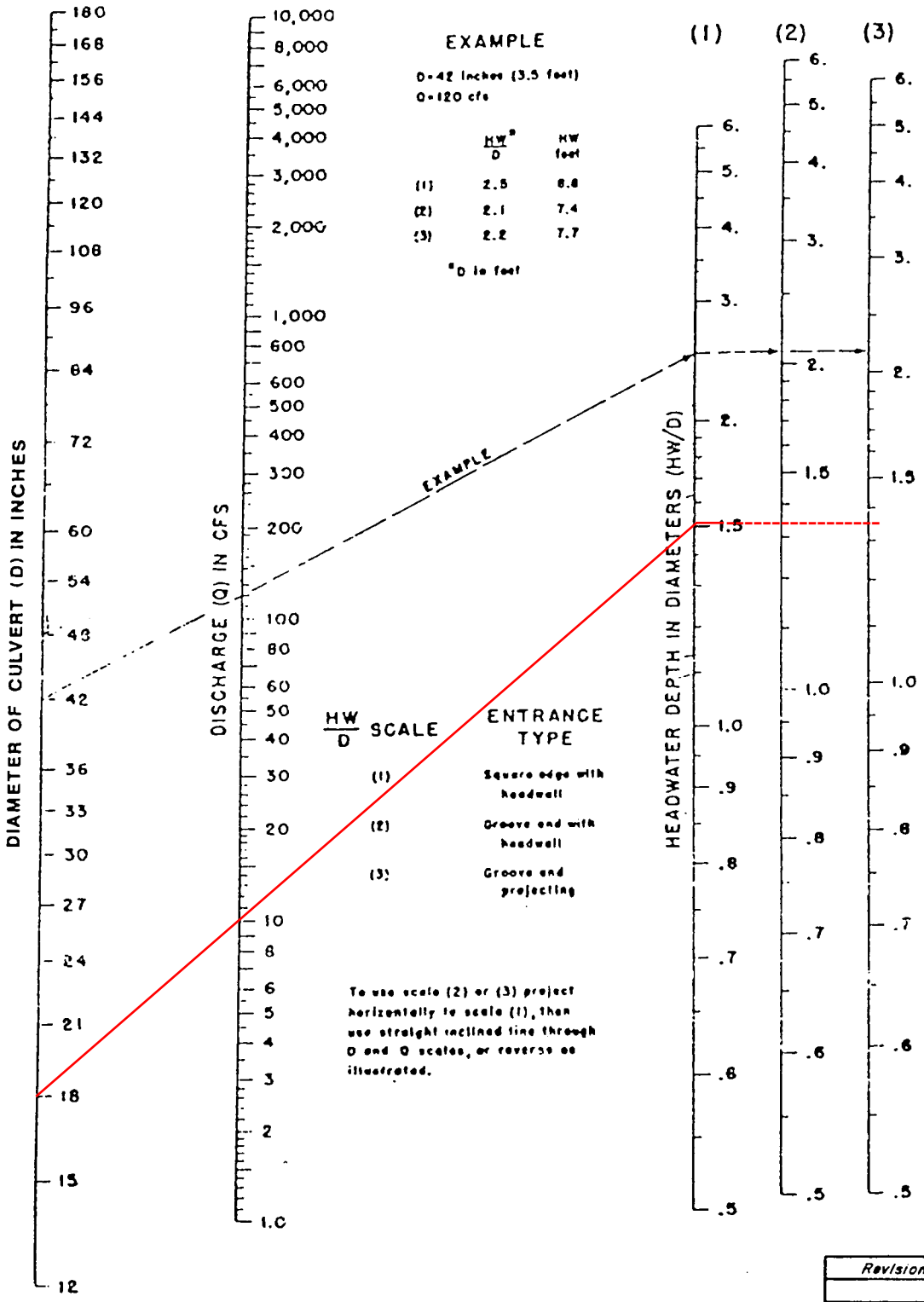
Westwood

Notes:		
Facility ID:	Facility P4-19	
Drainage Condition	Proposed	
Source of Flow	Q100 = Facility P4-16 Bypass+EAA2(4f)	
Design Flow (cfs)	23.5	
Inlet Type:	Type CM2 (Sump)	
Inlet Length:	12.5-ft	
Number of Grates:	4	
Input:	**Variable:**	**Input:**
Depth at Inlet (ft)	D	0.67
Grate Width (ft)	W	1.50
Length of Grate (ft)	L_g	9.75
Length of Curb Opening (ft)	L_c	12.00
Height of Curb Opening (ft)	H	0.50
Weir Coef. - Curb Opening	W_c	2.3
Weir Coef. - Grate	W_g	3.0
Orifice Coef.	O_c	0.67
Grate Coef.	G_c	0.60
Clogging Factor - Grate (%)	CF_g	50
Clogging Factor - Curb (%)	CF_c	50
Output (Grate):	**Equation:**	**Output (Grate):**
Effective Weir Length (ft)	$2*W+L_g$	12.75
Adjusted Effective Weir Length (ft)	$2*(1-CF_g/100)*W+(1-CF_g/100)*L_g$	6.38
Grate Open Area (sf)	$W*L_g$	14.63
Adjusted Grate Open Area (sf)	Grate Open Area * $G_c*(1-CF_g/100)$	4.39
Controlling Flow Type (weir/orifice)	If D<1.792*(Adj. Grate Open Area/Adj. Eff. Length)	weir
	use weir, else orifice	
Intercepted Flow (cfs)	weir: $W_g*(\text{Adj. Eff. Weir Length})*D^{1.5}$	10.4
	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	14.70
Adjusted Effective Weir Length (ft)	$L+1.8(1-CF_c/100)*W$	13.41
Curb Open Area (sf)	L*H	6.00
Adjusted Curb Open Area (sf)	Curb Open Area * $(1-CF_c/100)$	3.00
Controlling Flow Type (weir/orifice)	If D<H, weir, else orifice	orifice
Intercepted Flow (cfs)	weir: $W_c*(\text{Adj. Eff. Weir Length})*D^{1.5}$	13.13
	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)	**23.5**

Inlet Control Nomographs

NOMOGRAPH – INLET CONTROL RCP

P4-1a & P4-1b: Q=10 CFS



HW/D 1.5

D 18

HW 2.3

Revision	Date

WRC ENGINEERING

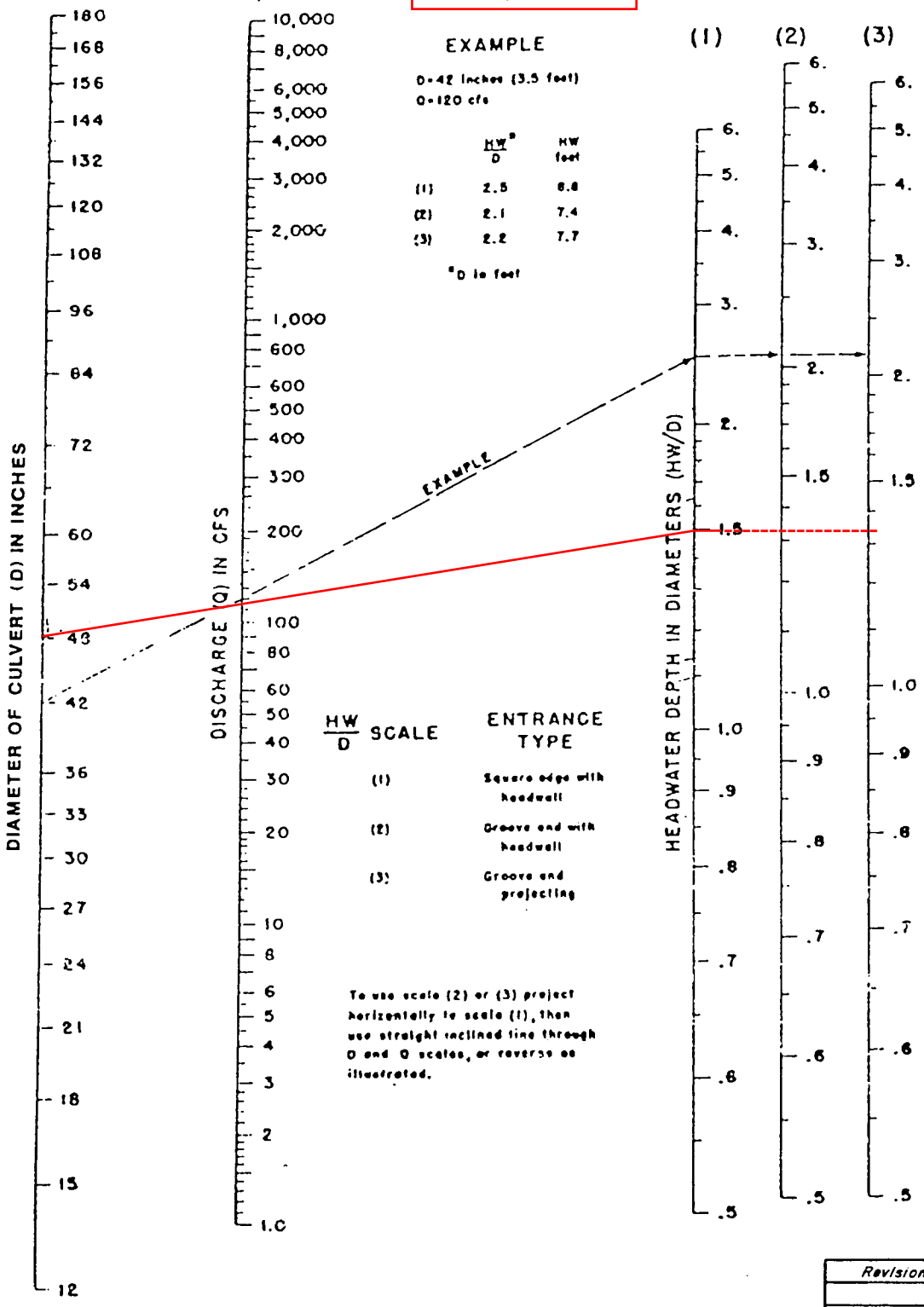
REFERENCE: USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH – INLET CONTROL RCP

P4-5: Q=115 CFS



HW/D 1.5

D 48

HW 2.3

Revision	Date

WRC ENGINEERING

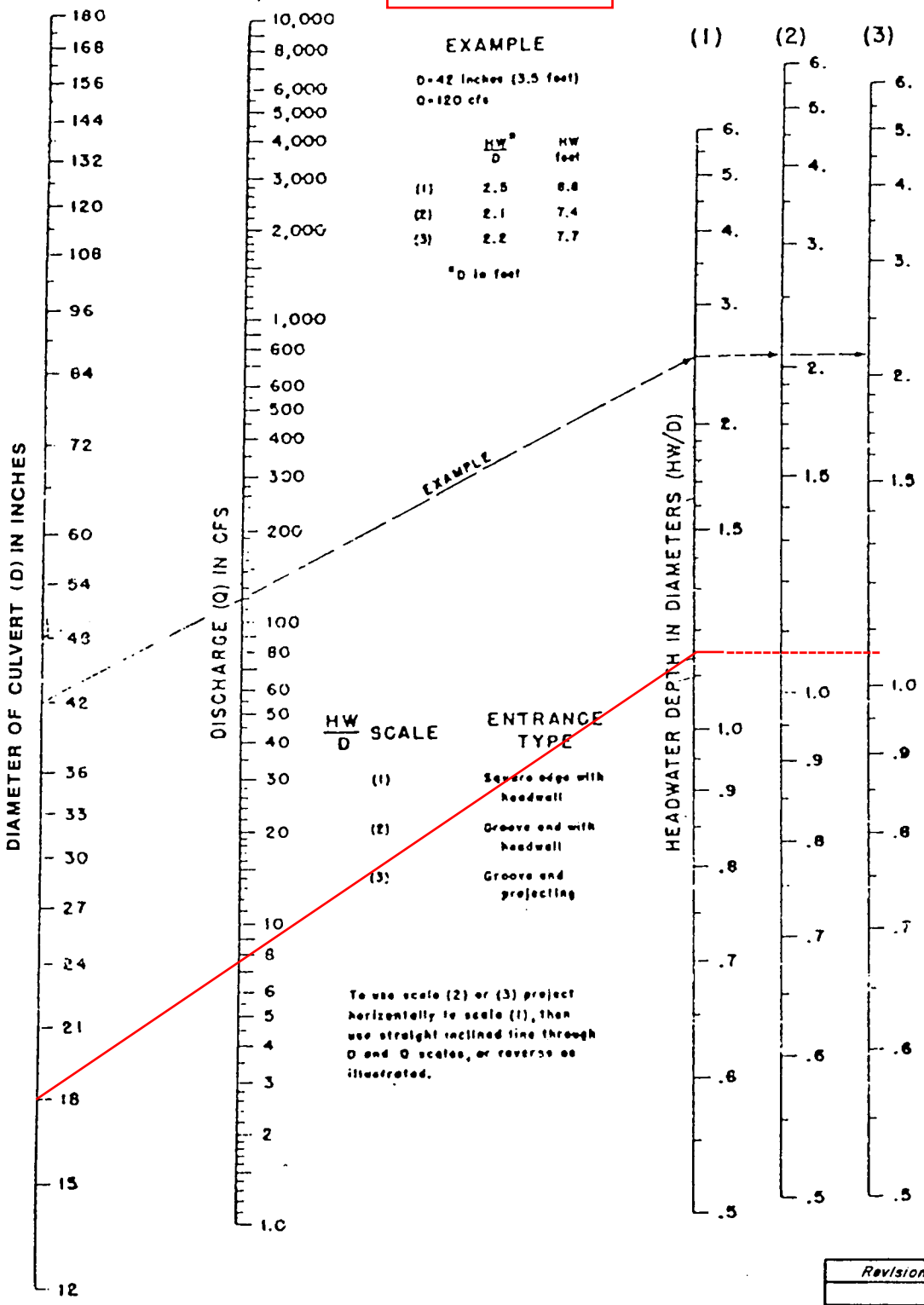
REFERENCE: USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH – INLET CONTROL RCP

P4-8: Q=7.5 CFS



HW/D	1.15
D	18
HW	2.3

Revision	Date

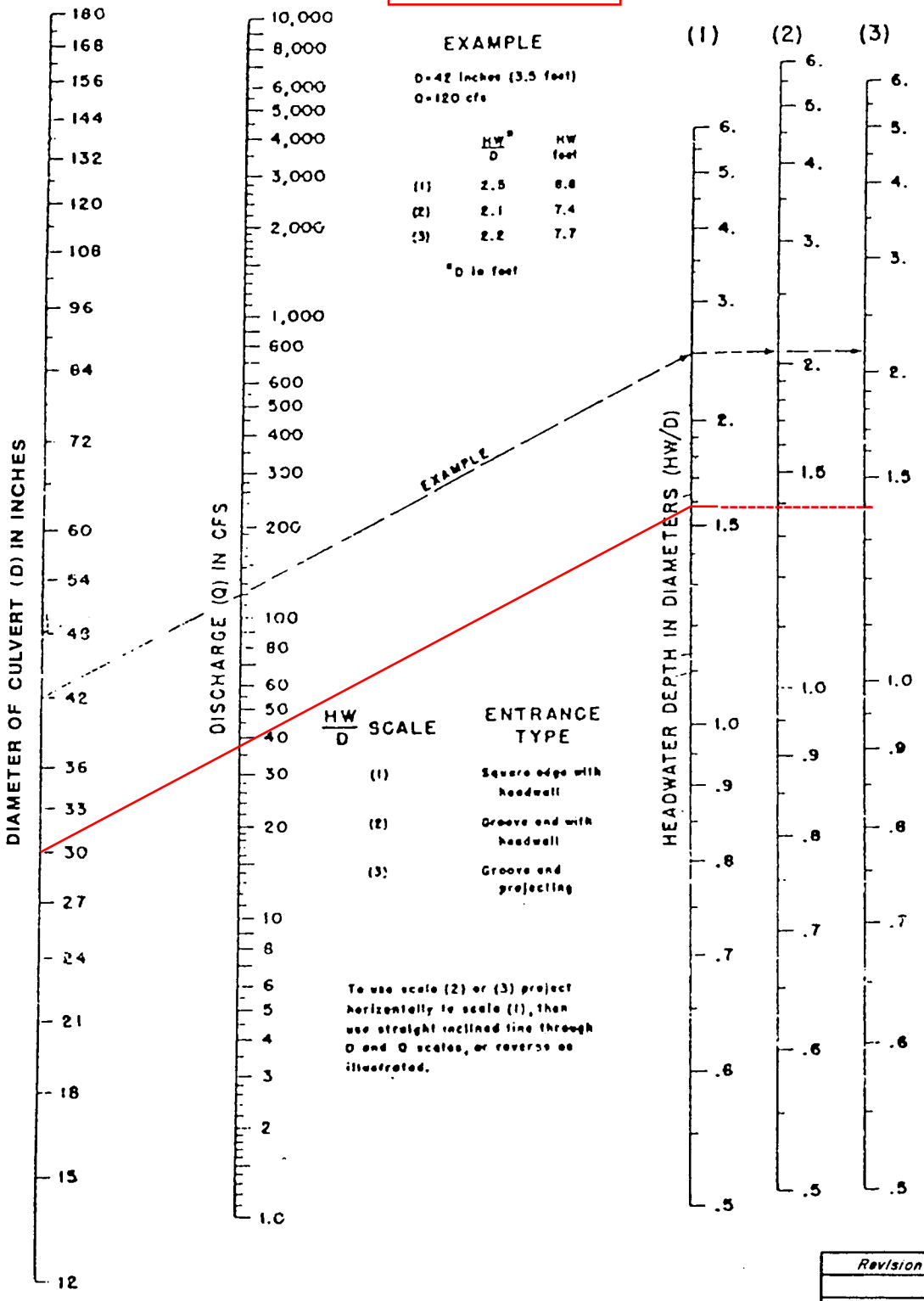
WRC ENGINEERING

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

FIGURE 1005

NOMOGRAPH – INLET CONTROL RCP

P4-10: Q=37 CFS



HW/D 1.6

D 30

HW 2.3

Revision	Date

WRC ENGINEERING

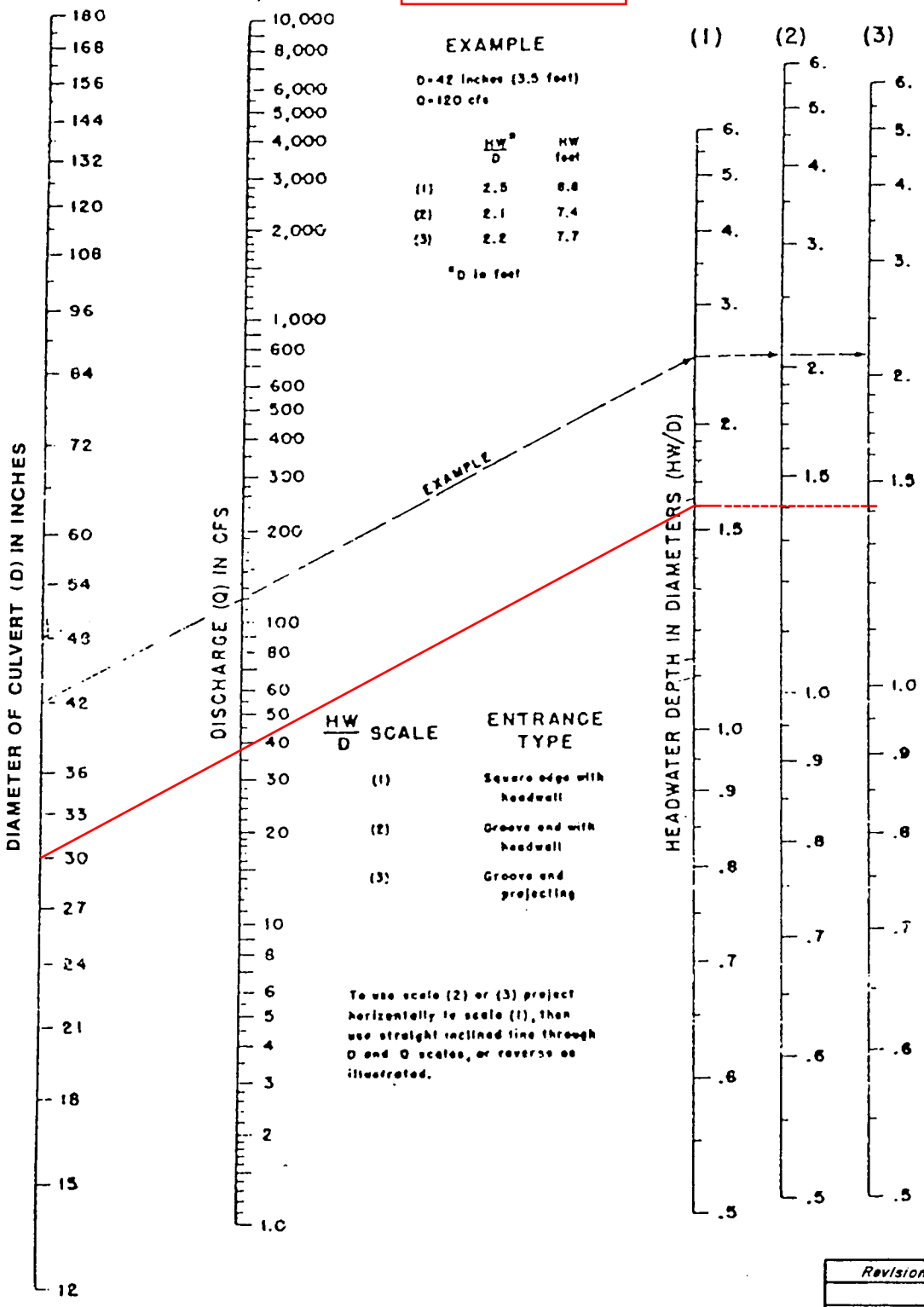
REFERENCE: USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH – INLET CONTROL RCP

P4-12: Q=37 CFS



HW/D	1.6
D	30
HW	2.3

Revision	Date

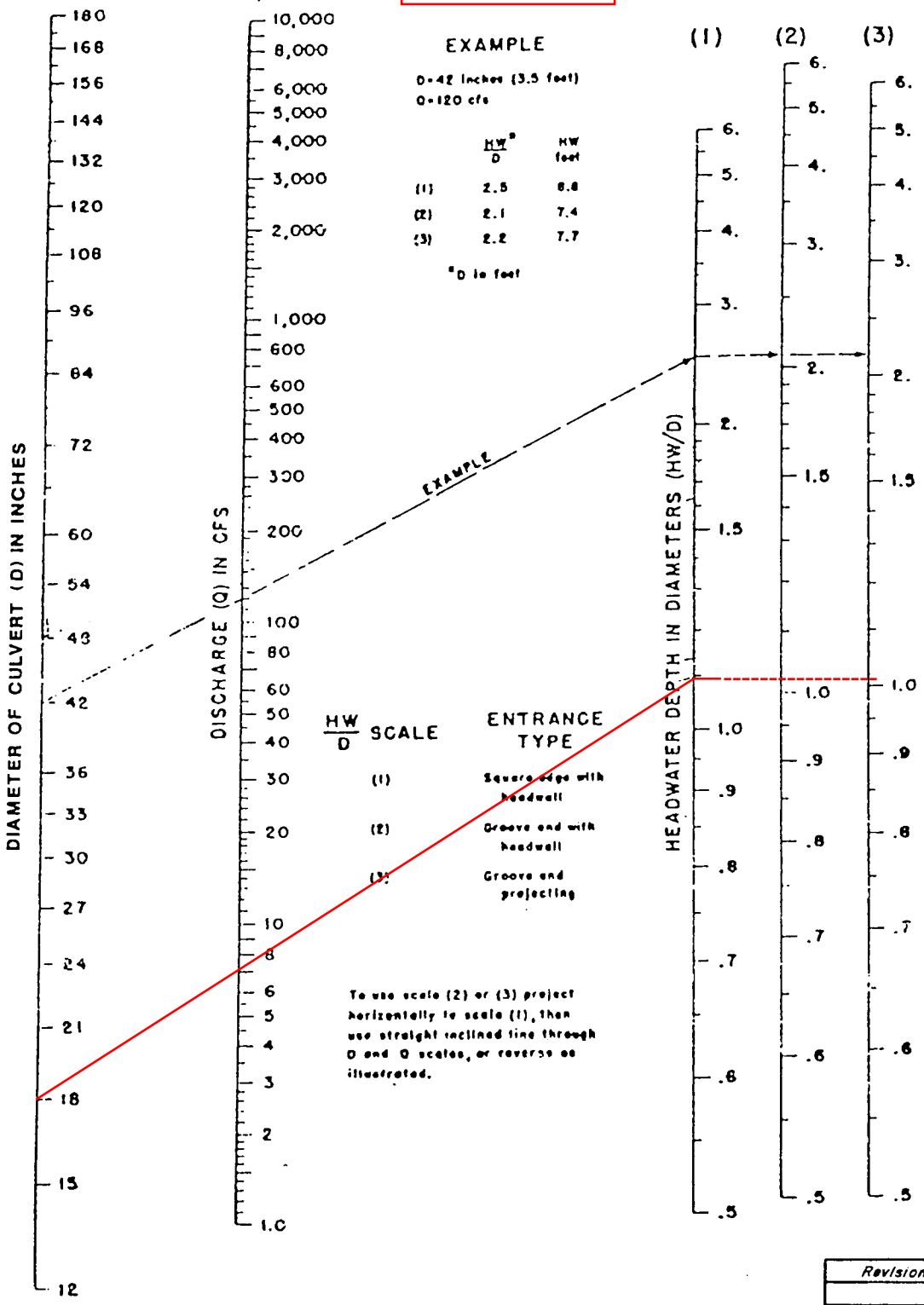
WRC ENGINEERING

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

FIGURE 1005

NOMOGRAPH – INLET CONTROL RCP

P4-14: Q=7 CFS



HW/D 1.1

D 18

HW 2.3

Revision	Date

WRC ENGINEERING

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

FIGURE 1005

WSPG Model - NORTH

Ultimate Condition WSPG Summary

PHASE 4A NORTH MODEL (PH4N.WSW): CONNECTING PH3 AND NCR2 STORM DRAIN

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.										
-405.67	N/A	P-4	48" RCP	2714.73	113.00	2722.82	8.99	2726.49		OK
-341.46	35+48.28	P-4	48" RCP	2715.38	113.00	2723.33	8.99	2727.01		OK
-338.96		P-4	48" RCP	2715.40	113.00	2723.37	8.99			OK
-307.87	35+10.42 & 35+14.69	P-4	48" RCP	2721.04	113.00	2723.55	13.60	2731.79	Facility P4-5	OK
-305.37		P-4	48" RCP	2721.54	113.00	2724.75	10.45	2731.79		OK
-301.09		P-4	42" RCP	2722.04	90.50	2725.78	9.41	2731.79		OK
-291.80	34+98.81	P-4	42" RCP	2722.15	90.50	2725.99	9.41	2731.79		OK
-289.30		P-4	42" RCP	2722.18	90.50	2726.07	9.41	2731.79		OK
-286.80		P-4	42" RCP	2722.21	90.50	2726.14	9.41	2731.79		OK
-223.00	27+33.91	P-4	42" RCP	2723.00	90.50	2725.17	14.41	2731.79	Connection to PH4-L Model	OK
-220.50		P-4	36" RCP	2723.61	70.50	2725.20	18.60	2733.91		OK
-183.20	27+35.23	P-4	36" RCP	2725.26	70.50	2726.89	17.95	2735.23		OK
259.77	27+49.72	P-3	36" RCP	2740.23	70.50	2741.88	17.73	2749.72		OK
518.88	26+90.35	P-2	36" RCP	2748.71	70.50	2750.37	17.63	2758.20		OK
665.46	25+43.73	P-2	36" RCP	2753.50	70.50	2755.19	17.13	2763.00		OK
833.66	23+75.73	P-1	36" RCP	2759.00	70.50	2761.04	13.79	2768.49		OK
995.00	22+14.58	P-1	36" RCP	2761.35	70.50	2763.07	16.85	2773.77		OK
1055.61	21+52.86	P-1	36" RCP	2763.28	70.50	2765.06	16.19	2776.01	Connection to PH3 Model	OK
1060.61		P-1	30" RCP	2763.78	53.50	2765.41	15.76	2776.01		OK

```
T1 SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
T2 PHASE 4A NORTH MODEL (PH4N.WSW)
T3 CONNECTING PH3 AND NCR2 STORM DRAIN
SO   -405.6702714.730 48                          2722.820
R    -341.4602715.375 48      .013                                      12.0   1
R    -338.9602715.400 48      .013                                       5.0
R    -307.8702721.039 48      .013                                      14.0   1
R    -305.3702721.540 48      .013                                      13.0
JX   -301.0902722.040 42 42   .013   22.5           2722.040         90.0
R    -291.8002722.151 42      .013                                      13.0   1
R    -289.3002722.180 42      .013                                      13.0
R    -286.8002722.210 42      .013                                      12.0
R    -223.0002723.000 42      .013                                       2.0   1
JX   -220.5002723.611 36 18   .013   20.0           2724.500         90.0
R    -183.2002725.260 36      .013                                       2.0   1
R     259.7702740.230 36      .013                                       0.0   1
R     518.8802748.710 36      .013                                       1.0   1
R     665.4602753.500 36      .013                                       1.0   1
R     833.6602759.000 36      .013                                       1.0   1
R     995.0002761.350 36      .013                                             1
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  42  4   1   0.000   3.500    0.000 0.000 0.000  0.0000.00  0.00
CD  48  4   1   0.000   4.000    0.000 0.000 0.000  0.0000.00  0.00
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
```

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	42	4	1		3.500														
CD	48	4	1		4.000														
CD	36	4	1		3.000														
CD	30	4	1		2.500														
CD	24	4	1		2.000														
CD	18	4	1		1.500														

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A

HEADING LINE NO 2 IS -
PHASE 4A NORTH MODEL (PH4N.WSW)

HEADING LINE NO 3 IS -
CONNECTING PH3 AND NCR2 STORM DRAIN

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

	STATION	INVERT	SECT	W S ELEV
U/S DATA	-405.670	2714.730	48	2722.820

ELEMENT NO 2 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-341.460	2715.375	48	.013	.000	.000	12.000	1

ELEMENT NO 3 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-338.960	2715.400	48	.013	.000	.000	5.000	0

ELEMENT NO 4 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-307.870	2721.039	48	.013	.000	.000	14.000	1

ELEMENT NO 5 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-305.370	2721.540	48	.013	.000	.000	13.000	0

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

	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
U/S DATA	-301.090	2722.040	42	42	0	.013	22.500	.000	2722.040	.000	90.000	.000

	RADIUS	ANGLE
	.000	.000

ELEMENT NO 7 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-291.800	2722.151	42	.013	.000	.000	13.000	1

ELEMENT NO 8 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-289.300	2722.180	42	.013	.000	.000	13.000	0

ELEMENT NO 9 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-286.800	2722.210	42	.013	.000	.000	12.000	0

ELEMENT NO 10 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-223.000	2723.000	42	.013	.000	.000	2.000	1

ELEMENT NO 11 IS A JUNCTION * * * * * * *

	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
U/S DATA	-220.500	2723.611	36	18	0	.013	20.000	.000	2724.500	.000	90.000	.000

	RADIUS	ANGLE
	.000	.000

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 12 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-183.200	2725.260	36	.013	.000	.000	2.000	1

ELEMENT NO 13 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	259.770	2740.230	36	.013	.000	.000	.000	1

ELEMENT NO 14 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	518.880	2748.710	36	.013	.000	.000	1.000	1

ELEMENT NO 15 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	665.460	2753.500	36	.013	.000	.000	1.000	1

ELEMENT NO 16 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	833.660	2759.000	36	.013	.000	.000	1.000	1

ELEMENT NO 17 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	995.000	2761.350	36	.013	.000	.000	.000	1

ELEMENT NO 18 IS A REACH * * *

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

ELEMENT NO 19 IS A JUNCTION * * * * * * *

	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
U/S DATA	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 20 IS A REACH * * *

