

TECHNICAL DRAINAGE STUDY

Sunstone

Phase 1 Infrastructure

City of Las Vegas, Nevada

Job No.: EST1805.000

Date: May 2019

Prepared By:

Slater Hanifan Group, Inc.
5740 S. Arville Street, Suite 216
Las Vegas, Nevada 89118
Phone: 702-284-5300 • Fax: 702-284-5399

Prepared For:

Eastland Company, LLC
9275 Russell Road, Suite 400
Las Vegas, NV 89148
Phone: 702-736-9100 • Fax: 702-736-9200



Lant Leavitt, P.E.
NV Professional Engineer No. 18287

Assisted by: Caitlyn Alcantara, E.I.

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Sunstone Phase 1 Infrastructure Date: 5/6/2019
Location of Development: a) Descriptive (Cross Streets): North/South: Kyle Canyon Road / Brent Lane
East/West: US 95
b) Section: 6 & 7 Township: 19 S. Range: 60 E.
c) APN: 125-06-501-001, 125-06-701-001 & 125-07-501-005

Name of Owner: Eastland Company, LLC
Telephone No.: (702) 736-9100 Fax No.: (702) 736-9200 E-mail Address: Efrain.Balizan@Lennar.com
Address: 9275 W. Russell Road, Suite 400 Las Vegas, NV 89148

Contact Person – Name: Lant Leavitt Telephone No.: (702) 284-5300
*E-mail Address: LLeavitt@shg-inc.com Fax No.: (702) 284-5399
Firm: Slater Hanifan Group
Address: 5740 S. Arville #216 Las Vegas NV 89118

Type of Land Development/Land Disturbance Process:

☐ Rezoning	☐ Subdivision Map	☐ Clearing and grading Only
☐ Parcel Map	☐ Planned Unit Development	☒ Other (Please specify below)
☐ Large Parcel Map	☐ Building Permit	

1. Total Owned Land Area: At Site: approx 600 acres Being Developed/Disturbed: approx 10 acres

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.): Master planned community infrastructure improvements

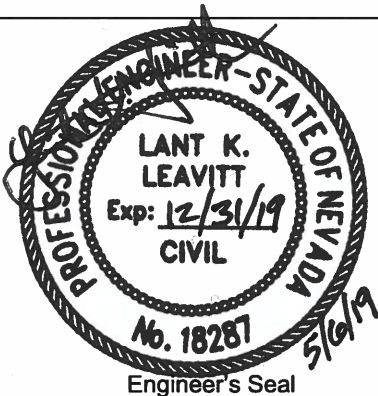
5. Approximate upstream land area which drains to the subject site: approximately 7.8 square miles

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

Skye Canyon Master Drainage Study Update #5 (Sunstone MDS), CLV# DS5081

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Moccasin Regional Storm Drain Facility,
Iron Mountain Road, Brent Lane

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



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

***Newly Required Field**

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

Local Entity File No.	Revision	Date

REFERENCE:

STANDARD FORM 1

Updated 05/01/2008



CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 5/18/11)

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

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

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

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

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

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

II. GRADING PLAN INFORMATION		
Yes	No	
X	-	Proposed on-site and off-site storm drains and other flood control facilities with plan and profile sheets for public storm drains showing the class of pipe, (Class III, IV, V, etc.), design hydraulic grade line, (HGL) and 100 year storm flow. A public drainage easement must be provided over on-site storm drains conveying off-site flows. An overflow path must be provided over all storm drains.
N/A	-	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.
N/A	-	Back of lot elevations and lot drainage pattern for all lots including common lots.
N/A	-	Sites with a grade difference two feet above or below existing ground are required to have approval from City of Las Vegas Current Planning. Current Planning approval is required prior to final approval of the drainage study.
N/A	-	On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners. (The project must pass flows through the site every 600 feet where the project is blocking flow paths.)
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	
N/A	-	Concrete valley gutters are required in parking lots with slopes less than 1 percent. Slopes through cul-de-sac must be at a 1 percent minimum where flow is drained through the cul-de-sac.
N/A	-	Ten-foot wide public drainage easements to be privately maintained are allowed for flow less than 20 cfs. The depth of flow entering the easement must be checked using the submerged weir calculation.
N/A	-	The limits of the flood zones and the base flood elevations (BFE) must be shown on all grading plans for all developments within a Special Flood Hazard Zone A, AO, AE, etc.
N/A	-	Minimum finish floor elevation is 6 inches above highest adjacent top of curb. Finish floor calculations must include allowances for super elevations on curves and velocity head for tee intersections.
N/A	-	Finished floor elevations for buildings adjacent to public drainage easements must be a minimum of 18 inches above the Q100 weir of submerged weir elevation, whichever is greater.

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
N/A	X	Lots with "B and C Type Drainage" that drain from one lot to another through a drainage easement shall be required to install an underground nuisance drainage system or a 2-foot valley gutter. 16" x 24" minimum block wall openings are required for both options.
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: Sunstone Phase 1 Infrastructure

Map ID:

Firm Name: Slater Hanifan Group

Engineer: Lant Leavitt

Address: 5740 S. Arville #216

City: Las Vegas

State: NV

Zip: 89118

Phone Number: (702) 284-5300

Fax Number: (702) 284-5399

Property Owner: Eastland Company, LLC

Address: 9275 W. Russell Road, Suite 400

City: Las Vegas, NV

State: 89148

Zip:

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.

N/A

-

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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS (Continued)

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

III. DRAINAGE PLAN

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

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

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

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

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

IV. HYDROLOGIC ANALYSIS

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

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

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

REFERENCE:

STANDARD FORM 2

TABLE OF CONTENTS

1	INTRODUCTION	1
1.1	Project Overview & Study Purpose	1
1.2	Description of Project	2
1.3	FEMA Flood Zone Designation	2
1.4	CCRFGD Facility Information	3
1.5	Reference Studies	3
2	METHODOLOGY	4
2.1	Compliance	4
2.2	Hydrologic Modeling.....	4
2.3	Hydraulic Modeling & Criteria.....	5
3	EXISTING DRAINAGE CONDITION	6
3.1	Discussion of Existing Condition	6
4	PROPOSED DRAINAGE CONDITION.....	6
4.1	Definition of Proposed Condition.....	6
4.2	Discussion of Proposed Condition.....	6
4.3	Summary of Proposed Condition Flows	7
4.4	Summary of Proposed Condition Street Flows.....	7
4.5	Summary of Drainage Facilities – Proposed Condition	7
5	ULTIMATE DRAINAGE CONDITION.....	10
5.1	Definition of Ultimate Condition.....	10
6	CONCLUSIONS & RECOMMENDATIONS.....	10
7	REFERENCES	11

LIST OF APPENDICES

Appendix A Drainage Exhibits

- Exhibit A – Location Map
- Exhibit B – FEMA FIRM Panel Map
- Exhibit C – CCRFCD 2018 MPU Facilities Exhibit
- Exhibit D – Proposed Condition Drainage Map
- Exhibit E – Cross Sections and Facilities Map

Appendix B Hydrologic Data

- Curve Number

Appendix C HEC-1 Analyses

- Proposed Condition

Appendix D Surface Flow Hydraulic Computations

- Street Hydraulics
- Drop Inlets
- Ditch Calculations
- Inlet Control Nomographs

Appendix E Storm Drain Analyses

- Sky Pointe Drive (Edgestone Drive)
- Log Cabin Way (Sunstone Parkway)
- North Connector (Sunbridge Pointe Drive)
- Ft Apache Road (Sun Park Drive)
- Moccasin Road
- O'Hare Road
- South Park
- Iron Mountain Road

Appendix F Reference Material

Master Drainage Study for Skye Canyon - Update #3, by SHG

- Approval Letter
- Proposed Condition Drainage Map

Appendix G Reference Material

Sunstone MDS (formally Master Drainage Study for Skye Canyon - Update #5), by SHG

- Approval Letter
- Ultimate Condition Drainage Map
- Ultimate Condition Facilities Map

Appendix H Reference Material

90% Drainage Design Report for US95/Kyle Canyon Road Interchange, by SHG

- 6-ft x 3-ft RCB Culvert Nomograph
- 42-in CMP Culvert Nomograph

Appendix I Reference Material

Technical Drainage Study – Sunstone Phase I Infrastructure

Technical Drainage Study for Moccasin Rd CCRFCD Facility, by SHG

- Approval Letter
- Plan/Profile Excerpt

Appendix J CD of Electronic Files

1 INTRODUCTION

1.1 Project Overview & Study Purpose

Eastland Company, LLC is proposing to construct roadway and drainage infrastructure improvements intended to support development of a portion of the Sunstone master planned property, identified hereinafter as *Phase 1*. The Phase 1 portion of Sunstone addressed by this technical study includes improvements associated with the following roadways:

- Sky Pointe Drive (Edgestone Drive) – Log Cabin Way to Hualapai Way
- Log Cabin Way (Sunstone Parkway) – US 95 to Skye Canyon Park Drive
- North Connector (Sunbridge Pointe Drive) – Log Cabin Way to Moccasin Road
- Skye Canyon Park Drive (Sun Park Drive) – Iron Mountain Road to Log Cabin Way
- O'Hare Road – Log Cabin Way to Skye Canyon Park Drive
- South Park – Entry Roads adjacent to the South Park
- Iron Mountain Road – Tee Pee Lane to Skye Canyon Park Drive
- Tee Pee Lane – Brent Lane to Iron Mountain Road

The overall Sunstone property boundary encompasses approximately 600 acres and is generally bounded by U.S. Highway 95 on the west, Moccasin Road on the north, and Skye Canyon Park Drive on the east. The property is located within the corporate limits of the City of Las Vegas, Nevada.

The Sunstone property has been master planned and the master drainage study (formally known as *Skye Canyon Master Drainage Study Update #5, DS5081*) was approved by the City of Las Vegas on January 28, 2019. In addition to this update, four (4) previous updates to the master drainage study have been processed:

- Skye Canyon Master Drainage Study - Update #1 to Kyle Canyon Master Drainage Study addressed changes in land use plan for the Phase 1, Phase 2 and detention basin areas of the site and was approved by the City of Las Vegas on March 05, 2015.
- Skye Canyon Master Drainage Study - Update #2 addressed downstream drainage impacts resulting from the changes in land use plan for the Phase 1, Phase 2 and detention basin areas and was approved by the City of Las Vegas on November 23, 2015.
- Skye Canyon Master Drainage Study - Update #3 addressed changes in the land use plan, re-alignment of Sheep Mountain Parkway, introduction of the Kyle Canyon Interchange Project, and relocation of the Skye Canyon downstream MPU facility to Log Cabin Way. This study was approved by the City of Las Vegas on August 15, 2016.
- Skye Canyon Master Drainage Study - Update #4 addressed a change in the Skye Canyon downstream MPU facility alignment from Log Cabin Way to Moccasin Road. This study was conditionally approved by the City of Las Vegas on October 10, 2017.

The portion of the site infrastructure identified as Phase 1 has been proposed within the framework set forth by the Master Drainage Study Updates. Therefore, it is the objective of this technical study to show conformance to the drainage patterns set forth in the Master Updates, specifically the Master Update #5.

Drainage facilities are proposed with this study in order to protect the proposed infrastructure improvements from onsite and offsite runoff in accordance with local storm water criteria. Hydrologic analysis from Master Update #5 has been used as the basis for design flow rates for the infrastructure. Existing storm drain facilities are identified, and this study intends to show conformance to each existing facility's design. Utilizing the conceptual analyses presented in the Master Update #5, this study provides a detailed hydraulic analysis of the proposed improvements.

1.2 Description of Project

The project is located within Township 19 South, Range 60 East, Section 6 and Section 7, on APN 125-06-501-001, APN 125-06-701-001, and APN 125-07-501-005. A location map identifying the site in relation to the surrounding major streets has been prepared as Exhibit A, included in Appendix A.

A Tentative Map for Sunstone is currently being processed through the City of Las Vegas that addresses the Phase 1 infrastructure roadway alignments and parcels for future development. Note that the roadway alignments, street sections and future development densities proposed by the Tentative Map are supported by the currently approved land plan for the property as addressed and supported by the approved Master Drainage Study – Update #5.

A Tentative Map has been approved for the Skye Canyon development west of US 95 and Phased Final Maps are currently being processed. Note that the roadway alignments, street sections and future development densities proposed in the Skye Canyon Phased Final Maps are consistent with the approved Master Drainage Study for Sunstone.

The roadway and drainage improvements proposed by this study are those necessary to service the Phase 1 portion of the property. Proposed drainage facilities will connect to the Moccasin Road CCRFCD Facility that runs through the middle of the property down Log Cabin Way and Skye Canyon Park Drive (MPU Facility labels MOLC 0072 and MOLC 0000.) This regional storm drain facility will be constructed through the Sunstone site with a separate privately funded project (CLV DS# 4987) and constructed downstream of the site to the Upper Las Vegas Wash with a publicly funded project (MPU Facility label LVMO 0000.)

Future technical drainage studies will follow that address the onsite individual parcel developments and associated interior drainage patterns that route storm runoff to the drainage infrastructure proposed by this study.

1.3 FEMA Flood Zone Designation

The Sunstone Phase 1 Infrastructure boundary has been delineated on current FEMA FIRM Panel Map 32003C1735E, dated September 27, 2002, as Exhibit B included in Appendix A. Per the FIRM Panel, the project site is located within a FEMA designated unshaded Zone 'X' (unshaded). A Zone 'X' (unshaded) is described as areas located outside the 0.2% annual chance flood plain.

1.4 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 C, included in Appendix A. Per the 2018 MPU, there are several CCRFCD regional facility alignments within and adjacent to the Phase 1 area. The following is a summary of the pertinent regional facility alignments, per the 2018 MPU, addressed by this study:

- MOLC 0149 – 13-ft x 8-ft RCB crossing US 95. This is an existing facility upstream of Sunstone Phase 1.
- MOLC 0072 – 12-ft x 8-ft RCB in Log Cabin Road from US 95 to Skye Canyon Park Drive. This facility runs through Phase 1 and is considered to be in place prior to construction of the Phase 1 improvements.
- MOLC 0000 – 20-ft x 10-ft RCB in Skye Canyon Park Drive from Log Cabin Road to Moccasin Road. Actual proposed size in Moccasin CCRFCD Facility plans is 18-ft x 10-ft RCB. This facility runs through Phase 1 and is considered to be in place prior to construction of the Phase 1 improvements.
- LVMO 0000 – 16-ft x 9-ft RCB in Moccasin Road from Skye Canyon Park Drive to Upper Las Vegas Wash. This facility is downstream of Phase 1 and is considered to be in place prior to construction of the Phase 1 improvements.
- LVMO 0001, 0144, 0184, 0226 and 0276. Parallel facility in Moccasin Road from the Upper Las Vegas Wash to US 95. This is a future facility that is not being constructed at this time. It is planned to accommodate runoff from future development of other properties in the northwest area.

1.5 Reference Studies

Existing drainage studies in the vicinity of Sunstone Phase 1 were researched in the preparation of this report. Studies impacting the Phase 1 infrastructure improvements have been identified below, along with the appendix location of referenced material:

- *Skye Canyon Master Drainage Study – Update #3*, prepared by Slater Hanifan Group was conditionally approved by the City of Las Vegas on August 15, 2016. Study included proposed condition hydrology that is being referenced for existing condition flow rates crossing U.S. Highway 95 toward Moccasin Road, see reference material in Appendix F.
- *Sunstone MDS (formally Skye Canyon Master Drainage Study – Update #5)*, prepared by Slater Hanifan Group was conditionally approved by the City of Las Vegas on January 28, 2019. Hydrologic analysis from study is used as the basis for Sunstone Phase 1 Infrastructure design flow rates, see reference material in Appendix G.

- *90% Drainage Design Report for US95 / Kyle Canyon Road Interchange*, prepared by GCW for NDOT and the City of Las Vegas on January 13, 2017. This study addressed facilities crossing US 95 in the vicinity of the proposed interchange. The Sunstone Phase 1 project references culvert crossing flow rates for the first two US 95 offsite culverts north of Kyle Canyon Road (existing 6-ft x 3-ft RCB and existing 42-in CMP.) See reference material in Appendix H.
- *Technical Drainage Study for Moccasin Rd CCRFCD Flood Control Facility – US95/Kyle Canyon Interchange to Moccasin Rd*, prepared by Slater Hanifan Group was conditionally approved by the City of Las Vegas on April 8, 2019. This study addresses the regional facility that will convey flows through the Sunstone development. The hydraulic model from this study was investigated to determine appropriate downstream hydraulic grade lines for hydraulic modeling of proposed Sunstone Phase 1 Infrastructure facilities. See reference material in Appendix I.

2 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 (CCRFCD Manual, 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.

Precipitation: Subbasins utilized in the hydrologic analysis within this study are referenced from the approved Sunstone Master Drainage Study. Therefore, no new precipitation values have been prepared.

Storm Distributions: All concentration points within the Sunstone development have a corresponding watershed area that does not exceed 8 square miles. Therefore, an SDN3 distribution has been selected. The SDN3 design storm distribution has been referenced from Table 503 of the CCRFCD Manual.

Curve Number: Subbasins utilized in the hydrologic analysis within this study are referenced from the approved Sunstone Master Drainage Study. Therefore, no new soils information has been prepared. However, a proposed condition model has been prepared to determine proposed runoff rates with proposed infrastructure improvements, but prior to individual parcel development. This model utilizes subbasin delineations and soils data from the Sunstone Master Drainage Study, but revises the land use to determine a

proposed condition runoff curve number. Computations for proposed condition runoff curve numbers are included in Appendix B.

Note the following regarding the land uses prepared in this study, and the associated CCRFCD Manual curve number tables have been included in Appendix B.

- Undeveloped areas have been analyzed with a land use corresponding to “desert shrub – poor condition”.

Lag Time: Subbasins utilized in the hydrologic analysis within this study are referenced from the approved Sunstone Master Drainage Study (MDS.) Land use values have been revised to create a proposed condition model. However, lag times have been left unchanged from the MDS. The runoff curve number is a parameter in the lag time calculation, however, revising the curve number to a lower value in this calculation would increase the lag time and generally result in a lower runoff rate. Therefore, it is conservative to leave lag times unchanged from the MDS ultimate condition model.

2.3 Hydraulic Modeling & Criteria

Street Flow: Street flows have been analyzed utilizing Bentley Flowmaster V8i software. In accordance with the CCRFCD Manual, the depth times velocity factor ($D \times V$) for street flow for the minor 10-year storm event must be less than or equal to 6, with a maximum depth of 1-ft. The depth times velocity factor ($D \times V$) for street flow for the major 100-year storm event must be less than or equal to 8, with a maximum depth of 2-ft. Additionally, streets with right-of-way width that are 80-ft wide or greater are required to meet the 10-year dry lane criteria. A 12-ft wide dry lane (excluding center turning lane) must be provided during the 10-year storm event. Also, 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. Note that all 10-yr street flow criteria (except dry lane) are met in the 100-yr event and therefore additional computations for the 10-yr event are not necessary.

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

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

Proposed Storm Drain Stubs: Inlet control has been utilized to assess capacities of proposed storm drain stub openings in sump condition. This project is proposing several storm drains that will be extended into future development; however, for the interim condition prior to extension, many of these storm drains function to collect the interim flows in sump openings. Inlet control nomographs have been utilized to demonstrate that the headwater criteria are satisfied, as set forth in the CCRFCD Manual Section 1002.4. Riprap has been provided on the slopes graded down to the culvert opening for stabilization from erosion.

3 EXISTING DRAINAGE CONDITION

3.1 Discussion of Existing Condition

The existing condition for the Sunstone development has been addressed with the Sunstone MDS. The MDS established existing condition flow rates and proposed hydrology and facilities to provide for acceptable discharging of flow downstream of the development. No subbasin delineations within the Sunstone development have been modified from the MDS, and all flow patterns established with the MDS have been adhered to. The following storm drain improvements are considered to be in place and functional prior to construction of Sunstone Phase 1 Infrastructure:

- Skye Canyon Detention Basin 1 (constructed)
- Skye Canyon Detention Basin 2 (currently in construction)
- Skye Village Road CCRFCD Facility - Skye Canyon Park Dr to Grand Canyon Dr (currently in construction)
- Skye Canyon Phase 3 Interim Channel - Grand Canyon Dr to Moccasin Facility "Catcher's Mitt" (currently in construction)
- Moccasin CCRFCD Facility – Interim "Catcher's Mitt" at US 95 to the Upper Las Vegas Wash (currently in design)
- Sunstone US 95 Facility - Brent Lane to Iron Mountain Road

4 PROPOSED DRAINAGE CONDITION

4.1 Definition of Proposed Condition

The proposed condition is defined as the proposed roadway and infrastructure improvements inclusive of the ditch grading on the parcels to be constructed prior to the development of the future residential subdivisions. Ditch grading is proposed to route runoff and protect the roadways in the interim condition prior to full buildout of the individual parcels. Stubs are provided for each parcel to drain to, and the majority of these stubs connect to the Moccasin CCRFCD Facility being constructed under a separate project through the Sunstone development.

4.2 Discussion of Proposed Condition

Refer to Exhibit D - Proposed Condition Onsite Hydrologic Map, included in Appendix A, for an exhibit showing proposed condition drainage patterns.

The Sunstone MDS ultimate condition hydrology has been used as the base for the proposed condition model. Onsite parcel runoff curve numbers have been revised from ultimate condition to existing condition land use to reflect the proposed condition. Subbasins north of Kyle Canyon Road have been referenced from the Kyle Canyon MDS Update #3 proposed condition model to model flows crossing US95 as they occur today. Skye Canyon onsite parcels upstream of the Sunstone development are conservatively assumed fully developed.

4.3 Summary of Proposed Condition Flows

A summary of all proposed condition flow rates determined by the HEC-1 analysis, as well as the concentrated flows at critical locations have been provided on the Proposed Condition Drainage Map (Exhibit D) in Appendix A. The applicable HEC-1 analysis is provided in Appendix C.

Due individual parcels being undeveloped in the proposed condition, proposed condition flow rates are generally lower than ultimate condition flow rates. However, inclusion of proposed condition offsite subbasins north of Kyle Canyon Road and west of US 95 results in higher runoff down the Moccasin Road corridor. This flow is still within the capacity of the stub provided by the Moccasin CCRFCD Facility at Skye Canyon Park Drive, and the total facility flow in the Moccasin CCRFCD Facility is not increased at this location.

4.4 Summary of Proposed Condition Street Flows

Street flow hydraulics for the proposed roadways have been analyzed and are summarized on the Cross Sections and Facilities Map (Exhibit E) in Appendix A.

Note that street sections for North Collector Road, Skye Canyon Park Drive, and Skye Pointe Drive have been modeled as half sections and O'Hare Road street sections have been modeled as full street sections. Street sections for Log Cabin Way have both half street and full street sections. Street sections for the 10-yr event have been provided for Log Cabin Way and Skye Canyon Park Drive, where right-of-way widths are greater than or equal to 80-ft, to ensure 10-yr dry lane criteria are met. Note that sections with erosive velocities (> 5 fps) are considered acceptable since the flow depth is less than the curb height with two exceptions as discussed below in the Skye Point Drive and O'Hare Road discussions.

4.5 Summary of Drainage Facilities – Proposed Condition

Refer to Exhibit E for locations and sizes of all proposed drainage facilities for the Sunstone Phase 1 Infrastructure. In general, storm drain stubs have been provided at each individual parcel within the Sunstone Phase 1 project area. These stubs have been analyzed using a culvert inlet control nomograph using the proposed condition flow rate, which controls due to the depth of ponding the condition causes. The remainder of the storm drain facility is hydraulically modeled with WSPGW software using the controlling flow rate (typically ultimate condition) to insure the storm drain is appropriately sized, see storm drain analyses in Appendix E. Interim ditches are provided to protect roadway infrastructure improvements and convey flows to the storm drain stubs provided. Riprap is proposed at the culvert inlets to protect the graded slopes from erosion. Upstream of this, ditch grading is proposed to be earthen. The majority of these ditches are non-erosive, see ditch calculations in Appendix D. However for the few ditches that are erosive, the developer prefers to provide maintenance as necessary to maintain these facilities rather than going to the expense of providing riprap along the entire length of the ditch. These ditches are an interim condition only conveying onsite flow, and therefore are unlikely to pose a significant risk to the proposed roadway infrastructure.

The following discussion summarizes the design considerations for each storm drain infrastructure proposed for each Phase 1 Infrastructure roadway:

Log Cabin Way: The Moccasin Rd CCRFCD Facility project will construct a 12-ft x 8-ft RCB facility in Log Cabin Way prior to construction of Sunstone Phase 1 improvements. Lateral locations and sizes for this facility have been coordinated for all laterals over 24-in diameter. Lateral locations for nuisance inlets and standard spacing (660-ft) inlets have not been provided with the Moccasin project, because detailed roadway information was not available at that time. These laterals will be punched into the Moccasin facility with the Phase 1 project and are included in the attached improvement plans.

For hydraulic analysis of laterals connecting to the CCRFCD facility in Log Cabin Way, a downstream HGL at the top of box has been conservatively assumed to help simplify the calculation process, as the RCB remains unpressurized throughout the Log Cabin Way alignment, see Moccasin Facility plans excerpt in Appendix I.

Interim earthen ditches have been proposed to convey existing condition parcel flows to the proposed stub locations where an interim riprap sump will intercept them. The ditches and riprap sumps are for interim collection only and will be replaced with ultimate condition facilities when the parcel is developed. For subbasins EAA3 and EAA4, the flows have been allowed to follow existing patterns and are proposed to be collected at the North Collector Road. Storm drain stubs are still proposed at subbasins EAA3 and EAA4 for draining future parcel development, but the interim riprap sumps provided at them are only intended to collect nuisance flow in the interim condition.

Sky Pointe Drive: The ultimate condition drainage prepared in the Sunstone MDS shows one ultimate condition subbasin north of Kyle Canyon Road and west of US 95 (subbasin NW50-C.) This basin is shown to drain toward the Kyle Canyon Interchange. However, in the existing condition, the watershed impacting US 95 in this area is larger and drains through existing culverts in US 95. This larger existing condition area is the controlling condition for the Sunstone development as development north of Kyle Canyon Road and west of US 95 does not appear to be imminent. Therefore, existing condition subbasins were referenced from the *Skye Canyon Master Drainage Study Update #3* (Appendix F), and existing culvert capacities were referenced from the *90% Design Report for the US 95/Kyle Canyon Interchange* (Appendix H.) Per this reference information, 85 cfs is conveyed through an existing 42-in CMP under US 95 toward Sky Pointe Drive near Station “SPD” 21+00. An additional 251 cfs is conveyed through an existing 6-ft x 3-ft RCB under US 95 toward Sky Pointe Drive near Station “SPD” 29+00. A 66-in RCP storm drain is proposed in Sky Pointe Drive to collect runoff from these US 95 culverts, as well as from adjacent Sunstone parcels. Note that though FlowMaster Street Section SP2b has erosive velocities, the flow depth is 0.51-ft, 0.01-ft above the curb height and therefore considered acceptable.

Skye Canyon Park Drive: Skye Canyon Park Drive has a right-of-way width greater than 80-ft and therefore a dry lane is provided during the 10-year storm event, and 660-ft spacing nuisance inlets are provided. There is a low point in the profile at O’Hare Road. Skye Canyon Park Drive remains crowned at O’Hare Road, and therefore larger storm events would have to pond up in this area and weir over the roadway crown. To avoid this situation, 100-year flows have been collected at this location and are discharged to the Moccasin Regional Facility at Log Cabin Way.

O'Hare Road: O'Hare Road is less than 80-ft right-of-way, therefore a dry lane is not required during the 10-year storm event. However, the developer has requested that flow depths stay below curb height to the largest extent possible to avoid requiring landscape maintenance after storm events. Also, as discussed above, the 100-year flow is collected at Skye Canyon Park Drive, and collecting storm water in O'Hare helps accomplish that goal. As with other roadways discussed above, earthen ditches are proposed to convey flows to interim riprap sumps at storm drain lateral stubs. Note that though Section OH1 is noted to have erosive velocities that overtop the curb height, restrictions in utility conflicts do not permit storm drain to be extended further north on O'Hare Road. Drop inlet facilities OH1a and OH1b have been proposed, as soon as feasible, in an effort to reduce flows in O'Hare Road to be below the curb height for the portions of O'Hare downstream of these inlets.

Private Entry 1 and 2: Private entry roads are being proposed off O'Hare Road on either side of the proposed South Park. The storm drain in O'Hare Road is proposed to extend up Entry Road 2 to drain subbasin EPJ.

Iron Mountain Road and Tee Pee Road: Iron Mountain Road and Tee Pee Road are less than 80-ft right-of-way. No proposed storm drains are required to meet drainage criteria in these streets, consistent with the Sunstone MDS. A 30-in storm drain is existing in Iron Mountain Road and is proposed to be extended to the west to provide for interim stormwater collection and a stub for future development. The roadway section for Iron Mountain Road has been shown per the section proposed in the development agreement for Sunstone. This roadway section results in the proposed north curb line being in the vicinity (horizontally) of the existing storm drain. To avoid existing storm drain manholes interfering with the proposed curb line, existing manholes are proposed to be replaced with modified County Type B drop inlets. Type B drop inlets provide a manhole in the sidewalk area and will allow for access to the existing storm drain without conflicting with the proposed curb line. In addition, the proposed drop inlets will provide for interception of nuisance flows.

North Collector Road: The North Collector Road has a high point at Station "SPW" 20+82. The parcels draining to the North Collector Road south of this point are conveyed to the CCRFCD facility in Log Cabin Way. The parcel north of the high point drains to Moccasin Road. In the proposed condition, offsite flows from west of US 95 also impact this area, see Proposed Condition Hydrologic Map (Exhibit D) in Appendix A. In the proposed condition these flows will travel through subbasin EAA1. With future phases, these flows will be routed north in Skye Village Road (Hualapai alignment) and then east in Moccasin Road. Flows are proposed to be conveyed across the North Collector Road via a 60-in RCP (designed to accommodate parcel runoff in the ultimate condition) and a 72-in RCP (designed to accommodate flows in Moccasin Road with future design phases.) After crossing the North Collector Road, these flows are conveyed down the Moccasin Road alignment in a riprap ditch, and then near Skye Canyon Park Drive the facility transitions to a 72-in RCP and is discharged into the Moccasin CCRFCD Facility. Because the Moccasin riprap ditch is planned to remain in the Sunstone developed condition, it has been conservatively designed for a flow rate equal to the arithmetic sum of US 95 offsite flows (concentration point CP27B, 173 cfs, Exhibit D) and ultimate condition onsite flows (concentration point EC21B, 212 cfs, ultimate Exhibit E), or 385 cfs.

Storm Drain Laterals: The mainline storm drains have been designed in a manner as to not result in significant backwater impacts to the proposed storm drain laterals. The storm drain laterals stubbed for extension into future residential subdivisions have been

hydraulically analyzed utilizing WSPG and/or verified with the inlet control nomograph to ensure that adequate headwater is provided at the interim sump locations. In addition, all storm drain laterals utilized by drop inlets have also been verified by method of inlet control nomograph to show adequate headwater capacity for flow to exit the drop inlet boxes.

Drop Inlets: Drop inlets have been proposed at a minimum 660-ft spacing on all roadways with right-of-way widths greater than 80-ft. In other locations drop inlets are proposed to meet street flow criteria, or to capture the 100-year flow prior to discharging to the Moccasin CCRFCD Facility. The drop inlet capacity calculations are provided in Appendix D. The summary of the proposed storm drain and drop inlet facilities has been provided on Exhibit E in Appendix A.

Interim Ditches: Interim earthen ditches have been proposed within the respective parcels to direct flows to the designed storm drain stub. Ditch grading is proposed to be earthen. The majority of these ditches are non-erosive, see ditch calculations in Appendix D. However for the few ditches that are erosive, the developer prefers to provide maintenance as necessary to maintain these facilities rather than going to the expense of providing riprap along the entire length of the ditch. These ditches are an interim condition only conveying onsite flow, and therefore are unlikely to pose a significant risk to the proposed roadway infrastructure. However, minimum riprap protection ($D_{50}=6"$, Thickness=12") have been specified at all proposed sump locations where storm drain lateral are stubbed out for future extension into developed parcels.

5 ULTIMATE DRAINAGE CONDITION

5.1 Definition of Ultimate Condition

The ultimate condition of the Phase 1 site has been conceptually analyzed by the Sunstone Master Drainage Study, based on the current master land plan. Flow rates for ultimate condition facility design have been referenced from this study. However, future technical drainage studies will be provided to address the development of the residential subdivisions within the Sunstone Phase 1 area. Refer to reference material included in Appendix G for ultimate condition drainage and facilities maps.

6 CONCLUSIONS & RECOMMENDATIONS

1. This project is in compliance with the applicable drainage laws as recognized by the state of Nevada. This project is in compliance with the CCRFCD "*Hydrologic Criteria and Drainage Design Manual*" (Reference 1).
2. This project is in compliance with the CCRFCD "Master Plan Update," and is connecting to regional facilities in the alignments of Log Cabin Way and Skye Canyon Park Drive.
3. The project site is not located within a FEMA designated Special Flood Hazard Area (SFHA). The site and the proposed improvements are located within a FEMA flood Zone "X" (unshaded). Therefore, FEMA notification will not be required.

4. The design of this project and the proposed drainage patterns are in compliance with the approved Master Drainage Study Update. The storm flows discharging from the Sunstone Phase 1 property are in conformance with the master planned drainage patterns and do not exceed allowable discharges established in the Master Update Study. Therefore, there are no adverse impacts to downstream property and facilities as a result of the proposed improvements.
5. Storm drain infrastructure required for the protection of Phase 1 from onsite and offsite runoff is generally in conformance to the conceptual master plan established in the Master Update Study. The drainage facilities have been designed to control and convey the onsite and offsite runoff from the 100-year storm event safely through the site and perpetuate flow in accordance with the master plan.
6. The design of site has been planned in such a way that flows from the site are generally kept away from the roadways. Street flow calculations for the proposed roadways have been provided which show that all the streets satisfy the street design criteria stipulated in the CCRFCD HCDDM.
7. No buildings nor finished floors and/or pad elevations are being proposed with this project. Future individual Technical Drainage Studies for the respective residential subdivisions will be provided to support compliance with finished floor requirements of any proposed building pads.
8. The grading plan, storm drain profile and detail sheets for this project have been included with this study, and an electronic copy is included in the CD in Appendix J. These plans support the drainage patterns and conclusions detailed in this study.

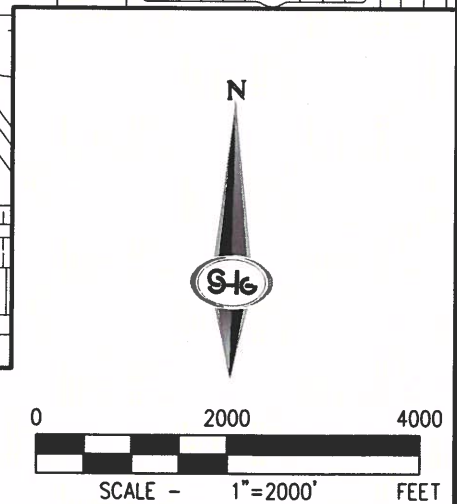
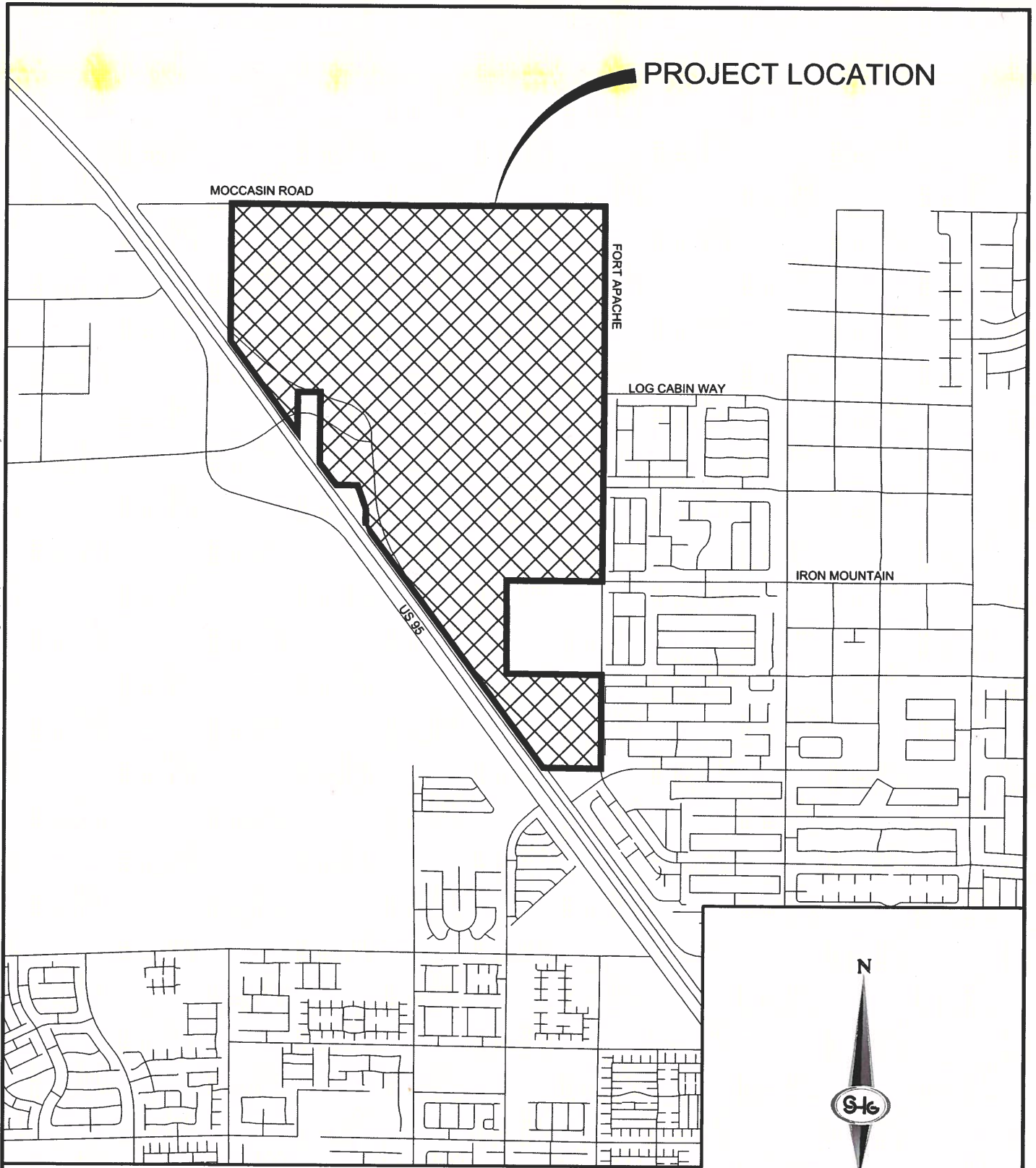
7 REFERENCES

1. *Las Vegas Valley Flood Control Master Plan Update*. Clark County Regional Flood Control District, 2013.
2. *Hydrologic Criteria and Drainage Design Manual*. Clark County Regional Flood Control District, 1999.
3. *Skye Canyon Master Drainage Study – Update #3*; Slater Hanifan Group, August 2016.
4. *Sunstone MDS (formally Skye Canyon Master Drainage Study – Update #5)*; Slater Hanifan Group, December 2018.
5. *90% Drainage Design Report for US95 / Kyle Canyon Road Interchange*; GCW, January 2017.
6. *Technical Drainage Study for Moccasin Rd CCRFCD Flood Control Facility*; Slater Hanifan Group, March 2019.

APPENDIX A

Drainage Exhibits

j:\est1905-000 sunstone.ph1 tds\drainage\technical study\figures\est1905-000 exhibit a-c upfront maps.dwg 5/6/2019 3:23 PM Caitlyn Alcantara



S-I-G **SLATER HANIFAN GROUP**
a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

EASTLAND COMPANY, LLC
SUNSTONE PHASE 1
LOCATION MAP

DATE: MAY 2019
DRAFTER: CAA
DESIGNER: CAA
CHECKED: LKL

PROJECT NO.
EST1905-000
EXHIBIT A
SHEET 1 OF 16

FIRM		FLOOD INSURANCE RATE MAP	
CLARK COUNTY, NEVADA AND INCORPORATED AREAS		PANEL 1735 E	
PANEL 1735 OF 4090 SEE MAP INDEX FOR FIRM PANEL LA-10271			
COMBIO: ACCIDENT:	NUMBER: PANEL: DATE:		
DATE: TIME: LOCATION:	DATE: TIME: LOCATION:	DATE: TIME: LOCATION:	DATE: TIME: LOCATION:
Notes: 1. This Map shows the Flood Insurance Rate Map for the area of Clark County, Nevada, and incorporated areas. 2. The map is for the purpose of determining flood insurance rates. 3. The map is for the purpose of determining flood insurance rates.			
MAP NUMBER 32003C1735 E		MAP REVISED: SEPTEMBER 27, 2002	
Federal Emergency Management Agency			

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 ○ Cross Section Line  
 (23) (23) Transcut Line  
 07 07 10 12 21 10 Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)  
 4276486M 1000-meter Universal Transverse Mercator grid values, zone 18  
 600000 FT 5000-foot grid ticks

DX5510X 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) 638-6626.

**MAP SCALE 1" = 1000'**

500' 0 1000 2000 FEET  
 300 0 300 600 METERS

**S-I-G**  
**SLATER**  
**HANIFAN**  
**GROUP**  
a Westwood team

5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118  
PHONE (702) 284-5300  
FAX (702) 284-5399

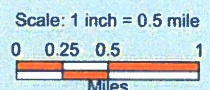
[illegible]

**EASTLAND COMPANY, LLC**  
**SUNSTONE PHASE 1**  
**FEMA FIRM MAP**

|             |             |
|-------------|-------------|
| DATE:       | MAY 2019    |
| DRAFTER:    | CAA         |
| DESIGNER:   | CAA         |
| CHECKED:    | LKL         |
| PROJECT NO. | EST1905-000 |

**EXHIBIT B**  
SHEET 1 OF 16







|               |          |
|---------------|----------|
|               |          |
| DATE:         | MAY 2019 |
| DRAFTER:      | CAA      |
| DESIGNER:     | CAA      |
| CHECKED:      | LKL      |
| PROJECT NO.   |          |
| EST1905-000   |          |
| EXHIBIT C2    |          |
| SHEET 1 OF 16 |          |



j:\est1905-000\_sunstone\_ph1\_tds\drainage\technical\_study\figures\est1905-000\_exhibit a-c upfront mops.dwg 5/6/2019 3:18 PM Caitlyn Alcantara

| ID / Mile   | Status | Facility Description                              | Length (ft.) | Flow (cfs) | HEC-1 Node | HEC-1 Model | Tributary Area (sq.mi.) | Channel Slope (%) ** |
|-------------|--------|---------------------------------------------------|--------------|------------|------------|-------------|-------------------------|----------------------|
| <b>BCHU</b> |        |                                                   |              |            |            |             |                         |                      |
| 0000        | E      | BELTWAY CHANNEL - HUALAPAI                        |              |            |            |             |                         |                      |
| 0017        | E      | 12' X 5' RCAP                                     | 853          | 206        | DBA3-C     | WEST3       | 0.84                    | 1.11                 |
| 0040        | E      | 8' X 5' RCAP                                      | 1216         | 218        | CBA3-C     | WEST3       | 0.84                    | 1.33                 |
| 0042        | 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                 |
| <b>BRDB</b> |        |                                                   |              |            |            |             |                         |                      |
| 0000        | E      | BRENT DRAINAGE SYSTEM                             |              |            |            |             |                         |                      |
| 0031        | E      | 36" RCP WITH 18" ORIFICE PLATE                    | 2170         | 36         | BRDB       | WEST3       | 2.37                    | 0.40                 |
| 0032        | 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 12W 7D 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                 |
| <b>CN95</b> |        |                                                   |              |            |            |             |                         |                      |
| 0000        | E      | CENTENNIAL PKWY CHANNEL WEST / U.S 95 BRANCH      |              |            |            |             |                         |                      |
| 0068        | E      | 20' X 7' RCB                                      | 3335         | 2778       | CNW83-C    | WEST3       | 3.35                    | 2.00                 |
| 0102        | E      | CONC CHNL 20W 9D 0.1 SS                           | 2300         | 2725       | CNW103-C   | WEST3       | 3.04                    | 2.10                 |
| 0104        | E      | 2.12' X 10' RCB                                   | 375          | 2548       | 2CNW89-C   | WEST3       | 2.65                    | 1.77                 |
| 0167        | E      | 16' X 8' RCB                                      | 300          | 2548       | 2CNW89-C   | WEST3       | 2.65                    | 1.10                 |
| 0199        | E      | 15' X 9' RCB                                      | 3521         | 2548       | 2CNW89-C   | WEST3       | 2.65                    | 1.58                 |
| 0218        | E      | 15' X 9' RCB                                      | 407          | 1467       | 2CNW72-C   | WEST3       | 1.13                    | 0.41                 |
| 0257        | E      | TRANSITION STRUCTURE                              | 1227         | 1467       | 2CNW72-C   | WEST3       | 1.13                    | 0.82                 |
| 0259        | E      | 15' X 9' RCB                                      | 59           | 1467       | 2CNW72-C   | WEST3       | 1.13                    | 0.77                 |
| 0313        | E      | 10' X 8' RCB                                      | 284          | 599        | CNW74-C    | WEST3       | 0.40                    | 0.77                 |
| 0318        | E      | TRANSITION STRUCTURE                              | 2680         | 599        | CNW74-C    | WEST3       | 0.40                    | 2.50                 |
| 0333        | E      | 5' X 5' RCB                                       | 60           | 599        | CNW74-C    | WEST3       | 0.40                    | 1.50                 |
| <b>CNFR</b> |        |                                                   |              |            |            |             |                         |                      |
| 0000        | P      | CENTENNIAL PKWY CHANNEL WEST / FARM ROAD          |              |            |            |             |                         |                      |
| 0000        | P      | 8' X 6' RCB                                       | 8350         | 776        | CNW89-C    | WEST3       | 1.05                    | 2.00                 |
| <b>CNGT</b> |        |                                                   |              |            |            |             |                         |                      |
| 0000        | E      | CENTENNIAL PKWY CHANNEL WEST / GRAND TETON BRANCH |              |            |            |             |                         |                      |
| 0020        | E      | 10' X 5' RCB                                      | 2376         | 543        | CNW71-E    | WEST3       | 0.47                    | 2.58                 |
| 0043        | E      | 10' X 5' RCB                                      | 1570         | 543        | CNW71-E    | WEST3       | 0.47                    | 3.50                 |
| 0118        | E      | 8' X 5' RCB                                       | 2470         | 543        | CNW71-E    | WEST3       | 0.47                    | 3.60                 |
| 0118        | E      | 8' X 5' RCAP                                      | 5472         | 349        | KYLED ET   | KYLED8      | 58.61                   | 3.72                 |
| <b>CNKC</b> |        |                                                   |              |            |            |             |                         |                      |
| 0000        | E      | CENTENNIAL PKWY CHANNEL WEST / KYLE CANYON BRANCH |              |            |            |             |                         |                      |
| 0007        | E      | 12' X 4' RCB                                      | 377          | 954        | CNW72-C    | WEST3       | 0.74                    | 4.58                 |
| 0024        | E      | 10' X 5' RCB                                      | 874          | 954        | CNW72-C    | WEST3       | 0.74                    | 3.28                 |
| 0050        | 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                 |
| <b>CNWE</b> |        |                                                   |              |            |            |             |                         |                      |
| 0195        | E      | CENTENNIAL PKWY CHANNEL WEST                      |              |            |            |             |                         |                      |
| 0200        | E      | CONC CHNL 36W 9D 0.1 SS                           | 1130         | 3771       | CNW383-C   | WEST3       | 5.84                    | 0.80                 |
| 0226        | E      | CONC CHNL 36W 9D 0.1 SS                           | 1340         | 3523       | CNW204-C   | WEST3       | 5.14                    | 1.00                 |
| 0241        | E      | 2.18' X 8.5' RCBC @ RIO VISTA                     | 100          | 3523       | CNW204-C   | WEST3       | 5.14                    | 0.51                 |
| 0251        | E      | CONC CHNL 36W 9.5D 0.1 SS                         | 405          | 3523       | CNW204-C   | WEST3       | 5.14                    | 0.51                 |
| 0271        | E      | CONC CHNL 32W 10D 0.1 SS                          | 575          | 3234       | CNW203-C   | WEST3       | 4.64                    | 0.51                 |
| 0274        | E      | 32' X 10' RCBC @ TENAYA                           | 229          | 3234       | CNW203-C   | WEST3       | 4.64                    | 0.51                 |
| 0277        | E      | CONC CHNL 32W 9D 0.1 SS                           | 142          | 3234       | CNW203-C   | WEST3       | 4.64                    | 0.51                 |
| 0287        | E      | CONC CHNL 32W 9D 0.1 SS                           | 579          | 3234       | CNW203-C   | WEST3       | 4.64                    | 0.64                 |
| 0301        | E      | CONC CHNL 32W 8D 0.1 SS                           | 965          | 2992       | CNW282-C   | WEST3       | 3.83                    | 1.59                 |
| 0304        | E      | 2.15' X 7' RCB                                    | 1738         | 2992       | CNW282-C   | WEST3       | 3.83                    | 1.30                 |
| 0314        | E      | 22' X 7' RCB                                      | 3410         | 2992       | CNW282-C   | WEST3       | 3.83                    | 1.85                 |
| 0314        | E      | 22' X 7' RCB                                      | 703          | 2822       | CNWBD2-N   | WEST3       | 3.45                    | 1.94                 |
| <b>EKBU</b> |        |                                                   |              |            |            |             |                         |                      |
| 0000        | E      | ELKHORN SPRINGS AND BUFFALO                       |              |            |            |             |                         |                      |
| 0000        | E      | 80" RCP                                           | 1046         | 255        | NW134-C    | WEST3       | 0.46                    | 0.89                 |
| <b>EKDB</b> |        |                                                   |              |            |            |             |                         |                      |
| 0000        | E      | ELKHORN SPRINGS DETENTION BASIN                   |              |            |            |             |                         |                      |
| 0025        | E      | GRASS CHNL 15W 5.8D 3.5 1 SS                      | 2575         | 221        | CNW150-C   | WEST3       | 1.41                    | 0.39                 |
| 0026        | E      | 4' X 3' RCB                                       | 160          | 106        | ELKBASIN   | WEST3       | 0.84                    | 0.50                 |
| 0049        | 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 (%) ** |
|-------------|--------|----------------------------------------------|--------------|------------|------------|-------------|-------------------------|----------------------|
| <b>EKHU</b> |        |                                              |              |            |            |             |                         |                      |
| 0003        | E      | ELKHORN AND HUALAPAI                         |              |            |            |             |                         |                      |
| 0020        | E      | 6' X 4' RCAP                                 | 980          | 393        | CNW26-C    | WEST3       | 0.51                    | 3.61                 |
| 0023        | 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                 |
| <b>GOEC</b> |        |                                              |              |            |            |             |                         |                      |
| 0176        | P      | GOWAN NORTH - EL CAPITAN BRANCH              |              |            |            |             |                         |                      |
| 0176        | P      | 78" RCP                                      | 1320         | 190        | CCPFR-C    | GOW3A       | 0.46                    | 1.15                 |
| <b>GONO</b> |        |                                              |              |            |            |             |                         |                      |
| 0511        | P      | GOWAN NORTH SYSTEM                           |              |            |            |             |                         |                      |
| 0511        | P      | 6' X 5' RCB                                  | 1320         | 326        | CCPHW-C    | GOW3A       | 0.60                    | 1.14                 |
| <b>LVMD</b> |        |                                              |              |            |            |             |                         |                      |
| 2507        | E      | LAS VEGAS WASH - MIDDLE                      |              |            |            |             |                         |                      |
| 2525        | 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 24W 7D 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                 |
| <b>MOHU</b> |        |                                              |              |            |            |             |                         |                      |
| 0000        | P0     | MOCCASIN-HUALAPAI BRANCH                     |              |            |            |             |                         |                      |
| 0026        | P0     | 13' X 6' RCB                                 | 1476         | 924        | 2CNW33-C   | LOWER3      | 2.08                    | 1.80                 |
| 0061        | P0     | 11' X 6' RCB                                 | 1654         | 560        | CNW45-N    | LOWER3      | 1.25                    | 0.50                 |
| 0076        | P0     | 9' X 6' RCB                                  | 779          | 560        | CNW45-N    | LOWER3      | 1.25                    | 0.50                 |
| 0095        | P0     | 60" RCP                                      | 1000         | 263        | CNW45-C    | LOWER3      | 1.03                    | 3.00                 |
| 0111        | P0     | NATURAL WASH                                 | 865          | 263        | CNW45-C    | LOWER3      | 1.03                    | 3.00                 |
| 0116        | P0     | 6' X 5' RCBC @ EGAN CREB DR                  | 164          | 263        | CNW45-C    | LOWER3      | 1.03                    | 6.10                 |
| 0151        | 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                 |
| <b>MOIR</b> |        |                                              |              |            |            |             |                         |                      |
| 0000        | P0     | MOCCASIN - IRON MOUNTAIN BRANCH              |              |            |            |             |                         |                      |
| 0020        | P0     | 60" RCP                                      | 1060         | 410        | CNW33-C    | LOWER3      | 0.83                    | 4.50                 |
| 0041        | P0     | 54" RCP                                      | 1161         | 71         | MODB2      | LOWER3      | 0.56                    | 3.20                 |
| 0065        | P0     | 42" RCP                                      | 1236         | 71         | MODB2      | LOWER3      | 0.56                    | 5.00                 |
| 0065        | P0     | 60" RCP                                      | 1099         | 71         | MODB2      | LOWER3      | 0.56                    | 0.40                 |
| <b>MOCK</b> |        |                                              |              |            |            |             |                         |                      |
| 0000        | P0     | MOCCASIN AND KYLE CANYON                     |              |            |            |             |                         |                      |
| 0000        | P0     | 9' X 6' RCB                                  | 6140         | 1072       | CNW35-C    | LOWER3      | 2.69                    | 3.40                 |
| <b>MOLC</b> |        |                                              |              |            |            |             |                         |                      |
| 0000        | P0     | MOCCASIN - LOG CABIN BRANCH                  |              |            |            |             |                         |                      |
| 0072        | P0     | 20' X 10' RCB                                | 2206         | 2265       | 2CNW64     | LOWER3      | 6.06                    | 0.65                 |
| 0149        | P0     | 12' X 8' RCB                                 | 4493         | 2265       | 2CNW64     | LOWER3      | 6.06                    | 2.66                 |
| 0157        | P      | 13' X 8' RCB                                 | 520          | 1817       | CNW62-N    | LOWER3      | 4.88                    | 2.00                 |
| 0162        | P0     | 13' X 8' RCB                                 | 288          | 1817       | CNW62-N    | LOWER3      | 4.88                    | 1.40                 |
| 0162        | P0     | 13' X 8' RCB                                 | 435          | 1817       | CNW62-N    | LOWER3      | 4.88                    | 1.80                 |
| <b>MSNV</b> |        |                                              |              |            |            |             |                         |                      |
| 0000        | E      | MOUNTAIN SPAVISTA RANCH                      |              |            |            |             |                         |                      |
| 0005        | E      | 6.12' X 5' RCBC @ GRAND TETON                | 273          | 639        | CNW163-C   | CWEST3      | 1.69                    | 0.40                 |
| 0125        | E      | GRASS CHNL 100W 4.5D 10.1 SS                 | 6325         | 259        | CNW155-C   | WEST3       | 4.46                    | 0.40                 |
| 0125        | E      | GRASS CHNL 100W 4.5D 10.1 SS                 | 1300         | 66         | CNW147E    | WEST3       | 1.55                    | 0.40                 |
| <b>RACO</b> |        |                                              |              |            |            |             |                         |                      |
| 0000        | E      | RACEL STREET COLLECTOR                       |              |            |            |             |                         |                      |
| 0001        | E      | 14' X 7' RCB BAFFLED ENERGY DISSIPATOR       | 87           | 424        | CNW111S    | WEST3       | 0.55                    | 0.29                 |
| 0064        | E      | 78" RCP                                      | 3245         | 424        | CNW111S    | WEST3       | 0.55                    | 2.46                 |
| 0064        | E      | 78" RCP                                      | 2650         | 347        | DNW111S    | WEST3       | 0.44                    | 2.09                 |
| <b>RCBC</b> |        |                                              |              |            |            |             |                         |                      |
| 0000        | E      | RANCHO ROAD SYSTEM - BELTWAY CHANNEL         |              |            |            |             |                         |                      |
| 0002        | E      | 6' X 5' RCB                                  | 1062         | 173        | FADB       | WEST3       | 1.54                    | 1.04                 |
| 0003        | E      | 54" RCP OUTLET WITH 41" ORIFICE              | 503          | 173        | FADB       | WEST3       | 1.54                    | 2.38                 |
| 0004        | E      | 2.341 CFS PMF SPILLWAY                       | 2341         |            | FADBIN     | WEST3       | 1.54                    |                      |
| 0007        | 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 12W 6.7D 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 12W 6.8D 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 12W 5.5D 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 |
|-----------|--------|------------------------------------------------------------------------|--------------|------------|------------|-------------|
| RCBC      |        |                                                                        |              |            |            |             |
| 0140      | E      | RANCHO ROAD SYSTEM - BELTWAY CHANNEL<br>CONC CHNL 10W 5D 0.1 SS        | 2155         | 475        | CDMNA1     | WEST3       |
| RCHB      |        |                                                                        |              |            |            |             |
| 0053      | E      | RANCHO ROAD SYSTEM - BELTWAY<br>2.12' X 8' RCBC @ SOUTH RAMP CONNECTOR | 85           | 1465       | CDW1C1-C   | WEST3       |
| 0054      | E      | CONC CHNL 21'W 6D 0.1 SS                                               | 432          | 1465       | CDW1C1-C   | WEST3       |
| 0062      | E      | TRANSITION STRUCTURE                                                   | 130          | 1465       | CDW1C1-C   | WEST3       |
| 0065      | E      | 24' X 7' RCB                                                           | 480          | 1465       | CDW1C1-C   | WEST3       |
| 0074      | E      | 24' X 6' RCB                                                           | 50           | 1414       | CNWBC6-C   | WEST3       |
| 0075      | E      | 20' X 6' RCBC @ BELTWAY                                                | 428          | 1414       | CNWBC6-C   | WEST3       |
| 0083      | P      | 20' X 4' RCB                                                           | 950          | 1414       | CNWBC6-C   | WEST3       |
| 0101      | P      | CONC CHNL 20'W 5D 0.1 SS                                               | 980          | 1414       | CNWBC6-C   | WEST3       |
| 0120      | E      | 20' X 6' RCBC @ GRAND MONTECITO                                        | 120          | 1414       | CNWBC6-C   | WEST3       |
| 0122      | P      | CONC CHNL 16'-20'W 6D 0.1 SS                                           | 350          | 1414       | CNWBC6-C   | WEST3       |
| 0130      | P      | CONC CHNL 16'W 5.5D 0.1 SS                                             | 1012         | 1414       | CNWBC6-C   | WEST3       |
| 0149      | P      | CONC CHNL 16'W 5.5D 0.1 SS                                             | 87           | 1115       | CNWBC3     | WEST3       |
| 0151      | P      | CONC CHNL 16'W 5D 0.1 SS                                               | 1255         | 1115       | CNWBC3     | WEST3       |
| 0171      | E      | 16' X 6' RCBC @ EL CAPITAN WAY                                         | 234          | 1115       | CNWBC3     | WEST3       |
| 0175      | E      | CONC CHNL 14'W 7D 0.1 SS                                               | 1220         | 1115       | CNWBC3     | WEST3       |
| 0198      | E      | CONC CHNL 14'W 7D 0.1 SS                                               | 225          | 788        | CNWBA6-C   | WEST3       |
| 0227      | E      | 12' X 6' RCB                                                           | 995          | 788        | CNWBA6-C   | WEST3       |
| 0250      | E      | 12' X 6' RCB                                                           | 4020         | 788        | CNWBA6-C   | WEST3       |
| 0275      | E      | 7' X 6' RCB                                                            | 2650         | 535        | CNW66-C    | WEST3       |
| 0295      | P      | 7' X 6' RCB                                                            | 2980         | 431        | CNW53-C    | WEST3       |
| TSDB      |        |                                                                        |              |            |            |             |
| 0000      | E      | TULE SPRINGS DRAINAGE SYSTEM<br>2.10' X 4' RCBC @ ECHO GRANDE          | 100          | 25         | TULEDB     | WEST3       |
| 0002      | E      | 36" RCP WITH 22" ORIFICE PLATE                                         | 320          | 25         | TULEDB     | WEST3       |
| 0010      | E      | 14.013 CFS PMF SPILLWAY                                                |              | 14013      | CTULEDB    | WEST3       |
| 0011      | E      | 117 AC-FT NORTH ENVIRONMENTAL ENHANCEMENT AREA                         |              | 551        | CTULEDB    | WEST3       |
| 0012      | E      | ENERGY DISSIPATOR                                                      | 260          | 333        | CNW148-C   | WEST3       |
| 0023      | P      | 78" RCP                                                                | 1320         | 333        | CNW148-C   | WEST3       |
| 0059      | P      | 72" RCP                                                                | 2640         | 333        | CNW148-C   | WEST3       |





| Ultimate Contention Flow Rate Summary<br>Skye Canyon Offsite Concentration Points |               |                        |  |
|-----------------------------------------------------------------------------------|---------------|------------------------|--|
| Basin/Concentration Point ID                                                      | Area (sq. mi) | Q <sub>100</sub> (cfs) |  |
| WEST CONCENTRATION POINTS                                                         |               |                        |  |
| 1510B                                                                             |               |                        |  |
| Q = R0W01F                                                                        | 2.19          | 1093                   |  |
| CP1                                                                               |               |                        |  |
| Q = W0F1F + W0F2F + W0F3F + W0F11F                                                | 0.50          | 471                    |  |
| CP2                                                                               |               |                        |  |
| Q = W0F1F + W0F3F                                                                 | 0.17          | 204                    |  |
| CP27A                                                                             |               |                        |  |
| Q = W0F1F + CP27B                                                                 | 1.14          | 406                    |  |
| CP27B                                                                             |               |                        |  |
| Q = CP27A + CP27B + CP27C + 95-1 + 95-2 + 95-3                                    | 0.31          | 173                    |  |
| CP27C                                                                             |               |                        |  |
| Q = Q20C4 + W0C18                                                                 | 0.51          | 917                    |  |
| Q = W0F1F + W0C1C                                                                 | 0.69          | 784                    |  |
| 20C17F                                                                            |               |                        |  |
| Q = R0F01F + Q20W1C                                                               | 1.70          | 1895                   |  |
| CW07F                                                                             |               |                        |  |
| Q = R0W01F + W0C1C                                                                | 2.19          | 2213                   |  |
| W0C1C                                                                             |               |                        |  |
| Q = R0W02F + W0C1C                                                                | 2.35          | 1139                   |  |
| CW35C                                                                             |               |                        |  |
| Q = R0W02F + W0C5C + W0R01C                                                       | 2.71          | 1021                   |  |
| CW37E                                                                             |               |                        |  |
| Q = R0W01F + W0F11F                                                               | 0.24          | 610                    |  |
| CW11W                                                                             |               |                        |  |
| Q = R0W02C + W0F11F                                                               | 0.24          | 354                    |  |
| CP01F                                                                             |               |                        |  |
| Q = R0F01F + CP01A                                                                | 0.04          | 65                     |  |
| CP02B                                                                             |               |                        |  |
| Q = R0F01F + CP02B                                                                | 0.05          | 990                    |  |
| CP02F                                                                             |               |                        |  |
| Q = R0F02F + CP02F                                                                | 0.01          | 19                     |  |
| CP04F                                                                             |               |                        |  |
| Q = R0F04F + CP04F + CP02F + CP03F                                                | 0.72          | 671                    |  |
| CP05F                                                                             |               |                        |  |
| Q = R0F05F + CP05F                                                                | 1.02          | 1182                   |  |
| DB1                                                                               |               |                        |  |
| Q = CP1 + W0F1A + W0F1F + W0F6F + W0F18F                                          | 0.88          | 783                    |  |
| DB1 (FROM DB1)                                                                    |               |                        |  |
| R081                                                                              |               |                        |  |
| Q = CP2 + W0F9F + W0F10F + W0F1A                                                  | 0.57          | 667                    |  |
| W0F10F                                                                            |               |                        |  |
| DB2 (FROM DB2)                                                                    |               |                        |  |
| R082                                                                              |               |                        |  |
| Q = R081 + W0F10C                                                                 | 0.57          | 70                     |  |
| EAST CONCENTRATION POINTS                                                         |               |                        |  |
| EC27                                                                              |               |                        |  |
| Q = EC1 + W0Y10C                                                                  | 6.34          | 3308                   |  |
| EC28                                                                              |               |                        |  |
| Q = EC1 + W0Y10C                                                                  | 6.52          | 3369                   |  |
| UPPER CONCENTRATION POINTS                                                        |               |                        |  |
| CH06B                                                                             |               |                        |  |
| Q = CH06B + W0C1F + CP1W                                                          | 0.18          | 130                    |  |
| CH06B                                                                             |               |                        |  |
| Q = CH06B + W0C1F                                                                 | 0.17          | 301                    |  |
| CH06B                                                                             |               |                        |  |
| Q = CH06B + W0C1F + CP14F                                                         | 0.30          | 648                    |  |
| CH07B                                                                             |               |                        |  |
| Q = CH07B + 95-9A                                                                 | 0.37          | 699                    |  |
| CH07C                                                                             |               |                        |  |
| Q = CH07C + CP0F1F                                                                | 0.40          | 731                    |  |
| CP58B                                                                             |               |                        |  |
| Q = 95-7A + 95-7B + 95-8A + 95-8B                                                 | 0.02          | 47                     |  |
| CP01C                                                                             |               |                        |  |
| Q = CH06B + CP0F1F + CP0F2F + CP0F3F + CP0F4F                                     | 1.05          | 1836                   |  |
| 955TH                                                                             |               |                        |  |
| Q = CH06B + CP0F1F + CP0F2F + CP0F3F + CP0F4F                                     | 1.54          | 2285                   |  |

| Proposed Condition Flow Rate<br>Summary Sunstone Basins |           |                        |  |
|---------------------------------------------------------|-----------|------------------------|--|
| Basin/Concentration Point ID                            | Area (ac) | Q <sub>100</sub> (cfs) |  |
| EAA1                                                    | 55.0      | 43                     |  |
| EAA2                                                    | 35.4      | 31                     |  |
| EAA3                                                    | 51.2      | 39                     |  |
| EAA4                                                    | 21.0      | 17                     |  |
| ECOM1A                                                  | 9.9       | 25                     |  |
| ECOM1B                                                  | 13.7      | 34                     |  |
| ECOM3                                                   | 6.4       | 6                      |  |
| ECOM4                                                   | 5.5       | 6                      |  |
| EMLA1                                                   | 3.2       | 4                      |  |
| ENP1                                                    | 3.5       | 0                      |  |
| ENP4                                                    | 17.1      | 16                     |  |
| EPB1                                                    | 31.6      | 28                     |  |
| EPB2                                                    | 46.3      | 36                     |  |
| EPC                                                     | 20.2      | 19                     |  |
| EPD                                                     | 28.9      | 24                     |  |
| EPF1                                                    | 12.5      | 11                     |  |
| EPF2                                                    | 9.1       | 9                      |  |
| EPF1                                                    | 13.5      | 13                     |  |
| EPF2                                                    | 19.1      | 24                     |  |
| EPG                                                     | 15.9      | 13                     |  |
| EPH1                                                    | 23.9      | 21                     |  |
| EPH2                                                    | 8.9       | 20                     |  |
| EPH3                                                    | 15.4      | 36                     |  |
| EPH1                                                    | 8.6       | 9                      |  |
| EPH2                                                    | 7.4       | 8                      |  |
| EPJ                                                     | 31.7      | 31                     |  |
| ES1                                                     | 10.4      | 20                     |  |
| ES2                                                     | 32.1      | 85                     |  |
| ESP                                                     | 3.5       | 0                      |  |
| ROADWAY BASINS                                          |           |                        |  |
| EBRT1                                                   | 1.8       | 6                      |  |
| ECR1                                                    | 7.8       | 22                     |  |
| EFA1                                                    | 2.7       | 8                      |  |
| EFA2                                                    | 2.4       | 7                      |  |
| EFA3                                                    | 2.5       | 7                      |  |
| EFA4                                                    | 2.8       | 8                      |  |
| EFA5                                                    | 0.9       | 3                      |  |
| EFA6A                                                   | 2.5       | 9                      |  |
| EFA6B                                                   | 5.7       | 18                     |  |
| EIRN1                                                   | 1.9       | 6                      |  |
| ELOG1                                                   | 4.3       | 15                     |  |
| ELOG2                                                   | 12.1      | 35                     |  |
| EMR1                                                    | 17.4      | 22                     |  |
| EMR2                                                    | 19.2      | 26                     |  |
| EOHR1                                                   | 1.0       | 29                     |  |
| ESK1                                                    | 3.3       | 11                     |  |
| ESKY1                                                   | 8.2       | 23                     |  |
| ETP4                                                    | 0.8       | 3                      |  |
| ETP5                                                    | 0.9       | 3                      |  |
| EUS95                                                   | 9.4       | 34                     |  |

| Proposed Condition Flow Rate<br>Summary Sunstone Offsite Basins |                   |               |
|-----------------------------------------------------------------|-------------------|---------------|
| Basin/Concentration Point<br>ID                                 | Area (sq.<br>mi.) | Q100<br>(cfs) |
| OFFA                                                            | 0.02              | 17            |
| OFFB                                                            | 0.13              | 73            |
| OFFC                                                            | 0.13              | 80            |
| OFFDB                                                           | 0.49              | 235           |
| OFFZ                                                            | 0.05              | 25            |

**SLATER**  
**HANIFAN**  
**GROUP**

**S-I-G**

**a Westwood team**

5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118  
PHONE (702) 284-5300 FAX (702) 284-5399



## APPENDIX B

---

### Hydrologic Data



# Skye Canyon Phase 1 Infrastructure

## Proposed Condition

MDS Ultimate Condition CN Matrix with highlighted cells revised to existing condition land use to reflect Proposed Condition

EST1905-000 GIS Curve Number.xlsx

| BASIN ID | APPROXIMATE LOCATION            | Soil Survey | LAND USE INDEX NUMBER | SOIL MAP UNIT NUMBER | SUB REGION CN | SUB REGION AREA (AC) | BASIN AREA (AC) | PERCENT OF BASIN | CUMULATIVE PERCENT | AREA WEIGHTED CN | CUMULATIVE CN | COMPOSITE CN |
|----------|---------------------------------|-------------|-----------------------|----------------------|---------------|----------------------|-----------------|------------------|--------------------|------------------|---------------|--------------|
| EEA1     | Moccasin Rd / Frontage Road     | LV          | 1                     | 314                  | 71.7          | 55.00                | 55.00           | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |
| EEA2     | Moccasin Rd / North Collector   | LV          | 1                     | 314                  | 71.7          | 35.40                | 35.40           | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |
| EEA3     | Log Cabin Wy / Sky Pointe Dr    | LV          | 1                     | 314                  | 71.7          | 51.20                | 51.20           | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |
| EEA4     | Log Cabin Wy / Roundabout       | LV          | 1                     | 314                  | 71.7          | 21.00                | 21.00           | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |
| EBRT1    | Brent Lane                      | LV          | 4                     | 400                  | 98            | 1.80                 | 1.80            | 100.0%           | 100.0%             | 98.00            | 98.00         | 98.0         |
| ECOM1A   | N. of Fort Apache Rd / US 95    | LV          | 1                     | 400                  | 89            | 9.90                 | 9.90            | 100.0%           | 100.0%             | 89.00            | 89.00         | 89.0         |
| ECOM1B   | Brent Ln / Fort Apache Rd       | LV          | 1                     | 400                  | 89            | 13.70                | 13.70           | 100.0%           | 100.0%             | 89.00            | 89.00         | 89.0         |
| ECOM2    | S. of Fort Apache Rd / US 95    | LV          | 1                     | 400                  | 89            | 4.70                 | 4.70            | 100.0%           | 100.0%             | 89.00            | 89.00         | 89.0         |
| ECOM3    | Log Cabin Wy / Sky Pointe Drive | LV          | 1                     | 314                  | 71.7          | 6.40                 | 6.40            | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |
| ECOM4    | West of Sky Pointe Drive        | LV          | 1                     | 314                  | 71.7          | 5.50                 | 5.50            | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |
| ECR1     | North Collector Ave             | LV          | 4                     | 314                  | 98            | 5.60                 | 7.80            | 71.8%            | 71.8%              | 70.36            | 70.36         |              |
| ECR1     |                                 | LV          | 9                     | 314                  | 96            | 0.60                 | 7.80            | 7.7%             | 79.5%              | 7.38             | 77.74         |              |
| ECR1     |                                 | LV          | 9                     | 314                  | 96            | 1.60                 | 7.80            | 20.5%            | 100.0%             | 19.69            | 97.44         | 97.4         |
| EFA1     | Fort Apache Road                | LV          | 4                     | 314                  | 98            | 2.70                 | 2.70            | 100.0%           | 100.0%             | 98.00            | 98.00         | 98.0         |
| EFA2     | Fort Apache Road                | LV          | 4                     | 314                  | 98            | 2.40                 | 2.40            | 100.0%           | 100.0%             | 98.00            | 98.00         | 98.0         |
| EFA3     | Fort Apache Road                | LV          | 4                     | 314                  | 98            | 2.50                 | 2.50            | 100.0%           | 100.0%             | 98.00            | 98.00         | 98.0         |
| EFA4     | Fort Apache Road                | LV          | 4                     | 314                  | 98            | 2.80                 | 2.80            | 100.0%           | 100.0%             | 98.00            | 98.00         | 98.0         |
| EFA5     | Fort Apache Road                | LV          | 4                     | 400                  | 98            | 0.90                 | 0.90            | 100.0%           | 100.0%             | 98.00            | 98.00         | 98.0         |
| EFA6A    | Fort Apache Road                | LV          | 4                     | 400                  | 98            | 2.50                 | 2.50            | 100.0%           | 100.0%             | 98.00            | 98.00         | 98.0         |
| EFA6B    | Fort Apache Road                | LV          | 4                     | 400                  | 98            | 5.70                 | 5.70            | 100.0%           | 100.0%             | 98.00            | 98.00         | 98.0         |
| EIRN1    | Iron Mountain Rd                | LV          | 4                     | 314                  | 98            | 1.20                 | 1.90            | 63.2%            | 63.2%              | 61.89            | 61.89         |              |
| EIRN1    |                                 | LV          | 9                     | 314                  | 96            | 0.60                 | 1.90            | 31.6%            | 94.7%              | 30.32            | 92.21         | 92.2         |
| ELOG1    | Log Cabin Way                   | LV          | 4                     | 314                  | 98            | 4.30                 | 4.30            | 100.0%           | 100.0%             | 98.00            | 98.00         | 98.0         |
| ELOG2    | Log Cabin Way                   | LV          | 4                     | 314                  | 98            | 11.50                | 12.10           | 95.0%            | 95.0%              | 93.14            | 93.14         |              |
| ELOG2    |                                 | LV          | 9                     | 314                  | 96            | 0.60                 | 12.10           | 5.0%             | 100.0%             | 4.76             | 97.90         | 97.9         |
| EMLA1    | Log Cabin Wy / Sky Pointe Dr    | LV          | 1                     | 314                  | 71.7          | 3.20                 | 3.20            | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |
| EMR1     | Adjacent to Moccasin Road       | LV          | 4                     | 314                  | 98            | 4.00                 | 17.40           | 23.0%            | 23.0%              | 22.53            | 22.53         |              |
| EMR1     |                                 | LV          | 13                    | 314                  | 67.45         | 10.10                | 17.40           | 58.0%            | 81.0%              | 39.15            | 61.68         |              |
| EMR1     |                                 | LV          | 9                     | 314                  | 96            | 3.30                 | 17.40           | 19.0%            | 100.0%             | 18.21            | 79.89         | 79.9         |
| EMR2     | Adjacent to Moccasin Road       | LV          | 13                    | 314                  | 67.45         | 10.00                | 19.20           | 52.1%            | 52.1%              | 35.13            | 35.13         |              |
| EMR2     |                                 | LV          | 9                     | 314                  | 96            | 2.60                 | 19.20           | 13.5%            | 65.6%              | 13.00            | 48.13         |              |
| EMR2     |                                 | LV          | 9                     | 314                  | 96            | 0.40                 | 19.20           | 2.1%             | 67.7%              | 2.00             | 50.13         |              |
| EMR2     |                                 | LV          | 9                     | 314                  | 96            | 0.70                 | 19.20           | 3.6%             | 71.4%              | 3.50             | 53.63         |              |
| EMR2     |                                 | LV          | 4                     | 314                  | 98            | 5.50                 | 19.20           | 28.6%            | 100.0%             | 28.07            | 81.70         | 81.7         |
| ENP      | North Park                      | LV          | 2                     | 314                  | 55.25         | 3.50                 | 3.50            | 100.0%           | 100.0%             | 55.25            | 55.25         | 55.3         |
| EOHR1    | O'Hare Road                     | LV          | 4                     | 314                  | 98            | 7.40                 | 10.10           | 73.3%            | 73.3%              | 71.80            | 71.80         |              |
| EOHR1    |                                 | LV          | 9                     | 314                  | 96            | 0.90                 | 10.10           | 8.9%             | 82.2%              | 8.55             | 80.36         |              |
| EOHR1    |                                 | LV          | 9                     | 314                  | 96            | 0.80                 | 10.10           | 7.9%             | 90.1%              | 7.60             | 87.96         |              |
| EOHR1    |                                 | LV          | 9                     | 314                  | 96            | 1.00                 | 10.10           | 9.9%             | 100.0%             | 9.50             | 97.47         | 97.5         |
| EPA      | Moccasin Road / North Collector | LV          | 1                     | 314                  | 71.7          | 17.10                | 17.10           | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |



| BASIN ID | APPROXIMATE LOCATION              | Soil Survey | LAND USE INDEX NUMBER | SOIL MAP UNIT NUMBER | SUB REGION CN | SUB REGION AREA (AC) | BASIN AREA (AC) | PERCENT OF BASIN | CUMULATIVE PERCENT | AREA WEIGHTED CN | CUMULATIVE CN | COMPOSITE CN |
|----------|-----------------------------------|-------------|-----------------------|----------------------|---------------|----------------------|-----------------|------------------|--------------------|------------------|---------------|--------------|
| EPB1     | Log Cabin Wy / Fort Apache Rd     | LV          | 1                     | 314                  | 71.7          | 31.60                | 31.60           | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |
| EPB2     | Moccasin Road / Fort Apache Rd    | LV          | 1                     | 314                  | 71.7          | 46.40                | 46.40           | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |
| EPD      | Log Cabin Wy / North Collector    | LV          | 1                     | 314                  | 71.7          | 20.20                | 20.20           | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |
| EPD      | Log Cabin Wy / Fort Apache Rd     | LV          | 1                     | 314                  | 71.7          | 28.90                | 28.90           | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |
| EPE1     | O'Hare Road / Fort Apache Rd      | LV          | 1                     | 314                  | 71.7          | 12.50                | 12.50           | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |
| EPE2     | Iron Mountain Rd / Fort Apache Rd | LV          | 1                     | 314                  | 71.7          | 9.10                 | 9.10            | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |
| EPF1     | Log Cabin Wy / O'Hare Rd          | LV          | 1                     | 314                  | 71.7          | 13.50                | 13.50           | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |
| EPF2     |                                   | LV          | 1                     | 314                  | 71.7          | 19.10                | 19.10           | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |
| EPF2     | Sky Pointe Dr / Fort Apache Rd    | LV          | 1                     | 400                  | 89            | 1.00                 | 1.00            | 100.0%           | 100.0%             | 89.00            | 89.00         | 89.0         |
| EPG      | Log Cabin Wy / Roundabout         | LV          | 1                     | 314                  | 71.7          | 15.90                | 15.90           | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |
| EPH1     | O'Hare Rd / South Park            | LV          | 1                     | 314                  | 71.7          | 23.90                | 23.90           | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |
| EPH2     | Iron Mountain Rd / Tee Pee Ln     | LV          | 1                     | 314                  | 71.7          | 1.90                 | 8.90            | 21.3%            | 21.3%              | 15.31            | 15.31         | 85.3         |
| EPH2     |                                   | LV          | 1                     | 400                  | 89            | 7.00                 | 8.90            | 78.7%            | 100.0%             | 70.00            | 85.31         | 85.3         |
| EPH3     | Brent Ln / US 95                  | LV          | 1                     | 400                  | 89            | 15.40                | 15.40           | 100.0%           | 100.0%             | 89.00            | 89.00         | 89.0         |
| EPH1     | Log Cabin Wy / US 95              | LV          | 1                     | 314                  | 71.7          | 8.60                 | 8.60            | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |
| EPH2     | Log Cabin Wy / US 95              | LV          | 1                     | 314                  | 71.7          | 7.40                 | 7.40            | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |
| EPJ      | Iron Mountain Rd / US 95          | LV          | 1                     | 400                  | 89            | 4.70                 | 31.70           | 14.8%            | 14.8%              | 13.20            | 13.20         | 74.3         |
| EPJ      |                                   | LV          | 1                     | 314                  | 71.7          | 27.00                | 31.70           | 85.2%            | 100.0%             | 61.07            | 74.26         | 74.3         |
| ES1      | Scherkenbach Elementary           | LV          | 37                    | 314                  | 83.51         | 8.20                 | 10.40           | 78.8%            | 78.8%              | 65.84            | 65.84         | 85.5         |
| ES1      |                                   | LV          | 37                    | 400                  | 92.96         | 2.20                 | 10.40           | 21.2%            | 100.0%             | 19.66            | 85.51         | 85.5         |
| ES2      | Bilbray Elementary                | LV          | 37                    | 400                  | 92.96         | 32.10                | 32.10           | 100.0%           | 100.0%             | 92.96            | 92.96         | 93.0         |
| ESKV1    | Skye Village Road                 | LV          | 4                     | 314                  | 98            | 3.90                 | 3.90            | 100.0%           | 100.0%             | 98.00            | 98.00         | 98.0         |
| ESKY1    | Skye Pointe Drive                 | LV          | 4                     | 314                  | 98            | 8.20                 | 8.20            | 100.0%           | 100.0%             | 98.00            | 98.00         | 98.0         |
| ESP      | South Park                        | LV          | 2                     | 314                  | 55.25         | 3.50                 | 3.50            | 100.0%           | 100.0%             | 55.25            | 55.25         | 55.3         |
| ETP4     | Tee Pee Lane                      | LV          | 4                     | 400                  | 98            | 0.50                 | 0.80            | 62.5%            | 62.5%              | 61.25            | 61.25         | 98.0         |
| ETP4     |                                   | LV          | 4                     | 314                  | 98            | 0.30                 | 0.80            | 37.5%            | 100.0%             | 36.75            | 98.00         | 98.0         |
| ETP5     | Tee Pee Lane                      | LV          | 4                     | 400                  | 98            | 0.90                 | 0.90            | 100.0%           | 100.0%             | 98.00            | 98.00         | 98.0         |
| EUS95    | Kyle Canyon Interchange           | LV          | 4                     | 314                  | 98            | 9.40                 | 9.40            | 100.0%           | 100.0%             | 98.00            | 98.00         | 98.0         |
| OFFZ     | Moccasin Rd / Skye Village Rd     | LV          | 1                     | 314                  | 71.7          | 30.80                | 30.80           | 100.0%           | 100.0%             | 71.70            | 71.70         | 71.7         |