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

ELEMENT NO 21 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA								

```
                          1203.370 2768.420   30              .013                        .000     .000    15.000     0
ELEMENT NO  22 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  23 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
                                              W S P G W                                                      PAGE NO   4
                       WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO  24 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  25 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
ELEMENT NO  26 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  27 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  28 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  29 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  30 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  31 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  32 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  33 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   -2.000
                                                                                          RADIUS    ANGLE
                                                                                            .000     .001
                                              W S P G W                                                      PAGE NO   5
                       WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO  34 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  35 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
ELEMENT NO  36 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  37 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  38 IS A REACH           *         *     *
                  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  39 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  40 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  41 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  42 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  43 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  44 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  45 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  46 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
                                              W S P G W                                                      PAGE NO   6
                       WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO  47 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  48 IS A JUNCTION        *         *     *     *               *                  *              *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
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                          2426.120 2777.220   18    18     0   .013    11.500      .000  2770.140      .000  90.000     .000
                                                                                          RADIUS    ANGLE
                                                                                            .000    .000
ELEMENT NO  49 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  50 IS A SYSTEM HEADWORKS                 *                    *
                  U/S DATA   STATION    INVERT  SECT                                W S ELEV
                          2463.250 2778.310   18                                      .000
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WATER SURFACE PROFILE LISTING Date: 5-17-2022 Time: 2:35:36

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
PHASE 4A NORTH MODEL (PH4N.WSW)
CONNECTING PH3 AND NCR2 STORM DRAIN

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
-405.670	2714.730	8.090	2722.820	113.00	8.99	1.26	2724.08	.00	3.21	.00	4.000	.000	.00	1 .0
64.210	.0100					.0062	.40	8.09	.00	2.67	.013	.00	.00	PIPE
-341.460	2715.375	7.955	2723.330	113.00	8.99	1.26	2724.59	.00	3.21	.00	4.000	.000	.00	1 .0
2.500	.0100					.0062	.02	7.95	.00	2.68	.013	.00	.00	PIPE
-338.960	2715.400	7.966	2723.366	113.00	8.99	1.26	2724.62	.00	3.21	.00	4.000	.000	.00	1 .0
15.319	.1814					.0062	.09	7.97	.00	1.16	.013	.00	.00	PIPE
-323.641	2718.178	5.349	2723.527	113.00	8.99	1.26	2724.78	.00	3.21	.00	4.000	.000	.00	1 .0
HYDRAULIC JUMP														
-323.641	2718.178	1.862	2720.041	113.00	19.71	6.03	2726.07	.00	3.21	3.99	4.000	.000	.00	1 .0
2.540	.1814					.0301	.08	1.86	2.90	1.16	.013	.00	.00	PIPE
-321.101	2718.639	1.917	2720.556	113.00	18.98	5.60	2726.15	.00	3.21	4.00	4.000	.000	.00	1 .0
2.823	.1814					.0269	.08	1.92	2.74	1.16	.013	.00	.00	PIPE
-318.278	2719.151	1.990	2721.141	113.00	18.10	5.09	2726.23	.00	3.21	4.00	4.000	.000	.00	1 .0
2.449	.1814					.0237	.06	1.99	2.55	1.16	.013	.00	.00	PIPE
-315.829	2719.595	2.066	2721.662	113.00	17.26	4.62	2726.29	.00	3.21	4.00	4.000	.000	.00	1 .0
2.121	.1814					.0209	.04	2.07	2.38	1.16	.013	.00	.00	PIPE
-313.708	2719.980	2.146	2722.126	113.00	16.45	4.20	2726.33	.00	3.21	3.99	4.000	.000	.00	1 .0
1.829	.1814					.0184	.03	2.15	2.21	1.16	.013	.00	.00	PIPE

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WATER SURFACE PROFILE LISTING Date: 5-17-2022 Time: 2:35:36

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
PHASE 4A NORTH MODEL (PH4N.WSW)
CONNECTING PH3 AND NCR2 STORM DRAIN

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
-311.880	2720.312	2.230	2722.542	113.00	15.69	3.82	2726.36	.00	3.21	3.97	4.000	.000	.00	1 .0
1.567	.1814					.0163	.03	2.23	2.05	1.16	.013	.00	.00	PIPE
-310.313	2720.596	2.319	2722.915	113.00	14.96	3.47	2726.39	.00	3.21	3.95	4.000	.000	.00	1 .0
1.330	.1814					.0144	.02	2.32	1.91	1.16	.013	.00	.00	PIPE
-308.983	2720.837	2.413	2723.250	113.00	14.26	3.16	2726.41	.00	3.21	3.91	4.000	.000	.00	1 .0
1.113	.1814					.0127	.01	2.41	1.77	1.16	.013	.00	.00	PIPE
-307.870	2721.039	2.512	2723.551	113.00	13.60	2.87	2726.42	.00	3.21	3.87	4.000	.000	.00	1 .0
.444	.2004					.0116	.01	2.51	1.63	1.13	.013	.00	.00	PIPE
-307.426	2721.128	2.566	2723.694	113.00	13.27	2.73	2726.43	.00	3.21	3.84	4.000	.000	.00	1 .0
.733	.2004					.0106	.01	2.57	1.57	1.13	.013	.00	.00	PIPE
-306.693	2721.275	2.675	2723.950	113.00	12.65	2.49	2726.44	.00	3.21	3.77	4.000	.000	.00	1 .0
.570	.2004					.0094	.01	2.68	1.45	1.13	.013	.00	.00	PIPE
-306.123	2721.389	2.792	2724.181	113.00	12.06	2.26	2726.44	.00	3.21	3.67	4.000	.000	.00	1 .0
.411	.2004					.0084	.00	2.79	1.33	1.13	.013	.00	.00	PIPE
-305.712	2721.472	2.919	2724.390	113.00	11.50	2.05	2726.44	.00	3.21	3.55	4.000	.000	.00	1 .0

.253	.2004					.0075	.00	2.92	1.22	1.13	.013	.00	.00	PIPE			
-305.458	2721.522	3.057	2724.579	113.00	10.97	1.87	2726.45	.00	3.21	3.40	4.000	.000	.00	1	.0		
.088	.2004					.0068	.00	3.06	1.11	1.13	.013	.00	.00	PIPE			

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WATER SURFACE PROFILE LISTING Date: 5-17-2022 Time: 2:35:36

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
PHASE 4A NORTH MODEL (PH4N.WSW)
CONNECTING PH3 AND NCR2 STORM DRAIN

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
-305.370	2721.540	3.210	2724.750	113.00	10.45	1.70	2726.45	.00	3.21	3.18	4.000	.000	.00	1 .0
JUNCT STR	.1168					.0073	.03	3.21	1.00		.013	.00	.00	PIPE
-301.090	2722.040	3.744	2725.784	90.50	9.41	1.37	2727.16	.00	2.95	.00	3.500	.000	.00	1 .0
9.290	.0119					.0081	.08	3.74	.00	2.42	.013	.00	.00	PIPE
-291.800	2722.151	3.836	2725.987	90.50	9.41	1.37	2727.36	.00	2.95	.00	3.500	.000	.00	1 .0
2.500	.0116					.0081	.02	3.84	.00	2.44	.013	.00	.00	PIPE
-289.300	2722.180	3.887	2726.066	90.50	9.41	1.37	2727.44	.00	2.95	.00	3.500	.000	.00	1 .0
2.500	.0120					.0081	.02	3.89	.00	2.41	.013	.00	.00	PIPE
-286.800	2722.210	3.931	2726.141	90.50	9.41	1.37	2727.51	.00	2.95	.00	3.500	.000	.00	1 .0
45.246	.0124					.0081	.37	3.93	.00	2.39	.013	.00	.00	PIPE
-241.553	2722.770	3.792	2726.563	90.50	9.41	1.37	2727.94	.00	2.95	.00	3.500	.000	.00	1 .0
HYDRAULIC JUMP														
-241.553	2722.770	2.191	2724.961	90.50	14.28	3.17	2728.13	.00	2.95	3.39	3.500	.000	.00	1 .0
18.553	.0124					.0160	.30	2.19	1.84	2.39	.013	.00	.00	PIPE
-223.000	2723.000	2.174	2725.174	90.50	14.41	3.23	2728.40	.00	2.95	3.40	3.500	.000	.00	1 .0
JUNCT STR	.2444					.0266	.07	2.17	1.87		.013	.00	.00	PIPE
-220.500	2723.611	1.585	2725.196	70.50	18.60	5.37	2730.57	.00	2.66	3.00	3.000	.000	.00	1 .0
37.300	.0442					.0355	1.32	1.59	2.91	1.50	.013	.00	.00	PIPE

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SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
PHASE 4A NORTH MODEL (PH4N.WSW)
CONNECTING PH3 AND NCR2 STORM DRAIN

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
-183.200	2725.260	1.631	2726.891	70.50	17.95	5.00	2731.89	.00	2.66	2.99	3.000	.000	.00	1 .0
246.730	.0338					.0338	8.34	1.63	2.76	1.63	.013	.00	.00	PIPE
63.530	2733.598	1.631	2735.229	70.50	17.95	5.00	2740.23	.00	2.66	2.99	3.000	.000	.00	1 .0
196.240	.0338					.0333	6.53	1.63	2.76	1.63	.013	.00	.00	PIPE
259.770	2740.230	1.648	2741.877	70.50	17.73	4.88	2746.76	.00	2.66	2.99	3.000	.000	.00	1 .0
62.195	.0327					.0327	2.04	1.65	2.71	1.65	.013	.00	.00	PIPE
321.965	2742.265	1.648	2743.913	70.50	17.73	4.88	2748.79	.00	2.66	2.99	3.000	.000	.00	1 .0
196.915	.0327					.0325	6.40	1.65	2.71	1.65	.013	.00	.00	PIPE
518.880	2748.710	1.655	2750.365	70.50	17.63	4.83	2755.19	.00	2.66	2.98	3.000	.000	.00	1 .0
146.580	.0327					.0311	4.55	1.66	2.68	1.65	.013	.00	.00	PIPE
665.460	2753.500	1.694	2755.194	70.50	17.13	4.56	2759.75	.00	2.66	2.97	3.000	.000	.00	1 .0
51.839	.0327					.0289	1.50	1.69	2.57	1.65	.013	.00	.00	PIPE
717.299	2755.195	1.731	2756.926	70.50	16.69	4.33	2761.25	.00	2.66	2.96	3.000	.000	.00	1 .0

50.908	.0327						.0263	1.34	1.73	2.46	1.65	.013	.00	.00	PIPE				
768.207	2756.860	1.801	2758.660	70.50	15.91	3.93	2762.59	.00	2.66	2.94	3.000	.000	.00	1	.0				
30.221	.0327						.0233	.70	1.80	2.28	1.65	.013	.00	.00	PIPE				
798.428	2757.848	1.875	2759.722	70.50	15.17	3.58	2763.30	.00	2.66	2.90	3.000	.000	.00	1	.0				
20.487	.0327						.0207	.42	1.87	2.11	1.65	.013	.00	.00	PIPE				

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SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
PHASE 4A NORTH MODEL (PH4N.WSW)
CONNECTING PH3 AND NCR2 STORM DRAIN

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	ZR	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall			Type Ch
818.915	2758.518	1.953	2760.471	70.50	14.47	3.25	2763.72	.00	2.66	2.86	3.000	.000	.00	1	.0
14.745	.0327					.0184	.27	1.95	1.95	1.65	.013	.00	.00	PIPE	
833.660	2759.000	2.037	2761.037	70.50	13.79	2.95	2763.99	.00	2.66	2.80	3.000	.000	.00	1	.0
13.143	.0146					.0175	.23	2.04	1.80	2.18	.013	.00	.00	PIPE	
846.803	2759.191	2.020	2761.212	70.50	13.92	3.01	2764.22	.00	2.66	2.81	3.000	.000	.00	1	.0
51.733	.0146					.0188	.97	2.02	1.83	2.18	.013	.00	.00	PIPE	
898.536	2759.945	1.938	2761.882	70.50	14.60	3.31	2765.19	.00	2.66	2.87	3.000	.000	.00	1	.0
38.464	.0146					.0212	.81	1.94	1.98	2.18	.013	.00	.00	PIPE	
937.000	2760.505	1.860	2762.365	70.50	15.31	3.64	2766.01	.00	2.66	2.91	3.000	.000	.00	1	.0
31.286	.0146					.0239	.75	1.86	2.15	2.18	.013	.00	.00	PIPE	
968.286	2760.961	1.787	2762.748	70.50	16.06	4.01	2766.75	.00	2.66	2.94	3.000	.000	.00	1	.0
26.714	.0146					.0270	.72	1.79	2.32	2.18	.013	.00	.00	PIPE	
995.000	2761.350	1.718	2763.068	70.50	16.85	4.41	2767.47	.00	2.66	2.97	3.000	.000	.00	1	.0
60.610	.0318					.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	

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WATER SURFACE PROFILE LISTING Date: 5-17-2022 Time: 2:35:36

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
PHASE 4A NORTH MODEL (PH4N.WSW)
CONNECTING PH3 AND NCR2 STORM DRAIN

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	ZR	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall			Type Ch
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	
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			

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
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			
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			

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
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			
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	

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	
2144.450	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	
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	

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	
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

PHASE 4A NORTH MODEL (PH4N.WSW)

CONNECTING PH3 AND NCR2 STORM DRAIN

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-405.67    .I   CH     W E                                                    .    R
-388.28    .                                                                  .
-370.90    .                                                                  .
-353.51    .                                                                  .
-336.12    .I    CH     WE                                                    .    R
-318.73    .I    CH     WE                                                    .    R
-301.35    .    I    CH W E                                                   .    R
-283.96    .    I  W CH     E                                                 .    R
-266.57    .     I  W CH    E                                                 .    R
-249.18    .      I  WCH    E                                                 .    R
-231.80    .      I  W CH   E                                                 .    R
-214.41    .       I  WC H  E                                                 .    R
-197.02    .       I   WCH  E                                                 .    R
-179.63    .        I  WCH  E                                                 .    R
-162.25    .        I   WCH E                                                 .    R
-144.86    .        I   WCH E                                                 .    R
-127.47    .         I  WCH E                                                 .    R
-110.08    .         I   WH E                                                 .    R
 -92.70    .         I   W HE                                                 .    R
 -75.31    .         I   WCHE                                                 .    R
 -57.92    .         I   WCHE                                                 .    R
 -40.53    .         I    WHE                                                 .    JX
 -23.15    .          I   CH E                                                .    R
  -5.76    .          I   CH E                                                .    R
  11.63    .          I   CHWE                                                .    R
  29.01    .          I   CHW E                                               .    R
  46.40    .           I   CH E                                               .    R
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 63.79    .          I  WCH E                                                    .    R
 81.18    .          I  WCH  E                                                   .    JX
 98.56    .           I W H     E                                                .    R
115.95    .             I  WCH    E                                             .    R
133.34    .                        I W H     E                                  .    R
150.73    .                                                                     .
168.11    .                                                                     .
185.50    .                                                                     .
202.89    .                                                                     .
220.28    .                                                                     .
237.66    .                                                                     .
255.05    .                                                                     .
272.44    .                                 I WCH    E                          .    R
289.83    .                                                                     .
307.21    .                                                                     .
324.60    .                                   I  WCH    E                       .    R
341.99    .                                                                     .
359.38    .                                                                     .
376.76    .                                                                     .
394.15    .                                                                     .
411.54    .                                                                     .
428.92    .                                                                     .
446.31    .                                                                     .
463.70    .                                                                     .
481.09    .                                                                     .
498.47    .                                                                     .
515.86    .                                                                     .
533.25    .                                          I WCH    E                 .    R
550.64    .                                                                     .
568.02    .                                                                     .
585.41    .                                                                     .
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 602.80    .                                                          .
 620.19    .                                                          .
 637.57    .                                                          .
 654.96    .                                                          .
 672.35    .                                    I  WCH   E            .    R
 689.74    .                                                          .
 707.12    .                                                          .
 724.51    .                                     I WCH   E            .    R
 741.90    .                                                          .
 759.29    .                                                          .
 776.67    .                                      I  WH   E           .    R
 794.06    .                                                          .
 811.45    .                                      I  WCH  E           .    R
 828.83    .                                       I  WCH  E          .    R
 846.22    .                                       I  WH  E           .    R
 863.61    .                                       I  WCH E           .    R
 881.00    .                                                          .
 898.38    .                                                          .
 915.77    .                                        I  WCH  E         .    R
 933.16    .                                                          .
 950.55    .                                         I  WH   E        .    R
 967.93    .                                                          .
 985.32    .                                          I W H   E       .    R
1002.71    .                                          I  WCH   E      .    R
1020.10    .                                                          .
1037.48    .                                                          .
1054.87    .                                                          .
1072.26    .                                             I  WH   E    .    JX
1089.65    .                                              I WH    E   .    R
1107.03    .                                               I WH   E   .    R
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1124.42   .                                                          .
1141.81   .                                                I WH   E  .   R
1159.20   .                                                 I  WH  E  .   R
1176.58   .                                                  I  WH  E .   R
1193.97   .                                                   I WH  E .   R
1211.36   .                                                   I  WH E .   R
1228.74   .                                                   I  WH E .   R
1246.13   .                                                   I  WH E .   R
1263.52   .                                                   I   H E .   R
1280.91   .                                                   I   H E .   R
1298.29   .                                                   I   H E .   R
1315.68   .                                                   I   H  E.   R
1333.07   .                                                   I   H  E.   R
1350.46   .                                                   I   H  E.   R
1367.84   .                                                     I  CH W E .   JX
1385.23   .                                                     I C H    WE .   R
1402.62   .                                                          .
1420.01   .                                                          .
1437.39   .                                                          .
1454.78   .                                                          .
1472.17   .                                                          .
1489.56   .                                                          .
1506.94   .                                                          .
1524.33   .                                                          .
1541.72   .                                                          .
1559.11   .                                                          .
1576.49   .                                                          .
1593.88   .                                                          .
1611.27   .                                                          .
1628.66   .                                                          .
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1646.04    .                                                  I CH   WE          .    R
1663.43    .                                                  I CH   WE          .    R
1680.82    .                                                                      .
1698.20    .                                                                      .
1715.59    .                                                                      .
1732.98    .                                                                      .
1750.37    .                                                                      .
1767.75    .                                                                      .
1785.14    .                                                                      .
1802.53    .                                                                      .
1819.92    .                                                                      .
1837.30    .                                                                      .
1854.69    .                                                                      .
1872.08    .                                                                      .
1889.47    .                                                                      .
1906.85    .                                                                      .
1924.24    .                                                                      .
1941.63    .                                                   I C H  W           .    R
1959.02    .                                                   I C H  W           .    R
1976.40    .                                                                      .
1993.79    .                                                   I  CH  W           .    JX
2011.18    .                                                    I CH WE           .    R
2028.57    .                                                                      .
2045.95    .                                                    I  H  WE          .    R
2063.34    .                                                    I  H  WE          .    R
2080.73    .                                                                      .
2098.11    .                                                     I CH  WE         .    R
2115.50    .                                                     I CH  WE         .    R
2132.89    .                                                                      .
2150.28    .                                                     I CH   WE        .    R
2167.66    .                                                     I  H   WE        .    R
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2185.05 . I H WE . R

2202.44 . I H WE . R

2219.83 . I H WE . R

2237.21 . I H WE . R

2254.60 . I H WE . R

2271.99 . .

2289.38 . .

2306.76 . .

2324.15 . .

2341.54 . .

2358.93 . .

2376.31 . .

2393.70 . .

2411.09 .

Ultimate Condition WSPG Summary

PHASE 4A NORTH LATERAL MODEL (PH4N-L.WSW): LATERAL TO PH4N MODEL

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	10+13.97	P-6	24" RCP	2724.50	20.00	2725.51	12.60	2733.91	Connection to PH4N Model	OK
1019.59	10+13.97	P-6	24" RCP	2725.59	20.00	2726.76	10.47	2734.20		OK
1072.82	10+87.25	P-6	24" RCP	2726.81	20.00	2728.42	7.40	2735.02		OK
1138.72	11+53.69	P-6	24" RCP	2727.21	20.00	2729.05	6.61	2735.65		OK
1199.39	12+19.9	P-6	24" RCP	2727.57	20.00	2729.50	6.43	2736.03		OK
1200.39		P-6	24" RCP	2727.58	20.00	2729.51	6.43	2736.03		OK
1201.39		P-6	24" RCP	2727.58	20.00	2729.52	6.43	2736.03		OK
1202.39		P-6	24" RCP	2727.59	20.00	2729.53	6.43	2736.03		OK
1203.39		P-6	24" RCP	2727.59	20.00	2729.53	6.42	2736.03		OK
1204.39		P-6	24" RCP	2727.60	20.00	2729.54	6.42	2736.03		OK
1260.76	18+62.1	P-5	24" RCP	2728.17	20.00	2729.72	7.63	2736.93	Junction with Facility P4-1b	OK
1261.59		P-5	24" RCP	2728.17	20.00	2729.73	7.60	2736.93		OK
1262.43		P-5	24" RCP	2728.18	20.00	2729.76	7.53	2736.93		OK
1263.26		P-5	24" RCP	2728.19	20.00	2729.80	7.40	2736.93		OK
1265.76		P-5	18" RCP	2728.72	10.00	2730.30	5.66	2736.93		OK
1293.26	9+63.7	P-5	18" RCP	2728.99	10.00	2730.55	5.66	2737.00	Facility P4-1a	OK
1293.26		P-5	18" RCP	2728.99	10.00	2730.55	5.66	2737.00		OK

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T1 SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
T2 PHASE 4A NORTH LATERAL MODEL (PH4N-L.WSW)
T3 LATERAL TO PH4N MODEL
SO   1000.0002724.500 24                          2725.196
R    1019.5902725.590 24      .013                                        8.0   1
R    1072.8202726.810 24      .013                                        2.0   1
R    1138.7202727.210 24      .013                                        2.0   1
R    1199.3902727.570 24      .013                                       15.0   1
R    1200.3902727.576 24      .013                                       15.0
R    1201.3902727.582 24      .013                                       14.0
R    1202.3902727.588 24      .013                                       14.0
R    1203.3902727.594 24      .013                                       14.0
R    1204.3902727.600 24      .013                                       14.0
R    1260.7602728.165 24      .013                                       15.0   1
R    1261.5932728.173 24      .013                                       15.0
R    1262.4272728.182 24      .013                                       15.0
R    1263.2602728.190 24      .013                                       15.0
JX   1265.7602728.715 18 18   .013   10.0           2728.715            54.0
R    1293.2602728.990 18      .013
SH   1293.2602728.990 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            10.000
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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 -

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A

HEADING LINE NO 2 IS -

PHASE 4A NORTH LATERAL MODEL (PH4N-L.WSW)

HEADING LINE NO 3 IS -

LATERAL TO PH4N 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	2724.500	24	2725.196

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1019.590	2725.590	24	.013	.000	.000	8.000	1

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1072.820	2726.810	24	.013	.000	.000	2.000	1

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1138.720	2727.210	24	.013	.000	.000	2.000	1

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1199.390	2727.570	24	.013	.000	.000	15.000	1

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1200.390	2727.576	24	.013	.000	.000	15.000	0

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1201.390	2727.582	24	.013	.000	.000	14.000	0

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1202.390	2727.588	24	.013	.000	.000	14.000	0

ELEMENT NO 9 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1203.390	2727.594	24	.013	.000	.000	14.000	0

ELEMENT NO 10 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1204.390	2727.600	24	.013	.000	.000	14.000	0

ELEMENT NO 11 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1260.760	2728.165	24	.013	.000	.000	15.000	1

ELEMENT NO 12 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1261.593	2728.173	24	.013	.000	.000	15.000	0

ELEMENT NO 13 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1262.427	2728.182	24	.013	.000	.000	15.000	0

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 14 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1263.260	2728.190	24	.013	.000	.000	15.000	0

ELEMENT NO 15 IS A JUNCTION * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1265.760	2728.715	18	18	0	.013	10.000	.000	2728.715	.000	.500	4.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 16 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1293.260	2728.990	18	.013	.000	.000	.000	0

ELEMENT NO 17 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1293.260	2728.990	18	.000

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 5-11-2022 Time: 3:21:35

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
PHASE 4A NORTH LATERAL MODEL (PH4N-L.WSW)
LATERAL TO PH4N 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	2724.500	1.008	2725.508	20.00	12.60	2.47	2727.97	.00	1.61	2.00	2.000	.000	.00	1 .0
6.217	.0556					.0288	.18	1.01	2.49	.85	.013	.00	.00	PIPE
1006.217	2724.846	1.043	2725.889	20.00	12.08	2.26	2728.15	.00	1.61	2.00	2.000	.000	.00	1 .0
5.499	.0556					.0256	.14	1.04	2.34	.85	.013	.00	.00	PIPE
1011.716	2725.152	1.083	2726.235	20.00	11.52	2.06	2728.29	.00	1.61	1.99	2.000	.000	.00	1 .0
4.369	.0556					.0226	.10	1.08	2.17	.85	.013	.00	.00	PIPE
1016.085	2725.395	1.126	2726.521	20.00	10.98	1.87	2728.39	.00	1.61	1.98	2.000	.000	.00	1 .0
3.505	.0556					.0199	.07	1.13	2.02	.85	.013	.00	.00	PIPE
1019.590	2725.590	1.171	2726.760	20.00	10.47	1.70	2728.46	.00	1.61	1.97	2.000	.000	.00	1 .0
6.934	.0229					.0184	.13	1.17	1.87	1.10	.013	.00	.00	PIPE
1026.524	2725.749	1.184	2726.932	20.00	10.33	1.66	2728.59	.00	1.61	1.97	2.000	.000	.00	1 .0
17.390	.0229					.0170	.30	1.18	1.83	1.10	.013	.00	.00	PIPE
1043.914	2726.147	1.232	2727.379	20.00	9.85	1.51	2728.89	.00	1.61	1.95	2.000	.000	.00	1 .0
10.944	.0229					.0151	.17	1.23	1.70	1.10	.013	.00	.00	PIPE
1054.858	2726.398	1.283	2727.681	20.00	9.39	1.37	2729.05	.00	1.61	1.92	2.000	.000	.00	1 .0
7.341	.0229					.0134	.10	1.28	1.57	1.10	.013	.00	.00	PIPE
1062.198	2726.566	1.338	2727.904	20.00	8.96	1.25	2729.15	.00	1.61	1.88	2.000	.000	.00	1 .0
4.962	.0229					.0119	.06	1.34	1.45	1.10	.013	.00	.00	PIPE

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 5-11-2022 Time: 3:21:35

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
PHASE 4A NORTH LATERAL MODEL (PH4N-L.WSW)
LATERAL TO PH4N 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
1067.161	2726.680	1.396	2728.076	20.00	8.54	1.13	2729.21	.00	1.61	1.84	2.000	.000	.00	1 .0
3.223	.0229					.0106	.03	1.40	1.33	1.10	.013	.00	.00	PIPE
1070.384	2726.754	1.460	2728.214	20.00	8.14	1.03	2729.24	.00	1.61	1.78	2.000	.000	.00	1 .0
1.833	.0229					.0095	.02	1.46	1.22	1.10	.013	.00	.00	PIPE
1072.217	2726.796	1.529	2728.325	20.00	7.76	.94	2729.26	.00	1.61	1.70	2.000	.000	.00	1 .0
.603	.0229					.0086	.01	1.53	1.11	1.10	.013	.00	.00	PIPE
1072.820	2726.810	1.606	2728.416	20.00	7.40	.85	2729.27	.00	1.61	1.59	2.000	.000	.00	1 .0
5.641	.0061					.0078	.04	1.61	1.00	2.00	.013	.00	.00	PIPE
1078.461	2726.844	1.693	2728.537	20.00	7.05	.77	2729.31	.00	1.61	1.44	2.000	.000	.00	1 .0
31.263	.0061					.0071	.22	1.69	.89	2.00	.013	.00	.00	PIPE
1109.724	2727.034	1.797	2728.831	20.00	6.72	.70	2729.53	.00	1.61	1.21	2.000	.000	.00	1 .0
28.996	.0061					.0068	.20	1.80	.76	2.00	.013	.00	.00	PIPE
1138.720	2727.210	1.844	2729.054	20.00	6.61	.68	2729.73	.00	1.61	1.07	2.000	.000	.00	1 .0
60.670	.0059					.0068	.41	1.84	.69	2.00	.013	.00	.00	PIPE
1199.390	2727.570	1.932	2729.502	20.00	6.43	.64	2730.14	.00	1.61	.73	2.000	.000	.00	1 .0

1.000	.0059				.0069	.01	1.93	.55	2.00	.013	.00	.00	PIPE		
1200.390	2727.576	1.934	2729.510	20.00	6.43	.64	2730.15	.00	1.61	.72	2.000	.000	.00	1	.0
1.000	.0061				.0069	.01	1.93	.54	2.00	.013	.00	.00	PIPE		

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 5-11-2022 Time: 3:21:35

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
PHASE 4A NORTH LATERAL MODEL (PH4N-L.WSW)
LATERAL TO PH4N 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	
1201.390	2727.582	1.935	2729.517	20.00	6.43	.64	2730.16	.00	1.61	.71	2.000	.000	.00	1	.0
1.000	.0059				.0069	.01	1.93	.54	2.00	.013	.00	.00	PIPE		
1202.390	2727.588	1.937	2729.525	20.00	6.43	.64	2730.17	.00	1.61	.70	2.000	.000	.00	1	.0
1.000	.0061				.0069	.01	1.94	.54	2.00	.013	.00	.00	PIPE		
1203.390	2727.594	1.938	2729.532	20.00	6.42	.64	2730.17	.00	1.61	.69	2.000	.000	.00	1	.0
1.000	.0061				.0069	.01	1.94	.53	2.00	.013	.00	.00	PIPE		
1204.390	2727.600	1.939	2729.540	20.00	6.42	.64	2730.18	.00	1.61	.69	2.000	.000	.00	1	.0
26.524	.0100				.0069	.18	1.94	.53	1.46	.013	.00	.00	PIPE		
1230.914	2727.866	1.792	2729.658	20.00	6.74	.70	2730.36	.00	1.61	1.22	2.000	.000	.00	1	.0
7.384	.0100				.0072	.05	1.79	.76	1.46	.013	.00	.00	PIPE		
1238.298	2727.940	1.689	2729.629	20.00	7.07	.78	2730.40	.00	1.61	1.45	2.000	.000	.00	1	.0
HYDRAULIC JUMP															
1238.298	2727.940	1.465	2729.405	20.00	8.11	1.02	2730.43	.00	1.61	1.77	2.000	.000	.00	1	.0
.792	.0100				.0098	.01	1.47	1.21	1.46	.013	.00	.00	PIPE		
1239.090	2727.948	1.484	2729.432	20.00	8.00	.99	2730.43	.00	1.61	1.75	2.000	.000	.00	1	.0
21.670	.0100				.0092	.20	1.48	1.18	1.46	.013	.00	.00	PIPE		
1260.760	2728.165	1.556	2729.721	20.00	7.63	.90	2730.62	.00	1.61	1.66	2.000	.000	.00	1	.0
.833	.0097				.0086	.01	1.56	1.07	1.48	.013	.00	.00	PIPE		

Program Package Serial Number: 7189

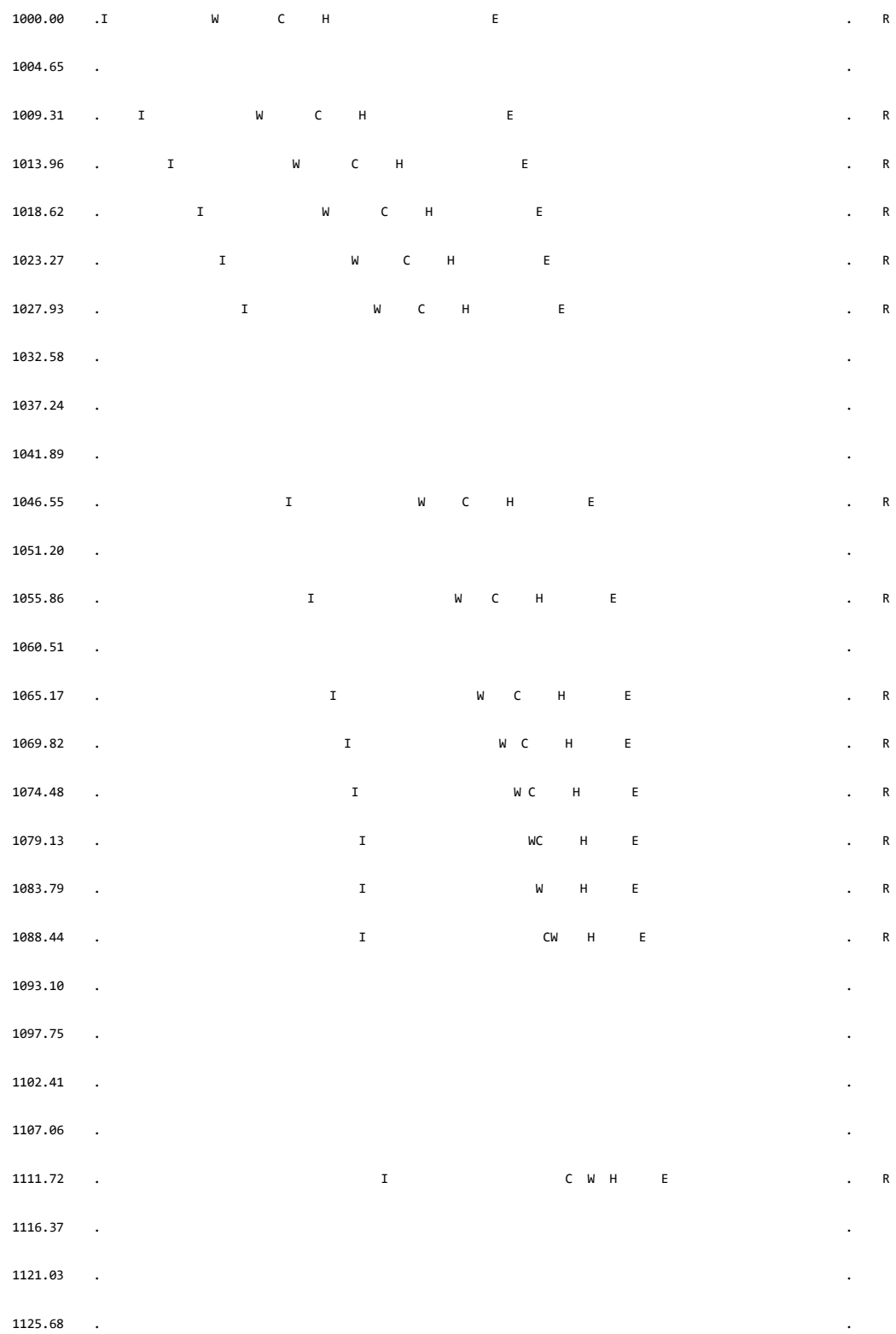
WATER SURFACE PROFILE LISTING Date: 5-11-2022 Time: 3:21:35

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
PHASE 4A NORTH LATERAL MODEL (PH4N-L.WSW)
LATERAL TO PH4N 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	
1261.593	2728.173	1.561	2729.734	20.00	7.60	.90	2730.63	.00	1.61	1.66	2.000	.000	.00	1	.0
.834	.0105				.0085	.01	1.56	1.06	1.43	.013	.00	.00	PIPE		
1262.427	2728.182	1.577	2729.759	20.00	7.53	.88	2730.64	.00	1.61	1.63	2.000	.000	.00	1	.0
.833	.0097				.0083	.01	1.58	1.04	1.48	.013	.00	.00	PIPE		
1263.260	2728.190	1.606	2729.796	20.00	7.40	.85	2730.65	.00	1.61	1.59	2.000	.000	.00	1	.0
JUNCT STR	.2101				.0086	.02	1.61	1.00		.013	.00	.00	PIPE		
1265.760	2728.715	1.585	2730.300	10.00	5.66	.50	2730.80	.00	1.22	.00	1.500	.000	.00	1	.0
27.500	.0100				.0091	.25	1.59	.00	1.17	.013	.00	.00	PIPE		
1293.260	2728.990	1.560	2730.550	10.00	5.66	.50	2731.05	.00	1.22	.00	1.500	.000	.00	1	.0

PHASE 4A NORTH LATERAL MODEL (PH4N-L.WSW)

LATERAL TO PH4N MODEL



```
1130.34   .                                                                .
1134.99   .                                                                .
1139.65   .                          I          C   W H      E            .   R
1144.30   .                                                                .
1148.96   .                                                                .
1153.61   .                                                                .
1158.27   .                                                                .
1162.92   .                                                                .
1167.58   .                                                                .
1172.23   .                                                                .
1176.89   .                                                                .
1181.54   .                                                                .
1186.20   .                                                                .
1190.85   .                                                                .
1195.51   .                                                                .
1200.16   .                      I           C   WH       E               .   R
1204.82   .                      I           C   WH       E               .   R
1209.47   .                       I          C   WH       E               .   R
1214.13   .                       I          C   WH       E               .   R
1218.78   .                       I          C   WH       E               .   R
1223.44   .                       I          C   WH       E               .   R
1228.09   .                                                                .
1232.75   .                          I           C  W  H      E             .   R
1237.40   .                                                                .
1242.06   .                            I           CW   H     E            .   R
1246.71   .                            I          W  C    H     E          .   R
1251.37   .                            I           W C    H     E          .   R
1256.02   .                                                                .
1260.68   .                                                                .
1265.33   .                               I           WC    H     E       .   R
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   1269.99    .                                                I                    WC     H      E       .    R

   1274.64    .                                                I                     W     H      E       .    R

   1279.30    .                                                I                     W     H      E       .    JX

   1283.95    .                                                        I               C    HW       E    .    R

   1288.61    .                                                                                              .

   1293.26    .                                                            I                C   HW       E.    R

            2724.500  2725.155  2725.810  2726.464  2727.119  2727.774  2728.429  2729.083  2729.738  2730.393  2731.047
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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

WSPG Model - SOUTH

Proposed Condition WSPG Summary

PHASE 4A SOUTH PROPOSED MODEL (PH4S-P.WSW): FROM PH3S MODEL TO SECTION FACILITY P4-17

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.
1326.03	11+01.91	P-12	36" RCP	2715.78	51.00	2718.78	7.22	2725.00		OK
1364.64	10+60.8	P-12	36" RCP	2715.97	51.00	2719.09	7.22	2725.00		OK
1364.64	10+60.8	P-12	36" RCP	2715.98	51.00	2719.17	7.22	2725.00		OK
1367.14	10+60.8	P-12	36" RCP	2715.99	51.00	2719.26	7.22	2725.00		OK
1467.94	9+60.	P-12	36" RCP	2716.49	51.00	2719.90	7.22	2726.20		OK
1532.34	18+38.03	P-12	36" RCP	2716.82	51.00	2720.32	7.22	2726.54		OK
1626.75	17+42.83	P-11	36" RCP	2717.29	51.00	2720.93	7.22	2727.20		OK
1707.66	16+58.73	P-11	36" RCP	2718.50	51.00	2719.99	14.64	2728.06	Junction with Facility P4-14	OK
1708.29		P-11	36" RCP	2718.51	51.00	2719.99	14.66	2728.06		OK
1708.91		P-11	36" RCP	2718.52	51.00	2720.00	14.68	2728.06		OK
1709.54		P-11	36" RCP	2718.53	51.00	2720.01	14.69	2728.06		OK
1710.16		P-11	36" RCP	2718.54	51.00	2720.02	14.71	2728.06		OK
1712.66	14+48.72	P-10	30" RCP	2719.14	44.00	2720.75	13.15	2728.01	Junction with Facility P4-12	OK
1738.13		P-10	30" RCP	2720.16	44.00	2722.14	10.54	2728.01		OK
1740.63		P-10	30" RCP	2720.26	44.00	2722.47	9.59	2728.01		OK
1743.13		P-10	30" RCP	2720.32	37.00	2723.43	7.54	2742.76		OK
1981.81	12+09.42	P-10	30" RCP	2726.00	37.00	2727.21	15.72	2742.76		OK
2196.97	9+91.76	P-10	30" RCP	2734.07	37.00	2735.89	9.62	2742.76	Junction with Facility P4-8 & P4-10	OK
2197.60		P-10	30" RCP	2734.09	37.00	2735.95	9.46	2742.76		OK
2198.22		P-10	30" RCP	2734.11	37.00	2736.00	9.29	2742.76		OK
2198.85		P-10	30" RCP	2734.14	37.00	2736.08	9.06	2742.76		OK
2199.47		P-10	30" RCP	2734.16	37.00	2736.22	8.55	2742.76		OK
2205.65		P-10	24" RCP	2734.66	22.00	2737.37	7.00	2743.01		OK
2209.21	11+38.89	P-9	24" RCP	2734.70	22.00	2737.40	7.00	2743.01		OK
2210.46		P-9	24" RCP	2734.71	22.00	2737.42	7.00	2743.01		OK
2211.71		P-9	24" RCP	2734.72	22.00	2737.47	7.00	2743.26		OK
2255.11	10+97.03	P-9	24" RCP	2734.98	22.00	2737.94	7.00	2745.39		OK
2364.31	14+74.63	P-8	24" RCP	2735.85	22.00	2739.03	7.00	2747.22		OK
2486.50	13+50.	P-8	24" RCP	2736.59	22.00	2740.23	7.00	2747.22		OK
2487.00		P-8	24" RCP	2736.59	22.00	2740.27	7.00	2747.22		OK
2487.50		P-8	24" RCP	2736.59	22.00	2740.31	7.00	2747.22		OK
2488.00		P-8	24" RCP	2736.59	22.00	2740.35	7.00	2747.22		OK
2488.50		P-8	24" RCP	2736.60	22.00	2740.40	7.00	2747.22		OK
2489.00		P-8	24" RCP	2736.60	22.00	2740.48	7.00	2755.41		OK

Proposed Condition WSPG Summary

PHASE 4A SOUTH PROPOSED MODEL (PH4S-P.WSW): FROM PH3S MODEL TO SECTION FACILITY P4-17

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.
2736.73	11+02.27	P-7	24" RCP	2747.25	22.00	2748.37	12.22	2758.11		OK
2832.97	10+06.03	P-7	24" RCP	2749.66	22.00	2750.69	13.50	2758.34	Connection to PH3S.WSW	OK
2974.97	N/A		24" RCP	2754.76	22.00	2756.44	7.83	2760.04		OK
2978.97			18" RCP	2755.26	11.00	2757.88	6.22	2760.04		OK
3006.07				2755.42	11.00	2758.21	6.22	2760.09		OK
3006.07				2755.42	11.00	2758.21	6.22	2760.09		OK

```
T1 SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
T2 PHASE 4A SOUTH PROPOSED MODEL (PH4S-P.WSW)
T3 FROM PH3S MODEL TO SECTION FACILITY P4-17
SO   1326.0302715.780 36                          2718.780
R    1364.6402715.970 36      .013                                    15.0   1
R    1364.6402715.980 36      .013                                    15.0   1
R    1367.1402715.990 36      .013                                    15.0   1
R    1467.9402716.490 36      .013                                     3.0   1
R    1532.3402716.820 36      .013                                     3.0   1
R    1626.7502717.290 36      .013                                     3.0   1
R    1707.6602718.503 36      .013                                    13.0
R    1708.2852718.512 36      .013                                    13.0
R    1708.9102718.521 36      .013                                    12.0
R    1709.5352718.531 36      .013                                    12.0
R    1710.1602718.540 36      .013                                    12.0   1
JX   1712.6602719.140 30 18   .013    7.0           2720.040         31.0
R    1738.1302720.160 30      .013                                    12.0
R    1740.6302720.260 30      .013                                    12.0
JX   1743.1302720.319 30 30   .013    7.0           2720.319         90.0
R    1981.8102726.000 30      .013                                           1
R    2196.9702734.066 30      .013                                    15.0
R    2197.5952734.090 30      .013                                    15.0
R    2198.2202734.113 30      .013                                    15.0
R    2198.8452734.137 30      .013                                    15.0
R    2199.4702734.160 30      .013                                    15.0   1
JX   2205.6502734.660 24 24 18.013    7.5      7.5  2733.6602735.160 90.0 16.0
R    2209.2102734.695 24      .013
R    2210.4602734.708 24      .013
R    2211.7102734.720 24      .013                                           1
R    2255.1102734.980 24      .013                                    11.0   1
R    2364.3102735.850 24      .013                                     8.0   1
R    2486.5002736.585 24      .013                                    15.0
R    2487.0002736.588 24      .013                                    15.0
R    2487.5002736.591 24      .013                                    15.0
R    2488.0002736.594 24      .013                                    15.0
R    2488.5002736.597 24      .013                                    15.0
R    2489.0002736.600 24      .013                                    15.0   1
R    2736.7302747.250 24      .013                                           1
R    2832.9702749.660 24      .013                                           1
R    2974.9702754.760 24      .013                                    13.0   1
JX   2978.9702755.260 18 18   .013   11.0           2755.260         90.0
R    3006.0702755.420 18      .013                                           1
SH   3006.0702755.420 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
CD  30  4   1   0.000   2.500    0.000 0.000 0.000  0.0000.00  0.00
CD  36  4   1   0.000   3.000    0.000 0.000 0.000  0.0000.00  0.00
CD  42  4   1   0.000   3.500    0.000 0.000 0.000  0.0000.00  0.00
Q            11.000
```

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	18	4	1		1.500														
CD	24	4	1		2.000														
CD	30	4	1		2.500														
CD	36	4	1		3.000														
CD	42	4	1		3.500														

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A

HEADING LINE NO 2 IS -

PHASE 4A SOUTH PROPOSED MODEL (PH4S-P.WSW)

HEADING LINE NO 3 IS -

FROM PH3S MODEL TO SECTION FACILITY P4-17

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1326.030	2715.780	36	2718.780

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1364.640	2715.970	36	.013	.000	.000	15.000	1

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1364.640	2715.980	36	.013	.000	.000	15.000	1

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1367.140	2715.990	36	.013	.000	.000	15.000	1

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1467.940	2716.490	36	.013	.000	.000	3.000	1

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1532.340	2716.820	36	.013	.000	.000	3.000	1

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1626.750	2717.290	36	.013	.000	.000	3.000	1

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1707.660	2718.503	36	.013	.000	.000	13.000	0

ELEMENT NO 9 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1708.285	2718.512	36	.013	.000	.000	13.000	0

ELEMENT NO 10 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1708.910	2718.521	36	.013	.000	.000	12.000	0

ELEMENT NO 11 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1709.535	2718.531	36	.013	.000	.000	12.000	0

ELEMENT NO 12 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1710.160	2718.540	36	.013	.000	.000	12.000	1

ELEMENT NO 13 IS A JUNCTION * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1712.660	2719.140	30	18	0	.013	7.000	.000	2720.040	.000	31.000	.000
									RADIUS	ANGLE		
									.000	.000		

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 14 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1738.130	2720.160	30	.013	.000	.000	12.000	0

ELEMENT NO 15 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1740.630	2720.260	30	.013	.000	.000	12.000	0

ELEMENT NO 16 IS A JUNCTION * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1743.130	2720.319	30	30	0	.013	7.000	.000	2720.319	.000	90.000	.000
									RADIUS	ANGLE		
									.000	.000		

ELEMENT NO 17 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1981.810	2726.000	30	.013	.000	.000	.000	1

ELEMENT NO 18 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2196.970	2734.066	30	.013	.000	.000	15.000	0

ELEMENT NO 19 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2197.595	2734.090	30	.013	.000	.000	15.000	0

ELEMENT NO 20 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2198.220	2734.113	30	.013	.000	.000	15.000	0

ELEMENT NO 21 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2198.845	2734.137	30	.013	.000	.000	15.000	0

ELEMENT NO 22 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H

```
                          2199.470 2734.160   30              .013                        .000     .000    15.000     1
ELEMENT NO  23 IS A JUNCTION          *         *     *     *                 *                  *              *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                             2205.650 2734.660   24    24    18   .013     7.500     7.500  2733.660  2735.160  90.000   16.000
                                                                                          RADIUS    ANGLE
                                                                                            .000    .000
                                                  W S P G W                                                      PAGE NO   4
                          WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO  24 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2209.210 2734.695   24              .013                          .000     .000      .000     0
ELEMENT NO  25 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2210.460 2734.708   24              .013                          .000     .000      .000     0
ELEMENT NO  26 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2211.710 2734.720   24              .013                          .000     .000      .000     1
ELEMENT NO  27 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2255.110 2734.980   24              .013                          .000     .000    11.000     1
ELEMENT NO  28 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2364.310 2735.850   24              .013                          .000     .000     8.000     1
ELEMENT NO  29 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2486.500 2736.585   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
                             2487.000 2736.588   24              .013                          .000     .000    15.000     0
ELEMENT NO  31 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2487.500 2736.591   24              .013                          .000     .000    15.000     0
ELEMENT NO  32 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2488.000 2736.594   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
                             2488.500 2736.597   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
                             2489.000 2736.600   24              .013                          .000     .000    15.000     1
ELEMENT NO  35 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2736.730 2747.250   24              .013                          .000     .000      .000     1
ELEMENT NO  36 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2832.970 2749.660   24              .013                          .000     .000      .000     1
                                                  W S P G W                                                      PAGE NO   5
                          WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO  37 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             2974.970 2754.760   24              .013                          .000     .000    13.000     1
ELEMENT NO  38 IS A JUNCTION          *         *     *     *                 *                  *              *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                             2978.970 2755.260   18    18     0   .013    11.000      .000  2755.260      .000  90.000     .000
                                                                                          RADIUS    ANGLE
                                                                                            .000    .000
ELEMENT NO  39 IS A REACH             *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                             3006.070 2755.420   18              .013                          .000     .000      .000     1
ELEMENT NO  40 IS A SYSTEM HEADWORKS                  *                     *
                  U/S DATA   STATION    INVERT  SECT                              W S ELEV
                             3006.070 2755.420   18                                 .000
```

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 5-11-2022 Time: 2:12:54

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
PHASE 4A SOUTH PROPOSED MODEL (PH4S-P.WSW)
FROM PH3S MODEL TO SECTION FACILITY P4-17

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
1326.030	2715.780	3.000	2718.780	51.00	7.22	.81	2719.59	.00	2.32	.00	3.000	.000	.00	1 .0
38.610	.0049					.0058	.23	3.00	.00	3.00	.013	.00	.00	PIPE
1364.640	2715.970	3.116	2719.086	51.00	7.22	.81	2719.89	.00	2.32	.00	3.000	.000	.00	1 .0
1364.640	2715.980	3.187	2719.167	51.00	7.22	.81	2719.97	.00	2.32	.00	3.000	.000	.00	1 .0
2.500	.0040					.0058	.01	3.19	.00	3.00	.013	.00	.00	PIPE
1367.140	2715.990	3.272	2719.261	51.00	7.22	.81	2720.07	.00	2.32	.00	3.000	.000	.00	1 .0
100.800	.0050					.0058	.59	3.27	.00	3.00	.013	.00	.00	PIPE
1467.940	2716.490	3.409	2719.899	51.00	7.22	.81	2720.71	.00	2.32	.00	3.000	.000	.00	1 .0
64.400	.0051					.0058	.38	3.41	.00	2.71	.013	.00	.00	PIPE
1532.340	2716.820	3.504	2720.324	51.00	7.22	.81	2721.13	.00	2.32	.00	3.000	.000	.00	1 .0
94.410	.0050					.0058	.55	3.50	.00	3.00	.013	.00	.00	PIPE
1626.750	2717.290	3.635	2720.925	51.00	7.22	.81	2721.73	.00	2.32	.00	3.000	.000	.00	1 .0
36.906	.0150					.0058	.22	3.63	.00	1.72	.013	.00	.00	PIPE
1663.656	2717.843	3.312	2721.155	51.00	7.22	.81	2721.96	.00	2.32	.00	3.000	.000	.00	1 .0
HYDRAULIC JUMP														
1663.656	2717.843	1.553	2719.396	51.00	13.81	2.96	2722.36	.00	2.32	3.00	3.000	.000	.00	1 .0
12.705	.0150					.0211	.27	1.55	2.19	1.72	.013	.00	.00	PIPE
1676.361	2718.034	1.540	2719.574	51.00	13.96	3.02	2722.60	.00	2.32	3.00	3.000	.000	.00	1 .0
31.299	.0150					.0228	.71	1.54	2.23	1.72	.013	.00	.00	PIPE

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 5-11-2022 Time: 2:12:54

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
PHASE 4A SOUTH PROPOSED MODEL (PH4S-P.WSW)
FROM PH3S MODEL TO SECTION FACILITY P4-17

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
1707.660	2718.503	1.483	2719.986	51.00	14.64	3.33	2723.31	.00	2.32	3.00	3.000	.000	.00	1 .0
.625	.0145					.0243	.02	1.48	2.39	1.74	.013	.00	.00	PIPE
1708.285	2718.512	1.482	2719.994	51.00	14.66	3.34	2723.33	.00	2.32	3.00	3.000	.000	.00	1 .0
.625	.0145					.0244	.02	1.48	2.40	1.74	.013	.00	.00	PIPE
1708.910	2718.521	1.480	2720.001	51.00	14.68	3.34	2723.35	.00	2.32	3.00	3.000	.000	.00	1 .0
.625	.0160					.0245	.02	1.48	2.40	1.68	.013	.00	.00	PIPE
1709.535	2718.531	1.479	2720.010	51.00	14.69	3.35	2723.36	.00	2.32	3.00	3.000	.000	.00	1 .0
.625	.0145					.0246	.02	1.48	2.41	1.74	.013	.00	.00	PIPE
1710.160	2718.540	1.478	2720.018	51.00	14.71	3.36	2723.38	.00	2.32	3.00	3.000	.000	.00	1 .0
JUNCT STR	.2399					.0226	.06	1.48	2.41		.013	.00	.00	PIPE
1712.660	2719.140	1.612	2720.751	44.00	13.15	2.69	2723.44	.00	2.21	2.39	2.500	.000	.00	1 .0
5.825	.0400					.0198	.12	1.61	1.96	1.30	.013	.00	.00	PIPE
1718.485	2719.373	1.656	2721.029	44.00	12.75	2.52	2723.55	.00	2.21	2.36	2.500	.000	.00	1 .0
7.153	.0400					.0180	.13	1.66	1.86	1.30	.013	.00	.00	PIPE

1725.638	2719.659	1.728	2721.387	44.00	12.16	2.30	2723.68	.00	2.21	2.31	2.500	.000	.00	1	.0
5.466	.0400					.0161	.09	1.73	1.71	1.30	.013	.00	.00	PIPE	
1731.104	2719.878	1.805	2721.684	44.00	11.59	2.09	2723.77	.00	2.21	2.24	2.500	.000	.00	1	.0
4.101	.0400					.0144	.06	1.81	1.57	1.30	.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
1735.205	2720.043	1.890	2721.932	44.00	11.05	1.90	2723.83	.00	2.21	2.15	2.500	.000	.00	1	.0
2.925	.0400					.0129	.04	1.89	1.43	1.30	.013	.00	.00	PIPE	
1738.130	2720.160	1.983	2722.143	44.00	10.54	1.72	2723.87	.00	2.21	2.03	2.500	.000	.00	1	.0
1.807	.0400					.0117	.02	1.98	1.29	1.30	.013	.00	.00	PIPE	
1739.937	2720.232	2.084	2722.317	44.00	10.06	1.57	2723.89	.00	2.21	1.86	2.500	.000	.00	1	.0
.693	.0400					.0107	.01	2.08	1.16	1.30	.013	.00	.00	PIPE	
1740.630	2720.260	2.208	2722.468	44.00	9.59	1.43	2723.90	.00	2.21	1.61	2.500	.000	.00	1	.0
JUNCT STR	.0236					.0092	.02	2.21	1.00		.013	.00	.00	PIPE	
1743.130	2720.319	3.108	2723.427	37.00	7.54	.88	2724.31	.00	2.06	.00	2.500	.000	.00	1	.0
9.081	.0238					.0081	.07	3.11	.00	1.37	.013	.00	.00	PIPE	
1752.211	2720.535	2.963	2723.498	37.00	7.54	.88	2724.38	.00	2.06	.00	2.500	.000	.00	1	.0
HYDRAULIC JUMP															
1752.211	2720.535	1.368	2721.903	37.00	13.46	2.81	2724.72	.00	2.06	2.49	2.500	.000	.00	1	.0
72.358	.0238					.0245	1.77	1.37	2.26	1.37	.013	.00	.00	PIPE	
1824.570	2722.258	1.355	2723.612	37.00	13.63	2.88	2726.50	.00	2.06	2.49	2.500	.000	.00	1	.0
85.784	.0238					.0266	2.28	1.35	2.30	1.37	.013	.00	.00	PIPE	
1910.354	2724.299	1.304	2725.603	37.00	14.29	3.17	2728.77	.00	2.06	2.50	2.500	.000	.00	1	.0
42.398	.0238					.0301	1.28	1.30	2.47	1.37	.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
1952.752	2725.308	1.256	2726.564	37.00	14.99	3.49	2730.05	.00	2.06	2.50	2.500	.000	.00	1	.0
29.058	.0238					.0342	.99	1.26	2.66	1.37	.013	.00	.00	PIPE	
1981.810	2726.000	1.210	2727.210	37.00	15.72	3.84	2731.05	.00	2.06	2.50	2.500	.000	.00	1	.0
54.150	.0375					.0357	1.93	1.21	2.85	1.20	.013	.00	.00	PIPE	
2035.960	2728.030	1.223	2729.253	37.00	15.50	3.73	2732.98	.00	2.06	2.50	2.500	.000	.00	1	.0
64.192	.0375					.0329	2.11	1.22	2.79	1.20	.013	.00	.00	PIPE	
2100.152	2730.437	1.270	2731.707	37.00	14.77	3.39	2735.10	.00	2.06	2.50	2.500	.000	.00	1	.0
30.593	.0375					.0290	.89	1.27	2.60	1.20	.013	.00	.00	PIPE	
2130.745	2731.583	1.319	2732.902	37.00	14.09	3.08	2735.98	.00	2.06	2.50	2.500	.000	.00	1	.0
19.209	.0375					.0256	.49	1.32	2.42	1.20	.013	.00	.00	PIPE	
2149.954	2732.304	1.370	2733.674	37.00	13.43	2.80	2736.48	.00	2.06	2.49	2.500	.000	.00	1	.0

13.443	.0375					.0226	.30	1.37	2.25	1.20	.013	.00	.00	PIPE					
2163.397	2732.808	1.425	2734.232	37.00	12.81	2.55	2736.78	.00	2.06	2.48	2.500	.000	.00	1	.0				
9.937	.0375					.0199	.20	1.42	2.09	1.20	.013	.00	.00	PIPE					
2173.334	2733.180	1.482	2734.662	37.00	12.21	2.31	2736.98	.00	2.06	2.46	2.500	.000	.00	1	.0				
7.558	.0375					.0176	.13	1.48	1.94	1.20	.013	.00	.00	PIPE					
2180.891	2733.463	1.542	2735.006	37.00	11.64	2.10	2737.11	.00	2.06	2.43	2.500	.000	.00	1	.0				
5.817	.0375					.0156	.09	1.54	1.79	1.20	.013	.00	.00	PIPE					

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 5-11-2022 Time: 2:12:54

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
PHASE 4A SOUTH PROPOSED MODEL (PH4S-P.WSW)
FROM PH3S MODEL TO SECTION FACILITY P4-17

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
2186.708	2733.681	1.606	2735.288	37.00	11.10	1.91	2737.20	.00	2.06	2.40	2.500	.000	.00	1 .0
4.461	.0375					.0139	.06	1.61	1.66	1.20	.013	.00	.00	PIPE
2191.170	2733.849	1.675	2735.524	37.00	10.58	1.74	2737.26	.00	2.06	2.35	2.500	.000	.00	1 .0
3.370	.0375					.0123	.04	1.68	1.53	1.20	.013	.00	.00	PIPE
2194.539	2733.975	1.748	2735.723	37.00	10.09	1.58	2737.30	.00	2.06	2.29	2.500	.000	.00	1 .0
2.431	.0375					.0110	.03	1.75	1.41	1.20	.013	.00	.00	PIPE
2196.970	2734.066	1.828	2735.894	37.00	9.62	1.44	2737.33	.00	2.06	2.22	2.500	.000	.00	1 .0
.625	.0387					.0102	.01	1.83	1.29	1.19	.013	.00	.00	PIPE
2197.595	2734.090	1.857	2735.947	37.00	9.46	1.39	2737.34	.00	2.06	2.19	2.500	.000	.00	1 .0
.625	.0367					.0098	.01	1.86	1.25	1.21	.013	.00	.00	PIPE
2198.220	2734.113	1.891	2736.004	37.00	9.29	1.34	2737.34	.00	2.06	2.15	2.500	.000	.00	1 .0
.625	.0383					.0093	.01	1.89	1.20	1.19	.013	.00	.00	PIPE
2198.845	2734.137	1.939	2736.076	37.00	9.06	1.27	2737.35	.00	2.06	2.09	2.500	.000	.00	1 .0
.187	.0367					.0090	.00	1.94	1.14	1.21	.013	.00	.00	PIPE
2199.031	2734.144	1.957	2736.101	37.00	8.97	1.25	2737.35	.00	2.06	2.06	2.500	.000	.00	1 .0
.438	.0367					.0085	.00	1.96	1.12	1.21	.013	.00	.00	PIPE
2199.470	2734.160	2.060	2736.219	37.00	8.55	1.14	2737.36	.00	2.06	1.90	2.500	.000	.00	1 .0
JUNCT STR	.0809					.0088	.05	2.06	1.00		.013	.00	.00	PIPE

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 5-11-2022 Time: 2:12:54

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
PHASE 4A SOUTH PROPOSED MODEL (PH4S-P.WSW)
FROM PH3S MODEL TO SECTION FACILITY P4-17

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
2205.650	2734.660	2.710	2737.370	22.00	7.00	.76	2738.13	.00	1.68	.00	2.000	.000	.00	1 .0
3.560	.0099					.0095	.03	2.71	.00	1.60	.013	.00	.00	PIPE
2209.210	2734.695	2.708	2737.403	22.00	7.00	.76	2738.16	.00	1.68	.00	2.000	.000	.00	1 .0
1.250	.0104					.0095	.01	2.71	.00	1.57	.013	.00	.00	PIPE
2210.460	2734.708	2.707	2737.415	22.00	7.00	.76	2738.18	.00	1.68	.00	2.000	.000	.00	1 .0
1.250	.0096					.0095	.01	2.71	.00	1.63	.013	.00	.00	PIPE
2211.710	2734.720	2.745	2737.465	22.00	7.00	.76	2738.23	.00	1.68	.00	2.000	.000	.00	1 .0
43.400	.0060					.0095	.41	2.74	.00	2.00	.013	.00	.00	PIPE
2255.110	2734.980	2.961	2737.941	22.00	7.00	.76	2738.70	.00	1.68	.00	2.000	.000	.00	1 .0

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2832.970	2749.660	1.029	2750.689	22.00	13.50	2.83	2753.52	.00	1.68	2.00	2.000	.000	.00	1	.0		
37.905	.0359					.0334	1.27	1.03	2.63	1.02	.013	.00	.00	PIPE			
2870.875	2751.021	1.046	2752.067	22.00	13.23	2.72	2754.79	.00	1.68	2.00	2.000	.000	.00	1	.0		
38.922	.0359					.0306	1.19	1.05	2.56	1.02	.013	.00	.00	PIPE			
2909.797	2752.419	1.087	2753.506	22.00	12.62	2.47	2755.98	.00	1.68	1.99	2.000	.000	.00	1	.0		
20.416	.0359					.0270	.55	1.09	2.38	1.02	.013	.00	.00	PIPE			
2930.213	2753.152	1.129	2754.282	22.00	12.03	2.25	2756.53	.00	1.68	1.98	2.000	.000	.00	1	.0		
13.188	.0359					.0239	.31	1.13	2.21	1.02	.013	.00	.00	PIPE			
2943.402	2753.626	1.175	2754.801	22.00	11.47	2.04	2756.84	.00	1.68	1.97	2.000	.000	.00	1	.0		
9.306	.0359					.0211	.20	1.17	2.05	1.02	.013	.00	.00	PIPE			
2952.708	2753.960	1.222	2755.183	22.00	10.94	1.86	2757.04	.00	1.68	1.95	2.000	.000	.00	1	.0		
6.855	.0359					.0187	.13	1.22	1.90	1.02	.013	.00	.00	PIPE			

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 5-11-2022 Time: 2:12:54

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
PHASE 4A SOUTH PROPOSED MODEL (PH4S-P.WSW)
FROM PH3S MODEL TO SECTION FACILITY P4-17

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
2959.563	2754.207	1.273	2755.479	22.00	10.43	1.69	2757.17	.00	1.68	1.92	2.000	.000	.00	1 .0
5.149	.0359					.0166	.09	1.27	1.75	1.02	.013	.00	.00	PIPE
2964.712	2754.392	1.327	2755.719	22.00	9.94	1.53	2757.25	.00	1.68	1.89	2.000	.000	.00	1 .0
3.859	.0359					.0147	.06	1.33	1.62	1.02	.013	.00	.00	PIPE
2968.572	2754.530	1.385	2755.915	22.00	9.48	1.40	2757.31	.00	1.68	1.85	2.000	.000	.00	1 .0
2.834	.0359					.0131	.04	1.38	1.49	1.02	.013	.00	.00	PIPE
2971.405	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
1.967	.0359					.0118	.02	1.45	1.37	1.02	.013	.00	.00	PIPE
2973.372	2754.703	1.515	2756.218	22.00	8.62	1.15	2757.37	.00	1.68	1.71	2.000	.000	.00	1 .0
1.185	.0359					.0106	.01	1.51	1.24	1.02	.013	.00	.00	PIPE
2974.556	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
.414	.0359					.0096	.00	1.59	1.12	1.02	.013	.00	.00	PIPE
2974.970	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
2978.970	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
3006.070	2755.420	2.791	2758.211	11.00	6.22	.60	2758.81	.00	1.27	.00	1.500	.000	.00	1 .0

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SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A

PHASE 4A SOUTH PROPOSED MODEL (PH4S-P.WSW)

FROM PH3S MODEL TO SECTION FACILITY P4-17

1326.03 .I CH E . R

1336.34 . .

1346.64 . .

1356.95 . .

1367.26 .I C H E . R

1377.56 .I C H E . R

1387.87 .I C HWE . R

1398.18 . .

1408.49 . .

1418.79 . .

1429.10 . .

1439.41 . .

1449.71 . .

1460.02 . .

1470.33 . I CHW E . R

1480.63 . .

1490.94 . .

1501.25 . .

1511.56 . .

1521.86 . .

1532.17 . .

1542.48 . I C HW E . R

1552.78 . .

1563.09 . .

1573.40 . .

1583.70 . .

1594.01 . .

1604.32 . .

1614.63 . .

1624.93 . .

1635.24 . I C HW E . R

1645.55 . .

1655.85 . .

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1666.16    .    I     CHW E                                                .    R

1676.47    .    I   W CH   E                                              .    R

1686.77    .     I  W C H  E                                              .    R

1697.08    .                                                              .

1707.39    .                                                              .

1717.70    .      I  W C H   E                                            .    R

1728.00    .      I  W C H   E                                            .    R

1738.31    .      I  W C H   E                                            .    R

1748.62    .      I  W C H   E                                            .    R

1758.92    .      I  W C H   E                                            .    JX

1769.23    .       I   WCH   E                                            .    R

1779.54    .        I   WCH   E                                           .    R

1789.84    .         I   WH   E                                           .    R

1800.15    .         I   WCH  E                                           .    R

1810.46    .         I    WH  E                                           .    R

1820.77    .          I   WH  E                                           .    R

1831.07    .          I    WH E                                           .    R

1841.38    .          I    WH E                                           .    JX

1851.69    .          I    CHW E                                          .    R

1861.99    .           I   CHW E                                          .    R

1872.30    .           I  WCH   E                                         .    R

1882.61    .              I  WCH   E                                      .    R

1892.91    .                                                              .

1903.22    .                                                              .

1913.53    .                  I  W CH    E                                .    R

1923.84    .                                                              .

1934.14    .                                                              .

1944.45    .                                                              .

1954.76    .                     I  WCH     E                            .    R

1965.06    .                                                              .
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1975.37   .                                                                .
1985.68   .                    I  W CH     E                               .   R
1995.98   .                                                                .
2006.29   .                                                                .
2016.60   .                                                                .
2026.91   .                                                                .
2037.21   .                         I  W CH    E                           .   R
2047.52   .                                                                .
2057.83   .                                                                .
2068.13   .                                                                .
2078.44   .                                                                .
2088.75   .                                                                .
2099.05   .                                                                .
2109.36   .                             I  WCH    E                       .   R
2119.67   .                                                                .
2129.98   .                                                                .
2140.28   .                               I  W CH   E                      .   R
2150.59   .                                  I  W CH   E                   .   R
2160.90   .                                                                .
2171.20   .                                   I  W CH  E                   .   R
2181.51   .                                    I  W CH  E                  .   R
2191.82   .                                      I  WCH  E                 .   R
2202.12   .                                      I   WCH E                 .   R
2212.43   .                                      I   WCH E                 .   R
2222.74   .                                       I   WCH E                .   R
2233.05   .                                       I   WCH E                .   R
2243.35   .                                       I   WCH E                .   R
2253.66   .                                       I   WCH E                .   R
2263.97   .                                       I    WH E                .   R
2274.27   .                                       I    WH E                .   R
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2284.58 . I WH E . JX

2294.89 . I CH WE . R

2305.19 . I CH W E . R

2315.50 . I CH W E . R

2325.81 . I CH W E . R

2336.12 . I CH W E . R

2346.42 . .

2356.73 . .

2367.04 . I CH WE . R

2377.34 . .

2387.65 . .

2397.96 . .

2408.26 . .

2418.57 . .

2428.88 . .

2439.19 . .

2449.49 . .

2459.80 . .

2470.11 . .

2480.41 . .

2490.72 . I H W E . R

2501.03 . I CH W E . R

2511.33 . I CH WE . R

2521.64 . I CH WE . R

2531.95 . I CH WE . R

2542.26 . I CH W E . R

2552.56 . I CH WE . R

2562.87 . I W CH E . R

2573.18 . I WCH E . R

2583.48 . .

2593.79 . .

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2604.10    .                                                                .
2614.40    .                                                                .
2624.71    .                                                                .
2635.02    .                                                                .
2645.33    .                                                                .
2655.63    .                                                                .
2665.94    .                                                                .
2676.25    .                                          I W H    E            .    R
2686.55    .                                                                .
2696.86    .                                                                .
2707.17    .                                            I  WCH   E           .    R
2717.47    .                                                                .
2727.78    .                                              I  WCH   E         .    R
2738.09    .                                                I W H   E        .    R
2748.40    .                                                I  WCH  E        .    R
2758.70    .                                                                .
2769.01    .                                                                .
2779.32    .                                                                .
2789.62    .                                                                .
2799.93    .                                                                .
2810.24    .                                                   I  WCH   E    .    R
2820.54    .                                                                .
2830.85    .                                                                .
2841.16    .                                                      I  WCH   E .    R
2851.47    .                                                                .
2861.77    .                                                                .
2872.08    .                                                         I  WCH   E .    R
2882.39    .                                                                .
2892.69    .                                                                .
2903.00    .                                                                .
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   2913.31    .                                                                  I W H   E       .    R

   2923.61    .                                                                                  .

   2933.92    .                                                                   I  WCH  E      .    R

   2944.23    .                                                                    I  WCH  E     .    R

   2954.54    .                                                                     I  WCH E     .    R

   2964.84    .                                                                       I  WH  E   .    R

   2975.15    .                                                                       I  WCH E   .    R

   2985.46    .                                                                        I  WH E   .    R

   2995.76    .                                                                        I  WH E   .    R

   3006.07    .                                                                        I  WCHE   .    R

            2715.780  2720.083  2724.386  2728.690  2732.993  2737.296  2741.599  2745.903  2750.206  2754.509  2758.813
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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

Ultimate Condition WSPG Summary
PHASE 4A SOUTH MODEL (PH4S.WSW): CONNECTING PH3S AND NCR1 STORM DRAIN

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	N/A		42" RCP	2706.32	85.50	2708.39	14.45	2718.81	Existing Facility	OK
1023.43			42" RCP	2706.79	85.50	2708.89	14.19	2718.81		OK
1025.93			36" RCP	2706.84	85.50	2708.94	16.15	2718.81		OK
1028.43			36" RCP	2707.42	85.50	2709.74	14.59	2719.53	Facility F4-20	OK
1051.38			36" RCP	2708.18	85.50	2710.82	12.96	2719.53		OK
1053.88			36" RCP	2708.26	85.50	2711.08	12.41	2719.53		OK
1056.38			36" RCP	2708.35	62.00	2713.41	8.77	2722.72		OK
1138.97			36" RCP	2711.41	62.00	2713.13	14.81	2722.72		OK
1139.60			36" RCP	2711.43	62.00	2713.15	14.79	2722.72		OK
1140.22			36" RCP	2711.45	62.00	2713.18	14.77	2722.72		OK
1140.85			36" RCP	2711.48	62.00	2713.20	14.74	2722.72		OK
1141.47			36" RCP	2711.50	62.00	2713.23	14.72	2723.46		OK
1197.20			36" RCP	2713.50	62.00	2716.04	9.73	2723.46	Junction with Facility F4-17	OK
1199.70			36" RCP	2713.55	51.00	2717.02	7.22	2724.25		OK
1252.54			36" RCP	2714.60	51.00	2716.48	10.95	2725.7		OK
1367.14	10+60.8	P-12	36" RCP	2715.99	51.00	2718.31	8.69	2726.20		OK
1467.94	9+60.	P-12	36" RCP	2716.49	51.00	2719.11	7.80	2726.54		OK
1532.34	18+38.03	P-12	36" RCP	2716.82	51.00	2719.46	7.74	2727.2		OK
1626.75	17+42.83	P-11	36" RCP	2717.29	51.00	2718.90	13.22	2728.06		OK
1707.66	16+58.73	P-11	36" RCP	2718.50	51.00	2719.99	14.64	2728.06	Junction with Facility P4-14	OK
1708.29		P-11	36" RCP	2718.51	51.00	2719.99	14.66	2728.06		OK
1708.91		P-11	36" RCP	2718.52	51.00	2720.00	14.68	2728.06		OK
1709.54		P-11	36" RCP	2718.53	51.00	2720.01	14.69	2728.06		OK
1710.16		P-11	36" RCP	2718.54	51.00	2720.02	14.71	2728.06		OK
1712.66	14+48.72	P-10	30" RCP	2719.14	44.00	2720.75	13.15	2728.01	Junction with Facility P4-12	OK
1738.13		P-10	30" RCP	2720.16	44.00	2722.14	10.54	2728.01		OK
1740.63		P-10	30" RCP	2720.26	44.00	2722.47	9.59	2728.01		OK
1743.13		P-10	30" RCP	2720.32	37.00	2723.43	7.54	2742.76		OK
1981.81	12+09.42	P-10	30" RCP	2726.00	37.00	2727.21	15.72	2742.76		OK
2196.97	9+91.76	P-10	30" RCP	2734.07	37.00	2735.89	9.62	2742.76	Junction with Facility P4-8 & P4-10	OK
1708.29		P-10	36" RCP	2718.51	51.00	2719.99	14.66	2742.76		OK
1708.91		P-10	36" RCP	2718.52	51.00	2720.00	14.68	2742.76		OK
1709.54		P-10	36" RCP	2718.53	51.00	2720.01	14.69	2742.76		OK

Ultimate Condition WSPG Summary

PHASE 4A SOUTH MODEL (PH4S.WSW): CONNECTING PH3S AND NCR1 STORM DRAIN

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.										
2199.47	9+91.76	P-10	30" RCP	2734.16	37.00	2736.22	8.55	2742.76	Junction with Facility P4-8 & P4-10	OK
2205.65		P-10	24" RCP	2734.66	22.00	2737.37	7.00	2743.01		OK
2209.21	11+38.89	P-9	24" RCP	2734.70	22.00	2737.40	7.00	2743.01		OK
2210.46		P-9	24" RCP	2734.71	22.00	2737.42	7.00	2743.01		OK
2211.71		P-9	24" RCP	2734.72	22.00	2737.47	7.00	2743.26		OK
2255.11	10+97.03	P-9	24" RCP	2734.98	22.00	2737.94	7.00	2745.39		OK
2364.31	14+74.63	P-8	24" RCP	2735.85	22.00	2739.03	7.00	2747.22		OK
2486.50	13+50.	P-8	24" RCP	2736.59	22.00	2740.23	7.00	2747.22		OK
2487.00		P-8	24" RCP	2736.59	22.00	2740.27	7.00	2747.22		OK
2487.50		P-8	24" RCP	2736.59	22.00	2740.31	7.00	2747.22		OK
2488.00		P-8	24" RCP	2736.59	22.00	2740.35	7.00	2747.22		OK
2488.50		P-8	24" RCP	2736.60	22.00	2740.40	7.00	2747.22		OK
2489.00		P-8	24" RCP	2736.60	22.00	2740.48	7.00	2755.41		OK
2736.73	11+02.27	P-7	24" RCP	2747.25	22.00	2748.37	12.22	2758.11		OK
2832.97	10+06.03	P-7	24" RCP	2749.66	22.00	2750.69	13.50	2760.04	Connection to PH3S.WSW	OK
2974.97	N/A		24" RCP	2754.76	22.00	2756.44	7.83	2760.04		OK
2978.97			18" RCP	2755.26	11.00	2757.88	6.22	2760.09		OK
3006.07				2755.42	11.00	2758.21	6.22	2760.09		OK

```
T1 SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
T2 PHASE 4A SOUTH MODEL (PH4S.WSW)
T3 CONNECTING PH3S AND NCR1 STORM DRAIN
SO   1000.0002706.320 42                         2708.556
R    1023.4302706.790 42      .013
R    1025.9302706.840 42      .013                                                  1
R    1028.4302707.422 36      .013
R    1051.3802708.178 36      .013                                        14.0
R    1053.8802708.260 36      .013                                        14.0
JX   1056.3802708.352 36 24   .013   23.5           2709.760         90.0
R    1138.9702711.408 36      .013                                        13.0
R    1139.5952711.431 36      .013                                        13.0
R    1140.2202711.454 36      .013                                        13.0
R    1140.8452711.477 36      .013                                        13.0
R    1141.4702711.500 36      .013                                        12.0   1
R    1197.2002713.500 36      .013                                         2.0
JX   1199.7002713.550 36 18   .013   11.0           2715.000         67.0
R    1252.5402714.600 36      .013                                         3.0   1
R    1367.1402715.990 36      .013                                         4.0   1
R    1467.9402716.490 36      .013                                         3.0   1
R    1532.3402716.820 36      .013                                         3.0   1
R    1626.7502717.290 36      .013                                         3.0   1
R    1707.6602718.503 36      .013                                        13.0
R    1708.2852718.512 36      .013                                        13.0
R    1708.9102718.521 36      .013                                        12.0
R    1709.5352718.531 36      .013                                        12.0
R    1710.1602718.540 36      .013                                        12.0   1
JX   1712.6602719.140 30 18   .013    7.0           2720.040         31.0
R    1738.1302720.160 30      .013                                        12.0
R    1740.6302720.260 30      .013                                        12.0
JX   1743.1302720.319 30 30   .013    7.0           2720.319         90.0
R    1981.8102726.000 30      .013                                                  1
R    2196.9702734.066 30      .013                                        15.0
R    2197.5952734.090 30      .013                                        15.0
R    2198.2202734.113 30      .013                                        15.0
R    2198.8452734.137 30      .013                                        15.0
R    2199.4702734.160 30      .013                                        15.0   1
JX   2205.6502734.660 24 24 18.013    7.5      7.5  2733.6602735.160 90.0 16.0
R    2209.2102734.695 24      .013
R    2210.4602734.708 24      .013
R    2211.7102734.720 24      .013                                                  1
R    2255.1102734.980 24      .013                                        11.0   1
R    2364.3102735.850 24      .013                                         8.0   1
R    2486.5002736.585 24      .013                                        15.0
R    2487.0002736.588 24      .013                                        15.0
R    2487.5002736.591 24      .013                                        15.0
R    2488.0002736.594 24      .013                                        15.0
R    2488.5002736.597 24      .013                                        15.0
R    2489.0002736.600 24      .013                                        15.0   1
R    2736.7302747.250 24      .013                                               1
R    2832.9702749.660 24      .013                                               1
R    2974.9702754.760 24      .013                                        13.0   1
JX   2978.9702755.260 18 18   .013   11.0           2755.260         90.0
R    3006.0702755.420 18      .013                                                  1
SH   3006.0702755.420 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
CD  30  4   1   0.000   2.500    0.000 0.000 0.000  0.0000.00  0.00
CD  36  4   1   0.000   3.000    0.000 0.000 0.000  0.0000.00  0.00
CD  42  4   1   0.000   3.500    0.000 0.000 0.000  0.0000.00  0.00
Q            11.000
```

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	18	4	1		1.500														
CD	24	4	1		2.000														
CD	30	4	1		2.500														
CD	36	4	1		3.000														
CD	42	4	1		3.500														

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A

HEADING LINE NO 2 IS -

PHASE 4A SOUTH MODEL (PH4S.WSW)

HEADING LINE NO 3 IS -

CONNECTING PH3S AND NCR1 STORM DRAIN

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1000.000	2706.320	42	2708.556

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1023.430	2706.790	42	.013	.000	.000	.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1025.930	2706.840	42	.013	.000	.000	.000	1

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1028.430	2707.422	36	.013	.000	.000	.000	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1051.380	2708.178	36	.013	.000	.000	14.000	0

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1053.880	2708.260	36	.013	.000	.000	14.000	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
	1056.380	2708.352	36	24	0	.013	23.500	.000	2709.760	.000	90.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1138.970	2711.408	36	.013	.000	.000	13.000	0

ELEMENT NO 9 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1139.595	2711.431	36	.013	.000	.000	13.000	0

ELEMENT NO 10 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1140.220	2711.454	36	.013	.000	.000	13.000	0

ELEMENT NO 11 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1140.845	2711.477	36	.013	.000	.000	13.000	0

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 12 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1141.470	2711.500	36	.013	.000	.000	12.000	1

ELEMENT NO 13 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1197.200	2713.500	36	.013	.000	.000	2.000	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
	1199.700	2713.550	36	18	0	.013	11.000	.000	2715.000	.000	67.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 15 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1252.540	2714.600	36	.013	.000	.000	3.000	1

ELEMENT NO 16 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1367.140	2715.990	36	.013	.000	.000	4.000	1

ELEMENT NO 17 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1467.940	2716.490	36	.013	.000	.000	3.000	1

ELEMENT NO 18 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1532.340	2716.820	36	.013	.000	.000	3.000	1

ELEMENT NO 19 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1626.750	2717.290	36	.013	.000	.000	3.000	1

ELEMENT NO 20 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1707.660	2718.503	36	.013	.000	.000	13.000	0

ELEMENT NO 21 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1708.285	2718.512	36	.013	.000	.000	13.000	0

ELEMENT NO 22 IS A REACH * * *

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                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             1708.910 2718.521   36              .013                         .000     .000    12.000     0
ELEMENT NO  23 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             1709.535 2718.531   36              .013                         .000     .000    12.000     0
                                                 W S P G W                                                      PAGE NO   4
                         WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO  24 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             1710.160 2718.540   36              .013                         .000     .000    12.000     1
ELEMENT NO  25 IS A JUNCTION         *         *     *     *              *                    *              *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                             1712.660 2719.140   30    18     0   .013     7.000      .000  2720.040      .000  31.000     .000
                                                                                          RADIUS    ANGLE
                                                                                            .000     .000
ELEMENT NO  26 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             1738.130 2720.160   30              .013                         .000     .000    12.000     0
ELEMENT NO  27 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             1740.630 2720.260   30              .013                         .000     .000    12.000     0
ELEMENT NO  28 IS A JUNCTION         *         *     *     *              *                    *              *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                             1743.130 2720.319   30    30     0   .013     7.000      .000  2720.319      .000  90.000     .000
                                                                                          RADIUS    ANGLE
                                                                                            .000     .000
ELEMENT NO  29 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             1981.810 2726.000   30              .013                         .000     .000      .000     1
ELEMENT NO  30 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             2196.970 2734.066   30              .013                         .000     .000    15.000     0
ELEMENT NO  31 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             2197.595 2734.090   30              .013                         .000     .000    15.000     0
ELEMENT NO  32 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             2198.220 2734.113   30              .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
                             2198.845 2734.137   30              .013                         .000     .000    15.000     0
                                                 W S P G W                                                      PAGE NO   5
                         WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO  34 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             2199.470 2734.160   30              .013                         .000     .000    15.000     1
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
                             2205.650 2734.660   24    24    18   .013     7.500     7.500  2733.660  2735.160  90.000   16.000
                                                                                          RADIUS    ANGLE
                                                                                            .000     .000
ELEMENT NO  36 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             2209.210 2734.695   24              .013                         .000     .000      .000     0
ELEMENT NO  37 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             2210.460 2734.708   24              .013                         .000     .000      .000     0
ELEMENT NO  38 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             2211.710 2734.720   24              .013                         .000     .000      .000     1
ELEMENT NO  39 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             2255.110 2734.980   24              .013                         .000     .000    11.000     1
ELEMENT NO  40 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             2364.310 2735.850   24              .013                         .000     .000     8.000     1
ELEMENT NO  41 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             2486.500 2736.585   24              .013                         .000     .000    15.000     0
ELEMENT NO  42 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             2487.000 2736.588   24              .013                         .000     .000    15.000     0
ELEMENT NO  43 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             2487.500 2736.591   24              .013                         .000     .000    15.000     0
ELEMENT NO  44 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             2488.000 2736.594   24              .013                         .000     .000    15.000     0
ELEMENT NO  45 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             2488.500 2736.597   24              .013                         .000     .000    15.000     0
                                                 W S P G W                                                      PAGE NO   6
                         WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO  46 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             2489.000 2736.600   24              .013                         .000     .000    15.000     1
ELEMENT NO  47 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                             2736.730 2747.250   24              .013                         .000     .000      .000     1
ELEMENT NO  48 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
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                          2832.970 2749.660   24              .013                        .000     .000      .000     1
ELEMENT NO  49 IS A REACH           *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                          2974.970 2754.760   24              .013                        .000     .000    13.000     1
ELEMENT NO  50 IS A JUNCTION        *         *     *     *                 *                 *              *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                          2978.970 2755.260   18    18     0   .013    11.000      .000  2755.260      .000  90.000     .000
                                                                                        RADIUS    ANGLE
                                                                                          .000    .000
ELEMENT NO  51 IS A REACH           *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                          3006.070 2755.420   18              .013                         .000     .000      .000     1
ELEMENT NO  52 IS A SYSTEM HEADWORKS                *                     *
                  U/S DATA   STATION    INVERT  SECT                                 W S ELEV
                          3006.070 2755.420   18                                        .000
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Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 5-11-2022 Time: 1: 7: 2

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
PHASE 4A SOUTH MODEL (PH4S.WSW)
CONNECTING PH3S AND NCR1 STORM DRAIN

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	2706.320	2.067	2708.387	85.50	14.45	3.24	2711.63	.00	2.88	3.44	3.500	.000	.00	1 .0
23.430	.0201					.0164	.38	2.07	1.94	1.95	.013	.00	.00	PIPE
1023.430	2706.790	2.099	2708.889	85.50	14.19	3.13	2712.02	.00	2.88	3.43	3.500	.000	.00	1 .0
2.500	.0200					.0160	.04	2.10	1.89	1.96	.013	.00	.00	PIPE
1025.930	2706.840	2.103	2708.943	85.50	16.15	4.05	2712.99	.00	2.82	2.75	3.000	.000	.00	1 .0
.179	.2328					.0232	.00	2.10	2.05	1.06	.013	.00	.00	PIPE
1026.109	2706.882	2.115	2708.997	85.50	16.05	4.00	2713.00	.00	2.82	2.74	3.000	.000	.00	1 .0
1.266	.2328					.0218	.03	2.12	2.03	1.06	.013	.00	.00	PIPE
1027.375	2707.177	2.212	2709.388	85.50	15.31	3.64	2713.03	.00	2.82	2.64	3.000	.000	.00	1 .0
1.055	.2328					.0195	.02	2.21	1.85	1.06	.013	.00	.00	PIPE
1028.430	2707.422	2.317	2709.740	85.50	14.59	3.31	2713.05	.00	2.82	2.52	3.000	.000	.00	1 .0
6.407	.0329					.0180	.12	2.32	1.69	1.86	.013	.00	.00	PIPE
1034.837	2707.633	2.373	2710.006	85.50	14.26	3.16	2713.16	.00	2.82	2.44	3.000	.000	.00	1 .0
10.033	.0329					.0168	.17	2.37	1.60	1.86	.013	.00	.00	PIPE
1044.870	2707.964	2.498	2710.462	85.50	13.59	2.87	2713.33	.00	2.82	2.24	3.000	.000	.00	1 .0
6.510	.0329					.0154	.10	2.50	1.43	1.86	.013	.00	.00	PIPE
1051.380	2708.178	2.645	2710.823	85.50	12.96	2.61	2713.43	.00	2.82	1.94	3.000	.000	.00	1 .0
2.500	.0328					.0145	.04	2.64	1.24	1.86	.013	.00	.00	PIPE

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 5-11-2022 Time: 1: 7: 2

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
PHASE 4A SOUTH MODEL (PH4S.WSW)
CONNECTING PH3S AND NCR1 STORM DRAIN

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
1053.880	2708.260	2.816	2711.076	85.50	12.41	2.39	2713.47	.00	2.82	1.44	3.000	.000	.00	1 .0
JUNCT STR	.0368					.0114	.03	2.82	1.00		.013	.00	.00	PIPE
1056.380	2708.352	5.054	2713.406	62.00	8.77	1.19	2714.60	.00	2.54	.00	3.000	.000	.00	1 .0
43.653	.0370					.0086	.38	5.05	.00	1.47	.013	.00	.00	PIPE
1100.033	2709.967	3.844	2713.812	62.00	8.77	1.19	2715.01	.00	2.54	.00	3.000	.000	.00	1 .0
HYDRAULIC JUMP														
1100.033	2709.967	1.610	2711.577	62.00	16.05	4.00	2715.58	.00	2.54	2.99	3.000	.000	.00	1 .0
18.401	.0370					.0262	.48	1.61	2.49	1.47	.013	.00	.00	PIPE
1118.434	2710.648	1.652	2712.301	62.00	15.54	3.75	2716.05	.00	2.54	2.98	3.000	.000	.00	1 .0
20.536	.0370					.0236	.48	1.65	2.37	1.47	.013	.00	.00	PIPE
1138.970	2711.408	1.718	2713.126	62.00	14.81	3.41	2716.53	.00	2.54	2.97	3.000	.000	.00	1 .0
.625	.0367					.0221	.01	1.72	2.20	1.47	.013	.00	.00	PIPE
1139.595	2711.431	1.720	2713.151	62.00	14.79	3.40	2716.55	.00	2.54	2.97	3.000	.000	.00	1 .0
.625	.0371					.0220	.01	1.72	2.19	1.47	.013	.00	.00	PIPE
1140.220	2711.454	1.722	2713.177	62.00	14.77	3.39	2716.56	.00	2.54	2.97	3.000	.000	.00	1 .0

.625	.0367					.0219	.01	1.72	2.19	1.47	.013	.00	.00	PIPE		
1140.845	2711.477	1.725	2713.202	62.00	14.74	3.37	2716.58	.00	2.54	2.97	3.000	.000	.00	1	.0	
.625	.0367					.0218	.01	1.72	2.18	1.47	.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
1141.470	2711.500	1.727	2713.227	62.00	14.72	3.36	2716.59	.00	2.54	2.97	3.000	.000	.00	1	.0	
11.023	.0359					.0209	.23	1.73	2.18	1.48	.013	.00	.00	PIPE		
1152.493	2711.895	1.774	2713.669	62.00	14.25	3.15	2716.82	.00	2.54	2.95	3.000	.000	.00	1	.0	
12.590	.0359					.0189	.24	1.77	2.07	1.48	.013	.00	.00	PIPE		
1165.083	2712.347	1.846	2714.193	62.00	13.58	2.87	2717.06	.00	2.54	2.92	3.000	.000	.00	1	.0	
9.577	.0359					.0167	.16	1.85	1.91	1.48	.013	.00	.00	PIPE		
1174.660	2712.691	1.923	2714.614	62.00	12.95	2.60	2717.22	.00	2.54	2.88	3.000	.000	.00	1	.0	
7.359	.0359					.0148	.11	1.92	1.77	1.48	.013	.00	.00	PIPE		
1182.019	2712.955	2.005	2714.960	62.00	12.35	2.37	2717.33	.00	2.54	2.82	3.000	.000	.00	1	.0	
5.619	.0359					.0132	.07	2.01	1.63	1.48	.013	.00	.00	PIPE		
1187.638	2713.157	2.093	2715.250	62.00	11.77	2.15	2717.40	.00	2.54	2.76	3.000	.000	.00	1	.0	
4.189	.0359					.0118	.05	2.09	1.50	1.48	.013	.00	.00	PIPE		
1191.827	2713.307	2.188	2715.495	62.00	11.23	1.96	2717.45	.00	2.54	2.67	3.000	.000	.00	1	.0	
2.944	.0359					.0105	.03	2.19	1.37	1.48	.013	.00	.00	PIPE		
1194.771	2713.413	2.291	2715.704	62.00	10.70	1.78	2717.48	.00	2.54	2.55	3.000	.000	.00	1	.0	
1.793	.0359					.0095	.02	2.29	1.25	1.48	.013	.00	.00	PIPE		
1196.564	2713.477	2.405	2715.883	62.00	10.21	1.62	2717.50	.00	2.54	2.39	3.000	.000	.00	1	.0	
.636	.0359					.0086	.01	2.41	1.13	1.48	.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
1197.200	2713.500	2.536	2716.036	62.00	9.73	1.47	2717.51	.00	2.54	2.17	3.000	.000	.00	1	.0	
JUNCT STR	.0200					.0070	.02	2.54	1.00		.013	.00	.00	PIPE		
1199.700	2713.550	3.466	2717.017	51.00	7.22	.81	2717.82	.00	2.32	.00	3.000	.000	.00	1	.0	
35.780	.0199					.0058	.21	3.47	.00	1.57	.013	.00	.00	PIPE		
1235.480	2714.261	3.000	2717.261	51.00	7.22	.81	2718.07	.00	2.32	.00	3.000	.000	.00	1	.0	
4.380	.0199					.0055	.02	3.00	.00	1.57	.013	.00	.00	PIPE		
1239.860	2714.348	2.925	2717.273	51.00	7.26	.82	2718.09	.00	2.32	.94	3.000	.000	.00	1	.0	
HYDRAULIC JUMP																
1239.860	2714.348	1.813	2716.161	51.00	11.42	2.02	2718.19	.00	2.32	2.93	3.000	.000	.00	1	.0	
12.680	.0199					.0120	.15	1.81	1.63	1.57	.013	.00	.00	PIPE		
1252.540	2714.600	1.879	2716.479	51.00	10.95	1.86	2718.34	.00	2.32	2.90	3.000	.000	.00	1	.0	
60.078	.0121					.0108	.65	1.88	1.52	1.84	.013	.00	.00	PIPE		
1312.618	2715.329	1.945	2717.274	51.00	10.51	1.72	2718.99	.00	2.32	2.86	3.000	.000	.00	1	.0	

30.082	.0121						.0097	.29	1.95	1.42	1.84	.013	.00	.00	PIPE				
1342.699	2715.694	2.029	2717.722	51.00	10.02	1.56	2719.28	.00	2.32	2.81	3.000	.000	.00	1	.0				
15.022	.0121						.0086	.13	2.03	1.31	1.84	.013	.00	.00	PIPE				
1357.722	2715.876	2.119	2717.994	51.00	9.56	1.42	2719.41	.00	2.32	2.73	3.000	.000	.00	1	.0				
7.278	.0121						.0077	.06	2.12	1.21	1.84	.013	.00	.00	PIPE				

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WATER SURFACE PROFILE LISTING Date: 5-11-2022 Time: 1: 7: 2

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
PHASE 4A SOUTH MODEL (PH4S.WSW)
CONNECTING PH3S AND NCR1 STORM DRAIN

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
1365.000	2715.964	2.215	2718.179	51.00	9.11	1.29	2719.47	.00	2.32	2.64	3.000	.000	.00	1 .0
2.140	.0121					.0069	.01	2.22	1.10	1.84	.013	.00	.00	PIPE
1367.140	2715.990	2.323	2718.313	51.00	8.69	1.17	2719.48	.00	2.32	2.51	3.000	.000	.00	1 .0
9.092	.0050					.0062	.06	2.32	1.00	3.00	.013	.00	.00	PIPE
1376.232	2716.035	2.441	2718.476	51.00	8.28	1.06	2719.54	.00	2.32	2.34	3.000	.000	.00	1 .0
54.059	.0050					.0057	.31	2.44	.90	3.00	.013	.00	.00	PIPE
1430.292	2716.303	2.576	2718.879	51.00	7.90	.97	2719.85	.00	2.32	2.09	3.000	.000	.00	1 .0
37.648	.0050					.0054	.20	2.58	.79	3.00	.013	.00	.00	PIPE
1467.940	2716.490	2.616	2719.105	51.00	7.80	.94	2720.05	.00	2.32	2.01	3.000	.000	.00	1 .0
64.400	.0051					.0053	.34	2.62	.76	2.71	.013	.00	.00	PIPE
1532.340	2716.820	2.640	2719.460	51.00	7.74	.93	2720.39	.00	2.32	1.95	3.000	.000	.00	1 .0
4.664	.0050					.0053	.02	2.64	.74	3.00	.013	.00	.00	PIPE
1537.004	2716.843	2.640	2719.484	51.00	7.74	.93	2720.41	.00	2.32	1.95	3.000	.000	.00	1 .0
HYDRAULIC JUMP														
1537.004	2716.843	2.046	2718.890	51.00	9.93	1.53	2720.42	.00	2.32	2.79	3.000	.000	.00	1 .0
13.094	.0050					.0095	.12	2.05	1.29	3.00	.013	.00	.00	PIPE
1550.099	2716.908	1.962	2718.870	51.00	10.41	1.68	2720.55	.00	2.32	2.85	3.000	.000	.00	1 .0
15.639	.0050					.0107	.17	1.96	1.40	3.00	.013	.00	.00	PIPE

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 5-11-2022 Time: 1: 7: 2

SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
PHASE 4A SOUTH MODEL (PH4S.WSW)
CONNECTING PH3S AND NCR1 STORM DRAIN

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
1565.737	2716.986	1.883	2718.869	51.00	10.92	1.85	2720.72	.00	2.32	2.90	3.000	.000	.00	1 .0
15.679	.0050					.0120	.19	1.88	1.52	3.00	.013	.00	.00	PIPE
1581.417	2717.064	1.808	2718.873	51.00	11.46	2.04	2720.91	.00	2.32	2.94	3.000	.000	.00	1 .0
15.473	.0050					.0136	.21	1.81	1.64	3.00	.013	.00	.00	PIPE
1596.889	2717.141	1.738	2718.879	51.00	12.01	2.24	2721.12	.00	2.32	2.96	3.000	.000	.00	1 .0
15.133	.0050					.0154	.23	1.74	1.77	3.00	.013	.00	.00	PIPE
1612.022	2717.217	1.671	2718.888	51.00	12.60	2.47	2721.35	.00	2.32	2.98	3.000	.000	.00	1 .0
14.728	.0050					.0174	.26	1.67	1.91	3.00	.013	.00	.00	PIPE
1626.750	2717.290	1.608	2718.898	51.00	13.22	2.71	2721.61	.00	2.32	2.99	3.000	.000	.00	1 .0
7.676	.0150					.0187	.14	1.61	2.05	1.72	.013	.00	.00	PIPE

1634.426	2717.405	1.600	2719.005	51.00	13.31	2.75	2721.75	.00	2.32	2.99	3.000	.000	.00	1	.0				
41.936	.0150					.0201	.84	1.60	2.07	1.72	.013	.00	.00	PIPE					
1676.361	2718.034	1.540	2719.574	51.00	13.96	3.02	2722.60	.00	2.32	3.00	3.000	.000	.00	1	.0				
31.299	.0150					.0228	.71	1.54	2.23	1.72	.013	.00	.00	PIPE					
1707.660	2718.503	1.483	2719.986	51.00	14.64	3.33	2723.31	.00	2.32	3.00	3.000	.000	.00	1	.0				
.625	.0145					.0243	.02	1.48	2.39	1.74	.013	.00	.00	PIPE					
1708.285	2718.512	1.482	2719.994	51.00	14.66	3.34	2723.33	.00	2.32	3.00	3.000	.000	.00	1	.0				
.625	.0145					.0244	.02	1.48	2.40	1.74	.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
1708.910	2718.521	1.480	2720.001	51.00	14.68	3.34	2723.35	.00	2.32	3.00	3.000	.000	.00	1	.0
.625	.0160					.0245	.02	1.48	2.40	1.68	.013	.00	.00	PIPE	
1709.535	2718.531	1.479	2720.010	51.00	14.69	3.35	2723.36	.00	2.32	3.00	3.000	.000	.00	1	.0
.625	.0145					.0246	.02	1.48	2.41	1.74	.013	.00	.00	PIPE	
1710.160	2718.540	1.478	2720.018	51.00	14.71	3.36	2723.38	.00	2.32	3.00	3.000	.000	.00	1	.0
JUNCT STR	.2399					.0226	.06	1.48	2.41		.013	.00	.00	PIPE	
1712.660	2719.140	1.612	2720.751	44.00	13.15	2.69	2723.44	.00	2.21	2.39	2.500	.000	.00	1	.0
5.825	.0400					.0198	.12	1.61	1.96	1.30	.013	.00	.00	PIPE	
1718.485	2719.373	1.656	2721.029	44.00	12.75	2.52	2723.55	.00	2.21	2.36	2.500	.000	.00	1	.0
7.153	.0400					.0180	.13	1.66	1.86	1.30	.013	.00	.00	PIPE	
1725.638	2719.659	1.728	2721.387	44.00	12.16	2.30	2723.68	.00	2.21	2.31	2.500	.000	.00	1	.0
5.466	.0400					.0161	.09	1.73	1.71	1.30	.013	.00	.00	PIPE	
1731.104	2719.878	1.805	2721.684	44.00	11.59	2.09	2723.77	.00	2.21	2.24	2.500	.000	.00	1	.0
4.101	.0400					.0144	.06	1.81	1.57	1.30	.013	.00	.00	PIPE	
1735.205	2720.043	1.890	2721.932	44.00	11.05	1.90	2723.83	.00	2.21	2.15	2.500	.000	.00	1	.0
2.925	.0400					.0129	.04	1.89	1.43	1.30	.013	.00	.00	PIPE	
1738.130	2720.160	1.983	2722.143	44.00	10.54	1.72	2723.87	.00	2.21	2.03	2.500	.000	.00	1	.0
1.807	.0400					.0117	.02	1.98	1.29	1.30	.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
1739.937	2720.232	2.084	2722.317	44.00	10.06	1.57	2723.89	.00	2.21	1.86	2.500	.000	.00	1	.0
.693	.0400					.0107	.01	2.08	1.16	1.30	.013	.00	.00	PIPE	
1740.630	2720.260	2.208	2722.468	44.00	9.59	1.43	2723.90	.00	2.21	1.61	2.500	.000	.00	1	.0
JUNCT STR	.0236					.0092	.02	2.21	1.00		.013	.00	.00	PIPE	
1743.130	2720.319	3.108	2723.427	37.00	7.54	.88	2724.31	.00	2.06	.00	2.500	.000	.00	1	.0
9.081	.0238					.0081	.07	3.11	.00	1.37	.013	.00	.00	PIPE	
1752.211	2720.535	2.963	2723.498	37.00	7.54	.88	2724.38	.00	2.06	.00	2.500	.000	.00	1	.0
HYDRAULIC JUMP															

1752.211	2720.535	1.368	2721.903	37.00	13.46	2.81	2724.72	.00	2.06	2.49	2.500	.000	.00	1 .0
72.358	.0238					.0245	1.77	1.37	2.26	1.37	.013	.00	.00	PIPE
1824.570	2722.258	1.355	2723.612	37.00	13.63	2.88	2726.50	.00	2.06	2.49	2.500	.000	.00	1 .0
85.784	.0238					.0266	2.28	1.35	2.30	1.37	.013	.00	.00	PIPE
1910.354	2724.299	1.304	2725.603	37.00	14.29	3.17	2728.77	.00	2.06	2.50	2.500	.000	.00	1 .0
42.398	.0238					.0301	1.28	1.30	2.47	1.37	.013	.00	.00	PIPE
1952.752	2725.308	1.256	2726.564	37.00	14.99	3.49	2730.05	.00	2.06	2.50	2.500	.000	.00	1 .0
29.058	.0238					.0342	.99	1.26	2.66	1.37	.013	.00	.00	PIPE
1981.810	2726.000	1.210	2727.210	37.00	15.72	3.84	2731.05	.00	2.06	2.50	2.500	.000	.00	1 .0
54.150	.0375					.0357	1.93	1.21	2.85	1.20	.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
2035.960	2728.030	1.223	2729.253	37.00	15.50	3.73	2732.98	.00	2.06	2.50	2.500	.000	.00	1 .0
64.192	.0375					.0329	2.11	1.22	2.79	1.20	.013	.00	.00	PIPE
2100.152	2730.437	1.270	2731.707	37.00	14.77	3.39	2735.10	.00	2.06	2.50	2.500	.000	.00	1 .0
30.593	.0375					.0290	.89	1.27	2.60	1.20	.013	.00	.00	PIPE
2130.745	2731.583	1.319	2732.902	37.00	14.09	3.08	2735.98	.00	2.06	2.50	2.500	.000	.00	1 .0
19.209	.0375					.0256	.49	1.32	2.42	1.20	.013	.00	.00	PIPE
2149.954	2732.304	1.370	2733.674	37.00	13.43	2.80	2736.48	.00	2.06	2.49	2.500	.000	.00	1 .0
13.443	.0375					.0226	.30	1.37	2.25	1.20	.013	.00	.00	PIPE
2163.397	2732.808	1.425	2734.232	37.00	12.81	2.55	2736.78	.00	2.06	2.48	2.500	.000	.00	1 .0
9.937	.0375					.0199	.20	1.42	2.09	1.20	.013	.00	.00	PIPE
2173.334	2733.180	1.482	2734.662	37.00	12.21	2.31	2736.98	.00	2.06	2.46	2.500	.000	.00	1 .0
7.558	.0375					.0176	.13	1.48	1.94	1.20	.013	.00	.00	PIPE
2180.891	2733.463	1.542	2735.006	37.00	11.64	2.10	2737.11	.00	2.06	2.43	2.500	.000	.00	1 .0
5.817	.0375					.0156	.09	1.54	1.79	1.20	.013	.00	.00	PIPE
2186.708	2733.681	1.606	2735.288	37.00	11.10	1.91	2737.20	.00	2.06	2.40	2.500	.000	.00	1 .0
4.461	.0375					.0139	.06	1.61	1.66	1.20	.013	.00	.00	PIPE
2191.170	2733.849	1.675	2735.524	37.00	10.58	1.74	2737.26	.00	2.06	2.35	2.500	.000	.00	1 .0
3.370	.0375					.0123	.04	1.68	1.53	1.20	.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
2194.539	2733.975	1.748	2735.723	37.00	10.09	1.58	2737.30	.00	2.06	2.29	2.500	.000	.00	1 .0
2.431	.0375					.0110	.03	1.75	1.41	1.20	.013	.00	.00	PIPE
2196.970	2734.066	1.828	2735.894	37.00	9.62	1.44	2737.33	.00	2.06	2.22	2.500	.000	.00	1 .0
.625	.0387					.0102	.01	1.83	1.29	1.19	.013	.00	.00	PIPE
2197.595	2734.090	1.857	2735.947	37.00	9.46	1.39	2737.34	.00	2.06	2.19	2.500	.000	.00	1 .0

.625	.0367					.0098	.01	1.86	1.25	1.21	.013	.00	.00	PIPE	
2198.220	2734.113	1.891	2736.004	37.00	9.29	1.34	2737.34	.00	2.06	2.15	2.500	.000	.00	1	.0
.625	.0383					.0093	.01	1.89	1.20	1.19	.013	.00	.00	PIPE	
2198.845	2734.137	1.939	2736.076	37.00	9.06	1.27	2737.35	.00	2.06	2.09	2.500	.000	.00	1	.0
.187	.0367					.0090	.00	1.94	1.14	1.21	.013	.00	.00	PIPE	
2199.031	2734.144	1.957	2736.101	37.00	8.97	1.25	2737.35	.00	2.06	2.06	2.500	.000	.00	1	.0
.438	.0367					.0085	.00	1.96	1.12	1.21	.013	.00	.00	PIPE	
2199.470	2734.160	2.060	2736.219	37.00	8.55	1.14	2737.36	.00	2.06	1.90	2.500	.000	.00	1	.0
JUNCT STR	.0809					.0088	.05	2.06	1.00		.013	.00	.00	PIPE	
2205.650	2734.660	2.710	2737.370	22.00	7.00	.76	2738.13	.00	1.68	.00	2.000	.000	.00	1	.0
3.560	.0099					.0095	.03	2.71	.00	1.60	.013	.00	.00	PIPE	
2209.210	2734.695	2.708	2737.403	22.00	7.00	.76	2738.16	.00	1.68	.00	2.000	.000	.00	1	.0
1.250	.0104					.0095	.01	2.71	.00	1.57	.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
2210.460	2734.708	2.707	2737.415	22.00	7.00	.76	2738.18	.00	1.68	.00	2.000	.000	.00	1 .0
1.250	.0096					.0095	.01	2.71	.00	1.63	.013	.00	.00	PIPE
2211.710	2734.720	2.745	2737.465	22.00	7.00	.76	2738.23	.00	1.68	.00	2.000	.000	.00	1 .0
43.400	.0060					.0095	.41	2.74	.00	2.00	.013	.00	.00	PIPE
2255.110	2734.980	2.961	2737.941	22.00	7.00	.76	2738.70	.00	1.68	.00	2.000	.000	.00	1 .0
109.200	.0080					.0095	1.03	2.96	.00	2.00	.013	.00	.00	PIPE
2364.310	2735.850	3.182	2739.032	22.00	7.00	.76	2739.79	.00	1.68	.00	2.000	.000	.00	1 .0
122.190	.0060					.0095	1.16	3.18	.00	2.00	.013	.00	.00	PIPE
2486.500	2736.585	3.640	2740.225	22.00	7.00	.76	2740.99	.00	1.68	.00	2.000	.000	.00	1 .0
.500	.0059					.0095	.00	3.64	.00	2.00	.013	.00	.00	PIPE
2487.000	2736.588	3.680	2740.268	22.00	7.00	.76	2741.03	.00	1.68	.00	2.000	.000	.00	1 .0
.500	.0063					.0095	.00	3.68	.00	2.00	.013	.00	.00	PIPE
2487.500	2736.591	3.719	2740.310	22.00	7.00	.76	2741.07	.00	1.68	.00	2.000	.000	.00	1 .0
.500	.0059					.0095	.00	3.72	.00	2.00	.013	.00	.00	PIPE
2488.000	2736.594	3.758	2740.353	22.00	7.00	.76	2741.11	.00	1.68	.00	2.000	.000	.00	1 .0
.500	.0059					.0095	.00	3.76	.00	2.00	.013	.00	.00	PIPE
2488.500	2736.597	3.798	2740.395	22.00	7.00	.76	2741.16	.00	1.68	.00	2.000	.000	.00	1 .0
.500	.0063					.0095	.00	3.80	.00	2.00	.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
2489.000	2736.600	3.875	2740.476	22.00	7.00	.76	2741.24	.00	1.68	.00	2.000	.000	.00	1 .0
30.227	.0430					.0095	.29	3.88	.00	.96	.013	.00	.00	PIPE
2519.227	2737.900	2.867	2740.766	22.00	7.00	.76	2741.53	.00	1.68	.00	2.000	.000	.00	1 .0