# APPENDIX C

---

## HEC-1 Analyses



```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 05MAY19 TIME 21:23:30
*
*****

```

```

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

```

```

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

```

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

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

1 HEC-1 INPUT PAGE 1

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

```

*DIAGRAM
1 ID SLATER HANIFAN GROUP
2 ID LENNAR HOMES
3 ID SUNSTONE
4 ID PHASE 1 INFRASTRUCTURE
5 ID PROPOSED DRAINAGE CONDITION
6 ID
7 ID RETURN PERIOD ----- 100-YEAR
8 ID DISTRIBUTION ----- 6-HOUR SDN3
9 ID PROJECT NO. ----- EST1905-000
10 ID FILENAME ----- SUN3.H1
11 ID DATE ----- April 2019
12 ID MODELED BY ----- LKL
13 ID
14 ID SIX HOUR DEPTH-AREA REDUCTION FACTORS
15 ID DRAINAGE AREA (MI^2) DARF
16 ID 0.0-0.49 1.00
17 ID 0.5-0.99 0.98
18 ID 1.0-1.99 0.97
19 ID 2.0-3.99 0.93
20 ID 4.0-5.99 0.91
21 ID 6.0-7.99 0.90
22 ID
23 IT 5 0 0 2000
24 IO 5 0 0
25 IN 5 0 0
26 JR PREC 1.00 0.98 0.97 0.93 0.91 0.90
*
27 KK WUS95
28 KM KYLE CANYON INTERCHANGE - WEST HALF
29 BA .0133
30 PB 2.77
31 PC 0 0.020 0.057 0.070 0.087 0.108 0.124 0.130 0.130 0.130
32 PC 0.130 0.130 0.130 0.133 0.140 0.142 0.148 0.158 0.172 0.181
33 PC 0.190 0.197 0.199 0.200 0.201 0.204 0.214 0.229 0.241 0.249
34 PC 0.251 0.256 0.270 0.278 0.281 0.283 0.295 0.322 0.352 0.409
35 PC 0.499 0.590 0.710 0.744 0.781 0.812 0.819 0.835 0.851 0.856
36 PC 0.860 0.868 0.876 0.888 0.910 0.926 0.937 0.950 0.970 0.976
37 PC 0.982 0.985 0.987 0.989 0.990 0.993 0.993 0.994 0.995 0.998
38 PC 0.998 0.999 1.000
39 LS 0 98.0
40 UD 0.082
*
41 KK DHD01B
42 KM FACILITY E-9
43 KM FLOW SPLIT AT VTN CULVERT 1
44 KM FLOW SPLITS TO BETWEEN NB AND SB ROADS OF US-95
45 KM REFERENCED FROM GCW MASTER DRAINAGE STUDY
46 DT DCHD1B
47 DI 0 133 187 250
48 DQ 0 120 135 150
*

```

1 HEC-1 INPUT PAGE 2

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



```

49      KK  DHD02B
50      KM  FACILITY E-10
51      KM  FLOW SPLIT AT VTN CULVERT 2
52      KM  FLOW SPLITS TO BETWEEN NB AND SB ROADS OF US-95
53      KM  REFERENCED FROM GCW MASTER DRAINAGE STUDY
54      DT  DCHD2B
55      DI      0      100      138
56      DQ      0      99      135
      *

57      KK  WML15A
58      KM  WEST BASIN, WEST OF SKYE PARK DRIVE
59      BA      .0193
60      PB      2.93
61      LS      0      95.0
62      UD      0.084
      *

63      KK  WSPD1
64      KM  WEST BASIN, SKYE PARK DRIVE
65      BA      .0011
66      PB      2.93
67      LS      0      98.0
68      UD      0.055
      *

69      KK  WC1
70      KM  FAR NW OF IRON MT/GRAND CANYON INTERSECTION
71      KM  COMBINE WML15A, WSPD1
72      HC      2
      *

73      KK  WIRN4
74      KM  WEST BASIN, IRN MT ROAD
75      BA      .0042
76      PB      2.93
77      LS      0      98.0
78      UD      0.079
      *

79      KK  WMLA1A
80      KM  WEST BASIN, WEST OF GRAND CANYON DRIVE
81      BA      .0101
82      PB      2.93
83      LS      0      95.0
84      UD      0.093
      *

85      KK  WC2
86      KM  NW OF IRON MT/GRAND CANYON INTERSECTION
87      KM  COMBINE WC1, WIRN4, WMLA1A
88      HC      3
      *

```

1

HEC-1 INPUT

PAGE 3

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

```

89      KK  WGED1B
90      KM  WEST BASIN, WEST OF US95
91      BA      .0179
92      PB      2.93
93      LS      0      94.0
94      UD      0.113
      *

95      KK  WIRN5
96      KM  WEST BASIN, WEST OF US95
97      BA      .0012
98      PB      2.93
99      LS      0      98.0
100     UD      0.050
      *

101     KK  WC3
102     KM  W OF IRON MT/US95 INTERSECTION
103     KM  COMBINE WC2, WGED1B, WIRON5
104     HC      3
      *

105     KK  OFFW
106     BA      .0122
107     PB      2.77
108     LS      0      92.0
109     UD      .089
      *

110     KK  CHD04B
111     HC      3
      *

112     KK  WPRK7
113     KM  WEST BASIN, WEST OF GRAND CANYON DRIVE

```



|     |    |                                        |      |
|-----|----|----------------------------------------|------|
| 114 | BA | .0046                                  |      |
| 115 | PB | 2.93                                   |      |
| 116 | LS | 0                                      | 84.0 |
| 117 | UD | 0.113                                  |      |
|     | *  |                                        |      |
| 118 | KK | WMLA1B                                 |      |
| 119 | KM | WEST BASIN, WEST OF GRAND CANYON DRIVE |      |
| 120 | BA | .0187                                  |      |
| 121 | PB | 2.93                                   |      |
| 122 | LS | 0                                      | 95.0 |
| 123 | UD | 0.103                                  |      |
|     | *  |                                        |      |

1

HEC-1 INPUT

PAGE 4

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

|     |    |                                                             |      |
|-----|----|-------------------------------------------------------------|------|
| 124 | KK | WMLA2                                                       |      |
| 125 | KM | WEST BASIN, WEST OF GRAND CANYON DRIVE                      |      |
| 126 | BA | .0476                                                       |      |
| 127 | PB | 2.93                                                        |      |
| 128 | LS | 0                                                           | 95.0 |
| 129 | UD | 0.137                                                       |      |
|     | *  |                                                             |      |
| 130 | KK | WGRC2                                                       |      |
| 131 | KM | WEST BASIN, GRAND CANYON DRIVE                              |      |
| 132 | BA | .0041                                                       |      |
| 133 | PB | 2.93                                                        |      |
| 134 | LS | 0                                                           | 98.0 |
| 135 | UD | 0.075                                                       |      |
|     | *  |                                                             |      |
| 136 | KK | WC4                                                         |      |
| 137 | KM | W OF IRON MT/US95 INTERSECTION                              |      |
| 138 | KM | COMBINE WPRK7, WMLA1B, WMLA2, WGRC2                         |      |
| 139 | HC | 4                                                           |      |
|     | *  |                                                             |      |
| 140 | KK | WMLA3                                                       |      |
| 141 | KM | WEST BASIN, WEST OF US95                                    |      |
| 142 | BA | .0180                                                       |      |
| 143 | PB | 2.93                                                        |      |
| 144 | LS | 0                                                           | 95.0 |
| 145 | UD | 0.104                                                       |      |
|     | *  |                                                             |      |
| 146 | KK | WC5                                                         |      |
| 147 | KM | W OF IRON MT/US95 INTERSECTION                              |      |
| 148 | HC | 2                                                           |      |
|     | *  |                                                             |      |
| 149 | KK | CHD05B                                                      |      |
| 150 | KM | DISCHARGE DIRECTLY INTO EXISTING US-95 INTERIM MPU FACILITY |      |
| 151 | HC | 2                                                           |      |
|     | *  |                                                             |      |
| 152 | KK | WML16                                                       |      |
| 153 | KM | WEST BASIN, WEST OF SKYE PARK DRIVE                         |      |
| 154 | BA | .0346                                                       |      |
| 155 | PB | 2.93                                                        |      |
| 156 | LS | 0                                                           | 95.0 |
| 157 | UD | 0.118                                                       |      |
|     | *  |                                                             |      |
| 158 | KK | WSPD3                                                       |      |
| 159 | KM | WEST BASIN, SKYE PARK DRIVE                                 |      |
| 160 | BA | .0014                                                       |      |
| 161 | PB | 2.93                                                        |      |
| 162 | LS | 0                                                           | 98.0 |
| 163 | UD | 0.072                                                       |      |
|     | *  |                                                             |      |

1

HEC-1 INPUT

PAGE 5

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

|     |    |                                              |      |
|-----|----|----------------------------------------------|------|
| 164 | KK | WC6                                          |      |
| 165 | KM | N OF SKYE CANYON PARK/SKYE PARK INTERSECTION |      |
| 166 | KM | COMBINE WML16, WSPD3                         |      |
| 167 | HC | 2                                            |      |
|     | *  |                                              |      |
| 168 | KK | WL9A                                         |      |
| 169 | KM | WEST BASIN, WEST OF SKYE PARK DRIVE          |      |
| 170 | BA | .0284                                        |      |
| 171 | PB | 2.93                                         |      |
| 172 | LS | 0                                            | 92.0 |
| 173 | UD | 0.118                                        |      |
|     | *  |                                              |      |
| 174 | KK | WL10A                                        |      |
| 175 | KM | WEST BASIN, WEST OF GRAND CANYON DRIVE       |      |
| 176 | BA | .0267                                        |      |



|     |    |                                                 |      |
|-----|----|-------------------------------------------------|------|
| 177 | PB | 2.93                                            |      |
| 178 | LS | 0                                               | 92.0 |
| 179 | UD | 0.125                                           |      |
|     | *  |                                                 |      |
| 180 | KK | WSCP4                                           |      |
| 181 | KM | WEST BASIN, SKYE CANYON PARK DRIVE              |      |
| 182 | BA | .0122                                           |      |
| 183 | PB | 2.93                                            |      |
| 184 | LS | 0                                               | 98.0 |
| 185 | UD | 0.103                                           |      |
|     | *  |                                                 |      |
| 186 | KK | WC7                                             |      |
| 187 | KM | W OF SKYE CANYON PARK/GRAND CANYON INTERSECTION |      |
| 188 | KM | COMBINE WC6, WL9A, WL10A, WSCP4                 |      |
| 189 | HC | 4                                               |      |
|     | *  |                                                 |      |
| 190 | KK | WGC3                                            |      |
| 191 | KM | WEST BASIN, WEST OF GRAND CANYON DRIVE          |      |
| 192 | BA | .0476                                           |      |
| 193 | PB | 2.93                                            |      |
| 194 | LS | 0                                               | 95.0 |
| 195 | UD | 0.099                                           |      |
|     | *  |                                                 |      |
| 196 | KK | WGRC1A                                          |      |
| 197 | KM | WEST BASIN, GRAND CANYON DRIVE                  |      |
| 198 | BA | .0020                                           |      |
| 199 | PB | 2.93                                            |      |
| 200 | LS | 0                                               | 98.0 |
| 201 | UD | 0.111                                           |      |
|     | *  |                                                 |      |

1

HEC-1 INPUT

PAGE 6

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

|     |    |                                                                          |      |
|-----|----|--------------------------------------------------------------------------|------|
| 202 | KK | WML15B                                                                   |      |
| 203 | KM | WEST BASIN, WEST OF SKYE PARK DRIVE                                      |      |
| 204 | BA | .0175                                                                    |      |
| 205 | PB | 2.93                                                                     |      |
| 206 | LS | 0                                                                        | 95.0 |
| 207 | UD | 0.102                                                                    |      |
|     | *  |                                                                          |      |
| 208 | KK | WSPD2                                                                    |      |
| 209 | KM | WEST BASIN, SKYE PARK DRIVE                                              |      |
| 210 | BA | .0012                                                                    |      |
| 211 | PB | 2.93                                                                     |      |
| 212 | LS | 0                                                                        | 98.0 |
| 213 | UD | 0.050                                                                    |      |
|     | *  |                                                                          |      |
| 214 | KK | WC8                                                                      |      |
| 215 | KM | COMBINE WML15B, WSPD2                                                    |      |
| 216 | HC | 2                                                                        |      |
|     | *  |                                                                          |      |
| 217 | KK | WC9                                                                      |      |
| 218 | KM | FAR N OF SKYE CANYON PARK/GRAND CANYON INTERSECTION                      |      |
| 219 | KM | COMBINE WC7, WC8, WGRC1A, WGC3                                           |      |
| 220 | HC | 4                                                                        |      |
|     | *  |                                                                          |      |
| 221 | KK | OFF14                                                                    |      |
| 222 | BA | .0145                                                                    |      |
| 223 | PB | 2.77                                                                     |      |
| 224 | LS | 0                                                                        | 94.7 |
| 225 | UD | 0.108                                                                    |      |
|     | *  |                                                                          |      |
| 226 | KK | CHD06B                                                                   |      |
| 227 | KM | ACCOUNTS FOR DIRECT CONNECTION FROM CHD05B TO US-95 INTERIM MPU FACILITY |      |
| 228 | HC | 3                                                                        |      |
|     | *  |                                                                          |      |
| 229 | KK | 95-9A                                                                    |      |
| 230 | KM | REFERENCED FROM GCW MASTER DRAINAGE STUDY                                |      |
| 231 | BA | .0110                                                                    |      |
| 232 | PB | 2.77                                                                     |      |
| 233 | LS | 0                                                                        | 94.7 |
| 234 | UD | 0.095                                                                    |      |
|     | *  |                                                                          |      |
| 235 | KK | CHD07B                                                                   |      |
| 236 | KM | COMBINE CHD06B, 95-9A                                                    |      |
| 237 | KM | REFERENCED FROM GCW MASTER DRAINAGE STUDY                                |      |
| 238 | HC | 2                                                                        |      |
|     | *  |                                                                          |      |

1

HEC-1 INPUT

PAGE 7

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



|     |    |                                           |      |  |
|-----|----|-------------------------------------------|------|--|
| 239 | KK | OFF15                                     |      |  |
| 240 | KM | REFERENCED FROM GCW MASTER DRAINAGE STUDY |      |  |
| 241 | BA | .0348                                     |      |  |
| 242 | PB | 2.77                                      |      |  |
| 243 | LS | 0                                         | 94.7 |  |
| 244 | UD | 0.108                                     |      |  |
|     | *  |                                           |      |  |
| 245 | KK | CHD7B2                                    |      |  |
| 246 | KM | COMBINE CHD07B, OFF15                     |      |  |
| 247 | KM | COMBINE FLOWS IN MPU FACILITY             |      |  |
| 248 | KM | REVISED FROM GCW MASTER DRAINAGE STUDY    |      |  |
| 249 | HC | 2                                         |      |  |
|     | *  |                                           |      |  |
| 250 | KK | OFF17B                                    |      |  |
| 251 | KM | REFERENCED FROM GCW MASTER DRAINAGE STUDY |      |  |
| 252 | KM | ADDED FROM HORSE INTERCHANGE MODEL        |      |  |
| 253 | BA | .0080                                     |      |  |
| 254 | PB | 2.773                                     |      |  |
| 255 | LS | 0                                         | 92.1 |  |
| 256 | UD | 0.069                                     |      |  |
|     | *  |                                           |      |  |
| 257 | KK | OFF17A                                    |      |  |
| 258 | KM | REFERENCED FROM GCW MASTER DRAINAGE STUDY |      |  |
| 259 | KM | ADDED FROM HORSE INTERCHANGE MODEL        |      |  |
| 260 | BA | .0305                                     |      |  |
| 261 | PB | 2.773                                     |      |  |
| 262 | LS | 0                                         | 92.1 |  |
| 263 | UD | 0.104                                     |      |  |
|     | *  |                                           |      |  |
| 264 | KK | COFF17                                    |      |  |
| 265 | KM | REFERENCED FROM GCW MASTER DRAINAGE STUDY |      |  |
| 266 | KM | ADDED FROM HORSE INTERCHANGE MODEL        |      |  |
| 267 | KM | COMBINE OFF17A, OFF17B                    |      |  |
| 268 | KM | CULVERT AT BASIN OFF24B                   |      |  |
| 269 | HC | 2                                         |      |  |
|     | *  |                                           |      |  |
| 270 | KK | ON1                                       |      |  |
| 271 | KM | START CENTENNIAL POINT HEC-1 DATA         |      |  |
| 272 | BA | .0042                                     |      |  |
| 273 | PB | 2.86                                      |      |  |
| 274 | LS | 0                                         | 91.2 |  |
| 275 | UD | 0.085                                     |      |  |
|     | *  |                                           |      |  |

1

HEC-1 INPUT

PAGE 8

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

|     |    |                                        |      |  |
|-----|----|----------------------------------------|------|--|
| 276 | KK | ON4A                                   |      |  |
| 277 | BA | .0045                                  |      |  |
| 278 | LS | 0                                      | 91.2 |  |
| 279 | UD | 0.077                                  |      |  |
|     | *  |                                        |      |  |
| 280 | KK | C1                                     |      |  |
| 281 | KM | COMBINE ON1 AND ON4A                   |      |  |
| 282 | HC | 2                                      |      |  |
|     | *  |                                        |      |  |
| 283 | KK | D1                                     |      |  |
| 284 | KM | DIVERT FLOW INTO BASIN ON6             |      |  |
| 285 | DT | DIV1                                   |      |  |
| 286 | DI | 0                                      | 16   |  |
| 287 | DQ | 0                                      | 13   |  |
|     | *  |                                        |      |  |
| 288 | KK | ON5                                    |      |  |
| 289 | BA | .0052                                  |      |  |
| 290 | LS | 0                                      | 91.2 |  |
| 291 | UD | 0.080                                  |      |  |
|     | *  |                                        |      |  |
| 292 | KK | C2                                     |      |  |
| 293 | KM | COMBINE C1 AND ON5                     |      |  |
| 294 | HC | 2                                      |      |  |
|     | *  |                                        |      |  |
| 295 | KK | D1A                                    |      |  |
| 296 | KM | DIVERT FLOW FOR LATER USE IN HEC-1 RUN |      |  |
| 297 | DT | DIV1A                                  |      |  |
| 298 | DI | 0                                      | 50   |  |
| 299 | DQ | 0                                      | 50   |  |
|     | *  |                                        |      |  |
| 300 | KK | ON4B                                   |      |  |
| 301 | BA | .0031                                  |      |  |
| 302 | LS | 0                                      | 91.2 |  |
| 303 | UD | 0.085                                  |      |  |
|     | *  |                                        |      |  |



304 KK RET1  
305 KM RETRIEVE FLOW FROM D1  
306 DR DIV1  
\*

307 KK ON6  
308 BA .0039  
309 LS 0 91.2  
310 UD 0.074  
\*

1

HEC-1 INPUT

PAGE 9

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

311 KK C3  
312 KM COMBINE RET1 AND ON6  
313 HC 2  
\*

314 KK D1B  
315 KM DIVERT FLOW FOR LATER USE IN HEC-1 RUN  
316 DT DIV1B  
317 DI 0 50  
318 DQ 0 50  
\*

319 KK ON2  
320 BA .0050  
321 LS 0 91.2  
322 UD 0.080  
\*

323 KK ON3  
324 BA .0063  
325 LS 0 91.5  
326 UD 0.079  
\*

327 KK ON9  
328 BA .0045  
329 LS 0 91.4  
330 UD 0.096  
\*

331 KK C4  
332 KM COMBINE ON2, ON3 AND ON9  
333 HC 3  
\*

334 KK D2  
335 KM DIVERT FLOW INTO BASIN ON8  
336 DT DIV2  
337 DI 0 29  
338 DQ 0 24  
\*

339 KK ON10  
340 BA .0025  
341 LS 0 91.5  
342 UD 0.071  
\*

343 KK C5  
344 KM COMBINE C4 AND ON10  
345 HC 2  
\*

1

HEC-1 INPUT

PAGE 10

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

346 KK D3  
347 KM DIVERT FLOW INTO BASIN ON7  
348 DT DIV3  
349 DI 0 10  
350 DQ 0 8  
\*

351 KK ON11  
352 BA .0025  
353 LS 0 91.5  
354 UD 0.067  
\*

355 KK C6  
356 KM COMBINE C5 AND ON11  
357 HC 2  
\*

358 KK D1C  
359 KM DIVERT FLOW FOR LATER USE IN HEC-1 RUN  
360 DT DIV1C  
361 DI 0 50



|     |    |                                |    |      |     |   |
|-----|----|--------------------------------|----|------|-----|---|
| 362 | DQ | 0                              | 50 |      |     |   |
|     | *  |                                |    |      |     |   |
| 363 | KK | CD1C                           |    |      |     |   |
| 364 | KM | COMBINE D1A, ON4B, D1B AND D1C |    |      |     |   |
| 365 | KM | PICK UP AT OFF23               |    |      |     |   |
| 366 | HC | 4                              |    |      |     |   |
|     | *  |                                |    |      |     |   |
| 367 | KK | RCD1C                          |    |      |     |   |
| 368 | KM | ROUTE CD1C TO BASIN OFF23      |    |      |     |   |
| 369 | RK | 2640 0.0346 0.02               |    | TRAP | 100 | 2 |
|     | *  |                                |    |      |     |   |
| 370 | KK | DRCD1C                         |    |      |     |   |
| 371 | KM | DIVERT FLOW TO BASIN OFF23     |    |      |     |   |
| 372 | DT | DOFF23                         |    |      |     |   |
| 373 | DI | 0 50 100                       |    |      |     |   |
| 374 | DQ | 0 50 100                       |    |      |     |   |
|     | *  |                                |    |      |     |   |
| 375 | KK | ON8                            |    |      |     |   |
| 376 | BA | .0042                          |    |      |     |   |
| 377 | LS | 0 83.5                         |    |      |     |   |
| 378 | UD | 0.074                          |    |      |     |   |
|     | *  |                                |    |      |     |   |

1 HEC-1 INPUT PAGE 11

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

|     |    |                                            |  |  |  |  |
|-----|----|--------------------------------------------|--|--|--|--|
| 379 | KK | RET2                                       |  |  |  |  |
| 380 | KM | RETRIEVE FLOW FROM D2                      |  |  |  |  |
| 381 | DR | DIV2                                       |  |  |  |  |
|     | *  |                                            |  |  |  |  |
| 382 | KK | C7                                         |  |  |  |  |
| 383 | KM | COMBINE ON11 AND RET2                      |  |  |  |  |
| 384 | HC | 2                                          |  |  |  |  |
|     | *  |                                            |  |  |  |  |
| 385 | KK | RET3                                       |  |  |  |  |
| 386 | KM | RETRIEVE FLOW FROM D3                      |  |  |  |  |
| 387 | DR | DIV3                                       |  |  |  |  |
|     | *  |                                            |  |  |  |  |
| 388 | KK | ON7                                        |  |  |  |  |
| 389 | BA | .0073                                      |  |  |  |  |
| 390 | LS | 0 91.3                                     |  |  |  |  |
| 391 | UD | 0.077                                      |  |  |  |  |
|     | *  |                                            |  |  |  |  |
| 392 | KK | C8                                         |  |  |  |  |
| 393 | KM | COMBINE C7, RET3 AND ON7                   |  |  |  |  |
| 394 | HC | 3                                          |  |  |  |  |
|     | *  |                                            |  |  |  |  |
| 395 | KK | RET1A                                      |  |  |  |  |
| 396 | KM | RETRIEVE FLOW FROM D1A IN TEE PEE          |  |  |  |  |
| 397 | DR | DIV1A                                      |  |  |  |  |
|     | *  |                                            |  |  |  |  |
| 398 | KK | RET1B                                      |  |  |  |  |
| 399 | KM | RETRIEVE FLOW FROM D1B IN TEE PEE          |  |  |  |  |
| 400 | DR | DIV1B                                      |  |  |  |  |
|     | *  |                                            |  |  |  |  |
| 401 | KK | RET1C                                      |  |  |  |  |
| 402 | KM | RETRIEVE FLOW FROM D1C IN TEE PEE          |  |  |  |  |
| 403 | DR | DIV1C                                      |  |  |  |  |
|     | *  |                                            |  |  |  |  |
| 404 | KK | C9                                         |  |  |  |  |
| 405 | KM | COMBINE C8, RET1A, RET1B, RET1C IN TEE PEE |  |  |  |  |
| 406 | KM | END CENTENNIAL POINT HEC-1 DATA            |  |  |  |  |
| 407 | HC | 3                                          |  |  |  |  |
|     | *  |                                            |  |  |  |  |
| 408 | KK | ON2D                                       |  |  |  |  |
| 409 | KM | START GRAND CANYON APARTMENTS HEC-1 DATA   |  |  |  |  |
| 410 | BA | .0105                                      |  |  |  |  |
| 411 | PB | 2.90                                       |  |  |  |  |
| 412 | LS | 0 95                                       |  |  |  |  |
| 413 | UD | 0.094                                      |  |  |  |  |
|     | *  |                                            |  |  |  |  |

1 HEC-1 INPUT PAGE 12

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

|     |    |       |  |  |  |  |
|-----|----|-------|--|--|--|--|
| 414 | KK | ON5D  |  |  |  |  |
| 415 | BA | .0038 |  |  |  |  |
| 416 | LS | 0 95  |  |  |  |  |
| 417 | UD | 0.067 |  |  |  |  |
|     | *  |       |  |  |  |  |



|     |    |                                                                |    |  |
|-----|----|----------------------------------------------------------------|----|--|
| 418 | KK | CP1                                                            |    |  |
| 419 | KM | COMBINE ON2D AND ON5D                                          |    |  |
| 420 | HC | 2                                                              |    |  |
|     | *  |                                                                |    |  |
| 421 | KK | ON3D                                                           |    |  |
| 422 | BA | .0036                                                          |    |  |
| 423 | LS | 0                                                              | 95 |  |
| 424 | UD | 0.084                                                          |    |  |
|     | *  |                                                                |    |  |
| 425 | KK | CP2                                                            |    |  |
| 426 | KM | COMBINE CP1 AND ON3D                                           |    |  |
| 427 | HC | 2                                                              |    |  |
|     | *  |                                                                |    |  |
| 428 | KK | ON1D                                                           |    |  |
| 429 | BA | .0075                                                          |    |  |
| 430 | LS | 0                                                              | 95 |  |
| 431 | UD | 0.079                                                          |    |  |
|     | *  |                                                                |    |  |
| 432 | KK | ON4D                                                           |    |  |
| 433 | BA | .0041                                                          |    |  |
| 434 | LS | 0                                                              | 95 |  |
| 435 | UD | 0.096                                                          |    |  |
|     | *  |                                                                |    |  |
| 436 | KK | CP3                                                            |    |  |
| 437 | KM | COMBINE ON1D AND ON4D                                          |    |  |
| 438 | HC | 2                                                              |    |  |
|     | *  |                                                                |    |  |
| 439 | KK | CP4                                                            |    |  |
| 440 | KM | COMBINE CP2 AND CP3                                            |    |  |
| 441 | KM | END GRAND CANYON APARTMENTS HEC-1 DATA                         |    |  |
| 442 | HC | 2                                                              |    |  |
|     | *  |                                                                |    |  |
| 443 | KK | CENGCA                                                         |    |  |
| 444 | KM | COMBINE DRCD1C, C9, CP4                                        |    |  |
| 445 | KM | CD1C IS DIVERSION OF FLOW ON TEE PEE FROM CENTENNIAL POINT     |    |  |
| 446 | KM | CP4 AND C9 ARE ENDING OF THE APARTMENT COMPLEX AND DEVELOPMENT |    |  |
| 447 | HC | 4                                                              |    |  |
|     | *  |                                                                |    |  |

1

HEC-1 INPUT

PAGE 13

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

|     |    |                                               |      |  |
|-----|----|-----------------------------------------------|------|--|
| 448 | KK | WML9                                          |      |  |
| 449 | KM | WEST BASIN, WEST OF EGAN CREST DRIVE          |      |  |
| 450 | BA | .0257                                         |      |  |
| 451 | PB | 3.00                                          |      |  |
| 452 | LS | 0                                             | 94.9 |  |
| 453 | UD | 0.083                                         |      |  |
|     | *  |                                               |      |  |
| 454 | KK | WPRK5                                         |      |  |
| 455 | KM | WEST BASIN, WEST OF EGAN CREST DRIVE          |      |  |
| 456 | BA | .0031                                         |      |  |
| 457 | PB | 3.00                                          |      |  |
| 458 | LS | 0                                             | 84.0 |  |
| 459 | UD | 0.064                                         |      |  |
|     | *  |                                               |      |  |
| 460 | KK | WC10A                                         |      |  |
| 461 | KM | FAR W OF EAGLE CANYON/EGAN CREST INTERSECTION |      |  |
| 462 | KM | COMBINE WML9, WPRK5                           |      |  |
| 463 | HC | 2                                             |      |  |
|     | *  |                                               |      |  |
| 464 | KK | WEGL1                                         |      |  |
| 465 | KM | WEST BASIN, EAGLE CANYON AVE                  |      |  |
| 466 | BA | .0052                                         |      |  |
| 467 | PB | 3.00                                          |      |  |
| 468 | LS | 0                                             | 98.0 |  |
| 469 | UD | 0.083                                         |      |  |
|     | *  |                                               |      |  |
| 470 | KK | WL4B                                          |      |  |
| 471 | BA | .0140                                         |      |  |
| 472 | PB | 3.00                                          |      |  |
| 473 | LS | 0                                             | 92.0 |  |
| 474 | UD | 0.093                                         |      |  |
|     | *  |                                               |      |  |
| 475 | KK | WC10B                                         |      |  |
| 476 | KM | W OF EAGLE CANYON/EGAN CREST INTERSECTION     |      |  |
| 477 | HC | 3                                             |      |  |
|     | *  |                                               |      |  |
| 478 | KK | WML10                                         |      |  |
| 479 | KM | WEST BASIN, WEST OF EGAN CREST DRIVE          |      |  |



480 BA .0181  
481 PB 3.00  
482 LS 0 95.0  
483 UD 0.092  
\*

1

HEC-1 INPUT

PAGE 14

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

484 KK WEGN3  
485 KM WEST BASIN, EGAN CREST DRIVE  
486 BA .0051  
487 PB 3.00  
488 LS 0 98.0  
489 UD 0.136  
\*

490 KK WML11  
491 KM WEST BASIN, WEST OF EGAN CREST DRIVE  
492 BA .0448  
493 PB 3.00  
494 LS 0 92.7  
495 UD 0.121  
\*

496 KK WC11  
497 KM W OF EAGLE CANYON/EGAN CREST INTERSECTION  
498 KM COMBINE WML10, WEGN3, WML11  
499 HC 3  
\*

500 KK WC12  
501 KM W OF EAGLE CANYON/EGAN CREST INTERSECTION  
502 KM COMBINE WC10B, WC11  
503 HC 2  
\*

504 KK WL6B  
505 KM WEST BASIN, WEST OF SKY VILLAGE ROAD  
506 BA .0165  
507 PB 3.00  
508 LS 0 92.0  
509 UD 0.106  
\*

510 KK WL7  
511 KM WEST BASIN, WEST OF SKY VILLAGE ROAD  
512 BA .0180  
513 PB 3.00  
514 LS 0 92.0  
515 UD 0.095  
\*

516 KK WML13  
517 KM WEST BASIN, WEST OF SKY VILLAGE ROAD  
518 BA .0256  
519 PB 3.00  
520 LS 0 95.0  
521 UD 0.117  
\*

1

HEC-1 INPUT

PAGE 15

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

522 KK WEGL2  
523 KM WEST BASIN, EAGLE CANYON AVE  
524 BA .0051  
525 PB 3.00  
526 LS 0 98.0  
527 UD 0.072  
\*

528 KK WC13  
529 KM W OF EAGLE CANYON/EGAN CREST INTERSECTION  
530 KM COMBINE WC12, WL6B, WL7, WML13, WEGL2  
531 HC 5  
\*

532 KK WML14  
533 KM WEST BASIN, WEST OF SKY VILLAGE ROAD  
534 BA .0300  
535 PB 3.00  
536 LS 0 95.0  
537 UD 0.111  
\*

538 KK WL8  
539 KM WEST BASIN, WEST OF SKY VILLAGE ROAD  
540 BA .0272  
541 PB 3.00  
542 LS 0 92.0  
543 UD 0.128  
\*



|     |    |                                           |      |  |
|-----|----|-------------------------------------------|------|--|
| 544 | KK | WSKV3                                     |      |  |
| 545 | KM | WEST BASIN, WEST OF SKY VILLAGE ROAD      |      |  |
| 546 | BA | .0066                                     |      |  |
| 547 | PB | 2.93                                      |      |  |
| 548 | LS | 0                                         | 98.0 |  |
| 549 | UD | 0.100                                     |      |  |
|     | *  |                                           |      |  |
| 550 | KK | WSKV4                                     |      |  |
| 551 | KM | WEST BASIN, SKY VILLAGE ROAD              |      |  |
| 552 | BA | .0070                                     |      |  |
| 553 | PB | 3.00                                      |      |  |
| 554 | LS | 0                                         | 98.0 |  |
| 555 | UD | 0.099                                     |      |  |
|     | *  |                                           |      |  |
| 556 | KK | WC14                                      |      |  |
| 557 | KM | E OF EAGLE CANYON/EGAN CREST INTERSECTION |      |  |
| 558 | KM | COMBINE WC13, WML14, WL8, WSKV3, WSKV4    |      |  |
| 559 | HC | 5                                         |      |  |
|     | *  |                                           |      |  |

1 HEC-1 INPUT PAGE 16

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

|     |    |                                               |      |  |
|-----|----|-----------------------------------------------|------|--|
| 560 | KK | WL9B                                          |      |  |
| 561 | KM | WEST BASIN, WEST OF SKY PARK DRIVE            |      |  |
| 562 | BA | .0224                                         |      |  |
| 563 | PB | 2.93                                          |      |  |
| 564 | LS | 0                                             | 92.0 |  |
| 565 | UD | 0.116                                         |      |  |
|     | *  |                                               |      |  |
| 566 | KK | WSPD4                                         |      |  |
| 567 | KM | WEST BASIN, WEST OF SKY VILLAGE ROAD          |      |  |
| 568 | BA | .0036                                         |      |  |
| 569 | PB | 2.93                                          |      |  |
| 570 | LS | 0                                             | 98.0 |  |
| 571 | UD | 0.095                                         |      |  |
|     | *  |                                               |      |  |
| 572 | KK | WC15                                          |      |  |
| 573 | KM | N OF EAGLE CANYON/SKY PARK DRIVE INTERSECTION |      |  |
| 574 | KM | COMBINE WL9B, WSPD4                           |      |  |
| 575 | HC | 2                                             |      |  |
|     | *  |                                               |      |  |
| 576 | KK | WL11                                          |      |  |
| 577 | KM | WEST BASIN, WEST OF MOUNTAIN LANDING STREET   |      |  |
| 578 | BA | .0573                                         |      |  |
| 579 | PB | 2.93                                          |      |  |
| 580 | LS | 0                                             | 92.0 |  |
| 581 | UD | 0.131                                         |      |  |
|     | *  |                                               |      |  |
| 582 | KK | WPRK8                                         |      |  |
| 583 | KM | WEST BASIN, WEST OF SKY VILLAGE ROAD          |      |  |
| 584 | BA | .0027                                         |      |  |
| 585 | PB | 2.93                                          |      |  |
| 586 | LS | 0                                             | 84.0 |  |
| 587 | UD | 0.077                                         |      |  |
|     | *  |                                               |      |  |
| 588 | KK | WPRK9                                         |      |  |
| 589 | KM | WEST BASIN, WEST OF SKY VILLAGE ROAD          |      |  |
| 590 | BA | .0007                                         |      |  |
| 591 | PB | 2.93                                          |      |  |
| 592 | LS | 0                                             | 84.0 |  |
| 593 | UD | 0.069                                         |      |  |
|     | *  |                                               |      |  |
| 594 | KK | WMTL1                                         |      |  |
| 595 | KM | WEST BASIN, MOUNTAIN LANDING STREET           |      |  |
| 596 | BA | .0020                                         |      |  |
| 597 | PB | 2.93                                          |      |  |
| 598 | LS | 0                                             | 98.0 |  |
| 599 | UD | 0.069                                         |      |  |
|     | *  |                                               |      |  |

1 HEC-1 INPUT PAGE 17

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

|     |    |                                                 |  |  |
|-----|----|-------------------------------------------------|--|--|
| 600 | KK | WC16                                            |  |  |
| 601 | KM | S OF EAGLE CANYON/MOUNTAIN LANDING INTERSECTION |  |  |
| 602 | KM | COMBINE WL11, WPRK8, WPRK9, WMTL1               |  |  |
| 603 | HC | 4                                               |  |  |
|     | *  |                                                 |  |  |
| 604 | KK | WEGL3                                           |  |  |
| 605 | KM | WEST BASIN, EAGLE CANYON AVE                    |  |  |
| 606 | BA | .0075                                           |  |  |
| 607 | PB | 3.00                                            |  |  |



```

608      LS      0      98.0
609      UD      0.098
        *

610      KK      WL10B
611      KM      WEST BASIN, WEST OF GRAND CANYON DRIVE
612      BA      .0286
613      PB      2.93
614      LS      0      92.0
615      UD      0.139
        *

616      KK      WC17
617      KM      W OF EAGLE CANYON/GRAND CANYON INTERSECTION
618      KM      COMBINE WC14, WC15, WC16, WEGL3, WL10B
619      HC      5
        *

620      KK      WL12
621      KM      WEST BASIN, WEST OF GRAND CANYON DRIVE
622      BA      .0490
623      PB      2.93
624      LS      0      92.0
625      UD      0.119
        *

626      KK      WGRC1B
627      KM      WEST BASIN, GRAND CANYON DRIVE
628      BA      .0050
629      PB      2.93
630      LS      0      98.0
631      UD      0.163
        *

632      KK      WC18
633      KM      W OF EAGLE CANYON/GRAND CANYON INTERSECTION
634      KM      COMBINE WC17, WL12, WGRC1B
635      HC      3
        *

```

1

HEC-1 INPUT

PAGE 18

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

```

636      KK      CCP4
637      HC      2
        *

638      KK      OFF21B
639      KM      REFERENCED FROM GCW MASTER DRAINAGE STUDY
640      KM      BASIN IS DEVELOPED, CHECK FOR REFERENCE MATERIAL
641      BA      .0414
642      PB      2.775
643      LS      0      95
644      UD      0.110
        *

645      KK      COF21B
646      KM      COMBINE OFF21B WITH FLOW FROM CENTENNIAL POINT AND GRAND CANYON APTS
647      KM      REFERENCED FROM GCW MASTER DRAINAGE STUDY
648      HC      2
        *

649      KK      ROFF23
650      KM      RETRIEVE FLOW FROM DIVOFF23
651      KM      REFERENCED FROM GCW MASTER DRAINAGE STUDY
652      DR      DOFF23
        *

653      KK      OFF23
654      KM      REFERENCED FROM GCW MASTER DRAINAGE STUDY
655      BA      .0091
656      PB      2.787
657      LS      0      95
658      UD      0.109
        *

659      KK      COFF23
660      KM      COMBINE OFF23, DOFF23
661      KM      REFERENCED FROM GCW MASTER DRAINAGE STUDY
662      HC      2
        *

663      KK      OFFU
664      BA      .0398
665      PB      2.93
666      LS      0      94.8
667      UD      0.118
        *

668      KK      CPCULV
669      HC      5
        *

```

1

HEC-1 INPUT

PAGE 19

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

670 KK NW29-C  
671 KM REFERENCED FROM 2008 MPU  
672 BA 0.132  
673 PB 3.00  
674 LS 0 92.4  
675 UD 0.214  
\*  
  
676 KK RNW29C  
677 KM ROUTE NW29-C TO CNW71-W  
678 KM FACILITY = CENTENNIAL PARKWAY CHANNEL WEST/GRAND TETON BRANCH  
679 KM FACILITY ID-MILE = CNGT 0118  
680 KM LINING = ARCH CON  
681 KM REFERENCED FROM 2008 MPU  
682 RD 2100 0.037 0.015 0 TRAP 6 0  
\*  
  
683 KK NW71-W  
684 KM REFERENCED FROM 2008 MPU  
685 BA 0.104  
686 PB 2.92  
687 LS 0 92.5  
688 UD 0.206  
\*  
  
689 KK CNW71W  
690 KM COMBINE RNW29C AND NW71-W  
691 KM CENTENNIAL PKWY CHANNEL WEST/GRAND TETON BRANCH @ HUALAPAI  
692 KM REFERENCED FROM 2008 MPU  
693 HC 2  
\*  
  
694 KK RCNW71-W  
695 KM ROUTE CNW71-W TO CNW71-E  
696 KM FACILITY = CENTENNIAL PARKWAY CHANNEL WEST/GRAND TETON BRANCH  
697 KM FACILITY ID-MILE = CNGT 0000,0043  
698 KM LINING = RCB  
699 KM REFERENCED FROM 2008 MPU  
700 RD 6270 0.030 0.015 0 TRAP 6 0  
\*  
  
701 KK NW71-E  
702 KM REFERENCED FROM 2008 MPU  
703 BA 0.238  
704 PB 2.85  
705 LS 0 88.3  
706 UD 0.293  
\*

1

HEC-1 INPUT

PAGE 20

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

707 KK CNW71E  
708 KM COMBINE NW71-E AND RCNW71-W  
709 KM CENTENNIAL PKWY CHANNEL WEST/GRAND TETON BRANCH @ US 95  
710 KM REFERENCED FROM 2008 MPU  
711 HC 2  
\*  
  
712 KK WGRT1  
713 KM WEST BASIN, GRAND TETON DRIVE  
714 BA .0183  
715 PB 3.00  
716 LS 0 98.0  
717 UD 0.256  
\*  
  
718 KK 95STH  
719 KM FLOW CONVEYED SOUTH IN US-95 AT GRAND TETON  
720 KM FLOW CONVEYED IN FACILITY ID = CN95 0167  
721 HC 3  
\*  
  
722 KK OFF4-1  
723 BA 0.3009  
724 PB 3.40  
725 LS 0 78.1  
726 UD 0.316  
\*  
  
727 KK ROFF41  
728 KM ROUTE OFF4-1 TO COFF4-2  
729 KM KYLE CANYON ROAD  
730 KM REFERENCED FROM 2008 MPU  
731 RD 5800 0.0414 0.016 0 TRAP 0 50  
\*  
  
732 KK OFF4-2  
733 BA 0.4195  
734 PB 3.34  
735 LS 0 79.9



736 UD 0.153  
 \*  
 737 KK COFF42  
 738 KM COMBINE ROFF4-1 AND OFF4-2  
 739 KM REFERENCED FROM 2008 MPU  
 740 HC 2  
 \*  
 741 KK RCOFF4-2  
 742 KM ROUTE COFF4-2 TO COFF5-1  
 743 KM KYLE CANYON ROAD  
 744 KM REFERENCED FROM 2008 MPU  
 745 RD 2800 0.0392 0.016 0 TRAP 0 50  
 \*

1 HEC-1 INPUT PAGE 21

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

746 KK OFF5-1  
 747 BA 0.2959  
 748 PB 3.26  
 749 LS 0 81.6  
 750 UD 0.228  
 \*  
 751 KK COFF51  
 752 KM COMBINE RCOFF4-2 AND OFF5-1  
 753 KM REFERENCED FROM 2008 MPU  
 754 HC 2  
 \*  
 755 KK RCOFF5-1  
 756 KM ROUTE COFF5-1 TO 2CNW1-C  
 757 KM FACILITY = MOCCASIN AND KYLE CANYON ROAD  
 758 KM FACILITY ID-MILE = MOKC 0380  
 759 KM LINING = RCP  
 760 KM REFERENCED FROM 2008 MPU  
 761 RD 5800 0.0373 0.013 0 CIRC 7.5 0  
 \*  
 762 KK OFF5-2  
 763 BA 0.3947  
 764 PB 3.20  
 765 LS 0 88.3  
 766 UD 0.313  
 \*  
 767 KK ROFF52  
 768 KM ROUTE OFF5-2 TO CNW1-C  
 769 KM FACILITY =KYLE CANYON ROAD AND UNKNOWN  
 770 KM FACILITY ID-MILE = KCUN 0000  
 771 KM LINING = RCP  
 772 KM REFERENCED FROM 2008 MPU  
 773 RD 2300 0.022 0.013 0 CIRC 7 0  
 \*  
 774 KK NW1-C  
 775 BA 0.2933  
 776 PB 3.12  
 777 LS 0 82.7  
 778 UD 0.267  
 \*  
 779 KK CNW1-C  
 780 KM COMBINE ROFF5-2 AND NW1-C  
 781 KM REFERENCED FROM 2008 MPU  
 782 HC 2  
 \*

1 HEC-1 INPUT PAGE 22

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

783 KK 2CNW1C  
 784 KM COMBINE RCOFF5-1 AND CNW1-C  
 785 KM REFERENCED FROM 2008 MPU  
 786 HC 2  
 \*  
 787 KK R2CNW1-C  
 788 KM ROUTE 2CNW1-C TO CNW-7  
 789 KM FACILITY =MOCCASIN AND KYLE CANYON ROAD  
 790 KM FACILITY ID-MILE = MOKC 0325  
 791 KM LINING = RCB  
 792 KM REFERENCED FROM 2008 MPU  
 793 RD 5700 0.0365 0.015 0 TRAP 9 0  
 \*  
 794 KK NW7-C  
 795 BA 0.4878  
 796 PB 3.03  
 797 LS 0 87.8  
 798 UD 0.363

```

*
799 KK CNW-7
800 KM COMBINE NW7-C AND R2CNW1-C
801 KM REFERENCED FROM 2008 MPU
802 HC 2
*

803 KK 157DB
804 KM ADDED SR-157 DB
805 RS 1 VOL -1
806 KO 1
807 SV 0 70 100
808 SE 0 5 7
809 SQ 0 626 885 1084 1252 1399
810 SE 0 3 4 5 6 7
*

811 KK RCNW7C
812 KM ROUTE CNW7-C TO CNW21-C
813 KM FACILITY =MOCCASIN AND KYLE CANYON ROAD
814 KM FACILITY ID-MILE = MOKC
815 KM LINING = RCB
816 KM REVISED FROM 2008 MPU
817 RD 2660 0.0338 0.015 0 TRAP 20 0
*

818 KK NW21-C
819 BA 0.1552
820 PB 3.00
821 LS 0 89.9
822 UD 0.305
*

```

1

HEC-1 INPUT

PAGE 23

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

```

823 KK CNW21C
824 KM COMBINE NW21-C AND CNW-7
825 HC 2
*

826 KK RCNW21-C
827 KM ROUTE CNW21-C TO CNW35-C
828 KM FACILITY =MOCCASIN AND KYLE CANYON ROAD
829 KM FACILITY ID-MILE = MOKC
830 KM LINING = RCB
831 KM REVISED FROM 2008 MPU
832 RD 5450 0.0339 0.015 0 TRAP 20 0
*

833 KK NW35-C
834 BA 0.3298
835 PB 2.93
836 LS 0 89.9
837 UD 0.252
*

838 KK WPRK10
839 KM OFFICER IGOR SOLDI MEMORIAL PARK
840 BA .0157
841 PB 2.77
842 LS 0 84.0
843 UD 0.114
*

844 KK CNW35C
845 KM COMBINE NW35-C AND CNW21-C
846 HC 3
*

847 KK WOFF1
848 KM DISCHARGES INTO DETENTION BASIN "DB1"
849 PB 3.00
850 BA .4073
851 LS 0 86.4
852 UD 0.356
*

853 KK WOFF11
854 KM DEVELOPED OFFSITE DRAINAGE BASIN
855 KM DISCHARGES INTO DETENTION BASIN "DB2"
856 BA .0281
857 LS 0 96.0
858 UD 0.118
*

```

1

HEC-1 INPUT

PAGE 24

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

```

859 KK WOFF2
860 KM DISCHARGES INTO DETENTION BASIN "DB1"
861 BA .0355

```



```

862      LS      0      85.0
863      UD      0.148
      *

864      KK      WOFF3
865      KM      DISCHARGES INTO DETENTION BASIN "DB1"
866      BA      .0259
867      LS      0      86.2
868      UD      0.112
      *

869      KK      CP1
870      KM      COMBINE WOFF1, WOFF2, WOFF3, WOFF11
871      HC      4
      *

872      KK      WOFF4
873      KM      DISCHARGES INTO DETENTION BASIN "DB1"
874      BA      .0581
875      LS      0      86.2
876      UD      0.136
      *

877      KK      WOFF5
878      KM      DISCHARGES INTO DETENTION BASIN "DB1"
879      BA      .2569
880      LS      0      86.5
881      UD      0.419
      *

882      KK      WOFF6
883      KM      DISCHARGES INTO DETENTION BASIN "DB1"
884      BA      .0399
885      LS      0      86.2
886      UD      0.121
      *

887      KK      WPF1B
888      KM      WEST BASIN, WEST OF SHEEP MT ROAD
889      BA      .0295
890      PB      3.00
891      LS      0      94.0
892      UD      0.077
      *

893      KK      DB1
894      KM      COMBINE CP1, WOFF4, WOFF5, WOFF6 AND WPF1B
895      HC      5
      *

```

1

HEC-1 INPUT

PAGE 25

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

```

896      KK      RDB1
897      KM      OUTLET = 24" ORIFICE @ INVERT ELEVATION = 3013.8-FT
898      KO      1
899      RS      1      ELEV 3025.5
900      SA      4.68  5.56  5.74  5.92  6.10  7.01  7.46  8.36  9.32 10.68
901      SE      3025.5 3027 3028 3029 3030 3035 3037 3040 3043 3046
902      SQ      0      13.7 31.5 48.3 60.6 70.8 74.5 1436.0 3920.5 7136.3
903      SE      3013.8 3017 3020 3025 3030 3035 3037 3040 3043 3046
      *

904      KK      WSHP3
905      KM      WEST BASIN, SHEEP MT ROAD
906      BA      .0163
907      PB      3.00
908      LS      0      94.0
909      UD      0.110
      *

910      KK      WPF2
911      KM      WEST BASIN, WEST OF SHEEP MT
912      BA      .0048
913      PB      3.00
914      LS      0      94.0
915      UD      0.074
      *

916      KK      WC19
917      KM      FAR N OF GRAND TETON/SHEEP MT INTERSECTION
918      KM      COMBINE RDB1, WSHP3, WPF2
919      HC      3
      *

920      KK      WPF5
921      KM      WEST BASIN, WEST OF SHAUMBER RD
922      BA      .0006
923      PB      3.00
924      LS      0      86.0
925      UD      0.052
      *

926      KK      WML2

```

|     |    |                                   |
|-----|----|-----------------------------------|
| 927 | KM | WEST BASIN, WEST OF SHAUMBER ROAD |
| 928 | BA | .0428                             |
| 929 | PB | 3.00                              |
| 930 | LS | 0 93.5                            |
| 931 | UD | 0.142                             |
|     | *  |                                   |
| 932 | KK | WSHA5                             |
| 933 | KM | WEST BASIN, SHAUMBER ROAD         |
| 934 | BA | .0037                             |
| 935 | PB | 3.00                              |
| 936 | LS | 0 98.0                            |
| 937 | UD | 0.086                             |
|     | *  |                                   |

1

HEC-1 INPUT

PAGE 26

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

|     |    |                                         |
|-----|----|-----------------------------------------|
| 938 | KK | WC20                                    |
| 939 | KM | S OF EAGLE CANYON/SHAUMBER INTERSECTION |
| 940 | KM | COMBINE WPF5, WML2, WSHA5               |
| 941 | HC | 3                                       |
|     | *  |                                         |
| 942 | KK | WARR4                                   |
| 943 | KM | WEST BASIN, WEST OF SHAUMBER ROAD       |
| 944 | BA | .0020                                   |
| 945 | PB | 3.00                                    |
| 946 | LS | 0 88.0                                  |
| 947 | UD | 0.100                                   |
|     | *  |                                         |
| 948 | KK | WPF4                                    |
| 949 | BA | .0090                                   |
| 950 | PB | 3.00                                    |
| 951 | LS | 0 94.0                                  |
| 952 | UD | 0.087                                   |
|     | *  |                                         |
| 953 | KK | WSHA4                                   |
| 954 | BA | .0022                                   |
| 955 | PB | 3.00                                    |
| 956 | LS | 0 98.0                                  |
| 957 | UD | 0.051                                   |
|     | *  |                                         |
| 958 | KK | WC21                                    |
| 959 | KM | S OF SHAUMBER SPLIT INTERSECTION        |
| 960 | HC | 5                                       |
|     | *  |                                         |
| 961 | KK | WL4A                                    |
| 962 | KM | WEST BASIN, WEST OF EGAN CREB DRIVE     |
| 963 | BA | .0125                                   |
| 964 | PB | 3.00                                    |
| 965 | LS | 0 92.0                                  |
| 966 | UD | 0.106                                   |
|     | *  |                                         |
| 967 | KK | WL5A                                    |
| 968 | KM | WEST BASIN, WEST OF EGAN CREB DRIVE     |
| 969 | BA | .0170                                   |
| 970 | PB | 3.00                                    |
| 971 | LS | 0 92.0                                  |
| 972 | UD | 0.099                                   |
|     | *  |                                         |

1

HEC-1 INPUT

PAGE 27

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

|     |    |                                     |
|-----|----|-------------------------------------|
| 973 | KK | WL5B                                |
| 974 | BA | .0059                               |
| 975 | PB | 3.00                                |
| 976 | LS | 0 92.0                              |
| 977 | UD | 0.085                               |
|     | *  |                                     |
| 978 | KK | WC22A                               |
| 979 | HC | 3                                   |
|     | *  |                                     |
| 980 | KK | WPRK4                               |
| 981 | KM | WEST BASIN, WEST OF EGAN CREB DRIVE |
| 982 | BA | .0016                               |
| 983 | PB | 3.00                                |
| 984 | LS | 0 84.0                              |
| 985 | UD | 0.067                               |
|     | *  |                                     |
| 986 | KK | WARR5                               |
| 987 | KM | WEST BASIN, WEST OF EGAN CREB DRIVE |
| 988 | BA | .0100                               |
| 989 | PB | 3.00                                |



|      |    |                                                  |      |
|------|----|--------------------------------------------------|------|
| 990  | LS | 0                                                | 90.0 |
| 991  | UD | 0.100                                            |      |
|      | *  |                                                  |      |
| 992  | KK | WC22                                             |      |
| 993  | KM | FAR S OF SKYE CANYON PARK/EGAN CREB INTERSECTION |      |
| 994  | HC | 4                                                |      |
|      | *  |                                                  |      |
| 995  | KK | WML8                                             |      |
| 996  | KM | WEST BASIN, WEST OF EGAN CREB DRIVE              |      |
| 997  | BA | .0161                                            |      |
| 998  | PB | 3.00                                             |      |
| 999  | LS | 0                                                | 95.0 |
| 1000 | UD | 0.093                                            |      |
|      | *  |                                                  |      |
| 1001 | KK | WPF6                                             |      |
| 1002 | KM | WEST BASIN, WEST OF EGAN CREB DRIVE              |      |
| 1003 | BA | .0016                                            |      |
| 1004 | PB | 3.00                                             |      |
| 1005 | LS | 0                                                | 94.0 |
| 1006 | UD | 0.050                                            |      |
|      | *  |                                                  |      |
| 1007 | KK | WEGN1                                            |      |
| 1008 | KM | WEST BASIN, EGAN CREB DRIVE                      |      |
| 1009 | BA | .0007                                            |      |
| 1010 | PB | 3.00                                             |      |
| 1011 | LS | 0                                                | 98.0 |
| 1012 | UD | 0.050                                            |      |
|      | *  |                                                  |      |

1

HEC-1 INPUT

PAGE 28

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

|      |    |                                                  |      |
|------|----|--------------------------------------------------|------|
| 1013 | KK | WEGN2                                            |      |
| 1014 | KM | WEST BASIN, EGAN CREB DRIVE                      |      |
| 1015 | BA | .0007                                            |      |
| 1016 | PB | 3.00                                             |      |
| 1017 | LS | 0                                                | 98.0 |
| 1018 | UD | 0.050                                            |      |
|      | *  |                                                  |      |
| 1019 | KK | WC23                                             |      |
| 1020 | KM | FAR S OF SKYE CANYON PARK/EGAN CREB INTERSECTION |      |
| 1021 | KM | COMBINE WC22, WML8, WPF6, WEGN1, WEGN2           |      |
| 1022 | HC | 5                                                |      |
|      | *  |                                                  |      |
| 1023 | KK | WARR6                                            |      |
| 1024 | KM | WEST BASIN, WEST OF SKYE VILLAGE ROAD            |      |
| 1025 | BA | .0038                                            |      |
| 1026 | PB | 3.00                                             |      |
| 1027 | LS | 0                                                | 88.0 |
| 1028 | UD | 0.100                                            |      |
|      | *  |                                                  |      |
| 1029 | KK | WPF7                                             |      |
| 1030 | KM | WEST BASIN, WEST OF SKYE VILLAGE ROAD            |      |
| 1031 | BA | .0071                                            |      |
| 1032 | PB | 3.00                                             |      |
| 1033 | LS | 0                                                | 94.0 |
| 1034 | UD | 0.097                                            |      |
|      | *  |                                                  |      |
| 1035 | KK | WL6A                                             |      |
| 1036 | KM | WEST BASIN, WEST OF SKYE VILLAGE ROAD            |      |
| 1037 | BA | .0096                                            |      |
| 1038 | PB | 3.00                                             |      |
| 1039 | LS | 0                                                | 92.0 |
| 1040 | UD | 0.092                                            |      |
|      | *  |                                                  |      |
| 1041 | KK | WC24                                             |      |
| 1042 | KM | FAR E OF SKYE CANYON PARK/EGAN CREB INTERSECTION |      |
| 1043 | KM | COMBINE WC23, WPF7, WARR6, WL6A                  |      |
| 1044 | HC | 4                                                |      |
|      | *  |                                                  |      |
| 1045 | KK | WSCP2                                            |      |
| 1046 | KM | WEST BASIN, SKYE CANYON PARK DRIVE               |      |
| 1047 | BA | .0047                                            |      |
| 1048 | PB | 3.00                                             |      |
| 1049 | LS | 0                                                | 98.0 |
| 1050 | UD | 0.063                                            |      |
|      | *  |                                                  |      |

1

HEC-1 INPUT

PAGE 29

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

|      |    |                                     |  |
|------|----|-------------------------------------|--|
| 1051 | KK | WPRK3                               |  |
| 1052 | KM | WEST BASIN, WEST OF EGAN CREB DRIVE |  |

|      |    |                                                |      |
|------|----|------------------------------------------------|------|
| 1053 | BA | .0028                                          |      |
| 1054 | PB | 3.00                                           |      |
| 1055 | LS | 0                                              | 84.0 |
| 1056 | UD | 0.070                                          |      |
|      | *  |                                                |      |
| 1057 | KK | WC25                                           |      |
| 1058 | KM | N OF SKYE CANYON PARK/EGAN CREB INTERSECTION   |      |
| 1059 | HC | 2                                              |      |
|      | *  |                                                |      |
| 1060 | KK | WPRK6                                          |      |
| 1061 | KM | WEST BASIN, WEST OF SKYE VILLAGE ROAD          |      |
| 1062 | BA | .0207                                          |      |
| 1063 | PB | 3.00                                           |      |
| 1064 | LS | 0                                              | 84.0 |
| 1065 | UD | 0.121                                          |      |
|      | *  |                                                |      |
| 1066 | KK | WSCP3                                          |      |
| 1067 | KM | WEST BASIN, SKYE CANYON PARK DRIVE             |      |
| 1068 | BA | .0055                                          |      |
| 1069 | PB | 3.00                                           |      |
| 1070 | LS | 0                                              | 98.0 |
| 1071 | UD | 0.074                                          |      |
|      | *  |                                                |      |
| 1072 | KK | WC26                                           |      |
| 1073 | KM | W OF SKY CANYON PARK/SKYE VILLAGE INTERSECTION |      |
| 1074 | KM | COMBINE WC24, WC25, WPRK6, WSCP3               |      |
| 1075 | HC | 4                                              |      |
|      | *  |                                                |      |
| 1076 | KK | WML7                                           |      |
| 1077 | KM | WEST BASIN, WEST OF SKY VILLAGE ROAD           |      |
| 1078 | BA | .0291                                          |      |
| 1079 | PB | 3.00                                           |      |
| 1080 | LS | 0                                              | 95.0 |
| 1081 | UD | 0.100                                          |      |
|      | *  |                                                |      |
| 1082 | KK | WSKV2                                          |      |
| 1083 | KM | WEST BASIN, SKYE VILLAGE ROAD                  |      |
| 1084 | BA | .0100                                          |      |
| 1085 | PB | 3.00                                           |      |
| 1086 | LS | 0                                              | 90.0 |
| 1087 | UD | 0.081                                          |      |
|      | *  |                                                |      |

1

HEC-1 INPUT

PAGE 30

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

|      |    |                                            |      |
|------|----|--------------------------------------------|------|
| 1088 | KK | WC27                                       |      |
| 1089 | KM | S OF SPD2/SKYE CANYON VILLAGE INTERSECTION |      |
| 1090 | KM | COMBINE WC26, WML7, WSKV2                  |      |
| 1091 | HC | 3                                          |      |
|      | *  |                                            |      |
| 1092 | KK | WL1B                                       |      |
| 1093 | KM | WEST BASIN, WEST OF SHEEP MT ROAD          |      |
| 1094 | BA | .0437                                      |      |
| 1095 | PB | 3.00                                       |      |
| 1096 | LS | 0                                          | 92.0 |
| 1097 | UD | 0.109                                      |      |
|      | *  |                                            |      |
| 1098 | KK | WARR1                                      |      |
| 1099 | KM | WEST BASIN, WEST OF SHEEP MT ROAD          |      |
| 1100 | BA | .0056                                      |      |
| 1101 | PB | 3.00                                       |      |
| 1102 | LS | 0                                          | 88.0 |
| 1103 | UD | 0.100                                      |      |
|      | *  |                                            |      |
| 1104 | KK | WSHP2                                      |      |
| 1105 | KM | WEST BASIN, SHEEP MT ROAD                  |      |
| 1106 | BA | .0146                                      |      |
| 1107 | PB | 3.00                                       |      |
| 1108 | LS | 0                                          | 94.0 |
| 1109 | UD | 0.148                                      |      |
|      | *  |                                            |      |
| 1110 | KK | WC28                                       |      |
| 1111 | KM | FAR S OF IRON MT/SHEEP MT INTERSECTION     |      |
| 1112 | KM | COMBINE WL1B, WARR1, WSHP3                 |      |
| 1113 | HC | 3                                          |      |
|      | *  |                                            |      |
| 1114 | KK | WPF3                                       |      |
| 1115 | BA | .0072                                      |      |
| 1116 | PB | 3.00                                       |      |
| 1117 | LS | 0                                          | 94.0 |
| 1118 | UD | 0.050                                      |      |
|      | *  |                                            |      |



|      |    |        |      |
|------|----|--------|------|
| 1119 | KK | WSHA3A |      |
| 1120 | BA | .0010  |      |
| 1121 | PB | 3.00   |      |
| 1122 | LS | 0      | 98.0 |
| 1123 | UD | 0.050  |      |
|      | *  |        |      |

1

HEC-1 INPUT

PAGE 31

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

|      |    |      |  |
|------|----|------|--|
| 1124 | KK | WC29 |  |
| 1125 | HC | 2    |  |
|      | *  |      |  |

|      |    |       |      |
|------|----|-------|------|
| 1126 | KK | WSCH2 |      |
| 1127 | BA | .0180 |      |
| 1128 | PB | 3.00  |      |
| 1129 | LS | 0     | 91.0 |
| 1130 | UD | 0.069 |      |
|      | *  |       |      |

|      |    |        |      |
|------|----|--------|------|
| 1131 | KK | WSHA3B |      |
| 1132 | BA | .0026  |      |
| 1133 | PB | 3.00   |      |
| 1134 | LS | 0      | 98.0 |
| 1135 | UD | 0.089  |      |
|      | *  |        |      |

|      |    |      |  |
|------|----|------|--|
| 1136 | KK | WC30 |  |
| 1137 | HC | 3    |  |
|      | *  |      |  |

|      |    |       |      |
|------|----|-------|------|
| 1138 | KK | WSCP1 |      |
| 1139 | BA | .0024 |      |
| 1140 | PB | 3.00  |      |
| 1141 | LS | 0     | 98.0 |
| 1142 | UD | 0.066 |      |
|      | *  |       |      |

|      |    |      |  |
|------|----|------|--|
| 1143 | KK | WC31 |  |
| 1144 | HC | 2    |  |
|      | *  |      |  |

|      |    |                                   |      |
|------|----|-----------------------------------|------|
| 1145 | KK | WML1                              |      |
| 1146 | KM | WEST BASIN, WEST OF SHAUMBER ROAD |      |
| 1147 | BA | .0282                             |      |
| 1148 | PB | 3.00                              |      |
| 1149 | LS | 0                                 | 92.0 |
| 1150 | UD | 0.103                             |      |
|      | *  |                                   |      |

|      |    |                           |      |
|------|----|---------------------------|------|
| 1151 | KK | WSHA2                     |      |
| 1152 | KM | WEST BASIN, SHAUMBER ROAD |      |
| 1153 | BA | .0024                     |      |
| 1154 | PB | 3.00                      |      |
| 1155 | LS | 0                         | 88.0 |
| 1156 | UD | 0.061                     |      |
|      | *  |                           |      |

1

HEC-1 INPUT

PAGE 32

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

|      |    |      |  |
|------|----|------|--|
| 1157 | KK | WC32 |  |
| 1158 | HC | 3    |  |
|      | *  |      |  |

|      |    |                                   |      |
|------|----|-----------------------------------|------|
| 1159 | KK | WARR2                             |      |
| 1160 | KM | WEST BASIN, WEST OF SHAUMBER ROAD |      |
| 1161 | BA | .0044                             |      |
| 1162 | PB | 3.00                              |      |
| 1163 | LS | 0                                 | 88.0 |
| 1164 | UD | 0.100                             |      |
|      | *  |                                   |      |

|      |    |      |  |
|------|----|------|--|
| 1165 | KK | WC33 |  |
| 1166 | HC | 3    |  |
|      | *  |      |  |

|      |    |                                      |      |
|------|----|--------------------------------------|------|
| 1167 | KK | WARR3                                |      |
| 1168 | KM | WEST BASIN, WEST OF SKY VILLAGE ROAD |      |
| 1169 | BA | .0110                                |      |
| 1170 | PB | 3.00                                 |      |
| 1171 | LS | 0                                    | 88.0 |
| 1172 | UD | 0.125                                |      |
|      | *  |                                      |      |

|      |    |                                      |      |
|------|----|--------------------------------------|------|
| 1173 | KK | WML5                                 |      |
| 1174 | KM | WEST BASIN, WEST OF SKY VILLAGE ROAD |      |
| 1175 | BA | .0427                                |      |
| 1176 | PB | 3.00                                 |      |
| 1177 | LS | 0                                    | 95.0 |
| 1178 | UD | 0.126                                |      |

```

*
1179 KK WML6
1180 KM WEST BASIN, WEST OF SKY VILLAGE ROAD
1181 BA .0321
1182 PB 3.00
1183 LS 0 95.0
1184 UD 0.107
*

1185 KK WC34
1186 KM FAR N OF SKYE CANYON PARK/SKYE VILLAGE INTERSECTION
1187 KM COMBINE WC33, WARR3, WML5, WML6
1188 HC 4
*

1189 KK WC35
1190 KM N OF SPD2/SKYE CANYON VILLAGE INTERSECTION
1191 KM COMBINE WC27, WC34
1192 HC 2
*

```

1

HEC-1 INPUT

PAGE 33

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

```

1193 KK WL2
1194 KM WEST BASIN, WEST OF SKY VILLAGE ROAD
1195 BA .0245
1196 PB 3.00
1197 LS 0 92.0
1198 UD 0.104
*

1199 KK WPRK2
1200 KM WEST BASIN, WEST OF SKY VILLAGE ROAD
1201 BA .0050
1202 PB 3.00
1203 LS 0 84.0
1204 UD 0.128
*

1205 KK WC36
1206 KM FAR S OF IRON MT/SKY VILLAGE RD INTERSECTION
1207 KM COMBINE WL2, WPRK2
1208 HC 2
*

1209 KK WSKV1B
1210 KM WEST BASIN, SKYE VILLAGE ROAD
1211 BA .0054
1212 PB 3.00
1213 LS 0 98.0
1214 UD 0.123
*

1215 KK WL3
1216 KM WEST BASIN, WEST OF SKY VILLAGE ROAD
1217 BA .0390
1218 PB 3.00
1219 LS 0 92.0
1220 UD 0.125
*

1221 KK WC37
1222 KM S OF IRON MT/SKYE VILLAGE RD INTERSECTION
1223 KM COMBINE WC35, WC36, WSKV1B, WL3
1224 HC 4
*

1225 KK WOFF7
1226 KM DISCHARGES INTO DETENTION BASIN "DB2"
1227 BA .0068
1228 LS 0 86.2
1229 UD 0.100
*

```

1

HEC-1 INPUT

PAGE 34

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

```

1230 KK WOFF8
1231 KM DISCHARGES INTO DETENTION BASIN "DB2"
1232 BA .1663
1233 LS 0 86.2
1234 UD 0.239
*

1235 KK CP2
1236 KM COMBINE WOFF7, AND WOFF8
1237 HC 2
*

1238 KK WOFF9
1239 KM DISCHARGES INTO DETENTION BASIN "DB2"

```



```

1240      BA      .1164
1241      LS           0      86.2
1242      UD      0.203
      *

1243      KK      WOFF10
1244      KM      DISCHARGES INTO DETENTION BASIN "DB2"
1245      BA      .2463
1246      LS           0      86.5
1247      UD      0.248
      *

1248      KK      WPF1A
1249      KM      WEST BASIN, WEST OF SHEEP MT ROAD
1250      BA      .0315
1251      PB      3.00
1252      LS           0      94.0
1253      UD      0.135
      *

1254      KK      DB2
1255      KM      COMBINE CP2, WOFF9, WOFF10 AND WPF1A
1256      HC           4
      *

1257      KK      RDB2
1258      KM      OUTLET = 25" ORIFICE @ INVERT ELEVATION = 2984.21-FT
1259      KO           1
1260      RS           1      ELEV      2992.0
1261      SV      0.00      2.34      7.60      24.30      46.28      73.78      107.11      146.75      193.03
1262      SE      2992.0      2993.0      2995.0      3000.0      3005.0      3010.0      3015.0      3020.0      3025.0
1263      SQ      0.00      44.44      51.05      64.70      83.84      99.36      520.9      3465.5      7888.4
1264      SE      2992.0      2993.0      2995.0      3000.0      3009.0      3018.0      3019.0      3022.0      3025.0
      *

```

1

HEC-1 INPUT

PAGE 35

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

```

1265      KK      WPRK1
1266      KM      WEST BASIN, WEST OF SHEEP MT ROAD
1267      BA      .0037
1268      PB      3.00
1269      LS           0      84.0
1270      UD      0.070
      *

1271      KK      WIRN1
1272      KM      WEST BASIN, IRON MT ROAD
1273      BA      .0009
1274      PB      3.00
1275      LS           0      98.0
1276      UD      0.050
      *

1277      KK      WL1A
1278      KM      WEST BASIN, WEST OF SHEEP MT ROAD
1279      BA      .0465
1280      PB      3.00
1281      LS           0      92.0
1282      UD      0.142
      *

1283      KK      WC38
1284      KM      W OF SHEEP MT/IRON MT INTERSECTION
1285      KM      COMBINE WPF1A, WPRK1, WIRN1
1286      HC           4
      *

1287      KK      WSHP1
1288      KM      WEST BASIN, SHEEP MT ROAD
1289      BA      .01000
1290      PB      3.00
1291      LS           0      94.0
1292      UD      0.125
      *

1293      KK      WC39
1294      KM      S OF IRON MT/SHAUMBER INTERSECTION
1295      KM      COMBINE WL1A, WSHP1
1296      HC           2
      *

1297      KK      WIRN2
1298      KM      WEST BASIN, IRON MT ROAD
1299      BA      .0034
1300      PB      3.00
1301      LS           0      98.0
1302      UD      0.097
      *

```

1

HEC-1 INPUT

PAGE 36

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

|      |    |                                        |
|------|----|----------------------------------------|
| 1303 | KK | WSCH1                                  |
| 1304 | KM | WEST BASIN, WEST OF SHAUMBER ROAD      |
| 1305 | BA | .0615                                  |
| 1306 | PB | 3.00                                   |
| 1307 | LS | 0 91.0                                 |
| 1308 | UD | 0.125                                  |
|      | *  |                                        |
| 1309 | KK | WSHA1                                  |
| 1310 | KM | WEST BASIN, SHAUMBER ROAD              |
| 1311 | BA | .0036                                  |
| 1312 | PB | 3.00                                   |
| 1313 | LS | 0 88.0                                 |
| 1314 | UD | 0.100                                  |
|      | *  |                                        |
| 1315 | KK | WC40                                   |
| 1316 | KM | S OF IRON MT/SHAUMBER INTERSECTION     |
| 1317 | KM | COMBINE WSCH1, WSHA1                   |
| 1318 | HC | 2                                      |
|      | *  |                                        |
| 1319 | KK | WML3                                   |
| 1320 | KM | WEST BASIN, WEST OF SKYE VILLAGE ROAD  |
| 1321 | BA | .0270                                  |
| 1322 | PB | 3.00                                   |
| 1323 | LS | 0 95.0                                 |
| 1324 | UD | 0.097                                  |
|      | *  |                                        |
| 1325 | KK | WC41                                   |
| 1326 | KM | FAR E OF IRON MT/SHAUMBER INTERSECTION |
| 1327 | KM | COMBINE WC39, WC40, WIRN2, WML3        |
| 1328 | HC | 4                                      |
|      | *  |                                        |
| 1329 | KK | WIRN3                                  |
| 1330 | KM | WEST BASIN, IRON MT ROAD               |
| 1331 | BA | .0020                                  |
| 1332 | PB | 3.00                                   |
| 1333 | LS | 0 98.0                                 |
| 1334 | UD | 0.071                                  |
|      | *  |                                        |
| 1335 | KK | WML4                                   |
| 1336 | KM | WEST BASIN, SKYE VILLAGE ROAD          |
| 1337 | BA | .0393                                  |
| 1338 | PB | 3.00                                   |
| 1339 | LS | 0 95.0                                 |
| 1340 | UD | 0.112                                  |
|      | *  |                                        |