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HYDRAULIC JUMP
 2519.227  2737.900    .963  2738.863    22.00   14.69    3.35  2742.21     .00    1.68    2.00    2.000    .000   .00   1   .0
   45.301    .0430                                  .0430     1.95     .96    2.99     .96    .013      .00   .00  PIPE
 2564.528  2739.847    .963  2740.810    22.00   14.69    3.35  2744.16     .00    1.68    2.00    2.000    .000   .00   1   .0
  104.162    .0430                                  .0408     4.24     .96    2.99     .96    .013      .00   .00  PIPE
 2668.690  2744.325    .995  2745.320    22.00   14.10    3.09  2748.41     .00    1.68    2.00    2.000    .000   .00   1   .0
   35.815    .0430                                  .0362     1.30     .99    2.81     .96    .013      .00   .00  PIPE
 2704.505  2745.865   1.033  2746.897    22.00   13.44    2.81  2749.70     .00    1.68    2.00    2.000    .000   .00   1   .0
   19.429    .0430                                  .0319      .62    1.03    2.62     .96    .013      .00   .00  PIPE
 2723.935  2746.700   1.073  2747.773    22.00   12.82    2.55  2750.32     .00    1.68    1.99    2.000    .000   .00   1   .0
   12.795    .0430                                  .0282      .36    1.07    2.44     .96    .013      .00   .00  PIPE
 2736.730  2747.250   1.115  2748.365    22.00   12.22    2.32  2750.68     .00    1.68    1.99    2.000    .000   .00   1   .0
    9.981    .0250                                  .0265      .26    1.11    2.26    1.13    .013      .00   .00  PIPE
 2746.711  2747.500   1.111  2748.611    22.00   12.27    2.34  2750.95     .00    1.68    1.99    2.000    .000   .00   1   .0
   56.164    .0250                                  .0285     1.60    1.11    2.28    1.13    .013      .00   .00  PIPE
 FILE: PH4S.WSW                          W S P G W - CIVILDESIGN Version 14.08                                    PAGE   13

                        Program Package Serial Number: 7189
                                     WATER SURFACE PROFILE LISTING                 Date: 5-11-2022  Time: 1: 7: 2
                     SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
                       PHASE 4A SOUTH MODEL (PH4S.WSW)
                         CONNECTING PH3S AND NCR1 STORM DRAIN

         | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super |Critical|Flow Top|Height/|Base Wt|      |No Wth
 Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev | Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
 L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch
 2802.875  2748.906    1.069  2749.975    22.00   12.87    2.57  2752.55     .00    1.68    2.00    2.000    .000   .00   1   .0
   30.095    .0250                                  .0323      .97    1.07    2.45    1.13    .013      .00   .00  PIPE
 2832.970  2749.660    1.029  2750.689    22.00   13.50    2.83  2753.52     .00    1.68    2.00    2.000    .000   .00   1   .0
   37.905    .0359                                  .0334     1.27    1.03    2.63    1.02    .013      .00   .00  PIPE
 2870.875  2751.021    1.046  2752.067    22.00   13.23    2.72  2754.79     .00    1.68    2.00    2.000    .000   .00   1   .0
   38.922    .0359                                  .0306     1.19    1.05    2.56    1.02    .013      .00   .00  PIPE
 2909.797  2752.419    1.087  2753.506    22.00   12.62    2.47  2755.98     .00    1.68    1.99    2.000    .000   .00   1   .0
   20.416    .0359                                  .0270      .55    1.09    2.38    1.02    .013      .00   .00  PIPE
 2930.213  2753.152    1.129  2754.282    22.00   12.03    2.25  2756.53     .00    1.68    1.98    2.000    .000   .00   1   .0
   13.188    .0359                                  .0239      .31    1.13    2.21    1.02    .013      .00   .00  PIPE
 2943.402  2753.626    1.175  2754.801    22.00   11.47    2.04  2756.84     .00    1.68    1.97    2.000    .000   .00   1   .0
    9.306    .0359                                  .0211      .20    1.17    2.05    1.02    .013      .00   .00  PIPE
 2952.708  2753.960    1.222  2755.183    22.00   10.94    1.86  2757.04     .00    1.68    1.95    2.000    .000   .00   1   .0
    6.855    .0359                                  .0187      .13    1.22    1.90    1.02    .013      .00   .00  PIPE
 2959.563  2754.207    1.273  2755.479    22.00   10.43    1.69  2757.17     .00    1.68    1.92    2.000    .000   .00   1   .0
    5.149    .0359                                  .0166      .09    1.27    1.75    1.02    .013      .00   .00  PIPE
 2964.712  2754.392    1.327  2755.719    22.00    9.94    1.53  2757.25     .00    1.68    1.89    2.000    .000   .00   1   .0
    3.859    .0359                                  .0147      .06    1.33    1.62    1.02    .013      .00   .00  PIPE
 FILE: PH4S.WSW                          W S P G W - CIVILDESIGN Version 14.08                                    PAGE   14

                        Program Package Serial Number: 7189
                                     WATER SURFACE PROFILE LISTING                 Date: 5-11-2022  Time: 1: 7: 2
                     SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A
                       PHASE 4A SOUTH MODEL (PH4S.WSW)
                         CONNECTING PH3S AND NCR1 STORM DRAIN

         | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super |Critical|Flow Top|Height/|Base Wt|      |No Wth
 Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev | Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
 L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch
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2968.572  2754.530    1.385  2755.915     22.00    9.48    1.40  2757.31     .00    1.68     1.85    2.000     .000   .00   1   .0
       -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-     -|-     |-
   2.834    .0359                                        .0131      .04    1.38    1.49    1.02    .013       .00   .00  PIPE
         |         |        |         |         |                |        |       |       |       |       |       |       |
2971.405  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
       -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-     -|-     |-
   1.967    .0359                                        .0118      .02    1.45    1.37    1.02    .013       .00   .00  PIPE
         |         |        |         |         |                |        |       |       |       |       |       |       |
2973.372  2754.703    1.515  2756.218     22.00    8.62    1.15  2757.37     .00    1.68     1.71    2.000     .000   .00   1   .0
       -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-     -|-     |-
   1.185    .0359                                        .0106      .01    1.51    1.24    1.02    .013       .00   .00  PIPE
         |         |        |         |         |                |        |       |       |       |       |       |       |
2974.556  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
       -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-     -|-     |-
    .414    .0359                                        .0096      .00    1.59    1.12    1.02    .013       .00   .00  PIPE
         |         |        |         |         |                |        |       |       |       |       |       |       |
2974.970  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
         |         |        |         |         |                |        |       |       |       |       |       |       |
2978.970  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
         |         |        |         |         |                |        |       |       |       |       |       |       |
3006.070  2755.420    2.791  2758.211     11.00    6.22     .60  2758.81     .00    1.27     .00    1.500     .000   .00   1   .0
       -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-     -|-     |-
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SHE1901-004: TRILOGY AT SUNSTONE PHASE 4A

PHASE 4A SOUTH MODEL (PH4S.WSW)

CONNECTING PH3S AND NCR1 STORM DRAIN

```
1000.00    .I  W CH   E                                                                .    R

1008.12    .                                                                           .

1016.24    .                                                                           .

1024.37    .I   W CH  E                                                                .    R

1032.49    .I   W H     E                                                              .    R

1040.61    . I   WH     E                                                             .    R

1048.73    . I   WCH    E                                                             .    R

1056.85    .  I   WH    E                                                             .    R

1064.97    .  I    WH    E                                                            .    R

1073.10    .   I   WH    E                                                           .    R

1081.22    .   I    WH   E                                                          .    R

1089.34    .   I     H   E                                                          .    JX

1097.46    .   I    CH   W E                                                        .    R

1105.58    .      I    CH W E                                                      .    R

1113.70    .      I   WCH    E                                                     .    R

1121.83    .        I  W H    E                                                    .    R

1129.95    .                                                                     .
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1138.07    .                                                                .
1146.19    .        I  W CH   E                                             .    R
1154.31    .        I   WCH   E                                             .    R
1162.43    .        I   WCH   E                                             .    R
1170.56    .        I   WCH   E                                             .    R
1178.68    .        I   WCH   E                                             .    R
1186.80    .         I  W CH   E                                            .    R
1194.92    .          I  W CH  E                                            .    R
1203.04    .           I  WCH  E                                            .    R
1211.17    .           I   WCH E                                            .    R
1219.29    .            I   WH  E                                           .    R
1227.41    .            I   WCH E                                           .    R
1235.53    .            I   WCH E                                           .    R
1243.65    .            I    WH E                                          .    R
1251.77    .            I    WH E                                          .    JX
1259.90    .            I    CHWE                                          .    R
1268.02    .              I   CH E                                          .    R
1276.14    .              I   CWHE                                          .    R
1284.26    .              I  WC HE                                          .    R
1292.38    .              I   WCHE                                          .    R
1300.50    .                                                                .
1308.63    .                                                                .
1316.75    .                I  WCH E                                        .    R
1324.87    .                                                                .
1332.99    .                                                                .
1341.11    .                                                                .
1349.23    .                I   WCHE                                        .    R
1357.36    .                                                                .
1365.48    .                 I   WHE                                        .    R
1373.60    .                 I   W HE                                       .    R
```

```
1381.72   .                I   W HE                                                .   R
1389.84   .                I   CWHE                                                .   R
1397.97   .                                                                        .
1406.09   .                                                                        .
1414.21   .                                                                        .
1422.33   .                                                                        .
1430.45   .                 I   WHE                                                .   R
1438.57   .                                                                        .
1446.70   .                                                                        .
1454.82   .                                                                        .
1462.94   .                                                                        .
1471.06   .                 I   CWHE                                               .   R
1479.18   .                                                                        .
1487.30   .                                                                        .
1495.43   .                                                                        .
1503.55   .                                                                        .
1511.67   .                                                                        .
1519.79   .                                                                        .
1527.91   .                                                                        .
1536.03   .                  I   CHE                                              .   R
1544.16   .                  I   CHE                                              .   R
1552.28   .                  I  WCHE                                              .   R
1560.40   .                  I  WCH E                                             .   R
1568.52   .                  I  WC HE                                             .   R
1576.64   .                                                                       .
1584.77   .                  I  WC HE                                             .   R
1592.89   .                                                                       .
1601.01   .                  I  W CH E                                            .   R
1609.13   .                                                                       .
1617.25   .                  I  W CH E                                            .   R
1625.37   .                                                                       .
```

1633.50 . I W CH E . R

1641.62 . I WCH E . R

1649.74 . .

1657.86 . .

1665.98 . .

1674.10 . .

1682.23 . I WC H E . R

1690.35 . .

1698.47 . .

1706.59 . .

1714.71 . I WCH E . R

1722.83 . I WCH E . R

1730.96 . I WCH E . R

1739.08 . I WCH E . R

1747.20 . I WCH E . JX

1755.32 . I WCH E . R

1763.44 . I WH E . R

1771.57 . I WCH E . R

1779.69 . I WH E . R

1787.81 . I WH E . R

1795.93 . I WH E . R

1804.05 . I WH E . R

1812.17 . I WH E . JX

1820.30 . I CHW E . R

1828.42 . I HW E . R

1836.54 . I W H E . R

1844.66 . I W CH E . R

1852.78 . .

1860.90 . .

1869.03 . .

1877.15 . .

1885.27 . .

1893.39 . .

1901.51 . .

1909.64 . .

1917.76 . I W CH E . R

1925.88 . .

1934.00 . .

1942.12 . .

1950.24 . .

1958.37 . I W H E . R

1966.49 . .

1974.61 . .

1982.73 . I W CH E . R

1990.85 . .

1998.97 . .

2007.10 . .

2015.22 . .

2023.34 . .

2031.46 . .

2039.58 . I W CH E . R

2047.70 . .

2055.83 . .

2063.95 . .

2072.07 . .

2080.19 . .

2088.31 . .

2096.44 . .

2104.56 . I WCH E . R

2112.68 . .

```
2120.80    .                                                    .
2128.92    .                                                    .
2137.04    .                                 I W H   E          .    R
2145.17    .                                                    .
2153.29    .                                  I  WCH  E         .    R
2161.41    .                                                    .
2169.53    .                                   I  WCH  E        .    R
2177.65    .                                   I W H  E         .    R
2185.77    .                                   I  WCH E         .    R
2193.90    .                                    I  WH E         .    R
2202.02    .                                    I  WCHE         .    R
2210.14    .                                    I   WH E        .    R
2218.26    .                                    I   WH E        .    R
2226.38    .                                    I   WH E        .    R
2234.50    .                                    I   WH E        .    R
2242.63    .                                    I   WH E        .    R
2250.75    .                                     I  WH E        .    R
2258.87    .                                     I  WH E        .    JX
2266.99    .                                     I   H WE       .    R
2275.11    .                                      I  H WE       .    R
2283.24    .                                      I  H WE       .    R
2291.36    .                                      I  H WE       .    R
2299.48    .                                      I  CH WE      .    R
2307.60    .                                                    .
2315.72    .                                                    .
2323.84    .                                                    .
2331.97    .                                                    .
2340.09    .                                                    .
2348.21    .                                                    .
2356.33    .                                                    .
2364.45    .                                        I  CH WE    .    R
```

2372.57 .

2380.70 .

2388.82 .

2396.94 .

2405.06 .

2413.18 .

2421.30 .

2429.43 .

2437.55 .

2445.67 .

2453.79 .

2461.91 .

2470.04 .

2478.16 .

2486.28 .

2494.40 . I CH W E . R

2502.52 . I CH W E . R

2510.64 . I CH W E . R

2518.77 . I CH W E . R

2526.89 . I CH W E . R

2535.01 . I CH WE . R

2543.13 . I H W E . R

2551.25 . IW H E . R

2559.37 .

2567.50 . I W H E . R

2575.62 .

2583.74 .

2591.86 .

2599.98 .

2608.10 .

2616.23 . .

2624.35 . .

2632.47 . .

2640.59 . .

2648.71 . .

2656.84 . .

2664.96 . .

2673.08 . I WCH E . R

2681.20 . .

2689.32 . .

2697.44 . .

2705.57 . I WCH E . R

2713.69 . .

2721.81 . .

2729.93 . I W H E . R

2738.05 . I WH E . R

2746.17 . .

2754.30 . I WCH E . R

2762.42 . .

2770.54 . .

2778.66 . .

2786.78 . .

2794.90 . .

2803.03 . I WH E . R

2811.15 . .

2819.27 . .

2827.39 . .

2835.51 . I WCH E . R

2843.64 . .

2851.76 . .

```
2859.88    .                                                                .
2868.00    .                                                                .
2876.12    .                                                  I WH   E      .    R
2884.24    .                                                                .
2892.37    .                                                                .
2900.49    .                                                                .
2908.61    .                                                                .
2916.73    .                                                    I W H  E    .    R
2924.85    .                                                                .
2932.97    .                                                      I WCH E   .    R
2941.10    .                                                                .
2949.22    .                                                       I WH  E  .    R
2957.34    .                                                       I  WH E  .    R
2965.46    .                                                        I WCHE  .    R
2973.58    .                                                        I  WH E .    R
2981.70    .                                                        I  WH E .    R
2989.83    .                                                         I WH E .    R
2997.95    .                                                         I  H E .    R
3006.07    .                                                         I  WHE .    R

         2706.32
```

Lateral Sizing Computations

Project Name:	PARCEL 3 AT SUNSTONE PHASE 4A
Project Number:	SHE1901.004
Date:	5/12/2022
By:	CAA

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	1012.81	ROUND 18" RCP	0.013	2728.69	2728.82	12.81	1.767146	0.375	0.004925	10	5.658843	0.497244	0.009025849	0.116	2730.30	2730.416	Yes	Facility P4-1b
1000	1031.76	ROUND 18" RCP	0.013	2735.16	2735.48	31.76	1.767146	0.375	0.004925	7.5	4.244132	0.2797	0.00507704	0.161	2737.37	2737.531	Yes	Facility P4-8
1000	1007.74	ROUND 18" RCP	0.013	2719.04	2718.62	7.74	1.767146	0.375	0.004925	7	3.96119	0.243649	0.004422666	0.034	2720.02	2720.751	Yes	Facility P4-14
1000	1032.08	ROUND 18" RCP	0.013	2715.00	2715.32	32.08	1.767146	0.375	0.004925	11	6.224727	0.601665	0.010921277	0.350	2717.02	2717.367	Yes	Facility P4-17
1000	1004.97	ROUND 24" RCP	0.013	2709.76	2709.81	4.97	3.141593	0.5	0.004925	23.5	7.480282	0.868861	0.010757227	0.053	2711.08	2711.129	No	Facility P4-20

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

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

Ditch Sizing Computations

Worksheet for Facility P4-17

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	1.00 %
Left Side Slope	2.000 H:V
Right Side Slope	2.000 H:V
Bottom Width	10.00 ft
Discharge	51.00 cfs

Results	
Normal Depth	0.89 ft
Flow Area	10.4 ft²
Wetted Perimeter	13.96 ft
Hydraulic Radius	0.75 ft
Top Width	13.54 ft
Critical Depth	0.88 ft
Critical Slope	1.04 %
Velocity	4.89 ft/s
Velocity Head	0.37 ft
Specific Energy	1.26 ft
Froude Number	0.983
Flow Type	Subcritical

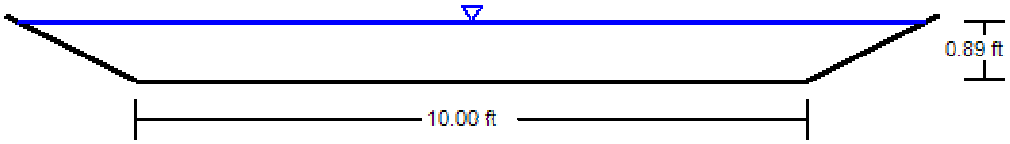
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

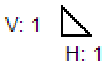
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.89 ft
Critical Depth	0.88 ft
Channel Slope	1.00 %
Critical Slope	1.04 %

Cross Section for Facility P4-17

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.025
Channel Slope	1.00 %
Normal Depth	0.89 ft
Left Side Slope	2.000 H:V
Right Side Slope	2.000 H:V
Bottom Width	10.00 ft
Discharge	51.00 cfs





Pipe Culvert Outlet Protection Computation

Westwood

Project Name:	Triology at Sunstone - Phase 4a
Project Number:	SHE1901-004
Date:	5/12/2022
By:	CAA
Facility ID	P4-17

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 =	51.0	Flow (cfs)
D =	3.0	Diameter of Pipe (ft)
V =	5	Allowable downstream velocity (typ=5 ft/s)
Fr =	0.0	Froude Number (0 if full)
Y_n =	3.0	Normal Depth of flow in Pipe Culvert (ft)*
		* Not necessary if Fr<1 (Enter 0 if unknown)
Y_t =	0.9	Tailwater Depth (Enter 0.4D if unknown)
D_a =	N/A	Only replaced as D, if Fr>=1

Riprap Erosion Protection Check (Figure 712):

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

$Q/D^{2.5}$ = *3.27* ← ***See Figure 712 for Recommended Riprap Type***

$Q/D^{1.5}$ = 9.81

Y_t/D 0.30

1/(2 tan θ)= 3.2 — Expansion factor for circular conduits (Figure 714)

Solve For:

A_t = 10.2	Req'd Area of flow at allowable velocity (ft2)
Y_t = 0.89	Tailwater Depth (ft)

D_{50} = 0.97	**Average Size Riprap (ft)**
D_{50} = 12	**Average Size Riprap (in)**

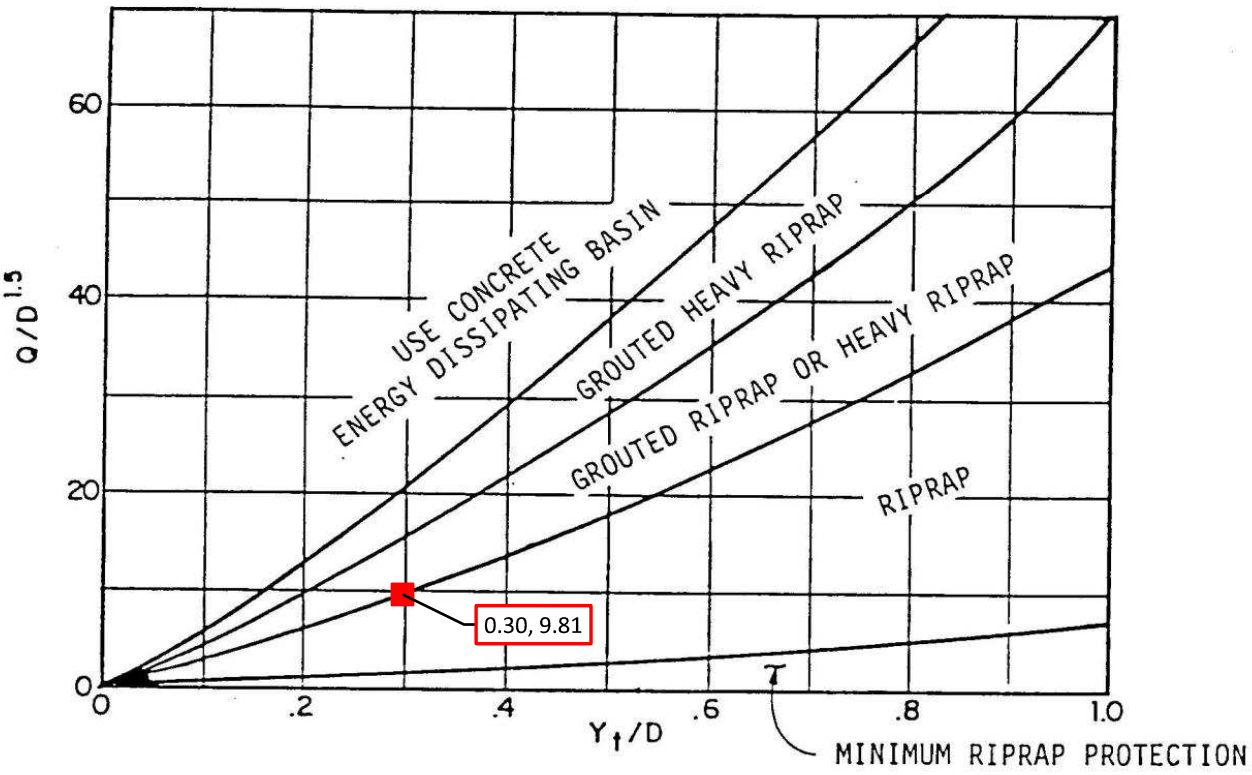
L = 27.1	**Length of Protection (ft)**
***L = 27.1**	***For: D<3.5-ft, L_{min}=3D. For: D>=3.5-ft, L_{min}>= 4D. $L_{max(required)}$=10D**
****L(max) = See *L**	**** For $Q/D^{2.5}$ > 6.0:**
	L_{max} = 10D+D/4, for every whole number $Q/D^{2.5}$ > 6

Notes:

Provide D_{50} = 12-inch riprap for a length of 30-ft

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

RIPRAP EROSION PROTECTION AT CIRCULAR CONDUIT OUTLET



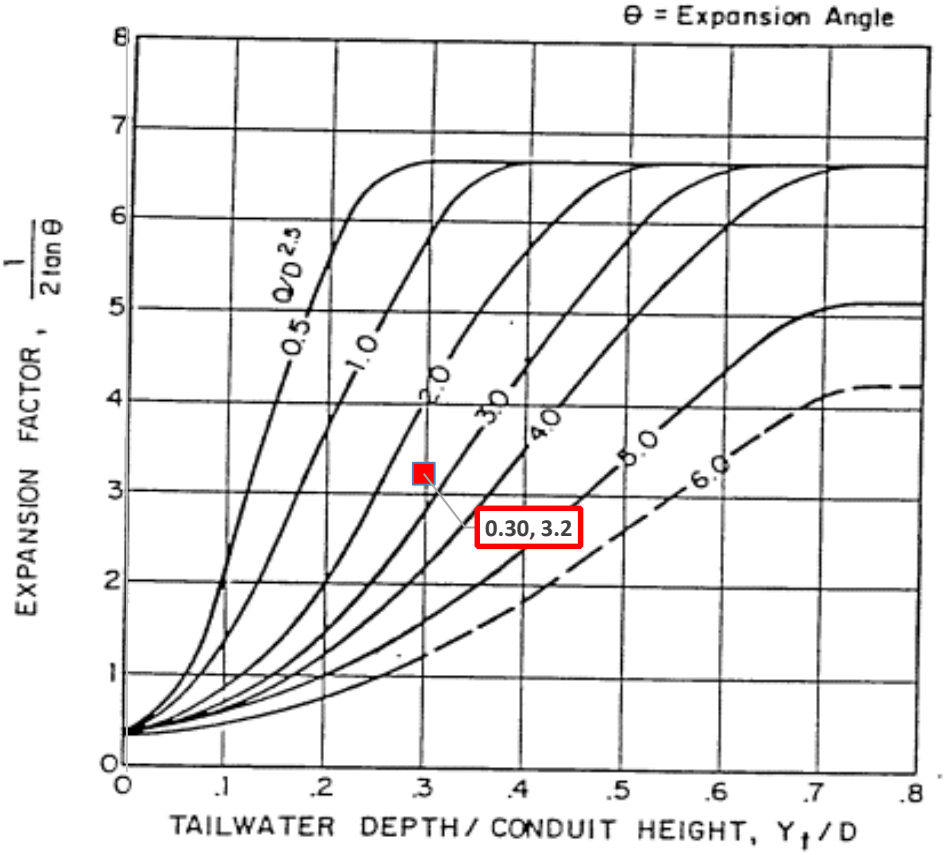
Notes:

1. Use H_a instead of H whenever culvert has supercritical flow in the barrel.
2. Minimum Riprap Protection: Use Riprap for a distance of 3H downstream for 18" to 36" equivalent round pipe size and 4D downstream for 42" and larger equivalent round pipe size.

Revision	Date

WRC ENGINEERING	REFERENCE: USDCM, DRCOG, March 1969 (with modifications)	FIGURE 712

EXPANSION FACTOR FOR CIRCULAR CONDUITS



Revision	Date

WRC ENGINEERING

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

FIGURE 714

APPENDIX D

Finished Floor Analysis

Parcel 3 at Sunstone Phase 4 - SHE1901.004 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 $F.F._{\cdot min}$[3] (ft)	T/C + 6" $F.F._{\cdot min}$[4] (ft)	$F.F._{\cdot Design}$ (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
573	4-1	2771.60	2771.22	0.5	2772.22	2772.10	2773.4	OK	OK	
574	4-1	2770.84	2770.46	0.5	2771.46	2771.34	2772.6	OK	OK	
575	4-1	2769.97	2769.59	0.5	2770.59	2770.47	2771.8	OK	OK	
576	4-1	2769.62	2769.24	0.5	2770.24	2770.12	2771.6	OK	OK	
577	4-1	2769.39	2769.01	0.5	2770.01	2769.89	2771.4	OK	OK	
578	4-1	2769.15	2768.77	0.5	2769.77	2769.65	2771.1	OK	OK	
579	4-1	2768.89	2768.51	0.5	2769.51	2769.39	2770.9	OK	OK	
580	4-1	2768.65	2768.27	0.5	2769.27	2769.15	2770.6	OK	OK	
581	4-1	2768.84	2768.46	0.5	2769.46	2769.34	2770.7	OK	OK	
582	4-1	2769.22	2768.84	0.5	2769.84	2769.72	2771.0	OK	OK	
583	4-1	2770.35	2769.97	0.5	2770.97	2770.85	2772.2	OK	OK	
584	4-1	2771.35	2770.97	0.5	2771.97	2771.85	2773.2	OK	OK	
585	4-1	2772.40	2772.02	0.5	2773.02	2772.90	2774.2	OK	OK	
586	4-1	2773.03	2772.65	0.5	2773.65	2773.53	2774.8	OK	OK	
587	4-4	2773.03	2772.65	0.35	2773.35	2773.53	2775.1	OK	OK	
588	4-4	2772.92	2772.54	0.35	2773.24	2773.42	2774.7	OK	OK	
589	4-4	2770.56	2770.18	0.35	2770.88	2771.06	2772.4	OK	OK	
590	4-4	2767.50	2767.12	0.35	2767.82	2768.00	2769.3	OK	OK	
591	4-4	2765.09	2764.71	0.35	2765.41	2765.59	2766.9	OK	OK	
592	4-4	2762.71	2762.33	0.35	2763.03	2763.21	2764.5	OK	OK	
593	4-4	2760.91	2760.53	0.35	2761.23	2761.41	2762.7	OK	OK	
594	4-4	2759.44	2759.06	0.35	2759.76	2759.94	2761.2	OK	OK	
595	4-4	2758.23	2757.85	0.35	2758.55	2758.73	2760.0	OK	OK	
596	4-4	2757.23	2756.85	0.35	2757.55	2757.73	2759.0	OK	OK	
597	4-4	2758.50	2758.12	0.35	2758.82	2759.00	2760.2	OK	OK	
598	4-4	2756.86	2756.48	0.35	2757.18	2757.36	2758.7	OK	OK	
599	4-4	2755.40	2755.02	0.35	2755.72	2755.90	2757.2	OK	OK	
600	4-4	2753.84	2753.46	0.35	2754.16	2754.34	2755.6	OK	OK	
601	4-4	2752.08	2751.70	0.35	2752.40	2752.58	2753.9	OK	OK	
602	4-4	2750.30	2749.92	0.35	2750.62	2750.80	2752.1	OK	OK	
603	4-4	2748.37	2747.99	0.35	2748.69	2748.87	2750.1	OK	OK	
604	4-4	2747.72	2747.34	0.35	2748.04	2748.22	2749.5	OK	OK	
605	4-4	2746.56	2746.18	0.35	2746.88	2747.06	2748.2	OK	OK	
606	4-4	2746.20	2745.82	0.35	2746.52	2746.70	2748.1	OK	OK	
607	4-4	2746.20	2745.82	0.35	2746.52	2746.70	2748.5	OK	OK	
608	4-4	2744.48	2744.10	0.35	2744.80	2744.98	2746.2	OK	OK	
609	4-4	2743.70	2743.32	0.35	2744.02	2744.20	2745.4	OK	OK	
610	4-4	2746.18	2745.80	0.35	2746.50	2746.68	2747.1	OK	OK	
611	4-4	2747.42	2747.04	0.35	2747.74	2747.92	2749.1	OK	OK	
612	4-4	2748.95	2748.57	0.35	2749.27	2749.45	2750.7	OK	OK	
613	4-4	2750.72	2750.34	0.35	2751.04	2751.22	2752.4	OK	OK	
614	4-4	2752.50	2752.12	0.35	2752.82	2753.00	2754.2	OK	OK	
615	4-4	2754.05	2753.67	0.35	2754.37	2754.55	2755.8	OK	OK	
616	4-5	2761.53	2761.15	0.22	2761.59	2762.03	2763.3	OK	OK	
617	4-5	2759.40	2759.02	0.22	2759.46	2759.90	2761.2	OK	OK	
618	4-5	2756.96	2756.58	0.22	2757.02	2757.46	2758.8	OK	OK	
619	4-5	2753.68	2753.30	0.22	2753.74	2754.18	2755.5	OK	OK	
620	4-5	2750.95	2750.57	0.22	2751.01	2751.45	2752.8	OK	OK	
621	4-6	2744.34	2743.96	0.43	2744.82	2744.84	2746.1	OK	OK	
622	4-6	2742.51	2742.13	0.43	2742.99	2743.01	2744.3	OK	OK	
623	4-6	2764.51	2764.13	0.43	2764.99	2765.01	2766.2	OK	OK	
624	4-6	2761.37	2760.99	0.43	2761.85	2761.87	2762.4	OK	OK	
625	4-6	2758.14	2757.76	0.43	2758.62	2758.64	2759.7	OK	OK	
626	4-6	2755.23	2754.85	0.43	2755.71	2755.73	2756.9	OK	OK	
627	4-6	2752.78	2752.40	0.43	2753.26	2753.28	2754.5	OK	OK	
628	4-6	2750.05	2749.67	0.43	2750.53	2750.55	2751.8	OK	OK	
629	4-6	2747.59	2747.21	0.43	2748.07	2748.09	2749.3	OK	OK	
630	4-6	2745.25	2744.87	0.43	2745.73	2745.75	2747.0	OK	OK	
631	4-6	2743.13	2742.75	0.43	2743.61	2743.63	2744.8	OK	OK	
632	4-1	2744.99	2744.61	0.5	2745.61	2745.49	2746.8	OK	OK	
633	4-1	2746.47	2746.09	0.5	2747.09	2746.97	2748.3	OK	OK	
634	4-1	2748.11	2747.73	0.5	2748.73	2748.61	2749.9	OK	OK	

Parcel 3 at Sunstone Phase 4 - SHE1901.004 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 $F.F._{\cdot min}$[3] (ft)	T/C + 6" $F.F._{\cdot min}$[4] (ft)	$F.F._{\cdot Design}$ (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
635	4-1	2749.64	2749.26	0.5	2750.26	2750.14	2751.4	OK	OK	
636	4-1	2751.48	2751.10	0.5	2752.10	2751.98	2753.3	OK	OK	
637	4-1	2753.67	2753.29	0.5	2754.29	2754.17	2755.5	OK	OK	
638	4-1	2756.20	2755.82	0.5	2756.82	2756.70	2758.0	OK	OK	
639	4-1	2758.74	2758.36	0.5	2759.36	2759.24	2760.5	OK	OK	
640	4-1	2761.27	2760.89	0.5	2761.89	2761.77	2763.1	OK	OK	
641	4-1	2763.55	2763.17	0.5	2764.17	2764.05	2765.4	OK	OK	
642	4-1	2766.08	2765.70	0.5	2766.70	2766.58	2767.9	OK	OK	
643	4-1	2768.61	2768.23	0.5	2769.23	2769.11	2770.4	OK	OK	
644	4-1	2771.18	2770.80	0.5	2771.80	2771.68	2773.0	OK	OK	
645	4-1	2770.90	2770.52	0.5	2771.52	2771.40	2773.9	OK	OK	
646	4-1	2768.94	2768.56	0.5	2769.56	2769.44	2771.0	OK	OK	
647	4-1	2766.80	2766.42	0.5	2767.42	2767.30	2768.5	OK	OK	
648	4-1	2764.27	2763.89	0.5	2764.89	2764.77	2766.0	OK	OK	
649	4-1	2761.99	2761.61	0.5	2762.61	2762.49	2763.7	OK	OK	
650	4-1	2759.71	2759.33	0.5	2760.33	2760.21	2761.4	OK	OK	
651	4-1	2757.43	2757.05	0.5	2758.05	2757.93	2759.1	OK	OK	
652	4-1	2754.90	2754.52	0.5	2755.52	2755.40	2756.6	OK	OK	
653	4-1	2755.98	2755.60	0.5	2756.60	2756.48	2757.8	OK	OK	
654	4-1	2757.54	2757.16	0.5	2758.16	2758.04	2759.3	OK	OK	
655	4-1	2758.98	2758.60	0.5	2759.60	2759.48	2760.8	OK	OK	
656	4-1	2760.42	2760.04	0.5	2761.04	2760.92	2762.2	OK	OK	
657	4-1	2761.86	2761.48	0.5	2762.48	2762.36	2763.7	OK	OK	
658	4-1	2763.46	2763.08	0.5	2764.08	2763.96	2765.3	OK	OK	
659	4-1	2765.38	2765.00	0.5	2766.00	2765.88	2767.2	OK	OK	
660	4-1	2767.01	2766.63	0.5	2767.63	2767.51	2768.8	OK	OK	
661	4-1	2768.45	2768.07	0.5	2769.07	2768.95	2770.3	OK	OK	
662	4-1	2768.76	2768.38	0.5	2769.38	2769.26	2770.6	OK	OK	
663	4-1	2769.09	2768.71	0.5	2769.71	2769.59	2770.9	OK	OK	
664	4-1	2769.24	2768.86	0.5	2769.86	2769.74	2771.5	OK	OK	
665	4-1	2762.14	2761.76	0.5	2762.76	2762.64	2764.3	OK	OK	
666	4-1	2762.14	2761.76	0.5	2762.76	2762.64	2763.9	OK	OK	
667	4-1	2761.55	2761.17	0.5	2762.17	2762.05	2763.4	OK	OK	
668	4-1	2761.00	2760.62	0.5	2761.62	2761.50	2762.7	OK	OK	
669	4-1	2754.23	2753.85	0.5	2754.85	2754.73	2755.9	OK	OK	
670	4-1	2753.43	2753.05	0.5	2754.05	2753.93	2755.1	OK	OK	
671	4-1	2752.58	2752.20	0.5	2753.20	2753.08	2754.3	OK	OK	
672	4-1	2751.46	2751.08	0.5	2752.08	2751.96	2753.2	OK	OK	
673	4-1	2744.48	2744.10	0.5	2745.10	2744.98	2746.3	OK	OK	
674	4-1	2745.70	2745.32	0.5	2746.32	2746.20	2747.5	OK	OK	
675	4-1	2746.93	2746.55	0.5	2747.55	2747.43	2748.7	OK	OK	
676	4-2	2741.93	2741.55	0.47	2742.49	2742.43	2744.7	OK	OK	
677	4-2	2743.24	2742.86	0.47	2743.80	2743.74	2744.7	OK	OK	
678	4-2	2744.55	2744.17	0.47	2745.11	2745.05	2747.3	OK	OK	
679	4-2	2745.86	2745.48	0.47	2746.42	2746.36	2747.3	OK	OK	
680	4-2	2747.17	2746.79	0.47	2747.73	2747.67	2750.0	OK	OK	
681	4-2	2748.47	2748.09	0.47	2749.03	2748.97	2750.0	OK	OK	
682	4-2	2749.78	2749.40	0.47	2750.34	2750.28	2752.6	OK	OK	
683	4-2	2751.09	2750.71	0.47	2751.65	2751.59	2752.6	OK	OK	
684	4-2	2752.40	2752.02	0.47	2752.96	2752.90	2755.2	OK	OK	
685	4-2	2753.71	2753.33	0.47	2754.27	2754.21	2755.2	OK	OK	
686	4-2	2755.02	2754.64	0.47	2755.58	2755.52	2757.8	OK	OK	
687	4-2	2756.33	2755.95	0.47	2756.89	2756.83	2757.8	OK	OK	
688	4-2	2757.64	2757.26	0.47	2758.20	2758.14	2760.4	OK	OK	
689	4-2	2758.96	2758.58	0.47	2759.52	2759.46	2760.4	OK	OK	
690	4-2	2760.26	2759.88	0.47	2760.82	2760.76	2763.0	OK	OK	
691	4-2	2761.58	2761.20	0.47	2762.14	2762.08	2763.0	OK	OK	
692	4-2	2762.87	2762.49	0.47	2763.43	2763.37	2765.7	OK	OK	
693	4-2	2764.19	2763.81	0.47	2764.75	2764.69	2765.7	OK	OK	
694	4-2	2765.65	2765.27	0.47	2766.21	2766.15	2767.5	OK	OK	
695	4-2	2767.12	2766.74	0.47	2767.68	2767.62	2768.9	OK	OK	
696	4-2	2769.79	2769.41	0.47	2770.35	2770.29	2771.6	OK	OK	

Parcel 3 at Sunstone Phase 4 - SHE1901.004 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 $F.F._{\cdot min}$[3] (ft)	T/C + 6" $F.F._{\cdot min}$[4] (ft)	$F.F._{\cdot Design}$ (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
697	4-2	2776.04	2775.66	0.47	2776.60	2776.54	2777.4	OK	OK	
698	4-2	2774.73	2774.35	0.47	2775.29	2775.23	2777.4	OK	OK	
699	4-2	2773.42	2773.04	0.47	2773.98	2773.92	2774.8	OK	OK	
700	4-2	2772.11	2771.73	0.47	2772.67	2772.61	2774.8	OK	OK	
701	4-2	2770.80	2770.42	0.47	2771.36	2771.30	2772.2	OK	OK	
702	4-2	2769.49	2769.11	0.47	2770.05	2769.99	2772.2	OK	OK	
703	4-2	2768.18	2767.80	0.47	2768.74	2768.68	2769.6	OK	OK	
704	4-2	2766.87	2766.49	0.47	2767.43	2767.37	2769.6	OK	OK	
705	4-2	2765.56	2765.18	0.47	2766.12	2766.06	2766.9	OK	OK	
706	4-2	2764.25	2763.87	0.47	2764.81	2764.75	2766.9	OK	OK	
707	4-2	2762.94	2762.56	0.47	2763.50	2763.44	2764.3	OK	OK	
708	4-2	2761.63	2761.25	0.47	2762.19	2762.13	2764.3	OK	OK	
709	4-2	2760.32	2759.94	0.47	2760.88	2760.82	2761.7	OK	OK	
710	4-2	2759.01	2758.63	0.47	2759.57	2759.51	2761.7	OK	OK	
711	4-2	2757.71	2757.33	0.47	2758.27	2758.21	2759.1	OK	OK	
712	4-2	2756.40	2756.02	0.47	2756.96	2756.90	2759.1	OK	OK	
713	4-2	2755.10	2754.72	0.47	2755.66	2755.60	2756.5	OK	OK	
714	4-2	2753.79	2753.41	0.47	2754.35	2754.29	2756.5	OK	OK	
715	4-2	2752.49	2752.11	0.47	2753.05	2752.99	2753.9	OK	OK	
716	4-2	2751.18	2750.80	0.47	2751.74	2751.68	2753.9	OK	OK	
717	4-2	2749.87	2749.49	0.47	2750.43	2750.37	2751.2	OK	OK	
718	4-2	2748.56	2748.18	0.47	2749.12	2749.06	2751.2	OK	OK	
719	4-2	2747.25	2746.87	0.47	2747.81	2747.75	2748.6	OK	OK	
720	4-2	2745.95	2745.57	0.47	2746.51	2746.45	2748.6	OK	OK	
721	4-2	2744.64	2744.26	0.47	2745.20	2745.14	2746.0	OK	OK	
722	4-2	2743.33	2742.95	0.47	2743.89	2743.83	2746.0	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
573	SANGRIA SUNRISE AVE	2774.54	2774.16	4-1	0.50	2775.16	2773.4	CHECK	Yes
596	GARNET FIRE LN	2758.57	2758.19	4-4	0.35	2758.89	2759.0	OK	No
597	SANDLOT LN	2759.62	2759.24	4-7	0.45	2760.14	2760.2	OK	No
598	SANDLOT LN	2759.02	2758.64	4-7	0.45	2759.54	2758.7	CHECK	Yes
599	SANDLOT LN	2757.41	2757.03	4-7	0.45	2757.93	2757.2	CHECK	Yes
600	SANDLOT LN	2756.77	2756.39	4-7	0.45	2757.29	2755.6	CHECK	Yes
601	SANDLOT LN	2755.46	2755.08	4-7	0.45	2755.98	2753.9	CHECK	Yes
602	SANDLOT LN	2754.12	2753.74	4-7	0.45	2754.64	2752.1	CHECK	Yes
603	SANDLOT LN	2752.78	2752.40	4-7	0.45	2753.30	2750.1	CHECK	Yes
604	SANDLOT LN	2751.44	2751.06	4-7	0.45	2751.96	2749.5	CHECK	Yes
605	SANDLOT LN	2749.28	2748.90	4-7	0.45	2749.80	2748.2	CHECK	Yes
606	SANDLOT LN	2747.08	2746.70	4-7	0.45	2747.60	2748.1	OK	No
607	SANDLOT LN	2743.08	2742.70	4-7	0.45	2743.60	2748.5	OK	No
608	GARNET FIRE LN	2746.13	2745.75	4-4	0.35	2746.45	2746.2	CHECK	Yes
610	SAFFRON SPICE PLACE	2744.48	2744.10	4-4	0.35	2744.80	2747.1	OK	No
615	GARNET BEND PL	2758.23	2757.85	4-4	0.35	2758.55	2755.8	CHECK	Yes
616	GARNET BEND PL	2762.96	2762.58	4-4	0.35	2763.28	2763.3	OK	No
620	SAFFRON SPICE PLACE	2745.11	2744.73	4-5	0.22	2745.17	2752.8	OK	No
621	SAFFRON SPICE PLACE	2745.11	2744.73	4-5	0.22	2745.17	2746.1	OK	No
623	GARNET BEND PL	2771.54	2771.16	4-6	0.43	2772.02	2766.2	CHECK	Yes
644	GARNET BEND PL	2773.08	2772.70	4-6	0.43	2773.56	2773.0	CHECK	Yes
645	GARNET BEND PL	2772.20	2771.82	4-1	0.50	2772.82	2773.9	OK	No
652	CHERRY CREEK PL	2752.22	2751.84	4-1	0.50	2752.84	2756.6	OK	No
653	CHERRY CREEK PL	2753.60	2753.22	4-1	0.50	2754.22	2757.8	OK	No
660	GARNET BEND PL	2769.98	2769.60	4-1	0.50	2770.60	2768.8	CHECK	Yes
661	MAHOGANY CREEK LN	2767.18	2766.80	4-1	0.50	2767.80	2770.3	OK	No
667	MAHOGANY CREEK LN	2763.50	2763.12	4-1	0.50	2764.12	2763.4	CHECK	Yes
668	MAHOGANY CREEK LN	2759.26	2758.88	4-1	0.50	2759.88	2762.7	OK	No
672	PEACH SANGRIA LN	2749.33	2748.95	4-1	0.50	2749.95	2753.2	OK	No
673	PEACH SANGRIA LN	2745.57	2745.19	4-1	0.50	2746.19	2746.3	OK	No
696	GARNET BEND PL	2770.53	2770.15	4-1	0.50	2771.15	2771.6	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
609	2343.90	EO4-1	0.89	2344.79	2745.40	OK	No
621	2343.90	EO4-1	0.89	2344.79	2746.10	OK	No
622	2343.90	EO4-1	0.89	2344.79	2744.30	OK	No
				0.00	0.00	OK	No

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

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

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

Specific Energy Check							
Lot Number	High TC[1]	High FL[2]	Section	Specific Energy[3]	Min FF[4]	Design FF	Check
598	2756.86	2756.48	4-4 SE	0.71	2757.19	2758.70	OK
599	2755.4	2755.02	4-4 SE	0.71	2755.73	2757.20	OK
635	2749.64	2749.26	4-1 SE	0.91	2750.17	2751.40	OK
636	2751.48	2751.10	4-1 SE	0.91	2752.01	2753.30	OK
656	2760.42	2760.04	4-1 SE	0.91	2760.95	2762.20	OK
657	2761.86	2761.48	4-1 SE	0.91	2762.39	2763.70	OK
669	2754.23	2753.85	4-1 SE	0.91	2754.76	2755.90	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 3,
by Westwood

Approval Letters

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: March 29, 2022
TO: **Land Development Services** Department of Building & Safety				FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for:			**COPIES TO:**
Parcel 3 at Sunstone Phase 3				Westwood
Cross Streets:	Sky Pointe Drive and Log Cabin Way			Northland ,LLC/Shea Homes Limited Partnership
File Number:	F:\Depot\DSMemos\DS5549A.doc			Bart Anderson, P.E., DevCo
Parcel Number:	125-06-211-016			
Zoning Action:	21-0524-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 & Supplement	2/24/2022 & 3/24/2022	3/21/2022 & 3/29/2022	See Comments Below	$400	4660112: $400
			TOTAL FEES (LDDRS):	**$400**	**----**

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.