1

HEC-1 INPUT

PAGE 37

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

|      |    |                                              |
|------|----|----------------------------------------------|
| 1341 | KK | WC42                                         |
| 1342 | KM | W OF IRON MT/SKYE VILLAGE INTERSECTION       |
| 1343 | KM | COMBINE WC41, WIRN3, WML4                    |
| 1344 | HC | 3                                            |
|      | *  |                                              |
| 1345 | KK | WC43                                         |
| 1346 | KM | N OF IRON MT/SKYE VILLAGE RD INTERSECTION    |
| 1347 | KM | COMBINE WC37, WC42                           |
| 1348 | HC | 2                                            |
|      | *  |                                              |
| 1349 | KK | WSKV1A                                       |
| 1350 | KM | WEST BASIN, SKYE VILLAGE ROAD                |
| 1351 | BA | .0021                                        |
| 1352 | PB | 3.00                                         |
| 1353 | LS | 0 98.0                                       |
| 1354 | UD | 0.093                                        |
|      | *  |                                              |
| 1355 | KK | WC44A                                        |
| 1356 | KM | S OF OSO BLANCA/SKYE VILLAGE RD INTERSECTION |
| 1357 | KM | COMBINE WC43, SKV1A                          |
| 1358 | HC | 2                                            |
|      | *  |                                              |
| 1359 | KK | WGC2                                         |
| 1360 | KM | WEST BASIN, WEST OF US95                     |
| 1361 | BA | .0130                                        |
| 1362 | PB | 2.93                                         |
| 1363 | LS | 0 92.0                                       |
| 1364 | UD | 0.107                                        |
|      | *  |                                              |
| 1365 | KK | WOSO1                                        |
| 1366 | KM | WEST BASIN, OSO BLANCA ROAD                  |
| 1367 | BA | .0034                                        |
| 1368 | PB | 2.93                                         |
| 1369 | LS | 0 98.0                                       |



1370 UD 0.067  
\*

1371 KK WGED1A  
1372 KM WEST BASIN, WEST OF US95  
1373 BA .0444  
1374 PB 2.93  
1375 LS 0 92.4  
1376 UD 0.133  
\*

1

HEC-1 INPUT

PAGE 38

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

1377 KK WC44B  
1378 KM W OF OSO BLANCA/US95 INTERSECTION  
1379 KM COMBINE CNW35C, WC44A, WGC2, WOSO1, WGED1A  
1380 HC 5  
\*

1381 KK RETC1B  
1382 KM RETRIEVE FLOW FROM VTN CULVERT 1  
1383 KM REFERENCED FROM GCW MASTER DRAINAGE STUDY  
1384 DR DCHD1B  
\*

1385 KK 95-4A  
1386 KM US95 BASIN BETWEEN LOG CABIN AND IRON MOUNTAIN  
1387 BA .0077  
1388 PB 2.77  
1389 LS 0 92.6  
1390 UD 0.083  
\*

1391 KK 95-4B  
1392 KM US95 BASIN BETWEEN LOG CABIN AND IRON MOUNTAIN  
1393 BA .0073  
1394 PB 2.77  
1395 LS 0 92.6  
1396 UD 0.082  
\*

1397 KK EUS95  
1398 BA 0.0147  
1399 PB 2.77  
1400 LS 0 98.0  
1401 UD 0.050  
\*

1402 KK COMB  
1403 KM REDUCE NUMBER OF HYDROGRAPHS  
1404 HC 5  
\*

1405 KK OFFDA  
1406 KM REFERENCED FROM GCW MASTER DRAINAGE STUDY  
1407 BA .6430  
1408 PB 3.09  
1409 LS 0 77.4  
1410 UD 0.530  
\*

1411 KK ROFFDA  
1412 KM REFERENCED FROM GCW MASTER DRAINAGE STUDY  
1413 KM STEPS K X-FACTOR  
1414 RM 5 0.400 0.15  
\*

1

HEC-1 INPUT

PAGE 39

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

1415 KK OFFDB  
1416 KM REFERENCED FROM GCW MASTER DRAINAGE STUDY  
1417 BA .4948  
1418 PB 2.84  
1419 LS 0 77.4  
1420 UD 0.522  
\*

1421 KK CP27A  
1422 KM COMBINE OFFDA, OFFDB  
1423 HC 2  
\*

1424 KK 42CMP  
1425 KM EXISTING US95 42" CMP CROSSING  
1426 KM CULVERT CAPACITY PER KYLE CANYON INTERCHANGE 90% DESIGN REPORT  
1427 DT D42CMP  
1428 DI 0 85 500  
1429 DQ 0 85 85  
\*

1430 KK WGC1

|      |    |                                                                |      |     |
|------|----|----------------------------------------------------------------|------|-----|
| 1431 | KM | WEST BASIN, WEST OF US95                                       |      |     |
| 1432 | BA | .0130                                                          |      |     |
| 1433 | PB | 2.77                                                           |      |     |
| 1434 | LS | 0                                                              | 92.0 |     |
| 1435 | UD | 0.091                                                          |      |     |
|      | *  |                                                                |      |     |
| 1436 | KK | WC44C                                                          |      |     |
| 1437 | HC | 2                                                              |      |     |
|      | *  |                                                                |      |     |
| 1438 | KK | 6X3RCB                                                         |      |     |
| 1439 | KM | EXISTING US95 6'x3' RCB CROSSING                               |      |     |
| 1440 | KM | CULVERT CAPACITY PER KYLE CANYON INTERCHANGE 90% DESIGN REPORT |      |     |
| 1441 | DT | D63RCB                                                         |      |     |
| 1442 | DI | 0                                                              | 251  | 500 |
| 1443 | DQ | 0                                                              | 251  | 251 |
|      | *  |                                                                |      |     |
| 1444 | KK | EC1                                                            |      |     |
| 1445 | HC | 2                                                              |      |     |
|      | *  |                                                                |      |     |
| 1446 | KK | RET42                                                          |      |     |
| 1447 | KM | RETRIEVE FLOW FROM US95 42" CMP CROSSING                       |      |     |
| 1448 | DR | D42CMP                                                         |      |     |
|      | *  |                                                                |      |     |

1

HEC-1 INPUT

PAGE 40

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

|      |    |                                            |      |  |
|------|----|--------------------------------------------|------|--|
| 1449 | KK | ECOM4                                      |      |  |
| 1450 | BA | 0.0086                                     |      |  |
| 1451 | LS | 0                                          | 71.7 |  |
| 1452 | UD | 0.079                                      |      |  |
|      | *  |                                            |      |  |
| 1453 | KK | RET6X3                                     |      |  |
| 1454 | KM | RETRIEVE FLOW FROM US95 6'X3' RCB CROSSING |      |  |
| 1455 | DR | D63RCB                                     |      |  |
|      | *  |                                            |      |  |
| 1456 | KK | EMLA1                                      |      |  |
| 1457 | BA | 0.0050                                     |      |  |
| 1458 | LS | 0                                          | 71.7 |  |
| 1459 | UD | 0.051                                      |      |  |
|      | *  |                                            |      |  |
| 1460 | KK | ECOM3                                      |      |  |
| 1461 | BA | 0.0100                                     |      |  |
| 1462 | LS | 0                                          | 71.7 |  |
| 1463 | UD | 0.086                                      |      |  |
|      | *  |                                            |      |  |
| 1464 | KK | COMB                                       |      |  |
| 1465 | KM | REDUCE NUMBER OF HYDROGRAPHS               |      |  |
| 1466 | HC | 2                                          |      |  |
|      | *  |                                            |      |  |
| 1467 | KK | ESKY1                                      |      |  |
| 1468 | BA | 0.0128                                     |      |  |
| 1469 | LS | 0                                          | 98.0 |  |
| 1470 | UD | 0.162                                      |      |  |
|      | *  |                                            |      |  |
| 1471 | KK | EC2A                                       |      |  |
| 1472 | HC | 5                                          |      |  |
|      | *  |                                            |      |  |
| 1473 | KK | EPI1                                       |      |  |
| 1474 | BA | 0.0134                                     |      |  |
| 1475 | LS | 0                                          | 71.7 |  |
| 1476 | UD | 0.077                                      |      |  |
|      | *  |                                            |      |  |
| 1477 | KK | ELOG1                                      |      |  |
| 1478 | BA | 0.0067                                     |      |  |
| 1479 | LS | 0                                          | 98.0 |  |
| 1480 | UD | 0.068                                      |      |  |
|      | *  |                                            |      |  |

1

HEC-1 INPUT

PAGE 41

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

|      |    |        |      |  |
|------|----|--------|------|--|
| 1481 | KK | EC2    |      |  |
| 1482 | HC | 4      |      |  |
|      | *  |        |      |  |
| 1483 | KK | EAA3   |      |  |
| 1484 | BA | 0.0800 |      |  |
| 1485 | LS | 0      | 71.7 |  |
| 1486 | UD | 0.208  |      |  |
|      | *  |        |      |  |



|      |    |        |      |
|------|----|--------|------|
| 1487 | KK | EAA4   |      |
| 1488 | BA | 0.0328 |      |
| 1489 | LS | 0      | 71.7 |
| 1490 | UD | 0.180  |      |
|      | *  |        |      |
| 1491 | KK | ECR1   |      |
| 1492 | BA | 0.0122 |      |
| 1493 | LS | 0      | 97.4 |
| 1494 | UD | 0.149  |      |
|      | *  |        |      |
| 1495 | KK | EAA2   |      |
| 1496 | BA | 0.0553 |      |
| 1497 | LS | 0      | 71.7 |
| 1498 | UD | 0.147  |      |
|      | *  |        |      |
| 1499 | KK | EPC    |      |
| 1500 | BA | 0.0316 |      |
| 1501 | LS | 0      | 71.7 |
| 1502 | UD | 0.121  |      |
|      | *  |        |      |
| 1503 | KK | EC5    |      |
| 1504 | HC | 5      |      |
|      | *  |        |      |
| 1505 | KK | EPF1   |      |
| 1506 | BA | 0.0211 |      |
| 1507 | LS | 0      | 71.7 |
| 1508 | UD | 0.109  |      |
|      | *  |        |      |
| 1509 | KK | EC6    |      |
| 1510 | HC | 3      |      |
|      | *  |        |      |
| 1511 | KK | ELOG2  |      |
| 1512 | BA | 0.0189 |      |
| 1513 | LS | 0      | 97.9 |
| 1514 | UD | 0.119  |      |
|      | *  |        |      |

1

HEC-1 INPUT

PAGE 42

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

|      |    |     |  |
|------|----|-----|--|
| 1515 | KK | EC8 |  |
| 1516 | HC | 2   |  |
|      | *  |     |  |

|      |    |                                           |  |
|------|----|-------------------------------------------|--|
| 1517 | KK | RETC2B                                    |  |
| 1518 | KM | RETRIEVE FLOW FROM VTN CULVERT 2          |  |
| 1519 | KM | REFERENCED FROM GCW MASTER DRAINAGE STUDY |  |
| 1520 | DR | DCHD2B                                    |  |
|      | *  |                                           |  |

|      |    |                                                |      |
|------|----|------------------------------------------------|------|
| 1521 | KK | 95-5A                                          |      |
| 1522 | KM | US95 BASIN BETWEEN LOG CABIN AND IRON MOUNTAIN |      |
| 1523 | BA | .0063                                          |      |
| 1524 | PB | 2.77                                           |      |
| 1525 | LS | 0                                              | 92.6 |
| 1526 | UD | 0.075                                          |      |
|      | *  |                                                |      |

|      |    |                                                |      |
|------|----|------------------------------------------------|------|
| 1527 | KK | 95-5B                                          |      |
| 1528 | KM | US95 BASIN BETWEEN LOG CABIN AND IRON MOUNTAIN |      |
| 1529 | BA | .0059                                          |      |
| 1530 | LS | 0                                              | 92.6 |
| 1531 | UD | 0.073                                          |      |
|      | *  |                                                |      |

|      |    |                                           |      |
|------|----|-------------------------------------------|------|
| 1532 | KK | 95-6A                                     |      |
| 1533 | KM | REFERENCED FROM GCW MASTER DRAINAGE STUDY |      |
| 1534 | BA | .0104                                     |      |
| 1535 | LS | 0                                         | 92.8 |
| 1536 | UD | 0.091                                     |      |
|      | *  |                                           |      |

|      |    |                                           |      |
|------|----|-------------------------------------------|------|
| 1537 | KK | 95-6B                                     |      |
| 1538 | KM | REFERENCED FROM GCW MASTER DRAINAGE STUDY |      |
| 1539 | BA | .0074                                     |      |
| 1540 | LS | 0                                         | 89.5 |
| 1541 | UD | 0.082                                     |      |
|      | *  |                                           |      |

|      |    |      |  |
|------|----|------|--|
| 1542 | KK | EC9A |  |
| 1543 | HC | 5    |  |
|      | *  |      |  |

|      |    |        |      |
|------|----|--------|------|
| 1544 | KK | ETP4   |      |
| 1545 | BA | 0.0013 |      |
| 1546 | LS | 0      | 98.0 |

LINE

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

1548

KK EPH2

1549

BA 0.0139

1550

LS 0 85.3

1551

UD 0.078

\*

1552

KK EC9B

1553

HC 3

\*

1554

KK EPE2

1555

BA 0.0142

1556

LS 0 71.7

1557

UD 0.104

\*

1558

KK ES1

1559

BA 0.0163

1560

LS 0 85.5

1561

UD 0.137

\*

1562

KK EIRN1

1563

BA 0.0030

1564

LS 0 92.2

1565

UD 0.064

\*

1566

KK EC10

1567

HC 4

\*

1568

KK FTNOR

1569

KM FLOW SPLIT AT IRON MOUNTAIN/FORT APACHE

1570

KM DIVERT FLOW EAST IN IRON MOUNTAIN ROAD

1571

KM MATCH CLV NWNS

1572

DT IREAST

1573

DI 0 98 235 500

1574

DQ 0 98 235 235

\*

1575

KK EFA4

1576

BA 0.0044

1577

LS 0 98.0

1578

UD 0.139

\*

1579

KK EPE1

1580

BA 0.0195

1581

LS 0 71.7

1582

UD 0.133

\*

LINE

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

1583

KK EC11

1584

HC 3

\*

1585

KK EPJ

1586

BA 0.0495

1587

LS 0 74.3

1588

UD 0.174

\*

1589

KK EPG

1590

BA 0.0248

1591

LS 0 71.7

1592

UD 0.163

\*

1593

KK EPI2

1594

BA 0.0116

1595

LS 0 71.7

1596

UD 0.081

\*

1597

KK EOHR1

1598

BA 0.0158

1599

LS 0 97.5

1600

UD 0.125

\*

1601

KK ESP

1602

BA 0.0055

1603

LS 0 55.3



|      |    |        |      |
|------|----|--------|------|
| 1604 | UD | 0.128  |      |
|      | *  |        |      |
| 1605 | KK | EC13   |      |
| 1606 | HC | 5      |      |
|      | *  |        |      |
| 1607 | KK | EPF2   |      |
| 1608 | BA | 0.0298 |      |
| 1609 | LS | 0      | 71.7 |
| 1610 | UD | 0.050  |      |
|      | *  |        |      |
| 1611 | KK | EPH1   |      |
| 1612 | BA | 0.0373 |      |
| 1613 | LS | 0      | 71.7 |
| 1614 | UD | 0.141  |      |
|      | *  |        |      |

1

HEC-1 INPUT

PAGE 45

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

|      |    |        |      |
|------|----|--------|------|
| 1615 | KK | EC14   |      |
| 1616 | HC | 3      |      |
|      | *  |        |      |
| 1617 | KK | EC15   |      |
| 1618 | HC | 2      |      |
|      | *  |        |      |
| 1619 | KK | EFA3   |      |
| 1620 | BA | 0.0039 |      |
| 1621 | LS | 0      | 98.0 |
| 1622 | UD | 0.122  |      |
|      | *  |        |      |
| 1623 | KK | EPD    |      |
| 1624 | BA | 0.0452 |      |
| 1625 | LS | 0      | 71.7 |
| 1626 | UD | 0.162  |      |
|      | *  |        |      |
| 1627 | KK | EC16   |      |
| 1628 | HC | 3      |      |
|      | *  |        |      |
| 1629 | KK | EC18   |      |
| 1630 | HC | 2      |      |
|      | *  |        |      |
| 1631 | KK | ENP    |      |
| 1632 | BA | 0.0055 |      |
| 1633 | LS | 0      | 45.3 |
| 1634 | UD | 0.139  |      |
|      | *  |        |      |
| 1635 | KK | EPB1   |      |
| 1636 | BA | 0.0494 |      |
| 1637 | LS | 0      | 71.7 |
| 1638 | UD | 0.165  |      |
|      | *  |        |      |
| 1639 | KK | EC8A   |      |
| 1640 | HC | 2      |      |
|      | *  |        |      |
| 1641 | KK | EFA2   |      |
| 1642 | BA | 0.0038 |      |
| 1643 | LS | 0      | 98.0 |
| 1644 | UD | 0.115  |      |
|      | *  |        |      |

1

HEC-1 INPUT

PAGE 46

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

|      |    |        |      |
|------|----|--------|------|
| 1645 | KK | EC17   |      |
| 1646 | HC | 3      |      |
|      | *  |        |      |
| 1647 | KK | EPA    |      |
| 1648 | BA | 0.0267 |      |
| 1649 | LS | 0      | 71.7 |
| 1650 | UD | 0.129  |      |
|      | *  |        |      |
| 1651 | KK | EPB2   |      |
| 1652 | BA | 0.0725 |      |
| 1653 | LS | 0      | 71.7 |
| 1654 | UD | 0.193  |      |
|      | *  |        |      |
| 1655 | KK | EC8B   |      |
| 1656 | HC | 2      |      |

|      |    |                                           |      |  |
|------|----|-------------------------------------------|------|--|
| 1657 | KK | EC21A                                     |      |  |
| 1658 | HC | 2                                         |      |  |
|      | *  |                                           |      |  |
| 1659 | KK | OFFC                                      |      |  |
| 1660 | KM | REFERENCED FROM GCW MASTER DRAINAGE STUDY |      |  |
| 1661 | BA | .1333                                     |      |  |
| 1662 | PB | 2.79                                      |      |  |
| 1663 | LS | 0                                         | 77.4 |  |
| 1664 | UD | 0.313                                     |      |  |
|      | *  |                                           |      |  |
| 1665 | KK | 95-3                                      |      |  |
| 1666 | KM | REFERENCED FROM GCW MASTER DRAINAGE STUDY |      |  |
| 1667 | BA | .0095                                     |      |  |
| 1668 | PB | 2.77                                      |      |  |
| 1669 | LS | 0                                         | 89.1 |  |
| 1670 | UD | 0.095                                     |      |  |
|      | *  |                                           |      |  |
| 1671 | KK | OFFB                                      |      |  |
| 1672 | KM | REFERENCED FROM GCW MASTER DRAINAGE STUDY |      |  |
| 1673 | BA | .1337                                     |      |  |
| 1674 | PB | 2.81                                      |      |  |
| 1675 | LS | 0                                         | 77.4 |  |
| 1676 | UD | 0.392                                     |      |  |
|      | *  |                                           |      |  |
| 1677 | KK | 95-2                                      |      |  |
| 1678 | KM | REFERENCED FROM GCW MASTER DRAINAGE STUDY |      |  |
| 1679 | BA | .0044                                     |      |  |
| 1680 | PB | 2.77                                      |      |  |
| 1681 | LS | 0                                         | 89.1 |  |
| 1682 | UD | 0.090                                     |      |  |
|      | *  |                                           |      |  |

1

# HEC-1 INPUT

PAGE 47

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

|      |    |                                            |      |  |
|------|----|--------------------------------------------|------|--|
| 1683 | KK | DUMMY                                      |      |  |
| 1684 | HC | 4                                          |      |  |
|      | *  |                                            |      |  |
| 1685 | KK | OFFA                                       |      |  |
| 1686 | KM | REFERENCED FROM GCW MASTER DRAINAGE STUDY  |      |  |
| 1687 | BA | .0203                                      |      |  |
| 1688 | PB | 2.77                                       |      |  |
| 1689 | LS | 0                                          | 77.4 |  |
| 1690 | UD | 0.149                                      |      |  |
|      | *  |                                            |      |  |
| 1691 | KK | 95-1                                       |      |  |
| 1692 | KM | REFERENCED FROM GCW MASTER DRAINAGE STUDY  |      |  |
| 1693 | BA | .0042                                      |      |  |
| 1694 | PB | 2.77                                       |      |  |
| 1695 | LS | 0                                          | 89.1 |  |
| 1696 | UD | 0.069                                      |      |  |
|      | *  |                                            |      |  |
| 1697 | KK | CP27B                                      |      |  |
| 1698 | KM | REFERENCED FROM GCW MASTER DRAINAGE STUDY  |      |  |
| 1699 | KM | COMBINE OFFC, 95-3, OFFB, 95-2, OFFA, 95-1 |      |  |
| 1700 | HC | 3                                          |      |  |
|      | *  |                                            |      |  |
| 1701 | KK | OFFZ                                       |      |  |
| 1702 | BA | 0.0481                                     |      |  |
| 1703 | LS | 0                                          | 71.7 |  |
| 1704 | UD | 0.175                                      |      |  |
|      | *  |                                            |      |  |
| 1705 | KK | ESKV1                                      |      |  |
| 1706 | BA | 0.0061                                     |      |  |
| 1707 | LS | 0                                          | 98.0 |  |
| 1708 | UD | 0.141                                      |      |  |
|      | *  |                                            |      |  |
| 1709 | KK | EC19                                       |      |  |
| 1710 | HC | 3                                          |      |  |
|      | *  |                                            |      |  |
| 1711 | KK | EMR1                                       |      |  |
| 1712 | BA | 0.0272                                     |      |  |
| 1713 | LS | 0                                          | 79.9 |  |
| 1714 | UD | 0.191                                      |      |  |
|      | *  |                                            |      |  |
| 1715 | KK | EAA1                                       |      |  |
| 1716 | BA | 0.0859                                     |      |  |
| 1717 | LS | 0                                          | 71.7 |  |
| 1718 | UD | 0.195                                      |      |  |
|      | *  |                                            |      |  |



| LINE | ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10 |                                           |      |
|------|-----------------------------------------------------------------|-------------------------------------------|------|
| 1719 | KK                                                              | EC20                                      |      |
| 1720 | HC                                                              | 3                                         |      |
|      | *                                                               |                                           |      |
| 1721 | KK                                                              | EMR2                                      |      |
| 1722 | BA                                                              | 0.0300                                    |      |
| 1723 | LS                                                              | 0                                         | 81.7 |
| 1724 | UD                                                              | 0.215                                     |      |
|      | *                                                               |                                           |      |
| 1725 | KK                                                              | EC21B                                     |      |
| 1726 | HC                                                              | 2                                         |      |
|      | *                                                               |                                           |      |
| 1727 | KK                                                              | EFA1                                      |      |
| 1728 | BA                                                              | 0.0042                                    |      |
| 1729 | LS                                                              | 0                                         | 98.0 |
| 1730 | UD                                                              | 0.152                                     |      |
|      | *                                                               |                                           |      |
| 1731 | KK                                                              | EC21                                      |      |
| 1732 | HC                                                              | 3                                         |      |
|      | *                                                               |                                           |      |
| 1733 | KK                                                              | NW102-C                                   |      |
| 1734 | BA                                                              | 0.2002                                    |      |
| 1735 | LS                                                              | 0                                         | 93.0 |
| 1736 | UD                                                              | 0.253                                     |      |
|      | *                                                               |                                           |      |
| 1737 | KK                                                              | EC27                                      |      |
| 1738 | HC                                                              | 2                                         |      |
|      | *                                                               |                                           |      |
| 1739 | KK                                                              | NW130-W                                   |      |
| 1740 | BA                                                              | 0.1559                                    |      |
| 1741 | LS                                                              | 0                                         | 75.5 |
| 1742 | UD                                                              | 0.241                                     |      |
|      | *                                                               |                                           |      |
| 1743 | KK                                                              | EC28                                      |      |
| 1744 | HC                                                              | 2                                         |      |
|      | *                                                               |                                           |      |
| 1745 | KK                                                              | 95-7A                                     |      |
| 1746 | KM                                                              | REFERENCED FROM GCW MASTER DRAINAGE STUDY |      |
| 1747 | BA                                                              | .0069                                     |      |
| 1748 | PB                                                              | 2.77                                      |      |
| 1749 | LS                                                              | 0                                         | 94.7 |
| 1750 | UD                                                              | 0.073                                     |      |
|      | *                                                               |                                           |      |

| LINE | ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10 |                                           |      |
|------|-----------------------------------------------------------------|-------------------------------------------|------|
| 1751 | KK                                                              | 95-7B                                     |      |
| 1752 | KM                                                              | REFERENCED FROM GCW MASTER DRAINAGE STUDY |      |
| 1753 | BA                                                              | .0081                                     |      |
| 1754 | LS                                                              | 0                                         | 94.7 |
| 1755 | UD                                                              | 0.084                                     |      |
|      | *                                                               |                                           |      |
| 1756 | KK                                                              | 95-8A                                     |      |
| 1757 | KM                                                              | REFERENCED FROM GCW MASTER DRAINAGE STUDY |      |
| 1758 | BA                                                              | .0052                                     |      |
| 1759 | LS                                                              | 0                                         | 94.7 |
| 1760 | UD                                                              | 0.061                                     |      |
|      | *                                                               |                                           |      |
| 1761 | KK                                                              | 95-8B                                     |      |
| 1762 | KM                                                              | REFERENCED FROM GCW MASTER DRAINAGE STUDY |      |
| 1763 | BA                                                              | .0031                                     |      |
| 1764 | LS                                                              | 0                                         | 94.7 |
| 1765 | UD                                                              | 0.050                                     |      |
|      | *                                                               |                                           |      |
| 1766 | KK                                                              | C95-8B                                    |      |
| 1767 | KM                                                              | COMBINE 95-7A, 95-7B, 95-8A, 95-8B        |      |
| 1768 | HC                                                              | 4                                         |      |
|      | *                                                               |                                           |      |
| 1769 | KK                                                              | ETP5                                      |      |
| 1770 | BA                                                              | 0.0014                                    |      |
| 1771 | LS                                                              | 0                                         | 98.0 |
| 1772 | UD                                                              | 0.088                                     |      |
|      | *                                                               |                                           |      |
| 1773 | KK                                                              | EPH3                                      |      |
| 1774 | BA                                                              | 0.0241                                    |      |

|      |    |        |      |
|------|----|--------|------|
| 1775 | LS | 0      | 89.0 |
| 1776 | UD | 0.106  |      |
|      | *  |        |      |
| 1777 | KK | EC22   |      |
| 1778 | HC | 3      |      |
|      | *  |        |      |
| 1779 | KK | ES2    |      |
| 1780 | BA | 0.0502 |      |
| 1781 | LS | 0      | 93.0 |
| 1782 | UD | 0.108  |      |
|      | *  |        |      |
| 1783 | KK | EBRT1  |      |
| 1784 | BA | 0.0028 |      |
| 1785 | LS | 0      | 98.0 |
| 1786 | UD | 0.066  |      |
|      | *  |        |      |

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

|      |    |                                                            |        |
|------|----|------------------------------------------------------------|--------|
| 1787 | KK | EC23                                                       |        |
| 1788 | HC | 3                                                          |        |
|      | *  |                                                            |        |
| 1789 | KK | ECOM1B                                                     |        |
| 1790 | BA | 0.0214                                                     |        |
| 1791 | LS | 0                                                          | 89.0   |
| 1792 | UD | 0.087                                                      |        |
|      | *  |                                                            |        |
| 1793 | KK | EFA6A                                                      |        |
| 1794 | BA | 0.0039                                                     |        |
| 1795 | LS | 0                                                          | 98.0   |
| 1796 | UD | 0.063                                                      |        |
|      | *  |                                                            |        |
| 1797 | KK | EC25                                                       |        |
| 1798 | HC | 3                                                          |        |
| 1799 | KK | SOUTH                                                      |        |
| 1800 | KM | FLOW SPLIT AT BRENT/FT. APACHE                             |        |
| 1801 | KM | DIVERT STORM DRAIN DESIGN FLOW 70 CFS SOUTH IN FORT APACHE |        |
| 1802 | DT | BRENT                                                      |        |
| 1803 | DI | 0                                                          | 70 500 |
| 1804 | DQ | 0                                                          | 0 430  |
|      | *  |                                                            |        |
| 1805 | KK | 95-9B                                                      |        |
| 1806 | KM | REFERENCED FROM GCW MASTER DRAINAGE STUDY                  |        |
| 1807 | BA | .0133                                                      |        |
| 1808 | LS | 0                                                          | 92.6   |
| 1809 | UD | 0.139                                                      |        |
|      | *  |                                                            |        |
| 1810 | KK | EFA6B                                                      |        |
| 1811 | BA | 0.0089                                                     |        |
| 1812 | LS | 0                                                          | 98.0   |
| 1813 | UD | 0.091                                                      |        |
|      | *  |                                                            |        |
| 1814 | KK | ECOM1A                                                     |        |
| 1815 | BA | 0.0155                                                     |        |
| 1816 | LS | 0                                                          | 89.0   |
| 1817 | UD | 0.089                                                      |        |
|      | *  |                                                            |        |
| 1818 | KK | EC24                                                       |        |
| 1819 | HC | 3                                                          |        |
|      | *  |                                                            |        |

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

|      |    |        |      |
|------|----|--------|------|
| 1820 | KK | EFA5   |      |
| 1821 | BA | 0.0014 |      |
| 1822 | LS | 0      | 98.0 |
| 1823 | UD | 0.050  |      |
|      | *  |        |      |
| 1824 | KK | EFP2   |      |
| 1825 | BA | 0.0016 |      |
| 1826 | LS | 0      | 89.0 |
| 1827 | UD | 0.050  |      |
|      | *  |        |      |
| 1828 | KK | ECOM2  |      |
| 1829 | BA | 0.0073 |      |
| 1830 | LS | 0      | 89.0 |
| 1831 | UD | 0.059  |      |
|      | *  |        |      |



|      |    |                                                |     |      |  |
|------|----|------------------------------------------------|-----|------|--|
| 1832 | KK | EC26                                           |     |      |  |
| 1833 | HC | 5                                              |     |      |  |
|      | *  |                                                |     |      |  |
| 1834 | KK | HORSE                                          |     |      |  |
| 1835 | KM | FLOW SPLIT AT HORSE/RACEL                      |     |      |  |
| 1836 | KM | DIVERT NWNS 101 CFS SOUTH IN FORT APACHE/RACEL |     |      |  |
| 1837 | DT | RACEL                                          |     |      |  |
| 1838 | DI | 0                                              | 114 | 1000 |  |
| 1839 | DQ | 0                                              | 114 | 114  |  |
|      | *  |                                                |     |      |  |
| 1840 | ZZ |                                                |     |      |  |

1

# SCHEMATIC DIAGRAM OF STREAM NETWORK

| INPUT<br>LINE | (V) ROUTING   | (--->) DIVERSION OR PUMP FLOW            |
|---------------|---------------|------------------------------------------|
| NO.           | (.) CONNECTOR | (<---) RETURN OF DIVERTED OR PUMPED FLOW |
| 27            | WUS95         |                                          |
|               | .             |                                          |
| 46            | .             | DCHD1B                                   |
| 41            | DHD01B        |                                          |
|               | .             |                                          |
| 54            | .             | DCHD2B                                   |
| 49            | DHD02B        |                                          |
|               | .             |                                          |
| 57            | WML15A        |                                          |
|               | .             |                                          |
| 63            | .             | WSPD1                                    |
|               | .             |                                          |
| 69            | WC1.....      |                                          |
|               | .             |                                          |
| 73            | .             | WIRN4                                    |
|               | .             |                                          |
| 79            | .             | WMLA1A                                   |
|               | .             |                                          |
| 85            | WC2.....      |                                          |
|               | .             |                                          |
| 89            | .             | WGED1B                                   |
|               | .             |                                          |
| 95            | .             | WIRN5                                    |
|               | .             |                                          |
| 101           | WC3.....      |                                          |
|               | .             |                                          |
| 105           | .             | OFFW                                     |
|               | .             |                                          |
| 110           | CHD04B.....   |                                          |
|               | .             |                                          |
| 112           | WPRK7         |                                          |
|               | .             |                                          |
| 118           | .             | WMLA1B                                   |
|               | .             |                                          |
| 124           | .             | WMLA2                                    |
|               | .             |                                          |
| 130           | .             | WGRC2                                    |
|               | .             |                                          |
| 136           | WC4.....      |                                          |
|               | .             |                                          |
| 140           | .             | WMLA3                                    |
|               | .             |                                          |
| 146           | WC5.....      |                                          |
|               | .             |                                          |
| 149           | CHD05B.....   |                                          |
|               | .             |                                          |
| 152           | WML16         |                                          |
|               | .             |                                          |
| 158           | .             | WSPD3                                    |
|               | .             |                                          |
| 164           | WC6.....      |                                          |

|     |        |        |        |        |        |
|-----|--------|--------|--------|--------|--------|
| 168 | .      | .      | WL9A   | .      |        |
| 174 | .      | .      |        | WL10A  | .      |
| 180 | .      | .      |        |        | WSCP4  |
| 186 | .      | WC7    | .      | .      | .      |
| 190 | .      |        | WGC3   | .      |        |
| 196 | .      | .      |        | WGRC1A | .      |
| 202 | .      | .      | .      |        | WML15B |
| 208 | .      | .      | .      | .      | WSPD2  |
| 214 | .      | .      | .      | .      | WC8    |
| 217 | .      | WC9    | .      | .      | .      |
| 221 | .      |        | OFF14  | .      |        |
| 226 | CHD06B | .      | .      | .      |        |
| 229 | .      | 95-9A  | .      |        |        |
| 235 | CHD07B | .      | .      |        |        |
| 239 | .      | OFF15  | .      |        |        |
| 245 | CHD7B2 | .      | .      |        |        |
| 250 | .      | OFF17B | .      |        |        |
| 257 | .      |        | OFF17A | .      |        |
| 264 | .      | COFF17 | .      |        |        |
| 270 | .      |        | ON1    | .      |        |
| 276 | .      |        |        | ON4A   | .      |
| 280 | .      |        | C1     | .      |        |
| 285 | .      |        | .      | .      | DIV1   |
| 283 | .      |        | D1     | .      |        |
| 288 | .      |        |        | ON5    | .      |
| 292 | .      |        | C2     | .      |        |
| 297 | .      |        | .      | .      | DIV1A  |
| 295 | .      |        | D1A    | .      |        |
| 300 | .      |        |        | ON4B   | .      |
| 306 | .      |        | .      | .      | DIV1   |
| 304 | .      |        | .      | RET1   | .      |
| 307 | .      |        | .      | .      | ON6    |
| 311 | .      |        | .      | .      | C3     |



```

316 . . . . .-----> DIV1B
314 . . . . .D1B
. . . . .
. . . . .
319 . . . . .ON2
. . . . .
. . . . .
323 . . . . .ON3
. . . . .
. . . . .
327 . . . . .ON9
. . . . .
. . . . .
331 . . . . .C4.....
. . . . .
. . . . .
336 . . . . .-----> DIV2
334 . . . . .D2
. . . . .
. . . . .
339 . . . . .ON10
. . . . .
. . . . .
343 . . . . .C5.....
. . . . .
. . . . .
348 . . . . .-----> DIV3
346 . . . . .D3
. . . . .
. . . . .
351 . . . . .ON11
. . . . .
. . . . .
355 . . . . .C6.....
. . . . .
. . . . .
360 . . . . .-----> DIV1C
358 . . . . .D1C
. . . . .
. . . . .
363 . . . . .CD1C.....
. . . . .V
. . . . .V
367 . . . . .RCD1C
. . . . .
. . . . .
372 . . . . .-----> DOFF23
370 . . . . .DRCD1C
. . . . .
. . . . .
375 . . . . .ON8
. . . . .
. . . . .
381 . . . . .<----- DIV2
379 . . . . .RET2
. . . . .
. . . . .
382 . . . . .C7.....
. . . . .
. . . . .
387 . . . . .<----- DIV3
385 . . . . .RET3
. . . . .
. . . . .
388 . . . . .ON7
. . . . .
. . . . .
392 . . . . .C8.....
. . . . .
. . . . .
397 . . . . .<----- DIV1A
395 . . . . .RET1A
. . . . .
. . . . .
400 . . . . .<----- DIV1B
398 . . . . .RET1B
. . . . .
. . . . .
403 . . . . .<----- DIV1C
401 . . . . .RET1C
. . . . .
. . . . .
404 . . . . .C9.....
. . . . .
. . . . .
408 . . . . .ON2D
. . . . .
. . . . .
414 . . . . .ON5D
. . . . .
. . . . .
418 . . . . .CP1.....
. . . . .
. . . . .
421 . . . . .ON3D

```

|     |   |   |             |   |   |   |          |   |
|-----|---|---|-------------|---|---|---|----------|---|
| 425 | . | . | .           | . | . | . | CP2..... | . |
| 428 | . | . | .           | . | . | . | ON1D     | . |
| 432 | . | . | .           | . | . | . | ON4D     | . |
| 436 | . | . | .           | . | . | . | CP3..... | . |
| 439 | . | . | .           | . | . | . | CP4..... | . |
| 443 | . | . | CENGCA..... | . | . | . | .        | . |
| 448 | . | . | WML9        | . | . | . | .        | . |
| 454 | . | . | WPRK5       | . | . | . | .        | . |
| 460 | . | . | WC10A.....  | . | . | . | .        | . |
| 464 | . | . | WEGL1       | . | . | . | .        | . |
| 470 | . | . | WL4B        | . | . | . | .        | . |
| 475 | . | . | WC10B.....  | . | . | . | .        | . |
| 478 | . | . | WML10       | . | . | . | .        | . |
| 484 | . | . | WEGN3       | . | . | . | .        | . |
| 490 | . | . | WML11       | . | . | . | .        | . |
| 496 | . | . | WC11.....   | . | . | . | .        | . |
| 500 | . | . | WC12.....   | . | . | . | .        | . |
| 504 | . | . | WL6B        | . | . | . | .        | . |
| 510 | . | . | WL7         | . | . | . | .        | . |
| 516 | . | . | WML13       | . | . | . | .        | . |
| 522 | . | . | WEGL2       | . | . | . | .        | . |
| 528 | . | . | WC13.....   | . | . | . | .        | . |
| 532 | . | . | WML14       | . | . | . | .        | . |
| 538 | . | . | WL8         | . | . | . | .        | . |
| 544 | . | . | WSKV3       | . | . | . | .        | . |
| 550 | . | . | WSKV4       | . | . | . | .        | . |
| 556 | . | . | WC14.....   | . | . | . | .        | . |
| 560 | . | . | WL9B        | . | . | . | .        | . |
| 566 | . | . | WSPD4       | . | . | . | .        | . |
| 572 | . | . | WC15.....   | . | . | . | .        | . |
| 576 | . | . | WL11        | . | . | . | .        | . |



|     |        |        |        |        |       |        |       |       |
|-----|--------|--------|--------|--------|-------|--------|-------|-------|
| 582 | .      | .      | .      | .      | .     | .      | WPRK8 | .     |
| 588 | .      | .      | .      | .      | .     | .      | .     | WPRK9 |
| 594 | .      | .      | .      | .      | .     | .      | .     | WMTL1 |
| 600 | .      | .      | .      | .      | .     | WC16   | ..... | .     |
| 604 | .      | .      | .      | .      | .     | .      | WEGL3 | .     |
| 610 | .      | .      | .      | .      | .     | .      | .     | WL10B |
| 616 | .      | .      | .      | WC17   | ..... | .      | .     | .     |
| 620 | .      | .      | .      | .      | WL12  | .      | .     | .     |
| 626 | .      | .      | .      | .      | .     | WGRC1B | .     | .     |
| 632 | .      | .      | .      | WC18   | ..... | .      | .     | .     |
| 636 | .      | .      | CCP4   | .....  | .     | .      | .     | .     |
| 638 | .      | .      | .      | OFF21B | .     | .      | .     | .     |
| 645 | .      | .      | COF21B | .....  | .     | .      | .     | .     |
| 652 | .      | .      | .      | .      | .     | .      | .     | .     |
| 649 | .      | .      | .      | ROFF23 | .     | .      | .     | .     |
| 653 | .      | .      | .      | .      | OFF23 | .      | .     | .     |
| 659 | .      | .      | .      | COFF23 | ..... | .      | .     | .     |
| 663 | .      | .      | .      | .      | OFFU  | .      | .     | .     |
| 668 | CPCULV | .....  | .      | .      | .     | .      | .     | .     |
| 670 | .      | NW29-C | .      | .      | .     | .      | .     | .     |
|     | .      | V      | .      | .      | .     | .      | .     | .     |
|     | .      | V      | .      | .      | .     | .      | .     | .     |
| 676 | .      | RNW29C | .      | .      | .     | .      | .     | .     |
| 683 | .      | .      | NW71-W | .      | .     | .      | .     | .     |
| 689 | .      | CNW71W | .....  | .      | .     | .      | .     | .     |
|     | .      | V      | .      | .      | .     | .      | .     | .     |
|     | .      | V      | .      | .      | .     | .      | .     | .     |
| 694 | .      | RCNW71 | .      | .      | .     | .      | .     | .     |
| 701 | .      | .      | NW71-E | .      | .     | .      | .     | .     |
| 707 | .      | CNW71E | .....  | .      | .     | .      | .     | .     |
| 712 | .      | .      | WGRT1  | .      | .     | .      | .     | .     |
| 718 | 95STH  | .....  | .      | .      | .     | .      | .     | .     |
| 722 | .      | OFF4-1 | .      | .      | .     | .      | .     | .     |
|     | .      | V      | .      | .      | .     | .      | .     | .     |
|     | .      | V      | .      | .      | .     | .      | .     | .     |
| 727 | .      | ROFF41 | .      | .      | .     | .      | .     | .     |
| 732 | .      | .      | OFF4-2 | .      | .     | .      | .     | .     |
| 737 | .      | COFF42 | .....  | .      | .     | .      | .     | .     |
|     | .      | V      | .      | .      | .     | .      | .     | .     |
|     | .      | V      | .      | .      | .     | .      | .     | .     |
| 741 | .      | RCOFF4 | .      | .      | .     | .      | .     | .     |

|     |   |             |             |        |       |
|-----|---|-------------|-------------|--------|-------|
| 746 | . | .           | OFF5-1      | .      |       |
|     | . | .           | .           | .      |       |
| 751 | . | COFF51..... | .           | .      |       |
|     | . | V           | .           | .      |       |
|     | . | V           | .           | .      |       |
| 755 | . | RCOFF5      | .           | .      |       |
|     | . | .           | .           | .      |       |
| 762 | . | .           | OFF5-2      | .      |       |
|     | . | .           | V           | .      |       |
|     | . | .           | V           | .      |       |
| 767 | . | .           | ROFF52      | .      |       |
|     | . | .           | .           | .      |       |
| 774 | . | .           | .           | NW1-C  |       |
|     | . | .           | .           | .      |       |
| 779 | . | .           | CNW1-C..... | .      |       |
|     | . | .           | .           | .      |       |
| 783 | . | 2CNW1C..... | .           | .      |       |
|     | . | V           | .           | .      |       |
|     | . | V           | .           | .      |       |
| 787 | . | R2CNW1      | .           | .      |       |
|     | . | .           | .           | .      |       |
| 794 | . | .           | NW7-C       | .      |       |
|     | . | .           | .           | .      |       |
| 799 | . | .           | CNW-7.....  | .      |       |
|     | . | .           | V           | .      |       |
|     | . | .           | V           | .      |       |
| 803 | . | 157DB       | .           | .      |       |
|     | . | V           | .           | .      |       |
|     | . | V           | .           | .      |       |
| 811 | . | RCNW7C      | .           | .      |       |
|     | . | .           | .           | .      |       |
| 818 | . | .           | NW21-C      | .      |       |
|     | . | .           | .           | .      |       |
| 823 | . | .           | CNW21C..... | .      |       |
|     | . | .           | V           | .      |       |
|     | . | .           | V           | .      |       |
| 826 | . | RCNW21      | .           | .      |       |
|     | . | .           | .           | .      |       |
| 833 | . | .           | NW35-C      | .      |       |
|     | . | .           | .           | .      |       |
| 838 | . | .           | .           | WPRK10 |       |
|     | . | .           | .           | .      |       |
| 844 | . | .           | CNW35C..... | .      |       |
|     | . | .           | .           | .      |       |
| 847 | . | .           | WOFF1       | .      |       |
|     | . | .           | .           | .      |       |
| 853 | . | .           | .           | WOFF11 |       |
|     | . | .           | .           | .      |       |
| 859 | . | .           | .           | WOFF2  |       |
|     | . | .           | .           | .      |       |
| 864 | . | .           | .           | WOFF3  |       |
|     | . | .           | .           | .      |       |
| 869 | . | .           | CP1.....    | .      |       |
|     | . | .           | .           | .      |       |
| 872 | . | .           | .           | WOFF4  |       |
|     | . | .           | .           | .      |       |
| 877 | . | .           | .           | WOFF5  |       |
|     | . | .           | .           | .      |       |
| 882 | . | .           | .           | WOFF6  |       |
|     | . | .           | .           | .      |       |
| 887 | . | .           | .           | .      | WPF1B |
|     | . | .           | .           | .      | .     |
| 893 | . | .           | DB1.....    | .      | .     |
|     | . | .           | V           | .      | .     |
|     | . | .           | V           | .      | .     |
| 896 | . | .           | RDB1        | .      | .     |
|     | . | .           | .           | .      | .     |
| 904 | . | .           | .           | WSHP3  | .     |
|     | . | .           | .           | .      | .     |

|      |   |   |      |       |       |       |
|------|---|---|------|-------|-------|-------|
| 910  | . | . | .    | .     | WPF2  | .     |
|      | . | . | .    | .     | .     | .     |
| 916  | . | . | WC19 | .     | .     | .     |
|      | . | . | .    | .     | .     | .     |
| 920  | . | . | .    | WPF5  | .     | .     |
|      | . | . | .    | .     | .     | .     |
| 926  | . | . | .    | .     | WML2  | .     |
|      | . | . | .    | .     | .     | .     |
| 932  | . | . | .    | .     | .     | WSHA5 |
|      | . | . | .    | .     | .     | .     |
| 938  | . | . | .    | WC20  | .     | .     |
|      | . | . | .    | .     | .     | .     |
| 942  | . | . | .    | .     | WARR4 | .     |
|      | . | . | .    | .     | .     | .     |
| 948  | . | . | .    | .     | .     | WPF4  |
|      | . | . | .    | .     | .     | .     |
| 953  | . | . | .    | .     | .     | .     |
|      | . | . | .    | .     | .     | WSHA4 |
|      | . | . | .    | .     | .     | .     |
| 958  | . | . | WC21 | .     | .     | .     |
|      | . | . | .    | .     | .     | .     |
| 961  | . | . | .    | WL4A  | .     | .     |
|      | . | . | .    | .     | .     | .     |
| 967  | . | . | .    | .     | WL5A  | .     |
|      | . | . | .    | .     | .     | .     |
| 973  | . | . | .    | .     | .     | WL5B  |
|      | . | . | .    | .     | .     | .     |
| 978  | . | . | .    | WC22A | .     | .     |
|      | . | . | .    | .     | .     | .     |
| 980  | . | . | .    | .     | WPRK4 | .     |
|      | . | . | .    | .     | .     | .     |
| 986  | . | . | .    | .     | .     | WARR5 |
|      | . | . | .    | .     | .     | .     |
| 992  | . | . | WC22 | .     | .     | .     |
|      | . | . | .    | .     | .     | .     |
| 995  | . | . | .    | WML8  | .     | .     |
|      | . | . | .    | .     | .     | .     |
| 1001 | . | . | .    | .     | WPF6  | .     |
|      | . | . | .    | .     | .     | .     |
| 1007 | . | . | .    | .     | .     | WEGN1 |
|      | . | . | .    | .     | .     | .     |
| 1013 | . | . | .    | .     | .     | .     |
|      | . | . | .    | .     | .     | WEGN2 |
|      | . | . | .    | .     | .     | .     |
| 1019 | . | . | WC23 | .     | .     | .     |
|      | . | . | .    | .     | .     | .     |
| 1023 | . | . | .    | WARR6 | .     | .     |
|      | . | . | .    | .     | .     | .     |
| 1029 | . | . | .    | .     | WPF7  | .     |
|      | . | . | .    | .     | .     | .     |
| 1035 | . | . | .    | .     | .     | WL6A  |
|      | . | . | .    | .     | .     | .     |
| 1041 | . | . | WC24 | .     | .     | .     |
|      | . | . | .    | .     | .     | .     |
| 1045 | . | . | .    | WSCP2 | .     | .     |
|      | . | . | .    | .     | .     | .     |
| 1051 | . | . | .    | .     | WPRK3 | .     |
|      | . | . | .    | .     | .     | .     |
| 1057 | . | . | .    | WC25  | .     | .     |
|      | . | . | .    | .     | .     | .     |
| 1060 | . | . | .    | .     | WPRK6 | .     |
|      | . | . | .    | .     | .     | .     |
| 1066 | . | . | .    | .     | .     | WSCP3 |
|      | . | . | .    | .     | .     | .     |
| 1072 | . | . | WC26 | .     | .     | .     |
|      | . | . | .    | .     | .     | .     |



|      |   |   |      |       |        |        |        |
|------|---|---|------|-------|--------|--------|--------|
| 1076 | . | . | .    | WML7  | .      | .      | .      |
| 1082 | . | . | .    | .     | WSKV2  | .      | .      |
| 1088 | . | . | WC27 | .     | .      | .      | .      |
| 1092 | . | . | .    | WL1B  | .      | .      | .      |
| 1098 | . | . | .    | .     | WARR1  | .      | .      |
| 1104 | . | . | .    | .     | .      | WSHP2  | .      |
| 1110 | . | . | .    | WC28  | .      | .      | .      |
| 1114 | . | . | .    | .     | WPF3   | .      | .      |
| 1119 | . | . | .    | .     | .      | WSHA3A | .      |
| 1124 | . | . | .    | .     | WC29   | .      | .      |
| 1126 | . | . | .    | .     | .      | WSCH2  | .      |
| 1131 | . | . | .    | .     | .      | .      | WSHA3B |
| 1136 | . | . | .    | .     | WC30   | .      | .      |
| 1138 | . | . | .    | .     | .      | WSCP1  | .      |
| 1143 | . | . | .    | .     | WC31   | .      | .      |
| 1145 | . | . | .    | .     | .      | WML1   | .      |
| 1151 | . | . | .    | .     | .      | .      | WSHA2  |
| 1157 | . | . | .    | .     | WC32   | .      | .      |
| 1159 | . | . | .    | .     | .      | WARR2  | .      |
| 1165 | . | . | .    | WC33  | .      | .      | .      |
| 1167 | . | . | .    | .     | WARR3  | .      | .      |
| 1173 | . | . | .    | .     | .      | WML5   | .      |
| 1179 | . | . | .    | .     | .      | .      | WML6   |
| 1185 | . | . | .    | WC34  | .      | .      | .      |
| 1189 | . | . | WC35 | .     | .      | .      | .      |
| 1193 | . | . | .    | WL2   | .      | .      | .      |
| 1199 | . | . | .    | .     | WPRK2  | .      | .      |
| 1205 | . | . | .    | WC36  | .      | .      | .      |
| 1209 | . | . | .    | .     | WSKV1B | .      | .      |
| 1215 | . | . | .    | .     | .      | WL3    | .      |
| 1221 | . | . | .    | WC37  | .      | .      | .      |
| 1225 | . | . | .    | WOFF7 | .      | .      | .      |

|      |   |   |   |       |        |        |
|------|---|---|---|-------|--------|--------|
| 1230 | . | . | . | .     | WOFF8  | .      |
|      | . | . | . | .     | .      | .      |
| 1235 | . | . | . | CP2   | .....  | .      |
|      | . | . | . | .     | .      | .      |
| 1238 | . | . | . | .     | WOFF9  | .      |
|      | . | . | . | .     | .      | .      |
| 1243 | . | . | . | .     | WOFF10 | .      |
|      | . | . | . | .     | .      | .      |
| 1248 | . | . | . | .     | .      | WPF1A  |
|      | . | . | . | .     | .      | .      |
| 1254 | . | . | . | DB2   | .....  | .      |
|      | . | . | . | V     | .      | .      |
|      | . | . | . | V     | .      | .      |
| 1257 | . | . | . | RDB2  | .      | .      |
|      | . | . | . | .     | .      | .      |
| 1265 | . | . | . | .     | WPRK1  | .      |
|      | . | . | . | .     | .      | .      |
| 1271 | . | . | . | .     | .      | WIRN1  |
|      | . | . | . | .     | .      | .      |
| 1277 | . | . | . | .     | .      | WL1A   |
|      | . | . | . | .     | .      | .      |
| 1283 | . | . | . | WC38  | .....  | .      |
|      | . | . | . | .     | .      | .      |
| 1287 | . | . | . | .     | WSHP1  | .      |
|      | . | . | . | .     | .      | .      |
| 1293 | . | . | . | WC39  | .....  | .      |
|      | . | . | . | .     | .      | .      |
| 1297 | . | . | . | .     | WIRN2  | .      |
|      | . | . | . | .     | .      | .      |
| 1303 | . | . | . | .     | .      | WSCH1  |
|      | . | . | . | .     | .      | .      |
| 1309 | . | . | . | .     | .      | WSHA1  |
|      | . | . | . | .     | .      | .      |
| 1315 | . | . | . | .     | WC40   | .....  |
|      | . | . | . | .     | .      | .      |
| 1319 | . | . | . | .     | .      | WML3   |
|      | . | . | . | .     | .      | .      |
| 1325 | . | . | . | WC41  | .....  | .      |
|      | . | . | . | .     | .      | .      |
| 1329 | . | . | . | .     | WIRN3  | .      |
|      | . | . | . | .     | .      | .      |
| 1335 | . | . | . | .     | .      | WML4   |
|      | . | . | . | .     | .      | .      |
| 1341 | . | . | . | WC42  | .....  | .      |
|      | . | . | . | .     | .      | .      |
| 1345 | . | . | . | WC43  | .....  | .      |
|      | . | . | . | .     | .      | .      |
| 1349 | . | . | . | .     | WSKV1A | .      |
|      | . | . | . | .     | .      | .      |
| 1355 | . | . | . | WC44A | .....  | .      |
|      | . | . | . | .     | .      | .      |
| 1359 | . | . | . | .     | WGC2   | .      |
|      | . | . | . | .     | .      | .      |
| 1365 | . | . | . | .     | WOSO1  | .      |
|      | . | . | . | .     | .      | .      |
| 1371 | . | . | . | .     | .      | WGED1A |
|      | . | . | . | .     | .      | .      |
| 1377 | . | . | . | WC44B | .....  | .      |
|      | . | . | . | .     | .      | .      |
| 1384 | . | . | . | .     | .      | .      |
| 1381 | . | . | . | .     | RETCLB | .      |
|      | . | . | . | .     | .      | .      |
| 1385 | . | . | . | .     | 95-4A  | .      |
|      | . | . | . | .     | .      | .      |

|      |   |      |        |                |                |       |
|------|---|------|--------|----------------|----------------|-------|
| 1391 | . | .    | .      | .              | 95-4B          | .     |
| 1397 | . | .    | .      | .              | .              | EUS95 |
| 1402 | . | COMB | .      | .              | .              | .     |
| 1405 | . | .    | OFFDA  | .              | .              | .     |
|      | . | .    | V      | .              | .              | .     |
|      | . | .    | V      | .              | .              | .     |
| 1411 | . | .    | ROFFDA | .              | .              | .     |
| 1415 | . | .    | .      | OFFDB          | .              | .     |
| 1421 | . | .    | CP27A  | .              | .              | .     |
| 1427 | . | .    | .      | -----> D42CMP  | .              | .     |
| 1424 | . | .    | 42CMP  | .              | .              | .     |
| 1430 | . | .    | .      | WGC1           | .              | .     |
| 1436 | . | .    | WC44C  | .              | .              | .     |
| 1441 | . | .    | .      | -----> D63RCB  | .              | .     |
| 1438 | . | .    | 6X3RCB | .              | .              | .     |
| 1444 | . | EC1  | .      | .              | .              | .     |
| 1448 | . | .    | .      | .<----- D42CMP | .              | .     |
| 1446 | . | .    | RET42  | .              | .              | .     |
| 1449 | . | .    | .      | ECOM4          | .              | .     |
| 1455 | . | .    | .      | .              | .<----- D63RCB | .     |
| 1453 | . | .    | .      | RET6X3         | .              | .     |
| 1456 | . | .    | .      | .              | EMLA1          | .     |
| 1460 | . | .    | .      | .              | .              | ECOM3 |
| 1464 | . | .    | .      | .              | COMB           | .     |
| 1467 | . | .    | .      | .              | .              | ESKY1 |
| 1471 | . | .    | EC2A   | .              | .              | .     |
| 1473 | . | .    | .      | EPI1           | .              | .     |
| 1477 | . | .    | .      | .              | ELOG1          | .     |
| 1481 | . | EC2  | .      | .              | .              | .     |
| 1483 | . | .    | EAA3   | .              | .              | .     |
| 1487 | . | .    | .      | EAA4           | .              | .     |
| 1491 | . | .    | .      | .              | ECR1           | .     |
| 1495 | . | .    | .      | .              | .              | EAA2  |
| 1499 | . | .    | .      | .              | .              | EPC   |
| 1503 | . | .    | EC5    | .              | .              | .     |
| 1505 | . | .    | .      | EPF1           | .              | .     |



```

1509      .      EC6.....
1511      .      .      ELOG2
1515      .      .      EC8.....
1520      .      .      .<----- DCHD2B
1517      .      .      RETC2B
1521      .      .      .      95-5A
1527      .      .      .      .      95-5B
1532      .      .      .      .      .      95-6A
1537      .      .      .      .      .      .      95-6B
1542      .      .      EC9A.....
1544      .      .      .      ETP4
1548      .      .      .      .      EPH2
1552      .      .      EC9B.....
1554      .      .      .      EPE2
1558      .      .      .      .      ES1
1562      .      .      .      .      .      EIRN1
1566      .      .      EC10.....
1572      .      .      .-----> IREAST
1568      .      .      FTNOR
1575      .      .      .      EFA4
1579      .      .      .      .      EPE1
1583      .      .      EC11.....
1585      .      .      .      EPJ
1589      .      .      .      .      EPG
1593      .      .      .      .      .      EPI2
1597      .      .      .      .      .      .      EOHR1
1601      .      .      .      .      .      .      .      ESP
1605      .      .      .      EC13.....
1607      .      .      .      .      EPF2
1611      .      .      .      .      .      EPH1
1615      .      .      .      EC14.....
1617      .      .      EC15.....
1619      .      .      .      EFA3

```

|      |   |       |        |      |       |
|------|---|-------|--------|------|-------|
| 1623 | . | .     | .      | .    | EPD   |
|      | . | .     | .      | .    | .     |
| 1627 | . | .     | EC16   | .    | .     |
|      | . | .     | .      | .    | .     |
| 1629 | . | EC18  | .      | .    | .     |
|      | . | .     | .      | .    | .     |
| 1631 | . | .     | ENP    | .    | .     |
|      | . | .     | .      | .    | .     |
| 1635 | . | .     | .      | EPB1 | .     |
|      | . | .     | .      | .    | .     |
| 1639 | . | .     | EC8A   | .    | .     |
|      | . | .     | .      | .    | .     |
| 1641 | . | .     | .      | EFA2 | .     |
|      | . | .     | .      | .    | .     |
| 1645 | . | EC17  | .      | .    | .     |
|      | . | .     | .      | .    | .     |
| 1647 | . | .     | EPA    | .    | .     |
|      | . | .     | .      | .    | .     |
| 1651 | . | .     | .      | EPB2 | .     |
|      | . | .     | .      | .    | .     |
| 1655 | . | .     | EC8B   | .    | .     |
|      | . | .     | .      | .    | .     |
| 1657 | . | EC21A | .      | .    | .     |
|      | . | .     | .      | .    | .     |
| 1659 | . | .     | OFFC   | .    | .     |
|      | . | .     | .      | .    | .     |
| 1665 | . | .     | .      | 95-3 | .     |
|      | . | .     | .      | .    | .     |
| 1671 | . | .     | .      | .    | OFFB  |
|      | . | .     | .      | .    | .     |
| 1677 | . | .     | .      | .    | 95-2  |
|      | . | .     | .      | .    | .     |
| 1683 | . | .     | DUMMY  | .    | .     |
|      | . | .     | .      | .    | .     |
| 1685 | . | .     | .      | OFFA | .     |
|      | . | .     | .      | .    | .     |
| 1691 | . | .     | .      | .    | 95-1  |
|      | . | .     | .      | .    | .     |
| 1697 | . | .     | CP27B  | .    | .     |
|      | . | .     | .      | .    | .     |
| 1701 | . | .     | .      | OFFZ | .     |
|      | . | .     | .      | .    | .     |
| 1705 | . | .     | .      | .    | ESKV1 |
|      | . | .     | .      | .    | .     |
| 1709 | . | .     | EC19   | .    | .     |
|      | . | .     | .      | .    | .     |
| 1711 | . | .     | .      | EMR1 | .     |
|      | . | .     | .      | .    | .     |
| 1715 | . | .     | .      | .    | EAA1  |
|      | . | .     | .      | .    | .     |
| 1719 | . | .     | EC20   | .    | .     |
|      | . | .     | .      | .    | .     |
| 1721 | . | .     | .      | EMR2 | .     |
|      | . | .     | .      | .    | .     |
| 1725 | . | .     | EC21B  | .    | .     |
|      | . | .     | .      | .    | .     |
| 1727 | . | .     | .      | EFA1 | .     |
|      | . | .     | .      | .    | .     |
| 1731 | . | EC21  | .      | .    | .     |
|      | . | .     | .      | .    | .     |
| 1733 | . | .     | NW102- | .    | .     |
|      | . | .     | .      | .    | .     |
| 1737 | . | EC27  | .      | .    | .     |
|      | . | .     | .      | .    | .     |

```

1739      .      .      NW130-
      .      .      .
1743      .      EC28.....
      .      .      .
1745      .      .      95-7A
      .      .      .
1751      .      .      .      95-7B
      .      .      .      .
1756      .      .      .      .      95-8A
      .      .      .      .      .
1761      .      .      .      .      .      95-8B
      .      .      .      .      .      .
1766      .      .      C95-8B.....
      .      .      .
1769      .      .      .      ETP5
      .      .      .      .
1773      .      .      .      .      EPH3
      .      .      .      .      .
1777      .      .      EC22.....
      .      .      .
1779      .      .      .      ES2
      .      .      .      .
1783      .      .      .      .      EBRT1
      .      .      .      .      .
1787      .      .      EC23.....
      .      .      .
1789      .      .      .      ECOM1B
      .      .      .      .
1793      .      .      .      .      EFA6A
      .      .      .      .      .
1797      .      .      EC25.....
      .      .      .
1802      .      .      .      .      .      BRENT
1799      .      .      SOUTH
      .      .      .
1805      .      .      .      95-9B
      .      .      .      .
1810      .      .      .      .      EFA6B
      .      .      .      .      .
1814      .      .      .      .      .      ECOM1A
      .      .      .      .      .      .
1818      .      .      .      EC24.....
      .      .      .      .
1820      .      .      .      .      EFA5
      .      .      .      .      .
1824      .      .      .      .      .      EFP2
      .      .      .      .      .      .
1828      .      .      .      .      .      .      ECOM2
      .      .      .      .      .      .
1832      .      .      EC26.....
      .      .      .
1837      .      .      .      .      .      RACEL
1834      .      .      HORSE

```

(\*\*\*) RUNOFF ALSO COMPUTED AT THIS LOCATION

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 05MAY19 TIME 21:23:30
*
*****

```