The following comments shall be addressed with the Improvement Plan submittal:

1. Revise the Flood Zone Note on All Grading Plans to reflect the correct FIRM Panel number, 32003C1735 E.

2. **Sheet G-4 & G-5:** The following finish floors do not meet the Regional Flood Control District minimum criteria of twice the Q_{100} depth of flow up to 18-inches above the water surface (CCRFCD Manual Section 304.4.E.1) or 6-inch minimum above the highest adjacent top of curb (CCRFCD Manual Section 1602 304.4.E.1). The following finish floors should be revised or alternate flood protection provided.

LOT	FF shown	Min FF
511	2782.20	2783.93
489	2775.60	2776.31

3. Provide an upstream TC elevation for Lot 534.

4. **Sheet G-8 and P-8:** Verify the TC elevation for the SDDI #2 at the Venetian Brick North Lateral. It appears that the TC shown is also a flowline projection. The profile appears to show a higher elevation as the TC does not match the profile drawing.

5. **Sheet P-8:** Call out the 20' Public Drainage Easement to be Privately Maintained by the HOA on the plan view.

6. **Sheet P-9:** Show the sewer crossing in profile of the temporary Storm Drain.

7. Revise **Detail 30/D2** to include the 36-inch and 42-inch Concrete Collar. Use the same tabular data for "L" (L=18") and "T" (T=9") as the 48-inch pipe.

8. The project proposes to build a temporary drainage facility at the Phase 3 Boundary at the ends of the storm drain system. Prior to final plan approval the developer must complete a maintenance and liability agreement for the interim drainage improvements (storm drain, off-site berms or channels) and post a minimum maintenance bond of $50,000 or 50-percent of the construction cost for the improvements, whichever is greater. The engineer must submit an estimate of the quantities for constructing the facility and an exhibit that adequately shows the location and limits of the drainage facility to *City of Las Vegas Flood Control* for approval. Once the drainage study is conditionally approved, the engineer should contact the City's Land Development Section (229-6371) to begin the agreement process.

9. The Common Elements need to clearly show the extent of the necessary Public Drainage Easements to be Privately Maintained (PDEPM). Show Common Elements "D, E, & F" as PDEPM. Update the Grading Plans to reflect all easements. The easements shall be dedicated by the Final Maps.

10. The Plans show a narrow (5-foot ±) Common Element between Lots 528 and 529. What is the purpose of this narrow strip ? Is this necessary for drainage ?

11. Revise the standard drainage compliance note on the grading plan to show the correct Drainage Study number: "*I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT* ***(DS5549)***".

12. Provide a Note on all Grading Plans: "*Post-Construction BMPs (PCBMPs) / Control Measures noted on the Grading Plans are mandatory permanent regulatory stormwater pollution controls. These PCBMPs must be installed per the approved plans and must be permanently maintained.*"

13. Update the Stormwater Management Notes to the current version with the Improvement Plan submittal to Building Department – Land Development.

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

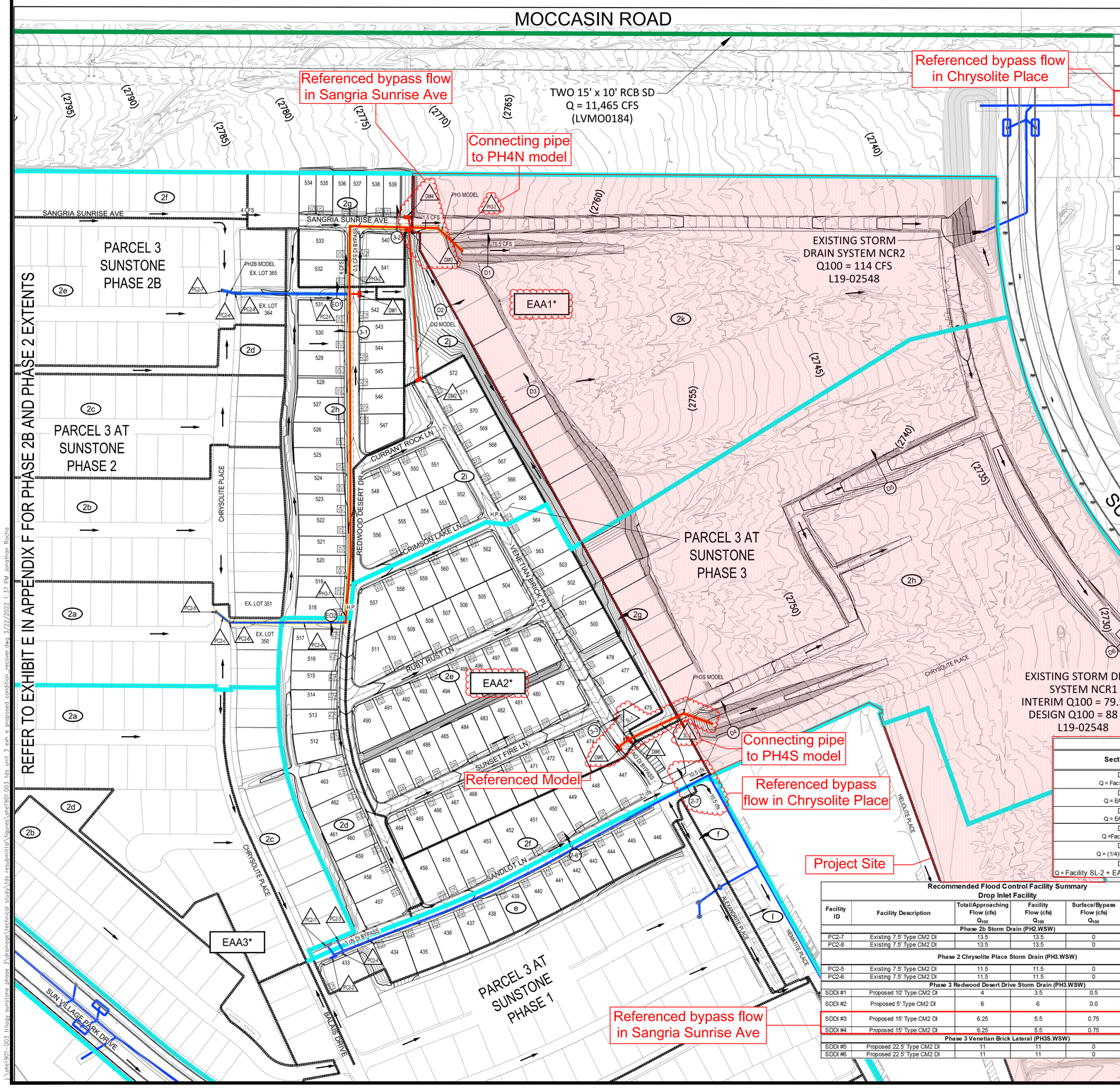
END OF REMARKS
HDR/PBJ

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

Referenced Drainage Exhibits

NOTE
* REFER TO APPENDIX E FOR REFERENCED HYDROLOGY & HYDRAULICS

SCALE – 1"=120' FEET (0, 120, 240)



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

Referenced Flowrate

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

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*(2c)	4	1.96	2.0
EAA3*(2d)	2	1.25	2.0
EAA3*(e)	5	2.61	2.0
EAA3*(f)	1	0.39	2.0
EAA3*(l)	2	1.08	2.0
Remainder	64	32.21	2.0
TOTAL	*102*	*51.20*	

Remainder of prorated Basins EAA3* not relevant to Project Site.

Prorate area/flow has been updated

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	

Continuation of flow in PH4N.WSW model

Continuation of flow in PH4S.WSW model

Westwood
5725 W. Badura Ave.
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Las Vegas, NV 89118
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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

J:\she1901-003 trilogy sunstone phase 3\drainage\technical studies\1ds resubmittal\figures\she1901-003 1ds unit 3 exh e proposed condition recover.dwg 3/22/2022 1:37 PM Jonathon Rocha

Referenced Hydraulics

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)

```
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
```

Referenced storm drain model.

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

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

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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
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Referenced Model with revised stations.

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														

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 -
PH3S LATERAL - FROM FACILITY SDDI#5 TO SL-2 OUTFALL

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
	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

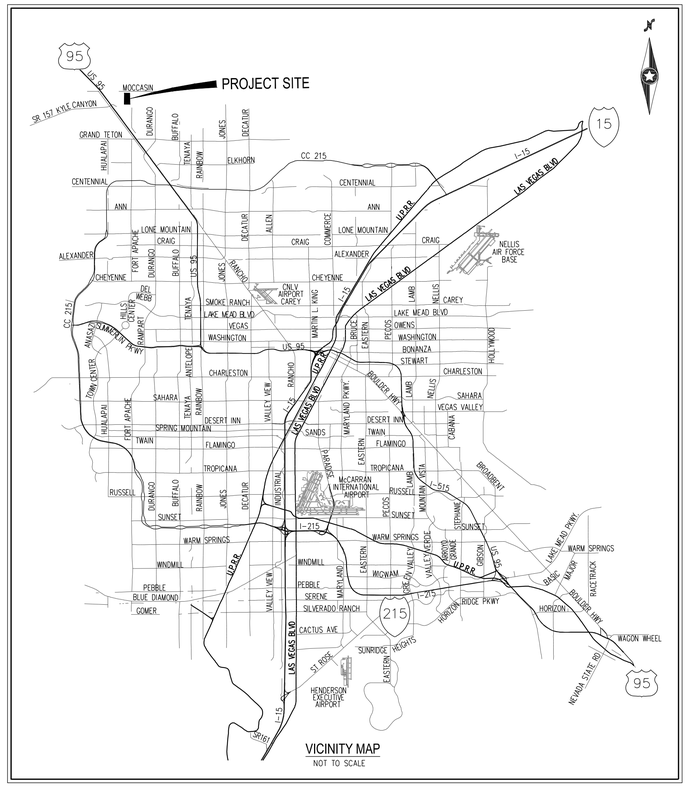
Program Package Serial Number: 7189

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

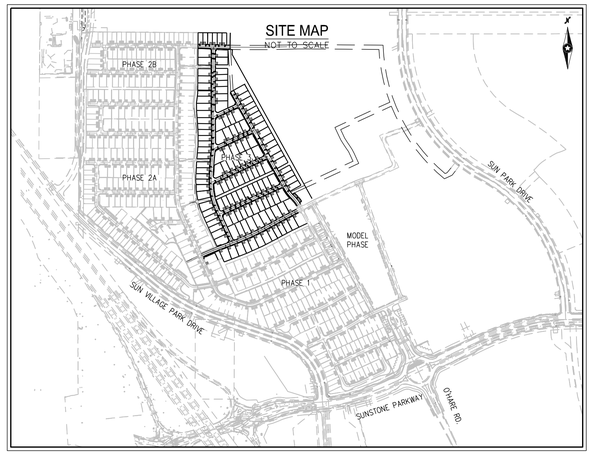
Referenced Improvement Plans



SHLP

IMPROVEMENT PLANS FOR PARCEL 3 AT SUNSTONE PHASE 3

CITY OF LAS VEGAS, NEVADA
RESIDENTIAL SUBDIVISION
APN: 125-06-211-016



Sheet List Table	
Sheet Number	Sheet Title
1	COVER SHEET
2	NOTES SHEET
3	QUANTITIES SHEET
4	MASTER GRADING PLAN
5	GRADING SHEET I
6	GRADING SHEET II
7	GRADING SHEET III
8	GRADING SHEET IV
9	GRADING SHEET V
10	GRADING SHEET VI
11	GRADING SHEET VII
12	GRADING SHEET VIII
13	GRADING SHEET IX
14	GRADING SHEET X
15	GRADING SHEET XI
16	GRADING SHEET XII
17	GRADING SHEET XIII
18	GRADING SHEET XIV
19	GRADING SHEET XV
20	GRADING SHEET XVI
21	DETAIL SHEET I
22	DETAIL SHEET II
23	Sangria Sunrise 18+50 TO 22+00
24	Redwood Desert 9+50 TO 14+00
25	Redwood Desert 14+00 TO 19+00
26	Redwood Desert 19+00 TO 23+00
27	Phase 2A Lateral 1+40 TO 4+50
28	Phase 2B Lateral 1+25 TO 4+25
29	Venetian Brick Lateral 0+00 TO 2+00
30	Venetian Brick North Lateral 9+50 to 13+56
31	Bronzed Honey Offsite Storm 9+50 to 10+50

APPROVALS

CITY OF LAS VEGAS 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

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.

CITY OF LAS VEGAS, NEVADA

SHLP

PARCEL 3 AT SUNSTONE PHASE 3
COVER SHEET

S6 T19 S R60 E

DATE: 2/16/22
DRAFTER: BD
DESIGNER: EE
CHECKED: DY

PROJECT NO.
SHE1901-003

PROFESSIONAL ENGINEER STATE OF NEVADA
DERICK D.J YORO
Exp. 06/30/2022
CIVIL
No. 16396
2/16/22

C-1
SHEET 1 OF 30

TOTAL DISTURBED AREA

30.75 ACRES

M.O.U. ITEMS

1. TMP-21-0524, 10/13/2021

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):	= 26.61 AC
ACREAGE (NET):	= 26.61 AC
DENSITY (LOTS/NET ACRE):	= 5.26 DU/NET AC
ZONING:	= SUNSTONE R-1 TRILOGY SUNSTONE R-TH
TOTAL NO. OF RESIDENTIAL LOTS	= 140
TOTAL NO. OF COMMON ELEMENTS *	= 7

EARTHWORK SUMMARY (UNADJUSTED)

CUT	69,250 CY.
FILL	174,349 CY.
NET	105,099 (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: 03/02/21

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.

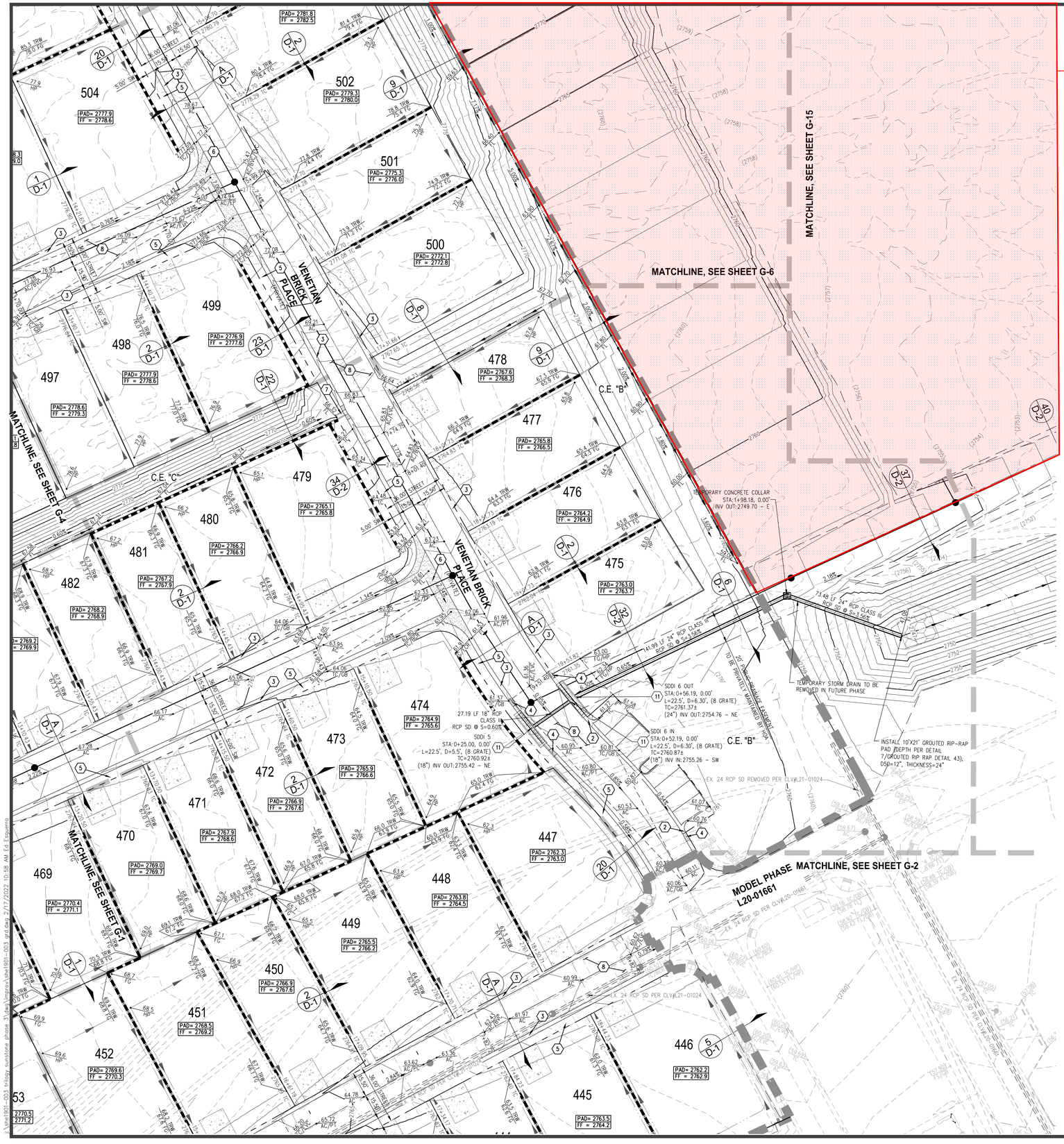
AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

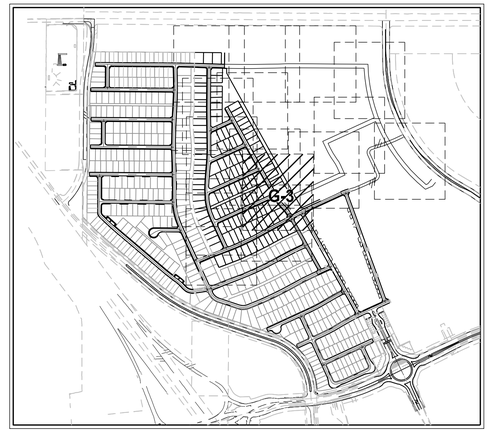
FAST
Call before you
UnderGround
1-702-432-5300
FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T)

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

Derick Yoro
Digitally signed by Derick Yoro
DN: cn=Derick Yoro, o=Westwood Professional Services, ou=Civil, email=Derick.yoro@westwoodps.com, c=US
Date: 2022.02.17 11:11:34-08'00'

J:\she1901-003 (vlog) sunstone phase 3\dwg\Versions\she1901-003 cvr.dwg, 2/17/2022 10:56 AM, Ed Esguerra





0 30 60
SCALE - 1"=30' FEET

Project Site

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 03/02/21

EARTHWORKS

EARTHWORK QUANTITIES (RAW):
CUT= 69,250 CU YDS
FILL= 174,349 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 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.)

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 28 ON SHEET D-1
5. CONSTRUCT 5' SIDEWALK PER CCAUSD #234
6. CONSTRUCT CROSS GUTTER PER CCAUSD #228
7. CONSTRUCT SIDEWALK UNDERDRAIN, DRAINAGE OUTLET AND U-CHANNEL PER CCAUSD #236 AND DETAIL 29 & 42 ON SHEET D-2. (MIN. TRANSITION=3')
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=10' (3 GRATE), DEPTH PER PLAN
11. CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=22.5' (8 GRATE), DEPTH PER PLAN
12. CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=5.0' (2 GRATE), DEPTH PER PLAN
13. CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=15.0' (5 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)

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NOTE

ALL PRIVATE STREETS ARE P.U.E., PUBLIC SEWER EASEMENTS, AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY H.O.A.
ALL ONSITE STORM DRAIN FACILITIES WITHIN THIS DEVELOPMENT SHALL BE PRIVATELY MAINTAINED BY THE H.O.A.

QUANTITIES

			PRIVATE
1.	10.0' TYPE "CM2" DROP INLET	EA	1
2.	22.5' TYPE "CM2" DROP INLET	EA	2
3.	18" RCP STORM DRAIN	LF	432
4.	24" RCP STORM DRAIN	LF	383
5.	30" RCP STORM DRAIN	LF	929
6.	8' WIDE CONCRETE VALLEY GUTTER	SF	3,580
7.	5.0' TYPE "CM2" DROP INLET	EA	1
8.	GROUTED RIPRAP D50=12", THK=24"	SF	470
9.	SIDEWALK UNDERDRAIN	EA	6
10.	48" TYPE III STORM DRAIN MANHOLE	EA	9
11.	42" RCP STORM DRAIN	LF	35
12.	15.0' TYPE "CM2" DROP INLET	EA	2
13.	36" RCP STORM DRAIN	LF	147

FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT CITY OF LAS VEGAS FOR THIS PROJECT (0555.30).

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
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 3
GRADING SHEET III

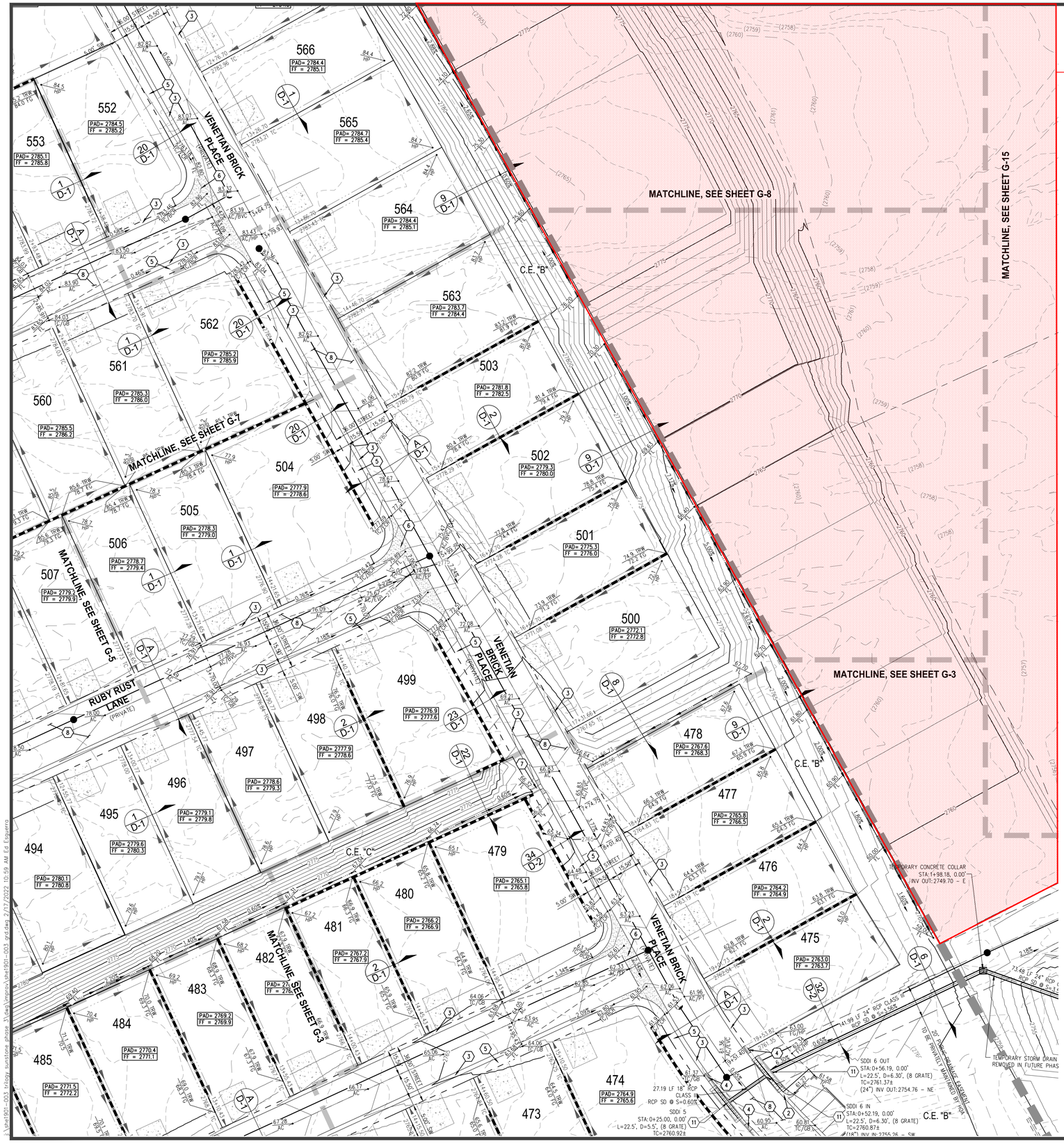
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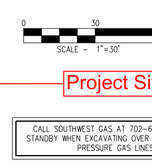
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DRAFTER: BD
DESIGNER: EE
CHECKED: DY
PROJECT NO.
SHE1901-003

PROFESSIONAL ENGINEER - STATE OF NEVADA
DERICK D. J. YORO
No. 16396
Exp. 06/30/2022
CIVIL
2/16/22

G-3
SHEET 7 OF 30

J:\she1901-003 Indigo Sunstone phase 3\Dev\Graphics\she1901-003 grd dwg 2/17/2022 10:58 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 SOUTHWEST GEOTECHNICAL

PROJECT NO. 182187 DATED 04/25/18

UPDATED SOILS REPORT BY SOUTHWEST GEOTECHNICAL

PROJECT NO. 205210 DATED 03/02/21

EARTHWORKS

EARTHWORK QUANTITIES (RAW):
CUT= 69,250 CU YDS
FILL= 174,349 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.

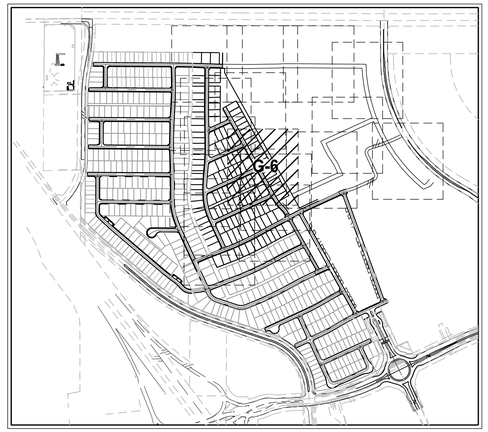
LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDELINES

(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 DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1755G, 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.)

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 28 ON SHEET D-1
5. CONSTRUCT 5' SIDEWALK PER CCAUSD #234
6. CONSTRUCT CROSS GUTTER PER CCAUSD #228
7. CONSTRUCT SIDEWALK UNDERDRAIN, DRAINAGE OUTLET AND U-CHANNEL PER CCAUSD #236 AND DETAIL 29 & 42 ON SHEET D-2. (MIN. TRANSITION=3')
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=10' (3 GRATE), DEPTH PER PLAN
11. CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=22.5' (8 GRATE), DEPTH PER PLAN
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13. CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=15.0' (5 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

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

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ALL ONSITE STORM DRAIN FACILITIES WITHIN THIS DEVELOPMENT SHALL BE PRIVATELY MAINTAINED BY THE H.O.A.

QUANTITIES

			PRIVATE
1.	10.0' TYPE "CM2" DROP INLET	EA	1
2.	22.5' TYPE "CM2" DROP INLET	EA	2
3.	18" RCP STORM DRAIN	LF	432
4.	24" RCP STORM DRAIN	LF	383
5.	30" RCP STORM DRAIN	LF	929
6.	8' WIDE CONCRETE VALLEY GUTTER	SF	3,580
7.	5.0' TYPE "CM2" DROP INLET	EA	1
8.	GROUTED RIPRAP D50=12", THK=24"	SF	470
9.	SIDEWALK UNDERDRAIN	EA	6
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12.	15.0' TYPE "CM2" DROP INLET	EA	2
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FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT CITY OF LAS VEGAS FOR THIS PROJECT (DS553O).

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
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 3
GRADING SHEET VI

S6 T19 S R60 E

DATE: 2/16/22
DRAFTER: BD
DESIGNER: EE
CHECKED: DY

PROJECT NO.
SHE1901-003

PROFESSIONAL ENGINEER – STATE OF NEVADA – DERICK D.J YORO – Exp: 06/30/2022 – CIVIL – No. 16396 – 2/16/22

G-6
SHEET 10 OF 30

J:\she1901-003 Hdspy sunstone phase 3\dwg\Vmprod\she1901-003 grd.dwg 2/17/2022 10:59 AM Ed Esguerra



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PROJECT NO. 182187 DATED 04/25/18

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PROJECT NO. 205210 DATED 03/02/21

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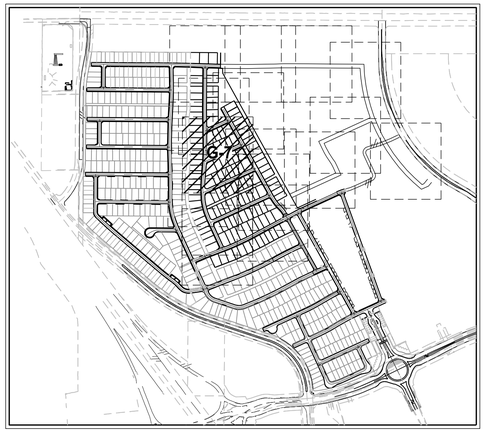
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BENCHMARK

MONUMENT ID: USDA (1934) 19

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

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NAVD 88 DATUM

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

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DERICK YORO, P.E. 16396 DATE

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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 3
GRADING SHEET VII

S6 T19 S R60 E

DATE: 2/16/22
DRAFTER: BD
DESIGNER: EE
CHECKED: DY

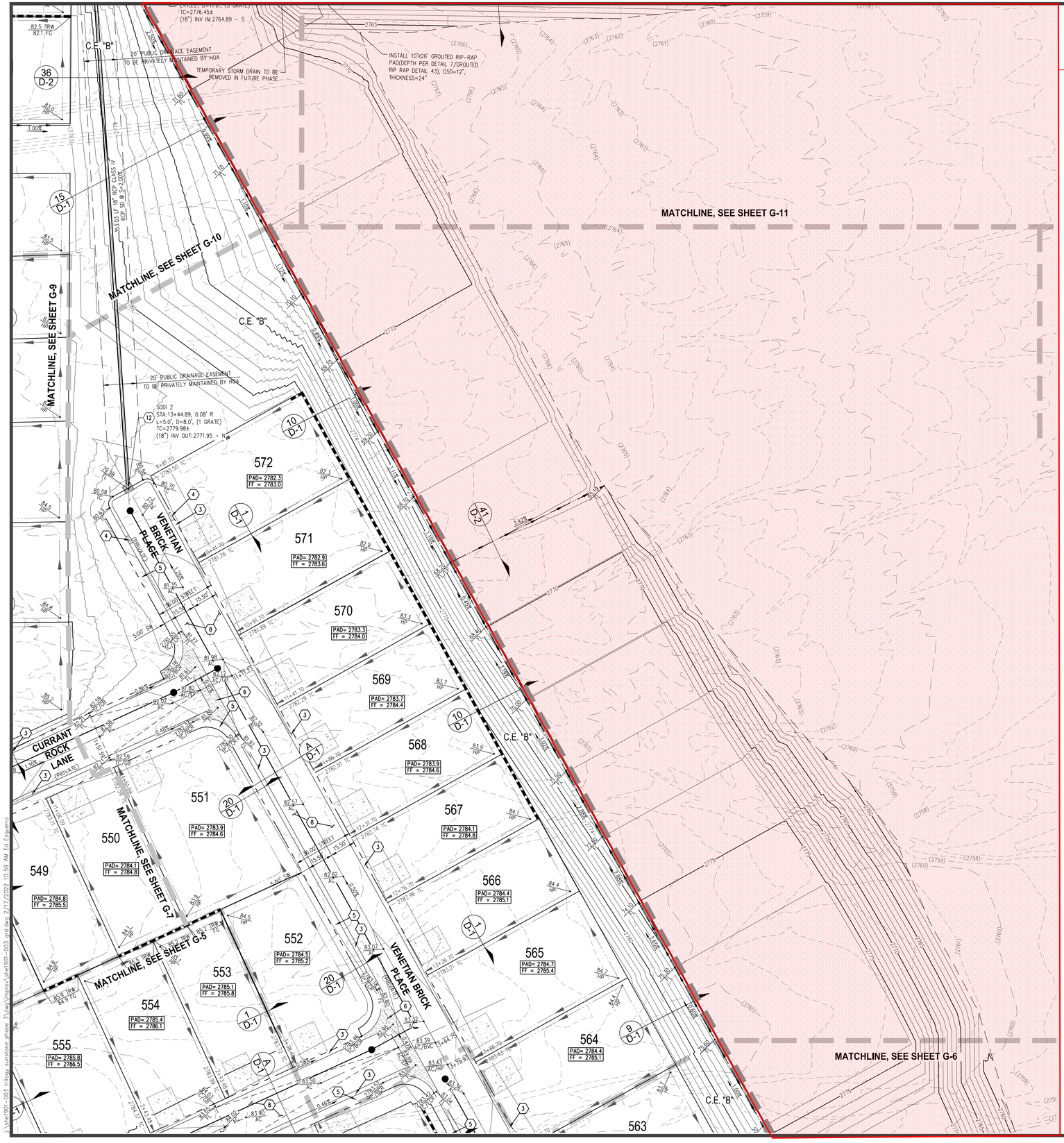
PROJECT NO.
SHE1901-003

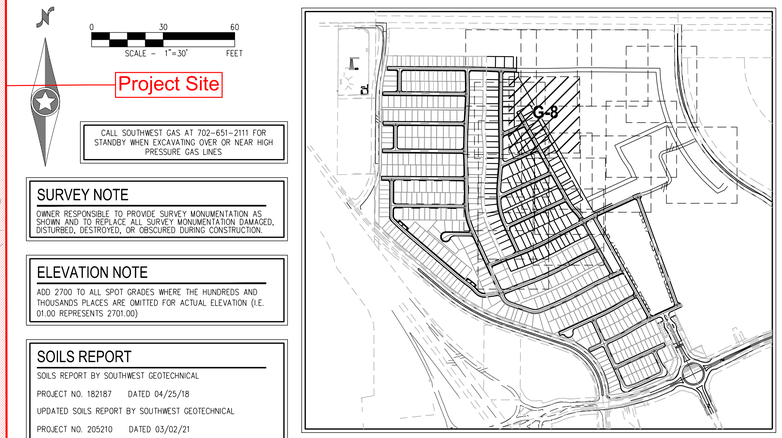
PROFESSIONAL ENGINEER STATE OF NEVADA DERICK D.J. YORO Exp. 06/30/2022 CIVIL No. 16396 2/16/22

G-7
SHEET 11 OF 30

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PROJECT NO. 182187 DATED 04/25/18

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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 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.)

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 28 ON SHEET D-1
5. CONSTRUCT 5' SIDEWALK PER CCAUSD #234
6. CONSTRUCT CROSS GUTTER PER CCAUSD #228
7. CONSTRUCT SIDEWALK UNDERDRAIN, DRAINAGE OUTLET AND U-CHANNEL PER CCAUSD #236 AND DETAIL 29 & 42 ON SHEET D-2. (MIN. TRANSITION=3')
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=10' (3 GRATE), DEPTH PER PLAN
11. CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=22.5' (8 GRATE), DEPTH PER PLAN
12. CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=5.0' (2 GRATE), DEPTH PER PLAN
13. CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=15.0' (5 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

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.
ALL ONSITE STORM DRAIN FACILITIES WITHIN THIS DEVELOPMENT SHALL BE PRIVATELY MAINTAINED BY THE H.O.A.

QUANTITIES

			PRIVATE
1.	10.0' TYPE "CM2" DROP INLET	EA	1
2.	22.5' TYPE "CM2" DROP INLET	EA	2
3.	18" RCP STORM DRAIN	LF	432
4.	24" RCP STORM DRAIN	LF	383
5.	30" RCP STORM DRAIN	LF	929
6.	8' WIDE CONCRETE VALLEY GUTTER	SF	3,580
7.	5.0' TYPE "CM2" DROP INLET	EA	1
8.	GROUTED RIPRAP D50=12", THK=24"	SF	470
9.	SIDEWALK UNDERDRAIN	EA	6
10.	48" TYPE III STORM DRAIN MANHOLE	EA	9
11.	42" RCP STORM DRAIN	LF	35
12.	15.0' TYPE "CM2" DROP INLET	EA	2
13.	36" RCP STORM DRAIN	LF	147

FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT CITY OF LAS VEGAS FOR THIS PROJECT (DS5530).

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
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 3
GRADING SHEET VIII

S:6 T:19 S R:60 E

DATE: 2/16/22
DRAFTER: BD
DESIGNER: EE
CHECKED: DY

PROJECT NO.
SHE1901-003

PROFESSIONAL ENGINEER - STATE OF NEVADA - DERICK D. J YORO - Exp. 06/30/2022 - CIVIL - No. 16396 - 2/16/22

G-8
SHEET 12 OF 30

J:\she1901-003 1-Hagy sunstone phase 3\dwg\Vistros\she1901-003 grd.dwg 2/17/2022 10:59 AM Ed Esguerra



N

0 30 60
SCALE – 1"=30' FEET

Project Site

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 03/02/21

EARTHWORKS

EARTHWORK QUANTITIES (RAW):
CUT= 69,250 CU YDS
FILL= 174,349 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.

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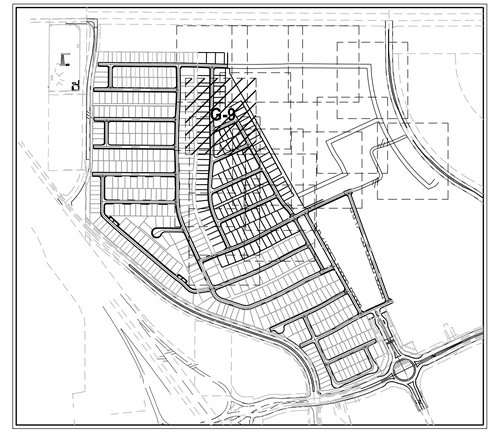
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BENCHMARK

MONUMENT ID: USDA (1934) 19

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

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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.

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QUANTITIES		PRIVATE
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2. 22.5' TYPE "CM2" DROP INLET	EA	2
3. 18" RCP STORM DRAIN	LF	432
4. 24" RCP STORM DRAIN	LF	383
5. 30" RCP STORM DRAIN	LF	929
6. 8' WIDE CONCRETE VALLEY GUTTER	SF	3,580
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FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT CITY OF LAS VEGAS FOR THIS PROJECT (DS5530).

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
5725 W. Badura Ave.
Suite 100
Las Vegas, NV 89118
westwoodps.com
Westwood Professional Services, Inc.

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

CITY OF LAS VEGAS, NEVADA

SHLP

PARCEL 3 AT SUNSTONE PHASE 3

GRADING SHEET IX

S6 T19 S R60 E

DATE: 2/16/22
DRAFTER: BD
DESIGNER: EE
CHECKED: DY

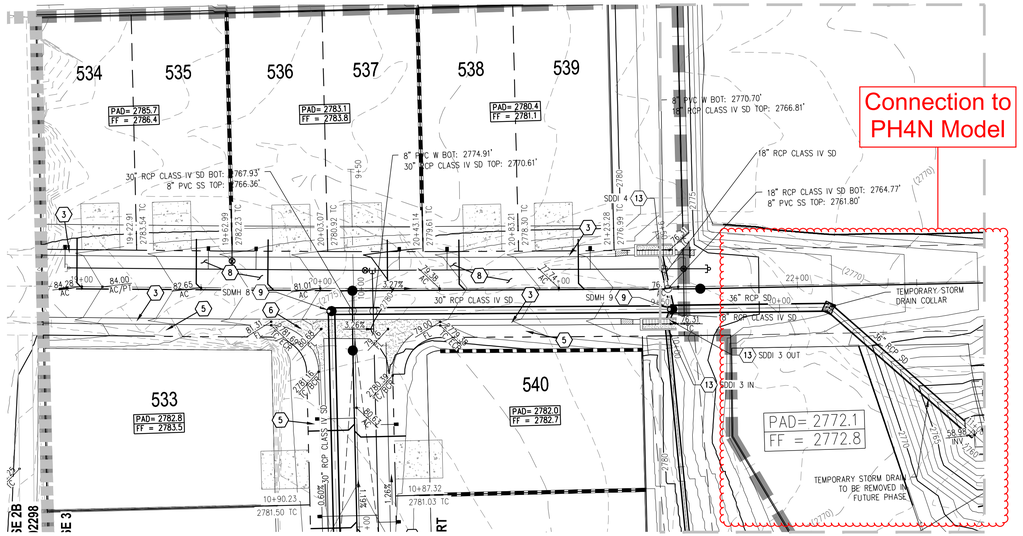
PROJECT NO.
SHE1901-003

PROFESSIONAL ENGINEER STATE OF NEVADA
DERICK D.J. YORO
No. 16396
Exp. 06/30/2022
CIVIL
2/16/22

G-9
SHEET 13 OF 30

J:\she1901-003 (nlogy sunstone phase 3\dwg\temp\she1901-003 grd.dwg 2/17/2022 10:59 AM Ed Esguerra

MATCHLINE, SEE SANGRIA SUNRISE OFFSITE STORM (9+50 - 11+89)



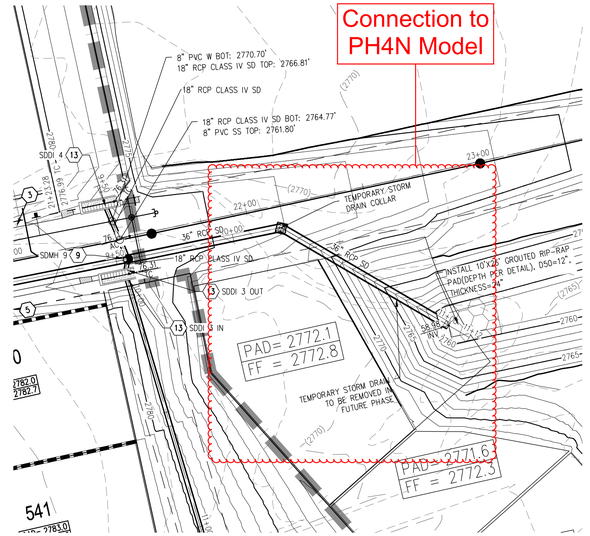
SANGRIA SUNRISE 18+50 TO 23+00 - PLAN VIEW

SCALE: 1"=30'

ALIGNMENT NOTE

THE SANGRIA SUNRISE PROFILE FOLLOWS THE STREET ALIGNMENT.

0 30 60
SCALE – 1"=30' FEET



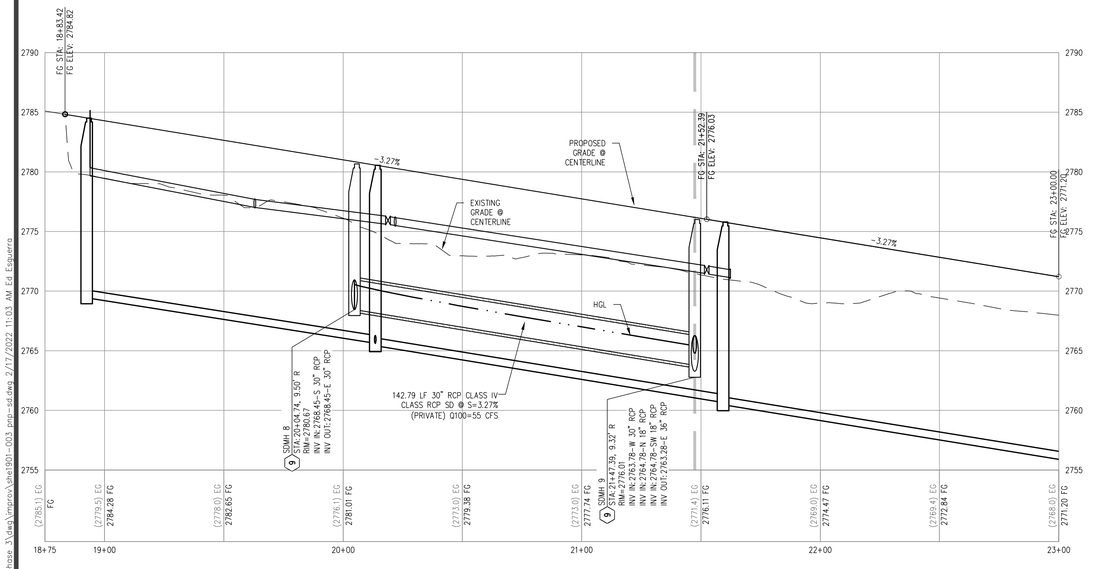
SANGRIA SUNRISE OFFSITE STORM (9+50-11+89)- PLAN VIEW

SCALE: 1"=30'

ALIGNMENT NOTE

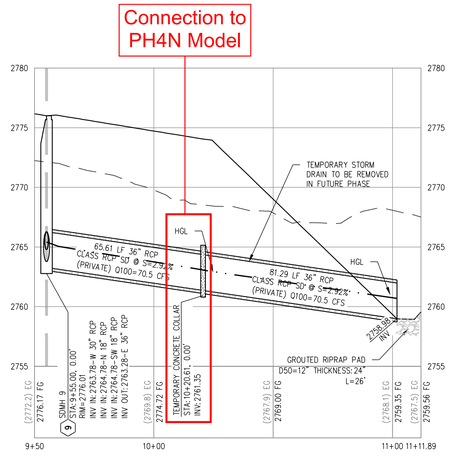
THE SANGRIA SUNRISE OFFSITE STORM PROFILE FOLLOWS THE STORM DRAIN ALIGNMENT.

0 30 60
SCALE – 1"=30' FEET



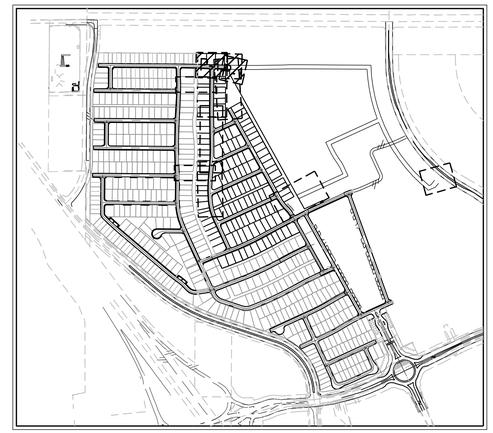
SANGRIA SUNRISE 18+50 TO 22+00- PROFILE VIEW

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



SANGRIA SUNRISE OFFSITE STORM - PROFILE VIEW

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



WATER NOTES

1. INSTALL 1" COPPER SERVICE WITH 3/4" METER PER UDACS PLATE NO. 1
2. INSTALL CONCRETE COLLER PER UDACS PLATE NO. 1 (TYPICAL FOR ROLL CURB SIDE)
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"X8" TEE WITH THRUST BLOCKS PER UDACS PLATE NO. 31
6. INSTALL 12"X12" TEE WITH THRUST BLOCKS PER UDACS PLATE NO. 31
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 8" GATE VALVE WITH VALVE BOX PER UDACS PLATE NO. 30 & 39
10. INSTALL 12"X8" REDUCER PER UDACS PLATE NO. 30
11. NOT USED
12. INSTALL 8"X6" REDUCER PER UDACS PLATE NO. 30
13. INSTALL CAP AND 2" BLOWOFF VALVE PER UDACS PLATE NO. 36
14. INSTALL 1" HORIZONTAL DEFLECTION PER UDACS SEC. 2.07
15. INSTALL 11.25° HORIZONTAL BEND PER UDACS PLATE NO. 31 (SIZE SHALL MATCH WATER MAIN SIZE)
16. INSTALL 45° HORIZONTAL BEND PER UDACS PLATE NO. 31 (SIZE SHALL MATCH WATER MAIN SIZE)
17. INSTALL 1" VERTICAL DEFLECTION PER UDACS SEC. 2.07
18. INSTALL 5° VERTICAL BEND PER UDACS PLATE NO. 31 (SIZE SHALL MATCH WATER MAIN SIZE)
19. INSTALL 6" 22.5° VERTICAL BEND PER UDACS PLATE NO. 31
20. WET TAP 1" COPPER SERVICE WITH 3/4" METER PER UDACS PLATE NO. 1
21. FIELD VERIFY, REMOVE EX CAP & BLOW-OFF, AND CONNECT TO EXISTING WATERLINE

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, SD-21 AND SD-23
4. CORE DRILL HOLE IN EXISTING MANHOLE AND CONNECT 8" PVC SANITARY SEWER PIPE PER DSCWCS SECTIONS 2.3.8 & 3.16.4

GRADING NOTES

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7. CONSTRUCT SIDEWALK UNDERDRAIN AND DRAINAGE OUTLET PER CCAUSD #236 AND DETAIL 29 ON SHEET D-2
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9. CONSTRUCT 48" TYPE II SDMH PER CCAUSD #401 & 405
10. CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=10' (3 GRATE), DEPTH PER PLAN
11. CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=22.5' (8 GRATE), DEPTH PER PLAN
12. CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=5.0' (1 GRATE), DEPTH PER PLAN
13. CONSTRUCT TYPE "CM2" D.I. PER CCAUSD #412.1 & 421 L=15.0' (5 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)

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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.