```

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

```



SLATER HANIFAN GROUP  
LENNAR HOMES  
SUNSTONE  
PHASE 1 INFRASTRUCTURE  
PROPOSED DRAINAGE CONDITION

RETURN PERIOD ----- 100-YEAR  
DISTRIBUTION ----- 6-HOUR SDN3  
PROJECT NO. ----- EST1905-000  
FILENAME ----- SUN3.H1  
DATE ----- April 2019  
MODELED BY ----- LKL

SIX HOUR DEPTH-AREA REDUCTION FACTORS

| DRAINAGE AREA (MI^2) | DARF |
|----------------------|------|
| 0.0-0.49             | 1.00 |
| 0.5-0.99             | 0.98 |
| 1.0-1.99             | 0.97 |
| 2.0-3.99             | 0.93 |
| 4.0-5.99             | 0.91 |
| 6.0-7.99             | 0.90 |

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

IT          HYDROGRAPH TIME DATA  
              NMIN            5    MINUTES IN COMPUTATION INTERVAL  
              IDATE            1    0    STARTING DATE  
              ITIME            0000    STARTING TIME  
              NQ               2000    NUMBER OF HYDROGRAPH ORDINATES  
              NDDATE          7    0    ENDING DATE  
              NDTIME          2235    ENDING TIME  
              ICENT            19    CENTURY MARK

             COMPUTATION INTERVAL      .08 HOURS  
              TOTAL TIME BASE    166.58 HOURS

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

JP          MULTI-PLAN OPTION  
              NPLAN            1    NUMBER OF PLANS

JR          MULTI-RATIO OPTION  
              RATIOS OF PRECIPITATION  
              1.00      .98      .97      .93      .91      .90

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

| OPERATION     | STATION | AREA | PLAN |      | RATIOS APPLIED TO PRECIPITATION |         |         |         |         |         |
|---------------|---------|------|------|------|---------------------------------|---------|---------|---------|---------|---------|
|               |         |      |      |      | RATIO 1                         | RATIO 2 | RATIO 3 | RATIO 4 | RATIO 5 | RATIO 6 |
|               |         |      |      |      | 1.00                            | .98     | .97     | .93     | .91     | .90     |
| HYDROGRAPH AT |         |      |      |      |                                 |         |         |         |         |         |
| +             | WUS95   | .01  | 1    | FLOW | 28.                             | 27.     | 27.     | 26.     | 25.     | 25.     |
|               |         |      |      | TIME | 3.50                            | 3.50    | 3.50    | 3.50    | 3.50    | 3.50    |
| DIVERSION TO  |         |      |      |      |                                 |         |         |         |         |         |
| +             | DCHD1B  | .01  | 1    | FLOW | 25.                             | 25.     | 24.     | 23.     | 23.     | 23.     |
|               |         |      |      | TIME | 3.50                            | 3.50    | 3.50    | 3.50    | 3.50    | 3.50    |
| HYDROGRAPH AT |         |      |      |      |                                 |         |         |         |         |         |
| +             | DHD01B  | .01  | 1    | FLOW | 3.                              | 3.      | 3.      | 3.      | 2.      | 2.      |
|               |         |      |      | TIME | 3.50                            | 3.50    | 3.50    | 3.50    | 3.50    | 3.50    |
| DIVERSION TO  |         |      |      |      |                                 |         |         |         |         |         |
| +             | DCHD2B  | .01  | 1    | FLOW | 3.                              | 3.      | 3.      | 3.      | 2.      | 2.      |
|               |         |      |      | TIME | 3.50                            | 3.50    | 3.50    | 3.50    | 3.50    | 3.50    |
| HYDROGRAPH AT |         |      |      |      |                                 |         |         |         |         |         |
| +             | DHD02B  | .01  | 1    | FLOW | 0.                              | 0.      | 0.      | 0.      | 0.      | 0.      |
|               |         |      |      | TIME | 3.50                            | 3.50    | 3.50    | 3.50    | 3.50    | 3.50    |
| HYDROGRAPH AT |         |      |      |      |                                 |         |         |         |         |         |
| +             | WML15A  | .02  | 1    | FLOW | 40.                             | 39.     | 39.     | 37.     | 36.     | 36.     |
|               |         |      |      | TIME | 3.50                            | 3.50    | 3.50    | 3.50    | 3.50    | 3.50    |
| HYDROGRAPH AT |         |      |      |      |                                 |         |         |         |         |         |
| +             | WSPD1   | .00  | 1    | FLOW | 3.                              | 3.      | 3.      | 2.      | 2.      | 2.      |
|               |         |      |      | TIME | 3.50                            | 3.50    | 3.50    | 3.50    | 3.50    | 3.50    |

|               |        |     |   |              |              |              |              |              |              |              |
|---------------|--------|-----|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 2 COMBINED AT |        |     |   |              |              |              |              |              |              |              |
| +             | WC1    | .02 | 1 | FLOW<br>TIME | 43.<br>3.50  | 42.<br>3.50  | 42.<br>3.50  | 40.<br>3.50  | 39.<br>3.50  | 38.<br>3.50  |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | WIRN4  | .00 | 1 | FLOW<br>TIME | 9.<br>3.50   | 9.<br>3.50   | 9.<br>3.50   | 9.<br>3.50   | 9.<br>3.50   | 8.<br>3.50   |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | WMLA1A | .01 | 1 | FLOW<br>TIME | 20.<br>3.50  | 20.<br>3.50  | 20.<br>3.50  | 19.<br>3.50  | 18.<br>3.50  | 18.<br>3.50  |
| 3 COMBINED AT |        |     |   |              |              |              |              |              |              |              |
| +             | WC2    | .03 | 1 | FLOW<br>TIME | 73.<br>3.50  | 71.<br>3.50  | 70.<br>3.50  | 67.<br>3.50  | 66.<br>3.50  | 65.<br>3.50  |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | WGED1B | .02 | 1 | FLOW<br>TIME | 33.<br>3.50  | 32.<br>3.50  | 32.<br>3.50  | 30.<br>3.50  | 30.<br>3.50  | 29.<br>3.50  |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | WIRN5  | .00 | 1 | FLOW<br>TIME | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   |
| 3 COMBINED AT |        |     |   |              |              |              |              |              |              |              |
| +             | WC3    | .05 | 1 | FLOW<br>TIME | 109.<br>3.50 | 106.<br>3.50 | 105.<br>3.50 | 100.<br>3.50 | 98.<br>3.50  | 97.<br>3.50  |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | OFFW   | .01 | 1 | FLOW<br>TIME | 22.<br>3.50  | 21.<br>3.50  | 21.<br>3.50  | 20.<br>3.50  | 19.<br>3.50  | 19.<br>3.50  |
| 3 COMBINED AT |        |     |   |              |              |              |              |              |              |              |
| +             | CHD04B | .08 | 1 | FLOW<br>TIME | 130.<br>3.50 | 127.<br>3.50 | 126.<br>3.50 | 120.<br>3.50 | 117.<br>3.50 | 116.<br>3.50 |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | WPRK7  | .00 | 1 | FLOW<br>TIME | 6.<br>3.58   | 6.<br>3.58   | 6.<br>3.58   | 5.<br>3.58   | 5.<br>3.58   | 5.<br>3.58   |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | WMLA1B | .02 | 1 | FLOW<br>TIME | 37.<br>3.50  | 36.<br>3.50  | 35.<br>3.50  | 34.<br>3.50  | 33.<br>3.50  | 33.<br>3.50  |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | WMLA2  | .05 | 1 | FLOW<br>TIME | 88.<br>3.58  | 86.<br>3.58  | 85.<br>3.58  | 81.<br>3.58  | 79.<br>3.58  | 78.<br>3.58  |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | WGRC2  | .00 | 1 | FLOW<br>TIME | 9.<br>3.50   | 9.<br>3.50   | 9.<br>3.50   | 9.<br>3.50   | 8.<br>3.50   | 8.<br>3.50   |
| 4 COMBINED AT |        |     |   |              |              |              |              |              |              |              |
| +             | WC4    | .08 | 1 | FLOW<br>TIME | 135.<br>3.58 | 132.<br>3.58 | 131.<br>3.58 | 125.<br>3.58 | 122.<br>3.58 | 120.<br>3.58 |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | WMLA3  | .02 | 1 | FLOW<br>TIME | 35.<br>3.50  | 34.<br>3.50  | 34.<br>3.50  | 32.<br>3.50  | 32.<br>3.50  | 31.<br>3.50  |
| 2 COMBINED AT |        |     |   |              |              |              |              |              |              |              |
| +             | WC5    | .09 | 1 | FLOW<br>TIME | 170.<br>3.50 | 166.<br>3.50 | 164.<br>3.50 | 157.<br>3.50 | 153.<br>3.50 | 151.<br>3.50 |
| 2 COMBINED AT |        |     |   |              |              |              |              |              |              |              |
| +             | CHD05B | .17 | 1 | FLOW<br>TIME | 301.<br>3.50 | 294.<br>3.50 | 290.<br>3.50 | 277.<br>3.50 | 270.<br>3.50 | 266.<br>3.50 |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | WML16  | .03 | 1 | FLOW<br>TIME | 64.<br>3.50  | 63.<br>3.58  | 62.<br>3.58  | 59.<br>3.58  | 58.<br>3.58  | 57.<br>3.58  |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | WSPD3  | .00 | 1 | FLOW<br>TIME | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   |
| 2 COMBINED AT |        |     |   |              |              |              |              |              |              |              |
| +             | WC6    | .04 | 1 | FLOW<br>TIME | 68.<br>3.50  | 66.<br>3.50  | 65.<br>3.50  | 62.<br>3.50  | 61.<br>3.50  | 60.<br>3.50  |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | WL9A   | .03 | 1 | FLOW<br>TIME | 49.<br>3.58  | 48.<br>3.58  | 47.<br>3.58  | 45.<br>3.58  | 44.<br>3.58  | 43.<br>3.58  |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | WL10A  | .03 | 1 | FLOW<br>TIME | 46.<br>3.58  | 45.<br>3.58  | 44.<br>3.58  | 42.<br>3.58  | 41.<br>3.58  | 40.<br>3.58  |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | WSCP4  | .01 | 1 | FLOW<br>TIME | 25.<br>3.50  | 25.<br>3.50  | 25.<br>3.50  | 24.<br>3.50  | 23.<br>3.50  | 23.<br>3.50  |
| 4 COMBINED AT |        |     |   |              |              |              |              |              |              |              |
| +             | WC7    | .10 | 1 | FLOW         | 186.         | 181.         | 179.         | 170.         | 166.         | 164.         |

[illegible]



|               |        |     |   |              |             |             |             |             |             |             |
|---------------|--------|-----|---|--------------|-------------|-------------|-------------|-------------|-------------|-------------|
| +             | D1A    | .01 | 1 | FLOW<br>TIME | 0.<br>.00   | 0.<br>.00   | 0.<br>.00   | 0.<br>.00   | 0.<br>.00   | 0.<br>.00   |
| HYDROGRAPH AT |        |     |   |              |             |             |             |             |             |             |
| +             | ON4B   | .00 | 1 | FLOW<br>TIME | 6.<br>3.50  | 5.<br>3.50  | 5.<br>3.50  | 5.<br>3.50  | 5.<br>3.50  | 5.<br>3.50  |
| HYDROGRAPH AT |        |     |   |              |             |             |             |             |             |             |
| +             | RET1   | .00 | 1 | FLOW<br>TIME | 13.<br>3.50 | 13.<br>3.50 | 13.<br>3.50 | 12.<br>3.50 | 12.<br>3.50 | 11.<br>3.50 |
| HYDROGRAPH AT |        |     |   |              |             |             |             |             |             |             |
| +             | ON6    | .00 | 1 | FLOW<br>TIME | 7.<br>3.50  | 7.<br>3.50  | 7.<br>3.50  | 7.<br>3.50  | 7.<br>3.50  | 6.<br>3.50  |
| 2 COMBINED AT |        |     |   |              |             |             |             |             |             |             |
| +             | C3     | .00 | 1 | FLOW<br>TIME | 20.<br>3.50 | 20.<br>3.50 | 20.<br>3.50 | 19.<br>3.50 | 18.<br>3.50 | 18.<br>3.50 |
| DIVERSION TO  |        |     |   |              |             |             |             |             |             |             |
| +             | DIV1B  | .00 | 1 | FLOW<br>TIME | 20.<br>3.50 | 20.<br>3.50 | 20.<br>3.50 | 19.<br>3.50 | 18.<br>3.50 | 18.<br>3.50 |
| HYDROGRAPH AT |        |     |   |              |             |             |             |             |             |             |
| +             | D1B    | .00 | 1 | FLOW<br>TIME | 0.<br>.00   | 0.<br>.00   | 0.<br>.00   | 0.<br>.00   | 0.<br>.00   | 0.<br>.00   |
| HYDROGRAPH AT |        |     |   |              |             |             |             |             |             |             |
| +             | ON2    | .00 | 1 | FLOW<br>TIME | 9.<br>3.50  | 9.<br>3.50  | 9.<br>3.50  | 8.<br>3.50  | 8.<br>3.50  | 8.<br>3.50  |
| HYDROGRAPH AT |        |     |   |              |             |             |             |             |             |             |
| +             | ON3    | .01 | 1 | FLOW<br>TIME | 12.<br>3.50 | 12.<br>3.50 | 11.<br>3.50 | 11.<br>3.50 | 10.<br>3.50 | 10.<br>3.50 |
| HYDROGRAPH AT |        |     |   |              |             |             |             |             |             |             |
| +             | ON9    | .00 | 1 | FLOW<br>TIME | 8.<br>3.50  | 8.<br>3.50  | 8.<br>3.50  | 7.<br>3.50  | 7.<br>3.50  | 7.<br>3.50  |
| 3 COMBINED AT |        |     |   |              |             |             |             |             |             |             |
| +             | C4     | .02 | 1 | FLOW<br>TIME | 29.<br>3.50 | 28.<br>3.50 | 28.<br>3.50 | 26.<br>3.50 | 26.<br>3.50 | 25.<br>3.50 |
| DIVERSION TO  |        |     |   |              |             |             |             |             |             |             |
| +             | DIV2   | .02 | 1 | FLOW<br>TIME | 24.<br>3.50 | 23.<br>3.50 | 23.<br>3.50 | 22.<br>3.50 | 21.<br>3.50 | 21.<br>3.50 |
| HYDROGRAPH AT |        |     |   |              |             |             |             |             |             |             |
| +             | D2     | .02 | 1 | FLOW<br>TIME | 5.<br>3.50  | 5.<br>3.50  | 5.<br>3.50  | 5.<br>3.50  | 4.<br>3.50  | 4.<br>3.50  |
| HYDROGRAPH AT |        |     |   |              |             |             |             |             |             |             |
| +             | ON10   | .00 | 1 | FLOW<br>TIME | 5.<br>3.50  | 5.<br>3.50  | 5.<br>3.50  | 4.<br>3.50  | 4.<br>3.50  | 4.<br>3.50  |
| 2 COMBINED AT |        |     |   |              |             |             |             |             |             |             |
| +             | C5     | .02 | 1 | FLOW<br>TIME | 10.<br>3.50 | 10.<br>3.50 | 9.<br>3.50  | 9.<br>3.50  | 9.<br>3.50  | 9.<br>3.50  |
| DIVERSION TO  |        |     |   |              |             |             |             |             |             |             |
| +             | DIV3   | .02 | 1 | FLOW<br>TIME | 8.<br>3.50  | 8.<br>3.50  | 8.<br>3.50  | 7.<br>3.50  | 7.<br>3.50  | 7.<br>3.50  |
| HYDROGRAPH AT |        |     |   |              |             |             |             |             |             |             |
| +             | D3     | .02 | 1 | FLOW<br>TIME | 2.<br>3.50  | 2.<br>3.50  | 2.<br>3.50  | 2.<br>3.50  | 2.<br>3.50  | 2.<br>3.50  |
| HYDROGRAPH AT |        |     |   |              |             |             |             |             |             |             |
| +             | ON11   | .00 | 1 | FLOW<br>TIME | 5.<br>3.50  | 5.<br>3.50  | 5.<br>3.50  | 4.<br>3.50  | 4.<br>3.50  | 4.<br>3.50  |
| 2 COMBINED AT |        |     |   |              |             |             |             |             |             |             |
| +             | C6     | .02 | 1 | FLOW<br>TIME | 7.<br>3.50  | 7.<br>3.50  | 7.<br>3.50  | 6.<br>3.50  | 6.<br>3.50  | 6.<br>3.50  |
| DIVERSION TO  |        |     |   |              |             |             |             |             |             |             |
| +             | DIV1C  | .02 | 1 | FLOW<br>TIME | 7.<br>3.50  | 7.<br>3.50  | 7.<br>3.50  | 6.<br>3.50  | 6.<br>3.50  | 6.<br>3.50  |
| HYDROGRAPH AT |        |     |   |              |             |             |             |             |             |             |
| +             | D1C    | .02 | 1 | FLOW<br>TIME | 0.<br>.00   | 0.<br>.00   | 0.<br>.00   | 0.<br>.00   | 0.<br>.00   | 0.<br>.00   |
| 4 COMBINED AT |        |     |   |              |             |             |             |             |             |             |
| +             | CD1C   | .04 | 1 | FLOW<br>TIME | 6.<br>3.50  | 5.<br>3.50  | 5.<br>3.50  | 5.<br>3.50  | 5.<br>3.50  | 5.<br>3.50  |
| ROUTED TO     |        |     |   |              |             |             |             |             |             |             |
| +             | RCD1C  | .04 | 1 | FLOW<br>TIME | 5.<br>3.67  | 5.<br>3.67  | 5.<br>3.67  | 5.<br>3.75  | 5.<br>3.75  | 4.<br>3.75  |
| DIVERSION TO  |        |     |   |              |             |             |             |             |             |             |
| +             | DOFF23 | .04 | 1 | FLOW<br>TIME | 5.<br>3.67  | 5.<br>3.67  | 5.<br>3.67  | 5.<br>3.75  | 5.<br>3.75  | 4.<br>3.75  |

|                    |        |     |   |              |              |              |              |              |              |              |
|--------------------|--------|-----|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| HYDROGRAPH AT<br>+ | DRCD1C | .04 | 1 | FLOW<br>TIME | 0.<br>.00    | 0.<br>.00    | 0.<br>.00    | 0.<br>.00    | 0.<br>.00    | 0.<br>.00    |
| HYDROGRAPH AT<br>+ | ON8    | .00 | 1 | FLOW<br>TIME | 6.<br>3.50   | 6.<br>3.50   | 6.<br>3.50   | 5.<br>3.50   | 5.<br>3.50   | 5.<br>3.50   |
| HYDROGRAPH AT<br>+ | RET2   | .00 | 1 | FLOW<br>TIME | 24.<br>3.50  | 23.<br>3.50  | 23.<br>3.50  | 22.<br>3.50  | 21.<br>3.50  | 21.<br>3.50  |
| 2 COMBINED AT<br>+ | C7     | .00 | 1 | FLOW<br>TIME | 30.<br>3.50  | 29.<br>3.50  | 29.<br>3.50  | 27.<br>3.50  | 26.<br>3.50  | 26.<br>3.50  |
| HYDROGRAPH AT<br>+ | RET3   | .00 | 1 | FLOW<br>TIME | 8.<br>3.50   | 8.<br>3.50   | 8.<br>3.50   | 7.<br>3.50   | 7.<br>3.50   | 7.<br>3.50   |
| HYDROGRAPH AT<br>+ | ON7    | .01 | 1 | FLOW<br>TIME | 14.<br>3.50  | 13.<br>3.50  | 13.<br>3.50  | 12.<br>3.50  | 12.<br>3.50  | 12.<br>3.50  |
| 3 COMBINED AT<br>+ | C8     | .01 | 1 | FLOW<br>TIME | 51.<br>3.50  | 50.<br>3.50  | 49.<br>3.50  | 47.<br>3.50  | 45.<br>3.50  | 45.<br>3.50  |
| HYDROGRAPH AT<br>+ | RET1A  | .00 | 1 | FLOW<br>TIME | 13.<br>3.50  | 12.<br>3.50  | 12.<br>3.50  | 12.<br>3.50  | 11.<br>3.50  | 11.<br>3.50  |
| HYDROGRAPH AT<br>+ | RET1B  | .00 | 1 | FLOW<br>TIME | 20.<br>3.50  | 20.<br>3.50  | 20.<br>3.50  | 19.<br>3.50  | 18.<br>3.50  | 18.<br>3.50  |
| HYDROGRAPH AT<br>+ | RET1C  | .00 | 1 | FLOW<br>TIME | 7.<br>3.50   | 7.<br>3.50   | 7.<br>3.50   | 6.<br>3.50   | 6.<br>3.50   | 6.<br>3.50   |
| 3 COMBINED AT<br>+ | C9     | .00 | 1 | FLOW<br>TIME | 40.<br>3.50  | 39.<br>3.50  | 38.<br>3.50  | 36.<br>3.50  | 35.<br>3.50  | 35.<br>3.50  |
| HYDROGRAPH AT<br>+ | ON2D   | .01 | 1 | FLOW<br>TIME | 21.<br>3.50  | 21.<br>3.50  | 20.<br>3.50  | 19.<br>3.50  | 19.<br>3.50  | 19.<br>3.50  |
| HYDROGRAPH AT<br>+ | ON5D   | .00 | 1 | FLOW<br>TIME | 8.<br>3.50   | 8.<br>3.50   | 8.<br>3.50   | 8.<br>3.50   | 7.<br>3.50   | 7.<br>3.50   |
| 2 COMBINED AT<br>+ | CP1    | .01 | 1 | FLOW<br>TIME | 29.<br>3.50  | 29.<br>3.50  | 28.<br>3.50  | 27.<br>3.50  | 26.<br>3.50  | 26.<br>3.50  |
| HYDROGRAPH AT<br>+ | ON3D   | .00 | 1 | FLOW<br>TIME | 7.<br>3.50   | 7.<br>3.50   | 7.<br>3.50   | 7.<br>3.50   | 7.<br>3.50   | 7.<br>3.50   |
| 2 COMBINED AT<br>+ | CP2    | .02 | 1 | FLOW<br>TIME | 37.<br>3.50  | 36.<br>3.50  | 36.<br>3.50  | 34.<br>3.50  | 33.<br>3.50  | 33.<br>3.50  |
| HYDROGRAPH AT<br>+ | ON1D   | .01 | 1 | FLOW<br>TIME | 16.<br>3.50  | 15.<br>3.50  | 15.<br>3.50  | 15.<br>3.50  | 14.<br>3.50  | 14.<br>3.50  |
| HYDROGRAPH AT<br>+ | ON4D   | .00 | 1 | FLOW<br>TIME | 8.<br>3.50   | 8.<br>3.50   | 8.<br>3.50   | 8.<br>3.50   | 7.<br>3.50   | 7.<br>3.50   |
| 2 COMBINED AT<br>+ | CP3    | .01 | 1 | FLOW<br>TIME | 24.<br>3.50  | 23.<br>3.50  | 23.<br>3.50  | 22.<br>3.50  | 21.<br>3.50  | 21.<br>3.50  |
| 2 COMBINED AT<br>+ | CP4    | .03 | 1 | FLOW<br>TIME | 61.<br>3.50  | 59.<br>3.50  | 59.<br>3.50  | 56.<br>3.50  | 55.<br>3.50  | 54.<br>3.50  |
| 4 COMBINED AT<br>+ | CENGCA | .08 | 1 | FLOW<br>TIME | 152.<br>3.50 | 148.<br>3.50 | 146.<br>3.50 | 139.<br>3.50 | 135.<br>3.50 | 134.<br>3.50 |
| HYDROGRAPH AT<br>+ | WML9   | .03 | 1 | FLOW<br>TIME | 55.<br>3.50  | 54.<br>3.50  | 53.<br>3.50  | 51.<br>3.50  | 50.<br>3.50  | 49.<br>3.50  |
| HYDROGRAPH AT<br>+ | WPRK5  | .00 | 1 | FLOW<br>TIME | 5.<br>3.50   | 5.<br>3.50   | 5.<br>3.50   | 4.<br>3.50   | 4.<br>3.50   | 4.<br>3.50   |
| 2 COMBINED AT<br>+ | WC10A  | .03 | 1 | FLOW<br>TIME | 60.<br>3.50  | 59.<br>3.50  | 58.<br>3.50  | 55.<br>3.50  | 54.<br>3.50  | 53.<br>3.50  |

|                    |       |     |   |              |              |              |              |              |              |              |
|--------------------|-------|-----|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| HYDROGRAPH AT<br>+ | WEGL1 | .01 | 1 | FLOW<br>TIME | 12.<br>3.50  | 12.<br>3.50  | 11.<br>3.50  | 11.<br>3.50  | 11.<br>3.50  | 11.<br>3.50  |
| HYDROGRAPH AT<br>+ | WL4B  | .01 | 1 | FLOW<br>TIME | 27.<br>3.50  | 26.<br>3.50  | 26.<br>3.50  | 25.<br>3.50  | 24.<br>3.50  | 24.<br>3.50  |
| 3 COMBINED AT<br>+ | WC10B | .05 | 1 | FLOW<br>TIME | 99.<br>3.50  | 97.<br>3.50  | 95.<br>3.50  | 91.<br>3.50  | 89.<br>3.50  | 88.<br>3.50  |
| HYDROGRAPH AT<br>+ | WML10 | .02 | 1 | FLOW<br>TIME | 38.<br>3.50  | 37.<br>3.50  | 37.<br>3.50  | 35.<br>3.50  | 34.<br>3.50  | 34.<br>3.50  |
| HYDROGRAPH AT<br>+ | WEGN3 | .01 | 1 | FLOW<br>TIME | 10.<br>3.58  | 10.<br>3.58  | 10.<br>3.58  | 9.<br>3.58   | 9.<br>3.58   | 9.<br>3.58   |
| HYDROGRAPH AT<br>+ | WML11 | .04 | 1 | FLOW<br>TIME | 81.<br>3.58  | 79.<br>3.58  | 78.<br>3.58  | 74.<br>3.58  | 72.<br>3.58  | 71.<br>3.58  |
| 3 COMBINED AT<br>+ | WC11  | .07 | 1 | FLOW<br>TIME | 127.<br>3.50 | 124.<br>3.50 | 123.<br>3.50 | 117.<br>3.50 | 114.<br>3.50 | 112.<br>3.50 |
| 2 COMBINED AT<br>+ | WC12  | .12 | 1 | FLOW<br>TIME | 226.<br>3.50 | 221.<br>3.50 | 218.<br>3.50 | 208.<br>3.50 | 202.<br>3.50 | 200.<br>3.50 |
| HYDROGRAPH AT<br>+ | WL6B  | .02 | 1 | FLOW<br>TIME | 30.<br>3.50  | 29.<br>3.50  | 29.<br>3.50  | 28.<br>3.50  | 27.<br>3.50  | 26.<br>3.50  |
| HYDROGRAPH AT<br>+ | WL7   | .02 | 1 | FLOW<br>TIME | 34.<br>3.50  | 33.<br>3.50  | 33.<br>3.50  | 31.<br>3.50  | 31.<br>3.50  | 30.<br>3.50  |
| HYDROGRAPH AT<br>+ | WML13 | .03 | 1 | FLOW<br>TIME | 49.<br>3.50  | 48.<br>3.50  | 47.<br>3.50  | 45.<br>3.50  | 44.<br>3.50  | 44.<br>3.50  |
| HYDROGRAPH AT<br>+ | WEGL2 | .01 | 1 | FLOW<br>TIME | 12.<br>3.50  | 12.<br>3.50  | 12.<br>3.50  | 11.<br>3.50  | 11.<br>3.50  | 11.<br>3.50  |
| 5 COMBINED AT<br>+ | WC13  | .18 | 1 | FLOW<br>TIME | 352.<br>3.50 | 343.<br>3.50 | 339.<br>3.50 | 323.<br>3.50 | 315.<br>3.50 | 311.<br>3.50 |
| HYDROGRAPH AT<br>+ | WML14 | .03 | 1 | FLOW<br>TIME | 59.<br>3.50  | 57.<br>3.50  | 57.<br>3.50  | 54.<br>3.50  | 53.<br>3.50  | 52.<br>3.50  |
| HYDROGRAPH AT<br>+ | WL8   | .03 | 1 | FLOW<br>TIME | 48.<br>3.58  | 47.<br>3.58  | 46.<br>3.58  | 44.<br>3.58  | 43.<br>3.58  | 42.<br>3.58  |
| HYDROGRAPH AT<br>+ | WSKV3 | .01 | 1 | FLOW<br>TIME | 14.<br>3.50  | 14.<br>3.50  | 13.<br>3.50  | 13.<br>3.50  | 13.<br>3.50  | 12.<br>3.50  |
| HYDROGRAPH AT<br>+ | WSKV4 | .01 | 1 | FLOW<br>TIME | 15.<br>3.50  | 15.<br>3.50  | 15.<br>3.50  | 14.<br>3.50  | 14.<br>3.50  | 14.<br>3.50  |
| 5 COMBINED AT<br>+ | WC14  | .25 | 1 | FLOW<br>TIME | 485.<br>3.50 | 474.<br>3.50 | 468.<br>3.50 | 446.<br>3.50 | 435.<br>3.50 | 429.<br>3.50 |
| HYDROGRAPH AT<br>+ | WL9B  | .02 | 1 | FLOW<br>TIME | 39.<br>3.58  | 38.<br>3.58  | 37.<br>3.58  | 35.<br>3.58  | 34.<br>3.58  | 34.<br>3.58  |
| HYDROGRAPH AT<br>+ | WSPD4 | .00 | 1 | FLOW<br>TIME | 8.<br>3.50   | 8.<br>3.50   | 7.<br>3.50   | 7.<br>3.50   | 7.<br>3.50   | 7.<br>3.50   |
| 2 COMBINED AT<br>+ | WC15  | .03 | 1 | FLOW<br>TIME | 46.<br>3.50  | 45.<br>3.50  | 44.<br>3.50  | 42.<br>3.50  | 41.<br>3.50  | 40.<br>3.50  |
| HYDROGRAPH AT<br>+ | WL11  | .06 | 1 | FLOW<br>TIME | 99.<br>3.58  | 96.<br>3.58  | 95.<br>3.58  | 90.<br>3.58  | 88.<br>3.58  | 87.<br>3.58  |
| HYDROGRAPH AT<br>+ | WPRK8 | .00 | 1 | FLOW<br>TIME | 4.<br>3.50   | 4.<br>3.50   | 4.<br>3.50   | 4.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   |
| HYDROGRAPH AT<br>+ | WPRK9 | .00 | 1 | FLOW         | 1.           | 1.           | 1.           | 1.           | 1.           | 1.           |



|               |        |      |   |           |               |               |               |               |               |               |
|---------------|--------|------|---|-----------|---------------|---------------|---------------|---------------|---------------|---------------|
|               |        |      |   | TIME      | 3.50          | 3.50          | 3.50          | 3.50          | 3.50          | 3.50          |
| HYDROGRAPH AT |        |      |   |           |               |               |               |               |               |               |
| +             | WMTL1  | .00  | 1 | FLOW TIME | 5.<br>3.50    | 5.<br>3.50    | 4.<br>3.50    | 4.<br>3.50    | 4.<br>3.50    | 4.<br>3.50    |
| 4 COMBINED AT |        |      |   |           |               |               |               |               |               |               |
| +             | WC16   | .06  | 1 | FLOW TIME | 106.<br>3.58  | 103.<br>3.58  | 102.<br>3.58  | 97.<br>3.58   | 94.<br>3.58   | 93.<br>3.58   |
| HYDROGRAPH AT |        |      |   |           |               |               |               |               |               |               |
| +             | WEGL3  | .01  | 1 | FLOW TIME | 16.<br>3.50   | 16.<br>3.50   | 16.<br>3.50   | 15.<br>3.50   | 15.<br>3.50   | 15.<br>3.50   |
| HYDROGRAPH AT |        |      |   |           |               |               |               |               |               |               |
| +             | WL10B  | .03  | 1 | FLOW TIME | 49.<br>3.58   | 48.<br>3.58   | 47.<br>3.58   | 45.<br>3.58   | 43.<br>3.58   | 43.<br>3.58   |
| 5 COMBINED AT |        |      |   |           |               |               |               |               |               |               |
| +             | WC17   | .38  | 1 | FLOW TIME | 695.<br>3.50  | 679.<br>3.50  | 671.<br>3.50  | 638.<br>3.50  | 622.<br>3.50  | 613.<br>3.50  |
| HYDROGRAPH AT |        |      |   |           |               |               |               |               |               |               |
| +             | WL12   | .05  | 1 | FLOW TIME | 84.<br>3.58   | 82.<br>3.58   | 81.<br>3.58   | 77.<br>3.58   | 75.<br>3.58   | 74.<br>3.58   |
| HYDROGRAPH AT |        |      |   |           |               |               |               |               |               |               |
| +             | WGRC1B | .00  | 1 | FLOW TIME | 10.<br>3.58   | 9.<br>3.58    | 9.<br>3.58    | 9.<br>3.58    | 9.<br>3.58    | 9.<br>3.58    |
| 3 COMBINED AT |        |      |   |           |               |               |               |               |               |               |
| +             | WC18   | .43  | 1 | FLOW TIME | 787.<br>3.50  | 768.<br>3.50  | 759.<br>3.50  | 722.<br>3.50  | 703.<br>3.50  | 694.<br>3.50  |
| 2 COMBINED AT |        |      |   |           |               |               |               |               |               |               |
| +             | CCP4   | .51  | 1 | FLOW TIME | 939.<br>3.50  | 917.<br>3.50  | 906.<br>3.50  | 861.<br>3.50  | 838.<br>3.50  | 827.<br>3.50  |
| HYDROGRAPH AT |        |      |   |           |               |               |               |               |               |               |
| +             | OFF21B | .04  | 1 | FLOW TIME | 75.<br>3.50   | 73.<br>3.50   | 72.<br>3.50   | 69.<br>3.50   | 67.<br>3.50   | 66.<br>3.50   |
| 2 COMBINED AT |        |      |   |           |               |               |               |               |               |               |
| +             | COF21B | .55  | 1 | FLOW TIME | 1014.<br>3.50 | 990.<br>3.50  | 978.<br>3.50  | 929.<br>3.50  | 905.<br>3.50  | 893.<br>3.50  |
| HYDROGRAPH AT |        |      |   |           |               |               |               |               |               |               |
| +             | ROFF23 | .00  | 1 | FLOW TIME | 5.<br>3.67    | 5.<br>3.67    | 5.<br>3.67    | 5.<br>3.75    | 5.<br>3.75    | 4.<br>3.75    |
| HYDROGRAPH AT |        |      |   |           |               |               |               |               |               |               |
| +             | OFF23  | .01  | 1 | FLOW TIME | 17.<br>3.50   | 16.<br>3.50   | 16.<br>3.50   | 15.<br>3.50   | 15.<br>3.50   | 15.<br>3.50   |
| 2 COMBINED AT |        |      |   |           |               |               |               |               |               |               |
| +             | COFF23 | .01  | 1 | FLOW TIME | 19.<br>3.58   | 18.<br>3.58   | 18.<br>3.58   | 17.<br>3.58   | 17.<br>3.58   | 16.<br>3.58   |
| HYDROGRAPH AT |        |      |   |           |               |               |               |               |               |               |
| +             | OFFU   | .04  | 1 | FLOW TIME | 74.<br>3.58   | 72.<br>3.58   | 71.<br>3.58   | 68.<br>3.58   | 66.<br>3.58   | 66.<br>3.58   |
| 5 COMBINED AT |        |      |   |           |               |               |               |               |               |               |
| +             | CPCULV | 1.05 | 1 | FLOW TIME | 1903.<br>3.50 | 1858.<br>3.50 | 1836.<br>3.50 | 1747.<br>3.50 | 1703.<br>3.50 | 1680.<br>3.50 |
| HYDROGRAPH AT |        |      |   |           |               |               |               |               |               |               |
| +             | NW29-C | .13  | 1 | FLOW TIME | 200.<br>3.67  | 195.<br>3.67  | 193.<br>3.67  | 183.<br>3.67  | 178.<br>3.67  | 176.<br>3.67  |
| ROUTED TO     |        |      |   |           |               |               |               |               |               |               |
| +             | RNW29C | .13  | 1 | FLOW TIME | 200.<br>3.67  | 195.<br>3.67  | 193.<br>3.67  | 184.<br>3.67  | 179.<br>3.67  | 176.<br>3.67  |
| HYDROGRAPH AT |        |      |   |           |               |               |               |               |               |               |
| +             | NW71-W | .10  | 1 | FLOW TIME | 156.<br>3.58  | 153.<br>3.58  | 151.<br>3.58  | 143.<br>3.58  | 139.<br>3.58  | 137.<br>3.58  |
| 2 COMBINED AT |        |      |   |           |               |               |               |               |               |               |
| +             | CNW71W | .24  | 1 | FLOW TIME | 354.<br>3.67  | 345.<br>3.67  | 341.<br>3.67  | 324.<br>3.67  | 316.<br>3.67  | 312.<br>3.67  |
| ROUTED TO     |        |      |   |           |               |               |               |               |               |               |
| +             | RCNW71 | .24  | 1 | FLOW TIME | 354.<br>3.67  | 344.<br>3.67  | 341.<br>3.67  | 322.<br>3.67  | 315.<br>3.67  | 310.<br>3.67  |
| HYDROGRAPH AT |        |      |   |           |               |               |               |               |               |               |
| +             | NW71-E | .24  | 1 | FLOW TIME | 259.<br>3.75  | 252.<br>3.75  | 249.<br>3.75  | 234.<br>3.75  | 227.<br>3.75  | 223.<br>3.75  |
| 2 COMBINED AT |        |      |   |           |               |               |               |               |               |               |
| +             | CNW71E | .47  | 1 | FLOW TIME | 610.<br>3.67  | 593.<br>3.67  | 585.<br>3.67  | 552.<br>3.67  | 537.<br>3.67  | 529.<br>3.67  |
| HYDROGRAPH AT |        |      |   |           |               |               |               |               |               |               |

|                           |        |      |   |               |               |               |               |               |               |               |
|---------------------------|--------|------|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| +                         | WGRT1  | .02  | 1 | FLOW<br>TIME  | 30.<br>3.67   | 30.<br>3.67   | 29.<br>3.67   | 28.<br>3.67   | 27.<br>3.67   | 27.<br>3.67   |
| 3 COMBINED AT             |        |      |   |               |               |               |               |               |               |               |
| +                         | 95STH  | 1.54 | 1 | FLOW<br>TIME  | 2370.<br>3.58 | 2311.<br>3.58 | 2285.<br>3.58 | 2170.<br>3.58 | 2115.<br>3.58 | 2084.<br>3.58 |
| HYDROGRAPH AT             |        |      |   |               |               |               |               |               |               |               |
| +                         | OFF4-1 | .30  | 1 | FLOW<br>TIME  | 273.<br>3.75  | 263.<br>3.75  | 258.<br>3.75  | 239.<br>3.75  | 229.<br>3.75  | 225.<br>3.75  |
| ROUTED TO                 |        |      |   |               |               |               |               |               |               |               |
| +                         | ROFF41 | .30  | 1 | FLOW<br>TIME  | 273.<br>3.92  | 264.<br>3.92  | 259.<br>3.92  | 240.<br>3.92  | 231.<br>3.92  | 226.<br>3.92  |
| HYDROGRAPH AT             |        |      |   |               |               |               |               |               |               |               |
| +                         | OFF4-2 | .42  | 1 | FLOW<br>TIME  | 541.<br>3.58  | 523.<br>3.58  | 514.<br>3.58  | 477.<br>3.58  | 460.<br>3.58  | 451.<br>3.58  |
| 2 COMBINED AT             |        |      |   |               |               |               |               |               |               |               |
| +                         | COFF42 | .72  | 1 | FLOW<br>TIME  | 630.<br>3.67  | 606.<br>3.67  | 595.<br>3.67  | 549.<br>3.67  | 527.<br>3.67  | 516.<br>3.67  |
| ROUTED TO                 |        |      |   |               |               |               |               |               |               |               |
| +                         | RCOFF4 | .72  | 1 | FLOW<br>TIME  | 626.<br>3.67  | 606.<br>3.67  | 591.<br>3.67  | 545.<br>3.67  | 525.<br>3.67  | 510.<br>3.67  |
| HYDROGRAPH AT             |        |      |   |               |               |               |               |               |               |               |
| +                         | OFF5-1 | .30  | 1 | FLOW<br>TIME  | 336.<br>3.67  | 325.<br>3.67  | 320.<br>3.67  | 298.<br>3.67  | 287.<br>3.67  | 282.<br>3.67  |
| 2 COMBINED AT             |        |      |   |               |               |               |               |               |               |               |
| +                         | COFF51 | 1.02 | 1 | FLOW<br>TIME  | 962.<br>3.67  | 931.<br>3.67  | 910.<br>3.67  | 843.<br>3.67  | 812.<br>3.67  | 791.<br>3.67  |
| ROUTED TO                 |        |      |   |               |               |               |               |               |               |               |
| +                         | RCOFF5 | 1.02 | 1 | FLOW<br>TIME  | 948.<br>3.75  | 912.<br>3.75  | 901.<br>3.75  | 829.<br>3.75  | 809.<br>3.75  | 779.<br>3.75  |
| HYDROGRAPH AT             |        |      |   |               |               |               |               |               |               |               |
| +                         | OFF5-2 | .39  | 1 | FLOW<br>TIME  | 493.<br>3.75  | 480.<br>3.75  | 473.<br>3.75  | 447.<br>3.75  | 433.<br>3.75  | 427.<br>3.75  |
| ROUTED TO                 |        |      |   |               |               |               |               |               |               |               |
| +                         | ROFF52 | .39  | 1 | FLOW<br>TIME  | 488.<br>3.75  | 475.<br>3.75  | 469.<br>3.75  | 442.<br>3.75  | 428.<br>3.75  | 422.<br>3.75  |
| HYDROGRAPH AT             |        |      |   |               |               |               |               |               |               |               |
| +                         | NW1-C  | .29  | 1 | FLOW<br>TIME  | 302.<br>3.67  | 292.<br>3.67  | 288.<br>3.67  | 268.<br>3.67  | 258.<br>3.67  | 253.<br>3.67  |
| 2 COMBINED AT             |        |      |   |               |               |               |               |               |               |               |
| +                         | CNW1-C | .69  | 1 | FLOW<br>TIME  | 787.<br>3.75  | 764.<br>3.75  | 753.<br>3.75  | 707.<br>3.75  | 684.<br>3.75  | 673.<br>3.75  |
| 2 COMBINED AT             |        |      |   |               |               |               |               |               |               |               |
| +                         | 2CNW1C | 1.70 | 1 | FLOW<br>TIME  | 1735.<br>3.75 | 1675.<br>3.75 | 1654.<br>3.75 | 1535.<br>3.75 | 1493.<br>3.75 | 1452.<br>3.75 |
| ROUTED TO                 |        |      |   |               |               |               |               |               |               |               |
| +                         | R2CNW1 | 1.70 | 1 | FLOW<br>TIME  | 1719.<br>3.75 | 1659.<br>3.75 | 1636.<br>3.75 | 1518.<br>3.75 | 1472.<br>3.75 | 1434.<br>3.75 |
| HYDROGRAPH AT             |        |      |   |               |               |               |               |               |               |               |
| +                         | NW7-C  | .49  | 1 | FLOW<br>TIME  | 512.<br>3.83  | 497.<br>3.83  | 490.<br>3.83  | 462.<br>3.83  | 447.<br>3.83  | 440.<br>3.83  |
| 2 COMBINED AT             |        |      |   |               |               |               |               |               |               |               |
| +                         | CNW-7  | 2.19 | 1 | FLOW<br>TIME  | 2230.<br>3.75 | 2155.<br>3.75 | 2126.<br>3.75 | 1978.<br>3.75 | 1918.<br>3.75 | 1873.<br>3.75 |
| ROUTED TO                 |        |      |   |               |               |               |               |               |               |               |
| +                         | 157DB  | 2.19 | 1 | FLOW<br>TIME  | 1098.<br>4.17 | 1067.<br>4.17 | 1052.<br>4.17 | 986.<br>4.17  | 956.<br>4.17  | 938.<br>4.17  |
| ** PEAK STAGES IN FEET ** |        |      |   |               |               |               |               |               |               |               |
|                           |        |      | 1 | STAGE<br>TIME | 5.08<br>4.17  | 4.92<br>4.17  | 4.84<br>4.17  | 4.51<br>4.17  | 4.35<br>4.17  | 4.27<br>4.17  |
| ROUTED TO                 |        |      |   |               |               |               |               |               |               |               |
| +                         | RCNW7C | 2.19 | 1 | FLOW<br>TIME  | 1095.<br>4.17 | 1064.<br>4.17 | 1048.<br>4.25 | 983.<br>4.25  | 953.<br>4.25  | 936.<br>4.25  |
| HYDROGRAPH AT             |        |      |   |               |               |               |               |               |               |               |
| +                         | NW21-C | .16  | 1 | FLOW<br>TIME  | 190.<br>3.75  | 185.<br>3.75  | 182.<br>3.75  | 173.<br>3.75  | 168.<br>3.75  | 165.<br>3.75  |
| 2 COMBINED AT             |        |      |   |               |               |               |               |               |               |               |
| +                         | CNW21C | 2.35 | 1 | FLOW<br>TIME  | 1176.<br>4.17 | 1142.<br>4.17 | 1126.<br>4.17 | 1056.<br>4.17 | 1024.<br>4.17 | 1005.<br>4.17 |
| ROUTED TO                 |        |      |   |               |               |               |               |               |               |               |
| +                         | RCNW21 | 2.35 | 1 | FLOW<br>TIME  | 1176.<br>4.17 | 1141.<br>4.17 | 1124.<br>4.17 | 1055.<br>4.17 | 1025.<br>4.17 | 1004.<br>4.17 |

|                           |        |      |   |               |                 |                 |                 |                 |                 |                 |
|---------------------------|--------|------|---|---------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| HYDROGRAPH AT<br>+        | NW35-C | .33  | 1 | FLOW<br>TIME  | 428.<br>3.67    | 417.<br>3.67    | 411.<br>3.67    | 388.<br>3.67    | 377.<br>3.67    | 371.<br>3.67    |
| HYDROGRAPH AT<br>+        | WPRK10 | .02  | 1 | FLOW<br>TIME  | 19.<br>3.58     | 18.<br>3.58     | 18.<br>3.58     | 17.<br>3.58     | 16.<br>3.58     | 16.<br>3.58     |
| 3 COMBINED AT<br>+        | CNW35C | 2.69 | 1 | FLOW<br>TIME  | 1344.<br>4.00   | 1303.<br>4.00   | 1283.<br>4.00   | 1201.<br>4.08   | 1165.<br>4.08   | 1142.<br>4.08   |
| HYDROGRAPH AT<br>+        | WOFF1  | .41  | 1 | FLOW<br>TIME  | 403.<br>3.75    | 391.<br>3.75    | 385.<br>3.75    | 361.<br>3.75    | 349.<br>3.83    | 343.<br>3.83    |
| HYDROGRAPH AT<br>+        | WOFF11 | .03  | 1 | FLOW<br>TIME  | 55.<br>3.50     | 54.<br>3.50     | 53.<br>3.50     | 51.<br>3.50     | 50.<br>3.50     | 49.<br>3.50     |
| HYDROGRAPH AT<br>+        | WOFF2  | .04  | 1 | FLOW<br>TIME  | 48.<br>3.58     | 47.<br>3.58     | 46.<br>3.58     | 43.<br>3.58     | 42.<br>3.58     | 41.<br>3.58     |
| HYDROGRAPH AT<br>+        | WOFF3  | .03  | 1 | FLOW<br>TIME  | 38.<br>3.58     | 37.<br>3.58     | 36.<br>3.58     | 34.<br>3.58     | 33.<br>3.58     | 33.<br>3.58     |
| 4 COMBINED AT<br>+        | CP1    | .50  | 1 | FLOW<br>TIME  | 485.<br>3.75    | 471.<br>3.75    | 464.<br>3.75    | 435.<br>3.75    | 421.<br>3.75    | 415.<br>3.75    |
| HYDROGRAPH AT<br>+        | WOFF4  | .06  | 1 | FLOW<br>TIME  | 84.<br>3.58     | 82.<br>3.58     | 81.<br>3.58     | 76.<br>3.58     | 73.<br>3.58     | 72.<br>3.58     |
| HYDROGRAPH AT<br>+        | WOFF5  | .26  | 1 | FLOW<br>TIME  | 236.<br>3.83    | 229.<br>3.83    | 226.<br>3.83    | 212.<br>3.83    | 205.<br>3.83    | 201.<br>3.83    |
| HYDROGRAPH AT<br>+        | WOFF6  | .04  | 1 | FLOW<br>TIME  | 59.<br>3.58     | 57.<br>3.58     | 56.<br>3.58     | 53.<br>3.58     | 51.<br>3.58     | 50.<br>3.58     |
| HYDROGRAPH AT<br>+        | WPF1B  | .03  | 1 | FLOW<br>TIME  | 63.<br>3.50     | 62.<br>3.50     | 61.<br>3.50     | 58.<br>3.50     | 57.<br>3.50     | 56.<br>3.50     |
| 5 COMBINED AT<br>+        | DB1    | .88  | 1 | FLOW<br>TIME  | 817.<br>3.75    | 793.<br>3.75    | 781.<br>3.75    | 734.<br>3.75    | 710.<br>3.75    | 699.<br>3.75    |
| ROUTED TO<br>+            | RDB1   | .88  | 1 | FLOW<br>TIME  | 71.<br>5.58     | 71.<br>5.58     | 71.<br>5.58     | 69.<br>5.50     | 69.<br>5.50     | 68.<br>5.50     |
| ** PEAK STAGES IN FEET ** |        |      |   |               |                 |                 |                 |                 |                 |                 |
|                           |        |      | 1 | STAGE<br>TIME | 3035.31<br>5.58 | 3035.02<br>5.58 | 3034.86<br>5.58 | 3034.24<br>5.50 | 3033.93<br>5.50 | 3033.78<br>5.50 |
| HYDROGRAPH AT<br>+        | WSHP3  | .02  | 1 | FLOW<br>TIME  | 31.<br>3.50     | 30.<br>3.50     | 30.<br>3.50     | 29.<br>3.50     | 28.<br>3.50     | 28.<br>3.50     |
| HYDROGRAPH AT<br>+        | WPF2   | .00  | 1 | FLOW<br>TIME  | 10.<br>3.50     | 10.<br>3.50     | 10.<br>3.50     | 10.<br>3.50     | 9.<br>3.50      | 9.<br>3.50      |
| 3 COMBINED AT<br>+        | WC19   | .90  | 1 | FLOW<br>TIME  | 95.<br>3.50     | 94.<br>3.50     | 93.<br>3.50     | 91.<br>3.50     | 90.<br>3.50     | 89.<br>3.50     |
| HYDROGRAPH AT<br>+        | WPF5   | .00  | 1 | FLOW<br>TIME  | 1.<br>3.50      | 1.<br>3.50      | 1.<br>3.50      | 1.<br>3.50      | 1.<br>3.50      | 1.<br>3.50      |
| HYDROGRAPH AT<br>+        | WML2   | .04  | 1 | FLOW<br>TIME  | 78.<br>3.58     | 76.<br>3.58     | 75.<br>3.58     | 72.<br>3.58     | 70.<br>3.58     | 69.<br>3.58     |
| HYDROGRAPH AT<br>+        | WSHA5  | .00  | 1 | FLOW<br>TIME  | 8.<br>3.50      | 8.<br>3.50      | 8.<br>3.50      | 8.<br>3.50      | 8.<br>3.50      | 7.<br>3.50      |
| 3 COMBINED AT<br>+        | WC20   | .05  | 1 | FLOW<br>TIME  | 86.<br>3.58     | 84.<br>3.58     | 83.<br>3.58     | 79.<br>3.58     | 77.<br>3.58     | 76.<br>3.58     |
| HYDROGRAPH AT<br>+        | WARR4  | .00  | 1 | FLOW<br>TIME  | 3.<br>3.50      | 3.<br>3.50      | 3.<br>3.50      | 3.<br>3.50      | 3.<br>3.50      | 3.<br>3.50      |
| HYDROGRAPH AT<br>+        | WPF4   | .01  | 1 | FLOW<br>TIME  | 19.<br>3.50     | 18.<br>3.50     | 18.<br>3.50     | 17.<br>3.50     | 17.<br>3.50     | 17.<br>3.50     |



|                    |       |      |   |              |              |              |              |              |              |              |
|--------------------|-------|------|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| HYDROGRAPH AT<br>+ | WSHA4 | .00  | 1 | FLOW<br>TIME | 6.<br>3.50   | 5.<br>3.50   | 5.<br>3.50   | 5.<br>3.50   | 5.<br>3.50   | 5.<br>3.50   |
| 5 COMBINED AT<br>+ | WC21  | .96  | 1 | FLOW<br>TIME | 204.<br>3.50 | 201.<br>3.50 | 199.<br>3.50 | 191.<br>3.50 | 188.<br>3.50 | 186.<br>3.50 |
| HYDROGRAPH AT<br>+ | WL4A  | .01  | 1 | FLOW<br>TIME | 23.<br>3.50  | 22.<br>3.50  | 22.<br>3.50  | 21.<br>3.50  | 20.<br>3.50  | 20.<br>3.50  |
| HYDROGRAPH AT<br>+ | WL5A  | .02  | 1 | FLOW<br>TIME | 32.<br>3.50  | 31.<br>3.50  | 31.<br>3.50  | 29.<br>3.50  | 28.<br>3.50  | 28.<br>3.50  |
| HYDROGRAPH AT<br>+ | WL5B  | .01  | 1 | FLOW<br>TIME | 12.<br>3.50  | 11.<br>3.50  | 11.<br>3.50  | 11.<br>3.50  | 10.<br>3.50  | 10.<br>3.50  |
| 3 COMBINED AT<br>+ | WC22A | .04  | 1 | FLOW<br>TIME | 67.<br>3.50  | 65.<br>3.50  | 64.<br>3.50  | 61.<br>3.50  | 59.<br>3.50  | 58.<br>3.50  |
| HYDROGRAPH AT<br>+ | WPRK4 | .00  | 1 | FLOW<br>TIME | 3.<br>3.50   | 2.<br>3.50   | 2.<br>3.50   | 2.<br>3.50   | 2.<br>3.50   | 2.<br>3.50   |
| HYDROGRAPH AT<br>+ | WARR5 | .01  | 1 | FLOW<br>TIME | 18.<br>3.50  | 17.<br>3.50  | 17.<br>3.50  | 16.<br>3.50  | 15.<br>3.50  | 15.<br>3.50  |
| 4 COMBINED AT<br>+ | WC22  | 1.01 | 1 | FLOW<br>TIME | 291.<br>3.50 | 285.<br>3.50 | 282.<br>3.50 | 270.<br>3.50 | 264.<br>3.50 | 262.<br>3.50 |
| HYDROGRAPH AT<br>+ | WML8  | .02  | 1 | FLOW<br>TIME | 34.<br>3.50  | 33.<br>3.50  | 32.<br>3.50  | 31.<br>3.50  | 30.<br>3.50  | 30.<br>3.50  |
| HYDROGRAPH AT<br>+ | WPF6  | .00  | 1 | FLOW<br>TIME | 4.<br>3.50   | 4.<br>3.50   | 4.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   |
| HYDROGRAPH AT<br>+ | WEGN1 | .00  | 1 | FLOW<br>TIME | 2.<br>3.50   | 2.<br>3.50   | 2.<br>3.50   | 2.<br>3.50   | 2.<br>3.50   | 2.<br>3.50   |
| HYDROGRAPH AT<br>+ | WEGN2 | .00  | 1 | FLOW<br>TIME | 2.<br>3.50   | 2.<br>3.50   | 2.<br>3.50   | 2.<br>3.50   | 2.<br>3.50   | 2.<br>3.50   |
| 5 COMBINED AT<br>+ | WC23  | 1.03 | 1 | FLOW<br>TIME | 332.<br>3.50 | 325.<br>3.50 | 322.<br>3.50 | 308.<br>3.50 | 301.<br>3.50 | 298.<br>3.50 |
| HYDROGRAPH AT<br>+ | WARR6 | .00  | 1 | FLOW<br>TIME | 6.<br>3.50   | 6.<br>3.50   | 6.<br>3.50   | 6.<br>3.50   | 5.<br>3.50   | 5.<br>3.50   |
| HYDROGRAPH AT<br>+ | WPF7  | .01  | 1 | FLOW<br>TIME | 14.<br>3.50  | 14.<br>3.50  | 14.<br>3.50  | 13.<br>3.50  | 13.<br>3.50  | 13.<br>3.50  |
| HYDROGRAPH AT<br>+ | WL6A  | .01  | 1 | FLOW<br>TIME | 19.<br>3.50  | 18.<br>3.50  | 18.<br>3.50  | 17.<br>3.50  | 16.<br>3.50  | 16.<br>3.50  |
| 4 COMBINED AT<br>+ | WC24  | 1.05 | 1 | FLOW<br>TIME | 371.<br>3.50 | 363.<br>3.50 | 359.<br>3.50 | 344.<br>3.50 | 336.<br>3.50 | 332.<br>3.50 |
| HYDROGRAPH AT<br>+ | WSCP2 | .00  | 1 | FLOW<br>TIME | 11.<br>3.50  | 11.<br>3.50  | 11.<br>3.50  | 11.<br>3.50  | 10.<br>3.50  | 10.<br>3.50  |
| HYDROGRAPH AT<br>+ | WPRK3 | .00  | 1 | FLOW<br>TIME | 4.<br>3.50   | 4.<br>3.50   | 4.<br>3.50   | 4.<br>3.50   | 4.<br>3.50   | 4.<br>3.50   |
| 2 COMBINED AT<br>+ | WC25  | .01  | 1 | FLOW<br>TIME | 16.<br>3.50  | 15.<br>3.50  | 15.<br>3.50  | 15.<br>3.50  | 14.<br>3.50  | 14.<br>3.50  |
| HYDROGRAPH AT<br>+ | WPRK6 | .02  | 1 | FLOW<br>TIME | 28.<br>3.58  | 27.<br>3.58  | 27.<br>3.58  | 25.<br>3.58  | 24.<br>3.58  | 24.<br>3.58  |
| HYDROGRAPH AT<br>+ | WSCP3 | .01  | 1 | FLOW<br>TIME | 13.<br>3.50  | 13.<br>3.50  | 12.<br>3.50  | 12.<br>3.50  | 12.<br>3.50  | 12.<br>3.50  |
| 4 COMBINED AT<br>+ | WC26  | 1.08 | 1 | FLOW         | 425.         | 416.         | 412.         | 393.         | 384.         | 379.         |



|   |               |        |      |   |                                            |                 |                 |                 |                 |                 |                 |
|---|---------------|--------|------|---|--------------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| + |               | WC34   | .22  | 1 | FLOW<br>TIME                               | 404.<br>3.50    | 394.<br>3.50    | 389.<br>3.50    | 370.<br>3.50    | 360.<br>3.50    | 356.<br>3.50    |
| + | 2 COMBINED AT | WC35   | 1.34 | 1 | FLOW<br>TIME                               | 907.<br>3.50    | 887.<br>3.50    | 876.<br>3.50    | 835.<br>3.50    | 814.<br>3.50    | 804.<br>3.50    |
| + | HYDROGRAPH AT | WL2    | .02  | 1 | FLOW<br>TIME                               | 45.<br>3.50     | 44.<br>3.50     | 44.<br>3.50     | 41.<br>3.50     | 40.<br>3.50     | 40.<br>3.50     |
| + | HYDROGRAPH AT | WPRK2  | .00  | 1 | FLOW<br>TIME                               | 7.<br>3.58      | 6.<br>3.58      | 6.<br>3.58      | 6.<br>3.58      | 6.<br>3.58      | 6.<br>3.58      |
| + | 2 COMBINED AT | WC36   | .03  | 1 | FLOW<br>TIME                               | 51.<br>3.50     | 50.<br>3.50     | 49.<br>3.50     | 47.<br>3.50     | 45.<br>3.50     | 45.<br>3.50     |
| + | HYDROGRAPH AT | WSKV1B | .01  | 1 | FLOW<br>TIME                               | 11.<br>3.58     | 11.<br>3.58     | 11.<br>3.58     | 10.<br>3.58     | 10.<br>3.58     | 10.<br>3.58     |
| + | HYDROGRAPH AT | WL3    | .04  | 1 | FLOW<br>TIME                               | 69.<br>3.58     | 68.<br>3.58     | 67.<br>3.58     | 63.<br>3.58     | 62.<br>3.58     | 61.<br>3.58     |
| + | 4 COMBINED AT | WC37   | 1.41 | 1 | FLOW<br>TIME                               | 1036.<br>3.50   | 1012.<br>3.50   | 1000.<br>3.50   | 953.<br>3.50    | 929.<br>3.50    | 917.<br>3.50    |
| + | HYDROGRAPH AT | WOFF7  | .01  | 1 | FLOW<br>TIME                               | 10.<br>3.50     | 10.<br>3.50     | 10.<br>3.50     | 9.<br>3.50      | 9.<br>3.50      | 9.<br>3.50      |
| + | HYDROGRAPH AT | WOFF8  | .17  | 1 | FLOW<br>TIME                               | 198.<br>3.67    | 192.<br>3.67    | 189.<br>3.67    | 177.<br>3.67    | 171.<br>3.67    | 169.<br>3.67    |
| + | 2 COMBINED AT | CP2    | .17  | 1 | FLOW<br>TIME                               | 204.<br>3.67    | 198.<br>3.67    | 195.<br>3.67    | 183.<br>3.67    | 177.<br>3.67    | 174.<br>3.67    |
| + | HYDROGRAPH AT | WOFF9  | .12  | 1 | FLOW<br>TIME                               | 144.<br>3.58    | 140.<br>3.58    | 138.<br>3.58    | 129.<br>3.67    | 125.<br>3.67    | 123.<br>3.67    |
| + | HYDROGRAPH AT | WOFF10 | .25  | 1 | FLOW<br>TIME                               | 292.<br>3.67    | 283.<br>3.67    | 279.<br>3.67    | 262.<br>3.67    | 253.<br>3.67    | 249.<br>3.67    |
| + | HYDROGRAPH AT | WPF1A  | .03  | 1 | FLOW<br>TIME                               | 59.<br>3.58     | 57.<br>3.58     | 57.<br>3.58     | 54.<br>3.58     | 53.<br>3.58     | 52.<br>3.58     |
| + | 4 COMBINED AT | DB2    | .57  | 1 | FLOW<br>TIME                               | 686.<br>3.67    | 667.<br>3.67    | 657.<br>3.67    | 617.<br>3.67    | 597.<br>3.67    | 588.<br>3.67    |
| + | ROUTED TO     | RDB2   | .57  | 1 | FLOW<br>TIME                               | 71.<br>5.25     | 70.<br>5.25     | 70.<br>5.25     | 68.<br>5.25     | 68.<br>5.25     | 68.<br>5.25     |
|   |               |        |      | 1 | ** PEAK STAGES IN FEET **<br>STAGE<br>TIME | 3002.75<br>5.25 | 3002.46<br>5.25 | 3002.32<br>5.25 | 3001.75<br>5.25 | 3001.46<br>5.25 | 3001.32<br>5.25 |
| + | HYDROGRAPH AT | WPRK1  | .00  | 1 | FLOW<br>TIME                               | 6.<br>3.50      | 6.<br>3.50      | 6.<br>3.50      | 5.<br>3.50      | 5.<br>3.50      | 5.<br>3.50      |
| + | HYDROGRAPH AT | WIRN1  | .00  | 1 | FLOW<br>TIME                               | 2.<br>3.50      | 2.<br>3.50      | 2.<br>3.50      | 2.<br>3.50      | 2.<br>3.50      | 2.<br>3.50      |
| + | HYDROGRAPH AT | WL1A   | .05  | 1 | FLOW<br>TIME                               | 81.<br>3.58     | 80.<br>3.58     | 79.<br>3.58     | 75.<br>3.58     | 73.<br>3.58     | 72.<br>3.58     |
| + | 4 COMBINED AT | WC38   | .62  | 1 | FLOW<br>TIME                               | 141.<br>3.58    | 139.<br>3.58    | 137.<br>3.58    | 132.<br>3.58    | 130.<br>3.58    | 129.<br>3.58    |
| + | HYDROGRAPH AT | WSHP1  | .01  | 1 | FLOW<br>TIME                               | 19.<br>3.58     | 18.<br>3.58     | 18.<br>3.58     | 17.<br>3.58     | 17.<br>3.58     | 17.<br>3.58     |
| + | 2 COMBINED AT | WC39   | .63  | 1 | FLOW<br>TIME                               | 160.<br>3.58    | 157.<br>3.58    | 155.<br>3.58    | 150.<br>3.58    | 147.<br>3.58    | 145.<br>3.58    |
| + | HYDROGRAPH AT | WIRN2  | .00  | 1 | FLOW<br>TIME                               | 7.<br>3.50      | 7.<br>3.50      | 7.<br>3.50      | 7.<br>3.50      | 7.<br>3.50      | 7.<br>3.50      |



|                    |        |      |   |              |               |               |               |               |               |               |
|--------------------|--------|------|---|--------------|---------------|---------------|---------------|---------------|---------------|---------------|
| HYDROGRAPH AT<br>+ | WSCH1  | .06  | 1 | FLOW<br>TIME | 106.<br>3.58  | 103.<br>3.58  | 102.<br>3.58  | 97.<br>3.58   | 94.<br>3.58   | 93.<br>3.58   |
| HYDROGRAPH AT<br>+ | WSHA1  | .00  | 1 | FLOW<br>TIME | 6.<br>3.50    | 6.<br>3.50    | 6.<br>3.50    | 5.<br>3.50    | 5.<br>3.50    | 5.<br>3.50    |
| 2 COMBINED AT<br>+ | WC40   | .07  | 1 | FLOW<br>TIME | 112.<br>3.58  | 109.<br>3.58  | 107.<br>3.58  | 102.<br>3.58  | 99.<br>3.58   | 98.<br>3.58   |
| HYDROGRAPH AT<br>+ | WML3   | .03  | 1 | FLOW<br>TIME | 56.<br>3.50   | 54.<br>3.50   | 54.<br>3.50   | 51.<br>3.50   | 50.<br>3.50   | 49.<br>3.50   |
| 4 COMBINED AT<br>+ | WC41   | .72  | 1 | FLOW<br>TIME | 328.<br>3.58  | 321.<br>3.58  | 318.<br>3.58  | 304.<br>3.58  | 297.<br>3.58  | 293.<br>3.58  |
| HYDROGRAPH AT<br>+ | WIRN3  | .00  | 1 | FLOW<br>TIME | 5.<br>3.50    | 5.<br>3.50    | 5.<br>3.50    | 4.<br>3.50    | 4.<br>3.50    | 4.<br>3.50    |
| HYDROGRAPH AT<br>+ | WML4   | .04  | 1 | FLOW<br>TIME | 77.<br>3.50   | 75.<br>3.50   | 74.<br>3.50   | 71.<br>3.50   | 69.<br>3.50   | 68.<br>3.50   |
| 3 COMBINED AT<br>+ | WC42   | .77  | 1 | FLOW<br>TIME | 406.<br>3.58  | 398.<br>3.58  | 393.<br>3.58  | 376.<br>3.58  | 367.<br>3.58  | 363.<br>3.58  |
| 2 COMBINED AT<br>+ | WC43   | 2.18 | 1 | FLOW<br>TIME | 1440.<br>3.50 | 1407.<br>3.50 | 1391.<br>3.50 | 1325.<br>3.50 | 1293.<br>3.50 | 1276.<br>3.50 |
| HYDROGRAPH AT<br>+ | WSKV1A | .00  | 1 | FLOW<br>TIME | 5.<br>3.50    | 5.<br>3.50    | 4.<br>3.50    | 4.<br>3.50    | 4.<br>3.50    | 4.<br>3.50    |
| 2 COMBINED AT<br>+ | WC44A  | 2.18 | 1 | FLOW<br>TIME | 1444.<br>3.50 | 1412.<br>3.50 | 1395.<br>3.50 | 1330.<br>3.50 | 1297.<br>3.50 | 1281.<br>3.50 |
| HYDROGRAPH AT<br>+ | WGC2   | .01  | 1 | FLOW<br>TIME | 23.<br>3.50   | 22.<br>3.50   | 22.<br>3.50   | 21.<br>3.50   | 20.<br>3.50   | 20.<br>3.50   |
| HYDROGRAPH AT<br>+ | WOSO1  | .00  | 1 | FLOW<br>TIME | 8.<br>3.50    | 8.<br>3.50    | 8.<br>3.50    | 7.<br>3.50    | 7.<br>3.50    | 7.<br>3.50    |
| HYDROGRAPH AT<br>+ | WGED1A | .04  | 1 | FLOW<br>TIME | 77.<br>3.58   | 75.<br>3.58   | 74.<br>3.58   | 71.<br>3.58   | 69.<br>3.58   | 68.<br>3.58   |
| 5 COMBINED AT<br>+ | WC44B  | 4.93 | 1 | FLOW<br>TIME | 2269.<br>3.58 | 2208.<br>3.58 | 2179.<br>3.58 | 2058.<br>3.58 | 1998.<br>3.58 | 1965.<br>3.58 |
| HYDROGRAPH AT<br>+ | RETC1B | .00  | 1 | FLOW<br>TIME | 25.<br>3.50   | 25.<br>3.50   | 24.<br>3.50   | 23.<br>3.50   | 23.<br>3.50   | 23.<br>3.50   |
| HYDROGRAPH AT<br>+ | 95-4A  | .01  | 1 | FLOW<br>TIME | 14.<br>3.50   | 14.<br>3.50   | 14.<br>3.50   | 13.<br>3.50   | 13.<br>3.50   | 12.<br>3.50   |
| HYDROGRAPH AT<br>+ | 95-4B  | .01  | 1 | FLOW<br>TIME | 13.<br>3.50   | 13.<br>3.50   | 13.<br>3.50   | 12.<br>3.50   | 12.<br>3.50   | 12.<br>3.50   |
| HYDROGRAPH AT<br>+ | EUS95  | .01  | 1 | FLOW<br>TIME | 34.<br>3.50   | 33.<br>3.50   | 33.<br>3.50   | 32.<br>3.50   | 31.<br>3.50   | 31.<br>3.50   |
| 5 COMBINED AT<br>+ | COMB   | 4.96 | 1 | FLOW<br>TIME | 2331.<br>3.58 | 2268.<br>3.58 | 2238.<br>3.58 | 2116.<br>3.58 | 2054.<br>3.58 | 2020.<br>3.58 |
| HYDROGRAPH AT<br>+ | OFFDA  | .64  | 1 | FLOW<br>TIME | 357.<br>4.00  | 343.<br>4.00  | 337.<br>4.00  | 310.<br>4.00  | 296.<br>4.00  | 290.<br>4.00  |
| ROUTED TO<br>+     | ROFFDA | .64  | 1 | FLOW<br>TIME | 330.<br>4.42  | 317.<br>4.42  | 311.<br>4.42  | 286.<br>4.42  | 274.<br>4.42  | 268.<br>4.42  |
| HYDROGRAPH AT<br>+ | OFFDB  | .49  | 1 | FLOW<br>TIME | 235.<br>4.00  | 226.<br>4.00  | 221.<br>4.00  | 202.<br>4.00  | 193.<br>4.00  | 189.<br>4.00  |
| 2 COMBINED AT<br>+ | CP27A  | 1.14 | 1 | FLOW<br>TIME | 492.<br>4.25  | 473.<br>4.25  | 463.<br>4.25  | 426.<br>4.33  | 408.<br>4.33  | 398.<br>4.33  |

|               |        |      |   |      |       |       |       |       |       |       |
|---------------|--------|------|---|------|-------|-------|-------|-------|-------|-------|
| DIVERSION TO  |        |      |   |      |       |       |       |       |       |       |
| +             | D42CMP | 1.14 | 1 | FLOW | 85.   | 85.   | 85.   | 85.   | 85.   | 85.   |
|               |        |      |   | TIME | 3.58  | 3.58  | 3.58  | 3.58  | 3.58  | 3.67  |
| HYDROGRAPH AT |        |      |   |      |       |       |       |       |       |       |
| +             | 42CMP  | 1.14 | 1 | FLOW | 407.  | 388.  | 378.  | 341.  | 323.  | 313.  |
|               |        |      |   | TIME | 4.25  | 4.25  | 4.25  | 4.33  | 4.33  | 4.33  |
| HYDROGRAPH AT |        |      |   |      |       |       |       |       |       |       |
| +             | WGC1   | .01  | 1 | FLOW | 23.   | 22.   | 22.   | 21.   | 20.   | 20.   |
|               |        |      |   | TIME | 3.50  | 3.50  | 3.50  | 3.50  | 3.50  | 3.50  |
| 2 COMBINED AT |        |      |   |      |       |       |       |       |       |       |
| +             | WC44C  | 1.15 | 1 | FLOW | 409.  | 389.  | 380.  | 343.  | 324.  | 315.  |
|               |        |      |   | TIME | 4.25  | 4.25  | 4.33  | 4.33  | 4.33  | 4.33  |
| DIVERSION TO  |        |      |   |      |       |       |       |       |       |       |
| +             | D63RCB | 1.15 | 1 | FLOW | 251.  | 251.  | 251.  | 251.  | 251.  | 251.  |
|               |        |      |   | TIME | 3.92  | 4.00  | 4.00  | 4.00  | 4.08  | 4.08  |
| HYDROGRAPH AT |        |      |   |      |       |       |       |       |       |       |
| +             | 6X3RCB | 1.15 | 1 | FLOW | 158.  | 138.  | 129.  | 92.   | 73.   | 64.   |
|               |        |      |   | TIME | 4.25  | 4.25  | 4.33  | 4.33  | 4.33  | 4.33  |
| 2 COMBINED AT |        |      |   |      |       |       |       |       |       |       |
| +             | EC1    | 6.11 | 1 | FLOW | 2331. | 2268. | 2238. | 2116. | 2054. | 2020. |
|               |        |      |   | TIME | 3.58  | 3.58  | 3.58  | 3.58  | 3.58  | 3.58  |
| HYDROGRAPH AT |        |      |   |      |       |       |       |       |       |       |
| +             | RET42  | .00  | 1 | FLOW | 85.   | 85.   | 85.   | 85.   | 85.   | 85.   |
|               |        |      |   | TIME | 3.58  | 3.58  | 3.58  | 3.58  | 3.58  | 3.67  |
| HYDROGRAPH AT |        |      |   |      |       |       |       |       |       |       |
| +             | ECOM4  | .01  | 1 | FLOW | 6.    | 5.    | 5.    | 5.    | 4.    | 4.    |
|               |        |      |   | TIME | 3.50  | 3.50  | 3.50  | 3.50  | 3.50  | 3.50  |
| HYDROGRAPH AT |        |      |   |      |       |       |       |       |       |       |
| +             | RET6X3 | .00  | 1 | FLOW | 251.  | 251.  | 251.  | 251.  | 251.  | 251.  |
|               |        |      |   | TIME | 3.92  | 4.00  | 4.00  | 4.00  | 4.08  | 4.08  |
| HYDROGRAPH AT |        |      |   |      |       |       |       |       |       |       |
| +             | EMLA1  | .00  | 1 | FLOW | 4.    | 4.    | 4.    | 3.    | 3.    | 3.    |
|               |        |      |   | TIME | 3.50  | 3.50  | 3.50  | 3.50  | 3.50  | 3.50  |
| HYDROGRAPH AT |        |      |   |      |       |       |       |       |       |       |
| +             | ECOM3  | .01  | 1 | FLOW | 6.    | 6.    | 6.    | 5.    | 5.    | 5.    |
|               |        |      |   | TIME | 3.50  | 3.50  | 3.50  | 3.50  | 3.50  | 3.50  |
| 2 COMBINED AT |        |      |   |      |       |       |       |       |       |       |
| +             | COMB   | .01  | 1 | FLOW | 10.   | 10.   | 10.   | 9.    | 8.    | 8.    |
|               |        |      |   | TIME | 3.50  | 3.50  | 3.50  | 3.50  | 3.50  | 3.50  |
| HYDROGRAPH AT |        |      |   |      |       |       |       |       |       |       |
| +             | ESKY1  | .01  | 1 | FLOW | 23.   | 23.   | 22.   | 21.   | 21.   | 21.   |
|               |        |      |   | TIME | 3.58  | 3.58  | 3.58  | 3.58  | 3.58  | 3.58  |
| 5 COMBINED AT |        |      |   |      |       |       |       |       |       |       |
| +             | EC2A   | .04  | 1 | FLOW | 348.  | 347.  | 345.  | 345.  | 343.  | 343.  |
|               |        |      |   | TIME | 3.92  | 3.92  | 4.00  | 4.00  | 4.58  | 4.58  |
| HYDROGRAPH AT |        |      |   |      |       |       |       |       |       |       |
| +             | EPI1   | .01  | 1 | FLOW | 9.    | 9.    | 8.    | 7.    | 7.    | 7.    |
|               |        |      |   | TIME | 3.50  | 3.50  | 3.50  | 3.50  | 3.50  | 3.50  |
| HYDROGRAPH AT |        |      |   |      |       |       |       |       |       |       |
| +             | ELOG1  | .01  | 1 | FLOW | 15.   | 14.   | 14.   | 14.   | 13.   | 13.   |
|               |        |      |   | TIME | 3.50  | 3.50  | 3.50  | 3.50  | 3.50  | 3.50  |
| 4 COMBINED AT |        |      |   |      |       |       |       |       |       |       |
| +             | EC2    | 6.17 | 1 | FLOW | 2518. | 2447. | 2413. | 2274. | 2205. | 2167. |
|               |        |      |   | TIME | 3.58  | 3.58  | 3.58  | 3.58  | 3.58  | 3.58  |
| HYDROGRAPH AT |        |      |   |      |       |       |       |       |       |       |
| +             | EAA3   | .08  | 1 | FLOW | 39.   | 37.   | 36.   | 33.   | 31.   | 30.   |
|               |        |      |   | TIME | 3.67  | 3.67  | 3.67  | 3.67  | 3.67  | 3.67  |
| HYDROGRAPH AT |        |      |   |      |       |       |       |       |       |       |
| +             | EAA4   | .03  | 1 | FLOW | 17.   | 16.   | 16.   | 14.   | 13.   | 13.   |
|               |        |      |   | TIME | 3.67  | 3.67  | 3.67  | 3.67  | 3.67  | 3.67  |
| HYDROGRAPH AT |        |      |   |      |       |       |       |       |       |       |
| +             | ECR1   | .01  | 1 | FLOW | 22.   | 22.   | 21.   | 20.   | 20.   | 20.   |
|               |        |      |   | TIME | 3.58  | 3.58  | 3.58  | 3.58  | 3.58  | 3.58  |
| HYDROGRAPH AT |        |      |   |      |       |       |       |       |       |       |
| +             | EAA2   | .06  | 1 | FLOW | 31.   | 30.   | 29.   | 26.   | 24.   | 24.   |
|               |        |      |   | TIME | 3.58  | 3.58  | 3.58  | 3.58  | 3.58  | 3.58  |
| HYDROGRAPH AT |        |      |   |      |       |       |       |       |       |       |
| +             | EPC    | .03  | 1 | FLOW | 19.   | 18.   | 18.   | 16.   | 15.   | 15.   |
|               |        |      |   | TIME | 3.58  | 3.58  | 3.58  | 3.58  | 3.58  | 3.58  |
| 5 COMBINED AT |        |      |   |      |       |       |       |       |       |       |
| +             | EC5    | .21  | 1 | FLOW | 124.  | 118.  | 115.  | 104.  | 99.   | 96.   |

[illegible]



|               |       |      |   |              |               |               |               |               |               |               |
|---------------|-------|------|---|--------------|---------------|---------------|---------------|---------------|---------------|---------------|
| +             | EPG   | .02  | 1 | FLOW<br>TIME | 13.<br>3.58   | 13.<br>3.58   | 12.<br>3.58   | 11.<br>3.58   | 10.<br>3.58   | 10.<br>3.58   |
| HYDROGRAPH AT |       |      |   |              |               |               |               |               |               |               |
| +             | EPI2  | .01  | 1 | FLOW<br>TIME | 8.<br>3.50    | 7.<br>3.50    | 7.<br>3.50    | 6.<br>3.50    | 6.<br>3.50    | 6.<br>3.50    |
| HYDROGRAPH AT |       |      |   |              |               |               |               |               |               |               |
| +             | EOHR1 | .02  | 1 | FLOW<br>TIME | 29.<br>3.58   | 29.<br>3.58   | 28.<br>3.58   | 27.<br>3.58   | 26.<br>3.58   | 26.<br>3.58   |
| HYDROGRAPH AT |       |      |   |              |               |               |               |               |               |               |
| +             | ESP   | .01  | 1 | FLOW<br>TIME | 0.<br>3.75    | 0.<br>3.75    | 0.<br>3.75    | 0.<br>4.92    | 0.<br>4.92    | 0.<br>4.92    |
| 5 COMBINED AT |       |      |   |              |               |               |               |               |               |               |
| +             | EC13  | .11  | 1 | FLOW<br>TIME | 80.<br>3.58   | 77.<br>3.58   | 76.<br>3.58   | 70.<br>3.58   | 67.<br>3.58   | 65.<br>3.58   |
| HYDROGRAPH AT |       |      |   |              |               |               |               |               |               |               |
| +             | EPF2  | .03  | 1 | FLOW<br>TIME | 24.<br>3.50   | 23.<br>3.50   | 22.<br>3.50   | 20.<br>3.50   | 19.<br>3.50   | 18.<br>3.50   |
| HYDROGRAPH AT |       |      |   |              |               |               |               |               |               |               |
| +             | EPH1  | .04  | 1 | FLOW<br>TIME | 21.<br>3.58   | 20.<br>3.58   | 20.<br>3.58   | 18.<br>3.58   | 17.<br>3.58   | 16.<br>3.58   |
| 3 COMBINED AT |       |      |   |              |               |               |               |               |               |               |
| +             | EC14  | .17  | 1 | FLOW<br>TIME | 116.<br>3.58  | 111.<br>3.58  | 109.<br>3.58  | 100.<br>3.58  | 95.<br>3.58   | 93.<br>3.58   |
| 2 COMBINED AT |       |      |   |              |               |               |               |               |               |               |
| +             | EC15  | .28  | 1 | FLOW<br>TIME | 136.<br>3.58  | 130.<br>3.58  | 127.<br>3.58  | 117.<br>3.58  | 111.<br>3.58  | 109.<br>3.58  |
| HYDROGRAPH AT |       |      |   |              |               |               |               |               |               |               |
| +             | EFA3  | .00  | 1 | FLOW<br>TIME | 7.<br>3.58    | 7.<br>3.58    | 7.<br>3.58    | 7.<br>3.58    | 7.<br>3.58    | 6.<br>3.58    |
| HYDROGRAPH AT |       |      |   |              |               |               |               |               |               |               |
| +             | EPD   | .05  | 1 | FLOW<br>TIME | 24.<br>3.58   | 23.<br>3.58   | 22.<br>3.58   | 20.<br>3.58   | 19.<br>3.58   | 18.<br>3.58   |
| 3 COMBINED AT |       |      |   |              |               |               |               |               |               |               |
| +             | EC16  | .33  | 1 | FLOW<br>TIME | 167.<br>3.58  | 160.<br>3.58  | 157.<br>3.58  | 143.<br>3.58  | 137.<br>3.58  | 134.<br>3.58  |
| 2 COMBINED AT |       |      |   |              |               |               |               |               |               |               |
| +             | EC18  | 6.75 | 1 | FLOW<br>TIME | 2858.<br>3.58 | 2772.<br>3.58 | 2732.<br>3.58 | 2566.<br>3.58 | 2483.<br>3.58 | 2438.<br>3.58 |
| HYDROGRAPH AT |       |      |   |              |               |               |               |               |               |               |
| +             | ENP   | .01  | 1 | FLOW<br>TIME | 0.<br>4.92    | 0.<br>4.92    | 0.<br>4.92    | 0.<br>5.00    | 0.<br>5.00    | 0.<br>5.08    |
| HYDROGRAPH AT |       |      |   |              |               |               |               |               |               |               |
| +             | EPB1  | .05  | 1 | FLOW<br>TIME | 26.<br>3.58   | 25.<br>3.58   | 24.<br>3.58   | 22.<br>3.58   | 20.<br>3.58   | 20.<br>3.58   |
| 2 COMBINED AT |       |      |   |              |               |               |               |               |               |               |
| +             | EC8A  | .05  | 1 | FLOW<br>TIME | 26.<br>3.58   | 25.<br>3.58   | 24.<br>3.58   | 22.<br>3.58   | 20.<br>3.58   | 20.<br>3.58   |
| HYDROGRAPH AT |       |      |   |              |               |               |               |               |               |               |
| +             | EFA2  | .00  | 1 | FLOW<br>TIME | 7.<br>3.50    | 7.<br>3.50    | 7.<br>3.50    | 7.<br>3.50    | 7.<br>3.50    | 6.<br>3.50    |
| 3 COMBINED AT |       |      |   |              |               |               |               |               |               |               |
| +             | EC17  | 6.81 | 1 | FLOW<br>TIME | 2891.<br>3.58 | 2804.<br>3.58 | 2763.<br>3.58 | 2594.<br>3.58 | 2509.<br>3.58 | 2464.<br>3.58 |
| HYDROGRAPH AT |       |      |   |              |               |               |               |               |               |               |
| +             | EPA   | .03  | 1 | FLOW<br>TIME | 16.<br>3.58   | 15.<br>3.58   | 15.<br>3.58   | 13.<br>3.58   | 12.<br>3.58   | 12.<br>3.58   |
| HYDROGRAPH AT |       |      |   |              |               |               |               |               |               |               |
| +             | EPB2  | .07  | 1 | FLOW<br>TIME | 36.<br>3.67   | 35.<br>3.67   | 34.<br>3.67   | 30.<br>3.67   | 29.<br>3.67   | 28.<br>3.67   |
| 2 COMBINED AT |       |      |   |              |               |               |               |               |               |               |
| +             | EC8B  | .10  | 1 | FLOW<br>TIME | 50.<br>3.58   | 48.<br>3.67   | 46.<br>3.67   | 42.<br>3.67   | 39.<br>3.67   | 38.<br>3.67   |
| 2 COMBINED AT |       |      |   |              |               |               |               |               |               |               |
| +             | EC21A | 6.91 | 1 | FLOW<br>TIME | 2941.<br>3.58 | 2852.<br>3.58 | 2809.<br>3.58 | 2635.<br>3.58 | 2548.<br>3.58 | 2502.<br>3.58 |
| HYDROGRAPH AT |       |      |   |              |               |               |               |               |               |               |
| +             | OFFC  | .13  | 1 | FLOW<br>TIME | 80.<br>3.75   | 77.<br>3.75   | 75.<br>3.75   | 69.<br>3.75   | 66.<br>3.75   | 64.<br>3.75   |
| HYDROGRAPH AT |       |      |   |              |               |               |               |               |               |               |
| +             | 95-3  | .01  | 1 | FLOW<br>TIME | 15.<br>3.50   | 14.<br>3.50   | 14.<br>3.50   | 13.<br>3.50   | 13.<br>3.50   | 13.<br>3.50   |

|                    |        |      |   |              |               |               |               |               |               |               |
|--------------------|--------|------|---|--------------|---------------|---------------|---------------|---------------|---------------|---------------|
| HYDROGRAPH AT<br>+ | OFFB   | .13  | 1 | FLOW<br>TIME | 73.<br>3.83   | 70.<br>3.83   | 68.<br>3.83   | 63.<br>3.83   | 60.<br>3.83   | 58.<br>3.83   |
| HYDROGRAPH AT<br>+ | 95-2   | .00  | 1 | FLOW<br>TIME | 7.<br>3.50    | 7.<br>3.50    | 7.<br>3.50    | 6.<br>3.50    | 6.<br>3.50    | 6.<br>3.50    |
| 4 COMBINED AT<br>+ | DUMMY  | .28  | 1 | FLOW<br>TIME | 158.<br>3.75  | 152.<br>3.75  | 149.<br>3.75  | 137.<br>3.83  | 131.<br>3.83  | 128.<br>3.83  |
| HYDROGRAPH AT<br>+ | OFFA   | .02  | 1 | FLOW<br>TIME | 17.<br>3.58   | 16.<br>3.58   | 16.<br>3.58   | 14.<br>3.58   | 14.<br>3.58   | 13.<br>3.58   |
| HYDROGRAPH AT<br>+ | 95-1   | .00  | 1 | FLOW<br>TIME | 7.<br>3.50    | 7.<br>3.50    | 7.<br>3.50    | 7.<br>3.50    | 6.<br>3.50    | 6.<br>3.50    |
| 3 COMBINED AT<br>+ | CP27B  | .31  | 1 | FLOW<br>TIME | 173.<br>3.75  | 166.<br>3.75  | 163.<br>3.75  | 149.<br>3.75  | 142.<br>3.75  | 139.<br>3.75  |
| HYDROGRAPH AT<br>+ | OFFZ   | .05  | 1 | FLOW<br>TIME | 25.<br>3.67   | 24.<br>3.67   | 23.<br>3.67   | 21.<br>3.67   | 19.<br>3.67   | 19.<br>3.67   |
| HYDROGRAPH AT<br>+ | ESKV1  | .01  | 1 | FLOW<br>TIME | 11.<br>3.58   | 11.<br>3.58   | 11.<br>3.58   | 10.<br>3.58   | 10.<br>3.58   | 10.<br>3.58   |
| 3 COMBINED AT<br>+ | EC19   | .36  | 1 | FLOW<br>TIME | 201.<br>3.75  | 193.<br>3.75  | 189.<br>3.75  | 173.<br>3.75  | 166.<br>3.75  | 162.<br>3.75  |
| HYDROGRAPH AT<br>+ | EMR1   | .03  | 1 | FLOW<br>TIME | 22.<br>3.67   | 22.<br>3.67   | 21.<br>3.67   | 20.<br>3.67   | 19.<br>3.67   | 18.<br>3.67   |
| HYDROGRAPH AT<br>+ | EAA1   | .09  | 1 | FLOW<br>TIME | 43.<br>3.67   | 41.<br>3.67   | 40.<br>3.67   | 36.<br>3.67   | 34.<br>3.67   | 33.<br>3.67   |
| 3 COMBINED AT<br>+ | EC20   | .47  | 1 | FLOW<br>TIME | 260.<br>3.67  | 249.<br>3.67  | 244.<br>3.75  | 224.<br>3.75  | 213.<br>3.75  | 208.<br>3.75  |
| HYDROGRAPH AT<br>+ | EMR2   | .03  | 1 | FLOW<br>TIME | 26.<br>3.67   | 26.<br>3.67   | 25.<br>3.67   | 23.<br>3.67   | 22.<br>3.67   | 22.<br>3.67   |
| 2 COMBINED AT<br>+ | EC21B  | .50  | 1 | FLOW<br>TIME | 287.<br>3.67  | 275.<br>3.67  | 269.<br>3.67  | 246.<br>3.67  | 235.<br>3.67  | 229.<br>3.67  |
| HYDROGRAPH AT<br>+ | EFA1   | .00  | 1 | FLOW<br>TIME | 8.<br>3.58    | 7.<br>3.58    | 7.<br>3.58    | 7.<br>3.58    | 7.<br>3.58    | 7.<br>3.58    |
| 3 COMBINED AT<br>+ | EC21   | 7.41 | 1 | FLOW<br>TIME | 3211.<br>3.58 | 3111.<br>3.58 | 3062.<br>3.58 | 2866.<br>3.58 | 2768.<br>3.58 | 2716.<br>3.58 |
| HYDROGRAPH AT<br>+ | NW102- | .20  | 1 | FLOW<br>TIME | 269.<br>3.67  | 263.<br>3.67  | 259.<br>3.67  | 246.<br>3.67  | 240.<br>3.67  | 236.<br>3.67  |
| 2 COMBINED AT<br>+ | EC27   | 7.61 | 1 | FLOW<br>TIME | 3459.<br>3.58 | 3353.<br>3.58 | 3301.<br>3.58 | 3093.<br>3.58 | 2989.<br>3.58 | 2934.<br>3.58 |
| HYDROGRAPH AT<br>+ | NW130- | .16  | 1 | FLOW<br>TIME | 92.<br>3.67   | 88.<br>3.67   | 86.<br>3.67   | 78.<br>3.67   | 75.<br>3.67   | 73.<br>3.67   |
| 2 COMBINED AT<br>+ | EC28   | 7.77 | 1 | FLOW<br>TIME | 3539.<br>3.58 | 3428.<br>3.58 | 3375.<br>3.58 | 3159.<br>3.58 | 3051.<br>3.58 | 2995.<br>3.58 |
| HYDROGRAPH AT<br>+ | 95-7A  | .01  | 1 | FLOW<br>TIME | 14.<br>3.50   | 14.<br>3.50   | 13.<br>3.50   | 13.<br>3.50   | 13.<br>3.50   | 12.<br>3.50   |
| HYDROGRAPH AT<br>+ | 95-7B  | .01  | 1 | FLOW<br>TIME | 16.<br>3.50   | 15.<br>3.50   | 15.<br>3.50   | 15.<br>3.50   | 14.<br>3.50   | 14.<br>3.50   |
| HYDROGRAPH AT<br>+ | 95-8A  | .01  | 1 | FLOW<br>TIME | 11.<br>3.50   | 11.<br>3.50   | 11.<br>3.50   | 10.<br>3.50   | 10.<br>3.50   | 10.<br>3.50   |
| HYDROGRAPH AT<br>+ | 95-8B  | .00  | 1 | FLOW<br>TIME | 7.<br>3.50    | 7.<br>3.50    | 7.<br>3.50    | 6.<br>3.50    | 6.<br>3.50    | 6.<br>3.50    |

|               |        |     |   |              |              |              |              |              |              |              |
|---------------|--------|-----|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 4 COMBINED AT |        |     |   |              |              |              |              |              |              |              |
| +             | C95-8B | .02 | 1 | FLOW<br>TIME | 47.<br>3.50  | 46.<br>3.50  | 46.<br>3.50  | 44.<br>3.50  | 43.<br>3.50  | 42.<br>3.50  |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | ETP5   | .00 | 1 | FLOW<br>TIME | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | EPH3   | .02 | 1 | FLOW<br>TIME | 36.<br>3.50  | 35.<br>3.50  | 34.<br>3.50  | 32.<br>3.50  | 31.<br>3.50  | 31.<br>3.50  |
| 3 COMBINED AT |        |     |   |              |              |              |              |              |              |              |
| +             | EC22   | .05 | 1 | FLOW<br>TIME | 86.<br>3.50  | 84.<br>3.50  | 83.<br>3.50  | 79.<br>3.50  | 77.<br>3.50  | 75.<br>3.50  |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | ES2    | .05 | 1 | FLOW<br>TIME | 85.<br>3.50  | 83.<br>3.50  | 82.<br>3.50  | 78.<br>3.50  | 76.<br>3.50  | 75.<br>3.50  |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | EBRT1  | .00 | 1 | FLOW<br>TIME | 6.<br>3.50   | 6.<br>3.50   | 6.<br>3.50   | 6.<br>3.50   | 6.<br>3.50   | 6.<br>3.50   |
| 3 COMBINED AT |        |     |   |              |              |              |              |              |              |              |
| +             | EC23   | .10 | 1 | FLOW<br>TIME | 178.<br>3.50 | 173.<br>3.50 | 171.<br>3.50 | 163.<br>3.50 | 158.<br>3.50 | 156.<br>3.50 |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | ECOM1B | .02 | 1 | FLOW<br>TIME | 34.<br>3.50  | 33.<br>3.50  | 33.<br>3.50  | 31.<br>3.50  | 30.<br>3.50  | 29.<br>3.50  |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | EFA6A  | .00 | 1 | FLOW<br>TIME | 9.<br>3.50   | 9.<br>3.50   | 8.<br>3.50   | 8.<br>3.50   | 8.<br>3.50   | 8.<br>3.50   |
| 3 COMBINED AT |        |     |   |              |              |              |              |              |              |              |
| +             | EC25   | .13 | 1 | FLOW<br>TIME | 221.<br>3.50 | 215.<br>3.50 | 212.<br>3.50 | 202.<br>3.50 | 196.<br>3.50 | 193.<br>3.50 |
| DIVERSION TO  |        |     |   |              |              |              |              |              |              |              |
| +             | BRENT  | .13 | 1 | FLOW<br>TIME | 151.<br>3.50 | 145.<br>3.50 | 142.<br>3.50 | 132.<br>3.50 | 126.<br>3.50 | 123.<br>3.50 |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | SOUTH  | .13 | 1 | FLOW<br>TIME | 70.<br>3.25  | 70.<br>3.25  | 70.<br>3.33  | 70.<br>3.33  | 70.<br>3.33  | 70.<br>3.33  |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | 95-9B  | .01 | 1 | FLOW<br>TIME | 22.<br>3.58  | 21.<br>3.58  | 21.<br>3.58  | 20.<br>3.58  | 19.<br>3.58  | 19.<br>3.58  |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | EFA6B  | .01 | 1 | FLOW<br>TIME | 18.<br>3.50  | 18.<br>3.50  | 18.<br>3.50  | 17.<br>3.50  | 16.<br>3.50  | 16.<br>3.50  |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | ECOM1A | .02 | 1 | FLOW<br>TIME | 25.<br>3.50  | 24.<br>3.50  | 24.<br>3.50  | 22.<br>3.50  | 22.<br>3.50  | 21.<br>3.50  |
| 3 COMBINED AT |        |     |   |              |              |              |              |              |              |              |
| +             | EC24   | .04 | 1 | FLOW<br>TIME | 63.<br>3.50  | 61.<br>3.50  | 60.<br>3.50  | 57.<br>3.50  | 56.<br>3.50  | 55.<br>3.50  |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | EFA5   | .00 | 1 | FLOW<br>TIME | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | EFP2   | .00 | 1 | FLOW<br>TIME | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   | 3.<br>3.50   |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | ECOM2  | .01 | 1 | FLOW<br>TIME | 13.<br>3.50  | 13.<br>3.50  | 13.<br>3.50  | 12.<br>3.50  | 11.<br>3.50  | 11.<br>3.50  |
| 5 COMBINED AT |        |     |   |              |              |              |              |              |              |              |
| +             | EC26   | .18 | 1 | FLOW<br>TIME | 152.<br>3.50 | 150.<br>3.50 | 149.<br>3.50 | 145.<br>3.50 | 143.<br>3.50 | 142.<br>3.50 |
| DIVERSION TO  |        |     |   |              |              |              |              |              |              |              |
| +             | RACEL  | .18 | 1 | FLOW<br>TIME | 114.<br>3.33 | 114.<br>3.33 | 114.<br>3.33 | 114.<br>3.42 | 114.<br>3.42 | 114.<br>3.42 |
| HYDROGRAPH AT |        |     |   |              |              |              |              |              |              |              |
| +             | HORSE  | .18 | 1 | FLOW<br>TIME | 38.<br>3.50  | 36.<br>3.50  | 35.<br>3.50  | 31.<br>3.50  | 29.<br>3.50  | 28.<br>3.50  |

1

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

## APPENDIX D

### Surface Flow Hydraulic Computations



## Street Hydraulics



Skye Pointe Drive (Edgestone Drive)

## Worksheet for SP1: Half Street (100-yr)

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                                              2.90    %  
Discharge                                                 6.00    ft<sup>3</sup>/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00.00      | 0.50           |
| 0+00.50      | 0.48           |
| 0+00.50      | 0.00           |
| 0+02.00      | 0.13           |
| 0+02.00      | 0.17           |
| 0+07.00      | 0.27           |
| 0+27.00      | 0.67           |
| 0+27.00      | 1.17           |
| 0+33.50      | 1.30           |

### Roughness Segment Definitions

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013                 |
| (0+02.00, 0.13) | (0+27.00, 0.67) | 0.016                 |
| (0+27.00, 0.67) | (0+33.50, 1.30) | 0.013                 |

### Options

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

### Results

Normal Depth                                              0.37    ft  
Elevation Range                                              0.00 to 1.30 ft

## Worksheet for SP1: Half Street (100-yr)

### Results

|                  |               |                 |
|------------------|---------------|-----------------|
| Flow Area        | 1.49          | ft <sup>2</sup> |
| Wetted Perimeter | 12.06         | ft              |
| Hydraulic Radius | 0.12          | ft              |
| Top Width        | 11.64         | ft              |
| Normal Depth     | 0.37          | ft              |
| Critical Depth   | 0.45          | ft              |
| Critical Slope   | 0.00671       | ft/ft           |
| Velocity         | 4.03          | ft/s            |
| Velocity Head    | 0.25          | ft              |
| Specific Energy  | 0.63          | ft              |
| Froude Number    | 1.99          |                 |
| Flow Type        | Supercritical |                 |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.37     | ft    |
| Critical Depth      | 0.45     | ft    |
| Channel Slope       | 2.90     | %     |
| Critical Slope      | 0.00671  | ft/ft |



## Project Description

### Manning Formula

### Normal Depth

6.00 ft<sup>3</sup>/s

## Worksheet for SP2: Half Street (100-yr)

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                                              2.90    %  
Discharge                                                18.00    ft<sup>3</sup>/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00.00      | 0.50           |
| 0+00.50      | 0.48           |
| 0+00.50      | 0.00           |
| 0+02.00      | 0.13           |
| 0+02.00      | 0.17           |
| 0+07.00      | 0.27           |
| 0+27.00      | 0.67           |
| 0+27.00      | 1.17           |
| 0+33.50      | 1.30           |

### Roughness Segment Definitions

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013                 |
| (0+02.00, 0.13) | (0+27.00, 0.67) | 0.016                 |
| (0+27.00, 0.67) | (0+33.50, 1.30) | 0.013                 |

### Options

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

### Results

Normal Depth                                              0.51    ft  
Elevation Range                                              0.00 to 1.30 ft

## Worksheet for SP2: Half Street (100-yr)

### Results

|                  |               |                 |
|------------------|---------------|-----------------|
| Flow Area        | 3.48          | ft <sup>2</sup> |
| Wetted Perimeter | 19.32         | ft              |
| Hydraulic Radius | 0.18          | ft              |
| Top Width        | 18.78         | ft              |
| Normal Depth     | 0.51          | ft              |
| Critical Depth   | 0.64          | ft              |
| Critical Slope   | 0.00585       | ft/ft           |
| Velocity         | 5.17          | ft/s            |
| Velocity Head    | 0.41          | ft              |
| Specific Energy  | 0.92          | ft              |
| Froude Number    | 2.11          |                 |
| Flow Type        | Supercritical |                 |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.51     | ft    |
| Critical Depth      | 0.64     | ft    |
| Channel Slope       | 2.90     | %     |
| Critical Slope      | 0.00585  | ft/ft |



## Project Description

### Manning Formula

### Normal Depth

18.00 ft<sup>3</sup>/s

The graph shows a profile with the following key features:

- Station 0+00:** Elevation starts at 0.50, drops vertically to approximately -0.05, then rises to 0.15.
- Station 0+05 to 0+10:** Elevation increases linearly from 0.20 to 0.50.
- Station 0+10:** A blue triangle symbol is located on the horizontal segment at elevation 0.50.
- Station 0+15 to 0+27:** Elevation increases linearly from 0.50 to 0.68.
- Station 0+27:** Elevation jumps vertically from 0.68 to 1.18.
- Station 0+27 to 0+30:** Elevation increases linearly from 1.18 to 1.30.



## Log Cabin Way (Sunstone Parkway)

## Worksheet for LC1 (100-yr)

### Project Description

Friction Method                      Manning Formula  
Solve For                                Normal Depth

### Input Data

Channel Slope                                              4.06    %  
Discharge                                                 10.00   ft³/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00.00      | 0.72           |
| 0+11.00      | 0.50           |
| 0+11.50      | 0.48           |
| 0+11.50      | 0.00           |
| 0+13.00      | 0.13           |
| 0+13.00      | 0.17           |
| 0+18.00      | 0.27           |
| 0+39.00      | 0.69           |
| 0+39.00      | 1.19           |
| 0+45.50      | 1.32           |
| 0+52.00      | 1.19           |
| 0+52.00      | 0.69           |
| 0+73.00      | 0.27           |
| 0+78.00      | 0.17           |
| 0+78.00      | 0.13           |
| 0+79.50      | 0.00           |
| 0+79.50      | 0.48           |
| 0+80.00      | 0.50           |
| 0+91.00      | 0.72           |

### Roughness Segment Definitions

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+00.00, 0.72) | (0+11.00, 0.50) | 0.022                 |
| (0+11.00, 0.50) | (0+13.00, 0.13) | 0.013                 |

## Worksheet for LC1 (100-yr)

### Input Data

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+13.00, 0.13) | (0+39.00, 0.69) | 0.016                 |
| (0+39.00, 0.69) | (0+52.00, 0.69) | 0.013                 |
| (0+52.00, 0.69) | (0+78.00, 0.13) | 0.016                 |
| (0+78.00, 0.13) | (0+79.50, 0.48) | 0.013                 |
| (0+79.50, 0.48) | (0+91.00, 0.72) | 0.020                 |

### Options

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

### Results

|                  |               |                 |
|------------------|---------------|-----------------|
| Normal Depth     | 0.34          | ft              |
| Elevation Range  | 0.00 to 1.32  | ft              |
| Flow Area        | 2.27          | ft <sup>2</sup> |
| Wetted Perimeter | 20.76         | ft              |
| Hydraulic Radius | 0.11          | ft              |
| Top Width        | 19.99         | ft              |
| Normal Depth     | 0.34          | ft              |
| Critical Depth   | 0.43          | ft              |
| Critical Slope   | 0.00682       | ft/ft           |
| Velocity         | 4.41          | ft/s            |
| Velocity Head    | 0.30          | ft              |
| Specific Energy  | 0.64          | ft              |
| Froude Number    | 2.31          |                 |
| Flow Type        | Supercritical |                 |

### GVF Input Data

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



---

## Worksheet for LC1 (100-yr)

---

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.34     | ft    |
| Critical Depth      | 0.43     | ft    |
| Channel Slope       | 4.06     | %     |
| Critical Slope      | 0.00682  | ft/ft |

## Project Description

### Manning Formula

### Normal Depth

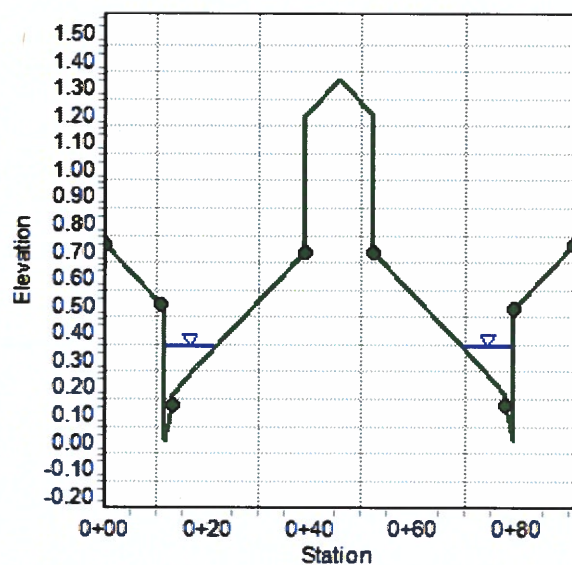
## Input Data

4.06 %

0.34 ft

10.00 ft<sup>3</sup>/s

### Cross Section Image



## Project Description

### Manning Formula

### Normal Depth

## Section Definitions



## Worksheet for LC1 (10-yr)

### Input Data

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+13.00, 0.13) | (0+39.00, 0.69) | 0.016                 |
| (0+39.00, 0.69) | (0+52.00, 0.69) | 0.013                 |
| (0+52.00, 0.69) | (0+78.00, 0.13) | 0.016                 |
| (0+78.00, 0.13) | (0+79.50, 0.48) | 0.013                 |
| (0+79.50, 0.48) | (0+91.00, 0.72) | 0.020                 |

### 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     | 0.28          | ft              |
| Elevation Range  | 0.00 to 1.32  | ft              |
| Flow Area        | 1.31          | ft <sup>2</sup> |
| Wetted Perimeter | 15.05         | ft              |
| Hydraulic Radius | 0.09          | ft              |
| Top Width        | 14.39         | ft              |
| Normal Depth     | 0.28          | ft              |
| Critical Depth   | 0.35          | ft              |
| Critical Slope   | 0.00731       | ft/ft           |
| Velocity         | 3.83          | ft/s            |
| Velocity Head    | 0.23          | ft              |
| Specific Energy  | 0.51          | ft              |
| Froude Number    | 2.24          |                 |
| Flow Type        | Supercritical |                 |

### GVF Input Data

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

---

## Worksheet for LC1 (10-yr)

---

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.28     | ft    |
| Critical Depth      | 0.35     | ft    |
| Channel Slope       | 4.06     | %     |
| Critical Slope      | 0.00731  | ft/ft |

## Cross Section for LC1 (10-yr)

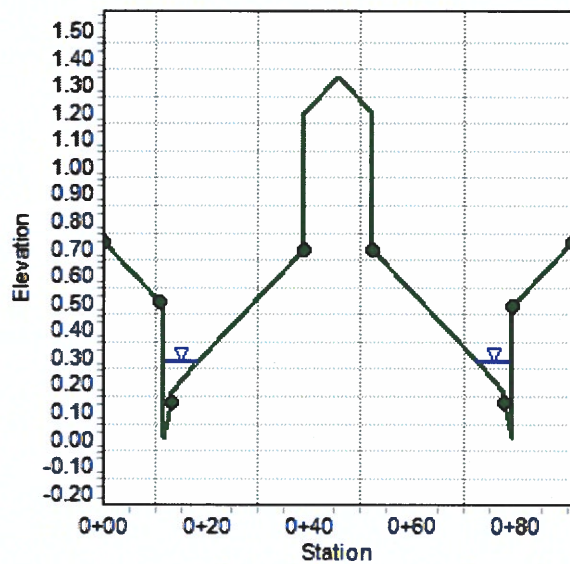
### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                              4.06 %  
Normal Depth                              0.28 ft  
Discharge                                  5.00 ft<sup>3</sup>/s

### Cross Section Image



## Worksheet for LC2 (100-yr)

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                                              4.06    %  
Discharge                                                 7.00    ft<sup>3</sup>/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00.00      | 0.72           |
| 0+11.00      | 0.50           |
| 0+11.50      | 0.48           |
| 0+11.50      | 0.00           |
| 0+13.00      | 0.13           |
| 0+13.00      | 0.17           |
| 0+18.00      | 0.27           |
| 0+39.00      | 0.69           |
| 0+39.00      | 1.19           |
| 0+45.50      | 1.32           |
| 0+52.00      | 1.19           |
| 0+52.00      | 0.69           |
| 0+73.00      | 0.27           |
| 0+78.00      | 0.17           |
| 0+78.00      | 0.13           |
| 0+79.50      | 0.00           |
| 0+79.50      | 0.48           |
| 0+80.00      | 0.50           |
| 0+91.00      | 0.72           |

### Roughness Segment Definitions

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+00.00, 0.72) | (0+11.00, 0.50) | 0.022                 |
| (0+11.00, 0.50) | (0+13.00, 0.13) | 0.013                 |



## Worksheet for LC2 (100-yr)

### Input Data

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+13.00, 0.13) | (0+39.00, 0.69) | 0.016                 |
| (0+39.00, 0.69) | (0+52.00, 0.69) | 0.013                 |
| (0+52.00, 0.69) | (0+78.00, 0.13) | 0.016                 |
| (0+78.00, 0.13) | (0+79.50, 0.48) | 0.013                 |
| (0+79.50, 0.48) | (0+91.00, 0.72) | 0.020                 |

### 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              |
| Elevation Range  | 0.00 to 1.32 ft |                 |
| Flow Area        | 1.71            | ft <sup>2</sup> |
| Wetted Perimeter | 17.70           | ft              |
| Hydraulic Radius | 0.10            | ft              |
| Top Width        | 16.98           | ft              |
| Normal Depth     | 0.31            | ft              |
| Critical Depth   | 0.39            | ft              |
| Critical Slope   | 0.00708         | ft/ft           |
| Velocity         | 4.09            | ft/s            |
| Velocity Head    | 0.26            | ft              |
| Specific Energy  | 0.57            | ft              |
| Froude Number    | 2.27            |                 |
| Flow Type        | Supercritical   |                 |

### GVF Input Data

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

---

## Worksheet for LC2 (100-yr)

---

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.31     | ft    |
| Critical Depth      | 0.39     | ft    |
| Channel Slope       | 4.06     | %     |
| Critical Slope      | 0.00708  | ft/ft |

## Cross Section for LC2 (100-yr)

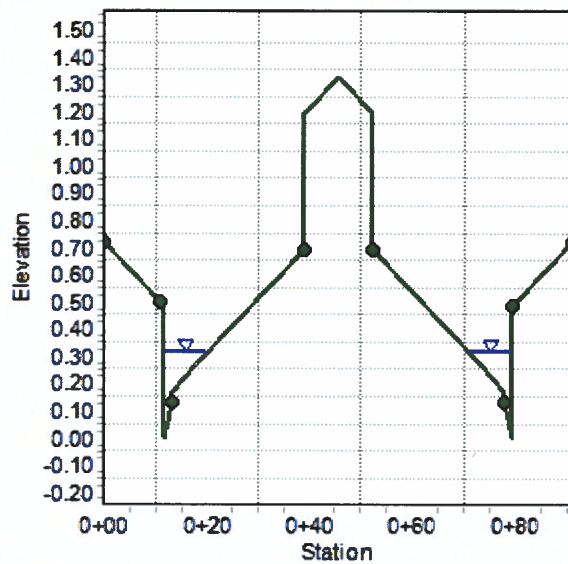
### Project Description

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

### Input Data

|               |      |                    |
|---------------|------|--------------------|
| Channel Slope | 4.06 | %                  |
| Normal Depth  | 0.31 | ft                 |
| Discharge     | 7.00 | ft <sup>3</sup> /s |

### Cross Section Image



## Project Description

### Input Data

| Station (ft) | Elevation (ft) |
|--------------|----------------|
|--------------|----------------|

### Roughness Segment Definitions

Bentley Systems, Inc. Haestad Methods Solution Center  
4/26/2019 10:21:44 AM 27 Siemens Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666 Page 1 of 3



## Worksheet for LC2 (10-yr)

### Input Data

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+13.00, 0.13) | (0+39.00, 0.69) | 0.016                 |
| (0+39.00, 0.69) | (0+52.00, 0.69) | 0.013                 |
| (0+52.00, 0.69) | (0+78.00, 0.13) | 0.016                 |
| (0+78.00, 0.13) | (0+79.50, 0.48) | 0.013                 |
| (0+79.50, 0.48) | (0+91.00, 0.72) | 0.020                 |

### 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              |
| Elevation Range  | 0.00 to 1.32 ft |                 |
| Flow Area        | 1.09            | ft <sup>2</sup> |
| Wetted Perimeter | 13.42           | ft              |
| Hydraulic Radius | 0.08            | ft              |
| Top Width        | 12.80           | ft              |
| Normal Depth     | 0.27            | ft              |
| Critical Depth   | 0.33            | ft              |
| Critical Slope   | 0.00745         | ft/ft           |
| Velocity         | 3.67            | ft/s            |
| Velocity Head    | 0.21            | ft              |
| Specific Energy  | 0.48            | ft              |
| Froude Number    | 2.22            |                 |
| Flow Type        | Supercritical   |                 |

### GVF Input Data

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

---

## Worksheet for LC2 (10-yr)

---

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.27     | ft    |
| Critical Depth      | 0.33     | ft    |
| Channel Slope       | 4.06     | %     |
| Critical Slope      | 0.00745  | ft/ft |

## Project Description

### Manning Formula

### Normal Depth

4.00 ft<sup>3</sup>/s

The profile view graph shows the elevation of a road surface relative to a datum. The x-axis represents the stationing from 0+00 to 0+80, and the y-axis represents the elevation from -0.20 to 1.50. The profile line is dark green. There are two blue horizontal lines with downward-pointing triangles, indicating specific elevations at stations 0+10 and 0+75.

| Station | Elevation |
|---------|-----------|
| 0+00    | 0.70      |
| 0+10    | 0.50      |
| 0+20    | 0.30      |
| 0+30    | 0.10      |
| 0+40    | 0.70      |
| 0+50    | 1.30      |
| 0+60    | 0.70      |
| 0+70    | 0.30      |
| 0+75    | 0.10      |
| 0+80    | 0.50      |
| 0+90    | 0.70      |

## Project Description

### Manning Formula

### Normal Depth

## Section Definitions



## Worksheet for LC3 (100-yr)

### Input Data

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+13.00, 0.13) | (0+39.00, 0.69) | 0.016                 |
| (0+39.00, 0.69) | (0+52.00, 0.69) | 0.013                 |
| (0+52.00, 0.69) | (0+78.00, 0.13) | 0.016                 |
| (0+78.00, 0.13) | (0+79.50, 0.48) | 0.013                 |
| (0+79.50, 0.48) | (0+91.00, 0.72) | 0.020                 |

### Options

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

### Results

|                  |               |                 |
|------------------|---------------|-----------------|
| Normal Depth     | 0.40          | ft              |
| Elevation Range  | 0.00 to 1.32  | ft              |
| Flow Area        | 3.61          | ft <sup>2</sup> |
| Wetted Perimeter | 26.75         | ft              |
| Hydraulic Radius | 0.14          | ft              |
| Top Width        | 25.85         | ft              |
| Normal Depth     | 0.40          | ft              |
| Critical Depth   | 0.45          | ft              |
| Critical Slope   | 0.00674       | ft/ft           |
| Velocity         | 3.32          | ft/s            |
| Velocity Head    | 0.17          | ft              |
| Specific Energy  | 0.57          | ft              |
| Froude Number    | 1.57          |                 |
| Flow Type        | Supercritical |                 |

### GVF Input Data

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

---

## Worksheet for LC3 (100-yr)

---

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.40     | ft    |
| Critical Depth      | 0.45     | ft    |
| Channel Slope       | 1.75     | %     |
| Critical Slope      | 0.00674  | ft/ft |

## Cross Section for LC3 (100-yr)

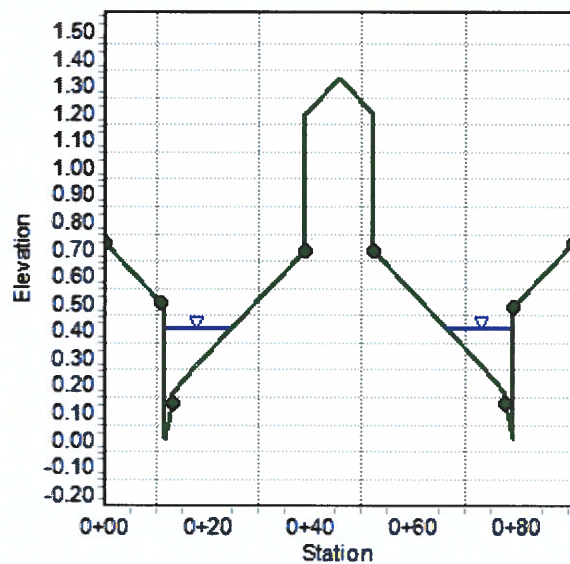
### Project Description

Friction Method                      Manning Formula  
Solve For                                Normal Depth

### Input Data

Channel Slope                                1.75    %  
Normal Depth                                0.40    ft  
Discharge                                    12.00   ft<sup>3</sup>/s

### Cross Section Image



## Worksheet for LC3 (10-yr)

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                                              1.75    %  
Discharge                                                 6.00    ft³/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00.00      | 0.72           |
| 0+11.00      | 0.50           |
| 0+11.50      | 0.48           |
| 0+11.50      | 0.00           |
| 0+13.00      | 0.13           |
| 0+13.00      | 0.17           |
| 0+18.00      | 0.27           |
| 0+39.00      | 0.69           |
| 0+39.00      | 1.19           |
| 0+45.50      | 1.32           |
| 0+52.00      | 1.19           |
| 0+52.00      | 0.69           |
| 0+73.00      | 0.27           |
| 0+78.00      | 0.17           |
| 0+78.00      | 0.13           |
| 0+79.50      | 0.00           |
| 0+79.50      | 0.48           |
| 0+80.00      | 0.50           |
| 0+91.00      | 0.72           |

### Roughness Segment Definitions

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+00.00, 0.72) | (0+11.00, 0.50) | 0.022                 |
| (0+11.00, 0.50) | (0+13.00, 0.13) | 0.013                 |



## Worksheet for LC3 (10-yr)

### Input Data

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+13.00, 0.13) | (0+39.00, 0.69) | 0.016                 |
| (0+39.00, 0.69) | (0+52.00, 0.69) | 0.013                 |
| (0+52.00, 0.69) | (0+78.00, 0.13) | 0.016                 |
| (0+78.00, 0.13) | (0+79.50, 0.48) | 0.013                 |
| (0+79.50, 0.48) | (0+91.00, 0.72) | 0.020                 |

### 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              |
| Elevation Range  | 0.00 to 1.32  | ft              |
| Flow Area        | 2.11          | ft <sup>2</sup> |
| Wetted Perimeter | 19.93         | ft              |
| Hydraulic Radius | 0.11          | ft              |
| Top Width        | 19.18         | ft              |
| Normal Depth     | 0.33          | ft              |
| Critical Depth   | 0.37          | ft              |
| Critical Slope   | 0.00728       | ft/ft           |
| Velocity         | 2.85          | ft/s            |
| Velocity Head    | 0.13          | ft              |
| Specific Energy  | 0.46          | ft              |
| Froude Number    | 1.51          |                 |
| Flow Type        | Supercritical |                 |

### GVF Input Data

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

---

## Worksheet for LC3 (10-yr)

---

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.33     | ft    |
| Critical Depth      | 0.37     | ft    |
| Channel Slope       | 1.75     | %     |
| Critical Slope      | 0.00728  | ft/ft |

## Project Description

### Manning Formula

**Normal Depth**

6.00 ft<sup>3</sup>/s

The graph shows a profile with the following approximate data points:

| Station | Elevation |
|---------|-----------|
| 0+00    | 0.75      |
| 0+10    | 0.50      |
| 0+15    | 0.15      |
| 0+40    | 0.70      |
| 0+45    | 1.30      |
| 0+50    | 1.20      |
| 0+55    | 0.70      |
| 0+75    | 0.50      |
| 0+80    | 0.15      |
| 0+90    | 0.75      |

## Project Description

### Manning Formula

### Normal Depth

## Section Definitions



## Worksheet for LC4 (100-yr)

### Input Data

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+13.00, 0.13) | (0+39.00, 0.69) | 0.016                 |
| (0+39.00, 0.69) | (0+52.00, 0.69) | 0.013                 |
| (0+52.00, 0.69) | (0+78.00, 0.13) | 0.016                 |
| (0+78.00, 0.13) | (0+79.50, 0.48) | 0.013                 |
| (0+79.50, 0.48) | (0+91.00, 0.72) | 0.020                 |

### 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              |
| Elevation Range  | 0.00 to 1.32  | ft              |
| Flow Area        | 2.08          | ft <sup>2</sup> |
| Wetted Perimeter | 19.75         | ft              |
| Hydraulic Radius | 0.11          | ft              |
| Top Width        | 19.00         | ft              |
| Normal Depth     | 0.33          | ft              |
| Critical Depth   | 0.42          | ft              |
| Critical Slope   | 0.00690       | ft/ft           |
| Velocity         | 4.34          | ft/s            |
| Velocity Head    | 0.29          | ft              |
| Specific Energy  | 0.62          | ft              |
| Froude Number    | 2.31          |                 |
| Flow Type        | Supercritical |                 |

### GVF Input Data

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

---

## Worksheet for LC4 (100-yr)

---

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.33     | ft    |
| Critical Depth      | 0.42     | ft    |
| Channel Slope       | 4.10     | %     |
| Critical Slope      | 0.00690  | ft/ft |



## Project Description

### Manning Formula

### Normal Depth

## Section Definitions



## Worksheet for LC4 (10-yr)

### Input Data

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+13.00, 0.13) | (0+39.00, 0.69) | 0.016                 |
| (0+39.00, 0.69) | (0+52.00, 0.69) | 0.013                 |
| (0+52.00, 0.69) | (0+78.00, 0.13) | 0.016                 |
| (0+78.00, 0.13) | (0+79.50, 0.48) | 0.013                 |
| (0+79.50, 0.48) | (0+91.00, 0.72) | 0.020                 |

### 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     | 0.25          | ft              |
| Elevation Range  | 0.00 to 1.32  | ft              |
| Flow Area        | 0.85          | ft <sup>2</sup> |
| Wetted Perimeter | 11.36         | ft              |
| Hydraulic Radius | 0.07          | ft              |
| Top Width        | 10.77         | ft              |
| Normal Depth     | 0.25          | ft              |
| Critical Depth   | 0.31          | ft              |
| Critical Slope   | 0.00760       | ft/ft           |
| Velocity         | 3.53          | ft/s            |
| Velocity Head    | 0.19          | ft              |
| Specific Energy  | 0.44          | ft              |
| Froude Number    | 2.21          |                 |
| Flow Type        | Supercritical |                 |

### GVF Input Data

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

---

## Worksheet for LC4 (10-yr)

---

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.25     | ft    |
| Critical Depth      | 0.31     | ft    |
| Channel Slope       | 4.10     | %     |
| Critical Slope      | 0.00760  | ft/ft |

## Project Description

### Manning Formula

### Normal Depth

3.00 ft<sup>3</sup>/s

The graph shows a profile with the following approximate data points:

| Station | Elevation |
|---------|-----------|
| 0+00    | 0.75      |
| 0+10    | 0.50      |
| 0+10    | 0.15      |
| 0+10    | 0.00      |
| 0+40    | 0.70      |
| 0+40    | 1.20      |
| 0+50    | 1.30      |
| 0+50    | 1.20      |
| 0+50    | 0.70      |
| 0+75    | 0.30      |
| 0+75    | 0.15      |
| 0+75    | 0.00      |
| 0+75    | 0.50      |
| 0+90    | 0.75      |

## Project Description

### Manning Formula

### Normal Depth

## Section Definitions



## Worksheet for LC5 (100-yr)

### Input Data

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+13.00, 0.13) | (0+39.00, 0.69) | 0.016                 |
| (0+39.00, 0.69) | (0+52.00, 0.69) | 0.013                 |
| (0+52.00, 0.69) | (0+78.00, 0.13) | 0.016                 |
| (0+78.00, 0.13) | (0+79.50, 0.48) | 0.013                 |
| (0+79.50, 0.48) | (0+91.00, 0.72) | 0.020                 |

### Options

|                                    |                     |
|------------------------------------|---------------------|
| Current roughness weighting Method | Pavlovskii's Method |
| Open Channel Weighting Method      | Pavlovskii's Method |
| Closed Channel Weighting Method    | Pavlovskii's Method |

### Results

|                  |               |                 |
|------------------|---------------|-----------------|
| Normal Depth     | 0.36          | ft              |
| Elevation Range  | 0.00 to 1.32  | ft              |
| Flow Area        | 2.77          | ft <sup>2</sup> |
| Wetted Perimeter | 23.17         | ft              |
| Hydraulic Radius | 0.12          | ft              |
| Top Width        | 22.35         | ft              |
| Normal Depth     | 0.36          | ft              |
| Critical Depth   | 0.44          | ft              |
| Critical Slope   | 0.00677       | ft/ft           |
| Velocity         | 3.97          | ft/s            |
| Velocity Head    | 0.25          | ft              |
| Specific Energy  | 0.61          | ft              |
| Froude Number    | 1.99          |                 |
| Flow Type        | Supercritical |                 |

### GVF Input Data

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

---

## Worksheet for LC5 (100-yr)

---

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.36     | ft    |
| Critical Depth      | 0.44     | ft    |
| Channel Slope       | 2.95     | %     |
| Critical Slope      | 0.00677  | ft/ft |

## Project Description

### Manning Formula

### Normal Depth

11.00 ft<sup>3</sup>/s

## Project Description

### Manning Formula

### Normal Depth

## Section Definitions



## Worksheet for LC5 (10-yr)

### Input Data

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+13.00, 0.13) | (0+39.00, 0.69) | 0.016                 |
| (0+39.00, 0.69) | (0+52.00, 0.69) | 0.013                 |
| (0+52.00, 0.69) | (0+78.00, 0.13) | 0.016                 |
| (0+78.00, 0.13) | (0+79.50, 0.48) | 0.013                 |
| (0+79.50, 0.48) | (0+91.00, 0.72) | 0.020                 |

### 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     | 0.28          | ft              |
| Elevation Range  | 0.00 to 1.32  | ft              |
| Flow Area        | 1.24          | ft <sup>2</sup> |
| Wetted Perimeter | 14.59         | ft              |
| Hydraulic Radius | 0.09          | ft              |
| Top Width        | 13.94         | ft              |
| Normal Depth     | 0.28          | ft              |
| Critical Depth   | 0.33          | ft              |
| Critical Slope   | 0.00751       | ft/ft           |
| Velocity         | 3.22          | ft/s            |
| Velocity Head    | 0.16          | ft              |
| Specific Energy  | 0.44          | ft              |
| Froude Number    | 1.90          |                 |
| Flow Type        | Supercritical |                 |

### GVF Input Data

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

---

## Worksheet for LC5 (10-yr)

---

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.28     | ft    |
| Critical Depth      | 0.33     | ft    |
| Channel Slope       | 2.95     | %     |
| Critical Slope      | 0.00751  | ft/ft |

## Project Description

### Manning Formula

### Normal Depth

4.00 ft<sup>3</sup>/s

Profile view graph showing Elevation (feet) versus Station (feet). The graph displays a proposed profile (solid line) and an existing profile (dashed line). The vertical axis is Elevation (feet) from -0.20 to 1.50. The horizontal axis is Station (feet) from 0+00 to 0+80. The proposed profile starts at 0.70 at station 0+00, drops to 0.50 at 0+10, rises to 0.70 at 0+40, peaks at 1.30 at 0+50, drops to 0.70 at 0+60, and ends at 0.70 at 0+80. The existing profile starts at 0.70 at station 0+00, drops to 0.10 at 0+10, rises to 0.70 at 0+40, drops to 0.10 at 0+50, and ends at 0.70 at 0+80. A blue line with a triangle symbol indicates a proposed grade change from 0.30 to 0.20 at station 0+10 and from 0.30 to 0.20 at station 0+70.

## Project Description

### Manning Formula

### Normal Depth

## Section Definitions



## Worksheet for LC6 (100-yr)

### Input Data

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+13.00, 0.13) | (0+39.00, 0.69) | 0.016                 |
| (0+39.00, 0.69) | (0+52.00, 0.69) | 0.013                 |
| (0+52.00, 0.69) | (0+78.00, 0.13) | 0.016                 |
| (0+78.00, 0.13) | (0+79.50, 0.48) | 0.013                 |
| (0+79.50, 0.48) | (0+91.00, 0.72) | 0.020                 |

### 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              |
| Elevation Range  | 0.00 to 1.32  | ft              |
| Flow Area        | 2.85          | ft <sup>2</sup> |
| Wetted Perimeter | 23.53         | ft              |
| Hydraulic Radius | 0.12          | ft              |
| Top Width        | 22.70         | ft              |
| Normal Depth     | 0.37          | ft              |
| Critical Depth   | 0.46          | ft              |
| Critical Slope   | 0.00663       | ft/ft           |
| Velocity         | 4.57          | ft/s            |
| Velocity Head    | 0.32          | ft              |
| Specific Energy  | 0.69          | ft              |
| Froude Number    | 2.27          |                 |
| Flow Type        | Supercritical |                 |

### GVF Input Data

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

---

## Worksheet for LC6 (100-yr)

---

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.37     | ft    |
| Critical Depth      | 0.46     | ft    |
| Channel Slope       | 3.83     | %     |
| Critical Slope      | 0.00663  | ft/ft |

## Project Description

### Manning Formula

### Normal Depth

|               |       |                    |
|---------------|-------|--------------------|
| Channel Slope | 3.83  | %                  |
| Normal Depth  | 0.37  | ft                 |
| Discharge     | 13.00 | ft <sup>3</sup> /s |

The graph shows a profile with the following approximate data points:

| Station | Elevation |
|---------|-----------|
| 0+00    | 0.70      |
| 0+10    | 0.50      |
| 0+20    | 0.30      |
| 0+30    | 0.10      |
| 0+40    | 0.70      |
| 0+50    | 1.30      |
| 0+60    | 0.70      |
| 0+70    | 0.50      |
| 0+80    | 0.70      |

## Project Description

### Manning Formula

### Normal Depth

## Section Definitions



## Worksheet for LC6 (10-yr)

### Input Data

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+13.00, 0.13) | (0+39.00, 0.69) | 0.016                 |
| (0+39.00, 0.69) | (0+52.00, 0.69) | 0.013                 |
| (0+52.00, 0.69) | (0+78.00, 0.13) | 0.016                 |
| (0+78.00, 0.13) | (0+79.50, 0.48) | 0.013                 |
| (0+79.50, 0.48) | (0+91.00, 0.72) | 0.020                 |

### Options

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

### Results

|                  |               |                 |
|------------------|---------------|-----------------|
| Normal Depth     | 0.29          | ft              |
| Elevation Range  | 0.00 to 1.32  | ft              |
| Flow Area        | 1.34          | ft <sup>2</sup> |
| Wetted Perimeter | 15.28         | ft              |
| Hydraulic Radius | 0.09          | ft              |
| Top Width        | 14.61         | ft              |
| Normal Depth     | 0.29          | ft              |
| Critical Depth   | 0.35          | ft              |
| Critical Slope   | 0.00732       | ft/ft           |
| Velocity         | 3.74          | ft/s            |
| Velocity Head    | 0.22          | ft              |
| Specific Energy  | 0.50          | ft              |
| Froude Number    | 2.18          |                 |
| Flow Type        | Supercritical |                 |

### GVF Input Data

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

---

## Worksheet for LC6 (10-yr)

---

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.29     | ft    |
| Critical Depth      | 0.35     | ft    |
| Channel Slope       | 3.83     | %     |
| Critical Slope      | 0.00732  | ft/ft |

## Cross Section for LC6 (10-yr)

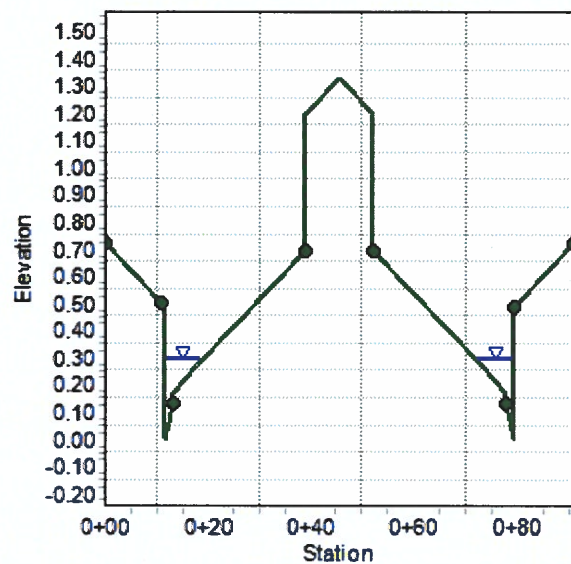
### Project Description

Friction Method                      Manning Formula  
Solve For                                Normal Depth

### Input Data

Channel Slope                                              3.83    %  
Normal Depth                                             0.29    ft  
Discharge                                                 5.00    ft<sup>3</sup>/s

### Cross Section Image



## Worksheet for LC7a: Half Street (100-yr)

### Project Description

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

### Input Data

|                     |      |                    |
|---------------------|------|--------------------|
| Channel Slope       | 3.83 | %                  |
| Discharge           | 5.50 | ft <sup>3</sup> /s |
| Section Definitions |      |                    |

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00.00      | 0.72           |
| 0+11.00      | 0.50           |
| 0+11.50      | 0.48           |
| 0+11.50      | 0.00           |
| 0+13.00      | 0.13           |
| 0+13.00      | 0.17           |
| 0+18.00      | 0.27           |
| 0+39.00      | 0.69           |
| 0+39.00      | 1.19           |
| 0+45.50      | 1.32           |

### Roughness Segment Definitions

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+00.00, 0.72) | (0+11.00, 0.50) | 0.022                 |
| (0+11.00, 0.50) | (0+13.00, 0.13) | 0.013                 |
| (0+13.00, 0.13) | (0+39.00, 0.69) | 0.016                 |
| (0+39.00, 0.69) | (0+45.50, 1.32) | 0.013                 |

### Options

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



## Worksheet for LC7a: Half Street (100-yr)

### Results

|                  |                 |         |                 |
|------------------|-----------------|---------|-----------------|
| Normal Depth     |                 | 0.35    | ft              |
| Elevation Range  | 0.00 to 1.32 ft |         |                 |
| Flow Area        |                 | 1.25    | ft <sup>2</sup> |
| Wetted Perimeter |                 | 10.95   | ft              |
| Hydraulic Radius |                 | 0.11    | ft              |
| Top Width        |                 | 10.55   | ft              |
| Normal Depth     |                 | 0.35    | ft              |
| Critical Depth   |                 | 0.44    | ft              |
| Critical Slope   |                 | 0.00675 | ft/ft           |
| Velocity         |                 | 4.40    | ft/s            |
| Velocity Head    |                 | 0.30    | ft              |
| Specific Energy  |                 | 0.65    | ft              |
| Froude Number    |                 | 2.26    |                 |
| Flow Type        | Supercritical   |         |                 |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.35     | ft    |
| Critical Depth      | 0.44     | ft    |
| Channel Slope       | 3.83     | %     |
| Critical Slope      | 0.00675  | ft/ft |

## Cross Section for LC7a: Half Street (100-yr)

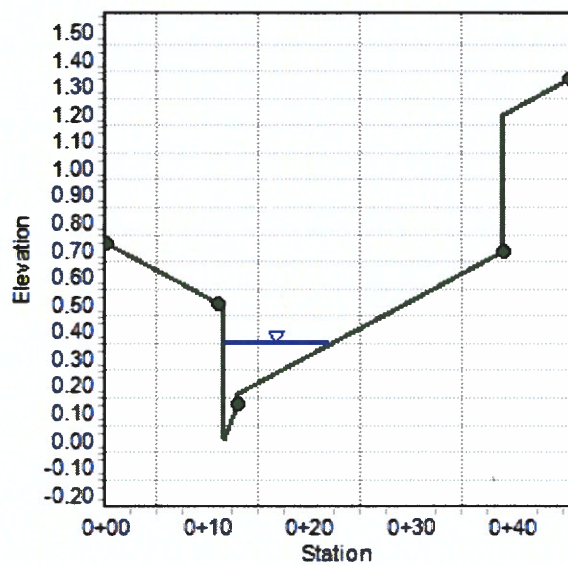
### Project Description

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

### Input Data

|               |      |                    |
|---------------|------|--------------------|
| Channel Slope | 3.83 | %                  |
| Normal Depth  | 0.35 | ft                 |
| Discharge     | 5.50 | ft <sup>3</sup> /s |

### Cross Section Image



## Project Description

### Input Data

Station (ft)

Elevation (ft)

|         |      |
|---------|------|
| 0+00.00 | 0.72 |
| 0+11.00 | 0.50 |
| 0+11.50 | 0.48 |
| 0+11.50 | 0.00 |
| 0+13.00 | 0.13 |
| 0+13.00 | 0.17 |
| 0+18.00 | 0.27 |
| 0+39.00 | 0.69 |
| 0+39.00 | 1.19 |
| 0+45.50 | 1.32 |

### Start Station

### Ending Station

### Roughness Coefficient

|                 |                 |       |
|-----------------|-----------------|-------|
| (0+00.00, 0.72) | (0+11.00, 0.50) | 0.022 |
| (0+11.00, 0.50) | (0+13.00, 0.13) | 0.013 |
| (0+13.00, 0.13) | (0+39.00, 0.69) | 0.016 |
| (0+39.00, 0.69) | (0+45.50, 1.32) | 0.013 |

## Options

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



## Worksheet for LC7a: Half Street (10-yr)

### Results

|                  |                 |         |                 |
|------------------|-----------------|---------|-----------------|
| Normal Depth     |                 | 0.27    | ft              |
| Elevation Range  | 0.00 to 1.32 ft |         |                 |
| Flow Area        |                 | 0.56    | ft <sup>2</sup> |
| Wetted Perimeter |                 | 6.82    | ft              |
| Hydraulic Radius |                 | 0.08    | ft              |
| Top Width        |                 | 6.50    | ft              |
| Normal Depth     |                 | 0.27    | ft              |
| Critical Depth   |                 | 0.33    | ft              |
| Critical Slope   |                 | 0.00747 | ft/ft           |
| Velocity         |                 | 3.59    | ft/s            |
| Velocity Head    |                 | 0.20    | ft              |
| Specific Energy  |                 | 0.47    | ft              |
| Froude Number    |                 | 2.16    |                 |
| Flow Type        | Supercritical   |         |                 |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.27     | ft    |
| Critical Depth      | 0.33     | ft    |
| Channel Slope       | 3.83     | %     |
| Critical Slope      | 0.00747  | ft/ft |



## Cross Section for LC7a: Half Street (10-yr)

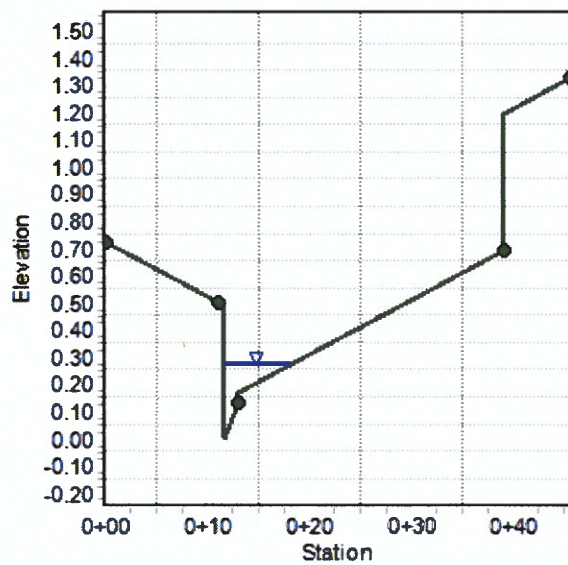
### Project Description

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

### Input Data

|               |      |                    |
|---------------|------|--------------------|
| Channel Slope | 3.83 | %                  |
| Normal Depth  | 0.27 | ft                 |
| Discharge     | 2.00 | ft <sup>3</sup> /s |

### Cross Section Image



## Worksheet for LC7b: Half Street (100-yr)

### Project Description

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

### Input Data

|                     |            |
|---------------------|------------|
| Channel Slope       | 3.75 %     |
| Discharge           | 7.50 ft³/s |
| Section Definitions |            |

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00.00      | 0.72           |
| 0+11.00      | 0.50           |
| 0+11.50      | 0.48           |
| 0+11.50      | 0.00           |
| 0+13.00      | 0.13           |
| 0+13.00      | 0.17           |
| 0+18.00      | 0.27           |
| 0+39.00      | 0.69           |
| 0+39.00      | 1.19           |
| 0+45.50      | 1.32           |

### Roughness Segment Definitions

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+00.00, 0.72) | (0+11.00, 0.50) | 0.022                 |
| (0+11.00, 0.50) | (0+13.00, 0.13) | 0.013                 |
| (0+13.00, 0.13) | (0+39.00, 0.69) | 0.016                 |
| (0+39.00, 0.69) | (0+45.50, 1.32) | 0.013                 |

### Options

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

## Worksheet for LC7b: Half Street (100-yr)

### Results

|                  |                 |         |                 |
|------------------|-----------------|---------|-----------------|
| Normal Depth     |                 | 0.38    | ft              |
| Elevation Range  | 0.00 to 1.32 ft |         |                 |
| Flow Area        |                 | 1.60    | ft <sup>2</sup> |
| Wetted Perimeter |                 | 12.54   | ft              |
| Hydraulic Radius |                 | 0.13    | ft              |
| Top Width        |                 | 12.11   | ft              |
| Normal Depth     |                 | 0.38    | ft              |
| Critical Depth   |                 | 0.49    | ft              |
| Critical Slope   |                 | 0.00653 | ft/ft           |
| Velocity         |                 | 4.68    | ft/s            |
| Velocity Head    |                 | 0.34    | ft              |
| Specific Energy  |                 | 0.72    | ft              |
| Froude Number    |                 | 2.27    |                 |
| Flow Type        | Supercritical   |         |                 |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.38     | ft    |
| Critical Depth      | 0.49     | ft    |
| Channel Slope       | 3.75     | %     |
| Critical Slope      | 0.00653  | ft/ft |



## Cross Section for LC7b: Half Street (100-yr)

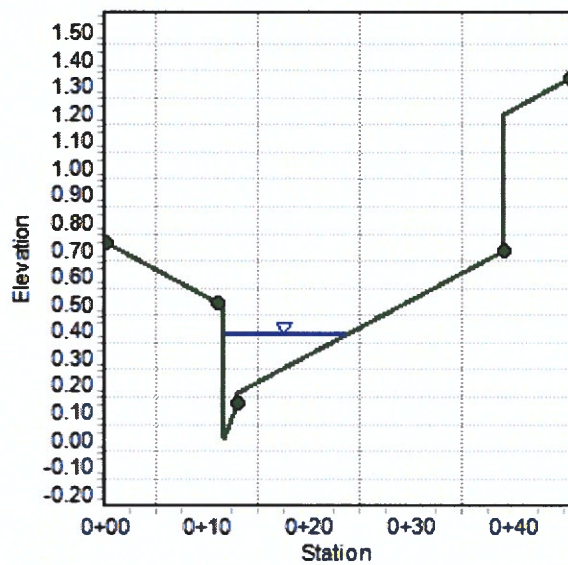
### Project Description

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

### Input Data

|               |                         |
|---------------|-------------------------|
| Channel Slope | 3.75 %                  |
| Normal Depth  | 0.38 ft                 |
| Discharge     | 7.50 ft <sup>3</sup> /s |

### Cross Section Image





## Worksheet for LC7b: Half Street (10-yr)

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                                              3.75    %  
Discharge                                                3.00    ft<sup>3</sup>/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00.00      | 0.72           |
| 0+11.00      | 0.50           |
| 0+11.50      | 0.48           |
| 0+11.50      | 0.00           |
| 0+13.00      | 0.13           |
| 0+13.00      | 0.17           |
| 0+18.00      | 0.27           |
| 0+39.00      | 0.69           |
| 0+39.00      | 1.19           |
| 0+45.50      | 1.32           |

### Roughness Segment Definitions

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+00.00, 0.72) | (0+11.00, 0.50) | 0.022                 |
| (0+11.00, 0.50) | (0+13.00, 0.13) | 0.013                 |
| (0+13.00, 0.13) | (0+39.00, 0.69) | 0.016                 |
| (0+39.00, 0.69) | (0+45.50, 1.32) | 0.013                 |

### Options

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

## Worksheet for LC7b: Half Street (10-yr)

### Results

|                  |               |         |       |
|------------------|---------------|---------|-------|
| Normal Depth     |               | 0.30    | ft    |
| Elevation Range  | 0.00 to 1.32  | ft      |       |
| Flow Area        |               | 0.78    | ft²   |
| Wetted Perimeter |               | 8.39    | ft    |
| Hydraulic Radius |               | 0.09    | ft    |
| Top Width        |               | 8.04    | ft    |
| Normal Depth     |               | 0.30    | ft    |
| Critical Depth   |               | 0.37    | ft    |
| Critical Slope   |               | 0.00720 | ft/ft |
| Velocity         |               | 3.84    | ft/s  |
| Velocity Head    |               | 0.23    | ft    |
| Specific Energy  |               | 0.53    | ft    |
| Froude Number    |               | 2.17    |       |
| Flow Type        | Supercritical |         |       |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.30     | ft    |
| Critical Depth      | 0.37     | ft    |
| Channel Slope       | 3.75     | %     |
| Critical Slope      | 0.00720  | ft/ft |







North Connector Road (Sunbridge Pointe Drive)



## Worksheet for NC2: Half Street (100-yr)

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                                              2.06    %  
Discharge                                                 3.00    ft³/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00.00      | 0.50           |
| 0+00.50      | 0.48           |
| 0+00.50      | 0.00           |
| 0+02.00      | 0.13           |
| 0+02.00      | 0.17           |
| 0+07.00      | 0.27           |
| 0+27.00      | 0.67           |
| 0+27.00      | 1.17           |
| 0+33.50      | 1.30           |
| 0+40.00      | 1.17           |
| 0+40.00      | 0.67           |
| 0+60.00      | 0.27           |
| 0+65.00      | 0.17           |
| 0+65.00      | 0.13           |
| 0+66.50      | 0.00           |
| 0+66.50      | 0.48           |
| 0+67.00      | 0.50           |

### Roughness Segment Definitions

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013                 |
| (0+02.00, 0.13) | (0+27.00, 0.67) | 0.016                 |
| (0+27.00, 0.67) | (0+40.00, 0.67) | 0.013                 |
| (0+40.00, 0.67) | (0+65.00, 0.13) | 0.016                 |

## Worksheet for NC2: Half Street (100-yr)

### Input Data

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+65.00, 0.13) | (0+67.00, 0.50) | 0.013                 |

### Options

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

### Results

|                  |               |                 |
|------------------|---------------|-----------------|
| Normal Depth     | 0.27          | ft              |
| Elevation Range  | 0.00 to 1.30  | ft              |
| Flow Area        | 1.14          | ft <sup>2</sup> |
| Wetted Perimeter | 13.80         | ft              |
| Hydraulic Radius | 0.08          | ft              |
| Top Width        | 13.16         | ft              |
| Normal Depth     | 0.27          | ft              |
| Critical Depth   | 0.31          | ft              |
| Critical Slope   | 0.00775       | ft/ft           |
| Velocity         | 2.64          | ft/s            |
| Velocity Head    | 0.11          | ft              |
| Specific Energy  | 0.38          | ft              |
| Froude Number    | 1.58          |                 |
| Flow Type        | Supercritical |                 |

### GVF Input Data

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

### GVF Output Data

|                     |          |      |
|---------------------|----------|------|
| Upstream Depth      | 0.00     | ft   |
| Profile Description |          |      |
| Profile Headloss    | 0.00     | ft   |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity   | Infinity | ft/s |
| Normal Depth        | 0.27     | ft   |
| Critical Depth      | 0.31     | ft   |

---

**Worksheet for NC2: Half Street (100-yr)**

---

**GVF Output Data**

|                |         |       |
|----------------|---------|-------|
| Channel Slope  | 2.06    | %     |
| Critical Slope | 0.00775 | ft/ft |

## Cross Section for NC2: Half Street (100-yr)

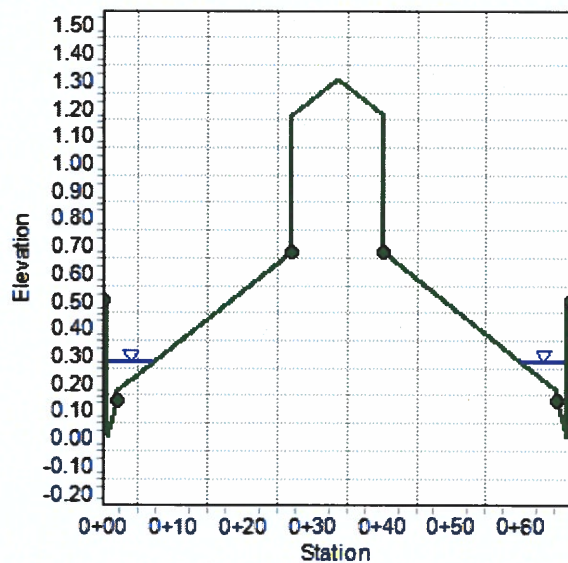
### Project Description

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

### Input Data

|               |      |                    |
|---------------|------|--------------------|
| Channel Slope | 2.06 | %                  |
| Normal Depth  | 0.27 | ft                 |
| Discharge     | 3.00 | ft <sup>3</sup> /s |

### Cross Section Image





Ft Apache Road / Skye Canyon Park Drive (Sun Park Drive)

## Worksheet for SC1: Half Street (100-yr)

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                                              0.46    %  
Discharge                                                5.00    ft<sup>3</sup>/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00.00      | 0.50           |
| 0+00.50      | 0.48           |
| 0+00.50      | 0.00           |
| 0+02.00      | 0.13           |
| 0+02.00      | 0.17           |
| 0+07.00      | 0.27           |
| 0+45.50      | 0.94           |

### Roughness Segment Definitions

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013                 |
| (0+02.00, 0.13) | (0+45.50, 0.94) | 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  
Elevation Range                                              0.00 to 0.94 ft  
Flow Area                                                      2.71    ft<sup>2</sup>  
Wetted Perimeter                                              17.51    ft  
Hydraulic Radius                                              0.15    ft

## Worksheet for SC1: Half Street (100-yr)

### Results

|                 |             |       |
|-----------------|-------------|-------|
| Top Width       | 17.01       | ft    |
| Normal Depth    | 0.45        | ft    |
| Critical Depth  | 0.43        | ft    |
| Critical Slope  | 0.00707     | ft/ft |
| Velocity        | 1.85        | ft/s  |
| Velocity Head   | 0.05        | ft    |
| Specific Energy | 0.51        | ft    |
| Froude Number   | 0.82        |       |
| Flow Type       | Subcritical |       |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.45     | ft    |
| Critical Depth      | 0.43     | ft    |
| Channel Slope       | 0.46     | %     |
| Critical Slope      | 0.00707  | ft/ft |



## Cross Section for SC1: Half Street (100-yr)

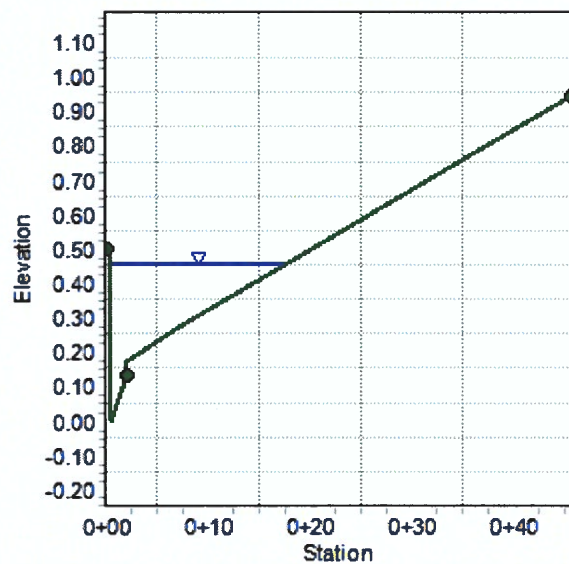
### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                              0.46 %  
Normal Depth                              0.45 ft  
Discharge                                  5.00 ft<sup>3</sup>/s

### Cross Section Image





## Worksheet for SC1: Half Street (10-yr)

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                                              0.46    %  
Discharge                                                 3.00    ft³/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00.00      | 0.50           |
| 0+00.50      | 0.48           |
| 0+00.50      | 0.00           |
| 0+02.00      | 0.13           |
| 0+02.00      | 0.17           |
| 0+07.00      | 0.27           |
| 0+45.50      | 0.94           |

### Roughness Segment Definitions

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013                 |
| (0+02.00, 0.13) | (0+45.50, 0.94) | 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  
Elevation Range                                              0.00 to 0.94 ft  
Flow Area                                                      1.83    ft²  
Wetted Perimeter                                              14.16    ft  
Hydraulic Radius                                              0.13    ft

---

## Worksheet for SC1: Half Street (10-yr)

---

### Results

|                 |             |       |
|-----------------|-------------|-------|
| Top Width       | 13.71       | ft    |
| Normal Depth    | 0.40        | ft    |
| Critical Depth  | 0.37        | ft    |
| Critical Slope  | 0.00749     | ft/ft |
| Velocity        | 1.64        | ft/s  |
| Velocity Head   | 0.04        | ft    |
| Specific Energy | 0.44        | ft    |
| Froude Number   | 0.79        |       |
| Flow Type       | Subcritical |       |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.40     | ft    |
| Critical Depth      | 0.37     | ft    |
| Channel Slope       | 0.46     | %     |
| Critical Slope      | 0.00749  | ft/ft |

## Cross Section for SC1: Half Street (10-yr)

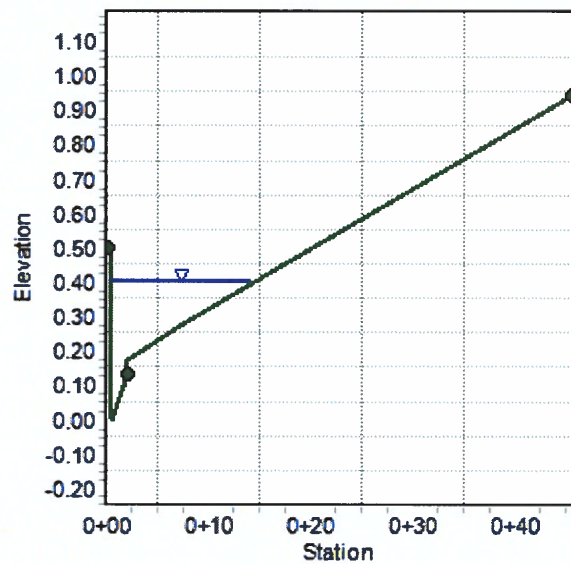
### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                              0.46 %  
Normal Depth                              0.40 ft  
Discharge                                  3.00 ft<sup>3</sup>/s

### Cross Section Image



## Worksheet for SC2: Half Street (100-yr)

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                                              0.46    %  
Discharge                                                14.50   ft<sup>3</sup>/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00.00      | 0.50           |
| 0+00.50      | 0.48           |
| 0+00.50      | 0.00           |
| 0+02.00      | 0.13           |
| 0+02.00      | 0.17           |
| 0+07.00      | 0.27           |
| 0+45.50      | 0.94           |

### Roughness Segment Definitions

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013                 |
| (0+02.00, 0.13) | (0+45.50, 0.94) | 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                                              0.61    ft  
Elevation Range                                              0.00 to 0.94 ft  
Flow Area                                                      6.11    ft<sup>2</sup>  
Wetted Perimeter                                              27.09   ft  
Hydraulic Radius                                              0.23    ft



## Worksheet for SC2: Half Street (100-yr)

### Results

|                 |             |       |
|-----------------|-------------|-------|
| Top Width       | 26.45       | ft    |
| Normal Depth    | 0.61        | ft    |
| Critical Depth  | 0.58        | ft    |
| Critical Slope  | 0.00619     | ft/ft |
| Velocity        | 2.37        | ft/s  |
| Velocity Head   | 0.09        | ft    |
| Specific Energy | 0.70        | ft    |
| Froude Number   | 0.87        |       |
| Flow Type       | Subcritical |       |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.61     | ft    |
| Critical Depth      | 0.58     | ft    |
| Channel Slope       | 0.46     | %     |
| Critical Slope      | 0.00619  | ft/ft |

## Cross Section for SC2: Half Street (100-yr)

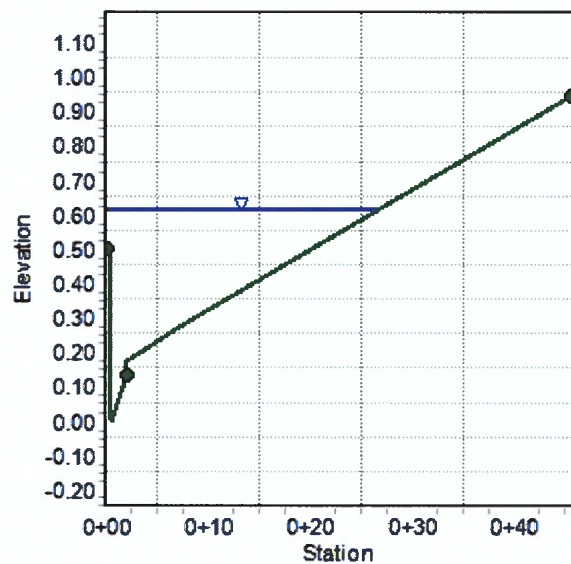
### Project Description

Friction Method                      Manning Formula  
Solve For                                Normal Depth

### Input Data

Channel Slope                                              0.46 %  
Normal Depth                                              0.61 ft  
Discharge                                                  14.50 ft<sup>3</sup>/s

### Cross Section Image



## Worksheet for SC3: Half Street (100-yr)

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                                              0.22    %  
Discharge                                                3.00    ft<sup>3</sup>/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00.00      | 0.50           |
| 0+00.50      | 0.48           |
| 0+00.50      | 0.00           |
| 0+02.00      | 0.13           |
| 0+02.00      | 0.17           |
| 0+07.00      | 0.27           |
| 0+45.50      | 0.94           |

### Roughness Segment Definitions

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013                 |
| (0+02.00, 0.13) | (0+45.50, 0.94) | 0.016                 |

### Options

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

### Results

Normal Depth                                              0.44    ft  
Elevation Range                                              0.00 to 0.94 ft  
Flow Area                                                      2.43    ft<sup>2</sup>  
Wetted Perimeter                                              16.51    ft  
Hydraulic Radius                                              0.15    ft

## Worksheet for SC3: Half Street (100-yr)

### Results

|                 |             |       |
|-----------------|-------------|-------|
| Top Width       | 16.03       | ft    |
| Normal Depth    | 0.44        | ft    |
| Critical Depth  | 0.37        | ft    |
| Critical Slope  | 0.00754     | ft/ft |
| Velocity        | 1.24        | ft/s  |
| Velocity Head   | 0.02        | ft    |
| Specific Energy | 0.46        | ft    |
| Froude Number   | 0.56        |       |
| Flow Type       | Subcritical |       |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.44     | ft    |
| Critical Depth      | 0.37     | ft    |
| Channel Slope       | 0.22     | %     |
| Critical Slope      | 0.00754  | ft/ft |



## Cross Section for SC3: Half Street (100-yr)

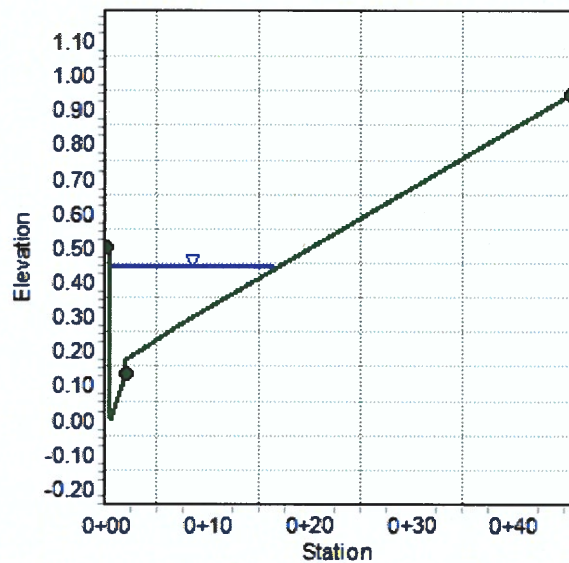
### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                              0.22    %  
Normal Depth                              0.44    ft  
Discharge                                  3.00    ft<sup>3</sup>/s

### Cross Section Image



## Worksheet for SC3: Half Street (10-yr)

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                                              0.22    %  
Discharge                                                1.00    ft<sup>3</sup>/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00.00      | 0.50           |
| 0+00.50      | 0.48           |
| 0+00.50      | 0.00           |
| 0+02.00      | 0.13           |
| 0+02.00      | 0.17           |
| 0+07.00      | 0.27           |
| 0+45.50      | 0.94           |

### Roughness Segment Definitions

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013                 |
| (0+02.00, 0.13) | (0+45.50, 0.94) | 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  
Elevation Range                                              0.00 to 0.94 ft  
Flow Area                                                      1.03    ft<sup>2</sup>  
Wetted Perimeter                                              10.17    ft  
Hydraulic Radius                                              0.10    ft

## Worksheet for SC3: Half Street (10-yr)

### Results

|                 |             |       |
|-----------------|-------------|-------|
| Top Width       | 9.80        | ft    |
| Normal Depth    | 0.33        | ft    |
| Critical Depth  | 0.28        | ft    |
| Critical Slope  | 0.00840     | ft/ft |
| Velocity        | 0.98        | ft/s  |
| Velocity Head   | 0.01        | ft    |
| Specific Energy | 0.34        | ft    |
| Froude Number   | 0.53        |       |
| Flow Type       | Subcritical |       |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.33     | ft    |
| Critical Depth      | 0.28     | ft    |
| Channel Slope       | 0.22     | %     |
| Critical Slope      | 0.00840  | ft/ft |

## Cross Section for SC3: Half Street (10-yr)

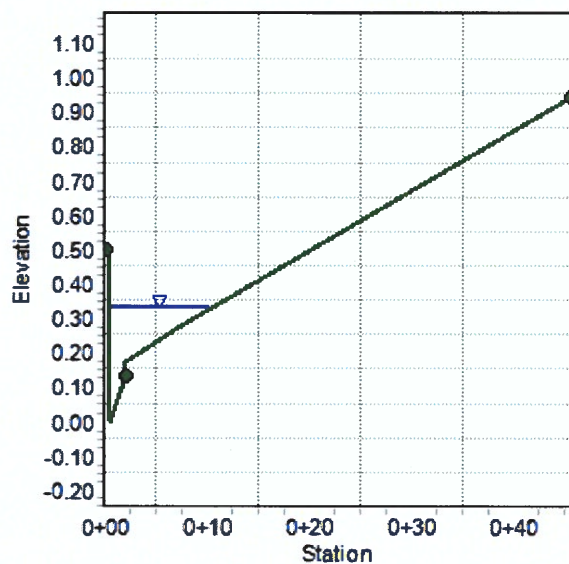
### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                              0.22    %  
Normal Depth                              0.33    ft  
Discharge                                  1.00    ft<sup>3</sup>/s

### Cross Section Image





## Worksheet for SC4: Half Street (100-yr)

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                                              0.65    %  
Discharge                                                 2.00    ft<sup>3</sup>/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00.00      | 0.50           |
| 0+00.50      | 0.48           |
| 0+00.50      | 0.00           |
| 0+02.00      | 0.13           |
| 0+02.00      | 0.17           |
| 0+07.00      | 0.27           |
| 0+45.50      | 0.94           |

### Roughness Segment Definitions

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013                 |
| (0+02.00, 0.13) | (0+45.50, 0.94) | 0.016                 |

### Options

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

### Results

Normal Depth                                              0.34    ft  
Elevation Range                                              0.00 to 0.94 ft  
Flow Area                                                      1.16    ft<sup>2</sup>  
Wetted Perimeter                                              10.94    ft  
Hydraulic Radius                                              0.11    ft

## Worksheet for SC4: Half Street (100-yr)

### Results

|                 |             |       |
|-----------------|-------------|-------|
| Top Width       | 10.55       | ft    |
| Normal Depth    | 0.34        | ft    |
| Critical Depth  | 0.33        | ft    |
| Critical Slope  | 0.00778     | ft/ft |
| Velocity        | 1.73        | ft/s  |
| Velocity Head   | 0.05        | ft    |
| Specific Energy | 0.39        | ft    |
| Froude Number   | 0.92        |       |
| Flow Type       | Subcritical |       |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.34     | ft    |
| Critical Depth      | 0.33     | ft    |
| Channel Slope       | 0.65     | %     |
| Critical Slope      | 0.00778  | ft/ft |

## Cross Section for SC4: Half Street (100-yr)

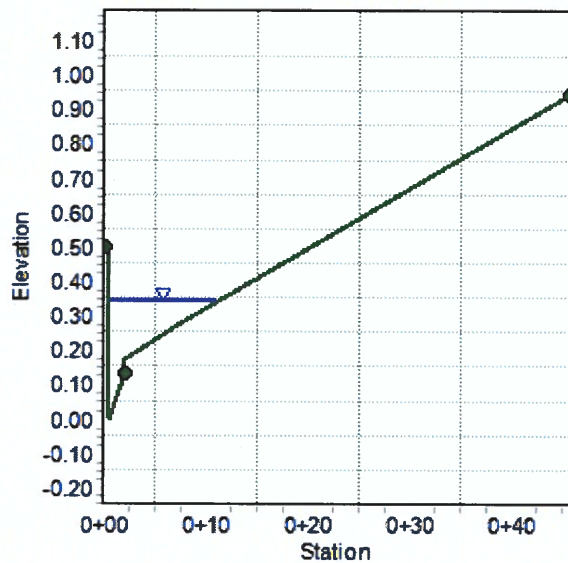
### Project Description

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

### Input Data

|               |      |                    |
|---------------|------|--------------------|
| Channel Slope | 0.65 | %                  |
| Normal Depth  | 0.34 | ft                 |
| Discharge     | 2.00 | ft <sup>3</sup> /s |

### Cross Section Image



## Worksheet for SC4: Half Street (10-yr)

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                                              0.65    %  
Discharge                                                1.00    ft<sup>3</sup>/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00.00      | 0.50           |
| 0+00.50      | 0.48           |
| 0+00.50      | 0.00           |
| 0+02.00      | 0.13           |
| 0+02.00      | 0.17           |
| 0+07.00      | 0.27           |
| 0+45.50      | 0.94           |

### Roughness Segment Definitions

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013                 |
| (0+02.00, 0.13) | (0+45.50, 0.94) | 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                                              0.28    ft  
Elevation Range                                              0.00 to 0.94 ft  
Flow Area                                                      0.66    ft<sup>2</sup>  
Wetted Perimeter                                              7.68    ft  
Hydraulic Radius                                              0.09    ft



## Worksheet for SC4: Half Street (10-yr)

### Results

|                 |             |       |
|-----------------|-------------|-------|
| Top Width       | 7.35        | ft    |
| Normal Depth    | 0.28        | ft    |
| Critical Depth  | 0.28        | ft    |
| Critical Slope  | 0.00823     | ft/ft |
| Velocity        | 1.52        | ft/s  |
| Velocity Head   | 0.04        | ft    |
| Specific Energy | 0.32        | ft    |
| Froude Number   | 0.89        |       |
| Flow Type       | Subcritical |       |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.28     | ft    |
| Critical Depth      | 0.28     | ft    |
| Channel Slope       | 0.65     | %     |
| Critical Slope      | 0.00823  | ft/ft |

## Project Description

### Manning Formula

### Normal Depth

|               |      |                    |
|---------------|------|--------------------|
| Channel Slope | 0.65 | %                  |
| Normal Depth  | 0.28 | ft                 |
| Discharge     | 1.00 | ft <sup>3</sup> /s |



O'Hare Road

---

## Worksheet for OH1

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                                              2.63    %  
Discharge                                                70.00   ft<sup>3</sup>/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00.00      | 0.50           |
| 0+00.50      | 0.48           |
| 0+00.50      | 0.00           |
| 0+02.00      | 0.13           |
| 0+02.00      | 0.17           |
| 0+07.00      | 0.27           |
| 0+21.50      | 0.56           |
| 0+36.00      | 0.27           |
| 0+41.00      | 0.17           |
| 0+41.00      | 0.13           |
| 0+42.50      | 0.00           |
| 0+42.50      | 0.48           |
| 0+43.00      | 0.50           |

### Roughness Segment Definitions

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013                 |
| (0+02.00, 0.13) | (0+41.00, 0.13) | 0.016                 |
| (0+41.00, 0.13) | (0+43.00, 0.50) | 0.013                 |

### Options

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



## Worksheet for OH1

### Results

|                  |                 |         |                 |
|------------------|-----------------|---------|-----------------|
| Normal Depth     |                 | 0.61    | ft              |
| Elevation Range  | 0.00 to 0.56 ft |         |                 |
| Flow Area        |                 | 11.31   | ft <sup>2</sup> |
| Wetted Perimeter |                 | 44.28   | ft              |
| Hydraulic Radius |                 | 0.26    | ft              |
| Top Width        |                 | 43.00   | ft              |
| Normal Depth     |                 | 0.61    | ft              |
| Critical Depth   |                 | 0.78    | ft              |
| Critical Slope   |                 | 0.00497 | ft/ft           |
| Velocity         |                 | 6.19    | ft/s            |
| Velocity Head    |                 | 0.60    | ft              |
| Specific Energy  |                 | 1.21    | ft              |
| Froude Number    |                 | 2.13    |                 |
| Flow Type        | Supercritical   |         |                 |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.61     | ft    |
| Critical Depth      | 0.78     | ft    |
| Channel Slope       | 2.63     | %     |
| Critical Slope      | 0.00497  | ft/ft |

### Messages

#### Notes

Q100 = EPI2+EPG+EOHR1(a)

## Cross Section for OH1

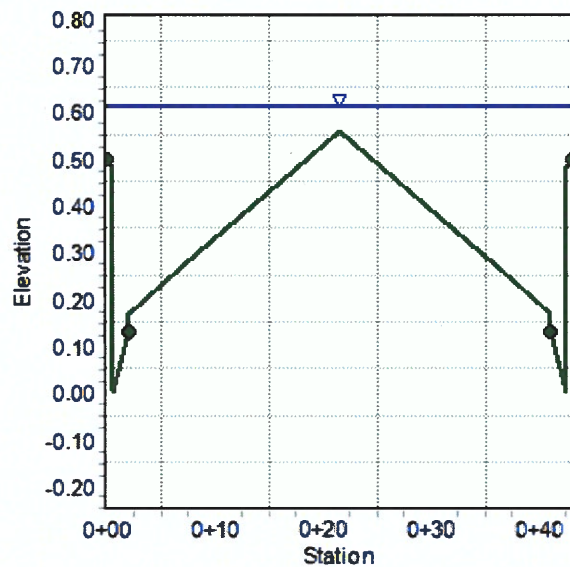
### Project Description

Friction Method                      Manning Formula  
Solve For                                Normal Depth

### Input Data

Channel Slope                                              2.63    %  
Normal Depth                                              0.61    ft  
Discharge                                                  70.00   ft<sup>3</sup>/s

### Cross Section Image



## Worksheet for OH2

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                              4.37    %  
Discharge                                  39.00   ft³/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00.00      | 0.50           |
| 0+00.50      | 0.48           |
| 0+00.50      | 0.00           |
| 0+02.00      | 0.13           |
| 0+02.00      | 0.17           |
| 0+07.00      | 0.27           |
| 0+21.50      | 0.56           |
| 0+36.00      | 0.27           |
| 0+41.00      | 0.17           |
| 0+41.00      | 0.13           |
| 0+42.50      | 0.00           |
| 0+42.50      | 0.48           |
| 0+43.00      | 0.50           |

### Roughness Segment Definitions

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013                 |
| (0+02.00, 0.13) | (0+41.00, 0.13) | 0.016                 |
| (0+41.00, 0.13) | (0+43.00, 0.50) | 0.013                 |

### Options

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

## Worksheet for OH2

### Results

|                  |                 |         |       |
|------------------|-----------------|---------|-------|
| Normal Depth     |                 | 0.49    | ft    |
| Elevation Range  | 0.00 to 0.56 ft |         |       |
| Flow Area        |                 | 6.31    | ft²   |
| Wetted Perimeter |                 | 36.18   | ft    |
| Hydraulic Radius |                 | 0.17    | ft    |
| Top Width        |                 | 35.12   | ft    |
| Normal Depth     |                 | 0.49    | ft    |
| Critical Depth   |                 | 0.64    | ft    |
| Critical Slope   |                 | 0.00560 | ft/ft |
| Velocity         |                 | 6.18    | ft/s  |
| Velocity Head    |                 | 0.59    | ft    |
| Specific Energy  |                 | 1.08    | ft    |
| Froude Number    |                 | 2.57    |       |
| Flow Type        | Supercritical   |         |       |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.49     | ft    |
| Critical Depth      | 0.64     | ft    |
| Channel Slope       | 4.37     | %     |
| Critical Slope      | 0.00560  | ft/ft |

### Messages

#### Notes

Q100 = Combined Bypass from OH1 Drop Inlets + EOHR1(b)



## Cross Section for OH2

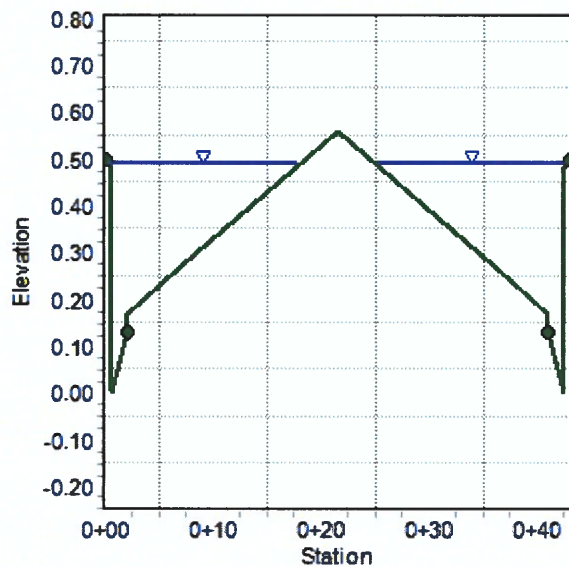
### Project Description

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

### Input Data

|               |       |                    |
|---------------|-------|--------------------|
| Channel Slope | 4.37  | %                  |
| Normal Depth  | 0.49  | ft                 |
| Discharge     | 39.00 | ft <sup>3</sup> /s |

### Cross Section Image



## Worksheet for OH3

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                                              3.76    %  
Discharge                                                36.00   ft³/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00.00      | 0.50           |
| 0+00.50      | 0.48           |
| 0+00.50      | 0.00           |
| 0+02.00      | 0.13           |
| 0+02.00      | 0.17           |
| 0+07.00      | 0.27           |
| 0+21.50      | 0.56           |
| 0+36.00      | 0.27           |
| 0+41.00      | 0.17           |
| 0+41.00      | 0.13           |
| 0+42.50      | 0.00           |
| 0+42.50      | 0.48           |
| 0+43.00      | 0.50           |

### Roughness Segment Definitions

| Start Station   | Ending Station  | Roughness Coefficient |
|-----------------|-----------------|-----------------------|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013                 |
| (0+02.00, 0.13) | (0+41.00, 0.13) | 0.016                 |
| (0+41.00, 0.13) | (0+43.00, 0.50) | 0.013                 |

### Options

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

## Worksheet for OH3

### Results

|                  |                 |         |                 |
|------------------|-----------------|---------|-----------------|
| Normal Depth     |                 | 0.49    | ft              |
| Elevation Range  | 0.00 to 0.56 ft |         |                 |
| Flow Area        |                 | 6.28    | ft <sup>2</sup> |
| Wetted Perimeter |                 | 36.07   | ft              |
| Hydraulic Radius |                 | 0.17    | ft              |
| Top Width        |                 | 35.02   | ft              |
| Normal Depth     |                 | 0.49    | ft              |
| Critical Depth   |                 | 0.63    | ft              |
| Critical Slope   |                 | 0.00570 | ft/ft           |
| Velocity         |                 | 5.73    | ft/s            |
| Velocity Head    |                 | 0.51    | ft              |
| Specific Energy  |                 | 1.00    | ft              |
| Froude Number    |                 | 2.38    |                 |
| Flow Type        | Supercritical   |         |                 |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.49     | ft    |
| Critical Depth      | 0.63     | ft    |
| Channel Slope       | 3.76     | %     |
| Critical Slope      | 0.00570  | ft/ft |

## Cross Section for OH3

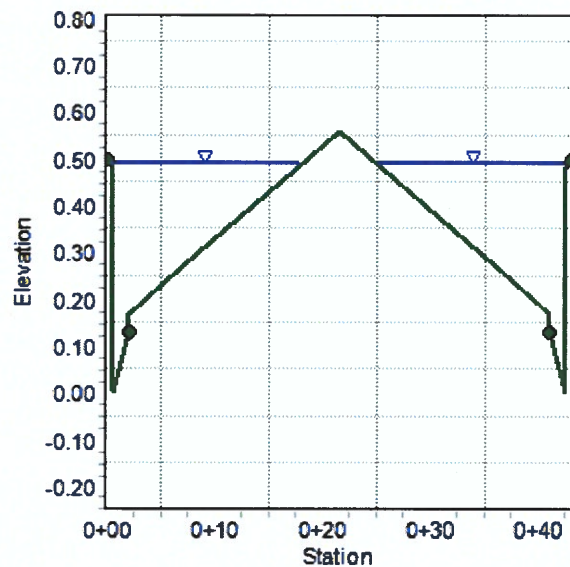
### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                              3.76 %  
Normal Depth                              0.49 ft  
Discharge                                  36.00 ft<sup>3</sup>/s

### Cross Section Image





## Drop Inlet Computations



| Curb Inlet Sizing Computation                                                                                                                                                                           |  |                                                                                                                                                              |                               | <br>SLATER HANIFAN GROUP<br>CONSULTING ENGINEERS & PLANNERS |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Project Name & Number:                                                                                                                                                                                  |  | EST1905-000: SUNSTONE PHASE 1                                                                                                                                |                               |                                                                                                                                                |  |
| Date:                                                                                                                                                                                                   |  | 4/25/2019                                                                                                                                                    |                               |                                                                                                                                                |  |
| By:                                                                                                                                                                                                     |  | CAA                                                                                                                                                          |                               |                                                                                                                                                |  |
| <b>Notes:</b><br>Facility ID: LC1<br>Source of Flow: Q100 (Pro): 1/2 OF ELOG1(a)<br>Q10 (Pro): 1/2 OF ELOG1(a)<br>Inlet Type: Type CM2 (Continuous Grade)<br>Inlet Length: 5.-ft<br>Number of Grates: 1 |  |                                                                                                                                                              |                               |                                                                                                                                                |  |
| <b>Input:</b>                                                                                                                                                                                           |  | <b>Variable:</b>                                                                                                                                             | <b>Q100 (Pro): Q10 (Pro):</b> |                                                                                                                                                |  |
| Street Flow (cfs)                                                                                                                                                                                       |  | Q                                                                                                                                                            | 5.0                           | 2.5                                                                                                                                            |  |
| Longitudinal Slope (ft/ft)                                                                                                                                                                              |  | S <sub>o</sub>                                                                                                                                               | 0.0406                        |                                                                                                                                                |  |
| Manning's Coefficient                                                                                                                                                                                   |  | n                                                                                                                                                            | 0.016                         |                                                                                                                                                |  |
| Street Flow Velocity (fps)                                                                                                                                                                              |  | V                                                                                                                                                            | 4.41                          | 3.83                                                                                                                                           |  |
| Street Flow Depth (ft)                                                                                                                                                                                  |  | D                                                                                                                                                            | 0.34                          | 0.28                                                                                                                                           |  |
| Street Cross Slope (ft/ft)                                                                                                                                                                              |  | S <sub>x</sub>                                                                                                                                               | 0.02                          |                                                                                                                                                |  |
| Grate Width (ft)                                                                                                                                                                                        |  | W                                                                                                                                                            | 1.5                           |                                                                                                                                                |  |
| Grate Depression (in)                                                                                                                                                                                   |  | D <sub>g</sub>                                                                                                                                               | 2.0                           |                                                                                                                                                |  |
| Length of Grate (ft)                                                                                                                                                                                    |  | L <sub>g</sub>                                                                                                                                               | 2.5                           |                                                                                                                                                |  |
| Length of Curb Opening (ft)                                                                                                                                                                             |  | L <sub>c</sub>                                                                                                                                               | 5.00                          |                                                                                                                                                |  |
| Clogging Factor - Grate (%)                                                                                                                                                                             |  | CF <sub>g</sub>                                                                                                                                              | 50%                           |                                                                                                                                                |  |
| Clogging Factor - Curb (%)                                                                                                                                                                              |  | CF <sub>c</sub>                                                                                                                                              | 50%                           |                                                                                                                                                |  |
| Effective Grate Length (ft)                                                                                                                                                                             |  | L <sub>ge</sub>                                                                                                                                              | 1.3                           |                                                                                                                                                |  |
| Effective Curb Opening Length (ft)                                                                                                                                                                      |  | L <sub>ce</sub>                                                                                                                                              | 2.50                          |                                                                                                                                                |  |
| <b>Output (Grate):</b>                                                                                                                                                                                  |  | <b>Equation:</b>                                                                                                                                             | <b>Output (Grate):</b>        |                                                                                                                                                |  |
| <sup>1</sup> R <sub>f</sub> - Frontal Flow Factor                                                                                                                                                       |  | 1-0.09*(V-V <sub>x</sub> ) if V>V <sub>x</sub> ; else Frontal Flow Factor=1                                                                                  | 1.00                          | 1.00                                                                                                                                           |  |
| <sup>2</sup> V <sub>o</sub> - Splash Over Velocity (fps)                                                                                                                                                |  | V <sub>x</sub> =p+q*L <sub>g</sub> -r*L <sub>ge</sub> <sup>2</sup> +sy*L <sub>ge</sub> <sup>3</sup> ; where<br>p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate) | 4.61                          |                                                                                                                                                |  |
| <sup>1</sup> E - Grate Flow Ratio                                                                                                                                                                       |  | Frontal Flow/Side Flow                                                                                                                                       | 0.40                          | 0.56                                                                                                                                           |  |
| <sup>2</sup> Q <sub>w</sub> - Frontal Flow (cfs)                                                                                                                                                        |  | Q <sub>w</sub> = Q[1-(1-(W/T)) <sup>2.67</sup> ]                                                                                                             | 1.99                          | 1.40                                                                                                                                           |  |
| <sup>1</sup> Q <sub>s</sub> - Side Flow (cfs)                                                                                                                                                           |  | Q <sub>s</sub> = Q-Q <sub>w</sub>                                                                                                                            | 3.0                           | 1.1                                                                                                                                            |  |
| <sup>1</sup> T - Side Flow Spread (ft)                                                                                                                                                                  |  | (D-D <sub>g</sub> )/S <sub>x</sub>                                                                                                                           | 8.67                          | 5.67                                                                                                                                           |  |
| <sup>1</sup> R <sub>s</sub> - Side Flow Factor                                                                                                                                                          |  | 1/(1+(0.15*V <sup>1.8</sup> )/(S <sub>x</sub> *L <sub>ge</sub> <sup>2.3</sup> ))                                                                             | 0.02                          | 0.02                                                                                                                                           |  |
| <sup>1</sup> Q <sub>gi</sub> - Intercepted Flow (cfs)                                                                                                                                                   |  | (R <sub>f</sub> *E+R <sub>s</sub> *(1-E))*Q                                                                                                                  | 2.0                           | 1.4                                                                                                                                            |  |
| <b>Output (Curb):</b>                                                                                                                                                                                   |  | <b>Equation:</b>                                                                                                                                             | <b>Output (Curb):</b>         |                                                                                                                                                |  |