SURVEY NOTE

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ELEVATION NOTE

ADD 2700 TO ALL SPOT GRADES WHERE THE HUNDREDS AND THOUSANDS PLACES ARE OMITTED FOR ACTUAL ELEVATION (I.E. 01.00 REPRESENTS 1801.00)

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.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO.___#####___ FIRST APPROVED 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
5725 W. Badura Ave. Suite 100 Las Vegas, NV 89118
westwoodps.com
Westwood Professional Services, Inc.

NO.	DESCRIPTION	DATE	BY	APP.	APP. DATE

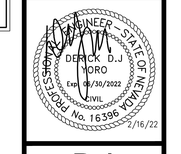
CITY OF LAS VEGAS, NEVADA

SHLP

PARCEL 3 AT SUNSTONE PHASE 3
SANGRIA SUNRISE 18+50 TO 22+00

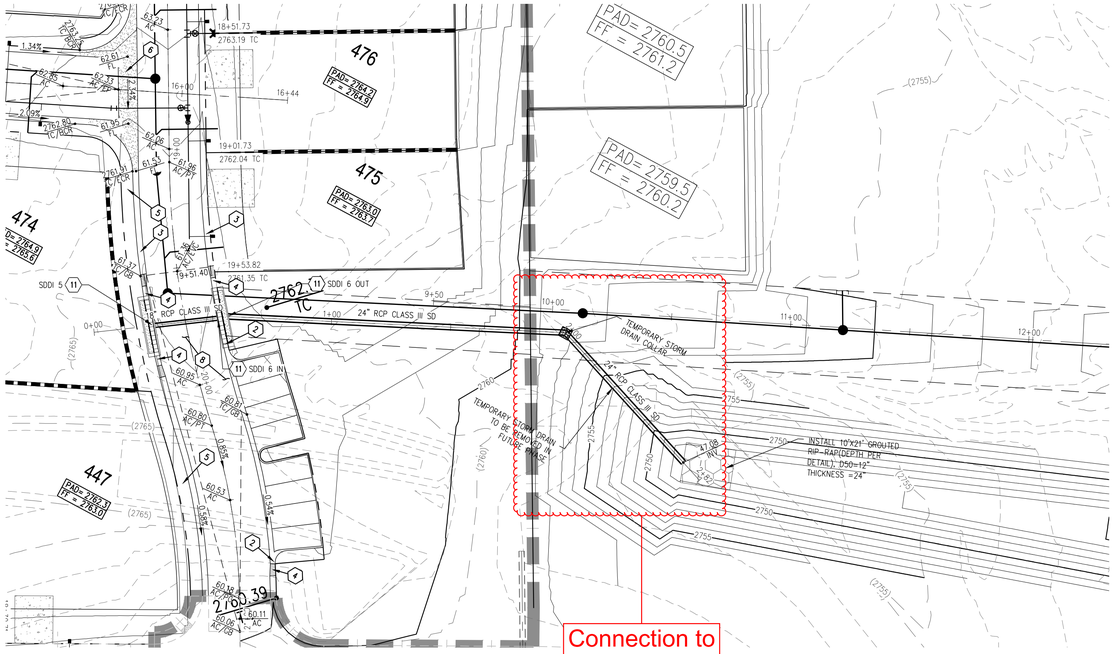
S 6 T 19 S R 60 E

DATE: 2/16/22
DRAFTER: BD
DESIGNER: EE
CHECKED: DY
PROJECT NO.
SHE1901-003



P-1
SHEET 23 OF 30

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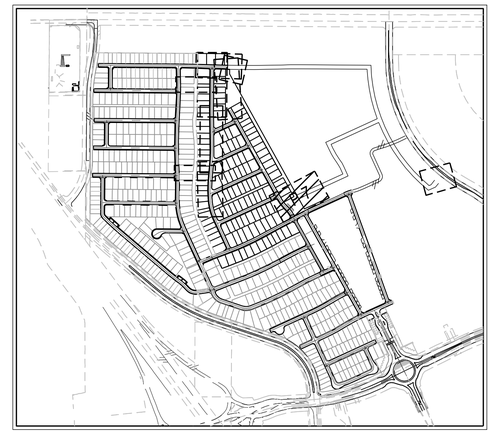


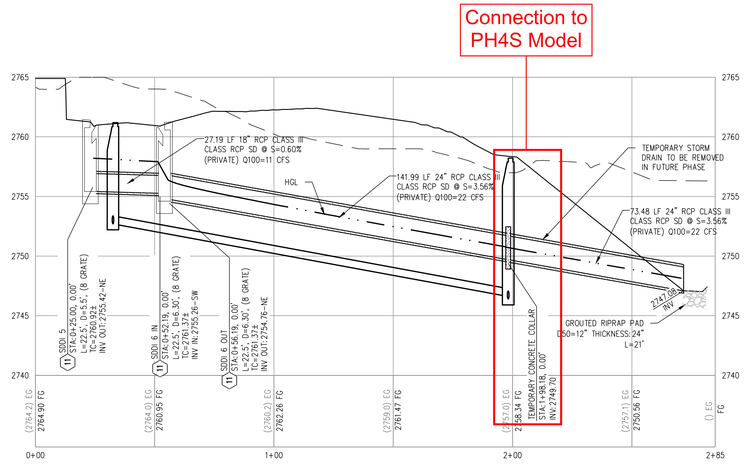
VENETIAN BRICK LATERAL (0+00-2+25) - PLAN VIEW

SCALE: 1" TO 30'

0 30 60

SCALE - 1"=30' FEET





VENETIAN BRICK LATERAL - PROFILE VIEW

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

WATER NOTES

1. INSTALL 1" COPPER SERVICE WITH 3/4" METER PER UDACS PLATE NO. 1
2. INSTALL CONCRETE COLLER PER UDACS PLATE NO. 1 (TYPICAL FOR ROLL CURB SIDE)
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"X8" TEE WITH THRUST BLOCKS PER UDACS PLATE NO. 31
6. INSTALL 12"X12" TEE WITH THRUST BLOCKS PER UDACS PLATE NO. 31
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 8" GATE VALVE WITH VALVE BOX PER UDACS PLATE NO. 30 & 39
10. INSTALL 12"X8" REDUCER PER UDACS PLATE NO. 30
11. NOT USED
12. INSTALL 8"X6" REDUCER PER UDACS PLATE NO. 30
13. INSTALL CAP AND 2" BLOWOFF VALVE PER UDACS PLATE NO. 36
14. INSTALL 1" HORIZONTAL DEFLECTION PER UDACS SEC. 2.07
15. INSTALL 11.25° HORIZONTAL BEND PER UDACS PLATE NO. 31 (SIZE SHALL MATCH WATER MAIN SIZE)
16. INSTALL 45° HORIZONTAL BEND PER UDACS PLATE NO. 31 (SIZE SHALL MATCH WATER MAIN SIZE)
17. INSTALL 1" VERTICAL DEFLECTION PER UDACS SEC. 2.07
18. INSTALL 5° VERTICAL BEND PER UDACS PLATE NO. 31 (SIZE SHALL MATCH WATER MAIN SIZE)
19. INSTALL 6" 22.5° VERTICAL BEND PER UDACS PLATE NO. 31
20. WET TAP 1" COPPER SERVICE WITH 3/4" METER PER UDACS PLATE NO. 1
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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO.___ ###### ___ 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. DATE	APP.

CITY OF LAS VEGAS, NEVADA

SHLP

PARCEL 3 AT SUNSTONE PHASE 3
VENETIAN BRICK LATERAL 0+00 TO 2+00

S6 T19S R60E

DATE: 2/16/22

DRAFTER: BD

DESIGNER: EE

CHECKED: DY

PROJECT NO.
SHE1901-003

PROFESSIONAL ENGINEER STATE OF NEVADA
DERICK D.J YORO
No. 16396
Exp. 06/30/2022
CIVIL
2/16/22

P-7
SHEET 29 OF 30

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APPENDIX F

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

Lawrence L. Brown, III
Chair
Clark County

Mayor Debra March
Vice-Chair
City of Henderson

George Gault
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Stavros Anthony
City of Las Vegas

Isaac Barron
City of North Las Vegas

Mayor Kiernan McManus
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.

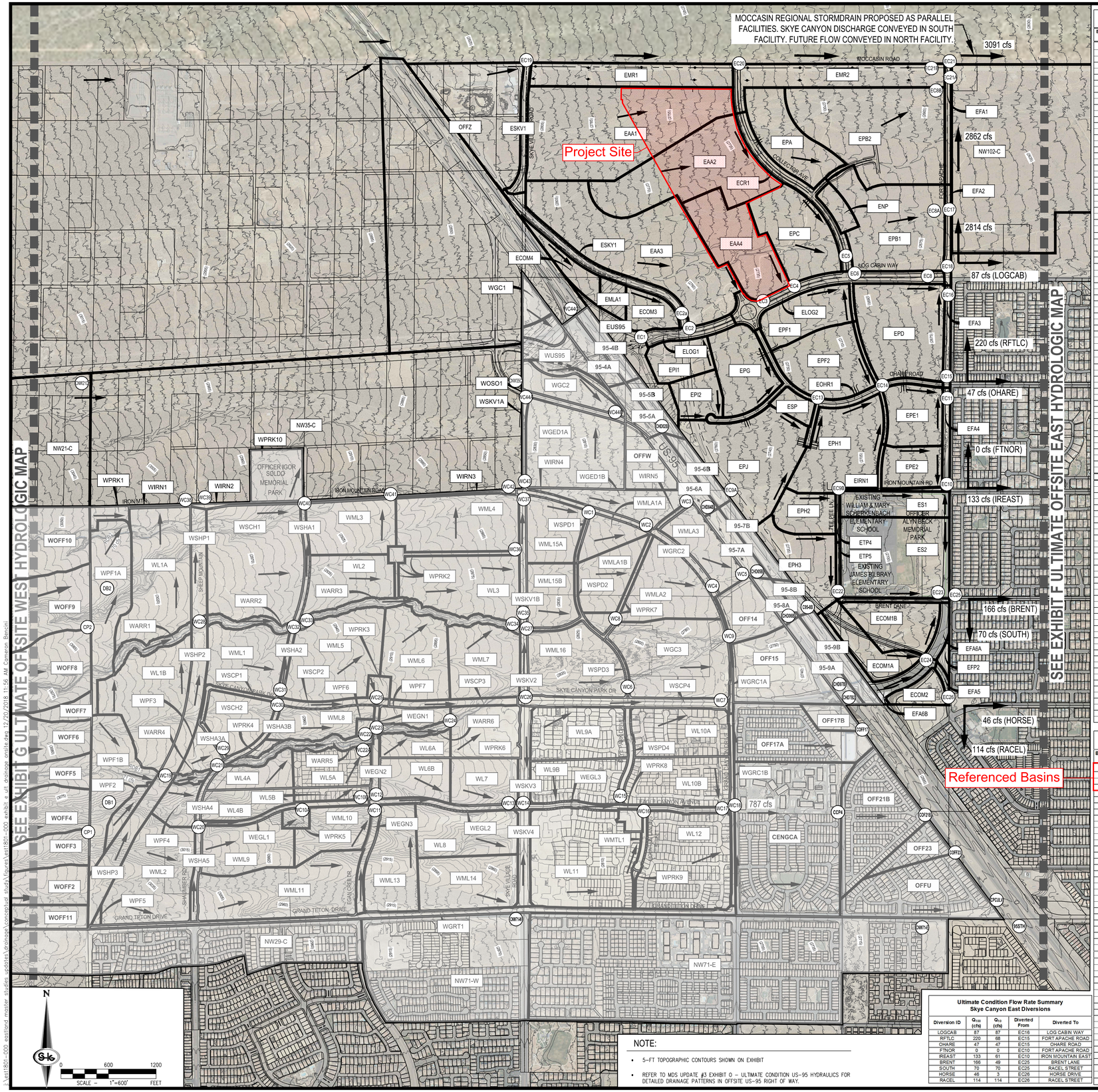
Please call me at (775) 888-7621 should you have any questions.

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



Ultimate Condition Flow Rate Summary Skye Canyon West Basins

Basin/Concentration Point ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
WARR1	3.6	9	4
WARR2	2.8	7	3
WARR3	7.1	17	7
WARR4	1.3	3	1
WARR5	8.0	18	8
WARR6	2.4	6	2
WGC1	8.3	24	11
WGC2	8.3	23	10
WGC3	30.4	95	47
WGED1A	28.4	77	35
WGED1B	11.5	33	16
WL10A	17.1	46	21
WL10B	18.3	49	22
WL11	36.7	99	46
WL12	31.4	84	38
WL1A	29.8	81	38
WL1B	28.0	79	36
WL2	15.7	45	21
WL3	24.9	69	32
WL4A	8.0	23	10
WL4B	8.9	27	12
WL5A	10.9	32	15
WL5B	3.8	12	5
WL6A	6.2	19	9
WL6B	10.6	30	14
WL7	11.5	34	16
WL8	17.4	48	22
WL9A	18.2	49	22
WL9B	14.4	39	18
WML1	18.0	52	24
WML10	11.6	36	19
WML11	16.0	48	23
WML12	15.1	44	20
WML13	16.4	49	25
WML14	19.2	59	29
WML15A	12.3	40	20
WML15B	11.2	34	17
WML16	22.2	64	32
WML2	27.4	78	38
WML3	17.3	56	28
WML4	25.1	77	38
WML5	27.3	82	41
WML6	20.5	64	32
WML7	18.6	59	30
WML8	10.3	34	17
WML9	16.4	55	28
WMLA1A	6.5	20	10
WMLA1B	12.0	37	18
WMLA2	30.4	88	44
WMLA3	11.5	35	17
WPF1A	20.2	59	29
WPF1B	18.9	63	31
WPF2	3.1	10	5
WPF3	4.6	17	8
WPF4	5.7	19	9
WPF5	0.4	1	0
WPF6	1.0	4	2
WPF7	4.5	14	7
WPRK1	2.4	6	2
WPRK10	10.0	19	8
WPRK2	3.2	7	2
WPRK3	1.8	4	2
WPRK4	1.0	3	1
WPRK5	2.0	5	2
WPRK6	13.2	28	10
WPRK7	3.0	6	2
WPRK8	1.7	4	1
WPRK9	0.5	1	0
WSCH1	39.4	106	48
WSCH2	11.5	37	16
WEST ROADWAY BASINS			
WEGL1	3.4	12	6
WEGL2	3.3	12	7
WEGL3	4.8	16	9
WEGN1	0.5	2	1
WEGN2	2.1	7	1
WEGN3	3.3	10	6
WGRC1A	1.3	4	2
WGRC1B	3.2	10	5
WGRC2	2.7	9	5
WGRT1	11.7	30	16
WIRN1	0.8	2	1
WIRN2	2.2	7	4
WIRN3	1.3	5	3
WIRN4	2.7	9	5
WIRN5	0.7	3	2
WMTL1	1.3	5	2
WOSO1	2.2	8	4
WSCP1	1.6	6	3
WSCP2	3.0	11	6
WSCP3	3.5	13	7
WSCP4	7.8	26	14
WSHA1	2.3	6	2
WSHA2	1.5	5	2
WSHA3A	0.7	3	1
WSHA3B	1.6	6	3
WSHA4	1.4	6	3
WSHA5	2.4	8	5
WSHP1	6.4	19	9
WSHP2	9.3	27	13
WSHP3	10.4	31	15
WSKV1A	1.4	5	3
WSKV1B	3.5	11	6
WSKV2	2.0	19	8
WSKV3	4.2	14	7
WSKV4	4.5	15	8
WSPD1	0.7	3	1
WSPD2	2.1	3	2
WSPD3	0.9	3	2
WSPD4	2.3	8	4
WUS95	8.5	28	16

Ultimate Condition Flow Rate Summary Skye Canyon Offsite Basins

Basin/Concentration Point ID	Area (sq. mi)	Q_{100} (cfs)	Q_{10} (cfs)
WEST BASINS			
CENGCA	0.1	152	71
ES1	0.0	29	14
ES2	0.1	84	43
NW1-C	0.3	302	93
NW7-C	0.5	512	201
NW21-C	0.2	190	81
NW29-C	0.1	200	93
NW35-C	0.3	428	177
NW50-C	0.2	228	87
NW71-E	0.2	259	106
NW71-W	0.1	156	74
OFF4-1	0.3	273	56
OFF4-2	0.4	541	128
OFF5-1	0.3	336	90
OFF5-2	0.4	493	182
OFF14	0.0	26	13
OFF15	0.0	62	32
OFF17A	0.0	51	24
OFF17B	0.0	15	7
OFF21B	0.0	75	39
OFF23	0.0	17	9
OFFU	0.0	74	37
OFFW	0.0	22	10
OFFZ	0.1	69	27
WOFF1	0.4	403	153
WOFF10	0.3	292	110
WOFF11	0.0	55	29
WOFF2	0.0	48	17
WOFF3	0.0	38	15
WOFF4	0.1	84	32
WOFF5	0.3	236	89
WOFF6	0.0	59	23
WOFF7	0.0	10	4
WOFF8	0.2	198	74
WOFF9	0.1	144	55
US95 BASINS			
95-4A	0.0	14	7
95-4B	0.0	13	6
95-5A	0.0	12	6
95-5B	0.0	11	5
95-6A	0.0	19	9
95-6B	0.0	12	5
95-7A	0.0	14	7
95-7B	0.0	16	8
95-8A	0.0	11	6
95-8B	<0.01	7	4
95-9A	0.0	21	10
95-9B	0.0	22	10
EAST BASINS			
NW102-C	0.2	269	129
NW157	0.3	92	20

Ultimate Condition Flow Rate Summary Skye Canyon East Basins

Basin/Concentration Point ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
EAA1	55.0	114	49
EAA2	35.4	82	36
EAA3	51.2	102	45
EAA4	21.0	45	20
ECOM1A	9.9	30	15
ECOM1B	13.7	42	21
ECOM3	6.4	17	7
ECOM4	5.5	15	7
EMLA1	3.2	10	4
ENP	3.5	0	0
EPA	17.1	40	18
EPB1	31.6	50	16
EPB2	46.4	67	22
EPC	20.2	48	21
EPD	28.9	65	28
EPE1	12.5	29	13
EPE2	9.1	22	10
EPF1	13.5	32	14
EPF2	19.1	57	26
EPG	15.9	36	16
EPH1	23.9	56	25
EPH2	8.9	27	13
EPH3	15.4	44	22
EPI1	8.6	23	10
EPI2	7.4	20	9
EPJ	31.7	55	19
ES1	10.4	20	8
ES2	32.1	85	41
ESP	3.5	0	0
OFFZ	30.8	39	10
EAST ROADWAY BASINS			
EBRT1	1.8	6	3
ECR1	7.8	22	12
EFA1	2.7	8	4
EFA2	2.4	7	4
EFA3	2.5	7	4
EFA4	2.8	8	5
EFA5	0.9	3	2
EFA6A	2.5	9	5
EFA6B	5.7	18	10
ERN1	1.9	6	3
ELOG1	4.3	15	8
ELOG2	12.1	35	19
EMR1	17.4	22	7
EMR2	19.2	26	8
EOHR1	10.1	29	16
ESKV1	3.9	11	6
ESKY1	8.2	23	13
ETP4	0.8	3	2
ETP5	0.9	3	2
EUS95	9.4	34	19

Ultimate Condition Flow Rate Summary Skye Canyon East Diversions

Diversion ID	Q_{100} (cfs)	Q_{10} (cfs)	Diverted From	Diverted To
LOGCAB	87	87	EC16	LOG CABIN WAY
RFTLC	220	68	EC15	FORT APACHE ROAD
OHARE	47	47	EC15	OHARE ROAD
FTNOR	0	0	EC10	FORT APACHE ROAD
IREAST	133	61	EC10	IRON MOUNTAIN EAST
BRENT	166	49	EC25	BRENT LANE
SOUTH	70	70	EC25	RACEL STREET
HORSE	46	3	EC26	HORSE DRIVE
RACEL	114	114	EC26	RACEL STREET

NOTE:

- 5-FT TOPOGRAPHIC CONTOURS SHOWN ON EXHIBIT
- REFER TO MDS UPDATE #3 EXHIBIT O – ULTIMATE CONDITION US-95 HYDRAULICS FOR DETAILED DRAINAGE PATTERNS IN OFFSITE US-95 RIGHT OF WAY.

Ultimate Condition Flow Rate Summary Skye Canyon West Concentration Points

Basin/Concentration Point ID	Area (sq. mi)	Q_{100} (cfs)	Q_{10} (cfs)
WC1 Q = WML15A + WSPD1	0.02	43	21
WC2 Q = WC1 + WWH4 + WMLA1A	0.03	73	37
WC3 Q = WC2 + WGED1B + WIRN5	0.05	109	54
WC4 Q = WWH2 + WMLA1B + WMLA2 + WGRC2	0.08	135	67
WC5 Q = WC4 + WML3	0.09	170	83
WC6 Q = WML16 + WSPD3	0.04	68	33
WC7 Q = WC6 + WL9A + WL10A + WSCP4	0.10	186	89
WC8 Q = WC7 + WGC3 + WGRC1A + WC9	0.02	37	19
WC9 Q = WC8 + WML9 + WRN5	0.17	322	155
WC10A Q = WC9A + WL4B + WEGL1	0.03	60	30
WC11 Q = WML10 + WEGN3	0.05	99	48
WC12 Q = WC10B + WC11	0.07	127	61
WC13 Q = WC12 + WL6B + WL7 + WML13 + WEGL2	0.11	226	109
WC14 Q = WC13 + WML14 + WL6 + WSKV3 + WSKV4	0.17	352	170
WC15 Q = WL6B + WSPD4	0.24	485	236
WC16 Q = WL11 + WWH3 + WWH9 + WMTL1	0.03	46	21
WC17 Q = WC14 + WC15 + WC16 + WEGL3 + WL10B	0.06	106	48
WC18 Q = WC17 + WL12 + WGRC1B	0.37	695	331
WC19 Q = REB1 + WSHP5 + WPF2	0.42	787	372
WC20 Q = WPF5 + WML2 + WSHA5	0.90	94	70
WC21 Q = WC19 + WC20 + WARR4 + WPF4 + WSHA4	0.05	86	42
WC22A Q = WL4A + WL5A + WL5B	0.96	201	121
WC22 Q = WC21 + WC22A + WRK4 + WARR5	0.05	67	43
WC23 Q = WC22 + WML8 + WPF6 + WEGN1 + WEGN2	1.01	282	169
WC24 Q = WC23 + WARR6 + WPF7 + WL6A	1.03	322	189
WC25 Q = WSKV2 + WRN3	1.05	359	194
WC26 Q = WC24 + WC25 + WRN6 WSCP3	0.01	16	8
WC27 Q = WC26 + WML7 + WSKV2	1.09	412	217
WC28 Q = WL1B + WARR1 + WSHP2	1.12	487	253
WC29 Q = WPF4 + WSHA3A	0.06	113	53
WC30 Q = WC29 + WSCH2 + WSHA3B	0.01	19	10
WC31 Q = WC29 + WSCP1	0.04	62	29
WC32 Q = WC31 + WML1 + WSHA2	0.04	68	33
WC33 Q = WC28 + WC32 + WARR2	0.07	124	58
WC34 Q = WC33 + WARR3 + WML5 + WML6	0.14	244	113
WC35 Q = WC27 + WC34	0.23	404	191
WC36 Q = WL2 + WPRK2	1.34	876	436
WC37 Q = WC35 + WC36 + WSKV1B + WL3	0.03	51	23
WC38 Q = REB2 + WPRK1 + WIRN1 + WL1A	1.41	1000	492
WC39 Q = WC38 + WSHP1	0.62	139	84
WC40 Q = WSCH1 + WSHA1	0.63	157	93
WC41 Q = WC38 + WC39 + WRN2 + WC40 + WML3	0.07	112	50
WC42 Q = WC41 + WRN3 + WML4	0.72	321	170
WC43 Q = WL3T + WC42	0.77	398	209
WC44A Q = WC43 + WSKV1A	2.18	1325	648
Q = CNW5C + WC44A + WC42 + WOSO1 + WC44B	2.19	1330	650
WC44C Q = WWH5-C + WSC2	4.93	1998	856
	0.18	232	94

Ultimate Condition Flow Rate Summary Skye Canyon Offsite Concentration Points

Basin/Concentration Point ID	Area (sq. mi)	Q_{100} (cfs)	Q_{10} (cfs)
WEST CONCENTRATION POINTS			
CNW5B Q = RSCNW	2.19	1093	386
CP1 Q = WOFF1 + WOFF2 + WOFF3 + WOFF11	0.50	471	178
CP2 Q = WOFF7 + WOFF8	0.17	204	77
CCP4 Q = CENGCA + WCI8	0.51	917	431
CNW1-C Q = RCPF02 + NW1-C	0.69	764	260
2CNW1C Q = RCOF01 + CNW1-C	1.70	1895	582
CNW7 Q = RCNW1 + NW7-C	2.19	2213	690
CNW21C Q = RCNW7C + NW21-C	2.35	1139	347
CNW35C Q = RCNW21 + NW35-C + WPRK10	2.71	1201	347
CNW71E Q = RCNW71 + NW71-E	0.24	610	106
CNW71W Q = RNW29C+ NW71-W	0.24	354	167
COFF17 Q = OFF17B + OFF17A	0.04	66	31
COF21B Q = COF4 + OFF21B	0.55	990	469
COFF23 Q = ROFF23 + OFF23	0.01	19	9
COFF42 Q = ROFF41 + OFF4-2	0.72	871	245
COFF55 Q = ROOFF4 + OFF5-1	1.02	1182	352
DB1 Q = CP1 + WOFF4 + WOFF5 + WOFF6 + WFF1B	0.88	793	313
REB1 (FROM DB1)	0.88	71	57
DB2 Q = CP2 + WOFF9 + WOFF10 + WFF1A	0.57	667	254
REB2 (FROM DB2)	0.57	70	53
EAST CONCENTRATION POINTS			
EC27 Q = EC21 + NW102-C	6.34	3308	1338
EC28 Q = EC27 + NW35-W	6.52	3369	1346
US95 CONCENTRATION POINTS			
CHD04B Q = DHD03 + WC3 + OFFW	0.08	130	64
CHD05B Q = CHD04B + WC5	0.17	301	147
CHD06B Q = CHD05B + WD8 + OFF14	0.36	648	315
CHD07B Q = CHD06B + 95-9A	0.37	669	325
CHD07B2 Q = CHD07B + OFF15	0.40	731	357
C95-8B Q = 95-7A + 95-7B + 95-8A + 95-8B	0.02	47	24
CPOU1V Q =CHD7B2 + COFF17 + COF21B + COFF23 + OFFU	1.05	1836	877
95STH Q = CPOU1V + CNW71E	1.54	2285	1070

LEGEND

- BASIN BOUNDARY (UNCHANGED BASIN)
- BASIN BOUNDARY
- MATCHLINE SEE EXHIBIT FOR MAP EXTENSION
- ID — BASIN ID
- ID — CONCENTRATION POINT ID
- FLOW DIRECTION
- ID — FLOW SPLIT

SLATER HANIFAN GROUP
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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

EASTLAND COMPANY, LLC

SKYE CANYON - MASTER DRAINAGE STUDY UPDATE

ULTIMATE CONDITION ONSITE HYDROLOGIC MAP

DATE: DEC. 2018
DRAFTER: CWB
DESIGNER: CWB
CHECKED: LL
PROJECT NO. EST1801-000

EXHIBIT E
SHEET 1 OF 1

J:\est1801-000 eastland master studies updates\drainage\conceptual study\figures\est1801-000 exhibit e ult drainage onsite.dwg 12/20/2018 11:56 AM Cameron Benchi

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(e))	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 = EOR1(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)**
		2	1.4	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

Referenced Section

MOCCASIN ROAD

EMR1 EMR2 EFA1 EFA2 EFA3 EFA4 ESKV1 EAA1 EAA2 EAA3 EAA4 ECR1 EPA EPB1 EPB2 EPC EPD EPE1 EPE2 EPF1 EPF2 EPG EPH1 EPI1 EPI2 EPJ ESP ENP ECOM3 ECOM4 EMLA1 ELOG1 ELOG2 ESKY1 EOHR1

Referenced storm drain model connecting to PH4N

Referenced storm drain model connecting to PH4S

Project Site

NORTH COLLECTOR ROAD STORM DRAIN MODEL (NCR3.WSW)

NORTH COLLECTOR ROAD STORM DRAIN MODEL (NCR2.WSW)

NORTH COLLECTOR ROAD STORM DRAIN MODEL (NCR1.WSW)

NORTH COLLECTOR ROAD LATERAL STORM DRAIN SYSTEM (NLAT1.WSW)

NORTH COLLECTOR ROAD

LOG CABIN WAY

LOG CABIN WAY LATERAL STORM DRAIN MODEL (LLAT1.WSW)

LOG CABIN WAY LATERAL STORM DRAIN MODEL (LLAT2.WSW)

LOG CABIN WAY LATERAL STORM DRAIN MODEL (LLAT3.WSW)

LOG CABIN WAY LATERAL STORM DRAIN MODEL (LLAT4.WSW)

LOG CABIN WAY LATERAL STORM DRAIN MODEL (LLAT5.WSW)

MAINLINE MOCCASIN REGIONAL STORM DRAIN

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)

SKYE CANYON PARK DRIVE

SKYE CANYON PARK STORM DRAIN MODEL (SCP.WSW)

O'HARE ROAD

OHARE STORM DRAIN MODEL (OHA.WSW)

OHARE LATERAL STORM DRAIN MODEL (OLAT1.WSW)

OHARE LATERAL STORM DRAIN MODEL (OLAT2.WSW)

SCP STORM DRAIN LATERAL (CLAT.WSW & CLAT-P.WSW)

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 tds\drainage\technical study\addendum\figures\est1905-000 tds add exhibit e cross sections and facilities map.dwg 8/7/2019 10:08 AM Caitlyn Alcantara

Referenced Hydraulics

Ultimate Condition WSPG Summary

Mainline in North Collector Road from Basin EAA2 to Regional Mainline (NCR1.WSW)

WSPG Station	Plan Set Project No. *	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]
1000.00	LCW: EST1908	N/A	P-8	60" RCP	2681.64	150.00	2689.00	7.64	2700.00	Connection to Existing Regional Facility	OK
1008.00		57+03.44		60" RCP	2682.72	150.00	2689.03	7.64	2700.00		OK
1030.76		56+90.2		60" RCP	2682.95	150.00	2689.26	7.64	2700.02		OK
1069.71		56+89.99		60" RCP	2683.34	150.00	2689.43	7.64	2699.63		OK
1122.45	NCR: EST1912	43+32.05	SD-4	60" RCP	2683.87	150.00	2689.66	7.64	2699.63	Junction with NC3 Drop Inlet Facilities and Basin EPC	OK
1122.45		43+32.05		42" RCP	2685.37	93.00	2689.82	9.67	2699.63		OK
1261.08		41+94.58		42" RCP	2687.59	93.00	2689.84	14.21	2700.41		OK
1430.87		40+26.23		42" RCP	2690.31	93.00	2692.72	13.16	2702.11		OK
1600.72		38+57.81		42" RCP	2692.00	93.00	2693.98	16.54	2703.80		OK
1770.57		36+89.39		42" RCP	2696.26	93.00	2698.57	13.81	2705.48		OK
1940.42		35+20.97	SD-3	42" RCP	2698.89	93.00	2701.87	10.65	2707.17	Junction with NC4 Drop Inlet Facilities	OK
1940.42				42" RCP	2698.89	88.00	2702.49	9.15	2707.17		OK
2110.27		33+52.55		42" RCP	2699.73	88.00	2703.89	9.15	2708.85		OK
2280.19		31+84.07		42" RCP	2700.58	88.00	2705.28	9.15	2710.54		OK
2643.50		28+21.33	SD-2	42" RCP	2705.13	88.00	2706.67	21.51	2717.75	Junction with NC2b	OK
2643.50				42" RCP	2705.13	85.00	2706.59	22.40	2717.75		OK
2685.06		27+90.9	SD-10	7.5' x 12' RCB	2706.25	85.00	2707.62	8.30	2716.97	Wall Entrance	OK
2685.06				7.5' x 12' RCB	2706.25	85.00	2707.62	8.30	2716.97	Junction with NC2a Drop Inlet Facility	OK
2687.56				7.5' x 12' RCB	2706.32	85.00	2707.91	7.15	2716.97		OK
2687.56				7.5' x 12' RCB	2706.32	82.00	2708.24	5.71	2716.97		OK
2690.06				42" RCP	2706.37	82.00	2708.18	6.04	2716.97		OK
2690.06				42" RCP	2706.37	82.00	2708.18	6.04	2716.97	Wall Exit	OK
2740.52		27+07.38		42" RCP	2707.38	82.00	2710.21	9.85	2715.00	Stub to Basin EAA2	OK
2740.52				42" RCP	2707.38	82.00	2710.21	9.85	2715.00		OK

Referenced structure for starting HGL

```
T1 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE
T2 SOUTHERN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR1)
T3 FROM PROPOSED BASIN EAA2 TO REGIONAL MAINLINE
SO   1000.0002681.640 60                          2689.000
R    1008.0002682.720 60      .013
R    1030.7602682.950 60      .013                                        36.0   1
R    1069.7102683.340 60      .013                                         0.0   1
R    1122.4502683.870 60      .013                                        -4.0   1
JX   1122.4502685.370 42 48 18.013   51.0      6.0  2684.8702687.370-40.0 45.0
R    1261.0802687.590 42      .013                                        -7.5   1
R    1430.8702690.310 42      .013                                        -7.5   1
R    1600.7202692.000 42      .013                                        -7.5   1
R    1770.5702696.260 42      .013                                        -7.5   1
R    1940.4202698.890 42      .013                                        -7.5   1
JX   1940.4202698.890 42 18 18.013    2.0      3.0  2700.8902700.890-80.0 57.0
R    2110.2702699.730 42      .013                                        -7.5   1
R    2280.1902700.580 42      .013                                        -7.5   1
R    2643.5002705.130 42      .013                                        -9.0   1
JX   2643.5002705.130 42 18   .013    3.0           2707.130         54.0
R    2685.0602706.252 42      .013                                       -39.0   1
WE   2685.0602706.252 42      .013
R    2687.5602706.320  3      .013                                       -44.0   1
JX   2687.5602706.320  3  3   .013    3.0           2706.320         90.0
R    2690.0602706.370  3      .013                                              1
WX   2690.0602706.370  3      .013
R    2740.5202707.380 42      .013
SH   2740.5202707.380 42
CD   3  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
CD  30  4   1   0.000   2.500    0.000 0.000 0.000  0.0000.00  0.00
CD  36  4   1   0.000   3.000    0.000 0.000 0.000  0.0000.00  0.00
CD  42  4   1   0.000   3.500    0.000 0.000 0.000  0.0000.00  0.00
CD  48  4   1   0.000   4.000    0.000 0.000 0.000  0.0000.00  0.00
CD  54  4   1   0.000   4.500    0.000 0.000 0.000  0.0000.00  0.00
CD  60  4   1   0.000   5.000    0.000 0.000 0.000  0.0000.00  0.00
CD  66  4   1   0.000   5.500    0.000 0.000 0.000  0.0000.00  0.00
CD  72  4   1   0.000   6.000    0.000 0.000 0.000  0.0000.00  0.00
Q            82.000
```

Referenced structure for starting HGL

Connection to proposed PH4S

FILE: NCR1.WSW W S P G W - EDIT LISTING - Version 14.10 Date: 8- 6-2019 Time: 2:51: 9

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

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	3	3	0	.000	12.000	7.500	.000	.000	.00										
CD	18	4	1		1.500														
CD	24	4	1		2.000														
CD	30	4	1		2.500														
CD	36	4	1		3.000														
CD	42	4	1		3.500														
CD	48	4	1		4.000														
CD	54	4	1		4.500														
CD	60	4	1		5.000														
CD	66	4	1		5.500														
CD	72	4	1		6.000														

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

HEADING LINE NO 2 IS -

SOUTHERN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR1)

HEADING LINE NO 3 IS -

FROM PROPOSED BASIN EAA2 TO REGIONAL MAINLINE

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1000.000	2681.640	60	2689.000

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1008.000	2682.720	60	.013	.000	.000	.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1030.760	2682.950	60	.013	.000	.000	36.000	1

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1069.710	2683.340	60	.013	.000	.000	.000	1

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1122.450	2683.870	60	.013	.000	.000	-4.000	1

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
	1122.450	2685.370	42	48	18	.013	51.000	6.000	2684.870	2687.370	-40.000	45.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1261.080	2687.590	42	.013	.000	.000	-7.500	1

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1430.870	2690.310	42	.013	.000	.000	-7.500	1

ELEMENT NO 9 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1600.720	2692.000	42	.013	.000	.000	-7.500	1

ELEMENT NO 10 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1770.570	2696.260	42	.013	.000	.000	-7.500	1

ELEMENT NO 11 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1940.420	2698.890	42	.013	.000	.000	-7.500	1

ELEMENT NO 12 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1940.420	2698.890	42	18	18	.013	2.000	3.000	2700.890	2700.890	-80.000	57.000

RADIUS	ANGLE
.000	.000

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

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 13 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2110.270	2699.730	42	.013	.000	.000	-7.500	1

ELEMENT NO 14 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2280.190	2700.580	42	.013	.000	.000	-7.500	1

ELEMENT NO 15 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2643.500	2705.130	42	.013	.000	.000	-9.000	1

ELEMENT NO 16 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	2643.500	2705.130	42	18	0	.013	3.000	.000	2707.130	.000	54.000	.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 17 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2685.060	2706.252	42	.013	.000	.000	-39.000	1

```
 ELEMENT NO  18 IS A  WALL  ENTRANCE                    *
                   U/S DATA   STATION    INVERT  SECT              FP
                              2685.060 2706.252   42              .013
WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
 ELEMENT NO  19 IS A REACH              *         *     *
                   U/S DATA   STATION    INVERT  SECT               N                            RADIUS    ANGLE     ANG PT  MAN H
                              2687.560 2706.320    3               .013                             .000     .000   -44.000     1
 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
                              2687.560 2706.320    3     3     0   .013     3.000      .000  2706.320      .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  21 IS A REACH              *         *     *
                   U/S DATA   STATION    INVERT  SECT               N                            RADIUS    ANGLE     ANG PT  MAN H
                              2690.060 2706.370    3               .013                             .000     .000      .000     1
                                                      W S P G W                                                                PAGE NO   4
                            WATER SURFACE PROFILE - ELEMENT CARD LISTING
 ELEMENT NO  22 IS A  WALL  EXIT                        *
                   U/S DATA   STATION    INVERT  SECT
                              2690.060 2706.370    3
WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
 ELEMENT NO  23 IS A REACH              *         *     *
                   U/S DATA   STATION    INVERT  SECT               N                            RADIUS    ANGLE     ANG PT  MAN H
                              2740.520 2707.380   42              .013                             .000     .000      .000     0
 ELEMENT NO  24 IS A SYSTEM HEADWORKS                   *                       *
                   U/S DATA   STATION    INVERT  SECT                                      W S ELEV
                              2740.520 2707.380   42                                          .000
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EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE
SOUTHERN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR1)
FROM PROPOSED BASIN EAA2 TO REGIONAL MAINLINE

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	2681.640	7.360	2689.000	150.00	7.64	.91	2689.91	.00	3.51	.00	5.000	.000	.00	1 .0
8.000	.1350					.0033	.03	7.36	.00	1.34	.013	.00	.00	PIPE
1008.000	2682.720	6.307	2689.027	150.00	7.64	.91	2689.93	.00	3.51	.00	5.000	.000	.00	1 .0
22.760	.0101					.0033	.08	6.31	.00	2.71	.013	.00	.00	PIPE
1030.760	2682.950	6.305	2689.255	150.00	7.64	.91	2690.16	.00	3.51	.00	5.000	.000	.00	1 .0
38.950	.0100					.0033	.13	6.31	.00	2.72	.013	.00	.00	PIPE
1069.710	2683.340	6.090	2689.430	150.00	7.64	.91	2690.34	.00	3.51	.00	5.000	.000	.00	1 .0
52.740	.0100					.0033	.17	6.09	.00	2.72	.013	.00	.00	PIPE
1122.450	2683.870	5.792	2689.662	150.00	7.64	.91	2690.57	.00	3.51	.00	5.000	.000	.00	1 .0
JUNCT STR	.0000					.0059	.00	5.79	.00		.013	.00	.00	PIPE
1122.450	2685.370	4.449	2689.819	93.00	9.67	1.45	2691.27	.00	2.98	.00	3.500	.000	.00	1 .0
97.983	.0160					.0085	.84	4.45	.00	2.22	.013	.00	.00	PIPE
1220.433	2686.939	3.792	2690.731	93.00	9.67	1.45	2692.18	.00	2.98	.00	3.500	.000	.00	1 .0
HYDRAULIC JUMP														
1220.433	2686.939	2.245	2689.184	93.00	14.26	3.16	2692.34	.00	2.98	3.36	3.500	.000	.00	1 .0
40.647	.0160					.0154	.63	2.25	1.80	2.22	.013	.00	.00	PIPE
1261.080	2687.590	2.252	2689.842	93.00	14.21	3.14	2692.98	.00	2.98	3.35	3.500	.000	.00	1 .0
102.714	.0160					.0148	1.52	2.25	1.79	2.22	.013	.00	.00	PIPE

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE
SOUTHERN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR1)
FROM PROPOSED BASIN EAA2 TO REGIONAL MAINLINE

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
1363.794	2689.236	2.310	2691.546	93.00	13.80	2.96	2694.50	.00	2.98	3.32	3.500	.000	.00	1 .0
67.076	.0160					.0135	.91	2.31	1.71	2.22	.013	.00	.00	PIPE
1430.870	2690.310	2.411	2692.721	93.00	13.16	2.69	2695.41	.00	2.98	3.24	3.500	.000	.00	1 .0
39.127	.0099					.0133	.52	2.41	1.57	2.66	.013	.00	.00	PIPE
1469.997	2690.699	2.330	2693.029	93.00	13.67	2.90	2695.93	.00	2.98	3.30	3.500	.000	.00	1 .0
39.920	.0099					.0148	.59	2.33	1.68	2.66	.013	.00	.00	PIPE
1509.917	2691.096	2.235	2693.331	93.00	14.34	3.19	2696.52	.00	2.98	3.36	3.500	.000	.00	1 .0
33.962	.0099					.0167	.57	2.23	1.82	2.66	.013	.00	.00	PIPE
1543.880	2691.434	2.146	2693.580	93.00	15.04	3.51	2697.09	.00	2.98	3.41	3.500	.000	.00	1 .0
29.910	.0099					.0189	.56	2.15	1.97	2.66	.013	.00	.00	PIPE
1573.789	2691.732	2.062	2693.793	93.00	15.77	3.86	2697.66	.00	2.98	3.44	3.500	.000	.00	1 .0
26.931	.0099					.0214	.58	2.06	2.12	2.66	.013	.00	.00	PIPE
1600.720	2692.000	1.982	2693.982	93.00	16.54	4.25	2698.23	.00	2.98	3.47	3.500	.000	.00	1 .0
71.392	.0251					.0216	1.54	1.98	2.29	1.92	.013	.00	.00	PIPE

1672.112	2693.791	2.045	2695.836	93.00	15.93	3.94	2699.77	.00	2.98	3.45	3.500	.000	.00	1	.0				
48.065	.0251					.0194	.93	2.05	2.16	1.92	.013	.00	.00	PIPE					
1720.177	2694.996	2.128	2697.124	93.00	15.19	3.58	2700.71	.00	2.98	3.42	3.500	.000	.00	1	.0				
29.919	.0251					.0171	.51	2.13	2.00	1.92	.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
1750.096	2695.747	2.216	2697.963	93.00	14.48	3.26	2701.22	.00	2.98	3.37	3.500	.000	.00	1 .0
20.474	.0251					.0152	.31	2.22	1.85	1.92	.013	.00	.00	PIPE
1770.570	2696.260	2.310	2698.570	93.00	13.81	2.96	2701.53	.00	2.98	3.32	3.500	.000	.00	1 .0
51.638	.0155					.0139	.72	2.31	1.71	2.25	.013	.00	.00	PIPE
1822.208	2697.060	2.354	2699.414	93.00	13.51	2.84	2702.25	.00	2.98	3.28	3.500	.000	.00	1 .0
58.151	.0155					.0128	.75	2.35	1.65	2.25	.013	.00	.00	PIPE
1880.359	2697.960	2.458	2700.417	93.00	12.88	2.58	2703.00	.00	2.98	3.20	3.500	.000	.00	1 .0
30.364	.0155					.0115	.35	2.46	1.51	2.25	.013	.00	.00	PIPE
1910.723	2698.430	2.569	2701.000	93.00	12.29	2.34	2703.34	.00	2.98	3.09	3.500	.000	.00	1 .0
17.390	.0155					.0103	.18	2.57	1.38	2.25	.013	.00	.00	PIPE
1928.113	2698.699	2.692	2701.391	93.00	11.71	2.13	2703.52	.00	2.98	2.95	3.500	.000	.00	1 .0
9.290	.0155					.0092	.09	2.69	1.26	2.25	.013	.00	.00	PIPE
1937.404	2698.843	2.827	2701.671	93.00	11.17	1.94	2703.61	.00	2.98	2.76	3.500	.000	.00	1 .0
3.016	.0155					.0084	.03	2.83	1.13	2.25	.013	.00	.00	PIPE
1940.420	2698.890	2.983	2701.873	93.00	10.65	1.76	2703.63	.00	2.98	2.48	3.500	.000	.00	1 .0
JUNCT STR	.0000					.0078	.00	2.98	1.00		.013	.00	.00	PIPE
1940.420	2698.890	3.599	2702.489	88.00	9.15	1.30	2703.79	.00	2.92	.00	3.500	.000	.00	1 .0
169.850	.0049					.0077	1.30	3.60	.00	3.50	.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
2110.270	2699.730	4.155	2703.885	88.00	9.15	1.30	2705.18	.00	2.92	.00	3.500	.000	.00	1 .0
169.920	.0050					.0077	1.30	4.16	.00	3.50	.013	.00	.00	PIPE
2280.190	2700.580	4.702	2705.282	88.00	9.15	1.30	2706.58	.00	2.92	.00	3.500	.000	.00	1 .0
163.260	.0125					.0077	1.25	4.70	.00	2.33	.013	.00	.00	PIPE
2443.450	2702.625	3.959	2706.584	88.00	9.15	1.30	2707.88	.00	2.92	.00	3.500	.000	.00	1 .0
HYDRAULIC JUMP														
2443.450	2702.625	2.049	2704.674	88.00	15.04	3.51	2708.18	.00	2.92	3.45	3.500	.000	.00	1 .0
23.260	.0125					.0189	.44	2.05	2.03	2.33	.013	.00	.00	PIPE
2466.711	2702.916	2.008	2704.924	88.00	15.41	3.69	2708.61	.00	2.92	3.46	3.500	.000	.00	1 .0
35.434	.0125					.0208	.74	2.01	2.11	2.33	.013	.00	.00	PIPE
2502.145	2703.360	1.931	2705.291	88.00	16.16	4.06	2709.35	.00	2.92	3.48	3.500	.000	.00	1 .0

| | | |

Referenced starting HGL

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 WALL  EXIT
       |       |       |       |       |       |       |       |       |       |       |       |       |
2690.060 2706.370  1.810 2708.180   82.00   6.04    .57 2708.75    .00   1.55    7.50  12.000   7.500  .00   0   .0
      -|-     -|-     -|-     -|-     -|-    -|-     -|-     -|-     -|-     -|-     -|-     -|-     -|-     |-
       |       |       |       |       |       |       |       |       |       |       |       |       |
2690.060 2706.370  2.186 2708.556   82.00  12.98   2.61 2711.17    .00   2.83    3.39   3.500   .000  .00   1   .0
      -|-     -|-     -|-     -|-     -|-    -|-     -|-     -|-     -|-     -|-     -|-     -|-     -|-     |-
  15.279    .0200                                .0125     .19    2.19    1.67    1.91    .013     .00  .00  PIPE
       |       |       |       |       |       |       |       |       |       |       |       |       |
2705.339 2706.676  2.256 2708.931   82.00  12.51   2.43 2711.36    .00   2.83    3.35   3.500   .000  .00   1   .0
      -|-     -|-     -|-     -|-     -|-    -|-     -|-     -|-     -|-     -|-     -|-     -|-     -|-     |-
  14.188    .0200                                .0112     .16    2.26    1.58    1.91    .013     .00  .00  PIPE
       |       |       |       |       |       |       |       |       |       |       |       |       |
2719.527 2706.960  2.352 2709.312   82.00  11.93   2.21 2711.52    .00   2.83    3.29   3.500   .000  .00   1   .0
      -|-     -|-     -|-     -|-     -|-    -|-     -|-     -|-     -|-     -|-     -|-     -|-     -|-     |-
   9.729    .0200                                .0100     .10    2.35    1.45    1.91    .013     .00  .00  PIPE
       |       |       |       |       |       |       |       |       |       |       |       |       |
2729.256 2707.154  2.455 2709.610   82.00  11.37   2.01 2711.62    .00   2.83    3.20   3.500   .000  .00   1   .0
      -|-     -|-     -|-     -|-     -|-    -|-     -|-     -|-     -|-     -|-     -|-     -|-     -|-     |-
   6.390    .0200                                .0089     .06    2.46    1.34    1.91    .013     .00  .00  PIPE
       |       |       |       |       |       |       |       |       |       |       |       |       |
2735.646 2707.282  2.567 2709.849   82.00  10.84   1.83 2711.67    .00   2.83    3.10   3.500   .000  .00   1   .0
      -|-     -|-     -|-     -|-     -|-    -|-     -|-     -|-     -|-     -|-     -|-     -|-     -|-     |-
   3.658    .0200                                .0080     .03    2.57    1.22    1.91    .013     .00  .00  PIPE
♠ FILE: NCR1.WSW                    W S P G W - CIVILDESIGN Version 14.08                              PAGE    7
                  Program Package Serial Number: 7189
                                WATER SURFACE PROFILE LISTING                 Date: 8- 6-2019  Time: 2:51:11
           EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE
             SOUTHERN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR1)
               FROM PROPOSED BASIN EAA2 TO REGIONAL MAINLINE
********************************************************************************************************************** ********
        | Invert  | Depth |  Water  |    Q    |  Vel    Vel  |  Energy | Super |Critical|Flow Top|Height/|Base Wt|      |No Wth
 Station |  Elev   |  (FT) |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev | Depth  | Width |Dia.-FT|or I.D.|  ZL  |Prs/Pip
      -|-     -|-     -|-     -|-     -|-    -|-     -|-     -|-     -|-     -|-     -|-     -|-     -|-    -|
 L/Elem  |Ch Slope |       |         |         |         SF Ave|    HF   |SE Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch
*********|*********|*******|*********|*********|*******|*******|*********|*******|********|********|*******|*******|******|********
       |       |       |         |         |       |       |         |       |        |        |       |       |      |
2739.304 2707.355  2.689 2710.044   82.00  10.34   1.66 2711.70    .00   2.83    2.95   3.500   .000  .00   1   .0
      -|-     -|-     -|-     -|-     -|-    -|-     -|-     -|-     -|-     -|-     -|-     -|-     -|-     |-
   1.216    .0200                                .0072     .01    2.69    1.11    1.91    .013     .00  .00  PIPE
       |       |       |       |       |       |       |       |       |       |       |       |       |
2740.520 2707.380  2.825 2710.205   82.00   9.85   1.51 2711.71    .00   2.83    2.76   3.500   .000  .00   1   .0
      -|-     -|-     -|-     -|-     -|-    -|-     -|-     -|-     -|-     -|-     -|-     -|-     -|-     |-
♠
♠
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EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

SOUTHERN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR1)

FROM PROPOSED BASIN EAA2 TO REGIONAL MAINLINE

```
1000.00    .I       C   H     W E                                                .   R

1015.40    . I       C   H   W E                                                .   R

1030.81    .  I       C   H  W  E                                               .   R

1046.21    .                                                                     .