| <sup>1</sup> S <sub>e</sub> - Equivalent Cross Slope (ft/ft)                                                                                                                                            |  | S <sub>x</sub> +S <sub>q</sub> *E                                                                                                                            | 0.064                         | 0.082                                                                                                                                          |  |
| Q <sub>sx</sub> - Remaining Flow After Grate Interception                                                                                                                                               |  | Q-Q <sub>gi</sub>                                                                                                                                            | 2.965                         | 1.079                                                                                                                                          |  |
| S <sub>g</sub> - Gutter Cross Slope (ft/ft)                                                                                                                                                             |  | D <sub>g</sub> /W                                                                                                                                            | 0.111                         |                                                                                                                                                |  |
| <sup>1</sup> L <sub>t</sub> - Effective Interception Length (ft)                                                                                                                                        |  | 0.60*Q <sub>sx</sub> <sup>0.42</sup> *S <sub>o</sub> <sup>0.30</sup> *(1/n*S <sub>e</sub> ) <sup>0.6</sup>                                                   | 22.48                         | 12.68                                                                                                                                          |  |
| <sup>1</sup> Q <sub>ci</sub> - Intercepted Flow (cfs)                                                                                                                                                   |  | (1-(1-L <sub>ce</sub> /L <sub>t</sub> ) <sup>1.8</sup> )*Q <sub>sx</sub><br>or Q <sub>sx</sub> if L <sub>t</sub> is less than L <sub>ce</sub>                | 0.6                           | 0.4                                                                                                                                            |  |
| <b>Output (Combination):</b>                                                                                                                                                                            |  | <b>Equation:</b>                                                                                                                                             | <b>Q100 (Pro): Q10 (Pro):</b> |                                                                                                                                                |  |
| Total Intercepted Flow (cfs)                                                                                                                                                                            |  | Intercepted (Grate) + Intercepted (Curb)                                                                                                                     | 3                             | 2                                                                                                                                              |  |
| Bypass Flow (cfs)                                                                                                                                                                                       |  | Street Flow - Total Intercepted Flow                                                                                                                         | 2                             | 1                                                                                                                                              |  |

<sup>1</sup> Formula referenced from the CCRFCD Manual

<sup>2</sup> Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

# Curb Inlet Sizing Computation



Project Name & Number: EST1905-000: SUNSTONE PHASE 1  
 Date: 4/25/2019  
 By: CAA

## Notes:

Facility ID: LC2  
 Source of Flow: Q100 (Pro): 1/2 OF (Combined Bypass from LC1 Drop Inlets + ELOG1(b))  
 Q10 (Pro): 1/2 OF (Combined Bypass from LC1 Drop Inlets + ELOG1(b))  
 Inlet Type: Type CM2 (Continuous Grade)  
 Inlet Length: 12.5-ft  
 Number of Grates: 4

## Input:

## Variable:

Q100 (Pro): Q10 (Pro):

|                                    |          |        |      |
|------------------------------------|----------|--------|------|
| Street Flow (cfs)                  | Q        | 3.5    | 2.0  |
| Longitudinal Slope (ft/ft)         | $S_o$    | 0.0406 |      |
| Manning's Coefficient              | n        | 0.016  |      |
| Street Flow Velocity (fps)         | V        | 4.09   | 3.67 |
| Street Flow Depth (ft)             | D        | 0.31   | 0.27 |
| 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)               | $L_g$    | 10.0   |      |
| Length of Curb Opening (ft)        | $L_c$    | 12.50  |      |
| Clogging Factor - Grate (%)        | $CF_g$   | 50%    |      |
| Clogging Factor - Curb (%)         | $CF_c$   | 50%    |      |
| Effective Grate Length (ft)        | $L_{ge}$ | 5.0    |      |
| Effective Curb Opening Length (ft) | $L_{ce}$ | 6.25   |      |

## Output (Grate):

## Equation:

## Output (Grate):

|                                                 |                                                                                                                                    |       |      |
|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-------|------|
| <sup>1</sup> $R_f$ - Frontal Flow Factor        | $1 - 0.09 \cdot (V - V_x)$ if $V > V_x$ ; else Frontal Flow Factor=1                                                               | 1.00  | 1.00 |
| <sup>2</sup> $V_o$ - Splash Over Velocity (fps) | $V_x = p + q \cdot L_g - r \cdot L_{ge}^2 + s \cdot L_{ge}^3$ ; where<br>$p = 0.30, q = 4.85, r = 1.31, s = 0.15$ (for Vane Grate) | 10.55 |      |
| <sup>1</sup> E - Grate Flow Ratio               | Frontal Flow/Side Flow                                                                                                             | 0.47  | 0.60 |
| <sup>2</sup> $Q_w$ - Frontal Flow (cfs)         | $Q_w = Q[1 - (1 - (W/T))^{2.67}]$                                                                                                  | 1.63  | 1.20 |
| <sup>1</sup> $Q_s$ - Side Flow (cfs)            | $Q_s = Q - Q_w$                                                                                                                    | 1.9   | 0.8  |
| T - Side Flow Spread (ft)                       | $(D - D_g)/S_x$                                                                                                                    | 7.17  | 5.17 |
| <sup>1</sup> $R_s$ - Side Flow Factor           | $1 / (1 + (0.15 \cdot V^{1.8}) / (S_x \cdot L_{ge}^{2.3}))$                                                                        | 0.30  | 0.34 |
| <sup>1</sup> $Q_{gi}$ - Intercepted Flow (cfs)  | $(R_f \cdot E + R_s \cdot (1 - E)) \cdot Q$                                                                                        | 2.2   | 1.5  |

## Output (Curb):

## Equation:

## Output (Curb):

|                                                         |                                                                                           |       |       |
|---------------------------------------------------------|-------------------------------------------------------------------------------------------|-------|-------|
| <sup>1</sup> $S_e$ - Equivalent Cross Slope (ft/ft)     | $S_x + S_g \cdot E$                                                                       | 0.072 | 0.087 |
| $Q_{sx}$ - Remaining Flow After Grate Interception      | $Q - Q_{gi}$                                                                              | 1.309 | 0.527 |
| $S_g$ - Gutter Cross Slope (ft/ft)                      | $D_g/W$                                                                                   | 0.111 |       |
| <sup>1</sup> $L_i$ - Effective Interception Length (ft) | $0.60 \cdot Q_{sx}^{0.42} \cdot S_o^{0.30} \cdot (1/n \cdot S_e)^{0.6}$                   | 14.92 | 9.09  |
| <sup>1</sup> $Q_{ci}$ - Intercepted Flow (cfs)          | $(1 - (1 - L_{ce}/L_i)^{1.8}) \cdot Q_{sx}$<br>or $Q_{sx}$ if $L_i$ is less than $L_{ce}$ | 0.8   | 0.5   |

## Output (Combination):

## Equation:

Q100 (Pro): Q10 (Pro):

|                              |                                          |     |   |
|------------------------------|------------------------------------------|-----|---|
| Total Intercepted Flow (cfs) | Intercepted (Grate) + Intercepted (Curb) | 3   | 2 |
| Bypass Flow (cfs)            | Street Flow - Total Intercepted Flow     | 0.5 | 0 |

<sup>1</sup> Formula referenced from the CCRFCD Manual

<sup>2</sup> Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)



# Curb Inlet Sizing Computation

Project Name & Number: EST1905-000: SUNSTONE PHASE 1

Date: 4/25/2019

By: CAA



## Notes:

Facility ID:

LC3

Source of Flow:

Q100 (Pro): 1/2 OF (Combined Bypass from LC2 Drop Inlets + ELOG1(c) + ELOG2(a))

Q10 (Pro): 1/2 OF (Combined Bypass from LC2 Drop Inlets + ELOG1(c) + ELOG2(a))

Inlet Type:

Type CM2 (Continuous Grade)

Inlet Length:

5.-ft

Number of Grates

1

## Input:

## Variable:

Q100 (Pro): Q10 (Pro):

Street Flow (cfs)

Q

6.0

3.0

Longitudinal Slope (ft/ft)

S<sub>o</sub>

0.0175

Manning's Coefficient

n

0.016

Street Flow Velocity (fps)

V

3.32

2.85

Street Flow Depth (ft)

D

0.40

0.33

Street Cross Slope (ft/ft)

S<sub>x</sub>

0.02

Grate Width (ft)

W

1.5

Grate Depression (in)

D<sub>g</sub>

2.0

Length of Grate (ft)

L<sub>g</sub>

2.5

Length of Curb Opening (ft)

L<sub>c</sub>

5.00

Clogging Factor - Grate (%)

CF<sub>g</sub>

50%

Clogging Factor - Curb (%)

CF<sub>c</sub>

50%

Effective Grate Length (ft)

L<sub>ge</sub>

1.3

Effective Curb Opening Length (ft)

L<sub>ce</sub>

2.50

## Output (Grate):

## Equation:

## Output (Grate):

<sup>1</sup> R<sub>f</sub> - Frontal Flow Factor

1-0.09\*(V-V<sub>x</sub>) if V>V<sub>x</sub>; else Frontal Flow Factor=1

1.00

1.00

<sup>2</sup> V<sub>o</sub> - Splash Over Velocity (fps)

V<sub>x</sub>=p+q\*L<sub>g</sub>-r\*L<sub>ge</sub><sup>2</sup>+sy\*L<sub>ge</sub><sup>3</sup>; where  
p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate)

4.61

<sup>1</sup> E - Grate Flow Ratio

Frontal Flow/Side Flow

0.31

0.42

<sup>2</sup> Q<sub>w</sub> - Frontal Flow (cfs)

Q<sub>w</sub> = Q[1-(1-(W/T))<sup>2.67</sup>]

1.85

1.25

<sup>1</sup> Q<sub>s</sub> - Side Flow (cfs)

Q<sub>s</sub> = Q-Q<sub>w</sub>

4.2

1.7

T - Side Flow Spread (ft)

(D-D<sub>g</sub>)/S<sub>x</sub>

11.67

8.17

<sup>1</sup> R<sub>s</sub> - Side Flow Factor

1/(1+(0.15\*V<sup>1.8</sup>)/(S<sub>x</sub>\*L<sub>ge</sub><sup>2.3</sup>))

0.03

0.03

<sup>1</sup> Q<sub>gi</sub> - Intercepted Flow (cfs)

(R<sub>f</sub>\*E+R<sub>s</sub>\*(1-E))\*Q

1.9

1.3

## Output (Curb):

## Equation:

## Output (Curb):

<sup>1</sup> S<sub>e</sub> - Equivalent Cross Slope (ft/ft)

S<sub>x</sub>+S<sub>g</sub>\*E

0.054

0.066

Q<sub>sx</sub> - Remaining Flow After Grate Interception

Q-Q<sub>gi</sub>

4.051

1.688

S<sub>g</sub> - Gutter Cross Slope (ft/ft)

D<sub>g</sub>/W

0.111

<sup>1</sup> L<sub>i</sub> - Effective Interception Length (ft)

0.60\*Q<sub>sx</sub><sup>0.42</sup>\*S<sub>o</sub><sup>0.30</sup>\*(1/n\*S<sub>e</sub>)<sup>0.6</sup>

22.06

13.50

<sup>1</sup> Q<sub>ci</sub> - Intercepted Flow (cfs)

(1-(1-L<sub>ce</sub>/L<sub>i</sub>)<sup>1.5</sup>)\*Q<sub>sx</sub>

0.8

0.5

or Q<sub>sx</sub> if L<sub>i</sub> is less than L<sub>ce</sub>

## Output (Combination):

## Equation:

Q100 (Pro): Q10 (Pro):

Total Intercepted Flow (cfs)

Intercepted (Grate) + Intercepted (Curb)

3

2

Bypass Flow (cfs)

Street Flow - Total Intercepted Flow

3

1

<sup>1</sup> Formula referenced from the CCRFCD Manual

<sup>2</sup> Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)



# Curb Inlet Sizing Computation



Project Name & Number: EST1905-000: SUNSTONE PHASE 1  
 Date: 4/25/2019  
 By: CAA

## Notes:

Facility ID: LC4  
 Source of Flow: Q100 (Pro): 1/2 OF(Combined Bypass from LC3 Drop Inlets + ELOG2(b))  
 Q10 (Pro): 1/2 OF(Combined Bypass from LC3 Drop Inlets + ELOG2(b))  
 Inlet Type: Type CM2 (Continuous Grade)  
 Inlet Length: 5.-ft  
 Number of Grates: 1

## Input:

## Variable:

Q100 (Pro): Q10 (Pro):

|                                    |                 |        |      |
|------------------------------------|-----------------|--------|------|
| Street Flow (cfs)                  | Q               | 4.5    | 1.5  |
| Longitudinal Slope (ft/ft)         | S <sub>o</sub>  | 0.0410 |      |
| Manning's Coefficient              | n               | 0.016  |      |
| Street Flow Velocity (fps)         | V               | 4.34   | 3.53 |
| Street Flow Depth (ft)             | D               | 0.33   | 0.25 |
| Street Cross Slope (ft/ft)         | S <sub>x</sub>  | 0.02   |      |
| Grate Width (ft)                   | W               | 1.5    |      |
| Grate Depression (in)              | D <sub>g</sub>  | 2.0    |      |
| Length of Grate (ft)               | L <sub>g</sub>  | 2.5    |      |
| Length of Curb Opening (ft)        | L <sub>c</sub>  | 5.00   |      |
| Clogging Factor - Grate (%)        | CF <sub>g</sub> | 50%    |      |
| Clogging Factor - Curb (%)         | CF <sub>c</sub> | 50%    |      |
| Effective Grate Length (ft)        | L <sub>ge</sub> | 1.3    |      |
| Effective Curb Opening Length (ft) | L <sub>ce</sub> | 2.50   |      |

## Output (Grate):

## Equation:

Output (Grate):

|                                                          |                                                                                                                                                              |      |      |
|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|
| <sup>1</sup> R <sub>f</sub> - Frontal Flow Factor        | 1-0.09*(V-V <sub>x</sub> ) if V>V <sub>x</sub> ; else Frontal Flow Factor=1                                                                                  | 1.00 | 1.00 |
| <sup>2</sup> V <sub>o</sub> - Splash Over Velocity (fps) | V <sub>x</sub> =p+q*L <sub>g</sub> -r*L <sub>ge</sub> <sup>2</sup> +sy*L <sub>ge</sub> <sup>3</sup> ; where<br>p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate) | 4.61 |      |
| <sup>1</sup> E - Grate Flow Ratio                        | Frontal Flow/Side Flow                                                                                                                                       | 0.42 | 0.70 |
| <sup>2</sup> Q <sub>w</sub> - Frontal Flow (cfs)         | Q <sub>w</sub> = Q[1-(1-(W/T)) <sup>2.67</sup> ]                                                                                                             | 1.88 | 1.04 |
| <sup>1</sup> Q <sub>s</sub> - Side Flow (cfs)            | Q <sub>s</sub> = Q-Q <sub>w</sub>                                                                                                                            | 2.6  | 0.5  |
| T - Side Flow Spread (ft)                                | (D-D <sub>g</sub> )/S <sub>x</sub>                                                                                                                           | 8.17 | 4.17 |
| <sup>1</sup> R <sub>s</sub> - Side Flow Factor           | 1/(1+(0.15*V <sup>1.8</sup> )/(S <sub>x</sub> *L <sub>ge</sub> <sup>2.3</sup> ))                                                                             | 0.02 | 0.02 |
| <sup>1</sup> Q <sub>gi</sub> - Intercepted Flow (cfs)    | (R <sub>f</sub> *E+R <sub>s</sub> *(1-E))*Q                                                                                                                  | 1.9  | 1.1  |

## Output (Curb):

## Equation:

Output (Curb):

|                                                                  |                                                                                                                                               |       |       |
|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| <sup>1</sup> S <sub>e</sub> - Equivalent Cross Slope (ft/ft)     | S <sub>x</sub> +S <sub>q</sub> *E                                                                                                             | 0.066 | 0.097 |
| Q <sub>sx</sub> - Remaining Flow After Grate Interception        | Q-Q <sub>gi</sub>                                                                                                                             | 2.577 | 0.445 |
| S <sub>q</sub> - Gutter Cross Slope (ft/ft)                      | D <sub>g</sub> /W                                                                                                                             | 0.111 |       |
| <sup>1</sup> L <sub>i</sub> - Effective Interception Length (ft) | 0.60*Q <sub>sx</sub> <sup>0.42</sup> *S <sub>o</sub> <sup>0.30</sup> *(1/n*S <sub>e</sub> ) <sup>0.6</sup>                                    | 20.82 | 7.92  |
| <sup>1</sup> Q <sub>ci</sub> - Intercepted Flow (cfs)            | (1-(1-L <sub>ce</sub> /L <sub>i</sub> ) <sup>1.8</sup> )*Q <sub>sx</sub><br>or Q <sub>sx</sub> if L <sub>i</sub> is less than L <sub>ce</sub> | 0.5   | 0.2   |

## Output (Combination):

## Equation:

Q100 (Pro): Q10 (Pro):

|                              |                                          |     |     |
|------------------------------|------------------------------------------|-----|-----|
| Total Intercepted Flow (cfs) | Intercepted (Grate) + Intercepted (Curb) | 2.5 | 1.5 |
| Bypass Flow (cfs)            | Street Flow - Total Intercepted Flow     | 2.0 | 0.0 |

<sup>1</sup> Formula referenced from the CCRFCD Manual

<sup>2</sup> Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)





**SLATER  
HANIFAN  
GROUP**  
CONSULTING ENGINEERS & PLANNERS

## CONSULTING ENGINEERS & PLANNERS

|        |  |           |                        |
|--------|--|-----------|------------------------|
| Input: |  | Variable: | Q100 (Pro): Q10 (Pro): |
|--------|--|-----------|------------------------|

| Output (Grate):                             | Equation:                                                                                                                                                    | Output (Grate): |      |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------|
| R <sub>f</sub> - Frontal Flow Factor        | 1-0.09*(V-V <sub>x</sub> ) if V>V <sub>x</sub> ; else Frontal Flow Factor=1                                                                                  | 1.00            | 1.00 |
| V <sub>o</sub> - Splash Over Velocity (fps) | V <sub>x</sub> =p+q*L <sub>g</sub> -r*L <sub>ge</sub> <sup>2</sup> +sy*L <sub>ge</sub> <sup>3</sup> ; where<br>p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate) | 4.61            |      |
| E - Grate Flow Ratio                        | Frontal Flow/Side Flow                                                                                                                                       | 0.36            | 0.56 |
| Q <sub>w</sub> - Frontal Flow (cfs)         | Q <sub>w</sub> = Q[1-(1-(W/T)) <sup>2.67</sup> ]                                                                                                             | 1.99            | 1.12 |
| Q <sub>s</sub> - Side Flow (cfs)            | Q <sub>s</sub> = Q-Q <sub>w</sub>                                                                                                                            | 3.5             | 0.9  |
| T - Side Flow Spread (ft)                   | (D-D <sub>g</sub> )/S <sub>x</sub>                                                                                                                           | 9.67            | 5.67 |
| R <sub>s</sub> - Side Flow Factor           | 1/(1+(0.15*V <sup>1.8</sup> )/(S <sub>x</sub> *L <sub>ge</sub> <sup>2.3</sup> ))                                                                             | 0.02            | 0.03 |
| Q <sub>gi</sub> - Intercepted Flow (cfs)    | (R <sub>f</sub> *E+R <sub>s</sub> *(1-E))*Q                                                                                                                  | 2.1             | 1.1  |

| Output (Curb):                                            |  | Equation:                                                         | Output (Curb): |       |
|-----------------------------------------------------------|--|-------------------------------------------------------------------|----------------|-------|
| S <sub>e</sub> - Equivalent Cross Slope (ft/ft)           |  | $S_x + S_g * E$                                                   | 0.060          | 0.082 |
| Q <sub>sx</sub> - Remaining Flow After Grate Interception |  | $Q - Q_{gi}$                                                      | 3.442          | 0.857 |
| S <sub>g</sub> - Gutter Cross Slope (ft/ft)               |  | $D_g / W$                                                         | 0.111          |       |
| L <sub>i</sub> - Effective Interception Length (ft)       |  | $0.60 * Q_{sx}^{0.42} * S_o^{0.30} * (1/n * S_e)^{0.6}$           | 22.59          | 10.46 |
| Q <sub>ci</sub> - Intercepted Flow (cfs)                  |  | $(1 - (1 - L_{ce}/L_i)^{1.8}) * Q_{sx}$                           | 0.7            | 0.3   |
|                                                           |  | or Q <sub>sx</sub> if L <sub>i</sub> is less than L <sub>ce</sub> |                |       |

| Output (Combination):        | Equation:                                | Q100 (Pro): | Q10 (Pro): |
|------------------------------|------------------------------------------|-------------|------------|
| Total Intercepted Flow (cfs) | Intercepted (Grate) + Intercepted (Curb) | 3           | 1.5        |
| Bypass Flow (cfs)            | Street Flow - Total Intercepted Flow     | 3           | 0.5        |

<sup>2</sup> Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)



# Curb Inlet Sizing Computation



Project Name & Number: EST1905-000: SUNSTONE PHASE 1  
 Date: 4/25/2019  
 By: CAA

## Notes:

Facility ID: LC6  
 Source of Flow: Q100 (Pro): 1/2 OF(Combined Bypass from LC5 Drop Inlets + ELOG2(d))  
 Q10 (Pro): 1/2 OF(Combined Bypass from LC5 Drop Inlets + ELOG2(d))  
 Inlet Type: Type CM2 (Continuous Grade)  
 Inlet Length: 5.-ft  
 Number of Grates: 1

## Input:

## Variable:

Q100 (Pro): Q10 (Pro):

|                                    |          |        |      |
|------------------------------------|----------|--------|------|
| Street Flow (cfs)                  | Q        | 6.5    | 2.5  |
| Longitudinal Slope (ft/ft)         | $S_o$    | 0.0383 |      |
| Manning's Coefficient              | n        | 0.016  |      |
| Street Flow Velocity (fps)         | V        | 4.57   | 3.74 |
| Street Flow Depth (ft)             | D        | 0.37   | 0.29 |
| 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)               | $L_g$    | 2.5    |      |
| Length of Curb Opening (ft)        | $L_c$    | 5.00   |      |
| Clogging Factor - Grate (%)        | $CF_g$   | 50%    |      |
| Clogging Factor - Curb (%)         | $CF_c$   | 50%    |      |
| Effective Grate Length (ft)        | $L_{ge}$ | 1.3    |      |
| Effective Curb Opening Length (ft) | $L_{ce}$ | 2.50   |      |

## Output (Grate):

## Equation:

## Output (Grate):

|                                                 |                                                                                                    |       |      |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------|-------|------|
| <sup>1</sup> $R_f$ - Frontal Flow Factor        | $1-0.09*(V-V_x)$ if $V>V_x$ ; else Frontal Flow Factor=1                                           | 1.00  | 1.00 |
| <sup>2</sup> $V_o$ - Splash Over Velocity (fps) | $V_x=p+q*L_g-r*L_{ge}^2+sy*L_{ge}^3$ ; where<br>$p=0.30, q=4.85, r=1.31, sy=0.15$ (for Vane Grate) | 4.61  |      |
| <sup>1</sup> E - Grate Flow Ratio               | Frontal Flow/Side Flow                                                                             | 0.35  | 0.52 |
| <sup>2</sup> $Q_w$ - Frontal Flow (cfs)         | $Q_w = Q[1-(1-(W/T))^2]^{0.67}$                                                                    | 2.26  | 1.31 |
| <sup>1</sup> $Q_s$ - Side Flow (cfs)            | $Q_s = Q - Q_w$                                                                                    | 4.2   | 1.2  |
| T - Side Flow Spread (ft)                       | $(D-D_g)/S_x$                                                                                      | 10.17 | 6.17 |
| <sup>1</sup> $R_s$ - Side Flow Factor           | $1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$                                                          | 0.01  | 0.02 |
| <sup>1</sup> $Q_{gi}$ - Intercepted Flow (cfs)  | $(R_f*E+R_s*(1-E))*Q$                                                                              | 2.3   | 1.3  |

## Output (Curb):

## Equation:

## Output (Curb):

|                                                         |                                                                                 |       |       |
|---------------------------------------------------------|---------------------------------------------------------------------------------|-------|-------|
| <sup>1</sup> $S_e$ - Equivalent Cross Slope (ft/ft)     | $S_x+S_{q_i}*E$                                                                 | 0.059 | 0.078 |
| $Q_{sx}$ - Remaining Flow After Grate Interception      | $Q-Q_{gi}$                                                                      | 4.184 | 1.164 |
| $S_g$ - Gutter Cross Slope (ft/ft)                      | $D_g/W$                                                                         | 0.111 |       |
| <sup>1</sup> $L_i$ - Effective Interception Length (ft) | $0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$                                 | 26.99 | 13.24 |
| <sup>1</sup> $Q_{ci}$ - Intercepted Flow (cfs)          | $(1-(1-L_{ce}/L_i)^{1.5})*Q_{sx}$<br>or $Q_{sx}$ if $L_i$ is less than $L_{ce}$ | 0.7   | 0.4   |

## Output (Combination):

## Equation:

Q100 (Pro): Q10 (Pro):

|                              |                                          |     |   |
|------------------------------|------------------------------------------|-----|---|
| Total Intercepted Flow (cfs) | Intercepted (Grate) + Intercepted (Curb) | 3.0 | 2 |
| Bypass Flow (cfs)            | Street Flow - Total Intercepted Flow     | 3.5 | 1 |

<sup>1</sup> Formula referenced from the CCRFCD Manual

<sup>2</sup> Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

# Curb Inlet Sizing Computation



Project Name & Number: EST1905-000: SUNSTONE PHASE 1  
 Date: 5/6/2019  
 By: CAA

## Notes:

Facility ID: LC7a  
 Source of Flow: Q100 (Pro): Bypass from LC6 + ELOG2(e)  
 Q10 (Pro): Bypass from LC6 + ELOG2(e)  
 Inlet Type: Type CM2 (Continuous Grade)  
 Inlet Length: 10.-ft  
 Number of Grates: 3

Input: Variable: Q100 (Pro): Q10 (Pro):

|                                    |          |        |      |
|------------------------------------|----------|--------|------|
| Street Flow (cfs)                  | Q        | 5.5    | 2.0  |
| Longitudinal Slope (ft/ft)         | $S_o$    | 0.0383 |      |
| Manning's Coefficient              | n        | 0.016  |      |
| Street Flow Velocity (fps)         | V        | 4.40   | 3.59 |
| Street Flow Depth (ft)             | D        | 0.35   | 0.27 |
| Street Cross Slope (ft/ft)         | $S_x$    | 0.02   |      |
| Grate Width (ft)                   | W        | 1.5    |      |
| Grate Depression (in)              | $D_g$    | 2.0    |      |
| Length of Grate (ft)               | $L_g$    | 7.5    |      |
| Length of Curb Opening (ft)        | $L_c$    | 10.00  |      |
| Clogging Factor - Grate (%)        | $CF_g$   | 50%    |      |
| Clogging Factor - Curb (%)         | $CF_c$   | 50%    |      |
| Effective Grate Length (ft)        | $L_{ge}$ | 3.8    |      |
| Effective Curb Opening Length (ft) | $L_{ce}$ | 5.00   |      |

Output (Grate): Equation: Output (Grate):

|                                                 |                                                                                                    |      |      |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------|------|------|
| <sup>1</sup> $R_f$ - Frontal Flow Factor        | $1-0.09*(V-V_x)$ if $V>V_x$ ; else Frontal Flow Factor=1                                           | 1.00 | 1.00 |
| <sup>2</sup> $V_o$ - Splash Over Velocity (fps) | $V_x=p+q*L_g-r*L_{ge}^2+sy*L_{ge}^3$ ; where<br>$p=0.30, q=4.85, r=1.31, sy=0.15$ (for Vane Grate) | 7.98 |      |
| <sup>1</sup> E - Grate Flow Ratio               | Frontal Flow/Side Flow                                                                             | 0.38 | 0.60 |
| <sup>2</sup> $Q_w$ - Frontal Flow (cfs)         | $Q_w = Q[1-(1-(W/T))^{2.67}]$                                                                      | 2.09 | 1.20 |
| <sup>1</sup> $Q_s$ - Side Flow (cfs)            | $Q_s = Q - Q_w$                                                                                    | 3.4  | 0.8  |
| T - Side Flow Spread (ft)                       | $(D-D_g)/S_x$                                                                                      | 9.17 | 5.17 |
| <sup>1</sup> $R_s$ - Side Flow Factor           | $1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$                                                          | 0.16 | 0.22 |
| <sup>1</sup> $Q_{gi}$ - Intercepted Flow (cfs)  | $(R_f*E+R_s*(1-E))*Q$                                                                              | 2.6  | 1.4  |

Output (Curb): Equation: Output (Curb):

|                                                         |                                                                                 |       |       |
|---------------------------------------------------------|---------------------------------------------------------------------------------|-------|-------|
| <sup>1</sup> $S_e$ - Equivalent Cross Slope (ft/ft)     | $S_x+S_g*E$                                                                     | 0.062 | 0.087 |
| $Q_{sx}$ - Remaining Flow After Grate Interception      | $Q-Q_{gi}$                                                                      | 2.859 | 0.626 |
| $S_g$ - Gutter Cross Slope (ft/ft)                      | $D_g/W$                                                                         | 0.111 |       |
| <sup>1</sup> $L_t$ - Effective Interception Length (ft) | $0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$                                 | 22.19 | 9.61  |
| <sup>1</sup> $Q_{ci}$ - Intercepted Flow (cfs)          | $(1-(1-L_{ce}/L_t)^{1.8})*Q_{sx}$<br>or $Q_{sx}$ if $L_t$ is less than $L_{ce}$ | 1.1   | 0.5   |

Output (Combination): Equation: Q100 (Pro): Q10 (Pro):

|                              |                                          |     |   |
|------------------------------|------------------------------------------|-----|---|
| Total Intercepted Flow (cfs) | Intercepted (Grate) + Intercepted (Curb) | 4.5 | 2 |
| Bypass Flow (cfs)            | Street Flow - Total Intercepted Flow     | 1   | 0 |

<sup>1</sup> Formula referenced from the CCRFCD Manual

<sup>2</sup> Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)



# Curb Inlet Sizing Computation



Project Name & Number: EST1905-000: SUNSTONE PHASE 1  
 Date: 5/6/2019  
 By: CAA

## Notes:

Facility ID: LC7b  
 Source of Flow: Q100 (Pro): Bypass from LC6 + ELOG2(f)  
 Q10 (Pro): Bypass from LC6 + ELOG2(f)  
 Inlet Type: Type CM2 (Continuous Grade)  
 Inlet Length: 15.-ft  
 Number of Grates: 5

## Input:

## Variable:

Q100 (Pro): Q10 (Pro):

|                                    |          |        |      |
|------------------------------------|----------|--------|------|
| Street Flow (cfs)                  | Q        | 7.5    | 3.0  |
| Longitudinal Slope (ft/ft)         | $S_o$    | 0.0375 |      |
| Manning's Coefficient              | n        | 0.016  |      |
| Street Flow Velocity (fps)         | V        | 4.68   | 3.84 |
| Street Flow Depth (ft)             | D        | 0.38   | 0.30 |
| 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)               | $L_g$    | 12.5   |      |
| Length of Curb Opening (ft)        | $L_c$    | 15.00  |      |
| Clogging Factor - Grate (%)        | $CF_g$   | 50%    |      |
| Clogging Factor - Curb (%)         | $CF_c$   | 50%    |      |
| Effective Grate Length (ft)        | $L_{ge}$ | 6.3    |      |
| Effective Curb Opening Length (ft) | $L_{ce}$ | 7.50   |      |

## Output (Grate):

## Equation:

Output (Grate):

|                                                 |                                                                                                                                            |       |      |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------|------|
| <sup>1</sup> $R_f$ - Frontal Flow Factor        | $1 - 0.09 \cdot (V - V_x)$ if $V > V_x$ ; else Frontal Flow Factor = 1                                                                     | 1.00  | 1.00 |
| <sup>2</sup> $V_o$ - Splash Over Velocity (fps) | $V_x = p + q \cdot L_g \cdot r \cdot L_{ge}^2 + s_y \cdot L_{ge}^3$ ; where<br>$p = 0.30, q = 4.85, r = 1.31, s_y = 0.15$ (for Vane Grate) | 16.06 |      |
| <sup>1</sup> E - Grate Flow Ratio               | Frontal Flow/Side Flow                                                                                                                     | 0.33  | 0.49 |
| <sup>2</sup> $Q_w$ - Frontal Flow (cfs)         | $Q_w = Q[1 - (1 - (W/T))^{2.67}]$                                                                                                          | 2.50  | 1.48 |
| <sup>1</sup> $Q_s$ - Side Flow (cfs)            | $Q_s = Q - Q_w$                                                                                                                            | 5.0   | 1.5  |
| T - Side Flow Spread (ft)                       | $(D - D_g)/S_x$                                                                                                                            | 10.67 | 6.67 |
| <sup>1</sup> $R_s$ - Side Flow Factor           | $1 / (1 + (0.15 \cdot V^{1.8}) / (S_x \cdot L_{ge}^{2.3}))$                                                                                | 0.36  | 0.44 |
| <sup>1</sup> $Q_{gi}$ - Intercepted Flow (cfs)  | $(R_f \cdot E + R_s \cdot (1 - E)) \cdot Q$                                                                                                | 4.3   | 2.2  |

## Output (Curb):

## Equation:

Output (Curb):

|                                                         |                                                                                           |       |       |
|---------------------------------------------------------|-------------------------------------------------------------------------------------------|-------|-------|
| <sup>1</sup> $S_e$ - Equivalent Cross Slope (ft/ft)     | $S_x + S_g \cdot E$                                                                       | 0.057 | 0.075 |
| $Q_{sx}$ - Remaining Flow After Grate Interception      | $Q - Q_{gi}$                                                                              | 3.206 | 0.843 |
| $S_g$ - Gutter Cross Slope (ft/ft)                      | $D_g/W$                                                                                   | 0.111 |       |
| <sup>1</sup> $L_i$ - Effective Interception Length (ft) | $0.60 \cdot Q_{sx}^{0.42} \cdot S_o^{0.30} \cdot (1/n \cdot S_e)^{0.6}$                   | 24.38 | 11.81 |
| <sup>1</sup> $Q_{ci}$ - Intercepted Flow (cfs)          | $(1 - (1 - L_{ce}/L_i)^{1.8}) \cdot Q_{sx}$<br>or $Q_{sx}$ if $L_i$ is less than $L_{ce}$ | 1.6   | 0.7   |

## Output (Combination):

## Equation:

Q100 (Pro): Q10 (Pro):

|                              |                                          |     |   |
|------------------------------|------------------------------------------|-----|---|
| Total Intercepted Flow (cfs) | Intercepted (Grate) + Intercepted (Curb) | 6.5 | 3 |
| Bypass Flow (cfs)            | Street Flow - Total Intercepted Flow     | 1   | 0 |

<sup>1</sup> Formula referenced from the CCRFCD Manual

<sup>2</sup> Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

| Curb Inlet Sizing Computation        |  |                                                                                                                                                | <br>CONSULTING ENGINEERS & PLANNERS |                        |
|--------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|------------------------|
| Project Name & Number:               |  | EST1905-000: SUNSTONE PHASE 1                                                                                                                  |                                                                                                                        |                        |
| Date:                                |  | 4/25/2019                                                                                                                                      |                                                                                                                        |                        |
| By:                                  |  | CAA                                                                                                                                            |                                                                                                                        |                        |
| <b>Notes:</b>                        |  |                                                                                                                                                |                                                                                                                        |                        |
| Facility ID:                         |  | LC8                                                                                                                                            |                                                                                                                        |                        |
| Drainage Condition                   |  | Proposed                                                                                                                                       |                                                                                                                        |                        |
| Source of Flow                       |  | Q100 = Bypass from LC7a + ELOG2(g)                                                                                                             |                                                                                                                        |                        |
| Design Flow (cfs)                    |  | Q100 = 1 + 1 = 2                                                                                                                               |                                                                                                                        |                        |
| Inlet Type:                          |  | Type CM2 (Sump)                                                                                                                                |                                                                                                                        |                        |
| Inlet Length:                        |  | 5.-ft                                                                                                                                          |                                                                                                                        |                        |
| Number of Grates:                    |  | 1                                                                                                                                              |                                                                                                                        |                        |
| <b>Input:</b>                        |  | <b>Variable:</b>                                                                                                                               |                                                                                                                        | <b>Input:</b>          |
| Depth at Inlet (ft)                  |  | D                                                                                                                                              |                                                                                                                        | 0.42                   |
| Grate Width (ft)                     |  | W                                                                                                                                              |                                                                                                                        | 1.50                   |
| Length of Grate (ft)                 |  | L <sub>g</sub>                                                                                                                                 |                                                                                                                        | 2.50                   |
| Length of Curb Opening (ft)          |  | L <sub>c</sub>                                                                                                                                 |                                                                                                                        | 5.00                   |
| Height of Curb Opening (ft)          |  | H                                                                                                                                              |                                                                                                                        | 0.50                   |
| Weir Coef. - Curb Opening            |  | W <sub>c</sub>                                                                                                                                 |                                                                                                                        | 2.3                    |
| Weir Coef. - Grate                   |  | W <sub>g</sub>                                                                                                                                 |                                                                                                                        | 3.0                    |
| Orifice Coef.                        |  | O <sub>c</sub>                                                                                                                                 |                                                                                                                        | 0.67                   |
| Grate Coef.                          |  | G <sub>c</sub>                                                                                                                                 |                                                                                                                        | 0.60                   |
| Clogging Factor - Grate (%)          |  | CF <sub>g</sub>                                                                                                                                |                                                                                                                        | 50                     |
| Clogging Factor - Curb (%)           |  | CF <sub>c</sub>                                                                                                                                |                                                                                                                        | 50                     |
| <b>Output (Grate):</b>               |  | <b>Equation:</b>                                                                                                                               |                                                                                                                        | <b>Output (Grate):</b> |
| Effective Weir Length (ft)           |  | 2*W+L <sub>g</sub>                                                                                                                             |                                                                                                                        | 5.50                   |
| Adjusted Effective Weir Length (ft)  |  | 2*(1-CF <sub>g</sub> /100)*W+(1-CF <sub>g</sub> /100)*L <sub>g</sub>                                                                           |                                                                                                                        | 2.75                   |
| Grate Open Area (sf)                 |  | W*L <sub>g</sub>                                                                                                                               |                                                                                                                        | 3.75                   |
| Adjusted Grate Open Area (sf)        |  | Grate Open Area * G <sub>c</sub> *(1-CF <sub>g</sub> /100)                                                                                     |                                                                                                                        | 1.13                   |
| Controlling Flow Type (weir/orifice) |  | If D<1.792*(Adj. Grate Open Area/Adj. Eff. Length)<br>use weir, else orifice                                                                   |                                                                                                                        | weir                   |
| Intercepted Flow (cfs)               |  | weir: W <sub>g</sub> *(Adj. Eff. Weir Length)*D <sup>1.5</sup><br>orifice: O <sub>c</sub> *(Adj. Grate Open Area)*(64.4*D) <sup>0.5</sup>      |                                                                                                                        | 2.2                    |
| <b>Output (Curb):</b>                |  | <b>Equation:</b>                                                                                                                               |                                                                                                                        | <b>Output (Curb):</b>  |
| Effective Weir Length (ft)           |  | L+1.8*W                                                                                                                                        |                                                                                                                        | 7.70                   |
| Adjusted Effective Weir Length (ft)  |  | L+1.8(1-CF <sub>c</sub> /100)*W                                                                                                                |                                                                                                                        | 6.41                   |
| Curb Open Area (sf)                  |  | L*H                                                                                                                                            |                                                                                                                        | 2.50                   |
| Adjusted Curb Open Area (sf)         |  | Curb Open Area * (1-CF <sub>c</sub> /100)                                                                                                      |                                                                                                                        | 1.25                   |
| Controlling Flow Type (weir/orifice) |  | If D<H, weir, else orifice                                                                                                                     |                                                                                                                        | weir                   |
| Intercepted Flow (cfs)               |  | weir: W <sub>c</sub> *(Adj. Eff. Weir Length)*D <sup>1.5</sup><br>orifice: O <sub>c</sub> *(Adj. Curb Open Area)*(64.4*(D-H/2)) <sup>0.5</sup> |                                                                                                                        | 4.01                   |
| <b>Output (Total):</b>               |  | <b>Equation:</b>                                                                                                                               |                                                                                                                        | <b>Output (Total):</b> |
| Capacity Intercepted Flow (cfs)      |  | Intercepted (Grate) + Intercepted (Curb)                                                                                                       |                                                                                                                        | 6.3                    |



| Curb Inlet Sizing Computation                                                       |                                                                                                                                                              |                              |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Project Name & Number:                                                              | EST1905-000: SUNSTONE PHASE 1                                                                                                                                |                              |
| Date:                                                                               | 4/25/2019                                                                                                                                                    |                              |
| By:                                                                                 | CAA                                                                                                                                                          |                              |
|  |                                                                                                                                                              |                              |
| <b>Notes:</b>                                                                       |                                                                                                                                                              |                              |
| Facility ID:                                                                        | SP1                                                                                                                                                          |                              |
| Drainage Condition:                                                                 | Proposed                                                                                                                                                     |                              |
| Source of Flow:                                                                     | Q100 = ESKY1(a)                                                                                                                                              |                              |
| Inlet Type:                                                                         | Type CM2 (Continuous Grade)                                                                                                                                  |                              |
| Inlet Length:                                                                       | 5.-ft                                                                                                                                                        |                              |
| Number of Grates                                                                    | 1                                                                                                                                                            |                              |
| <b>Input:</b>                                                                       | <b>Variable:</b>                                                                                                                                             | <b>Input:</b>                |
| Street Flow (cfs)                                                                   | Q                                                                                                                                                            | 6.0                          |
| Longitudinal Slope (ft/ft)                                                          | S <sub>o</sub>                                                                                                                                               | 0.0290                       |
| Manning's Coefficient                                                               | n                                                                                                                                                            | 0.016                        |
| Street Flow Velocity (fps)                                                          | V                                                                                                                                                            | 4.03                         |
| Street Flow Depth (ft)                                                              | D                                                                                                                                                            | 0.37                         |
| Street Cross Slope (ft/ft)                                                          | S <sub>x</sub>                                                                                                                                               | 0.02                         |
| Grate Width (ft)                                                                    | W                                                                                                                                                            | 1.5                          |
| Grate Depression (in)                                                               | D <sub>g</sub>                                                                                                                                               | 2.0                          |
| Length of Grate (ft)                                                                | L <sub>g</sub>                                                                                                                                               | 2.5                          |
| Length of Curb Opening (ft)                                                         | L <sub>c</sub>                                                                                                                                               | 5.00                         |
| Clogging Factor - Grate (%)                                                         | CF <sub>g</sub>                                                                                                                                              | 50%                          |
| Clogging Factor - Curb (%)                                                          | CF <sub>c</sub>                                                                                                                                              | 50%                          |
| Effective Grate Length (ft)                                                         | L <sub>ge</sub>                                                                                                                                              | 1.3                          |
| Effective Curb Opening Length (ft)                                                  | L <sub>ce</sub>                                                                                                                                              | 2.50                         |
| <b>Output (Grate):</b>                                                              | <b>Equation:</b>                                                                                                                                             | <b>Output (Grate):</b>       |
| <sup>1</sup> R <sub>f</sub> - Frontal Flow Factor                                   | 1-0.09*(V-V <sub>x</sub> ) if V>V <sub>x</sub> ; else Frontal Flow Factor=1                                                                                  | 1.00                         |
| <sup>2</sup> V <sub>o</sub> - Splash Over Velocity (fps)                            | V <sub>x</sub> =p+q*L <sub>g</sub> -r*L <sub>ge</sub> <sup>2</sup> +sy*L <sub>ge</sub> <sup>3</sup> ; where<br>p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate) | 4.61                         |
| <sup>1</sup> E - Grate Flow Ratio                                                   | Frontal Flow/Side Flow                                                                                                                                       | 0.35                         |
| <sup>2</sup> Q <sub>w</sub> - Frontal Flow (cfs)                                    | Q <sub>w</sub> = Q[1-(1-(W/T)) <sup>2.67</sup> ]                                                                                                             | 2.08                         |
| <sup>1</sup> Q <sub>s</sub> - Side Flow (cfs)                                       | Q <sub>s</sub> = Q-Q <sub>w</sub>                                                                                                                            | 3.9                          |
| T - Side Flow Spread (ft)                                                           | (D-D <sub>g</sub> )/S <sub>x</sub>                                                                                                                           | 10.17                        |
| <sup>1</sup> R <sub>s</sub> - Side Flow Factor                                      | 1/(1+(0.15*V <sup>1.8</sup> )/(S <sub>x</sub> *L <sub>ge</sub> <sup>2.3</sup> ))                                                                             | 0.02                         |
| <sup>1</sup> Q <sub>gi</sub> - Intercepted Flow (cfs)                               | (R <sub>f</sub> *E+R <sub>s</sub> *(1-E))*Q                                                                                                                  | 2.2                          |
| <b>Output (Curb):</b>                                                               | <b>Equation:</b>                                                                                                                                             | <b>Output (Curb):</b>        |
| <sup>1</sup> S <sub>e</sub> - Equivalent Cross Slope (ft/ft)                        | S <sub>x</sub> +S <sub>g</sub> *E                                                                                                                            | 0.059                        |
| Q <sub>sx</sub> - Remaining Flow After Grate Interception (cfs)                     | Q-Q <sub>gi</sub>                                                                                                                                            | 3.848                        |
| S <sub>g</sub> - Gutter Cross Slope (ft/ft)                                         | D <sub>g</sub> /W                                                                                                                                            | 0.111                        |
| <sup>1</sup> L <sub>t</sub> - Effective Interception Length (ft)                    | 0.60*Q <sub>sx</sub> <sup>0.42</sup> *S <sub>o</sub> <sup>0.30</sup> *(1/n*S <sub>e</sub> ) <sup>0.6</sup>                                                   | 23.97                        |
| <sup>1</sup> Q <sub>ci</sub> - Intercepted Flow (cfs)                               | (1-(1-L <sub>ce</sub> /L <sub>t</sub> ) <sup>1.8</sup> )*Q <sub>sx</sub><br>or Q <sub>sx</sub> if L <sub>t</sub> is less than L <sub>ce</sub>                | 0.7                          |
| <b>Output (Combination):</b>                                                        | <b>Equation:</b>                                                                                                                                             | <b>Output (Combination):</b> |
| Total Intercepted Flow (cfs)                                                        | Intercepted (Grate) + Intercepted (Curb)                                                                                                                     | 3                            |
| Bypass Flow (cfs)                                                                   | Street Flow - Total Intercepted Flow                                                                                                                         | 3                            |

<sup>1</sup> Formula referenced from the CCRFCD Manual  
<sup>2</sup> Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)



| Curb Inlet Sizing Computation        |  | <br>SLATER HANIFAN GROUP<br>CONSULTING ENGINEERS & PLANNERS |         |
|--------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Project Name & Number:               |  | EST1905-000: SUNSTONE PHASE 1                                                                                                                  |         |
| Date:                                |  | 4/26/2019                                                                                                                                      |         |
| By:                                  |  | CAA                                                                                                                                            |         |
| <b>Notes:</b>                        |  |                                                                                                                                                |         |
| Facility ID:                         |  | SP2a                                                                                                                                           |         |
| Drainage Condition                   |  | Proposed                                                                                                                                       |         |
| Source of Flow                       |  | Q100 = Bypass from Facility SP1 + EMLA1 + ESKY1b                                                                                               |         |
| Design Flow (cfs)                    |  | Q100 = 3 + 10 + 5 = 18                                                                                                                         |         |
| Inlet Type:                          |  | Type CM2 (Sump)                                                                                                                                |         |
| Inlet Length:                        |  | 7.5-ft                                                                                                                                         |         |
| Number of Grates:                    |  | 2                                                                                                                                              |         |
| <b>Input:</b>                        |  | <b>Variable:</b>                                                                                                                               |         |
| Depth at Inlet (ft)                  |  | D                                                                                                                                              | 0.83    |
| Grate Width (ft)                     |  | W                                                                                                                                              | 1.50    |
| Length of Grate (ft)                 |  | L <sub>g</sub>                                                                                                                                 | 5.00    |
| Length of Curb Opening (ft)          |  | L <sub>c</sub>                                                                                                                                 | 7.50    |
| Height of Curb Opening (ft)          |  | H                                                                                                                                              | 0.50    |
| Weir Coef. - Curb Opening            |  | W <sub>c</sub>                                                                                                                                 | 2.3     |
| Weir Coef. - Grate                   |  | W <sub>g</sub>                                                                                                                                 | 3.0     |
| Orifice Coef.                        |  | O <sub>c</sub>                                                                                                                                 | 0.67    |
| Grate Coef.                          |  | G <sub>c</sub>                                                                                                                                 | 0.60    |
| Clogging Factor - Grate (%)          |  | CF <sub>g</sub>                                                                                                                                | 50      |
| Clogging Factor - Curb (%)           |  | CF <sub>c</sub>                                                                                                                                | 50      |
| <b>Output (Grate):</b>               |  | <b>Equation:</b>                                                                                                                               |         |
| Effective Weir Length (ft)           |  | 2*W+L <sub>g</sub>                                                                                                                             | 8.00    |
| Adjusted Effective Weir Length (ft)  |  | 2*(1-CF <sub>g</sub> /100)*W+(1-CF <sub>g</sub> /100)*L <sub>g</sub>                                                                           | 4.00    |
| Grate Open Area (sf)                 |  | W*L <sub>g</sub>                                                                                                                               | 7.50    |
| Adjusted Grate Open Area (sf)        |  | Grate Open Area * G <sub>c</sub> *(1-CF <sub>g</sub> /100)                                                                                     | 2.25    |
| Controlling Flow Type (weir/orifice) |  | If D<1.792*(Adj. Grate Open Area/Adj. Eff. Length)<br>use weir, else orifice                                                                   | weir    |
| Intercepted Flow (cfs)               |  | weir: W <sub>g</sub> *(Adj. Eff. Weir Length)*D <sup>1.5</sup><br>orifice: O <sub>c</sub> *(Adj. Grate Open Area)*(64.4*D) <sup>0.5</sup>      | 9.1     |
| <b>Output (Curb):</b>                |  | <b>Equation:</b>                                                                                                                               |         |
| Effective Weir Length (ft)           |  | L+1.8*W                                                                                                                                        | 10.20   |
| Adjusted Effective Weir Length (ft)  |  | L+1.8(1-CF <sub>c</sub> /100)*W                                                                                                                | 8.91    |
| Curb Open Area (sf)                  |  | L*H                                                                                                                                            | 3.75    |
| Adjusted Curb Open Area (sf)         |  | Curb Open Area * (1-CF <sub>c</sub> /100)                                                                                                      | 1.88    |
| Controlling Flow Type (weir/orifice) |  | If D<H, weir, else orifice                                                                                                                     | orifice |
| Intercepted Flow (cfs)               |  | weir: W <sub>c</sub> *(Adj. Eff. Weir Length)*D <sup>1.5</sup><br>orifice: O <sub>c</sub> *(Adj. Curb Open Area)*(64.4*(D-H/2)) <sup>0.5</sup> | 9.16    |
| <b>Output (Total):</b>               |  | <b>Equation:</b>                                                                                                                               |         |
| Capacity Intercepted Flow (cfs)      |  | Intercepted (Grate) + Intercepted (Curb)                                                                                                       | 18.2    |



| Curb Inlet Sizing Computation        |  | <br>SLATER HANIFAN GROUP<br>CONSULTING ENGINEERS & PLANNERS |         |
|--------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Project Name & Number:               |  | EST1905-000: SUNSTONE PHASE 1                                                                                                                  |         |
| Date:                                |  | 4/26/2019                                                                                                                                      |         |
| By:                                  |  | CAA                                                                                                                                            |         |
| <b>Notes:</b>                        |  |                                                                                                                                                |         |
| Facility ID:                         |  | SP2b                                                                                                                                           |         |
| Drainage Condition                   |  | Proposed                                                                                                                                       |         |
| Source of Flow                       |  | Q100 = ESKY1(c)                                                                                                                                |         |
| Design Flow (cfs)                    |  | Q100 = 12                                                                                                                                      |         |
| Inlet Type:                          |  | Type CM2 (Sump)                                                                                                                                |         |
| Inlet Length:                        |  | 7.5-ft                                                                                                                                         |         |
| Number of Grates:                    |  | 2                                                                                                                                              |         |
| <b>Input:</b>                        |  | <b>Variable:</b>                                                                                                                               |         |
| Depth at Inlet (ft)                  |  | D                                                                                                                                              | 0.83    |
| Grate Width (ft)                     |  | W                                                                                                                                              | 1.50    |
| Length of Grate (ft)                 |  | L <sub>g</sub>                                                                                                                                 | 5.00    |
| Length of Curb Opening (ft)          |  | L <sub>c</sub>                                                                                                                                 | 7.50    |
| Height of Curb Opening (ft)          |  | H                                                                                                                                              | 0.50    |
| Weir Coef. - Curb Opening            |  | W <sub>c</sub>                                                                                                                                 | 2.3     |
| Weir Coef. - Grate                   |  | W <sub>g</sub>                                                                                                                                 | 3.0     |
| Orifice Coef.                        |  | O <sub>c</sub>                                                                                                                                 | 0.67    |
| Grate Coef.                          |  | G <sub>c</sub>                                                                                                                                 | 0.60    |
| Clogging Factor - Grate (%)          |  | CF <sub>g</sub>                                                                                                                                | 50      |
| Clogging Factor - Curb (%)           |  | CF <sub>c</sub>                                                                                                                                | 50      |
| <b>Output (Grate):</b>               |  | <b>Equation:</b>                                                                                                                               |         |
| Effective Weir Length (ft)           |  | 2*W+L <sub>g</sub>                                                                                                                             | 8.00    |
| Adjusted Effective Weir Length (ft)  |  | 2*(1-CF <sub>g</sub> /100)*W+(1-CF <sub>g</sub> /100)*L <sub>g</sub>                                                                           | 4.00    |
| Grate Open Area (sf)                 |  | W*L <sub>g</sub>                                                                                                                               | 7.50    |
| Adjusted Grate Open Area (sf)        |  | Grate Open Area * G <sub>c</sub> *(1-CF <sub>g</sub> /100)                                                                                     | 2.25    |
| Controlling Flow Type (weir/orifice) |  | If D<1.792*(Adj. Grate Open Area/Adj. Eff. Length)<br>use weir, else orifice                                                                   | weir    |
| Intercepted Flow (cfs)               |  | weir: W <sub>g</sub> *(Adj. Eff. Weir Length)*D <sup>1.5</sup><br>orifice: O <sub>c</sub> *(Adj. Grate Open Area)*(64.4*D) <sup>0.5</sup>      | 9.1     |
| <b>Output (Curb):</b>                |  | <b>Equation:</b>                                                                                                                               |         |
| Effective Weir Length (ft)           |  | L+1.8*W                                                                                                                                        | 10.20   |
| Adjusted Effective Weir Length (ft)  |  | L+1.8(1-CF <sub>c</sub> /100)*W                                                                                                                | 8.91    |
| Curb Open Area (sf)                  |  | L*H                                                                                                                                            | 3.75    |
| Adjusted Curb Open Area (sf)         |  | Curb Open Area * (1-CF <sub>c</sub> /100)                                                                                                      | 1.88    |
| Controlling Flow Type (weir/orifice) |  | If D<H, weir, else orifice                                                                                                                     | orifice |
| Intercepted Flow (cfs)               |  | weir: W <sub>c</sub> *(Adj. Eff. Weir Length)*D <sup>1.5</sup><br>orifice: O <sub>c</sub> *(Adj. Curb Open Area)*(64.4*(D-H/2)) <sup>0.5</sup> | 9.16    |
| <b>Output (Total):</b>               |  | <b>Equation:</b>                                                                                                                               |         |
| Capacity Intercepted Flow (cfs)      |  | Intercepted (Grate) + Intercepted (Curb)                                                                                                       | 18.2    |



| Curb Inlet Sizing Computation                                                                                                                                                           |                                                                                                                                                              | <br>SLATER HANIFAN GROUP<br>CONSULTING ENGINEERS & PLANNERS |       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Project Name & Number:                                                                                                                                                                  | EST1905-000: SUNSTONE PHASE 1                                                                                                                                |                                                                                                                                                |       |
| Date:                                                                                                                                                                                   | 4/25/2019                                                                                                                                                    |                                                                                                                                                |       |
| By:                                                                                                                                                                                     | CAA                                                                                                                                                          |                                                                                                                                                |       |
| <b>Notes:</b><br>Facility ID: SC1<br>Source of Flow: Q100 (Pro): EFA4(a)<br>Q10 (Pro): EFA4(a)<br>Inlet Type: Type CM2 (Continuous Grade)<br>Inlet Length: 5.-ft<br>Number of Grates: 1 |                                                                                                                                                              |                                                                                                                                                |       |
| <b>Input:</b>                                                                                                                                                                           | <b>Variable:</b>                                                                                                                                             | <b>Q100 (Pro): Q10 (Pro):</b>                                                                                                                  |       |
| Street Flow (cfs)                                                                                                                                                                       | Q                                                                                                                                                            | 5.0                                                                                                                                            | 3.0   |
| Longitudinal Slope (ft/ft)                                                                                                                                                              | S <sub>o</sub>                                                                                                                                               | 0.0046                                                                                                                                         |       |
| Manning's Coefficient                                                                                                                                                                   | n                                                                                                                                                            | 0.016                                                                                                                                          |       |
| Street Flow Velocity (fps)                                                                                                                                                              | V                                                                                                                                                            | 1.85                                                                                                                                           | 1.64  |
| Street Flow Depth (ft)                                                                                                                                                                  | D                                                                                                                                                            | 0.45                                                                                                                                           | 0.40  |
| Street Cross Slope (ft/ft)                                                                                                                                                              | S <sub>x</sub>                                                                                                                                               | 0.02                                                                                                                                           |       |
| Grate Width (ft)                                                                                                                                                                        | W                                                                                                                                                            | 1.5                                                                                                                                            |       |
| Grate Depression (in)                                                                                                                                                                   | D <sub>g</sub>                                                                                                                                               | 2.0                                                                                                                                            |       |
| Length of Grate (ft)                                                                                                                                                                    | L <sub>g</sub>                                                                                                                                               | 2.5                                                                                                                                            |       |
| Length of Curb Opening (ft)                                                                                                                                                             | L <sub>c</sub>                                                                                                                                               | 5.00                                                                                                                                           |       |
| Clogging Factor - Grate (%)                                                                                                                                                             | CF <sub>g</sub>                                                                                                                                              | 50%                                                                                                                                            |       |
| Clogging Factor - Curb (%)                                                                                                                                                              | CF <sub>c</sub>                                                                                                                                              | 50%                                                                                                                                            |       |
| Effective Grate Length (ft)                                                                                                                                                             | L <sub>ge</sub>                                                                                                                                              | 1.3                                                                                                                                            |       |
| Effective Curb Opening Length (ft)                                                                                                                                                      | L <sub>ce</sub>                                                                                                                                              | 2.50                                                                                                                                           |       |
| <b>Output (Grate):</b>                                                                                                                                                                  | <b>Equation:</b>                                                                                                                                             | <b>Output (Grate):</b>                                                                                                                         |       |
| <sup>1</sup> R <sub>f</sub> - Frontal Flow Factor                                                                                                                                       | 1-0.09*(V-V <sub>x</sub> ) if V>V <sub>x</sub> ; else Frontal Flow Factor=1                                                                                  | 1.00                                                                                                                                           | 1.00  |
| <sup>2</sup> V <sub>o</sub> - Splash Over Velocity (fps)                                                                                                                                | V <sub>x</sub> =p+q*L <sub>g</sub> -r*L <sub>ge</sub> <sup>2</sup> +sy*L <sub>ge</sub> <sup>3</sup> ; where<br>p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate) | 4.61                                                                                                                                           |       |
| <sup>1</sup> E - Grate Flow Ratio                                                                                                                                                       | Frontal Flow/Side Flow                                                                                                                                       | 0.26                                                                                                                                           | 0.31  |
| <sup>2</sup> Q <sub>w</sub> - Frontal Flow (cfs)                                                                                                                                        | Q <sub>w</sub> = Q[1-(1-(W/T)) <sup>2.67</sup> ]                                                                                                             | 1.29                                                                                                                                           | 0.92  |
| <sup>1</sup> Q <sub>s</sub> - Side Flow (cfs)                                                                                                                                           | Q <sub>s</sub> = Q-Q <sub>w</sub>                                                                                                                            | 3.7                                                                                                                                            | 2.1   |
| T - Side Flow Spread (ft)                                                                                                                                                               | (D-D <sub>g</sub> )/S <sub>x</sub>                                                                                                                           | 14.17                                                                                                                                          | 11.67 |
| <sup>1</sup> R <sub>s</sub> - Side Flow Factor                                                                                                                                          | 1/(1+(0.15*V <sup>1.8</sup> )/(S <sub>x</sub> *L <sub>ge</sub> <sup>2.3</sup> ))                                                                             | 0.07                                                                                                                                           | 0.08  |
| <sup>1</sup> Q <sub>gi</sub> - Intercepted Flow (cfs)                                                                                                                                   | (R <sub>f</sub> *E+R <sub>s</sub> *(1-E))*Q                                                                                                                  | 1.5                                                                                                                                            | 1.1   |
| <b>Output (Curb):</b>                                                                                                                                                                   | <b>Equation:</b>                                                                                                                                             | <b>Output (Curb):</b>                                                                                                                          |       |
| <sup>1</sup> S <sub>e</sub> - Equivalent Cross Slope (ft/ft)                                                                                                                            | S <sub>x</sub> +S <sub>q</sub> *E                                                                                                                            | 0.049                                                                                                                                          | 0.054 |
| Q <sub>sx</sub> - Remaining Flow After Grate Interception                                                                                                                               | Q-Q <sub>gi</sub>                                                                                                                                            | 3.454                                                                                                                                          | 1.903 |
| S <sub>q</sub> - Gutter Cross Slope (ft/ft)                                                                                                                                             | D <sub>g</sub> /W                                                                                                                                            | 0.111                                                                                                                                          |       |
| <sup>1</sup> L <sub>i</sub> - Effective Interception Length (ft)                                                                                                                        | 0.60*Q <sub>sx</sub> <sup>0.42</sup> *S <sub>o</sub> <sup>0.30</sup> *(1/n*S <sub>e</sub> ) <sup>0.6</sup>                                                   | 14.73                                                                                                                                          | 10.76 |
| <sup>1</sup> Q <sub>ci</sub> - Intercepted Flow (cfs)                                                                                                                                   | (1-(1-L <sub>ce</sub> /L <sub>i</sub> ) <sup>1.8</sup> )*Q <sub>sx</sub><br>or Q <sub>sx</sub> if L <sub>i</sub> is less than L <sub>ce</sub>                | 1.0                                                                                                                                            | 0.7   |
| <b>Output (Combination):</b>                                                                                                                                                            | <b>Equation:</b>                                                                                                                                             | <b>Q100 (Pro): Q10 (Pro):</b>                                                                                                                  |       |
| Total Intercepted Flow (cfs)                                                                                                                                                            | Intercepted (Grate) + Intercepted (Curb)                                                                                                                     | 2.5                                                                                                                                            | 2     |
| Bypass Flow (cfs)                                                                                                                                                                       | Street Flow - Total Intercepted Flow                                                                                                                         | 2.5                                                                                                                                            | 1     |

<sup>1</sup> Formula referenced from the CCRFCD Manual  
<sup>2</sup> Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)



| Curb Inlet Sizing Computation        |                                                                                                                                                |                                                                       | <br>SLATER HANIFAN GROUP<br>CONSULTING ENGINEERS & PLANNERS |  |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Project Name & Number:               |                                                                                                                                                | EST1905-000: SUNSTONE PHASE 1                                         |                                                                                                                                                |  |
| Date:                                |                                                                                                                                                | 4/25/2019                                                             |                                                                                                                                                |  |
| By:                                  |                                                                                                                                                | CAA                                                                   |                                                                                                                                                |  |
| <b>Notes:</b>                        |                                                                                                                                                |                                                                       |                                                                                                                                                |  |
| Facility ID:                         |                                                                                                                                                | SC2                                                                   |                                                                                                                                                |  |
| Drainage Condition                   |                                                                                                                                                | Proposed                                                              |                                                                                                                                                |  |
| Source of Flow                       |                                                                                                                                                | Q100 = Bypass from SC1 + Combined Bypass from OH3 + EFA4(b) + EFA3(a) |                                                                                                                                                |  |
| Design Flow (cfs)                    |                                                                                                                                                | Q100 = 2.5 + 8 + 3 + 1 = 14.5                                         |                                                                                                                                                |  |
| Inlet Type:                          |                                                                                                                                                | Type CM2 (Sump)                                                       |                                                                                                                                                |  |
| Inlet Length:                        |                                                                                                                                                | 7.5-ft                                                                |                                                                                                                                                |  |
| Number of Grates:                    |                                                                                                                                                | 2                                                                     |                                                                                                                                                |  |
| <b>Input:</b>                        | <b>Variable:</b>                                                                                                                               | <b>Input:</b>                                                         |                                                                                                                                                |  |
| Depth at Inlet (ft)                  | D                                                                                                                                              | 0.83                                                                  |                                                                                                                                                |  |
| Grate Width (ft)                     | W                                                                                                                                              | 1.50                                                                  |                                                                                                                                                |  |
| Length of Grate (ft)                 | L <sub>g</sub>                                                                                                                                 | 5.00                                                                  |                                                                                                                                                |  |
| Length of Curb Opening (ft)          | L <sub>c</sub>                                                                                                                                 | 7.50                                                                  |                                                                                                                                                |  |
| Height of Curb Opening (ft)          | H                                                                                                                                              | 0.50                                                                  |                                                                                                                                                |  |
| Weir Coef. - Curb Opening            | W <sub>c</sub>                                                                                                                                 | 2.3                                                                   |                                                                                                                                                |  |
| Weir Coef. - Grate                   | W <sub>g</sub>                                                                                                                                 | 3.0                                                                   |                                                                                                                                                |  |
| Orifice Coef.                        | O <sub>c</sub>                                                                                                                                 | 0.67                                                                  |                                                                                                                                                |  |
| Grate Coef.                          | G <sub>c</sub>                                                                                                                                 | 0.60                                                                  |                                                                                                                                                |  |
| Clogging Factor - Grate (%)          | CF <sub>g</sub>                                                                                                                                | 50                                                                    |                                                                                                                                                |  |
| Clogging Factor - Curb (%)           | CF <sub>c</sub>                                                                                                                                | 50                                                                    |                                                                                                                                                |  |
| <b>Output (Grate):</b>               | <b>Equation:</b>                                                                                                                               | <b>Output (Grate):</b>                                                |                                                                                                                                                |  |
| Effective Weir Length (ft)           | 2*W+L <sub>g</sub>                                                                                                                             | 8.00                                                                  |                                                                                                                                                |  |
| Adjusted Effective Weir Length (ft)  | 2*(1-CF <sub>g</sub> /100)*W+(1-CF <sub>g</sub> /100)*L <sub>g</sub>                                                                           | 4.00                                                                  |                                                                                                                                                |  |
| Grate Open Area (sf)                 | W*L <sub>g</sub>                                                                                                                               | 7.50                                                                  |                                                                                                                                                |  |
| Adjusted Grate Open Area (sf)        | Grate Open Area * G <sub>c</sub> *(1-CF <sub>g</sub> /100)                                                                                     | 2.25                                                                  |                                                                                                                                                |  |
| Controlling Flow Type (weir/orifice) | If D<1.792*(Adj. Grate Open Area/Adj. Eff. Length)<br>use weir, else orifice                                                                   | weir                                                                  |                                                                                                                                                |  |
| Intercepted Flow (cfs)               | weir: W <sub>g</sub> *(Adj. Eff. Weir Length)*D <sup>1.5</sup><br>orifice: O <sub>c</sub> *(Adj. Grate Open Area)*(64.4*D) <sup>0.5</sup>      | 9.1                                                                   |                                                                                                                                                |  |
| <b>Output (Curb):</b>                | <b>Equation:</b>                                                                                                                               | <b>Output (Curb):</b>                                                 |                                                                                                                                                |  |
| Effective Weir Length (ft)           | L+1.8*W                                                                                                                                        | 10.20                                                                 |                                                                                                                                                |  |
| Adjusted Effective Weir Length (ft)  | L+1.8(1-CF <sub>c</sub> /100)*W                                                                                                                | 8.91                                                                  |                                                                                                                                                |  |
| Curb Open Area (sf)                  | L*H                                                                                                                                            | 3.75                                                                  |                                                                                                                                                |  |
| Adjusted Curb Open Area (sf)         | Curb Open Area * (1-CF <sub>c</sub> /100)                                                                                                      | 1.88                                                                  |                                                                                                                                                |  |
| Controlling Flow Type (weir/orifice) | If D<H, weir, else orifice                                                                                                                     | orifice                                                               |                                                                                                                                                |  |
| Intercepted Flow (cfs)               | weir: W <sub>c</sub> *(Adj. Eff. Weir Length)*D <sup>1.5</sup><br>orifice: O <sub>c</sub> *(Adj. Curb Open Area)*(64.4*(D-H/2)) <sup>0.5</sup> | 9.16                                                                  |                                                                                                                                                |  |
| <b>Output (Total):</b>               | <b>Equation:</b>                                                                                                                               | <b>Output (Total):</b>                                                |                                                                                                                                                |  |
| Capacity Intercepted Flow (cfs)      | Intercepted (Grate) + Intercepted (Curb)                                                                                                       | 18.2                                                                  |                                                                                                                                                |  |



| Curb Inlet Sizing Computation                                                                                                                                                           |  |                                                                                                                                                              |  | <br>SLATER<br>HANIFAN<br>GROUP<br>CONSULTING ENGINEERS & PLANNERS |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Project Name & Number:                                                                                                                                                                  |  | EST1905-000: SUNSTONE PHASE 1                                                                                                                                |  |                                                                                                                                                      |  |
| Date:                                                                                                                                                                                   |  | 4/25/2019                                                                                                                                                    |  |                                                                                                                                                      |  |
| By:                                                                                                                                                                                     |  | CAA                                                                                                                                                          |  |                                                                                                                                                      |  |
| <b>Notes:</b><br>Facility ID: SC3<br>Source of Flow: Q100 (Pro): EFA3(b)<br>Q10 (Pro): EFA3(b)<br>Inlet Type: Type CM2 (Continuous Grade)<br>Inlet Length: 5.-ft<br>Number of Grates: 1 |  |                                                                                                                                                              |  |                                                                                                                                                      |  |
| <b>Input:</b>                                                                                                                                                                           |  | <b>Variable:</b>                                                                                                                                             |  | <b>Q100 (Pro): Q10 (Pro):</b>                                                                                                                        |  |
| Street Flow (cfs)                                                                                                                                                                       |  | Q                                                                                                                                                            |  | 3.0 1.0                                                                                                                                              |  |
| Longitudinal Slope (ft/ft)                                                                                                                                                              |  | S <sub>o</sub>                                                                                                                                               |  | 0.0022                                                                                                                                               |  |
| Manning's Coefficient                                                                                                                                                                   |  | n                                                                                                                                                            |  | 0.016                                                                                                                                                |  |
| Street Flow Velocity (fps)                                                                                                                                                              |  | V                                                                                                                                                            |  | 1.24 0.98                                                                                                                                            |  |
| Street Flow Depth (ft)                                                                                                                                                                  |  | D                                                                                                                                                            |  | 0.44 0.33                                                                                                                                            |  |
| Street Cross Slope (ft/ft)                                                                                                                                                              |  | S <sub>x</sub>                                                                                                                                               |  | 0.02                                                                                                                                                 |  |
| Grate Width (ft)                                                                                                                                                                        |  | W                                                                                                                                                            |  | 1.5                                                                                                                                                  |  |
| Grate Depression (in)                                                                                                                                                                   |  | D <sub>g</sub>                                                                                                                                               |  | 2.0                                                                                                                                                  |  |
| Length of Grate (ft)                                                                                                                                                                    |  | L <sub>g</sub>                                                                                                                                               |  | 2.5                                                                                                                                                  |  |
| Length of Curb Opening (ft)                                                                                                                                                             |  | L <sub>c</sub>                                                                                                                                               |  | 5.00                                                                                                                                                 |  |
| Clogging Factor - Grate (%)                                                                                                                                                             |  | CF <sub>g</sub>                                                                                                                                              |  | 50%                                                                                                                                                  |  |
| Clogging Factor - Curb (%)                                                                                                                                                              |  | CF <sub>c</sub>                                                                                                                                              |  | 50%                                                                                                                                                  |  |
| Effective Grate Length (ft)                                                                                                                                                             |  | L <sub>ge</sub>                                                                                                                                              |  | 1.3                                                                                                                                                  |  |
| Effective Curb Opening Length (ft)                                                                                                                                                      |  | L <sub>ce</sub>                                                                                                                                              |  | 2.50                                                                                                                                                 |  |
| <b>Output (Grate):</b>                                                                                                                                                                  |  | <b>Equation:</b>                                                                                                                                             |  | <b>Output (Grate):</b>                                                                                                                               |  |
| <sup>1</sup> R <sub>f</sub> - Frontal Flow Factor                                                                                                                                       |  | 1-0.09*(V-V <sub>x</sub> ) if V>V <sub>x</sub> ; else Frontal Flow Factor=1                                                                                  |  | 1.00 1.00                                                                                                                                            |  |
| <sup>2</sup> V <sub>o</sub> - Splash Over Velocity (fps)                                                                                                                                |  | V <sub>x</sub> =p+q*L <sub>g</sub> -r*L <sub>ge</sub> <sup>2</sup> +sy*L <sub>ge</sub> <sup>3</sup> ; where<br>p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate) |  | 4.61                                                                                                                                                 |  |
| <sup>1</sup> E - Grate Flow Ratio                                                                                                                                                       |  | Frontal Flow/Side Flow                                                                                                                                       |  | 0.27 0.42                                                                                                                                            |  |
| <sup>2</sup> Q <sub>w</sub> - Frontal Flow (cfs)                                                                                                                                        |  | Q <sub>w</sub> = Q[1-(1-(W/T)) <sup>2.67</sup> ]                                                                                                             |  | 0.80 0.42                                                                                                                                            |  |
| <sup>1</sup> Q <sub>s</sub> - Side Flow (cfs)                                                                                                                                           |  | Q <sub>s</sub> = Q-Q <sub>w</sub>                                                                                                                            |  | 2.2 0.6                                                                                                                                              |  |
| T - Side Flow Spread (ft)                                                                                                                                                               |  | (D-D <sub>g</sub> )/S <sub>x</sub>                                                                                                                           |  | 13.67 8.17                                                                                                                                           |  |
| <sup>1</sup> R <sub>s</sub> - Side Flow Factor                                                                                                                                          |  | 1/((1+(0.15*V <sup>1.8</sup> )/(S <sub>x</sub> *L <sub>ge</sub> <sup>2.3</sup> )))                                                                           |  | 0.13 0.19                                                                                                                                            |  |
| <sup>1</sup> Q <sub>gi</sub> - Intercepted Flow (cfs)                                                                                                                                   |  | (R <sub>f</sub> *E+R <sub>s</sub> *(1-E))*Q                                                                                                                  |  | 1.1 0.5                                                                                                                                              |  |
| <b>Output (Curb):</b>                                                                                                                                                                   |  | <b>Equation:</b>                                                                                                                                             |  | <b>Output (Curb):</b>                                                                                                                                |  |
| <sup>1</sup> S <sub>e</sub> - Equivalent Cross Slope (ft/ft)                                                                                                                            |  | S <sub>x</sub> +S <sub>g</sub> *E                                                                                                                            |  | 0.050 0.066                                                                                                                                          |  |
| Q <sub>sx</sub> - Remaining Flow After Grate Interception                                                                                                                               |  | Q-Q <sub>gi</sub>                                                                                                                                            |  | 1.910 0.473                                                                                                                                          |  |
| S <sub>g</sub> - Gutter Cross Slope (ft/ft)                                                                                                                                             |  | D <sub>g</sub> /W                                                                                                                                            |  | 0.111                                                                                                                                                |  |
| <sup>1</sup> L <sub>i</sub> - Effective Interception Length (ft)                                                                                                                        |  | 0.60*Q <sub>sx</sub> <sup>0.42</sup> *S <sub>o</sub> <sup>0.30</sup> *(1/n*S <sub>g</sub> ) <sup>0.6</sup>                                                   |  | 9.10 4.25                                                                                                                                            |  |
| <sup>1</sup> Q <sub>ci</sub> - Intercepted Flow (cfs)                                                                                                                                   |  | (1-(1-L <sub>ce</sub> /L <sub>i</sub> ) <sup>1.85</sup> )*Q <sub>sx</sub><br>or Q <sub>sx</sub> if L <sub>i</sub> is less than L <sub>ce</sub>               |  | 0.8 0.4                                                                                                                                              |  |
| <b>Output (Combination):</b>                                                                                                                                                            |  | <b>Equation:</b>                                                                                                                                             |  | <b>Q100 (Pro): Q10 (Pro):</b>                                                                                                                        |  |
| Total Intercepted Flow (cfs)                                                                                                                                                            |  | Intercepted (Grate) + Intercepted (Curb)                                                                                                                     |  | 2 1                                                                                                                                                  |  |
| Bypass Flow (cfs)                                                                                                                                                                       |  | Street Flow - Total Intercepted Flow                                                                                                                         |  | 1 0                                                                                                                                                  |  |

<sup>1</sup> Formula referenced from the CCRFCD Manual  
<sup>2</sup> Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)





**SLATER  
HANIFAN  
GROUP**  
CONSULTING ENGINEERS & PLANNERS

CONSULTING ENGINEERS &amp; PLANNERS

|                  |                             |         |        |
|------------------|-----------------------------|---------|--------|
| Facility ID:     | SC4                         |         |        |
| Source of Flow:  | Q100 (Pro):                 | EFA3(c) |        |
|                  | Q10 (Pro):                  | EFA3(c) |        |
| Inlet Type:      | Type CM2 (Continuous Grade) |         |        |
| Inlet Length:    |                             |         | 7.5-ft |
| Number of Grates | 2                           |         |        |

| Output (Grate):                             | Equation:                                                                                                                                       | Output (Grate): |      |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------|
| R <sub>f</sub> - Frontal Flow Factor        | 1-0.09*(V-V <sub>x</sub> ) if V>V <sub>x</sub> ; else Frontal Flow Factor=1                                                                     | 1.00            | 1.00 |
| V <sub>o</sub> - Splash Over Velocity (fps) | V <sub>x</sub> =p+q*Lg-r*L <sub>ge</sub> <sup>2</sup> +sy*L <sub>ge</sub> <sup>3</sup> ; where<br>p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate) | 6.58            |      |
| E - Grate Flow Ratio                        | Frontal Flow/Side Flow                                                                                                                          | 0.40            | 0.56 |
| Q <sub>w</sub> - Frontal Flow (cfs)         | Q <sub>w</sub> = Q[1-(1-(W/T)) <sup>2.67</sup> ]                                                                                                | 0.80            | 0.56 |
| Q <sub>s</sub> - Side Flow (cfs)            | Q <sub>s</sub> = Q-Q <sub>w</sub>                                                                                                               | 1.2             | 0.4  |
| T - Side Flow Spread (ft)                   | (D-D <sub>g</sub> )/S <sub>x</sub>                                                                                                              | 8.67            | 5.67 |
| R <sub>s</sub> - Side Flow Factor           | 1/((1+(0.15*V <sup>1.8</sup> )/(S <sub>x</sub> *L <sub>ge</sub> <sup>2.3</sup> )))                                                              | 0.29            | 0.34 |
| Q <sub>gi</sub> - Intercepted Flow (cfs)    | (R <sub>f</sub> *E+R <sub>s</sub> *(1-E))*Q                                                                                                     | 1.1             | 0.7  |

| Output (Curb):                                            | Equation:                                                               | Output (Curb): |       |
|-----------------------------------------------------------|-------------------------------------------------------------------------|----------------|-------|
| S <sub>e</sub> - Equivalent Cross Slope (ft/ft)           | S <sub>x</sub> +S <sub>g</sub> *E                                       | 0.064          | 0.082 |
| Q <sub>sx</sub> - Remaining Flow After Grate Interception | Q-Q <sub>gi</sub>                                                       | 0.855          | 0.290 |
| S <sub>g</sub> - Gutter Cross Slope (ft/ft)               | D <sub>g</sub> /W                                                       | 0.111          |       |
| L <sub>i</sub> - Effective Interception Length (ft)       | $0.60 \cdot Q_{sx}^{0.42} \cdot S_o^{0.30} \cdot (1/n \cdot S_e)^{0.6}$ | 7.70           | 4.22  |
| Q <sub>ci</sub> - Intercepted Flow (cfs)                  | $(1 - (1 - L_{ce}/L_i)^{1.8}) \cdot Q_{sx}$                             | 0.6            | 0.3   |
|                                                           | or Q <sub>sx</sub> if L <sub>i</sub> is less than L <sub>ce</sub>       |                |       |

| Output (Combination):        | Equation:                                | Q100 (Pro): | Q10 (Pro): |
|------------------------------|------------------------------------------|-------------|------------|
| Total Intercepted Flow (cfs) | Intercepted (Grate) + Intercepted (Curb) | <b>2</b>    | <b>1</b>   |
| Bypass Flow (cfs)            | Street Flow - Total Intercepted Flow     | <b>0</b>    | <b>0</b>   |

<sup>2</sup> Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)



| Curb Inlet Sizing Computation                                                       |                                                                                                                                                              |                              |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Project Name & Number:                                                              | EST1905-000: SUNSTONE PHASE 1                                                                                                                                |                              |
| Date:                                                                               | 4/25/2019                                                                                                                                                    |                              |
| By:                                                                                 | CAA                                                                                                                                                          |                              |
|  |                                                                                                                                                              |                              |
| <b>Notes:</b>                                                                       |                                                                                                                                                              |                              |
| Facility ID:                                                                        | OH1                                                                                                                                                          |                              |
| Drainage Condition:                                                                 | Proposed                                                                                                                                                     |                              |
| Source of Flow:                                                                     | Q100 = 1/2 OF (EPI2+EPG+EOHR1(a))                                                                                                                            |                              |
| Inlet Type:                                                                         | Type CM2 (Continuous Grade)                                                                                                                                  |                              |
| Inlet Length:                                                                       | 15.-ft                                                                                                                                                       |                              |
| Number of Grates                                                                    | 5                                                                                                                                                            |                              |
| <b>Input:</b>                                                                       | <b>Variable:</b>                                                                                                                                             | <b>Input:</b>                |
| Street Flow (cfs)                                                                   | Q                                                                                                                                                            | 35.0                         |
| Longitudinal Slope (ft/ft)                                                          | S <sub>o</sub>                                                                                                                                               | 0.0263                       |
| Manning's Coefficient                                                               | n                                                                                                                                                            | 0.016                        |
| Street Flow Velocity (fps)                                                          | V                                                                                                                                                            | 6.19                         |
| Street Flow Depth (ft)                                                              | D                                                                                                                                                            | 0.61                         |
| Street Cross Slope (ft/ft)                                                          | S <sub>x</sub>                                                                                                                                               | 0.02                         |
| Grate Width (ft)                                                                    | W                                                                                                                                                            | 1.5                          |
| Grate Depression (in)                                                               | D <sub>g</sub>                                                                                                                                               | 2.0                          |
| Length of Grate (ft)                                                                | L <sub>g</sub>                                                                                                                                               | 12.5                         |
| Length of Curb Opening (ft)                                                         | L <sub>c</sub>                                                                                                                                               | 15.00                        |
| Clogging Factor - Grate (%)                                                         | CF <sub>g</sub>                                                                                                                                              | 50%                          |
| Clogging Factor - Curb (%)                                                          | CF <sub>c</sub>                                                                                                                                              | 50%                          |
| Effective Grate Length (ft)                                                         | L <sub>ge</sub>                                                                                                                                              | 6.3                          |
| Effective Curb Opening Length (ft)                                                  | L <sub>ce</sub>                                                                                                                                              | 7.50                         |
| <b>Output (Grate):</b>                                                              | <b>Equation:</b>                                                                                                                                             | <b>Output (Grate):</b>       |
| <sup>1</sup> R <sub>f</sub> - Frontal Flow Factor                                   | 1-0.09*(V-V <sub>x</sub> ) if V>V <sub>x</sub> ; else Frontal Flow Factor=1                                                                                  | 1.00                         |
| <sup>2</sup> V <sub>o</sub> - Splash Over Velocity (fps)                            | V <sub>x</sub> =p+q*L <sub>g</sub> -r*L <sub>ge</sub> <sup>2</sup> +sy*L <sub>ge</sub> <sup>3</sup> ; where<br>p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate) | 16.06                        |
| <sup>1</sup> E - Grate Flow Ratio                                                   | Frontal Flow/Side Flow                                                                                                                                       | 0.17                         |
| <sup>2</sup> Q <sub>w</sub> - Frontal Flow (cfs)                                    | Q <sub>w</sub> = Q[1-(1-(W/T)) <sup>2.67</sup> ]                                                                                                             | 5.97                         |
| <sup>1</sup> Q <sub>s</sub> - Side Flow (cfs)                                       | Q <sub>s</sub> = Q-Q <sub>w</sub>                                                                                                                            | 29.0                         |
| <sup>1</sup> T - Side Flow Spread (ft)                                              | (D-D <sub>g</sub> )/S <sub>x</sub>                                                                                                                           | 22.17                        |
| <sup>1</sup> R <sub>s</sub> - Side Flow Factor                                      | 1/(1+(0.15*V <sup>1.8</sup> )/(S <sub>x</sub> *L <sub>ge</sub> <sup>2.3</sup> ))                                                                             | 0.25                         |
| <sup>1</sup> Q <sub>gi</sub> - Intercepted Flow (cfs)                               | (R <sub>f</sub> *E+R <sub>s</sub> *(1-E))*Q                                                                                                                  | 13.3                         |
| <b>Output (Curb):</b>                                                               | <b>Equation:</b>                                                                                                                                             | <b>Output (Curb):</b>        |
| <sup>1</sup> S <sub>e</sub> - Equivalent Cross Slope (ft/ft)                        | S <sub>x</sub> +S <sub>g</sub> *E                                                                                                                            | 0.039                        |
| Q <sub>sx</sub> - Remaining Flow After Grate Interception (cfs)                     | Q-Q <sub>gi</sub>                                                                                                                                            | 21.676                       |
| S <sub>g</sub> - Gutter Cross Slope (ft/ft)                                         | D <sub>g</sub> /W                                                                                                                                            | 0.111                        |
| <sup>1</sup> L <sub>t</sub> - Effective Interception Length (ft)                    | 0.60*Q <sub>sx</sub> <sup>0.42</sup> *S <sub>o</sub> <sup>0.30</sup> *(1/n*S <sub>e</sub> ) <sup>0.6</sup>                                                   | 61.44                        |
| <sup>1</sup> Q <sub>ci</sub> - Intercepted Flow (cfs)                               | (1-(1-L <sub>ce</sub> /L <sub>t</sub> ) <sup>1.8</sup> )*Q <sub>sx</sub><br>or Q <sub>sx</sub> if L <sub>t</sub> is less than L <sub>ce</sub>                | 4.5                          |
| <b>Output (Combination):</b>                                                        | <b>Equation:</b>                                                                                                                                             | <b>Output (Combination):</b> |
| Total Intercepted Flow (cfs)                                                        | Intercepted (Grate) + Intercepted (Curb)                                                                                                                     | 18                           |
| Bypass Flow (cfs)                                                                   | Street Flow - Total Intercepted Flow                                                                                                                         | 17                           |

<sup>1</sup> Formula referenced from the CCRFCD Manual  
<sup>2</sup> Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)



# Curb Inlet Sizing Computation



Project Name & Number: EST1905-000: SUNSTONE PHASE 1  
 Date: 4/25/2019  
 By: CAA

## Notes:

Facility ID: OH2  
 Drainage Condition: Proposed  
 Source of Flow: Q100 = 1/2 OF (Combined Bypass from OH1 Drop Inlets + EOHR1(b))  
 = 1/2 (17\*2 + 5) = 19.5  
 Inlet Type: Type CM2 (Continuous Grade)  
 Inlet Length: 12.5-ft  
 Number of Grates: 4

## Input:

## Variable:

## Input:

|                                    |                 |        |
|------------------------------------|-----------------|--------|
| Street Flow (cfs)                  | Q               | 19.5   |
| Longitudinal Slope (ft/ft)         | S <sub>o</sub>  | 0.0437 |
| Manning's Coefficient              | n               | 0.016  |
| Street Flow Velocity (fps)         | V               | 6.18   |
| Street Flow Depth (ft)             | D               | 0.49   |
| Street Cross Slope (ft/ft)         | S <sub>x</sub>  | 0.02   |
| Grate Width (ft)                   | W               | 1.5    |
| Grate Depression (in)              | D <sub>g</sub>  | 2.0    |
| Length of Grate (ft)               | L <sub>g</sub>  | 10.0   |
| Length of Curb Opening (ft)        | L <sub>c</sub>  | 12.50  |
| Clogging Factor - Grate (%)        | CF <sub>g</sub> | 8%     |
| Clogging Factor - Curb (%)         | CF <sub>c</sub> | 50%    |
| Effective Grate Length (ft)        | L <sub>ge</sub> | 0.8    |
| Effective Curb Opening Length (ft) | L <sub>ce</sub> | 6.25   |

## Output (Grate):

## Equation:

## Output (Grate):

|                                                          |                                                                                                                                                              |       |
|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <sup>1</sup> R <sub>f</sub> - Frontal Flow Factor        | 1-0.09*(V-V <sub>x</sub> ) if V>V <sub>x</sub> ; else Frontal Flow Factor=1                                                                                  | 0.74  |
| <sup>2</sup> V <sub>o</sub> - Splash Over Velocity (fps) | V <sub>x</sub> =p+q*L <sub>g</sub> -r*L <sub>ge</sub> <sup>2</sup> +sy*L <sub>ge</sub> <sup>3</sup> ; where<br>p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate) | 3.26  |
| <sup>1</sup> E - Grate Flow Ratio                        | Frontal Flow/Side Flow                                                                                                                                       | 0.23  |
| <sup>2</sup> Q <sub>w</sub> - Frontal Flow (cfs)         | Q <sub>w</sub> = Q[1-(1-(W/T)) <sup>2.67</sup> ]                                                                                                             | 4.46  |
| <sup>1</sup> Q <sub>s</sub> - Side Flow (cfs)            | Q <sub>s</sub> = Q-Q <sub>w</sub>                                                                                                                            | 15.0  |
| T - Side Flow Spread (ft)                                | (D-D <sub>g</sub> )/S <sub>x</sub>                                                                                                                           | 16.17 |
| <sup>1</sup> R <sub>s</sub> - Side Flow Factor           | 1/(1+(0.15*V <sup>1.8</sup> )/(S <sub>x</sub> *L <sub>ge</sub> <sup>2.3</sup> ))                                                                             | 0.00  |
| <sup>1</sup> Q <sub>gi</sub> - Intercepted Flow (cfs)    | (R <sub>f</sub> *E+R <sub>s</sub> *(1-E))*Q                                                                                                                  | 3.3   |

## Output (Curb):

## Equation:

## Output (Curb):

|                                                                  |                                                                                                                                               |        |
|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|--------|
| <sup>1</sup> S <sub>e</sub> - Equivalent Cross Slope (ft/ft)     | S <sub>x</sub> +S <sub>g</sub> *E                                                                                                             | 0.045  |
| Q <sub>sx</sub> - Remaining Flow After Grate Interception (cfs)  | Q-Q <sub>gi</sub>                                                                                                                             | 16.168 |
| S <sub>g</sub> - Gutter Cross Slope (ft/ft)                      | D <sub>g</sub> /W                                                                                                                             | 0.111  |
| <sup>1</sup> L <sub>t</sub> - Effective Interception Length (ft) | 0.60*Q <sub>sx</sub> <sup>0.42</sup> *S <sub>o</sub> <sup>0.30</sup> *(1/n*S <sub>e</sub> ) <sup>0.6</sup>                                    | 57.68  |
| <sup>1</sup> Q <sub>ci</sub> - Intercepted Flow (cfs)            | (1-(1-L <sub>ce</sub> /L <sub>t</sub> ) <sup>1.8</sup> )*Q <sub>sx</sub><br>or Q <sub>sx</sub> if L <sub>t</sub> is less than L <sub>ce</sub> | 3.0    |

## Output (Combination):

## Equation:

## Output (Combination):

|                              |                                          |    |
|------------------------------|------------------------------------------|----|
| Total Intercepted Flow (cfs) | Intercepted (Grate) + Intercepted (Curb) | 6  |
| Bypass Flow (cfs)            | Street Flow - Total Intercepted Flow     | 13 |

<sup>1</sup> Formula referenced from the CCRFCD Manual

<sup>2</sup> Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)



# Curb Inlet Sizing Computation



Project Name & Number: EST1905-000: SUNSTONE PHASE 1  
 Date: 4/25/2019  
 By: CAA

## Notes:

Facility ID: OH3  
 Drainage Condition: Proposed  
 Source of Flow: Q100 = 1/2 OF (Combined Bypass from OH2 Drop Inlets + EOHR1(c))  
 = 1/2 (13\*2 + 10) = 18  
 Inlet Type: Type CM2 (Continuous Grade)  
 Inlet Length: 20.-ft  
 Number of Grates: 7

## Input:

## Variable:

## Input:

|                                    |                 |        |
|------------------------------------|-----------------|--------|
| Street Flow (cfs)                  | Q               | 18.0   |
| Longitudinal Slope (ft/ft)         | S <sub>o</sub>  | 0.0376 |
| Manning's Coefficient              | n               | 0.016  |
| Street Flow Velocity (fps)         | V               | 5.49   |
| Street Flow Depth (ft)             | D               | 0.46   |
| Street Cross Slope (ft/ft)         | S <sub>x</sub>  | 0.02   |
| Grate Width (ft)                   | W               | 1.5    |
| Grate Depression (in)              | D <sub>g</sub>  | 2.0    |
| Length of Grate (ft)               | L <sub>g</sub>  | 17.5   |
| Length of Curb Opening (ft)        | L <sub>c</sub>  | 20.0   |
| Clogging Factor - Grate (%)        | CF <sub>g</sub> | 50%    |
| Clogging Factor - Curb (%)         | CF <sub>c</sub> | 50%    |
| Effective Grate Length (ft)        | L <sub>ge</sub> | 8.8    |
| Effective Curb Opening Length (ft) | L <sub>ce</sub> | 10.00  |

## Output (Grate):

## Equation:

## Output (Grate):

|                                                          |                                                                                                                                                              |       |
|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <sup>1</sup> R <sub>f</sub> - Frontal Flow Factor        | 1-0.09*(V-V <sub>x</sub> ) if V>V <sub>x</sub> ; else Frontal Flow Factor=1                                                                                  | 1.00  |
| <sup>2</sup> V <sub>o</sub> - Splash Over Velocity (fps) | V <sub>x</sub> =p+q*L <sub>g</sub> -r*L <sub>ge</sub> <sup>2</sup> +sy*L <sub>ge</sub> <sup>3</sup> ; where<br>p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate) | 42.93 |
| <sup>1</sup> E - Grate Flow Ratio                        | Frontal Flow/Side Flow                                                                                                                                       | 0.25  |
| <sup>2</sup> Q <sub>w</sub> - Frontal Flow (cfs)         | Q <sub>w</sub> = Q[1-(1-(W/T)) <sup>2.67</sup> ]                                                                                                             | 4.51  |
| <sup>1</sup> Q <sub>s</sub> - Side Flow (cfs)            | Q <sub>s</sub> = Q-Q <sub>w</sub>                                                                                                                            | 13.5  |
| T - Side Flow Spread (ft)                                | (D-D <sub>g</sub> )/S <sub>x</sub>                                                                                                                           | 14.67 |
| <sup>1</sup> R <sub>s</sub> - Side Flow Factor           | 1/(1+(0.15*V <sup>1.8</sup> )/(S <sub>x</sub> *L <sub>ge</sub> <sup>2.3</sup> ))                                                                             | 0.48  |
| <sup>1</sup> Q <sub>gi</sub> - Intercepted Flow (cfs)    | (R <sub>f</sub> *E+R <sub>s</sub> *(1-E))*Q                                                                                                                  | 10.9  |

## Output (Curb):

## Equation:

## Output (Curb):

|                                                                  |                                                                                                                                               |       |
|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <sup>1</sup> S <sub>o</sub> - Equivalent Cross Slope (ft/ft)     | S <sub>x</sub> +S <sub>g</sub> *E                                                                                                             | 0.048 |
| Q <sub>sx</sub> - Remaining Flow After Grate Interception (cfs)  | Q-Q <sub>gi</sub>                                                                                                                             | 7.055 |
| S <sub>g</sub> - Gutter Cross Slope (ft/ft)                      | D <sub>g</sub> /W                                                                                                                             | 0.111 |
| <sup>1</sup> L <sub>t</sub> - Effective Interception Length (ft) | 0.60*Q <sub>sx</sub> <sup>0.42</sup> *S <sub>o</sub> <sup>0.30</sup> *(1/n*S <sub>g</sub> ) <sup>0.6</sup>                                    | 37.75 |
| <sup>1</sup> Q <sub>ci</sub> - Intercepted Flow (cfs)            | (1-(1-L <sub>ce</sub> /L <sub>t</sub> ) <sup>1.8</sup> )*Q <sub>sx</sub><br>or Q <sub>sx</sub> if L <sub>t</sub> is less than L <sub>ce</sub> | 3.0   |

## Output (Combination):

## Equation:

## Output (Combination):

|                              |                                          |    |
|------------------------------|------------------------------------------|----|
| Total Intercepted Flow (cfs) | Intercepted (Grate) + Intercepted (Curb) | 14 |
| Bypass Flow (cfs)            | Street Flow - Total Intercepted Flow     | 4  |

<sup>1</sup> Formula referenced from the CCRFCD Manual

<sup>2</sup> Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)



| Curb Inlet Sizing Computation        |  |                                                                                                                                                | <br>SLATER HANIFAN GROUP<br>CONSULTING ENGINEERS & PLANNERS |  |
|--------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Project Name & Number:               |  | EST1905-000: SUNSTONE PHASE 1                                                                                                                  |                                                                                                                                                |  |
| Date:                                |  | 4/25/2019                                                                                                                                      |                                                                                                                                                |  |
| By:                                  |  | CAA                                                                                                                                            |                                                                                                                                                |  |
| <b>Notes:</b>                        |  |                                                                                                                                                |                                                                                                                                                |  |
| Facility ID:                         |  | NC1a                                                                                                                                           |                                                                                                                                                |  |
| Drainage Condition                   |  | Proposed                                                                                                                                       |                                                                                                                                                |  |
| Source of Flow                       |  | Q100 = 1/2 of (EMR2(a) + ECR1(a))                                                                                                              |                                                                                                                                                |  |
| Design Flow (cfs)                    |  | Q100 = 1/2 (3 + 2) = 2.5                                                                                                                       |                                                                                                                                                |  |
| Inlet Type:                          |  | Type CM2 (Sump)                                                                                                                                |                                                                                                                                                |  |
| Inlet Length:                        |  | 5.-ft                                                                                                                                          |                                                                                                                                                |  |
| Number of Grates:                    |  | 1                                                                                                                                              |                                                                                                                                                |  |
| <b>Input:</b>                        |  | <b>Variable:</b>                                                                                                                               | <b>Input:</b>                                                                                                                                  |  |
| Depth at Inlet (ft)                  |  | D                                                                                                                                              | 0.83                                                                                                                                           |  |
| Grate Width (ft)                     |  | W                                                                                                                                              | 1.50                                                                                                                                           |  |
| Length of Grate (ft)                 |  | L <sub>g</sub>                                                                                                                                 | 2.50                                                                                                                                           |  |
| Length of Curb Opening (ft)          |  | L <sub>c</sub>                                                                                                                                 | 5.00                                                                                                                                           |  |