1061.61    .                                                                     .

1077.01    .   I       C   H  W E                                               .   R

1092.42    .                                                                     .

1107.82    .                                                                     .

1123.22    .     I       C   H W  E                                             .   JX

1138.63    .         I      CH  W   E                                           .   R

1154.03    .                                                                     .
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1169.43   .                                                                .
1184.83   .                                                                .
1200.24   .                                                                .
1215.64   .                                                                .
1231.04   .            I      CHW   E                                      .   R
1246.45   .            I    W CH    E                                      .   R
1261.85   .              I    W CH    E                                    .   R
1277.25   .                                                                .
1292.65   .                                                                .
1308.06   .                                                                .
1323.46   .                                                                .
1338.86   .                                                                .
1354.27   .                                                                .
1369.67   .                 I    W C H   E                                 .   R
1385.07   .                                                                .
1400.47   .                                                                .
1415.88   .                                                                .
1431.28   .                    I     WC H  E                               .   R
1446.68   .                                                                .
1462.08   .                                                                .
1477.49   .                    I     WC H  E                               .   R
1492.89   .                                                                .
1508.29   .                                                                .
1523.70   .                     I    W C H   E                             .   R
1539.10   .                                                                .
1554.50   .                     I    W C H    E                            .   R
1569.90   .                                                                .
1585.31   .                      I   W C H    E                            .   R
1600.71   .                                                                .
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1616.11   .                        I   W  CH      E                          .   R
1631.52   .                                                                   .
1646.92   .                                                                   .
1662.32   .                                                                   .
1677.72   .                          I   W  CH     E                          .   R
1693.13   .                                                                   .
1708.53   .                                                                   .
1723.93   .                           I    W CH    E                         .   R
1739.34   .                                                                   .
1754.74   .                            I    W CH    E                        .   R
1770.14   .                                                                   .
1785.54   .                             I     WC H   E                       .   R
1800.95   .                                                                   .
1816.35   .                                                                   .
1831.75   .                              I     W CH   E                       .   R
1847.16   .                                                                   .
1862.56   .                                                                   .
1877.96   .                                                                   .
1893.36   .                                 I     WCH   E                     .   R
1908.77   .                                                                   .
1924.17   .                                  I     WC H  E                    .   R
1939.57   .                                   I     WCH  E                    .   R
1954.98   .                                   I      W H E                    .   R
1970.38   .                                   I       WH E                    .   JX
1985.78   .                                   I      C H  E                   .   R
2001.18   .                                                                   .
2016.59   .                                                                   .
2031.99   .                                                                   .
2047.39   .                                                                   .
2062.80   .                                                                   .
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2078.20   .                                                          .
2093.60   .                                                          .
2109.00   .                                                          .
2124.41   .                        I      CH W   E                  .   R
2139.81   .                                                          .
2155.21   .                                                          .
2170.62   .                                                          .
2186.02   .                                                          .
2201.42   .                                                          .
2216.82   .                                                          .
2232.23   .                                                          .
2247.63   .                                                          .
2263.03   .                                                          .
2278.44   .                                                          .
2293.84   .                         I      C H  W  E                 .   R
2309.24   .                                                          .
2324.64   .                                                          .
2340.05   .                                                          .
2355.45   .                                                          .
2370.85   .                                                          .
2386.25   .                                                          .
2401.66   .                                                          .
2417.06   .                                                          .
2432.46   .                                                          .
2447.87   .                              I      CHW   E              .   R
2463.27   .                              I   W  CH    E              .   R
2478.67   .                              I    W C H    E             .   R
2494.07   .                                                          .
2509.48   .                                I   W  CH     E           .   R
2524.88   .                                                          .
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2540.28   .                                    I   W  CH      E                  .   R
2555.69   .                                                                       .
2571.09   .                                    I   W   CH       E                 .   R
2586.49   .                                    I   W  C H       E                 .   R
2601.89   .                                                                       .
2617.30   .                                    I   W  C H       E                 .   R
2632.70   .                                    I   W   CH          E              .   R
2648.10   .                                    I   W  C H          E              .   JX
2663.51   .                                    I   W   C H           E            .   R
2678.91   .                                        I   W   CH             E       .   R
2694.31   .                                            I  WC E                H .   R
2709.71   .                                            I  WC E                H .   R
2725.12   .                                            I   W E                H .   R
2740.52   .                                            I   W E                H .   R

          2681.640  2685.313  2688.986  2692.659  2696.332  2700.005  2703.678  2707.352  2711.025  2714.698  2718.370
```

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

Ultimate Condition WSPG Summary

Mainline in North Collector Road from Basin EAA1 to Basin EMR2 (NCR2.WSW)

WSPG Station	Plan Set Project No. *	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]
1000.00	NCR: EST1912	14+01.84	SD-1	48" RCP	2713.30	119.00	2720.40	9.47	2724.00		OK
1046.88		14+37.44		48" RCP	2713.61	119.00	2720.91	9.47	2724.91	Junction with NC1 Drop Inlet Facilities	OK
1046.88		14+37.44		48" RCP	2713.61	114.00	2721.13	9.07	2724.91		OK
1261.27		16+52.1		48" RCP	2714.73	114.00	2722.82	9.07	2726.49		OK
1375.20		16+93.03	SD-5	48" RCP	2715.87	114.00	2723.54	9.07	2726.49		OK
1375.20		16+93.03		48" RCP	2715.87	114.00	2723.54	9.07	2726.49		OK

```
T1 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE
T2 NORTHERN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR2)
T3 FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2 (PROPOSED FLOW)
SO   1000.0002713.300 48                          2720.400
R    1046.8802713.610 48      .013                                    40.0
JX   1046.8802713.610 48 18 18.013    2.5      2.5  2716.1602716.160 33.0 90.0
R    1261.2702714.730 48      .013                                    66.0
R    1375.2002715.870 48      .013
SH   1375.2002715.870 48
CD   5  3   0   0.000   9.000   10.000 0.000 0.000  0.0000.00  0.00
CD  18  4   1   0.000   1.500    0.000 0.000 0.000  0.0000.00  0.00
CD  24  4   1   0.000   2.000    0.000 0.000 0.000  0.0000.00  0.00
CD  30  4   1   0.000   2.500    0.000 0.000 0.000  0.0000.00  0.00
CD  36  4   1   0.000   3.000    0.000 0.000 0.000  0.0000.00  0.00
CD  42  4   1   0.000   3.500    0.000 0.000 0.000  0.0000.00  0.00
CD  48  4   1   0.000   4.000    0.000 0.000 0.000  0.0000.00  0.00
CD  54  4   1   0.000   4.500    0.000 0.000 0.000  0.0000.00  0.00
CD  60  4   1   0.000   5.000    0.000 0.000 0.000  0.0000.00  0.00
CD  66  4   1   0.000   5.500    0.000 0.000 0.000  0.0000.00  0.00
CD  72  4   1   0.000   6.000    0.000 0.000 0.000  0.0000.00  0.00
Q           114.000
```

Referenced starting HGL

Connection to proposed PH4N

FILE: NCR2.WSW W S P G W - EDIT LISTING - Version 14.10 Date: 8- 6-2019 Time:10:53:50

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	5	3	0	.000	9.000	10.000	.000	.000	.00										
CD	18	4	1		1.500														
CD	24	4	1		2.000														
CD	30	4	1		2.500														
CD	36	4	1		3.000														
CD	42	4	1		3.500														
CD	48	4	1		4.000														
CD	54	4	1		4.500														
CD	60	4	1		5.000														
CD	66	4	1		5.500														
CD	72	4	1		6.000														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

HEADING LINE NO 2 IS -

NORTHERN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR2)

HEADING LINE NO 3 IS -

FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2 (PROPOSED FLOW)

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	2713.300	48	2720.400

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1046.880	2713.610	48	.013	.000	.000	40.000	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
	1046.880	2713.610	48	18	18	.013	2.500	2.500	2716.160	2716.160	33.000	90.000

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 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1261.270	2714.730	48	.013	.000	.000	66.000	1

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1375.200	2715.870	48	.013	.000	.000	.000	0

ELEMENT NO 6 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1375.200	2715.870	48	.000

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 8- 6-2019 Time:10:53:53

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

NORTHERN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR2)

FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2 (PROPOSED FLOW)

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	2713.300	7.100	2720.400	119.00	9.47	1.39	2721.79	.00	3.29	.00	4.000	.000	.00	1 .0
46.880	.0066					.0069	.32	7.10	.00	3.35	.013	.00	.00	PIPE
1046.880	2713.610	7.295	2720.906	119.00	9.47	1.39	2722.30	.00	3.29	.00	4.000	.000	.00	1 .0
JUNCT STR	.0000					.0066	.00	7.30	.00		.013	.00	.00	PIPE
1046.880	2713.610	7.517	2721.127	114.00	9.07	1.28	2722.41	.00	3.22	.00	4.000	.000	.00	1 .0
214.390	.0052					.0063	1.35	7.52	.00	4.00	.013	.00	.00	PIPE
1261.270	2714.730	8.090	2722.820	114.00	9.07	1.28	2724.10	.00	3.22	.00	4.000	.000	.00	1 .0
113.930	.0100					.0063	.72	8.09	.00	2.69	.013	.00	.00	PIPE
1375.200	2715.870	7.667	2723.537	114.00	9.07	1.28	2724.82	.00	3.22	.00	4.000	.000	.00	1 .0

♠
♠

Referenced Starting HGL

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

NORTHERN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR2)

FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2 (PROPOSED FLOW)

```
1000.00   .I                    C     H                    W          E                    .   R

1007.66   .                                                                                 .

1015.31   .                                                                                 .

1022.97   .                                                                                 .

1030.63   .                                                                                 .

1038.29   .                                                                                 .

1045.94   .                                                                                 .

1053.60   . I                    C     H                    W          E                    .   JX

1061.26   . I                    C     H                    W          E                    .   R

1068.91   .                                                                                 .

1076.57   .                                                                                 .

1084.23   .                                                                                 .

1091.89   .                                                                                 .

1099.54   .                                                                                 .

1107.20   .                                                                                 .
```

1114.86 .

1122.51 .

1130.17 .

1137.83 .

1145.49 .

1153.14 .

1160.80 .

1168.46 .

1176.11 .

1183.77 .

1191.43 .

1199.09 .

1206.74 .

1214.40 .

1222.06 .

1229.71 .

1237.37 .

1245.03 .

1252.69 .

1260.34 .

1268.00 . I C H W E . R

1275.66 .

1283.31 .

1290.97 .

1298.63 .

1306.29 .

1313.94 .

1321.60 .

1329.26 .

```
  1336.91    .                                                                .

  1344.57    .                                                                .

  1352.23    .                                                                .

  1359.89    .                                                                .

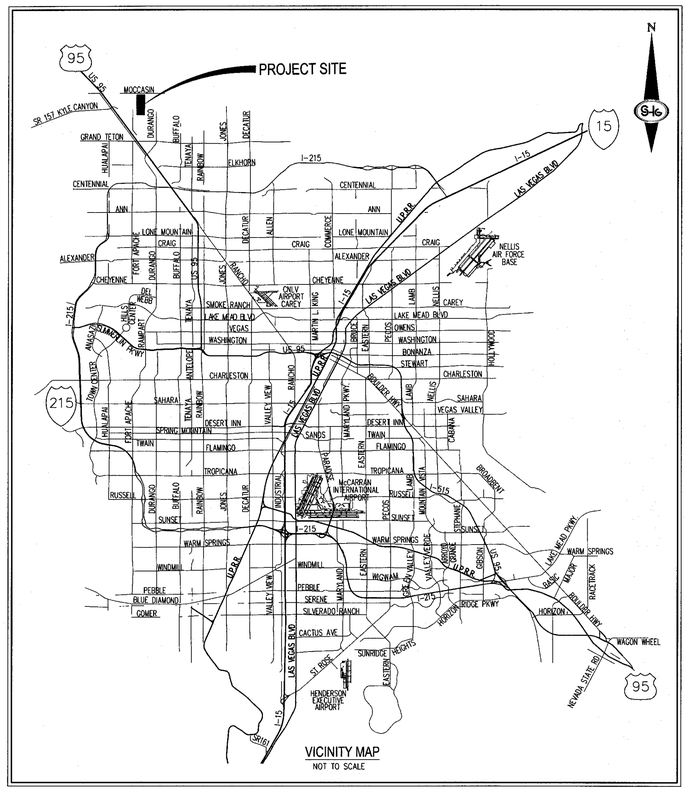
  1367.54    .                                                                .

  1375.20    .                    I                       C     H                          W          E.    R

           2713.300  2714.451  2715.603  2716.754  2717.906  2719.057  2720.208  2721.360  2722.511  2723.662  2724.815
```

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

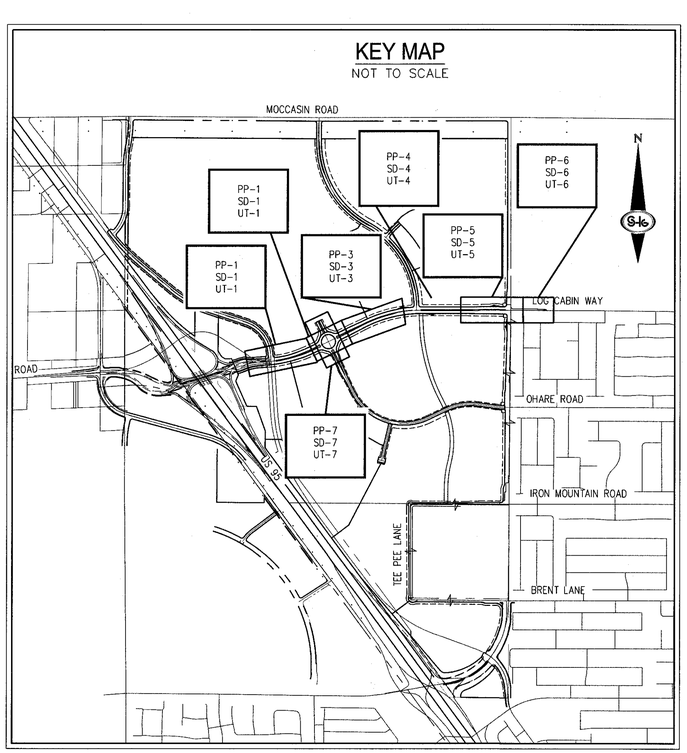
Referenced Improvement Plans



VICINITY MAP
NOT TO SCALE

IMPROVEMENT PLANS FOR SUNSTONE PHASE 1 LOG CABIN WAY

CITY OF LAS VEGAS, NEVADA



SHEET INDEX	Sheet List Table	
NO.	SHEET	TITLE
1	CS-1	COVER SHEET
2	CS-2	GENERAL NOTES
3	CS-3	ABBREVIATIONS, LEGEND AND QUANTITIES
6	PP-1	PLAN AND PROFILE 1 – "LCW" 32+00.00 TO "LCW" 41+00.00
7	PP-2	PLAN AND PROFILE 2 – "LCW" 41+00.00 TO "LCW" 46+50.00
8	PP-3	PLAN AND PROFILE 3 – "LCW" 46+50.00 TO "LCW" 55+00.00
9	PP-4	PLAN AND PROFILE 4 – "LCW" 55+00.00 TO "LCW" 63+00.00
10	PP-5	PLAN AND PROFILE 5 – "LCW" 63+00.00 TO "LCW" 71+50.00
11	PP-6	PLAN AND PROFILE 6 – "LCW" 71+00.00 TO "LCW" 76+00.00
12	PP-7	PLAN AND PROFILE 7 – "OR" 7+00.00 TO "OR" 15+00.00
13	RA-1	ROUNDABOUT GRADING PLAN
14	RA-2	ROUNDABOUT PROFILE
15	RA-3	ROUNDABOUT SOUTH CURB PROFILES
16	RA-4	ROUNDABOUT NORTH CURB PROFILES
17	SD-1	STORM DRAIN 1 – "LCW" 32+00.00 TO "LCW" 41+00.00
18	SD-2	STORM DRAIN 2 – "LCW" 41+00.00 TO "LCW" 46+50.00
19	SD-3	STORM DRAIN 3 – "LCW" 46+50.00 TO "LCW" 55+00.00
20	SD-4	STORM DRAIN 4 – "LCW" 55+00.00 TO "LCW" 63+00.00
21	SD-5	STORM DRAIN 5 – "LCW" 63+00.00 TO "LCW" 71+50.00
22	SD-6	STORM DRAIN 6 – "LCW" 71+00.00 TO "LCW" 76+00.00
23	SD-7	STORM DRAIN 7 – "OR" 7+00.00 TO "OR" 15+00.00
24	SD-8	STORM DRAIN LATERAL DETAILS 1
25	SD-9	STORM DRAIN LATERAL DETAILS 2
26	G-1	GRADING PLAN 1
27	G-2	GRADING PLAN 2
28	UT-1	UTILITY PLAN 1 – "LCW" 32+00.00 TO "LCW" 41+00.00
29	UT-2	UTILITY PLAN 2 – "LCW" 41+00.00 TO "LCW" 46+50.00
30	UT-3	UTILITY PLAN 3 – "LCW" 46+50.00 TO "LCW" 55+00.00
31	UT-4	UTILITY PLAN 4 – "LCW" 55+00.00 TO "LCW" 63+00.00
32	UT-5	UTILITY PLAN 5 – "LCW" 63+00.00 TO "LCW" 71+50.00
33	UT-6	UTILITY PLAN 6 – "LCW" 71+00.00 TO "LCW" 76+00.00
34	UT-7	UTILITY PLAN 7 – "GH" 7+00.00 TO "OR" 15+00.00
35	UT-8	UTILITY PLAN 8
36	U-9	WATER LATERAL 1
37	U-10	SEWER LATERAL 1
38	DT-1	DETAIL SHEET 1
39	ST-01	SIGNAGE AND STRIPING LCW 32+00.00 TO LCW 41+00.00
40	ST-02	SIGNAGE AND STRIPING LCW 41+00.00 TO LCW 46+50.00
41	ST-03	SIGNAGE AND STRIPING LCW 46+50.00 TO LCW 55+00.00
42	LL-01	LIGHTING & ITS LCW 32+00.00 TO LCW 41+00.00
43	LL-02	LIGHTING & ITS LCW 41+00.00 TO LCW 46+50.00
44	LL-03	LIGHTING & ITS LCW 46+50.00 TO LCW 55+00.00
45	TS-01	TRAFFIC SIGNAL INFRASTRUCTURE
46	TS-02	PEDESTRIAN FLASHER PLAN 1
47	TS-03	PEDESTRIAN FLASHER PLAN 2

APPROVALS

CITY ENGINEER–ALLEN PAVELKA PE, #9029 DATE

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

LAS VEGAS FIRE AND RESCUE DATE

CITY OF LAS VEGAS – PLANNING DEPARTMENT DATE

THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE 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 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
LVVWD APPROVAL IS VALID FOR ONE (1) YEAR FROM SIGNATURE DATE. IF CONSTRUCTION IS NOT STARTED, PLANS MUST BE RESUBMITTED FOR REVIEW AND APPROVAL.

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

OWNER/DEVELOPER	ENGINEER
EASTLAND COMPANY, LLC 9275 RUSSELL RD SUITE 400 LAS VEGAS, NV 89148 PH: 702-821-4808	SLATER HANIFAN GROUP, INC. a WESTWOOD TEAM 5740 S. ARVILLE STREET, SUITE 216 LAS VEGAS, NV 89118 PH: (702) 284-5300 CONTACT: JOSH JOHNSON

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 DESIGNATED ZONE 'X' (AREA OUTSIDE THE 500 YEAR FLOODPLAIN), PER THE FEMA FIRM PANELS ???????? DATED NOVEMBER 16, 2011

PROJECT PLAN APPROVAL CONTINGENT ON

SUNSTONE PHASE 1 XXXXX #XXXXX
SUNSTONE PHASE 1 XXXXX #XXXXX
SUNSTONE PHASE 1 XXXXX #XXXXX

PLAN APPROVAL

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/BMPC/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.

DEVIATIONS FROM STANDARDS

GEOTECHNICAL ENGINEER

PREPARED BY: FIRM
ADDRESS: ADDRESS
PHONE: PHONE #
PROJECT No. PROJECT NUMBER
DATED: DATE

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 1-800-227-2600

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

SC EAST LANDCO, LLC

SUNSTONE PHASE 1

COVER SHEET

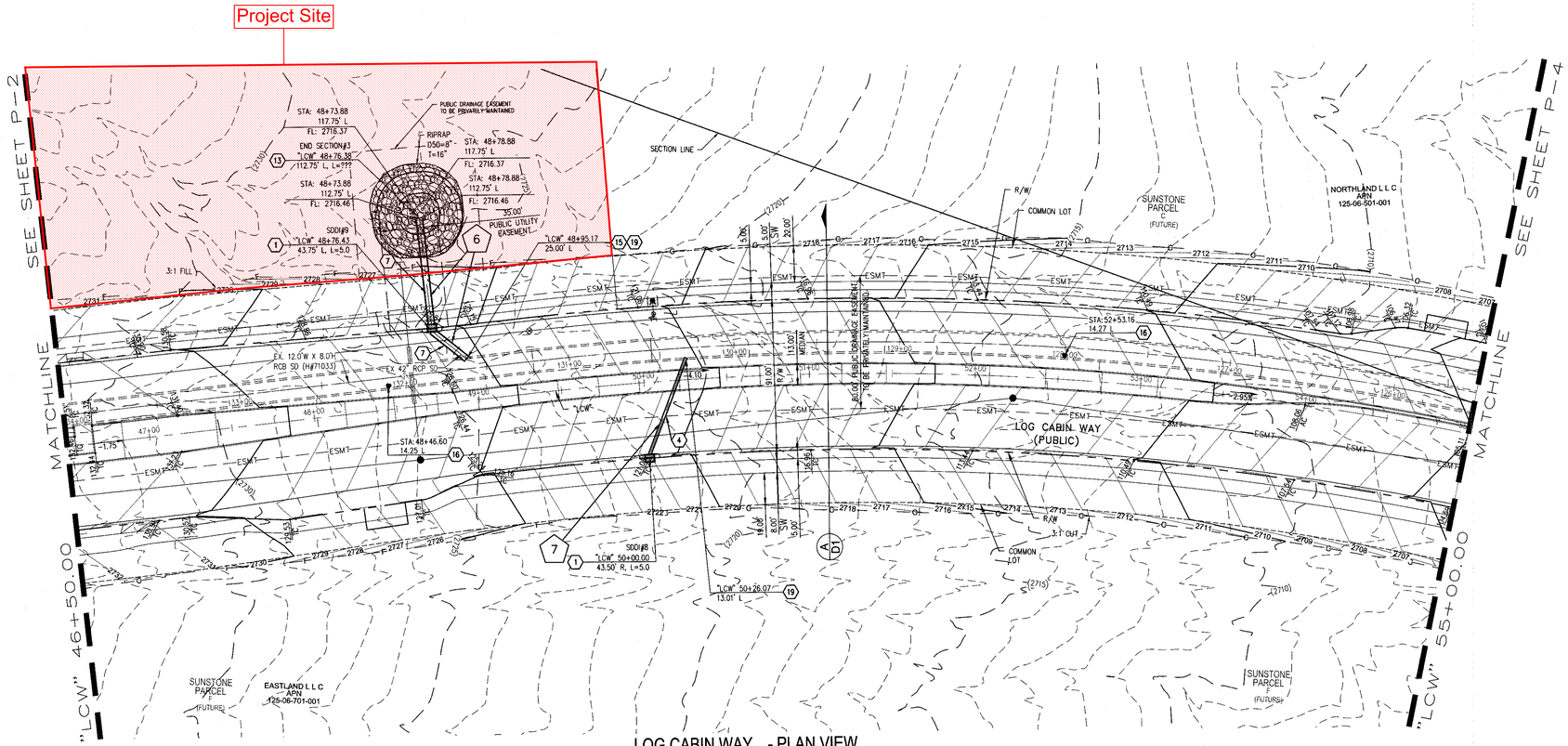
DATE: 08/07/2019
DRAFTER: SB/JR
DESIGNER: BC
CHECKED: JJ

PROJECT NO.
EST1906-000

PROFESSIONAL ENGINEER – STATE OF NEVADA
JOSHUA J. JOHNSON
Exp. 06/30/2021
No. 15789
CIVIL
8/7/19

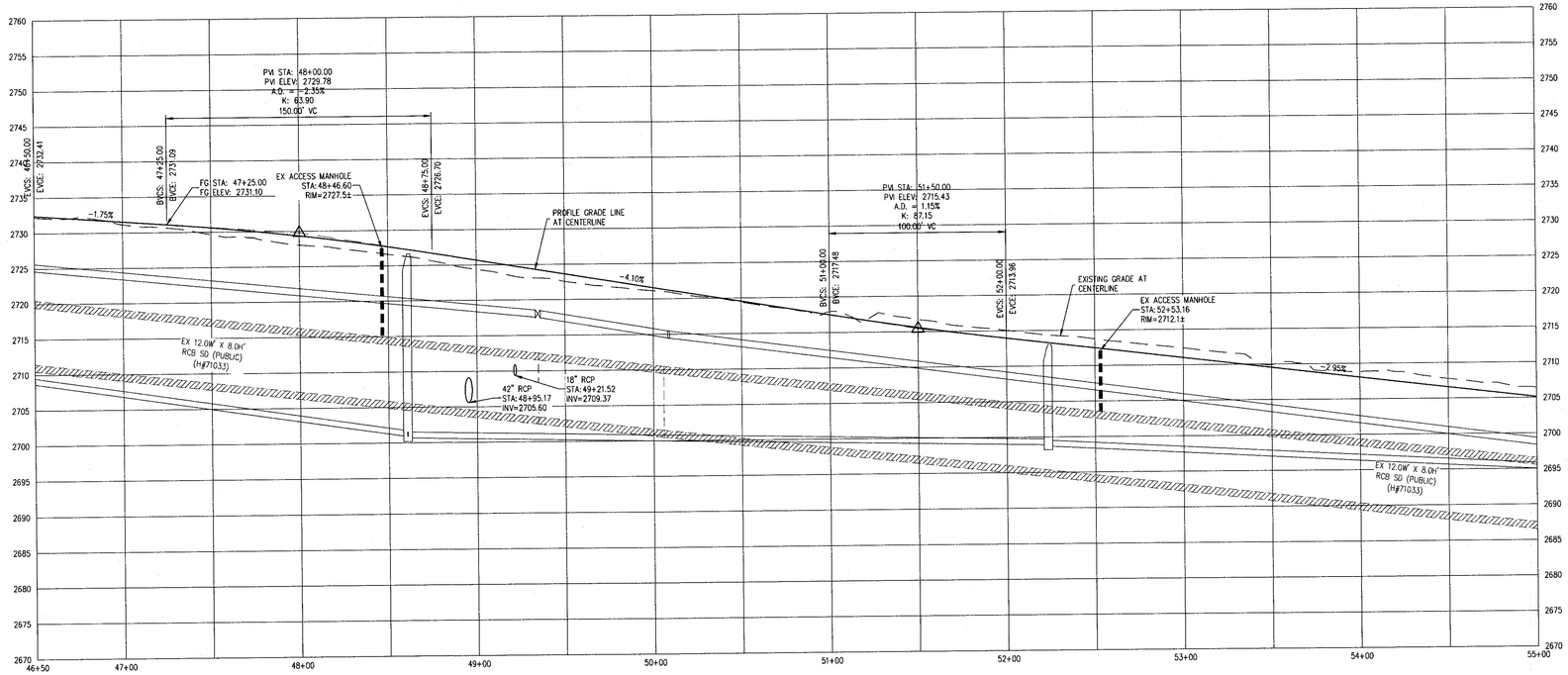
CS-1
SHEET 1 OF 47

K:\est1906-000 sunstone log cabin\civil\dwg\cover\est1906-000_cvr.dwg 8/7/2019 8:31 AM Thomas Duran



LOG CABIN WAY - PLAN VIEW

PUBLIC



LOG CABIN WAY - PROFILE VIEW

HORIZ: 1" = 40'
VERT: 1" = 10'

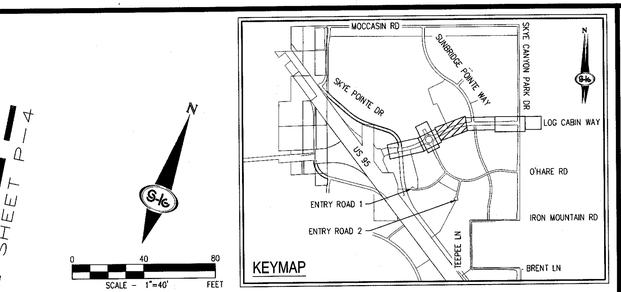
CALL SOUTHWEST GAS AT 702-651-2111 FOR STANDBY WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES

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 2600 TO ALL SPOT GRADES WHERE THE HUNDREDS AND THOUSANDS PLACES ARE OMITTED FOR ACTUAL ELEVATION (I.E. 01.00 REPRESENTS 1801.00)



EXISTING EASEMENTS

- E1 COVENANTS, CONDITIONS, EASEMENTS AND RESTRICTIONS\X IN A FINAL ORDER OF CONDEMNATION RECORDED OCTOBER 2, 2015, IN BOOK 20151002 AS INSTRUMENT NO. 03298 OF OFFICIAL RECORDS.
- E2 RIGHT-OF-WAY GRANTED BY DECISION, DATED APRIL 04, 2003, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-75702 TO NEVADA POWER COMPANY FOR UNDERGROUND ELECTRICAL DISTRIBUTION LINE UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON APRIL 17, 2003 IN BOOK 20030417, AS INSTRUMENT NO. 02746 OF OFFICIAL RECORDS.
- E3 A RIGHT-OF-WAY GRANTED BY DECISION, DATED AUGUST 21, 1970, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER NEVOO3376 ET (N-121) TO STATE OF NEVADA, DEPARTMENT OF HIGHWAYS FOR HIGHWAY (U.S. 95) INCLUDING ACCESS RIGHTS UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON DECEMBER 22, 1972 IN BOOK 288, AS INSTRUMENT NO. 247599 OF OFFICIAL RECORDS.
- E4 AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED JUNE 8, 2015 IN BOOK 20150608 AS INSTRUMENT NO. 00947 OF OFFICIAL RECORDS
- E6 NDOT EASENT PER NEV-043376, N-43063, CC-018234, CC-018138, CC-018191

  RESERVATIONS, PROVISIONS AND EASEMENTS AS CONTAINED IN PATENT FROM THE UNITED STATES OF AMERICA, RECORDED AUGUST 03, 2005, IN BOOK 20050803 OF OFFICIAL RECORDS, AS INSTRUMENT NO. 01359.
- E7 RIGHT-OF-WAY GRANTED BY DECISION, DATED JUNE 5, 2004, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER B-75757A TO CITY OF LAS VEGAS FOR ROADWAY, SANITARY SEER AND DRAINAGE PURPOSES UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF THE LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON JUNE 18, 2004 IN BOOK 20040618, AS INSTUMENT NO. 01781 OF OFFICIAL RECORDS.

STORM DRAIN NOTES

1. CONSTRUCT TYPE "CM2" DROP INLET (USDCCA STD. DWG. NO. 412.1 & 421)
2. CONSTRUCT 60" TYPE III MANHOLE (USDCCA STD. DWG. NO. 406.1)
3. CONSTRUCT NDOT TYPE 4 MANHOLE (NDOT STD. PLAN R-4.3.2)
4. INSTALL 18" RCP (USDCCA STD. DWG. NO. 503.2)
5. INSTALL 24" RCP (USDCCA STD. DWG. NO. 503.2)
6. INSTALL 30" RCP (USDCCA STD. DWG. NO. 503.2)
7. INSTALL 42" RCP (USDCCA STD. DWG. NO. 503.2)
8. INSTALL 48" RCP (USDCCA STD. DWG. NO. 503.2)
9. INSTALL 54" RCP (USDCCA STD. DWG. NO. 503.2)
10. INSTALL 60" RCP (USDCCA STD. DWG. NO. 503.2)
11. INSTALL 66" RCP (USDCCA STD. DWG. NO. 503.2)
12. INSTALL 72" RCP (USDCCA STD. DWG. NO. 503.2)
13. INSTALL RCP END SECTION (NDOT STD. PLAN R-2.3.1)
14. REMOVE PLUG AND CONNECT TO EXISTING STORM DRAIN
15. REMOVE EXISTING STORM DRAIN LATERAL
16. ADJUST STORM DRAIN MANHOLE TO FINISH GRADE (USDCCA STD. DWG. NO. 403.1 OR 404.1)
17. INSTALL 48" C900 STORM DRAIN ADJUST EXISTING STORM DRAIN ACCESS
18. VAULT TO FINISH GRADE (PER STRUCTURE DETAIL)
19. CONNECT TO EXISTING RCB PER DETAIL E ON SHEET DT-1

LEGEND

(1) STORM DRAIN LATERAL # (SEE SHEETS SD-6)

NOTES

1. ALL RCP SHALL BE CLASS III UNLESS OTHERWISE SHOWN.
2. ALL PIPE LENGTHS ARE MEASURED ALONG PIPE CENTERLINE TO CENTER OF MANHOLE OR INSIDE EDGE OF DI OR RCB/RCA.
3. ALL DROP INLETS SHALL INCLUDE STORM WATER MANAGEMENT STAMP AND DETAIL PER USDCCA STD. DWG. NO. 421.
4. SEE STRUCTURAL PLANS FOR ADDITIONAL STRUCTURAL DETAILS AND CONNECTIONS.
5. ALL PIPES IN PUBLIC ROW ARE PUBLICLY MAINTAINED.
6. ADD SPECIAL INSPECTION REQUIRED FOR PIPE SEGMENTS WITH SACRIFICIAL CONCRETE.
7. SEE UTILITY PLAN AND PROFILE SHEETS FOR UTILITY ADJUSTMENTS AND RELOCATIONS.
8. ALL INTERIM DRAINAGE FACILITIES TO BE PRIVATELY MAINTAINED.
9. PROPERTY OWNER IS RESPONSIBLE TO MAINTAIN THE BEST MANAGEMENT PRACTICES, SUCH AS BUT NOT LIMITED TO, THE REMOVAL OF ACCUMULATED SEDIMENT AND DEBRIS AND CARE OF VEGETATION.
10. WHERE 10 FEET PARALLEL SEPARATION IS NOT PRACTICABLE:

    CAST-IN-PLACE MONOLITHIC POUR WITH WATERSTOP BETWEEN SLAB AND WALLS. BASE, WALLS AND TOP TO BE CONSTRUCTED WITH WATERSTOPS, CENTER BULB, OR FLAT STRIP (VINYLEX, GREENSTREAK PLASTIC PRODUCTS OR APPROVED EQUAL).

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.

FLOOD CERTIFICATION

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

JOSH JOHNSON, P.E. 15789 — DATE

FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE 'X' (OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN) ON THE FLOOD INSURANCE RATE MAP (FIRM) PANELS: 32003C1735E AND 32003C1750E BOTH DATED SEPTEMBER 27, 2002

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
PROJECT NO. ###### FIRST APPROVED DATE:
LVVWD APPROVED FIRE FLOW: TOTAL 1,500 GPM / ONSITE 20 GPM

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 1-800-227-2600

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

SC EAST LANDCO, LLC

SUNSTONE PHASE 1
LOG CABIN WAY
STORM DRAIN 3 - "LCW" 46+50.00 TO "LCW" 55+00.00

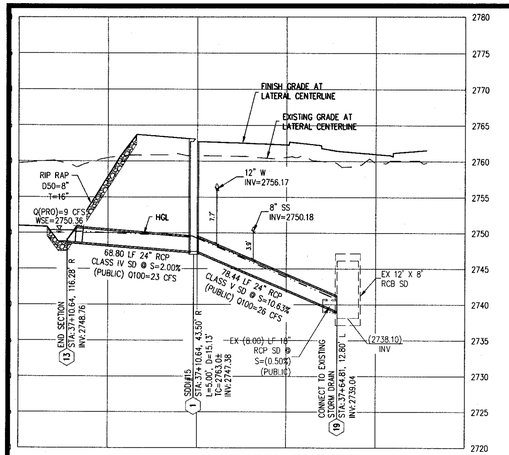
DATE: 08/07/2019
DRAFTER: SB/JR
DESIGNER: BC
CHECKED: JJ

PROJECT NO.
EST1906-000

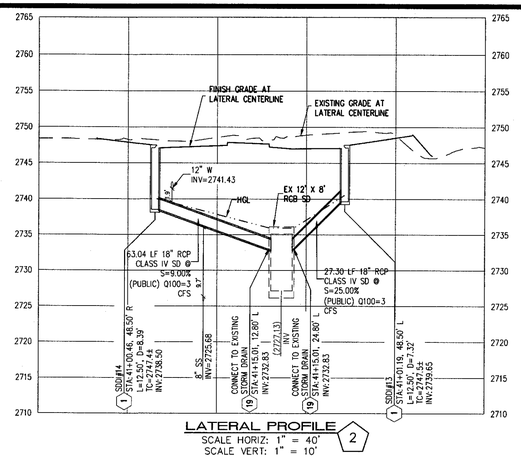
PROFESSIONAL ENGINEER - STATE OF NEVADA
JOSHUA L. JOHNSON
No. 15789
Exp. 06/30/2021
civil
8/7/19

SD-3
SHEET 19 OF 47

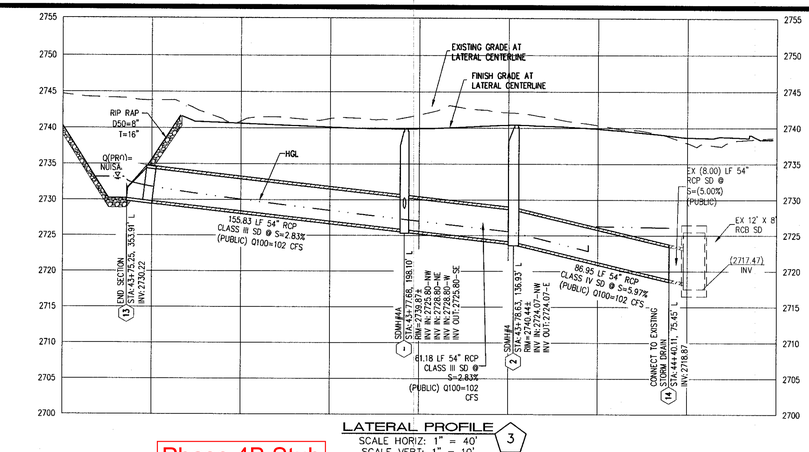
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LATERAL PROFILE 1
SCALE HORIZ: 1" = 40'
SCALE VERT: 1" = 10'

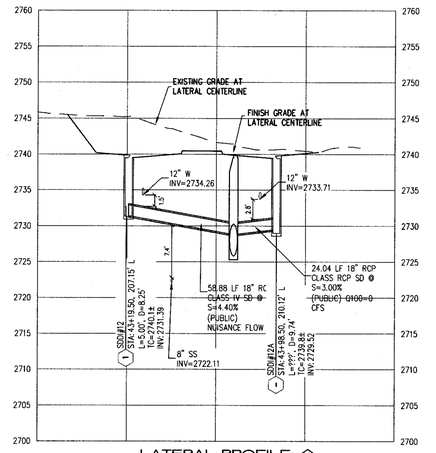


LATERAL PROFILE 2
SCALE HORIZ: 1" = 40'
SCALE VERT: 1" = 10'

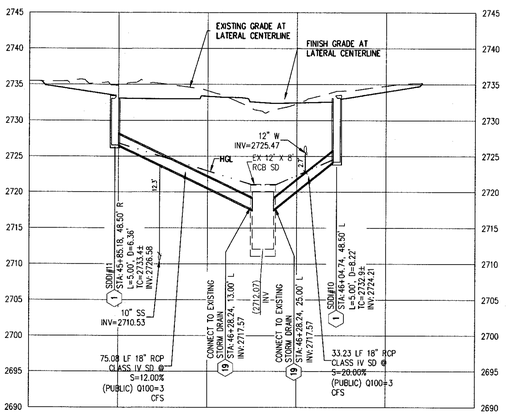


LATERAL PROFILE 3
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SCALE VERT: 1" = 10'

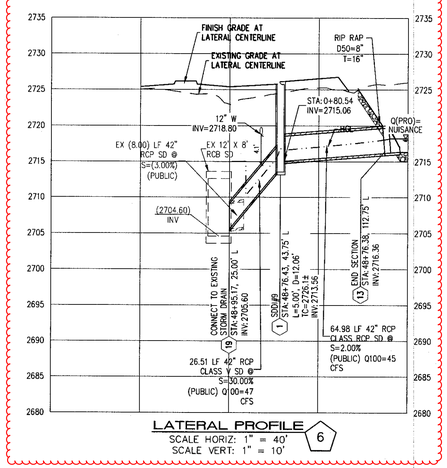
Phase 4B Stub



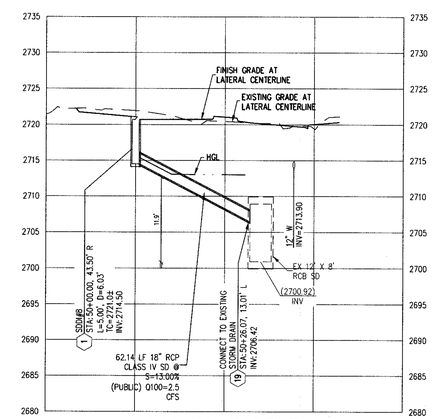
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SCALE VERT: 1" = 10'



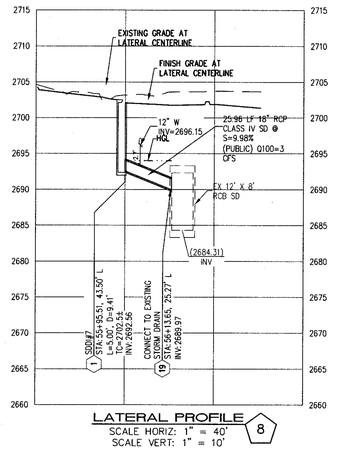
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SCALE VERT: 1" = 10'



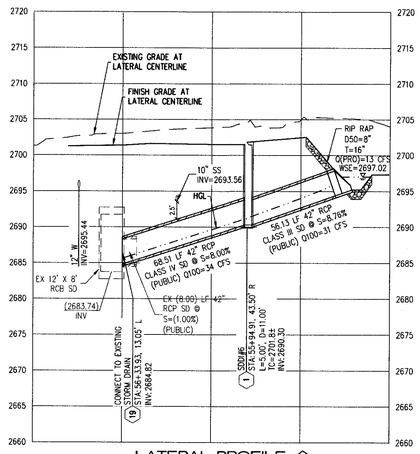
LATERAL PROFILE 6
SCALE HORIZ: 1" = 40'
SCALE VERT: 1" = 10'



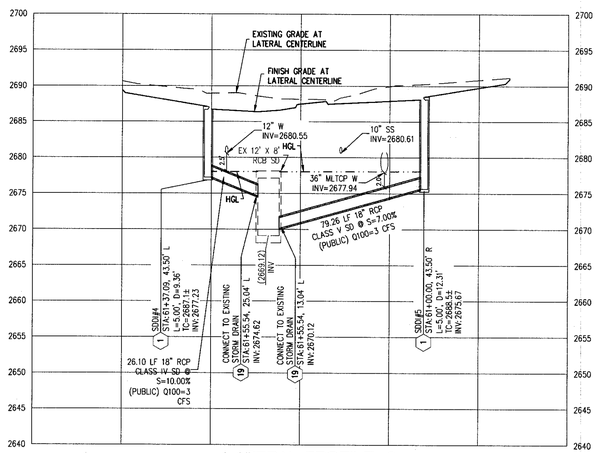
LATERAL PROFILE 7
SCALE HORIZ: 1" = 40'
SCALE VERT: 1" = 10'



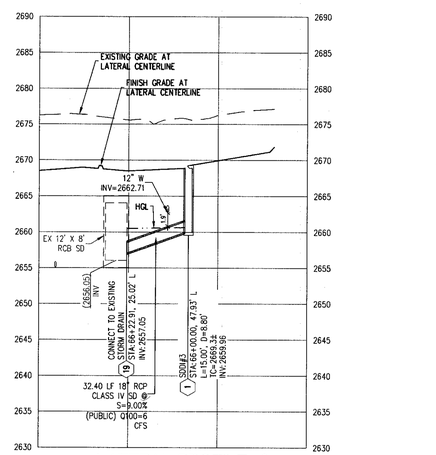
LATERAL PROFILE 8
SCALE HORIZ: 1" = 40'
SCALE VERT: 1" = 10'



LATERAL PROFILE 9
SCALE HORIZ: 1" = 40'
SCALE VERT: 1" = 10'



LATERAL PROFILE 10
SCALE HORIZ: 1" = 40'
SCALE VERT: 1" = 10'



LATERAL PROFILE 11
SCALE HORIZ: 1" = 40'
SCALE VERT: 1" = 10'

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.	APP. DATE

CITY OF LAS VEGAS

SC EAST LANDCO, LLC

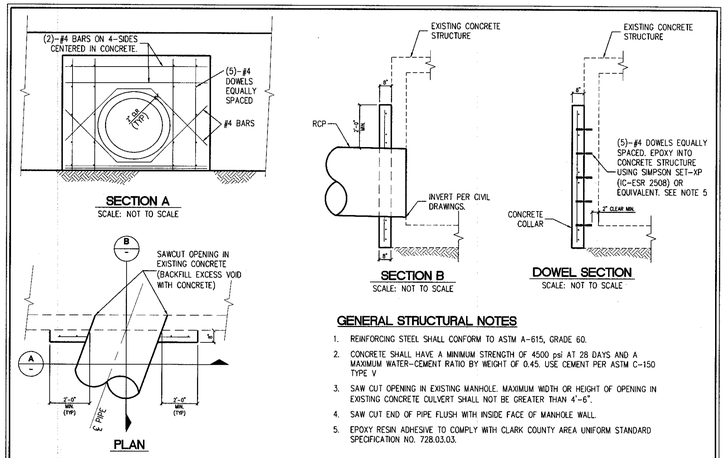
SUNSTONE PHASE 1
LOG CABIN WAY
STORM DRAIN LATERAL DETAILS 1

DATE: 08/07/2019
DRAFTER: SB/JR
DESIGNER: BC
CHECKED: JJ
PROJECT NO.
EST1906-000

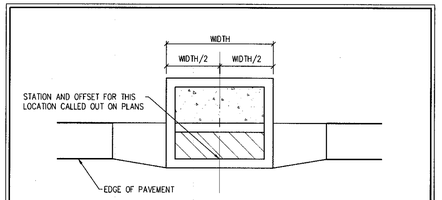
PROFESSIONAL ENGINEER STATE OF NEVADA
JOSHUA L. JOHNSON
Exp. 06/30/2021
CIVIL
PROJECT No. 15789
8/7/19

SD-8
SHEET 24 OF 47

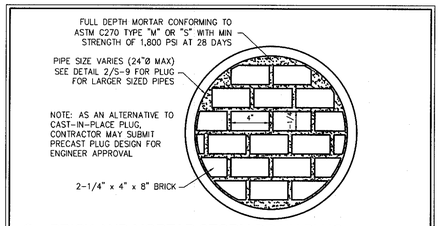
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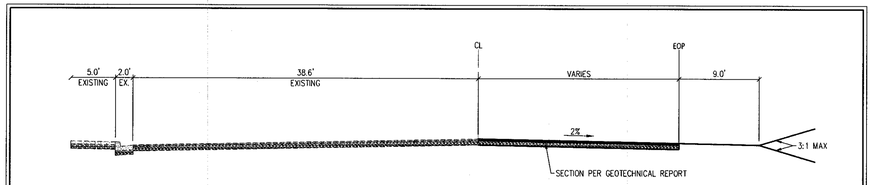
E. COLLAR AND SIDE PENETRATION DETAIL (EX STRUCTURE)
NOT TO SCALE



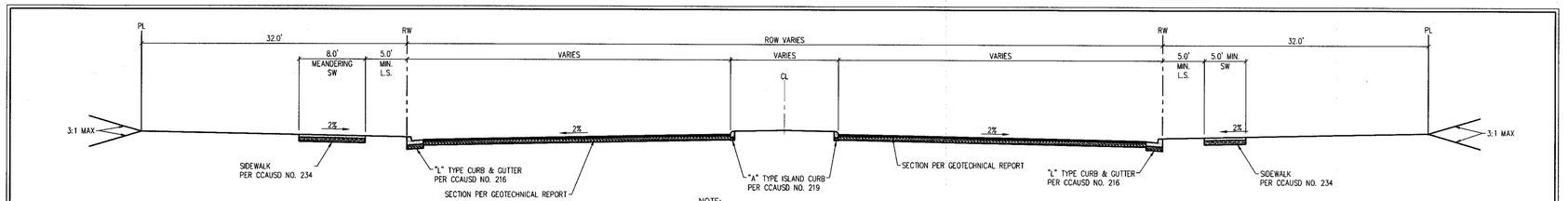
D. DROP INLET STATION AND OFFSET LOCATION DETAIL
NOT TO SCALE



C. BRICK AND MORTAR STORM DRAIN PLUG
NOT TO SCALE



B. LOG CABIN WAY HALF STREET (PUBLIC)
NOT TO SCALE



A. LOG CABIN WAY
NOT TO SCALE

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
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

SC EAST LANDCO, LLC

SUNSTONE PHASE 1
LOG CABIN WAY
DETAIL SHEET 1

DATE: 08/07/2019
DRAFTER: SB/JR
DESIGNER: BC
CHECKED: JJ

PROJECT NO.
EST1906-000

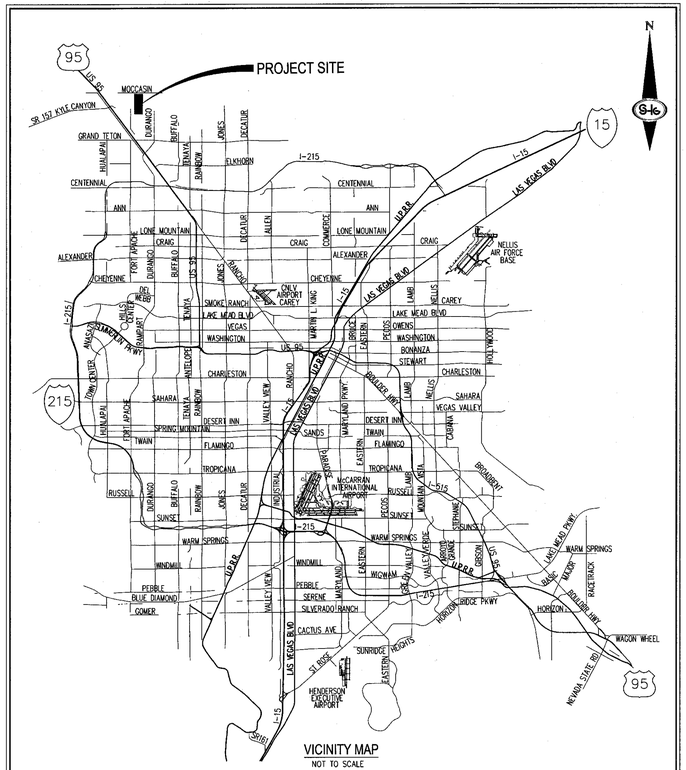
PROFESSIONAL ENGINEER - STATE OF NEVADA
JOSHUA L. JOHNSON
No. 15789
EXP. 06/30/2021
8/7/19

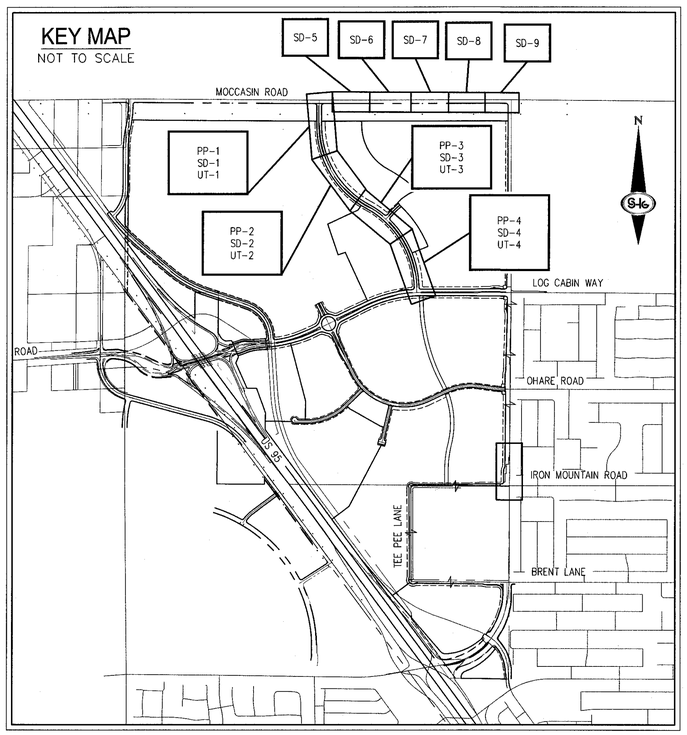
DT-1
SHEET 38 OF 47

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IMPROVEMENT PLANS
FOR
SUNSTONE PHASE 1
North Connector

CITY OF LAS VEGAS, NEVADA





CITY OF LAS VEGAS NEVADA

SHEET INDEX — Sheet List Table

NO.	SHEET	TITLE
1	CS-1	COVER SHEET
2	CS-2	GENERAL NOTES
3	CS-3	ABBREVIATIONS, LEGEND AND QUANTITIES
4	PP-1	PLAN & PROFILE I – "NCR" 12+00.00 TO "NCR" 20+50.00
5	PP-2	PLAN AND PROFILE II – "NCR" 20+50.00 TO "NCR" 28+50.00
6	PP-3	PLAN AND PROFILE III – "NCR" 28+50.00 TO "NCR" 36+50.00
7	PP-4	PLAN AND PROFILE IV – "NCR" 36+50.00 TO "NCR" 46+00.00
8	SD-1	STORM DRAIN I – "NCR" 12+00.00 TO "NCR" 20+50.00
9	SD-2	STORM DRAIN II – "NCR" 20+50.00 TO "NCR" 28+50.00
10	SD-3	STORM DRAIN III – "NCR" 28+50.00 TO "NCR" 36+50.00
11	SD-4	STORM DRAIN IV – "NCR" 36+50.00 TO "NCR" 46+00.00
12	SD-5	STORM DRAIN V – "MOC" 0+00.00 TO "MOC" 6+50.00
13	SD-6	STORM DRAIN VI – "MOC" 6+50.00 TO "MOC" 13+00.00
14	SD-7	STORM DRAIN VII – "MOC" 13+00.00 TO "MOC" 19+50.00
15	SD-8	STORM DRAIN VIII – "MOC" 19+50.00 TO "MOC" 26+00.00
16	SD-9	STORM DRAIN IX – "MOC" 26+50.00 TO "MOC" 28+85.42
17	SD-10	STORM DRAIN LATERALS
18	UT-1	UTILITY PLAN I – "NCR" 12+00.00 TO "NCR" 20+50.00
19	UT-2	UTILITY PLAN II – "NCR" 20+50.00 TO "NCR" 28+50.00
20	UT-3	UTILITY PLAN III – "NCR" 28+50.00 TO "NCR" 36+50.00
21	UT-4	UTILITY PLAN IV – "NCR" 36+50.00 TO "NCR" 46+00.00
22	UT-5	UTILITY LATERALS
23	DT-1	DETAIL SHEET 1

APPROVALS

CITY ENGINEER–ALLEN PAVELKA PE, #9029 DATE

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

LAS VEGAS FIRE AND RESCUE DATE

CITY OF LAS VEGAS – DATE
PLANNING DEPARTMENT

THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE 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 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
LVVWD APPROVAL IS VALID FOR ONE (1) YEAR FROM SIGNATURE DATE. IF CONSTRUCTION IS NOT STARTED, PLANS MUST BE RESUBMITTED FOR REVIEW AND APPROVAL.

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

OWNER/DEVELOPER
EASTLAND COMPANY, LLC
9275 RUSSELL RD SUITE 400
LAS VEGAS, NV 89148
PH: 702-821-4808

ENGINEER
SLATER HANIFAN GROUP, INC.
a WESTWOOD TEAM
5740 S. ARVILLE STREET, SUITE 216
LAS VEGAS, NV 89118
PH: (702) 284-5300
CONTACT: JOSH JOHNSON

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 8, 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 DESIGNATED ZONE 'X' (AREA OUTSIDE THE 500 YEAR FLOODPLAIN), PER THE FEMA FIRM PANELS ???????? DATED NOVEMBER 16, 2011

PROJECT PLAN APPROVAL CONTINGENT ON
SUNSTONE PHASE 1 XXXXX #XXXXX
SUNSTONE PHASE 1 XXXXX #XXXXX
SUNSTONE PHASE 1 XXXXX #XXXXX

PLAN APPROVAL

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/BMPC/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.

DEVIATIONS FROM STANDARDS
NONE

GEOTECHNICAL ENGINEER
PREPARED BY: FIRM
ADDRESS: ADDRESS
PHONE: PHONE #
PROJECT No. PROJECT NUMBER
DATED: DATE

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 1-800-227-2600

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

SC EAST LANDCO, LLC

SUNSTONE PHASE 1

COVER SHEET

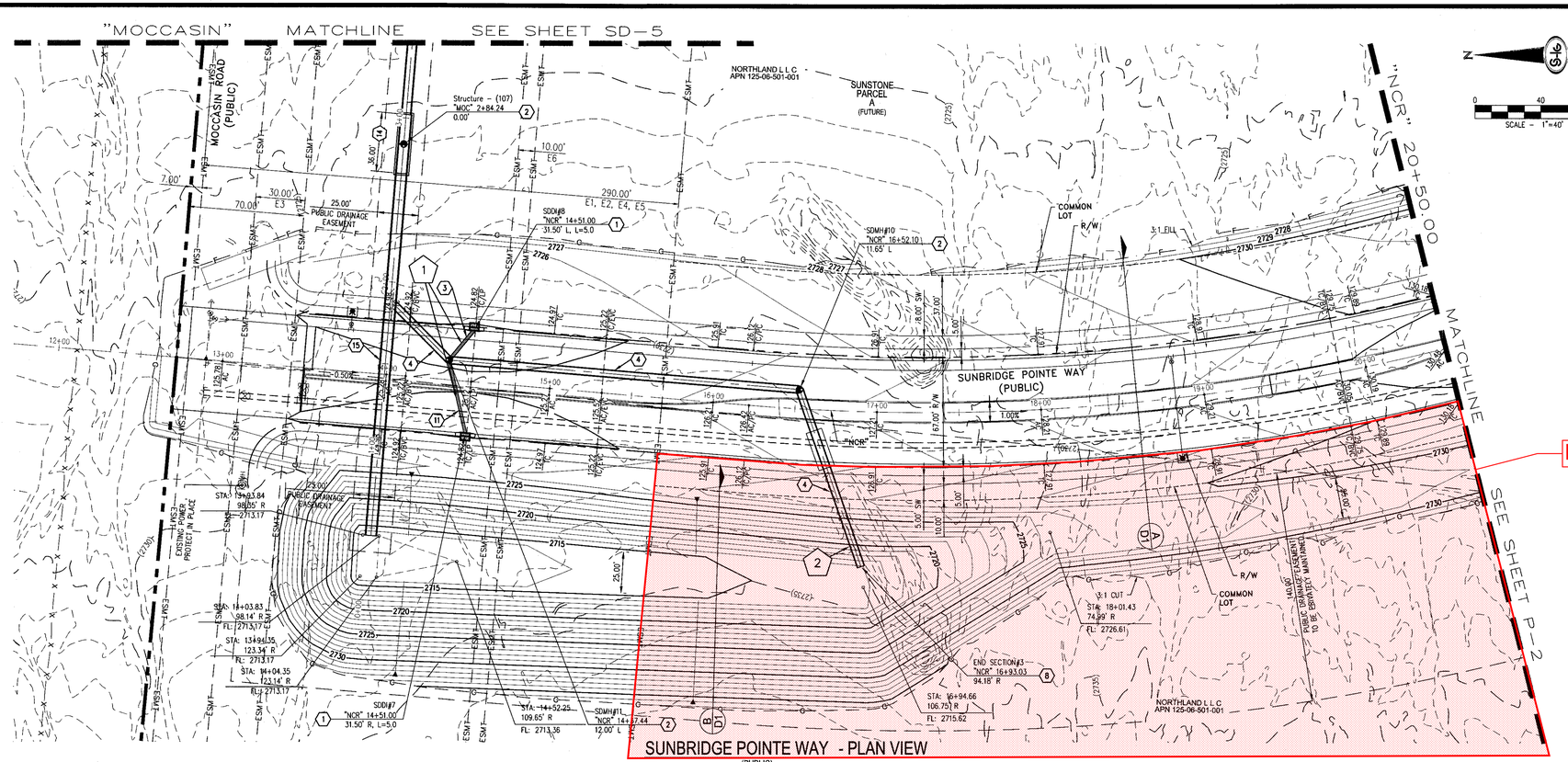
DATE: 08/07/19
DRAFTER: SB/JR
DESIGNER: BC
CHECKED: JJ

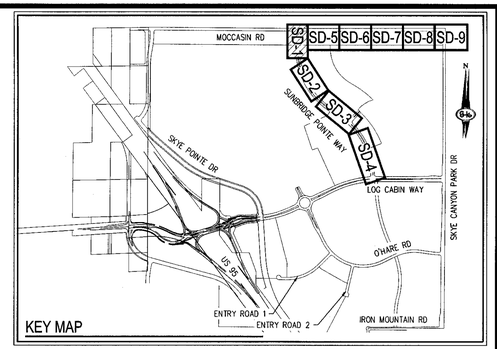
PROJECT NO.
EST1912-000

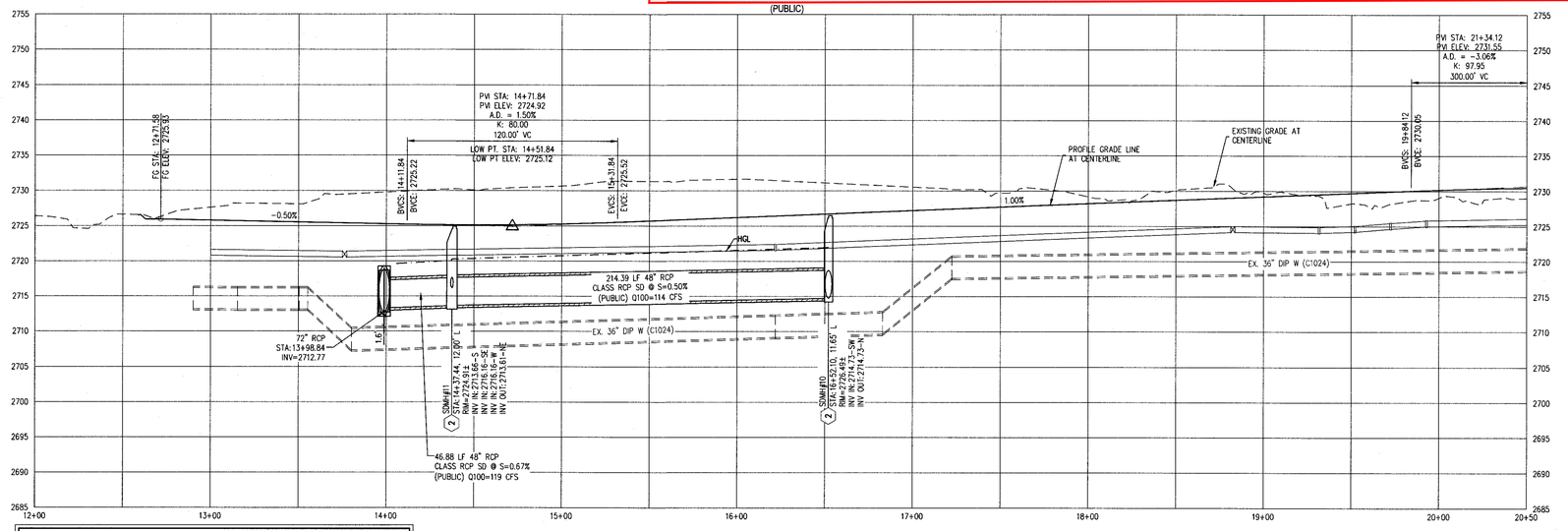
PROFESSIONAL ENGINEER – STATE OF NEVADA
JOSHUA L. JOHNSON
Exp. 06/30/2021
CIVIL
No. 15789
8/7/19

CS-1
SHEET 1 OF 23

J:\est1912-000 sunstone north connector\dwg\mxrox\est1912-000 cvr.dwg, 8/7/2019 7:56 AM Thomas Dyson







STORM DRAIN NOTES

1. CONSTRUCT TYPE "CM2" DROP INLET (USDCCA STD. DWG. NO. 412.1 & 421)
2. CONSTRUCT 60" TYPE III MANHOLE (USDCCA STD. DWG. NO. 406.1)
3. INSTALL 18" RCP (USDCCA STD. DWG. NO. 503.2)
4. INSTALL 48" RCP (USDCCA STD. DWG. NO. 503.2)
5. INSTALL 42" RCP (USDCCA STD. DWG. NO. 503.2)
6. INSTALL 60" RCP (USDCCA STD. DWG. NO. 503.2)
7. INSTALL 72" RCP (USDCCA STD. DWG. NO. 503.2)
8. INSTALL RCP END SECTION (NDOT STD. PLAN R-2.3.1)
9. CONNECT TO STORM DRAIN
10. INSTALL HEADWALL PER STRUCTURAL DETAIL
11. INSTALL 18" C900 STORM DRAIN
12. INSTALL 42" C900 STORM DRAIN
13. INSTALL 48" C900 STORM DRAIN
14. INSTALL 20' CUSTOM JUNCTION STRUCTURE PER STRUCTURAL DETAIL ? ON SHEET S-1
15. INSTALL 6' X 6' RCB

EASEMENT NOTES

E1 AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN THE DOCUMNET RECORDED JUNE 8, 2015 IN BOOK 20150608 AS INSTRUMENT NO. 00946 OF OFFICIAL RECORDS

E2 COVENANTS, CONDITIONS, EASEMENTS AND RESTRICTIONS\X IN A FINAL ORDER OF CONDEMNATION RECORDED OCTOBER 2, 2015, IN BOOK 20151002 AS INSTRUMENT NO. 03298 OF OFFICIAL RECORDS.

E3 RIGHT-OF-WAY GRANTED BY DECISION, DATED AUGUST 18, 2004, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-42592C TO NEVADA POWER COMPANY FOR RIGHT TO CONSTRUCT, OPERATE, MAINTAIN, AND TERMINATE AN UNDERGROUND 15KV DISTRIBUTION LINE WITH RELATED APPURTENANCES ON PUBLIC LANDS UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF THE LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON SEPTEMBER 24, 2004 IN BOOK 20040924, AS INSTRUMENT NO. 02389 OF OFFICIAL RECORDS.

E4 RIGHT-OF-WAY GRANTED BY DECISION, DATED JUNE 06, 2002, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-75025 TO NEVADA POWER COMPANY FOR TRANSMISSION LINE UNDER RIGHT-OF-WAY GRANT FILE IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON OCTOBER 09, 2003 IN BOOK 20031009, AS INSTRUMENT NO. 01802 OF OFFICIAL RECORDS.

E5 RIGHT-OF-WAY GRANTED BY DECISION, DATED JUNE 06, 2002, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-75060 TO NEVADA POWER COMPANY FOR FIBER OPTIC LINE UNDER SAID RIGHT-OF-WAY GRANT FILE IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON DECEMBER 22, 2003 IN BOOK 20031222, AS INSTRUMENT NO. 02836 OF OFFICIAL RECORDS.

E6 RIGHT-OF-WAY GRANTED BY DECISION, DATED NOVEMBER 30, 2004, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-76432 TO NEVADA POWER COMPANY FOR RIGHT TO CONSTRUCT, OPERATE, MAINTAIN, AND TERMINATE AN OVERHEAD FIBER OPTIC LINE (CONTAINING 12 FIBERS) WITH RELATED APPURTENANCES ON PUBLIC LANDS UNDER RIGHT-OF-WAY GRANT FILE IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF THE LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON FEBRUARY 09, 2005 IN BOOK 20050209, AS INSTRUMENT NO. 00888 OF OFFICIAL RECORDS.

E7 RIGHT-OF-WAY GRANTED BY DECISION, DATED MAY 28, 2003, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-75757 TO CITY OF LAS VEGAS FOR ROADWAY, SANITARY SEWER AND DRAINAGE PURPOSES AND RELATED PURPOSES UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AD RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON JUNE 30, 2003 IN BOOK 20030630, AS INSTRUMENT NO. 00811 OF OFFICIAL RECORDS.

E8 RIGHT-OF-WAY GRANTED BY DECISION, DATED JUNE 9, 2004, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER B-75757A TO CITY OF LAS VEGAS FOR ROADWAY, SANITARY SEER AND DRAINAGE PURPOSES UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF THE LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON JUNE 18, 2004 IN BOOK 20040618, AS INSTRUMENT NO. 01781 OF OFFICIAL RECORDS.

NOTES

1. ALL RCP SHALL BE CLASS III UNLESS OTHERWISE SHOWN.
2. ALL PIPE LENGTHS ARE MEASURED ALONG PIPE CENTERLINE TO CENTER OF MANHOLE OR INSIDE EDGE OF DI OR RCB/RCA.
3. ALL DROP INLETS SHALL INCLUDE STORM WATER MANAGEMENT STAMP AND DETAIL PER USDCCA STD. DWG. NO. 421.
4. SEE STRUCTURAL PLANS FOR ADDITIONAL STRUCTURAL DETAILS AND CONNECTIONS.
5. ALL PIPES IN PUBLIC ROW ARE PUBLICLY MAINTAINED.
6. ADD SPECIAL INSPECTION REQUIRED FOR PIPE SEGMENTS WITH SACRIFICIAL CONCRETE.
7. SEE UTILITY PLAN AND PROFILE SHEETS FOR UTILITY ADJUSTMENTS AND RELOCATIONS.
8. ALL INTERIM DRAINAGE FACILITIES TO BE PRIVATELY MAINTAINED.
9. PROPERTY OWNER IS RESPONSIBLE TO MAINTAIN THE BEST MANAGEMENT PRACTICES, SUCH AS BUT NOT LIMITED TO, THE REMOVAL OF ACCUMULATED SEDIMENT AND DEBRIS AND CARE OF VEGETATION.
10. WHERE 10 FEET PARALLEL SEPARATION IS NOT PRACTICABLE:

    CAST-IN-PLACE MONOLITHIC POUR WITH WATERSTOP BETWEEN SLAB AND WALLS. BASE, WALLS AND TOP TO BE CONSTRUCTED WITH WATERSTOPS, CENTER BULB, OR FLAT STRIP (VINYLEX, GREENSTREAK PLASTIC PRODUCTS OR APPROVED EQUAL).

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.

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)

LEGEND

(1) STORM DRAIN LATERAL # (SEE SHEETS SD-10)

FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL ----------, DATED NOVEMBER 16, 2011. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.

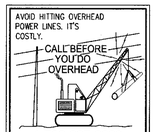
FLOOD CERTIFICATION

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

JOSH JOHNSON, P.E. 15789 DATE

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
PROJECT NO. ////// FIRST APPROVED DATE:
LVVWD APPROVED FIRE FLOW: TOTAL 1,500 GPM / ONSITE 20 GPM







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.	APP. DATE

CITY OF LAS VEGAS

SC EAST LANDCO, LLC

SUNSTONE PHASE 1
SUNBRIDGE POINTE WAY
STORM DRAIN I - "NCR" 12+00.00 TO "NCR" 20+50.00

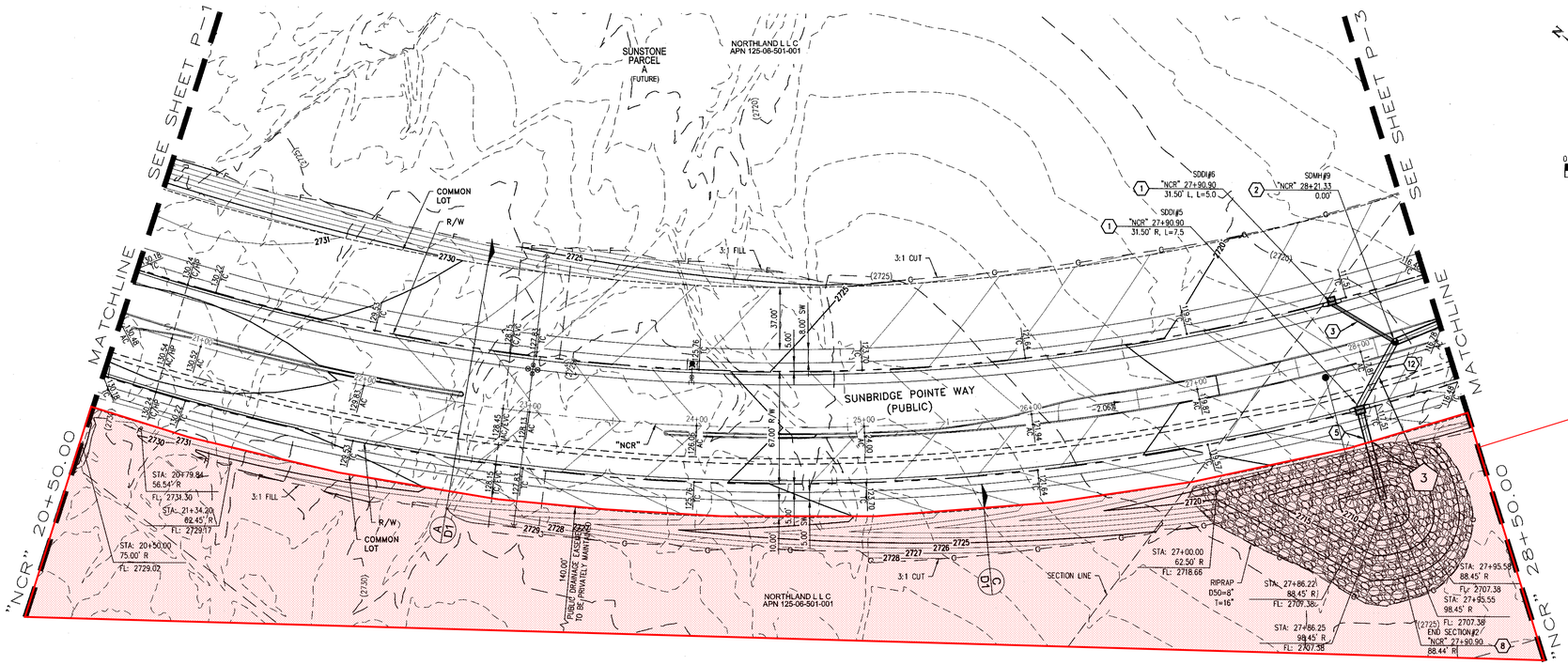
DATE: 08/07/19
DRAFTER: SB/JR
DESIGNER: BC
CHECKED: JJ

PROJECT NO.
EST1912-000

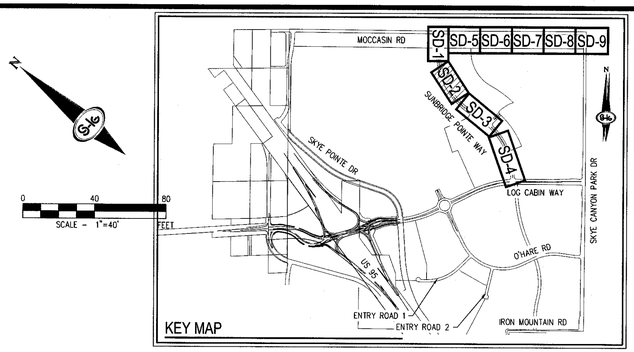
PROFESSIONAL ENGINEER - STATE OF NEVADA - JOSHUA L. JOHNSON - No. 15789 - 8/7/19

SD-1
SHEET 8 OF 23

I:\est1912-000_sunstone north connector\dwg\improv\est1912-000 drn.dwg 8/7/2019 7:59 AM Thomas Dyson



Project Site



STORM DRAIN NOTES

1. CONSTRUCT TYPE "CM2" DROP INLET (USDCCA STD. DWG. NO. 412.1 & 421)
2. CONSTRUCT 60" TYPE III MANHOLE (USDCCA STD. DWG. NO. 406.1)
3. INSTALL 18" RCP (USDCCA STD. DWG. NO. 503.2)
4. INSTALL 48" RCP (USDCCA STD. DWG. NO. 503.2)
5. INSTALL 42" RCP (USDCCA STD. DWG. NO. 503.2)
6. INSTALL 60" RCP (USDCCA STD. DWG. NO. 503.2)
7. INSTALL 72" RCP (USDCCA STD. DWG. NO. 503.2)
8. INSTALL RCP END SECTION (NDOT STD. PLAN R-2.3.1)
9. CONNECT TO STORM DRAIN
10. INSTALL HEADWALL PER STRUCTURAL DETAIL
11. INSTALL 18" C900 STORM DRAIN
12. INSTALL 42" C900 STORM DRAIN
13. INSTALL 48" C900 STORM DRAIN
14. INSTALL 20' CUSTOM JUNCTION STRUCTURE PER STRUCTURAL DETAIL ? ON SHEET S-1
15. INSTALL 6' X 6' RCB

EASEMENT NOTES

E1 AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN THE DOCUMNET RECORDED JUNE 8, 2015 IN BOOK 20150608 AS INSTRUMENT NO. 00946 OF OFFICIAL RECORDS

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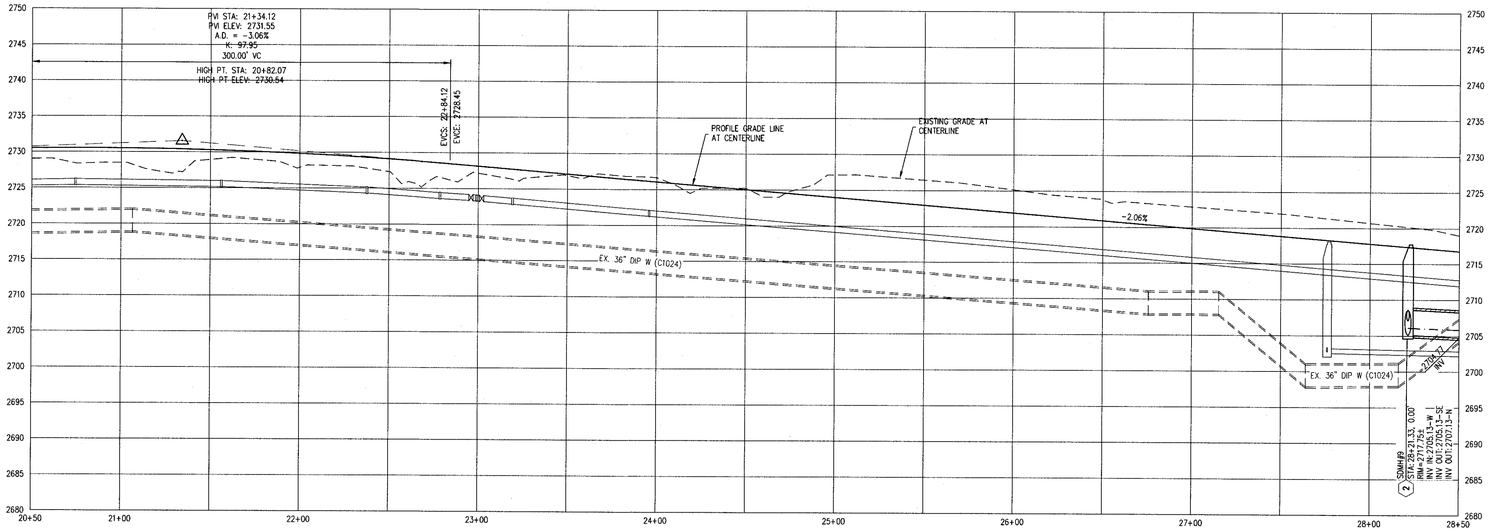
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SUNBRIDGE POINTE WAY - PLAN VIEW

(PUBLIC)

SUNBRIDGE POINTE WAY - PROFILE VIEW

HORIZ: 1" = 40'
VERT: 1" = 10'



NOTES

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LEGEND

(1) STORM DRAIN LATERAL # (SEE SHEETS SD-10)

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
PROJECT NO. ##### FIRST APPROVED DATE: _____
LVVWD APPROVED FIRE FLOW: TOTAL 1,500 GPM / ONSITE 20 GPM

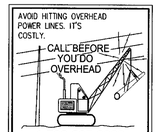
FLOOD ZONE

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FLOOD CERTIFICATION

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JOSH JOHNSON, P.E. 15789 DATE







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

SC EAST LANDCO, LLC

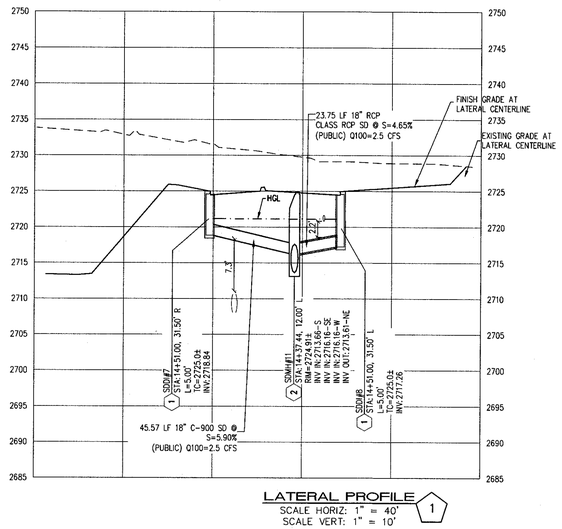
SUNSTONE PHASE 1
SUNBRIDGE POINTE WAY
STORM DRAIN II - "NCR" 20+50.00 TO "NCR" 28+50.00

DATE: 08/07/19
DRAFTER: SB/JR
DESIGNER: BC
CHECKED: JJ
PROJECT NO.
EST1912-000

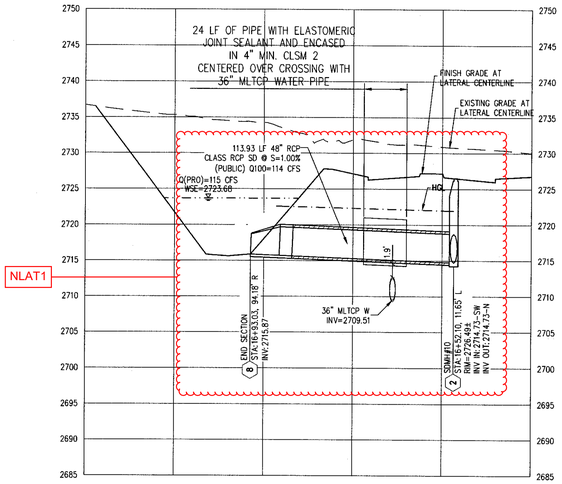
PROFESSIONAL ENGINEER - STATE OF NEVADA - JOSHUA L. JOHNSON - No. 15789 - CIVIL - 08/07/2019

SD-2
SHEET 9 OF 23

J:\est1912-000 sunstone north connector\civil\xrefs\est1912-000 dm dwg 8/7/2019 8:00 AM Thomas Eyson



LATERAL PROFILE 1
SCALE HORIZ: 1" = 40'
SCALE VERT: 1" = 10'

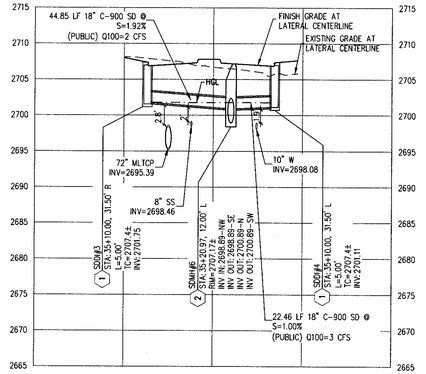


LATERAL PROFILE 2
SCALE HORIZ: 1" = 40'
SCALE VERT: 1" = 10'

LATERAL PROFILE 3
SCALE HORIZ: 1" = 40'
SCALE VERT: 1" = 10'

NLAT2

LATERAL PROFILE 4
SCALE HORIZ: 1" = 40'
SCALE VERT: 1" = 10'



LATERAL PROFILE 5
SCALE HORIZ: 1" = 40'
SCALE VERT: 1" = 10'

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

SC EAST LANDCO, LLC

SUNSTONE PHASE 1

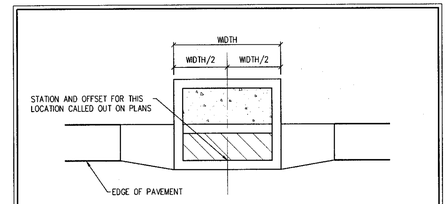
STORM DRAIN LATERALS

DATE: 08/07/19
DRAFTER: SB/JR
DESIGNER: BC
CHECKED: JJ
PROJECT NO.
EST1912-000

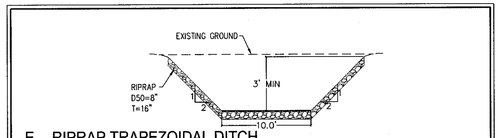
PROFESSIONAL ENGINEER STATE OF NEVADA
JOSHUA JOHNSON
No. 15789
Exp. 06/30/2021
CIVIL
8/7/19

SD-10
SHEET 17 OF 23

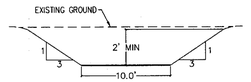
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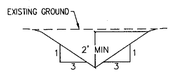
F. DROP INLET STATION AND OFFSET LOCATION DETAIL
NOT TO SCALE



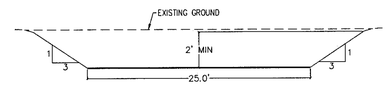
E. RIPRAP TRAPEZOIDAL DITCH
NOT TO SCALE



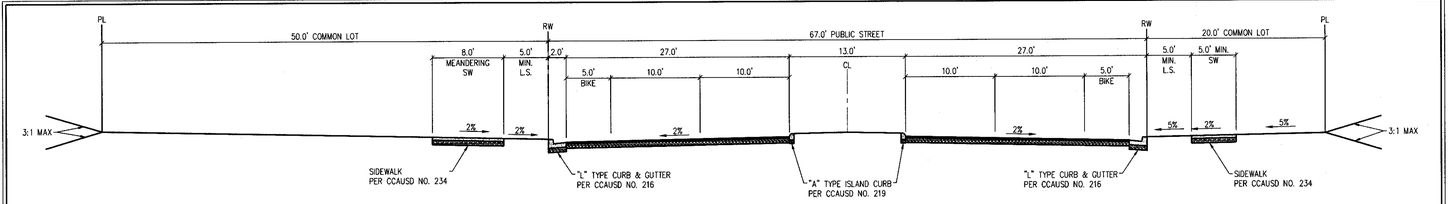
D. EARTHEN TRAPEZOIDAL DITCH
NOT TO SCALE



C. EARTHEN V-DITCH
NOT TO SCALE



B. EARTHEN TRAPEZOIDAL DITCH
NOT TO SCALE



A. SUNBRIDGE POINTE WAY WITH TRAIL ONE SIDE (PUBLIC)
NOT TO SCALE

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
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

SC EAST LANDCO, LLC

SUNSTONE PHASE 1
SUNBRIDGE POINTE WAY
DETAIL SHEET 1

DATE: 08/07/19
DRAFTER: SB/JR
DESIGNER: BC
CHECKED: JJ

PROJECT NO.
EST1912-000

PROFESSIONAL ENGINEER STATE OF NEVADA
JOSHUA L. JOHNSON
No. 15789
EXP: 06/30/2021
CIVIL
8/7/19

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SHEET 23 OF 23

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APPENDIX G

Zoning & Planning Conditions

LAS VEGAS CITY COUNCIL

CAROLYN G. GOODMAN
Mayor

STAVROS S. ANTHONY
Mayor Pro Tem

MICHELE FIORE
CEDRIC CREAR
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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

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cityoflasvegas
lasvegasnevada.gov

March 9, 2022

Mr. Efraim Balizan
Northland LLC
9275 W. Russell Road, Ste. 400
Las Vegas, Nevada 89148

RE: 22-0039-TMP1
PLANNING COMMISSION MEETING OF MARCH 8, 2022

Dear Applicant:

The Planning Commission at a regular meeting held on ***March 8, 2022*** voted to ***APPROVE*** a request FOR A 150-LOT SINGLE-FAMILY DETACHED AND ATTACHED RESIDENTIAL SUBDIVISION on a 24.84-acre portion of 82.37 acres at the northeast corner of Sunstone Parkway and Sun Village Park Drive (APNs 125-06-211-016 and 107), 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 to be privately maintained by the Homeowner's Association.

7. A working sanitary sewer connection shall be in place prior to final inspection of any units within this development. Full permanent improvements on all major access streets, including all required landscaped areas between the perimeter wall and adjacent public street, shall be constructed and accepted by the City prior to issuance of any building permits beyond 50% of all units within this development. All off-site improvements adjacent to this site, including all required landscaped areas between the perimeter walls and adjacent public streets, shall be constructed and accepted prior to issuance of building permits beyond 75%. The above thresholds notwithstanding, all required Improvements shall be constructed in accordance with Title19.02.130.D.

8. 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.

9. The approval of all Public Works related improvements shown on this Tentative Map is in concept only. Specific design and construction details relating to size, type and/or alignment of improvements, including but not limited to street, sewer and drainage improvements, shall be resolved prior to approval of the construction plans by the City. No deviations from adopted City Standards shall be allowed unless specific written approval for such is received from the City Engineer prior to the recordation of a Final Map or the approval of subdivision-related construction plans, whichever may occur first. Approval of this Tentative Map does not constitute approval of any deviations. If such approval cannot be obtained, a revised Tentative Map must be submitted showing elimination of such deviations.

This action by the Planning Commission on **March 8, 2022** is final unless a written appeal is filed with the City Clerk within seven days of the date of the Planning Commission's decision as allowed by code or there is a review action filed by the City Council within the same time period. For additional information on appeals or review requests submitted please access https://www.lasvegasnevada.gov/Business/Permits-Licenses/Building-Permits/Permit-Application-Status, or contact the Department of Planning and Development at 702.229.6301 after ***March 15, 2022***. No building permits or business licenses related to these items shall be issued prior to the expiration of the required seven day waiting period, or until any filed appeal is resolved pursuant to LVMC Title 19.18.

Sincerely,

Eric McCammond
Senior Management Analyst
Case Planning Division

EM:nl

cc:

Mr. Rob Izer
Shea Homes Limited Partnership
8800 N. Gainey Street
Scottsdale, AZ 85258

Ms. Hannah Swan
Westwood Professional Services
5725 W. Badura Avenue, Ste. 100
Las Vegas, Nevada 89118

APPENDIX H

Improvement Plans