| Height of Curb Opening (ft)          |  | H                                                                                                                                              | 0.50                                                                                                                                           |  |
| Weir Coef. - Curb Opening            |  | W <sub>c</sub>                                                                                                                                 | 2.3                                                                                                                                            |  |
| Weir Coef. - Grate                   |  | W <sub>g</sub>                                                                                                                                 | 3.0                                                                                                                                            |  |
| Orifice Coef.                        |  | O <sub>c</sub>                                                                                                                                 | 0.67                                                                                                                                           |  |
| Grate Coef.                          |  | G <sub>c</sub>                                                                                                                                 | 0.60                                                                                                                                           |  |
| Clogging Factor - Grate (%)          |  | CF <sub>g</sub>                                                                                                                                | 50                                                                                                                                             |  |
| Clogging Factor - Curb (%)           |  | CF <sub>c</sub>                                                                                                                                | 50                                                                                                                                             |  |
| <b>Output (Grate):</b>               |  | <b>Equation:</b>                                                                                                                               | <b>Output (Grate):</b>                                                                                                                         |  |
| Effective Weir Length (ft)           |  | 2*W+L <sub>g</sub>                                                                                                                             | 5.50                                                                                                                                           |  |
| Adjusted Effective Weir Length (ft)  |  | 2*(1-CF <sub>g</sub> /100)*W+(1-CF <sub>g</sub> /100)*L <sub>g</sub>                                                                           | 2.75                                                                                                                                           |  |
| Grate Open Area (sf)                 |  | W*L <sub>g</sub>                                                                                                                               | 3.75                                                                                                                                           |  |
| Adjusted Grate Open Area (sf)        |  | Grate Open Area * G <sub>c</sub> *(1-CF <sub>g</sub> /100)                                                                                     | 1.13                                                                                                                                           |  |
| Controlling Flow Type (weir/orifice) |  | If D<1.792*(Adj. Grate Open Area/Adj. Eff. Length)<br>use weir, else orifice                                                                   | orifice                                                                                                                                        |  |
| Intercepted Flow (cfs)               |  | weir: W <sub>g</sub> *(Adj. Eff. Weir Length)*D <sup>1.5</sup><br>orifice: O <sub>c</sub> *(Adj. Grate Open Area)*(64.4*D) <sup>0.5</sup>      | 5.5                                                                                                                                            |  |
| <b>Output (Curb):</b>                |  | <b>Equation:</b>                                                                                                                               | <b>Output (Curb):</b>                                                                                                                          |  |
| Effective Weir Length (ft)           |  | L+1.8*W                                                                                                                                        | 7.70                                                                                                                                           |  |
| Adjusted Effective Weir Length (ft)  |  | L+1.8(1-CF <sub>c</sub> /100)*W                                                                                                                | 6.41                                                                                                                                           |  |
| Curb Open Area (sf)                  |  | L*H                                                                                                                                            | 2.50                                                                                                                                           |  |
| Adjusted Curb Open Area (sf)         |  | Curb Open Area * (1-CF <sub>c</sub> /100)                                                                                                      | 1.25                                                                                                                                           |  |
| Controlling Flow Type (weir/orifice) |  | If D<H, weir, else orifice                                                                                                                     | orifice                                                                                                                                        |  |
| Intercepted Flow (cfs)               |  | weir: W <sub>c</sub> *(Adj. Eff. Weir Length)*D <sup>1.5</sup><br>orifice: O <sub>c</sub> *(Adj. Curb Open Area)*(64.4*(D-H/2)) <sup>0.5</sup> | 6.11                                                                                                                                           |  |
| <b>Output (Total):</b>               |  | <b>Equation:</b>                                                                                                                               | <b>Output (Total):</b>                                                                                                                         |  |
| Capacity Intercepted Flow (cfs)      |  | Intercepted (Grate) + Intercepted (Curb)                                                                                                       | 11.6                                                                                                                                           |  |



| Curb Inlet Sizing Computation        |                                                                                                                                                | <br>SLATER<br>HANIFAN<br>GROUP<br>CONSULTING ENGINEERS & PLANNERS |  |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Project Name & Number:               | EST1905-000: SUNSTONE PHASE 1                                                                                                                  |                                                                                                                                                      |  |
| Date:                                | 4/25/2019                                                                                                                                      |                                                                                                                                                      |  |
| By:                                  | CAA                                                                                                                                            |                                                                                                                                                      |  |
| <b>Notes:</b>                        |                                                                                                                                                |                                                                                                                                                      |  |
| Facility ID:                         | NC1b                                                                                                                                           |                                                                                                                                                      |  |
| Drainage Condition                   | Proposed                                                                                                                                       |                                                                                                                                                      |  |
| Source of Flow                       | Q100 = 1/2 of (EMR2(a) + ECR1(a))                                                                                                              |                                                                                                                                                      |  |
| Design Flow (cfs)                    | Q100 = 1/2 (3 + 2) = 2.5                                                                                                                       |                                                                                                                                                      |  |
| Inlet Type:                          | Type CM2 (Sump)                                                                                                                                |                                                                                                                                                      |  |
| Inlet Length:                        | 10.-ft                                                                                                                                         |                                                                                                                                                      |  |
| Number of Grates:                    | 3                                                                                                                                              |                                                                                                                                                      |  |
| <b>Input:</b>                        | <b>Variable:</b>                                                                                                                               | <b>Input:</b>                                                                                                                                        |  |
| Depth at Inlet (ft)                  | D                                                                                                                                              | 0.83                                                                                                                                                 |  |
| Grate Width (ft)                     | W                                                                                                                                              | 1.50                                                                                                                                                 |  |
| Length of Grate (ft)                 | L <sub>g</sub>                                                                                                                                 | 7.50                                                                                                                                                 |  |
| Length of Curb Opening (ft)          | L <sub>c</sub>                                                                                                                                 | 10.00                                                                                                                                                |  |
| Height of Curb Opening (ft)          | H                                                                                                                                              | 0.50                                                                                                                                                 |  |
| Weir Coef. - Curb Opening            | W <sub>c</sub>                                                                                                                                 | 2.3                                                                                                                                                  |  |
| Weir Coef. - Grate                   | W <sub>g</sub>                                                                                                                                 | 3.0                                                                                                                                                  |  |
| Orifice Coef.                        | O <sub>c</sub>                                                                                                                                 | 0.67                                                                                                                                                 |  |
| Grate Coef.                          | G <sub>c</sub>                                                                                                                                 | 0.60                                                                                                                                                 |  |
| Clogging Factor - Grate (%)          | CF <sub>g</sub>                                                                                                                                | 50                                                                                                                                                   |  |
| Clogging Factor - Curb (%)           | CF <sub>c</sub>                                                                                                                                | 50                                                                                                                                                   |  |
| <b>Output (Grate):</b>               | <b>Equation:</b>                                                                                                                               | <b>Output (Grate):</b>                                                                                                                               |  |
| Effective Weir Length (ft)           | 2*W+L <sub>g</sub>                                                                                                                             | 10.50                                                                                                                                                |  |
| Adjusted Effective Weir Length (ft)  | 2*(1-CF <sub>g</sub> /100)*W+(1-CF <sub>g</sub> /100)*L <sub>g</sub>                                                                           | 5.25                                                                                                                                                 |  |
| Grate Open Area (sf)                 | W*L <sub>g</sub>                                                                                                                               | 11.25                                                                                                                                                |  |
| Adjusted Grate Open Area (sf)        | Grate Open Area * G <sub>c</sub> *(1-CF <sub>g</sub> /100)                                                                                     | 3.38                                                                                                                                                 |  |
| Controlling Flow Type (weir/orifice) | If D<1.792*(Adj. Grate Open Area/Adj. Eff. Length)<br>use weir, else orifice                                                                   | weir                                                                                                                                                 |  |
| Intercepted Flow (cfs)               | weir: W <sub>g</sub> *(Adj. Eff. Weir Length)*D <sup>1.5</sup><br>orifice: O <sub>c</sub> *(Adj. Grate Open Area)*(64.4*D) <sup>0.5</sup>      | 11.9                                                                                                                                                 |  |
| <b>Output (Curb):</b>                | <b>Equation:</b>                                                                                                                               | <b>Output (Curb):</b>                                                                                                                                |  |
| Effective Weir Length (ft)           | L+1.8*W                                                                                                                                        | 12.70                                                                                                                                                |  |
| Adjusted Effective Weir Length (ft)  | L+1.8(1-CF <sub>c</sub> /100)*W                                                                                                                | 11.41                                                                                                                                                |  |
| Curb Open Area (sf)                  | L*H                                                                                                                                            | 5.00                                                                                                                                                 |  |
| Adjusted Curb Open Area (sf)         | Curb Open Area * (1-CF <sub>c</sub> /100)                                                                                                      | 2.50                                                                                                                                                 |  |
| Controlling Flow Type (weir/orifice) | If D<H, weir, else orifice                                                                                                                     | orifice                                                                                                                                              |  |
| Intercepted Flow (cfs)               | weir: W <sub>c</sub> *(Adj. Eff. Weir Length)*D <sup>1.5</sup><br>orifice: O <sub>c</sub> *(Adj. Curb Open Area)*(64.4*(D-H/2)) <sup>0.5</sup> | 12.22                                                                                                                                                |  |
| <b>Output (Total):</b>               | <b>Equation:</b>                                                                                                                               | <b>Output (Total):</b>                                                                                                                               |  |
| Capacity Intercepted Flow (cfs)      | Intercepted (Grate) + Intercepted (Curb)                                                                                                       | 24.1                                                                                                                                                 |  |



| Curb Inlet Sizing Computation                                                       |                                                                                                                                                              |                              |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Project Name & Number:                                                              | EST1905-000: SUNSTONE PHASE 1                                                                                                                                |                              |
| Date:                                                                               | 4/25/2019                                                                                                                                                    |                              |
| By:                                                                                 | CAA                                                                                                                                                          |                              |
|  |                                                                                                                                                              |                              |
| <b>Notes:</b>                                                                       |                                                                                                                                                              |                              |
| Facility ID:                                                                        | NC2                                                                                                                                                          |                              |
| Drainage Condition:                                                                 | Proposed                                                                                                                                                     |                              |
| Source of Flow:                                                                     | Q100 = ECR1(b)                                                                                                                                               |                              |
| Inlet Type:                                                                         | Type CM2 (Continuous Grade)                                                                                                                                  |                              |
| Inlet Length:                                                                       | 7.5-ft                                                                                                                                                       |                              |
| Number of Grates                                                                    | 2                                                                                                                                                            |                              |
| <b>Input:</b>                                                                       | <b>Variable:</b>                                                                                                                                             | <b>Input:</b>                |
| Street Flow (cfs)                                                                   | Q                                                                                                                                                            | 3.0                          |
| Longitudinal Slope (ft/ft)                                                          | S <sub>o</sub>                                                                                                                                               | 0.0206                       |
| Manning's Coefficient                                                               | n                                                                                                                                                            | 0.016                        |
| Street Flow Velocity (fps)                                                          | V                                                                                                                                                            | 2.64                         |
| Street Flow Depth (ft)                                                              | D                                                                                                                                                            | 0.27                         |
| Street Cross Slope (ft/ft)                                                          | S <sub>x</sub>                                                                                                                                               | 0.02                         |
| Grate Width (ft)                                                                    | W                                                                                                                                                            | 1.5                          |
| Grate Depression (in)                                                               | D <sub>g</sub>                                                                                                                                               | 2.0                          |
| Length of Grate (ft)                                                                | L <sub>g</sub>                                                                                                                                               | 5.0                          |
| Length of Curb Opening (ft)                                                         | L <sub>c</sub>                                                                                                                                               | 7.50                         |
| Clogging Factor - Grate (%)                                                         | CF <sub>g</sub>                                                                                                                                              | 50%                          |
| Clogging Factor - Curb (%)                                                          | CF <sub>c</sub>                                                                                                                                              | 50%                          |
| Effective Grate Length (ft)                                                         | L <sub>ge</sub>                                                                                                                                              | 2.5                          |
| Effective Curb Opening Length (ft)                                                  | L <sub>ce</sub>                                                                                                                                              | 3.75                         |
| <b>Output (Grate):</b>                                                              | <b>Equation:</b>                                                                                                                                             | <b>Output (Grate):</b>       |
| <sup>1</sup> R <sub>f</sub> - Frontal Flow Factor                                   | 1-0.09*(V-V <sub>x</sub> ) if V>V <sub>x</sub> ; else Frontal Flow Factor=1                                                                                  | 1.00                         |
| <sup>2</sup> V <sub>o</sub> - Splash Over Velocity (fps)                            | V <sub>x</sub> =p+q*L <sub>g</sub> -r*L <sub>ge</sub> <sup>2</sup> +sy*L <sub>ge</sub> <sup>3</sup> ; where<br>p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate) | 6.58                         |
| <sup>1</sup> E - Grate Flow Ratio                                                   | Frontal Flow/Side Flow                                                                                                                                       | 0.60                         |
| <sup>2</sup> Q <sub>w</sub> - Frontal Flow (cfs)                                    | Q <sub>w</sub> = Q[1-(1-(W/T)) <sup>2.67</sup> ]                                                                                                             | 1.80                         |
| <sup>1</sup> Q <sub>s</sub> - Side Flow (cfs)                                       | Q <sub>s</sub> = Q-Q <sub>w</sub>                                                                                                                            | 1.2                          |
| <sup>1</sup> T - Side Flow Spread (ft)                                              | (D-D <sub>g</sub> )/S <sub>x</sub>                                                                                                                           | 5.17                         |
| <sup>1</sup> R <sub>s</sub> - Side Flow Factor                                      | 1/(1+(0.15*V <sup>1.8</sup> )/(S <sub>x</sub> *L <sub>ge</sub> <sup>2.3</sup> ))                                                                             | 0.16                         |
| <sup>1</sup> Q <sub>gi</sub> - Intercepted Flow (cfs)                               | (R <sub>f</sub> *E+R <sub>s</sub> *(1-E))*Q                                                                                                                  | 2.0                          |
| <b>Output (Curb):</b>                                                               | <b>Equation:</b>                                                                                                                                             | <b>Output (Curb):</b>        |
| <sup>1</sup> S <sub>e</sub> - Equivalent Cross Slope (ft/ft)                        | S <sub>x</sub> +S <sub>g</sub> *E                                                                                                                            | 0.087                        |
| Q <sub>sx</sub> - Remaining Flow After Grate Interception (cfs)                     | Q-Q <sub>gi</sub>                                                                                                                                            | 1.008                        |
| S <sub>g</sub> - Gutter Cross Slope (ft/ft)                                         | D <sub>g</sub> /W                                                                                                                                            | 0.111                        |
| <sup>1</sup> L <sub>i</sub> - Effective Interception Length (ft)                    | 0.60*Q <sub>sx</sub> <sup>0.42</sup> *S <sub>o</sub> <sup>0.30</sup> *(1/n*S <sub>e</sub> ) <sup>0.6</sup>                                                   | 9.74                         |
| <sup>1</sup> Q <sub>ci</sub> - Intercepted Flow (cfs)                               | (1-(1-L <sub>ce</sub> /L <sub>i</sub> ) <sup>1.5</sup> )*Q <sub>sx</sub><br>or Q <sub>sx</sub> if L <sub>i</sub> is less than L <sub>ce</sub>                | 0.6                          |
| <b>Output (Combination):</b>                                                        | <b>Equation:</b>                                                                                                                                             | <b>Output (Combination):</b> |
| Total Intercepted Flow (cfs)                                                        | Intercepted (Grate) + Intercepted (Curb)                                                                                                                     | 3                            |
| Bypass Flow (cfs)                                                                   | Street Flow - Total Intercepted Flow                                                                                                                         | 0                            |

<sup>1</sup> Formula referenced from the CCRFCD Manual  
<sup>2</sup> Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)





**SLATER  
HANIFAN  
GROUP**  
CONSULTING ENGINEERS & PLANNERS

\\shgfs1\Data\EST1905-000 Sunstone PH1 TDS\Drainage\Technical Study\Calcs\EST1905-000 Drop Inlet Sizing v180819.xlsx



| Curb Inlet Sizing Computation        |  |                                                                                                                                                | <br>SLATER HANIFAN GROUP<br>CONSULTING ENGINEERS & PLANNERS |  |
|--------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Project Name & Number:               |  | EST1905-000: SUNSTONE PHASE 1                                                                                                                  |                                                                                                                                                |  |
| Date:                                |  | 4/25/2019                                                                                                                                      |                                                                                                                                                |  |
| By:                                  |  | CAA                                                                                                                                            |                                                                                                                                                |  |
| <b>Notes:</b>                        |  |                                                                                                                                                |                                                                                                                                                |  |
| Facility ID:                         |  | NC3b                                                                                                                                           |                                                                                                                                                |  |
| Drainage Condition                   |  | Proposed                                                                                                                                       |                                                                                                                                                |  |
| Source of Flow                       |  | Q100 = ECR1(d)                                                                                                                                 |                                                                                                                                                |  |
| Design Flow (cfs)                    |  | Q100 = 11                                                                                                                                      |                                                                                                                                                |  |
| Inlet Type:                          |  | Type CM2 (Sump)                                                                                                                                |                                                                                                                                                |  |
| Inlet Length:                        |  | 5.-ft                                                                                                                                          |                                                                                                                                                |  |
| Number of Grates:                    |  | 1                                                                                                                                              |                                                                                                                                                |  |
| <b>Input:</b>                        |  | <b>Variable:</b>                                                                                                                               | <b>Input:</b>                                                                                                                                  |  |
| Depth at Inlet (ft)                  |  | D                                                                                                                                              | 0.83                                                                                                                                           |  |
| Grate Width (ft)                     |  | W                                                                                                                                              | 1.50                                                                                                                                           |  |
| Length of Grate (ft)                 |  | L <sub>g</sub>                                                                                                                                 | 2.50                                                                                                                                           |  |
| Length of Curb Opening (ft)          |  | L <sub>c</sub>                                                                                                                                 | 5.00                                                                                                                                           |  |
| Height of Curb Opening (ft)          |  | H                                                                                                                                              | 0.50                                                                                                                                           |  |
| Weir Coef. - Curb Opening            |  | W <sub>c</sub>                                                                                                                                 | 2.3                                                                                                                                            |  |
| Weir Coef. - Grate                   |  | W <sub>g</sub>                                                                                                                                 | 3.0                                                                                                                                            |  |
| Orifice Coef.                        |  | O <sub>c</sub>                                                                                                                                 | 0.67                                                                                                                                           |  |
| Grate Coef.                          |  | G <sub>c</sub>                                                                                                                                 | 0.60                                                                                                                                           |  |
| Clogging Factor - Grate (%)          |  | CF <sub>g</sub>                                                                                                                                | 50                                                                                                                                             |  |
| Clogging Factor - Curb (%)           |  | CF <sub>c</sub>                                                                                                                                | 50                                                                                                                                             |  |
| <b>Output (Grate):</b>               |  | <b>Equation:</b>                                                                                                                               | <b>Output (Grate):</b>                                                                                                                         |  |
| Effective Weir Length (ft)           |  | 2*W+L <sub>g</sub>                                                                                                                             | 5.50                                                                                                                                           |  |
| Adjusted Effective Weir Length (ft)  |  | 2*(1-CF <sub>g</sub> /100)*W+(1-CF <sub>g</sub> /100)*L <sub>g</sub>                                                                           | 2.75                                                                                                                                           |  |
| Grate Open Area (sf)                 |  | W*L <sub>g</sub>                                                                                                                               | 3.75                                                                                                                                           |  |
| Adjusted Grate Open Area (sf)        |  | Grate Open Area * G <sub>c</sub> *(1-CF <sub>g</sub> /100)                                                                                     | 1.13                                                                                                                                           |  |
| Controlling Flow Type (weir/orifice) |  | If D<1.792*(Adj. Grate Open Area/Adj. Eff. Length)<br>use weir, else orifice                                                                   | orifice                                                                                                                                        |  |
| Intercepted Flow (cfs)               |  | weir: W <sub>g</sub> *(Adj. Eff. Weir Length)*D <sup>1.5</sup><br>orifice: O <sub>c</sub> *(Adj. Grate Open Area)*(64.4*D) <sup>0.5</sup>      | 5.5                                                                                                                                            |  |
| <b>Output (Curb):</b>                |  | <b>Equation:</b>                                                                                                                               | <b>Output (Curb):</b>                                                                                                                          |  |
| Effective Weir Length (ft)           |  | L+1.8*W                                                                                                                                        | 7.70                                                                                                                                           |  |
| Adjusted Effective Weir Length (ft)  |  | L+1.8(1-CF <sub>c</sub> /100)*W                                                                                                                | 6.41                                                                                                                                           |  |
| Curb Open Area (sf)                  |  | L*H                                                                                                                                            | 2.50                                                                                                                                           |  |
| Adjusted Curb Open Area (sf)         |  | Curb Open Area * (1-CF <sub>c</sub> /100)                                                                                                      | 1.25                                                                                                                                           |  |
| Controlling Flow Type (weir/orifice) |  | If D<H, weir, else orifice                                                                                                                     | orifice                                                                                                                                        |  |
| Intercepted Flow (cfs)               |  | weir: W <sub>c</sub> *(Adj. Eff. Weir Length)*D <sup>1.5</sup><br>orifice: O <sub>c</sub> *(Adj. Curb Open Area)*(64.4*(D-H/2)) <sup>0.5</sup> | 6.11                                                                                                                                           |  |
| <b>Output (Total):</b>               |  | <b>Equation:</b>                                                                                                                               | <b>Output (Total):</b>                                                                                                                         |  |
| Capacity Intercepted Flow (cfs)      |  | Intercepted (Grate) + Intercepted (Curb)                                                                                                       | 11.6                                                                                                                                           |  |



## Ditch Calculations



| Proposed Condition Interim Onsite Ditch Summary |                                |                           |              |               |                   |                                                                                      |
|-------------------------------------------------|--------------------------------|---------------------------|--------------|---------------|-------------------|--------------------------------------------------------------------------------------|
| Section ID<br>(Subbasin)                        | Section Description            | Q <sub>100</sub><br>(cfs) | Slope<br>(%) | Depth<br>(ft) | Velocity<br>(fps) | Notes                                                                                |
| EAA1                                            | 25-ft Earthen Trap Chnl 3:1 SS | 260                       | 0.50         | 1.65          | 5.25              | Within subbasin EAA1, but flow based on proposed condition concentration point EC20. |
| EAA2                                            | V-Ditch 3:1 SS                 | 31                        | 2.00         | 1.30          | 6.10              |                                                                                      |
| EPC                                             | V-Ditch 3:1 SS                 | 124                       | 1.00         | 1.41          | 6.18              | Within subbasin EPC, but flow based on proposed condition concentration point EC5.   |
| EPD                                             | V-Ditch 3:1 SS                 | 24                        | 0.50         | 1.53          | 3.40              |                                                                                      |
| EPE1                                            | V-Ditch 3:1 SS                 | 11                        | 0.50         | 1.14          | 2.80              |                                                                                      |
| EPF1                                            | V-Ditch 3:1 SS                 | 13                        | 0.50         | 1.22          | 2.92              |                                                                                      |
| EPF2                                            | V-Ditch 3:1 SS                 | 24                        | 0.50         | 1.53          | 3.40              |                                                                                      |
| EPH1                                            | V-Ditch 3:1 SS                 | 9                         | 0.50         | 1.06          | 2.66              |                                                                                      |
| EPH1                                            | V-Ditch 3:1 SS                 | 21                        | 0.50         | 1.46          | 3.29              |                                                                                      |
| EPJ                                             | V-Ditch 3:1 SS                 | 31                        | 0.50         | 1.48          | 4.70              |                                                                                      |

## Cross Section for EAA1 Prop Int Trap Chnl

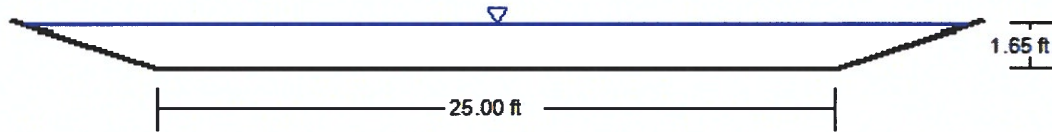
### Project Description

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

### Input Data

|                       |                           |
|-----------------------|---------------------------|
| Roughness Coefficient | 0.025                     |
| Channel Slope         | 0.00500 ft/ft             |
| Normal Depth          | 1.65 ft                   |
| Left Side Slope       | 3.00 ft/ft (H:V)          |
| Right Side Slope      | 3.00 ft/ft (H:V)          |
| Bottom Width          | 25.00 ft                  |
| Discharge             | 260.00 ft <sup>3</sup> /s |

### Cross Section Image



V: 1  
H: 1

## Worksheet for EAA1 Prop Int Trap Chnl

### Project Description

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

### Input Data

|                       |         |             |
|-----------------------|---------|-------------|
| Roughness Coefficient | 0.025   |             |
| Channel Slope         | 0.00500 | ft/ft       |
| Left Side Slope       | 3.00    | ft/ft (H:V) |
| Right Side Slope      | 3.00    | ft/ft (H:V) |
| Bottom Width          | 25.00   | ft          |
| Discharge             | 260.00  | ft³/s       |

### Results

|                  |             |       |
|------------------|-------------|-------|
| Normal Depth     | 1.65        | ft    |
| Flow Area        | 49.51       | ft²   |
| Wetted Perimeter | 35.45       | ft    |
| Hydraulic Radius | 1.40        | ft    |
| Top Width        | 34.92       | ft    |
| Critical Depth   | 1.41        | ft    |
| Critical Slope   | 0.00865     | ft/ft |
| Velocity         | 5.25        | ft/s  |
| Velocity Head    | 0.43        | ft    |
| Specific Energy  | 2.08        | ft    |
| Froude Number    | 0.78        |       |
| Flow Type        | Subcritical |       |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 1.65     | ft    |
| Critical Depth      | 1.41     | ft    |
| Channel Slope       | 0.00500  | ft/ft |



---

## Worksheet for EAA1 Prop Int Trap Chnl

---

### GVF Output Data

Critical Slope

0.00865 ft/ft

## Cross Section for EAA2 Prop Int Earthen Ditch

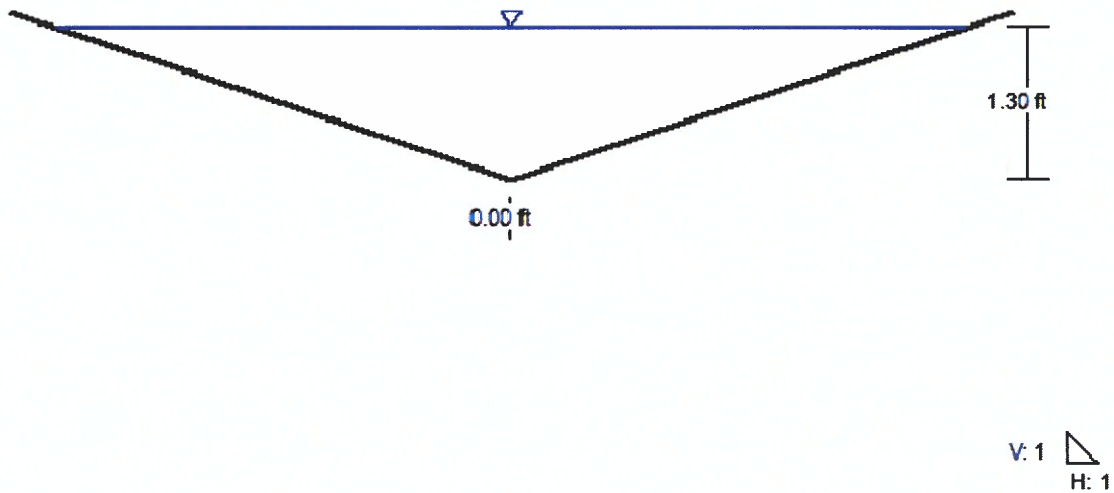
### Project Description

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

### Input Data

|                       |                          |
|-----------------------|--------------------------|
| Roughness Coefficient | 0.025                    |
| Channel Slope         | 0.02000 ft/ft            |
| Normal Depth          | 1.30 ft                  |
| Left Side Slope       | 3.00 ft/ft (H:V)         |
| Right Side Slope      | 3.00 ft/ft (H:V)         |
| Bottom Width          | 0.00 ft                  |
| Discharge             | 31.00 ft <sup>3</sup> /s |

### Cross Section Image



## Worksheet for EAA2 Prop Int Earthen Ditch

### Project Description

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

### Input Data

|                       |         |                    |
|-----------------------|---------|--------------------|
| Roughness Coefficient | 0.025   |                    |
| Channel Slope         | 0.02000 | ft/ft              |
| Left Side Slope       | 3.00    | ft/ft (H:V)        |
| Right Side Slope      | 3.00    | ft/ft (H:V)        |
| Bottom Width          | 0.00    | ft                 |
| Discharge             | 31.00   | ft <sup>3</sup> /s |

### Results

|                  |               |                 |
|------------------|---------------|-----------------|
| Normal Depth     | 1.30          | ft              |
| Flow Area        | 5.09          | ft <sup>2</sup> |
| Wetted Perimeter | 8.23          | ft              |
| Hydraulic Radius | 0.62          | ft              |
| Top Width        | 7.81          | ft              |
| Critical Depth   | 1.46          | ft              |
| Critical Slope   | 0.01085       | ft/ft           |
| Velocity         | 6.10          | ft/s            |
| Velocity Head    | 0.58          | ft              |
| Specific Energy  | 1.88          | ft              |
| Froude Number    | 1.33          |                 |
| Flow Type        | Supercritical |                 |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 1.30     | ft    |
| Critical Depth      | 1.46     | ft    |
| Channel Slope       | 0.02000  | ft/ft |



---

## Worksheet for EAA2 Prop Int Earthen Ditch

---

### GVF Output Data

Critical Slope

0.01085 ft/ft

## Cross Section for EPC Prop Int Earthen Ditch

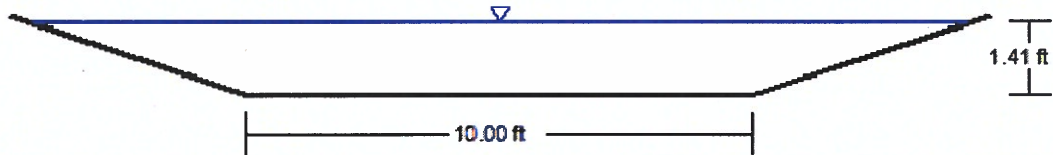
### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

|                       |                              |
|-----------------------|------------------------------|
| Roughness Coefficient | 0.025                        |
| Channel Slope         | 0.01000    ft/ft             |
| Normal Depth          | 1.41    ft                   |
| Left Side Slope       | 3.00    ft/ft (H:V)          |
| Right Side Slope      | 3.00    ft/ft (H:V)          |
| Bottom Width          | 10.00    ft                  |
| Discharge             | 124.00    ft <sup>3</sup> /s |

### Cross Section Image



V: 1  
H: 1

## Worksheet for EPC Prop Int Earthen Ditch

### Project Description

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

### Input Data

|                       |         |                    |
|-----------------------|---------|--------------------|
| Roughness Coefficient | 0.025   |                    |
| Channel Slope         | 0.01000 | ft/ft              |
| Left Side Slope       | 3.00    | ft/ft (H:V)        |
| Right Side Slope      | 3.00    | ft/ft (H:V)        |
| Bottom Width          | 10.00   | ft                 |
| Discharge             | 124.00  | ft <sup>3</sup> /s |

### Results

|                  |               |                 |
|------------------|---------------|-----------------|
| Normal Depth     | 1.41          | ft              |
| Flow Area        | 20.06         | ft <sup>2</sup> |
| Wetted Perimeter | 18.92         | ft              |
| Hydraulic Radius | 1.06          | ft              |
| Top Width        | 18.46         | ft              |
| Critical Depth   | 1.45          | ft              |
| Critical Slope   | 0.00909       | ft/ft           |
| Velocity         | 6.18          | ft/s            |
| Velocity Head    | 0.59          | ft              |
| Specific Energy  | 2.00          | ft              |
| Froude Number    | 1.05          |                 |
| Flow Type        | Supercritical |                 |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 1.41     | ft    |
| Critical Depth      | 1.45     | ft    |
| Channel Slope       | 0.01000  | ft/ft |



---

## Worksheet for EPC Prop Int Earthen Ditch

---

### GVF Output Data

Critical Slope

0.00909 ft/ft

## Cross Section for EPD Prop Int Earthen Ditch

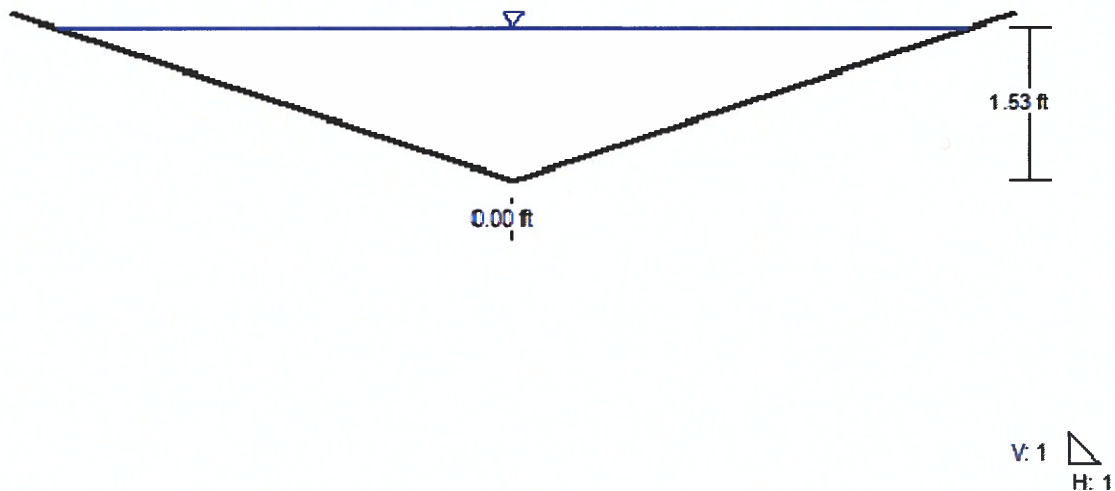
### Project Description

Friction Method      Manning Formula  
Solve For              Normal Depth

### Input Data

|                       |         |                    |
|-----------------------|---------|--------------------|
| Roughness Coefficient | 0.025   |                    |
| Channel Slope         | 0.00500 | ft/ft              |
| Normal Depth          | 1.53    | ft                 |
| Left Side Slope       | 3.00    | ft/ft (H:V)        |
| Right Side Slope      | 3.00    | ft/ft (H:V)        |
| Bottom Width          | 0.00    | ft                 |
| Discharge             | 24.00   | ft <sup>3</sup> /s |

### Cross Section Image



## Worksheet for EPD Prop Int Earthen Ditch

### Project Description

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

### Input Data

|                       |         |                    |
|-----------------------|---------|--------------------|
| Roughness Coefficient | 0.025   |                    |
| Channel Slope         | 0.00500 | ft/ft              |
| Left Side Slope       | 3.00    | ft/ft (H:V)        |
| Right Side Slope      | 3.00    | ft/ft (H:V)        |
| Bottom Width          | 0.00    | ft                 |
| Discharge             | 24.00   | ft <sup>3</sup> /s |

### Results

|                  |             |                 |
|------------------|-------------|-----------------|
| Normal Depth     | 1.53        | ft              |
| Flow Area        | 7.06        | ft <sup>2</sup> |
| Wetted Perimeter | 9.70        | ft              |
| Hydraulic Radius | 0.73        | ft              |
| Top Width        | 9.20        | ft              |
| Critical Depth   | 1.32        | ft              |
| Critical Slope   | 0.01123     | ft/ft           |
| Velocity         | 3.40        | ft/s            |
| Velocity Head    | 0.18        | ft              |
| Specific Energy  | 1.71        | ft              |
| Froude Number    | 0.68        |                 |
| Flow Type        | Subcritical |                 |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 1.53     | ft    |
| Critical Depth      | 1.32     | ft    |
| Channel Slope       | 0.00500  | ft/ft |



---

## Worksheet for EPD Prop Int Earthen Ditch

---

### GVF Output Data

Critical Slope

0.01123 ft/ft

## Cross Section for EPE1 Prop Int Earthen Ditch

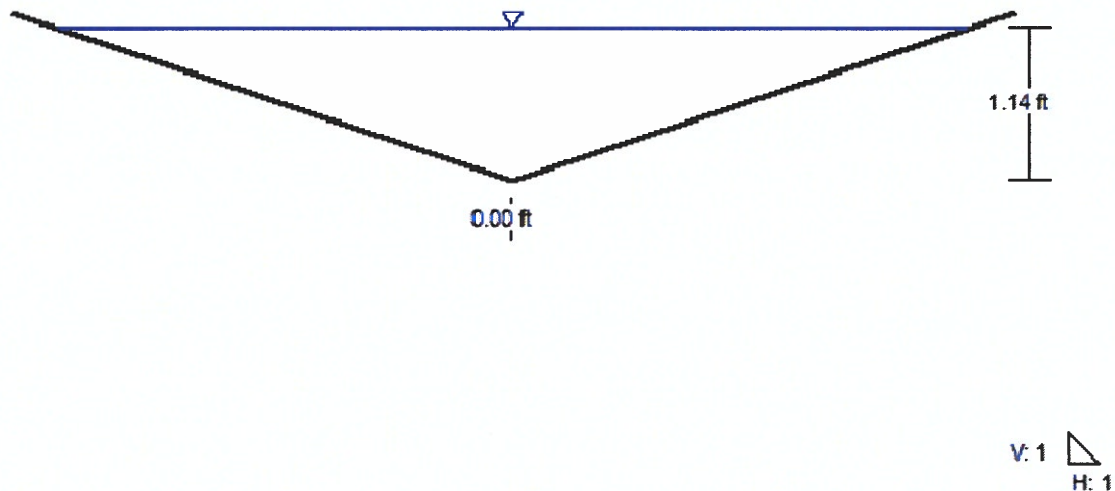
### Project Description

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

### Input Data

|                       |                          |
|-----------------------|--------------------------|
| Roughness Coefficient | 0.025                    |
| Channel Slope         | 0.00500 ft/ft            |
| Normal Depth          | 1.14 ft                  |
| Left Side Slope       | 3.00 ft/ft (H:V)         |
| Right Side Slope      | 3.00 ft/ft (H:V)         |
| Bottom Width          | 0.00 ft                  |
| Discharge             | 11.00 ft <sup>3</sup> /s |

### Cross Section Image



## Worksheet for EPE1 Prop Int Earthen Ditch

### Project Description

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

### Input Data

|                       |         |                    |
|-----------------------|---------|--------------------|
| Roughness Coefficient | 0.025   |                    |
| Channel Slope         | 0.00500 | ft/ft              |
| Left Side Slope       | 3.00    | ft/ft (H:V)        |
| Right Side Slope      | 3.00    | ft/ft (H:V)        |
| Bottom Width          | 0.00    | ft                 |
| Discharge             | 11.00   | ft <sup>3</sup> /s |

### Results

|                  |             |                 |
|------------------|-------------|-----------------|
| Normal Depth     | 1.14        | ft              |
| Flow Area        | 3.93        | ft <sup>2</sup> |
| Wetted Perimeter | 7.24        | ft              |
| Hydraulic Radius | 0.54        | ft              |
| Top Width        | 6.87        | ft              |
| Critical Depth   | 0.96        | ft              |
| Critical Slope   | 0.01246     | ft/ft           |
| Velocity         | 2.80        | ft/s            |
| Velocity Head    | 0.12        | ft              |
| Specific Energy  | 1.27        | ft              |
| Froude Number    | 0.65        |                 |
| Flow Type        | Subcritical |                 |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 1.14     | ft    |
| Critical Depth      | 0.96     | ft    |
| Channel Slope       | 0.00500  | ft/ft |



---

**Worksheet for EPE1 Prop Int Earthen Ditch**

---

**GVF Output Data**

Critical Slope 0.01246 ft/ft

## Cross Section for EPF1 Prop Int Earthen Ditch

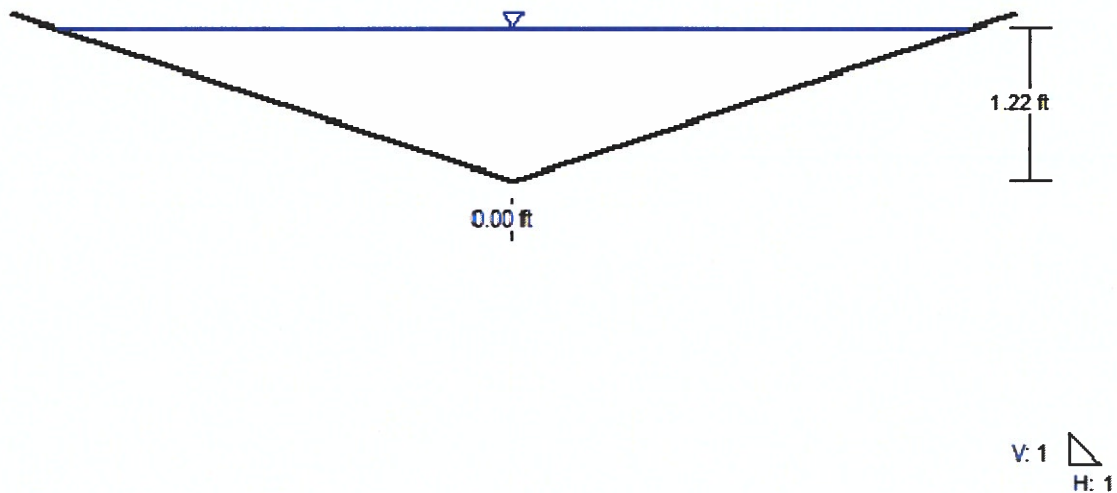
### Project Description

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

### Input Data

|                       |                          |
|-----------------------|--------------------------|
| Roughness Coefficient | 0.025                    |
| Channel Slope         | 0.00500 ft/ft            |
| Normal Depth          | 1.22 ft                  |
| Left Side Slope       | 3.00 ft/ft (H:V)         |
| Right Side Slope      | 3.00 ft/ft (H:V)         |
| Bottom Width          | 0.00 ft                  |
| Discharge             | 13.00 ft <sup>3</sup> /s |

### Cross Section Image



## Worksheet for EPF1 Prop Int Earthen Ditch

### Project Description

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

### Input Data

|                       |         |                    |
|-----------------------|---------|--------------------|
| Roughness Coefficient | 0.025   |                    |
| Channel Slope         | 0.00500 | ft/ft              |
| Left Side Slope       | 3.00    | ft/ft (H:V)        |
| Right Side Slope      | 3.00    | ft/ft (H:V)        |
| Bottom Width          | 0.00    | ft                 |
| Discharge             | 13.00   | ft <sup>3</sup> /s |

### Results

|                  |             |                 |
|------------------|-------------|-----------------|
| Normal Depth     | 1.22        | ft              |
| Flow Area        | 4.46        | ft <sup>2</sup> |
| Wetted Perimeter | 7.71        | ft              |
| Hydraulic Radius | 0.58        | ft              |
| Top Width        | 7.31        | ft              |
| Critical Depth   | 1.03        | ft              |
| Critical Slope   | 0.01218     | ft/ft           |
| Velocity         | 2.92        | ft/s            |
| Velocity Head    | 0.13        | ft              |
| Specific Energy  | 1.35        | ft              |
| Froude Number    | 0.66        |                 |
| Flow Type        | Subcritical |                 |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 1.22     | ft    |
| Critical Depth      | 1.03     | ft    |
| Channel Slope       | 0.00500  | ft/ft |



---

## Worksheet for EPF1 Prop Int Earthen Ditch

---

### GVF Output Data

Critical Slope

0.01218 ft/ft

## Cross Section for EPF2 Prop Int Earthen Ditch

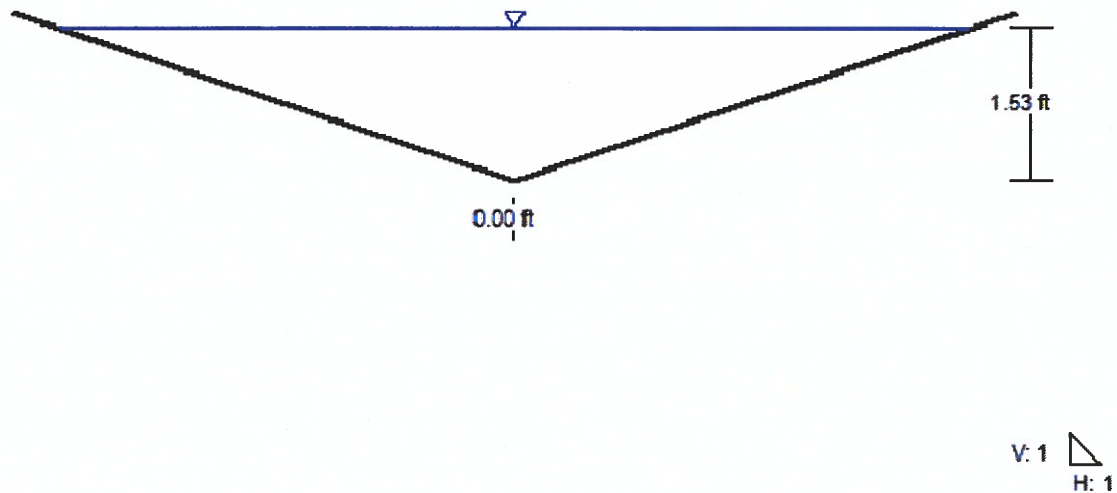
### Project Description

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

### Input Data

|                       |                          |
|-----------------------|--------------------------|
| Roughness Coefficient | 0.025                    |
| Channel Slope         | 0.00500 ft/ft            |
| Normal Depth          | 1.53 ft                  |
| Left Side Slope       | 3.00 ft/ft (H:V)         |
| Right Side Slope      | 3.00 ft/ft (H:V)         |
| Bottom Width          | 0.00 ft                  |
| Discharge             | 24.00 ft <sup>3</sup> /s |

### Cross Section Image



## Worksheet for EPF2 Prop Int Earthen Ditch

### Project Description

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

### Input Data

|                       |         |             |
|-----------------------|---------|-------------|
| Roughness Coefficient | 0.025   |             |
| Channel Slope         | 0.00500 | ft/ft       |
| Left Side Slope       | 3.00    | ft/ft (H:V) |
| Right Side Slope      | 3.00    | ft/ft (H:V) |
| Bottom Width          | 0.00    | ft          |
| Discharge             | 24.00   | ft³/s       |

### Results

|                  |             |       |
|------------------|-------------|-------|
| Normal Depth     | 1.53        | ft    |
| Flow Area        | 7.06        | ft²   |
| Wetted Perimeter | 9.70        | ft    |
| Hydraulic Radius | 0.73        | ft    |
| Top Width        | 9.20        | ft    |
| Critical Depth   | 1.32        | ft    |
| Critical Slope   | 0.01123     | ft/ft |
| Velocity         | 3.40        | ft/s  |
| Velocity Head    | 0.18        | ft    |
| Specific Energy  | 1.71        | ft    |
| Froude Number    | 0.68        |       |
| Flow Type        | Subcritical |       |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 1.53     | ft    |
| Critical Depth      | 1.32     | ft    |
| Channel Slope       | 0.00500  | ft/ft |



---

## Worksheet for EPF2 Prop Int Earthen Ditch

---

### GVF Output Data

Critical Slope 0.01123 ft/ft

## Cross Section for EPI1 Prop Int Earthen Ditch

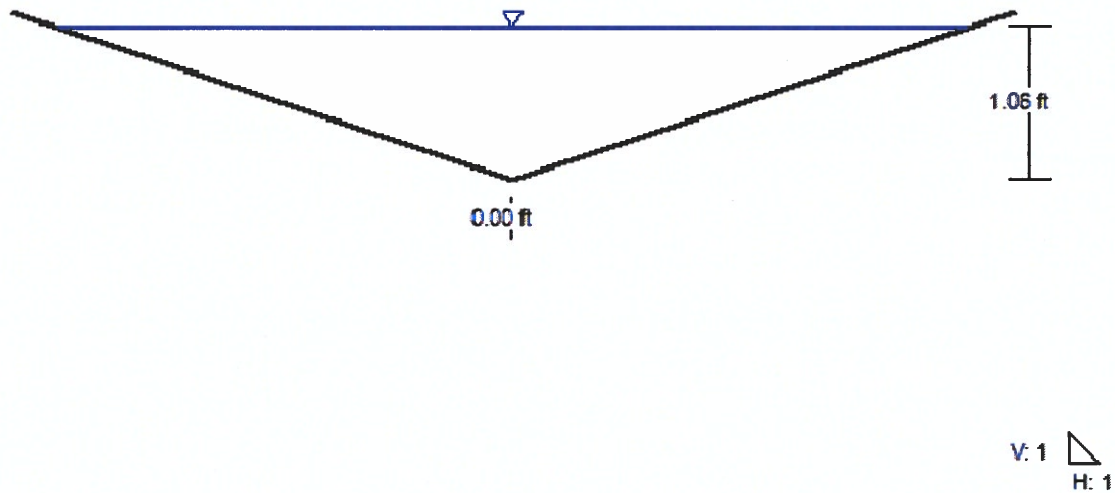
### Project Description

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

### Input Data

|                       |                         |
|-----------------------|-------------------------|
| Roughness Coefficient | 0.025                   |
| Channel Slope         | 0.00500 ft/ft           |
| Normal Depth          | 1.06 ft                 |
| Left Side Slope       | 3.00 ft/ft (H:V)        |
| Right Side Slope      | 3.00 ft/ft (H:V)        |
| Bottom Width          | 0.00 ft                 |
| Discharge             | 9.00 ft <sup>3</sup> /s |

### Cross Section Image



## Worksheet for EPI1 Prop Int Earthen Ditch

### Project Description

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

### Input Data

|                       |         |                    |
|-----------------------|---------|--------------------|
| Roughness Coefficient | 0.025   |                    |
| Channel Slope         | 0.00500 | ft/ft              |
| Left Side Slope       | 3.00    | ft/ft (H:V)        |
| Right Side Slope      | 3.00    | ft/ft (H:V)        |
| Bottom Width          | 0.00    | ft                 |
| Discharge             | 9.00    | ft <sup>3</sup> /s |

### Results

|                  |             |                 |
|------------------|-------------|-----------------|
| Normal Depth     | 1.06        | ft              |
| Flow Area        | 3.38        | ft <sup>2</sup> |
| Wetted Perimeter | 6.72        | ft              |
| Hydraulic Radius | 0.50        | ft              |
| Top Width        | 6.37        | ft              |
| Critical Depth   | 0.89        | ft              |
| Critical Slope   | 0.01280     | ft/ft           |
| Velocity         | 2.66        | ft/s            |
| Velocity Head    | 0.11        | ft              |
| Specific Energy  | 1.17        | ft              |
| Froude Number    | 0.64        |                 |
| Flow Type        | Subcritical |                 |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 1.06     | ft    |
| Critical Depth      | 0.89     | ft    |
| Channel Slope       | 0.00500  | ft/ft |



---

## Worksheet for EPI1 Prop Int Earthen Ditch

---

### GVF Output Data

Critical Slope

0.01280 ft/ft

## Cross Section for EPH1 Prop Int Earthen Ditch

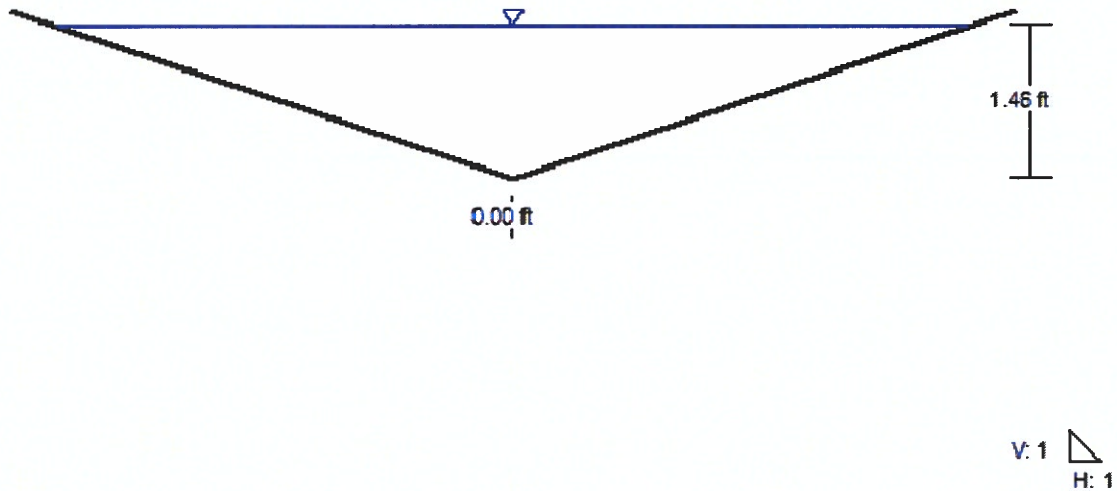
### Project Description

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

### Input Data

|                       |         |                    |
|-----------------------|---------|--------------------|
| Roughness Coefficient | 0.025   |                    |
| Channel Slope         | 0.00500 | ft/ft              |
| Normal Depth          | 1.46    | ft                 |
| Left Side Slope       | 3.00    | ft/ft (H:V)        |
| Right Side Slope      | 3.00    | ft/ft (H:V)        |
| Bottom Width          | 0.00    | ft                 |
| Discharge             | 21.00   | ft <sup>3</sup> /s |

### Cross Section Image



## Worksheet for EPH1 Prop Int Earthen Ditch

### Project Description

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

### Input Data

|                       |         |             |
|-----------------------|---------|-------------|
| Roughness Coefficient | 0.025   |             |
| Channel Slope         | 0.00500 | ft/ft       |
| Left Side Slope       | 3.00    | ft/ft (H:V) |
| Right Side Slope      | 3.00    | ft/ft (H:V) |
| Bottom Width          | 0.00    | ft          |
| Discharge             | 21.00   | ft³/s       |

### Results

|                  |             |       |
|------------------|-------------|-------|
| Normal Depth     | 1.46        | ft    |
| Flow Area        | 6.39        | ft²   |
| Wetted Perimeter | 9.23        | ft    |
| Hydraulic Radius | 0.69        | ft    |
| Top Width        | 8.75        | ft    |
| Critical Depth   | 1.25        | ft    |
| Critical Slope   | 0.01143     | ft/ft |
| Velocity         | 3.29        | ft/s  |
| Velocity Head    | 0.17        | ft    |
| Specific Energy  | 1.63        | ft    |
| Froude Number    | 0.68        |       |
| Flow Type        | Subcritical |       |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 1.46     | ft    |
| Critical Depth      | 1.25     | ft    |
| Channel Slope       | 0.00500  | ft/ft |



---

## Worksheet for EPH1 Prop Int Earthen Ditch

---

### GVF Output Data

Critical Slope

0.01143 ft/ft

## Cross Section for EPJ Prop Int Earthen Ditch

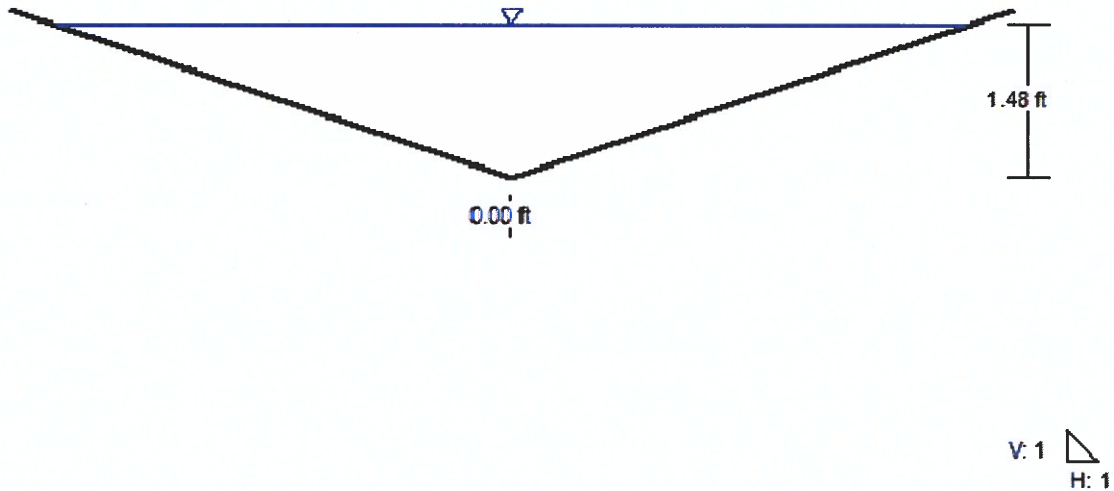
### Project Description

Friction Method                      Manning Formula  
Solve For                                Normal Depth

### Input Data

|                       |                          |
|-----------------------|--------------------------|
| Roughness Coefficient | 0.025                    |
| Channel Slope         | 0.01000 ft/ft            |
| Normal Depth          | 1.48 ft                  |
| Left Side Slope       | 3.00 ft/ft (H:V)         |
| Right Side Slope      | 3.00 ft/ft (H:V)         |
| Bottom Width          | 0.00 ft                  |
| Discharge             | 31.00 ft <sup>3</sup> /s |

### Cross Section Image



## Worksheet for EPJ Prop Int Earthen Ditch

### Project Description

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

### Input Data

|                       |         |             |
|-----------------------|---------|-------------|
| Roughness Coefficient | 0.025   |             |
| Channel Slope         | 0.01000 | ft/ft       |
| Left Side Slope       | 3.00    | ft/ft (H:V) |
| Right Side Slope      | 3.00    | ft/ft (H:V) |
| Bottom Width          | 0.00    | ft          |
| Discharge             | 31.00   | ft³/s       |

### Results

|                  |             |       |
|------------------|-------------|-------|
| Normal Depth     | 1.48        | ft    |
| Flow Area        | 6.59        | ft²   |
| Wetted Perimeter | 9.38        | ft    |
| Hydraulic Radius | 0.70        | ft    |
| Top Width        | 8.90        | ft    |
| Critical Depth   | 1.46        | ft    |
| Critical Slope   | 0.01085     | ft/ft |
| Velocity         | 4.70        | ft/s  |
| Velocity Head    | 0.34        | ft    |
| Specific Energy  | 1.83        | ft    |
| Froude Number    | 0.96        |       |
| Flow Type        | Subcritical |       |

### GVF Input Data

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

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 1.48     | ft    |
| Critical Depth      | 1.46     | ft    |
| Channel Slope       | 0.01000  | ft/ft |



---

## Worksheet for EPJ Prop Int Earthen Ditch

---

### GVF Output Data

Critical Slope

0.01085 ft/ft

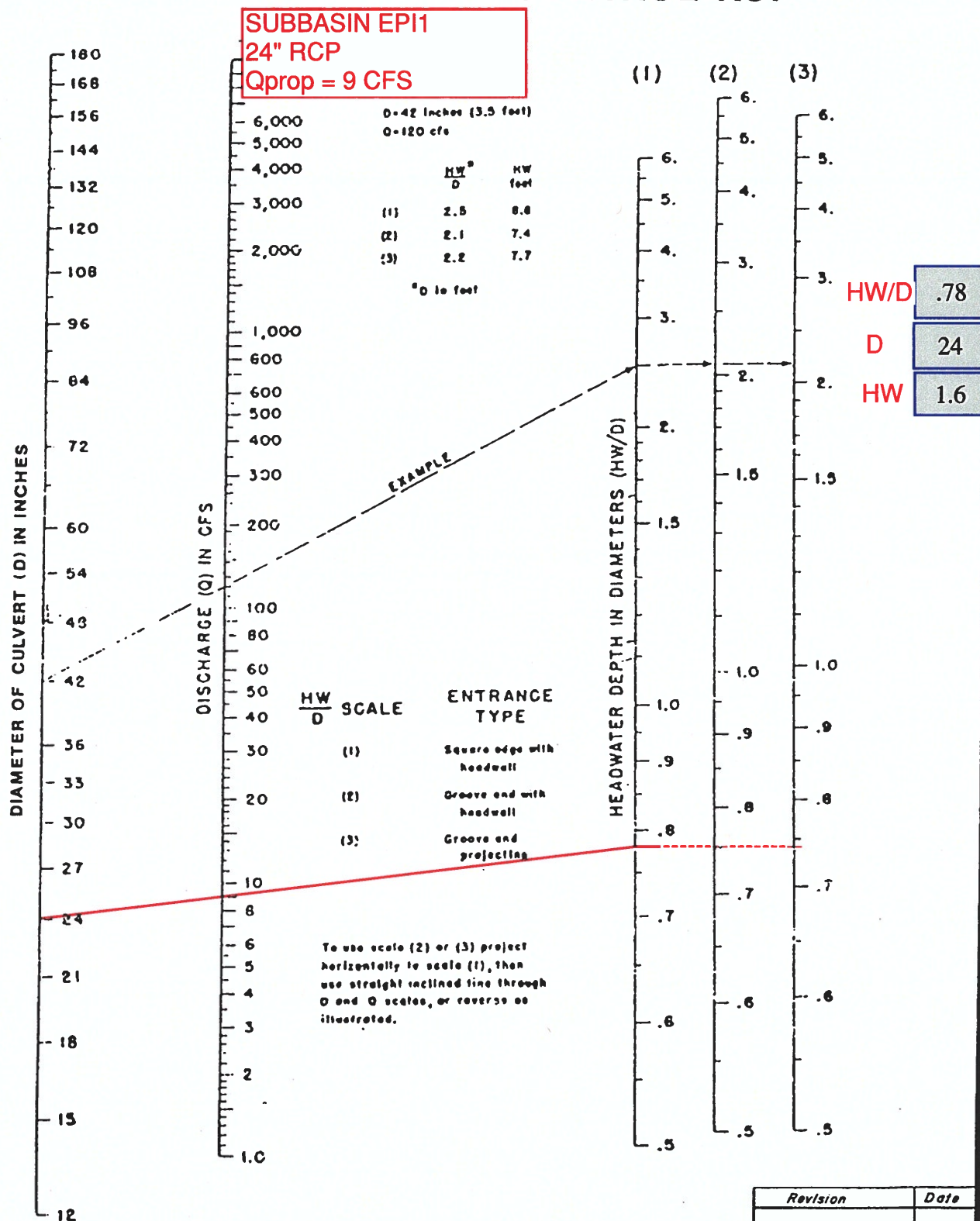
## Inlet Control Nomographs

| Proposed Interim Culvert Entrance Calculation Summary |                |                      |                   |                             |                      |                              |                           |                                                                                                                    |
|-------------------------------------------------------|----------------|----------------------|-------------------|-----------------------------|----------------------|------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------|
| Plan Set                                              | Profile Number | Facility Description | Upstream Subbasin | Flow (cfs) Q <sub>100</sub> | Headwater Depth (ft) | Culvert Upstream Invert (ft) | Culvert Upstream WSE (ft) | Notes                                                                                                              |
| Log Cabin Way                                         | 1              | 24-in RCP            | EPI1              | 9                           | 1.60                 | 2748.76                      | 2750.36                   | Undeveloped Condition                                                                                              |
|                                                       | 3              | 54-in RCP            | EAA3              | nuisance                    | n/a                  | 2730.22                      | n/a                       | In proposed condition, this culvert collects nuisance flow. Subbasin flow collected at North Collector Lateral #4. |
|                                                       | 6              | 24-in RCP            | EAA4              | nuisance                    | n/a                  | 2716.36                      | n/a                       | See note above.                                                                                                    |
|                                                       | 9              | 42-in RCP            | EPF1              | 13                          | 1.80                 | 2695.22                      | 2697.02                   | Undeveloped Condition                                                                                              |
|                                                       | 12             | 48-in RCP            | EPD               | 24                          | 2.50                 | 2655.50                      | 2658.00                   | Undeveloped Condition                                                                                              |
| Skye Pointe Drive                                     | 1              | 42-in RCP            | US95 42" CMP      | 85                          | 5.60                 | 2794.65                      | 2800.25                   | Flow per Kyle Interchange study                                                                                    |
|                                                       | 2              | 24-in RCP            | ECOM4             | 6                           | 1.20                 | 2784.67                      | 2785.87                   | Undeveloped Condition                                                                                              |
|                                                       | 3              | 54-in RCP            | US95 6'x3' RCB    | 251                         | 12.20                | 2770.58                      | 2782.78                   | Flow per Kyle Interchange study                                                                                    |
|                                                       | 4              | 24-in RCP            | ECOM3 + EMLA1     | 10                          | 1.70                 | 2757.43                      | 2759.13                   | Undeveloped Condition                                                                                              |
|                                                       | 6              | 18-in RCP            | EPE1              | 11                          | 2.50                 | 2664.30                      | 2666.80                   | Undeveloped Condition                                                                                              |
| Skye Canyon Park Drive<br>O'Hare Road                 | 2              | 36-in RCP            | EPH1              | 21                          | 2.20                 | 2686.60                      | 2688.80                   | Undeveloped Condition                                                                                              |
|                                                       | 3              | 36-in RCP            | EPF2              | 24                          | 2.30                 | 2690.41                      | 2692.71                   | Undeveloped Condition                                                                                              |
|                                                       | 1              | 36-in RCP            | EPJ               | 31                          | 2.80                 | 2712.59                      | 2715.39                   | Undeveloped Condition                                                                                              |
| Private Entry Road 2                                  | n/a            | 30-in HDPE           | EPH2              | 20                          | 2.30                 | 2707.26                      | 2709.56                   | Undev Cond, matches ex pipe material                                                                               |
| Iron Mountain Road<br>North Collector Road            | 2              | 60-in RCP            | EC21B + CP27B     | 115                         | 4.80                 | 2715.87                      | 2720.67                   | (CP27B flow from MDS Update #3)                                                                                    |
|                                                       | 3              | 42-in RCP            | EAA2              | 31                          | 2.80                 | 2707.38                      | 2710.18                   | Undeveloped Condition                                                                                              |
|                                                       | 4              | 48-in RCP            | EAA3 + EAA4 + EPC | 124                         | 6.60                 | 2688.79                      | 2695.39                   | Undeveloped Condition                                                                                              |
|                                                       | 5              | 72-in RCP            | EC21B + CP27B     | 270                         | 7.50                 | 2713.17                      | 2720.67                   | Flow split between profiles 2 and 5                                                                                |



# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

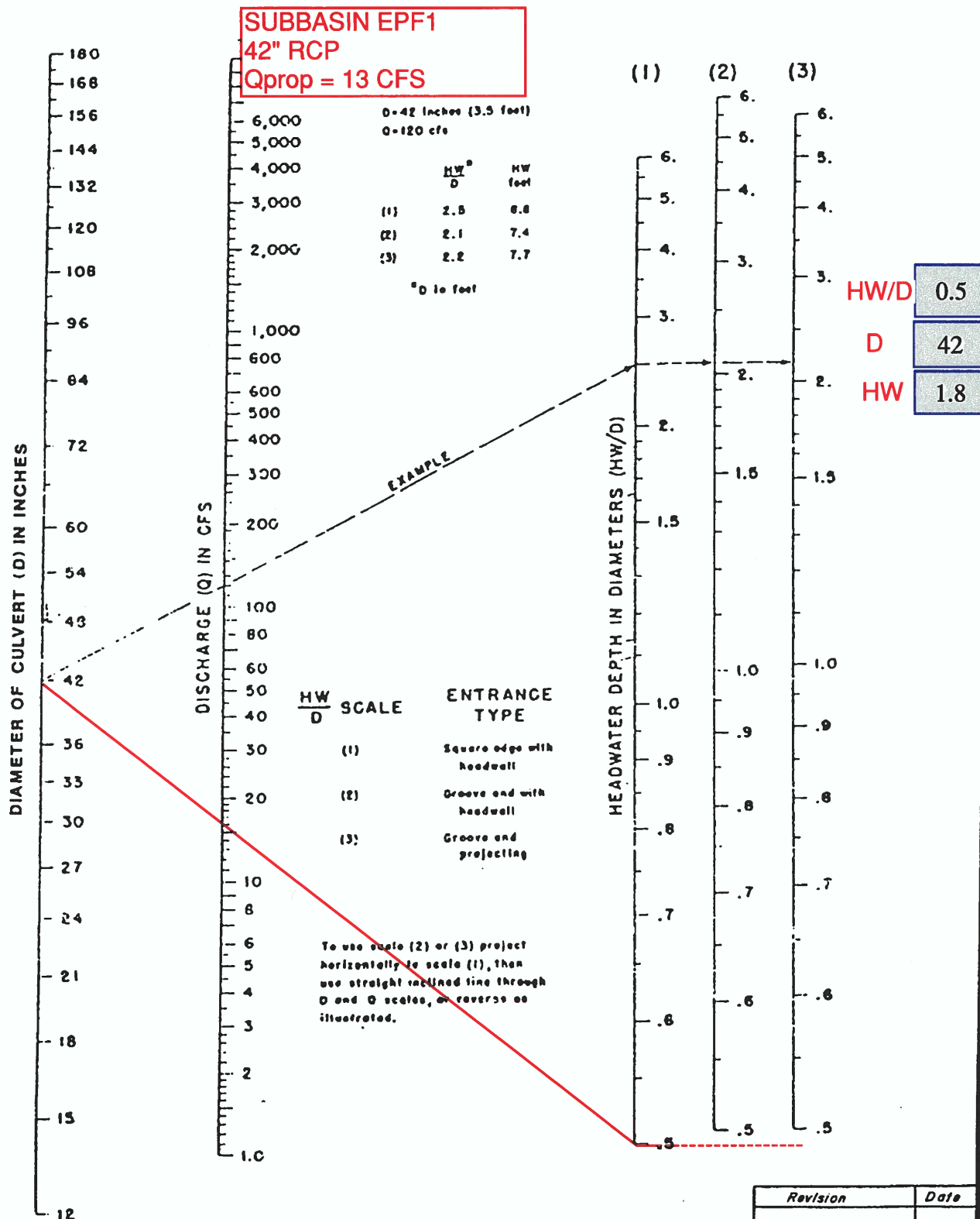
## NOMOGRAPH - INLET CONTROL RCP



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

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

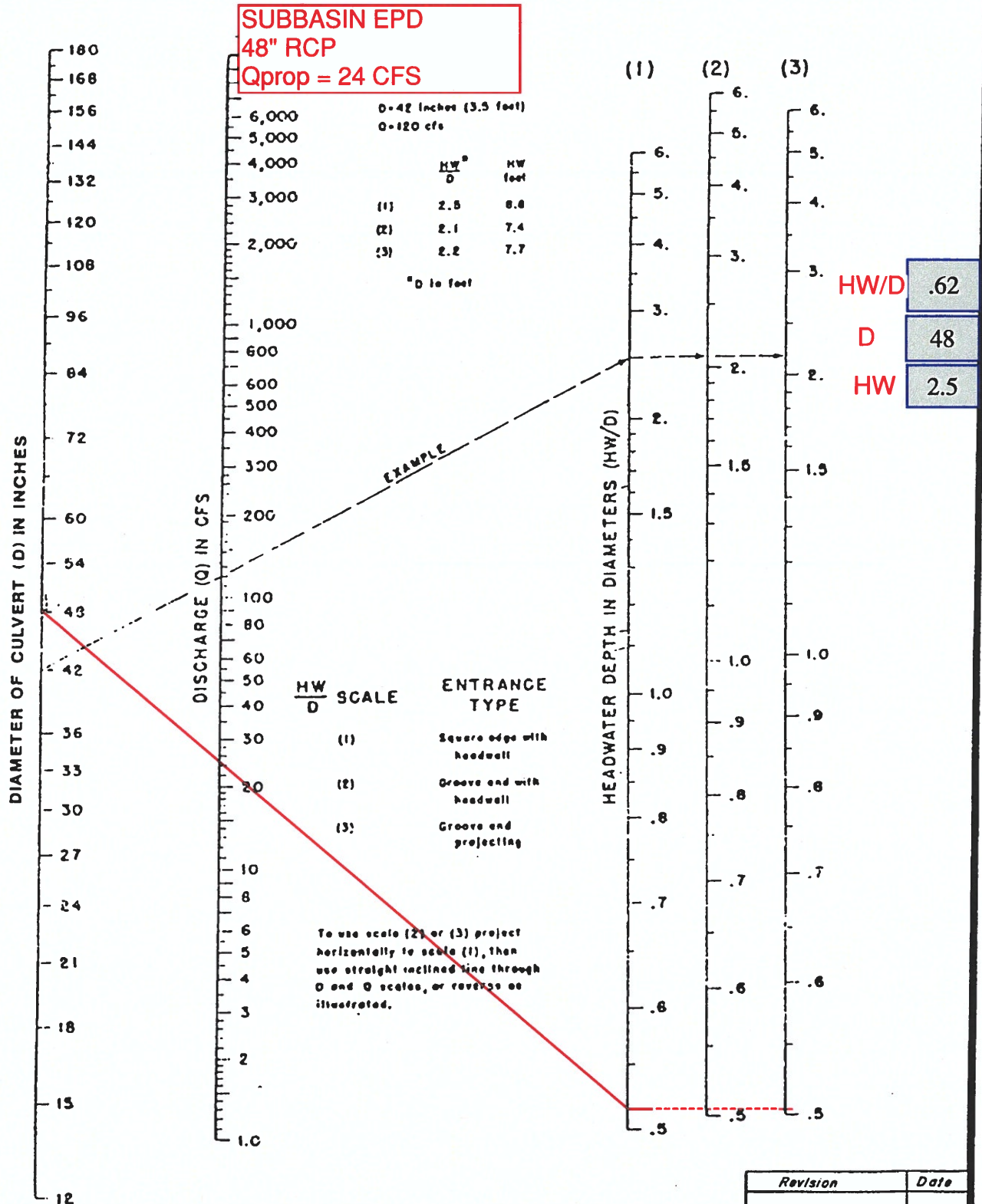
## NOMOGRAPH - INLET CONTROL RCP



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

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## NOMOGRAPH - INLET CONTROL RCP



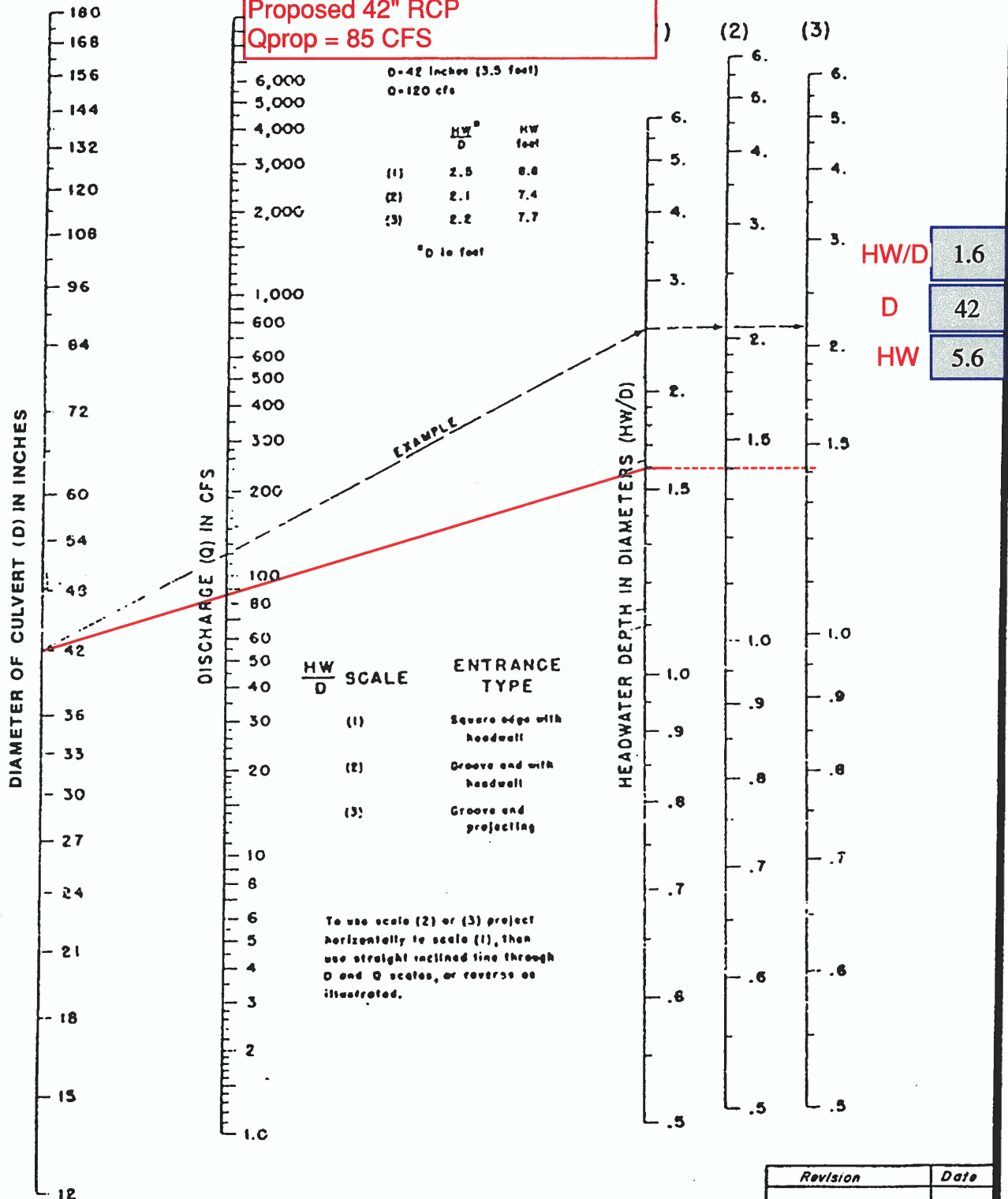
| Revision | Date |
|----------|------|
|          |      |
|          |      |
|          |      |
|          |      |



# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## NOMOGRAPH - INLET CONTROL RCP

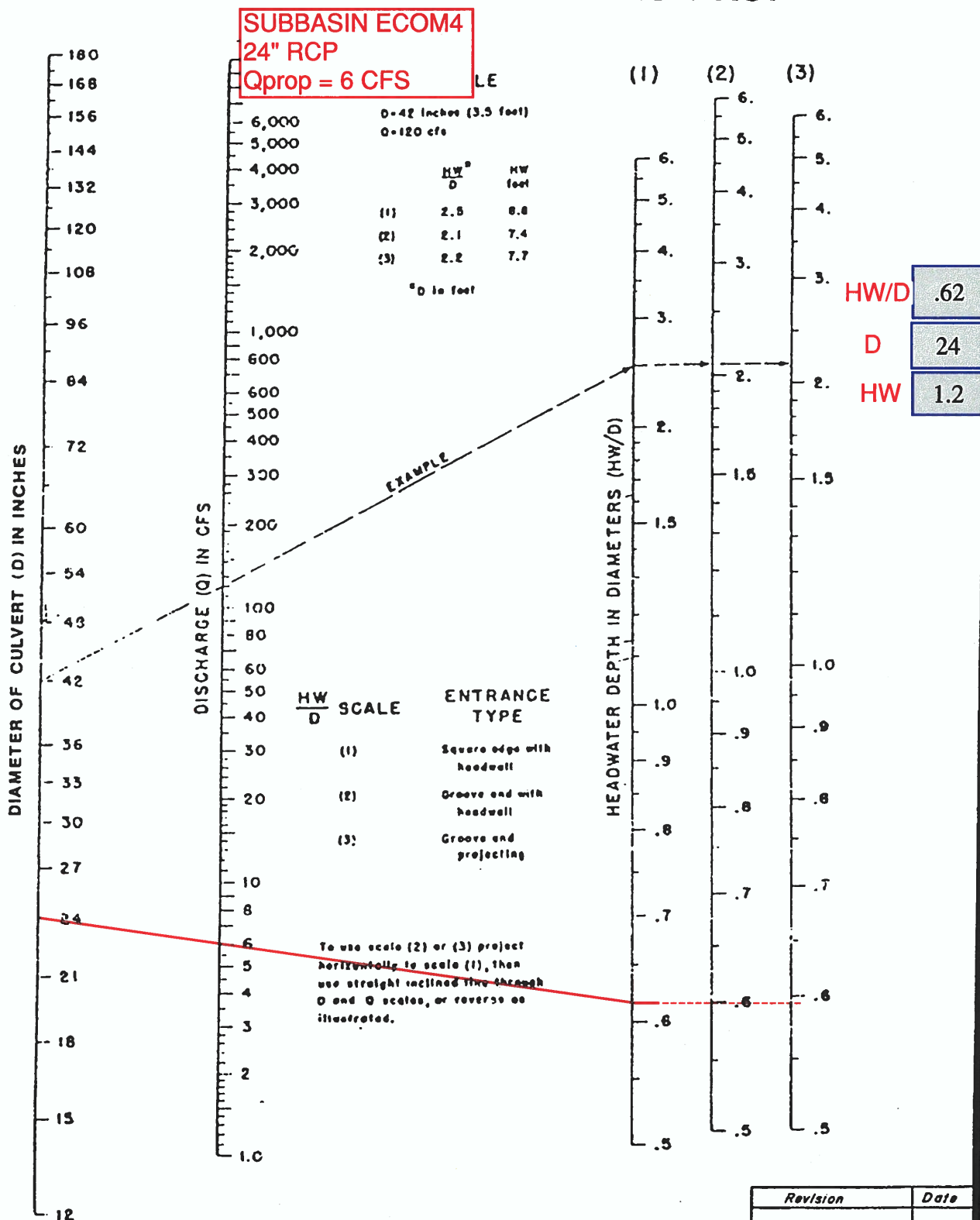
US 95 42" CMP Crossing Alignment  
Proposed 42" RCP  
 $Q_{prop} = 85 \text{ CFS}$



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

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## NOMOGRAPH - INLET CONTROL RCP

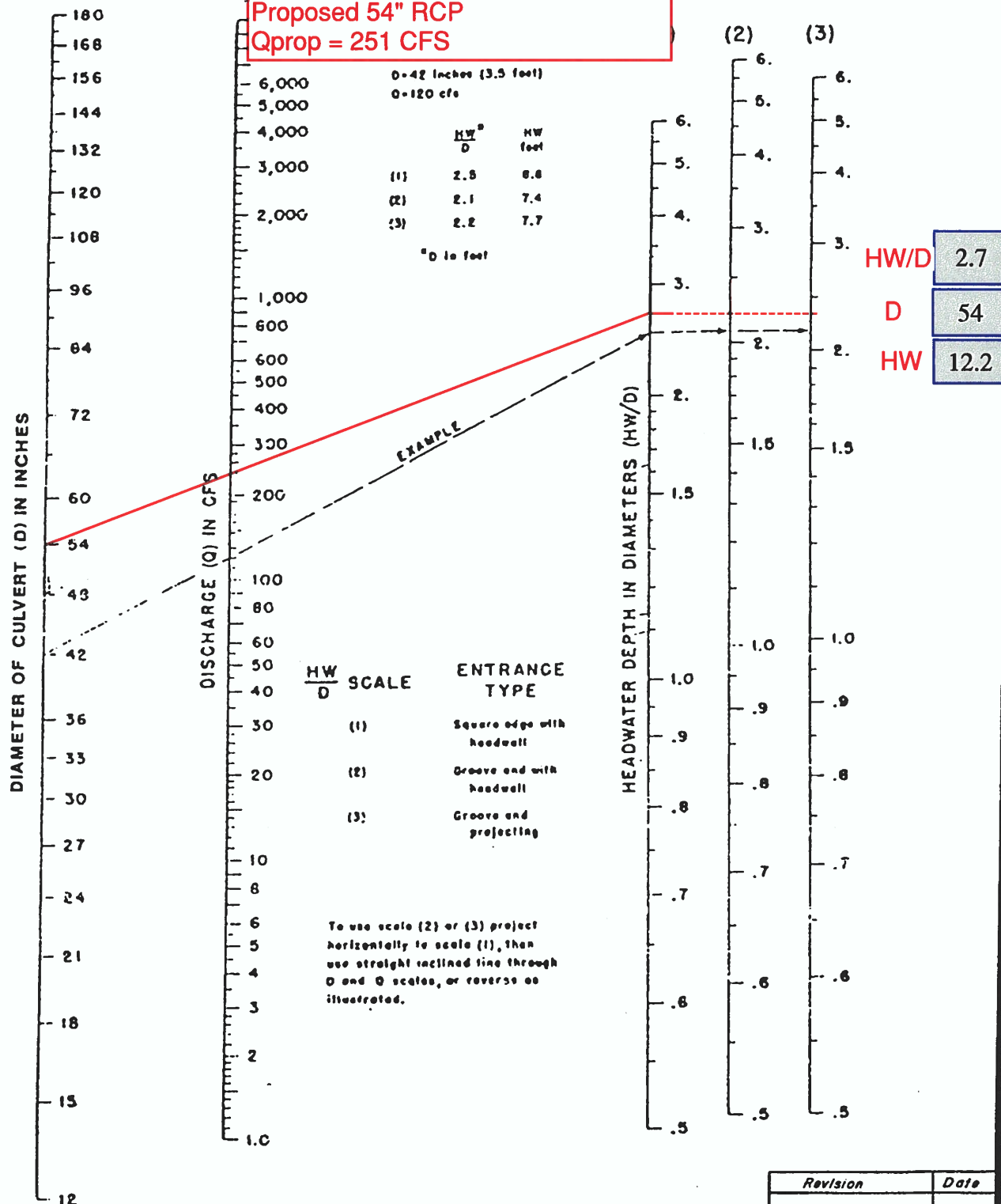


| Revision | Date |
|----------|------|
|          |      |
|          |      |
|          |      |
|          |      |

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## NOMOGRAPH - INLET CONTROL RCP

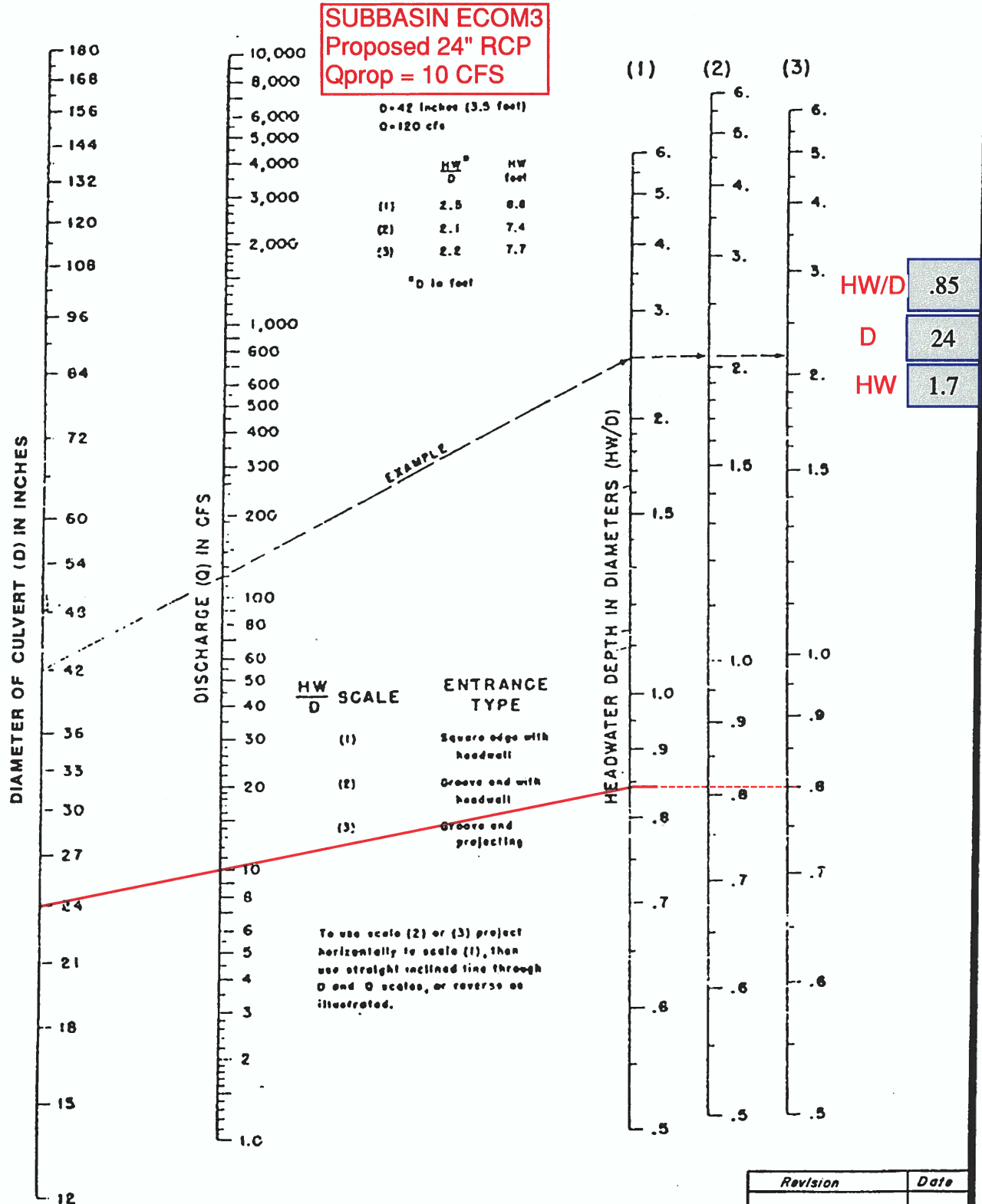
US 95 6'x3' RCB Crossing Alignment  
Proposed 54" RCP  
 $Q_{prop} = 251$  CFS





# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

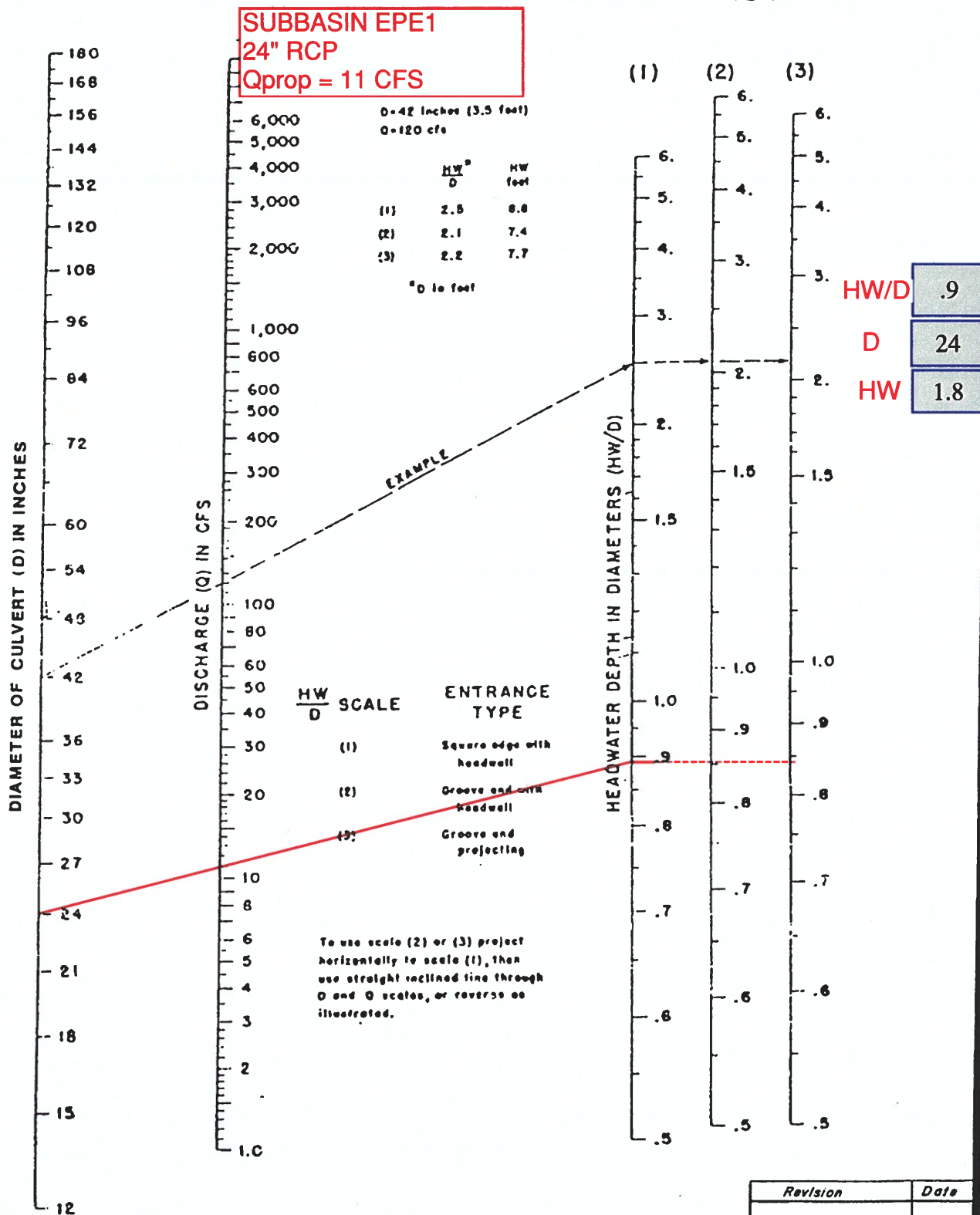
## NOMOGRAPH - INLET CONTROL RCP



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

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

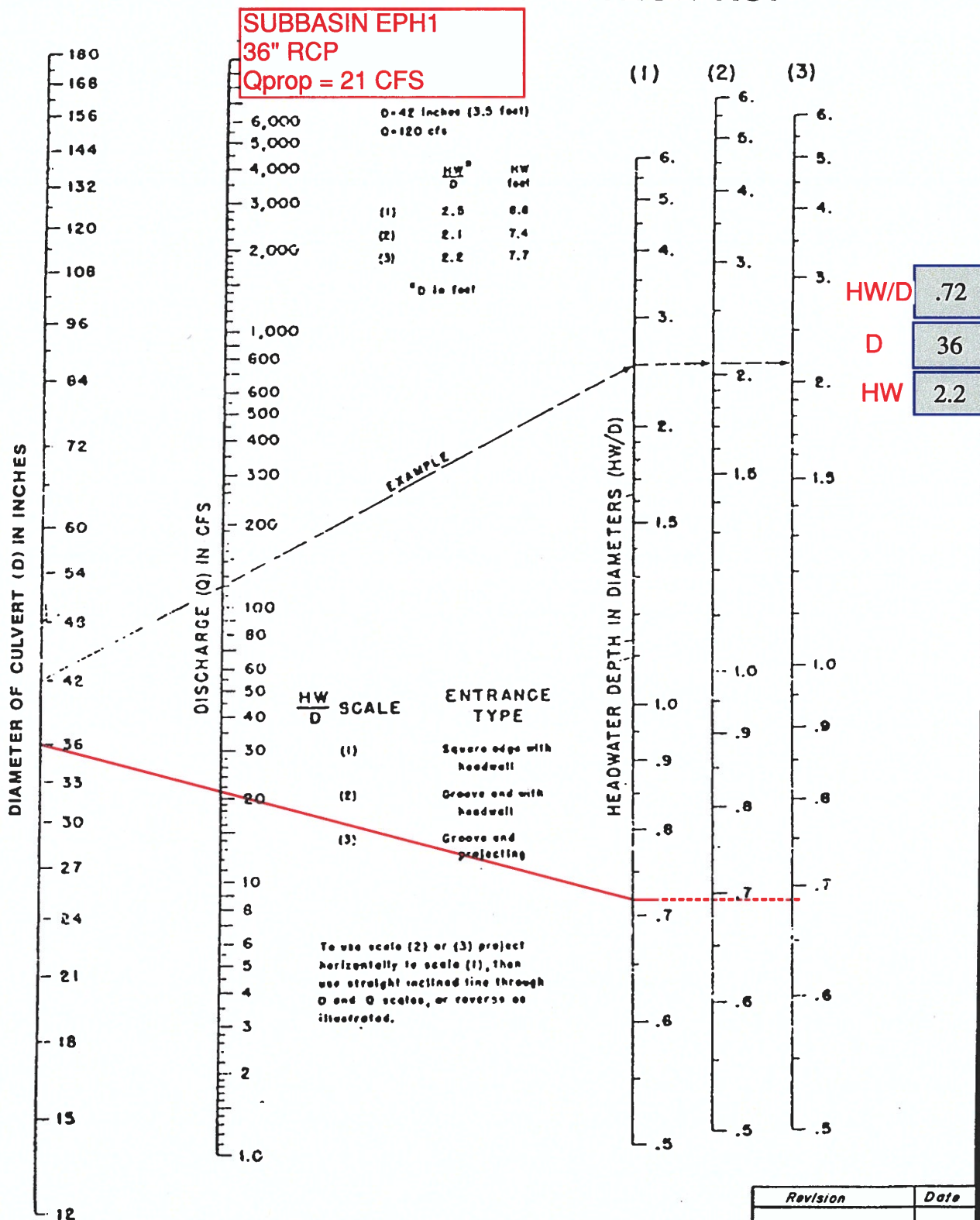
## NOMOGRAPH - INLET CONTROL RCP



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

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## NOMOGRAPH - INLET CONTROL RCP

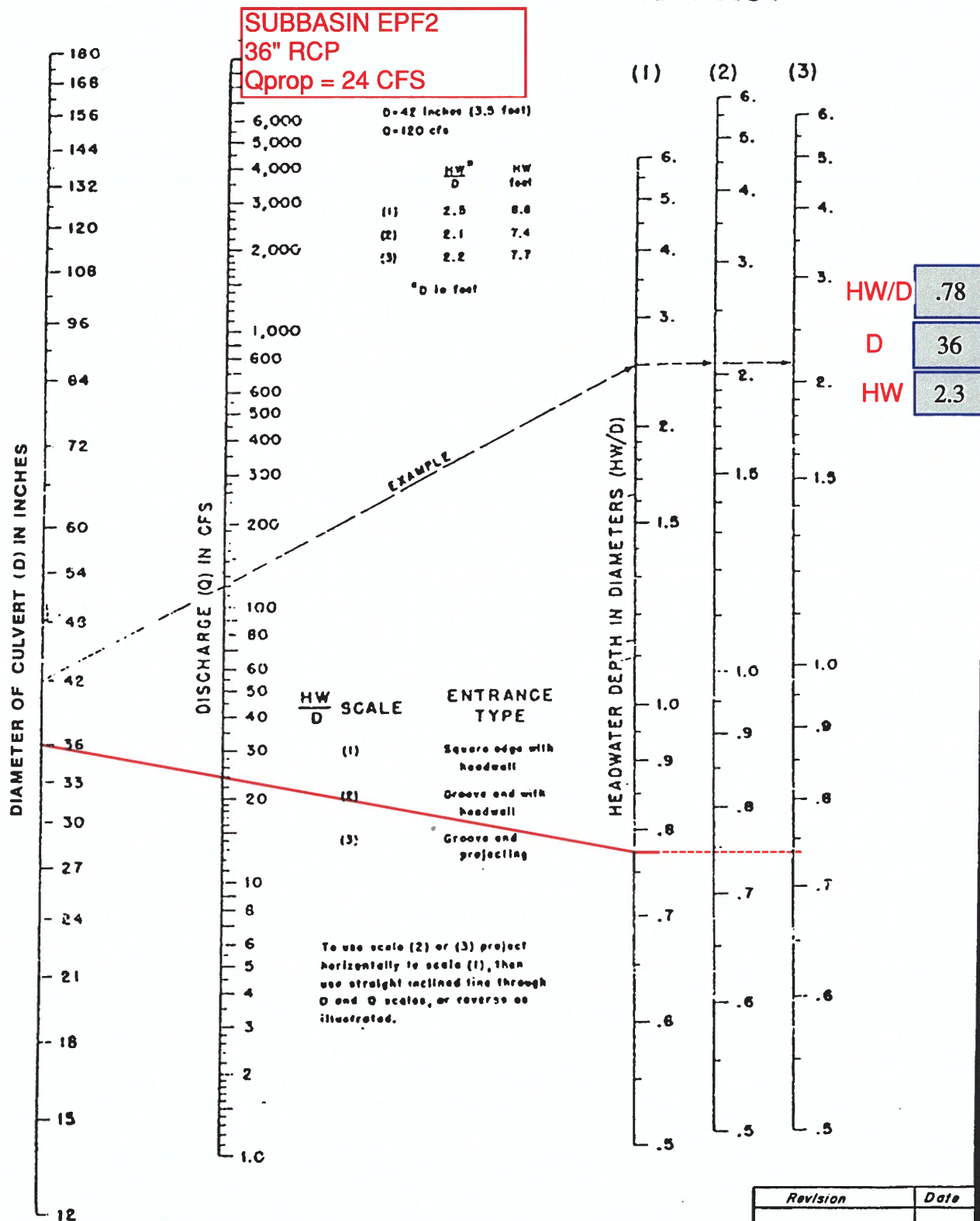


| Revision | Date |
|----------|------|
|          |      |
|          |      |
|          |      |
|          |      |



# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

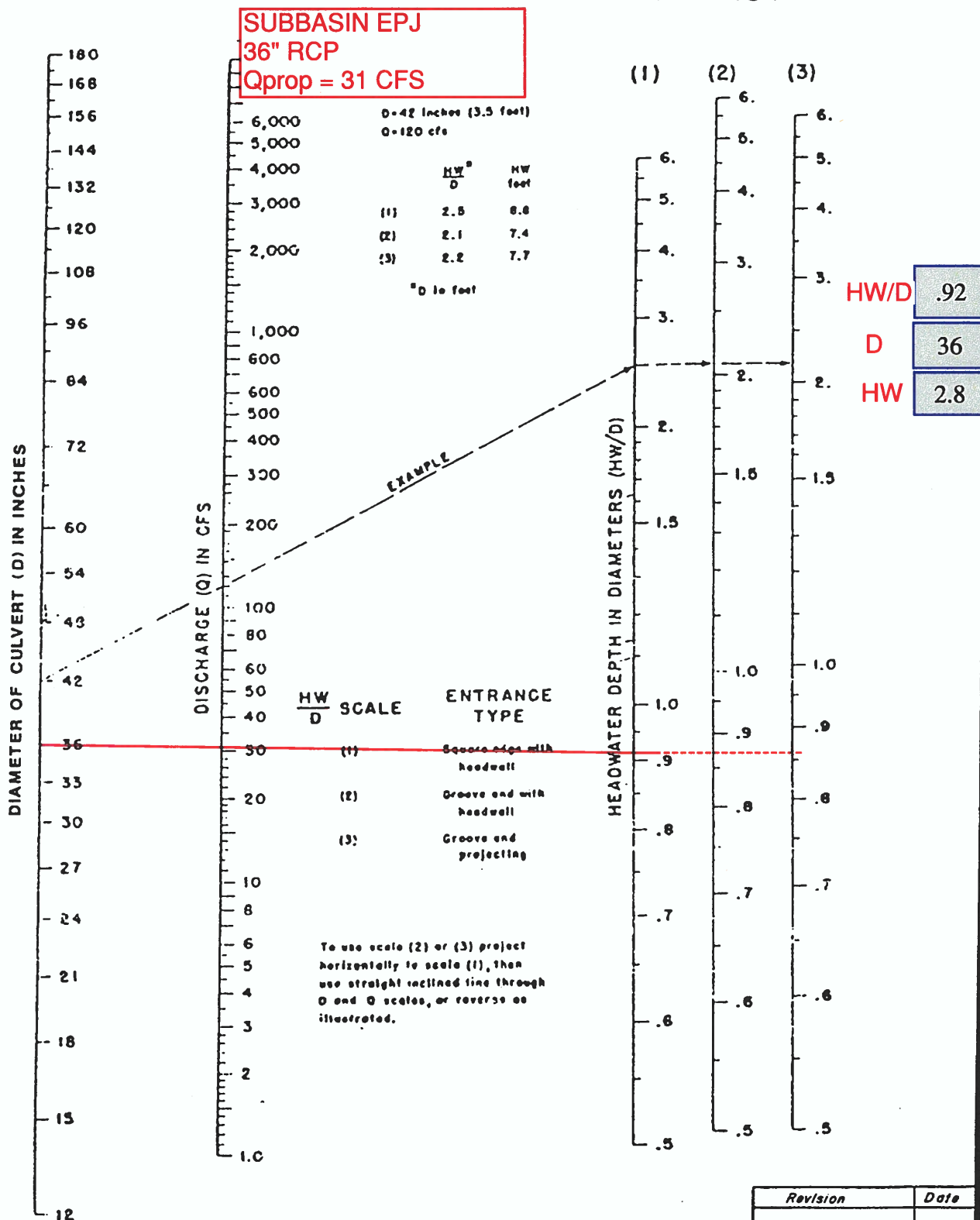
## NOMOGRAPH - INLET CONTROL RCP



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

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

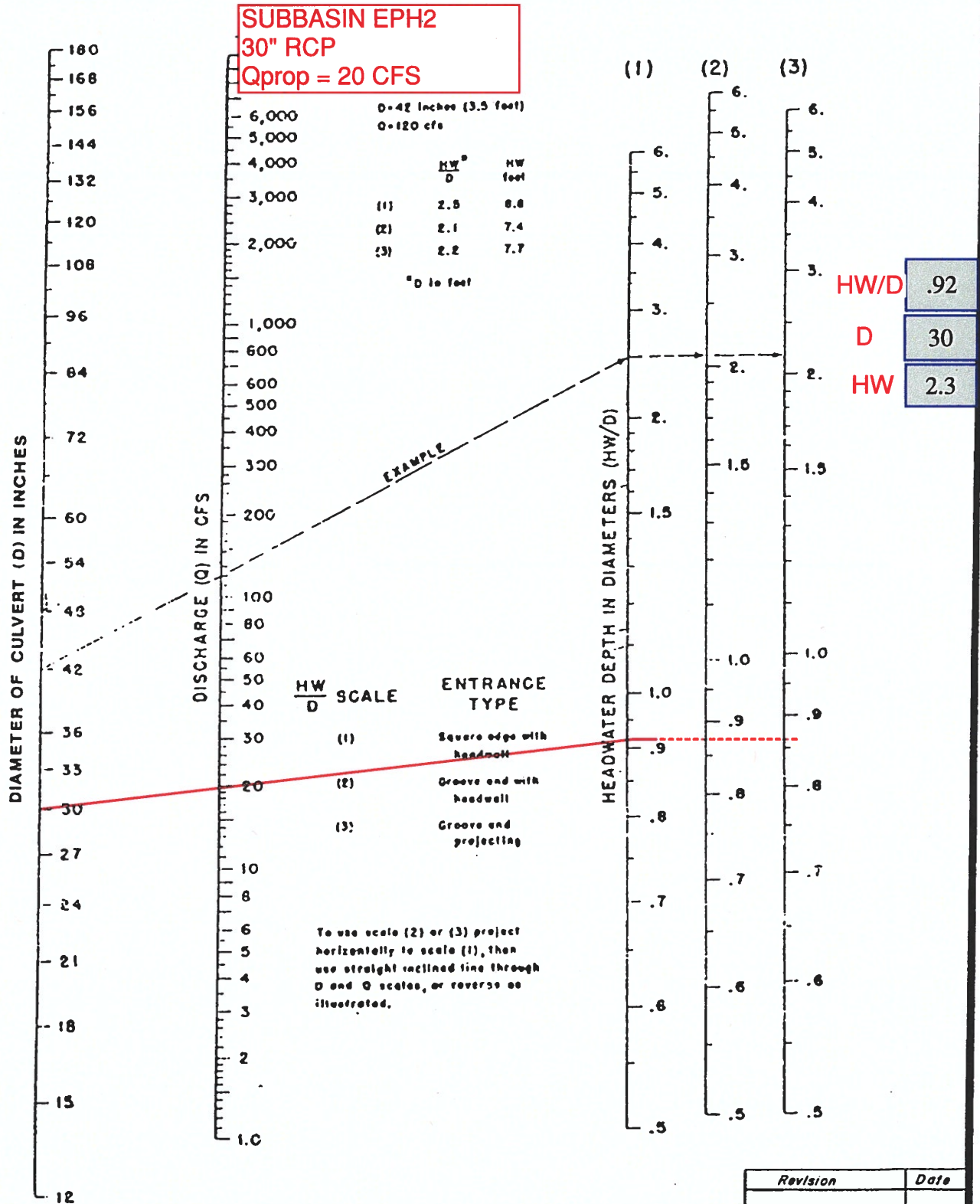
## NOMOGRAPH - INLET CONTROL RCP



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

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## NOMOGRAPH - INLET CONTROL RCP

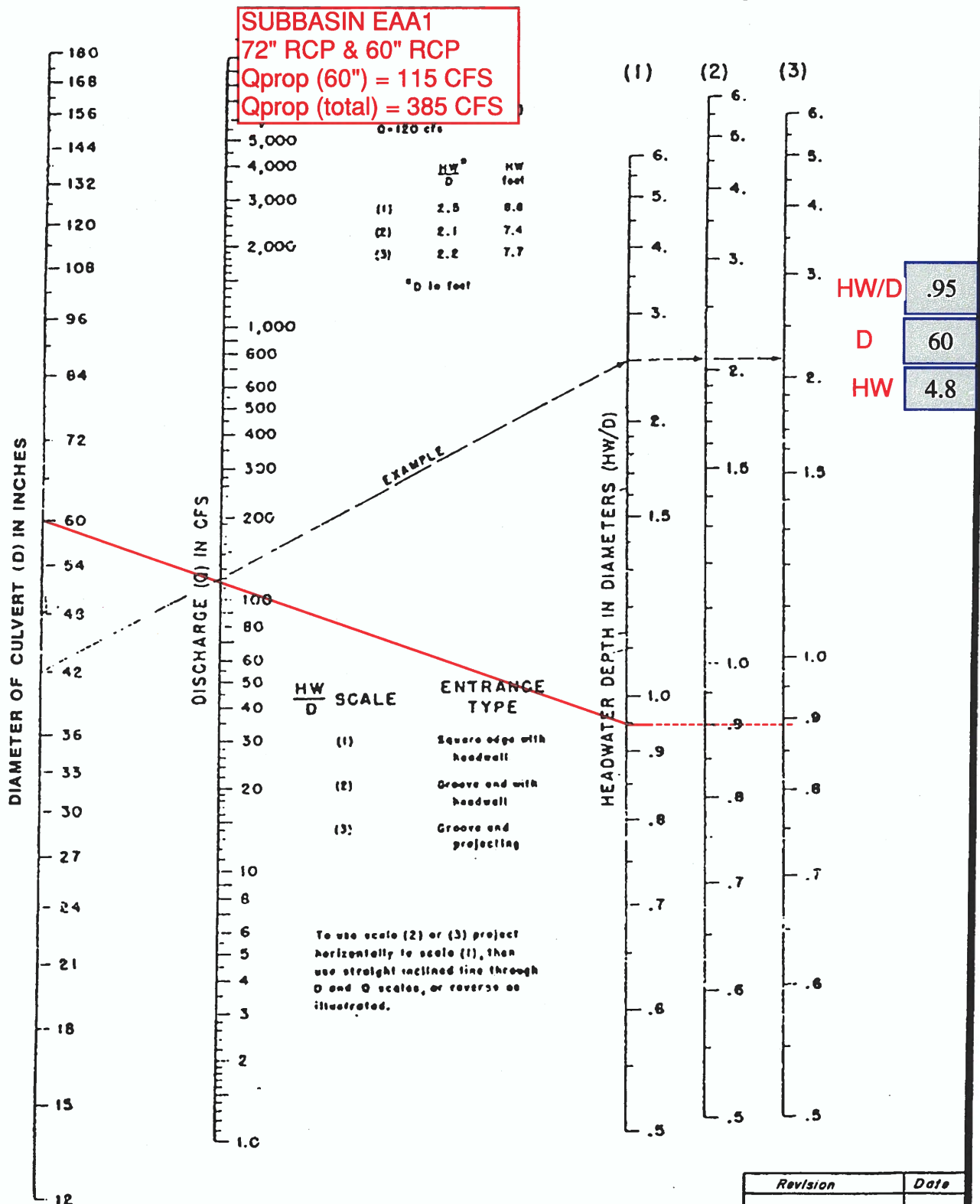


| Revision | Date |
|----------|------|
|          |      |
|          |      |
|          |      |
|          |      |



# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

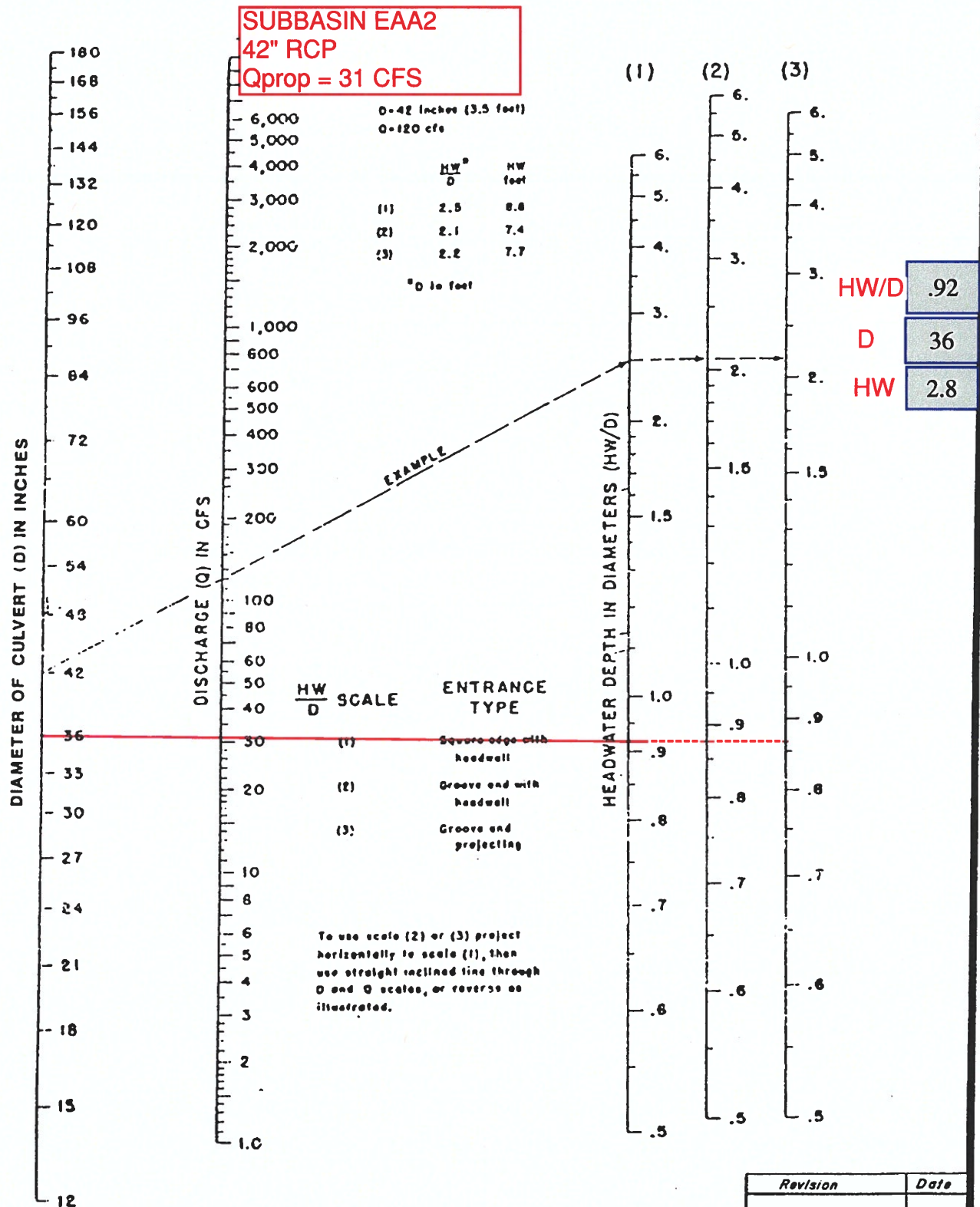
## NOMOGRAPH - INLET CONTROL RCP



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

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

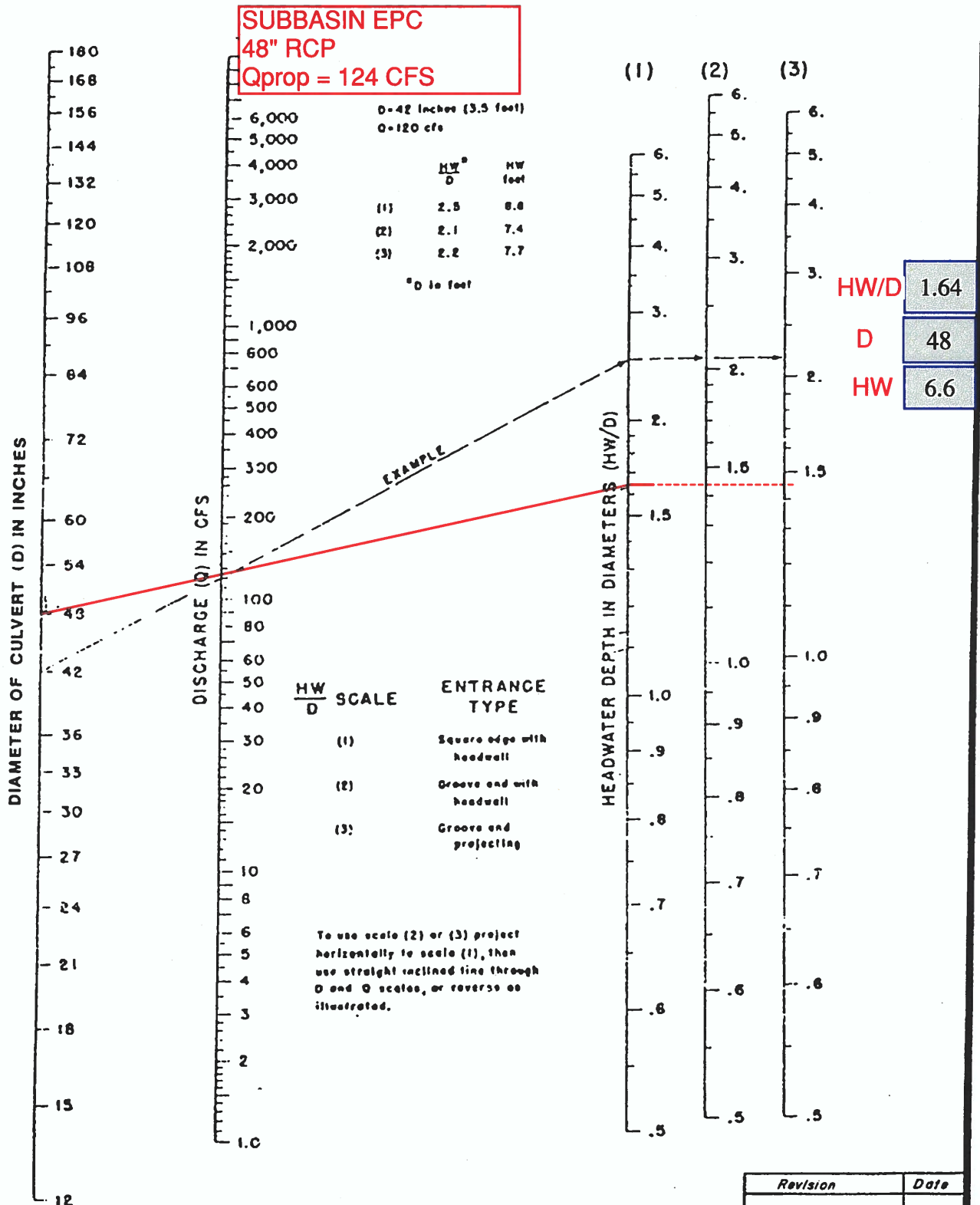
## NOMOGRAPH - INLET CONTROL RCP



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

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## NOMOGRAPH - INLET CONTROL RCP

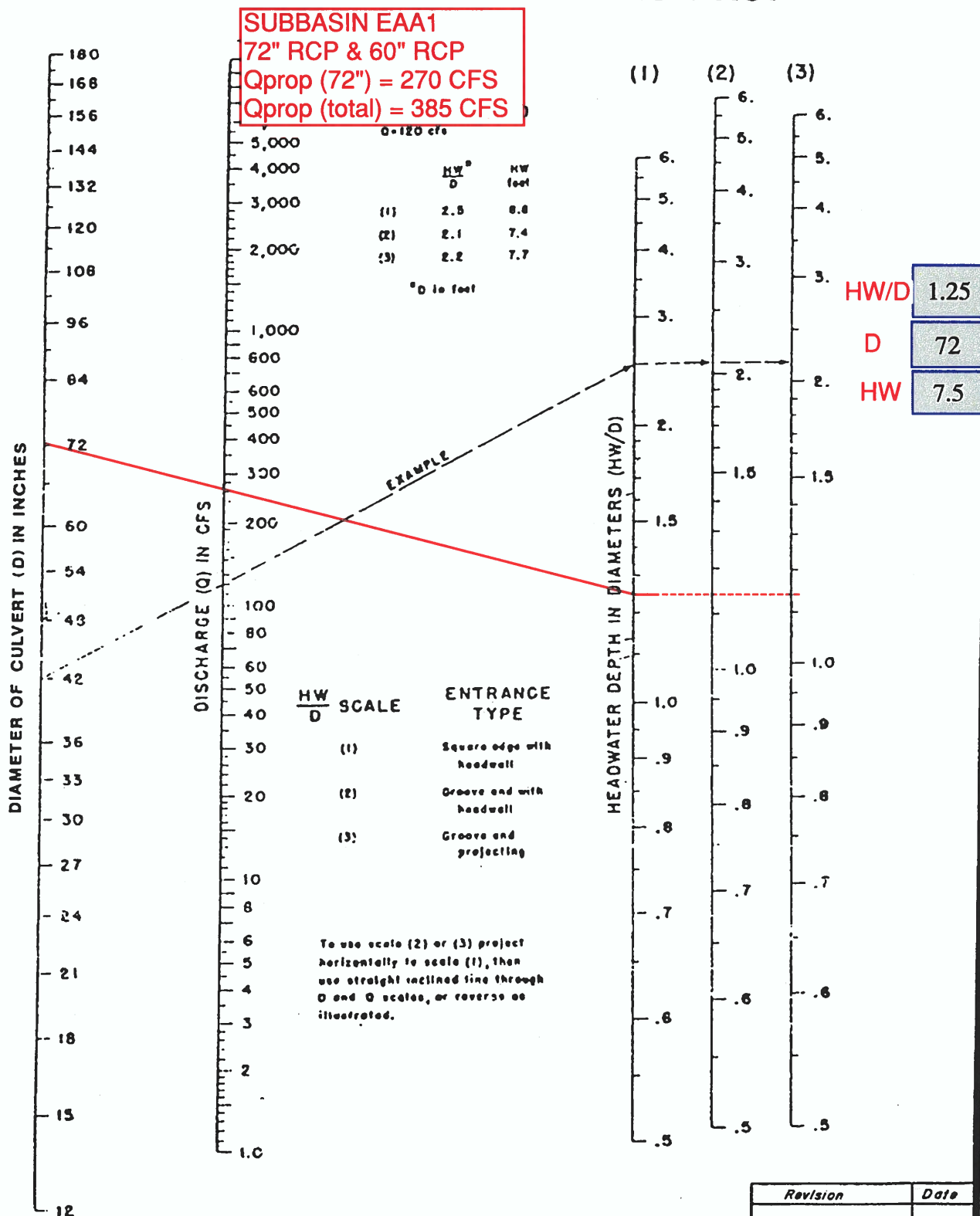


| Revision | Date |
|----------|------|
|          |      |
|          |      |
|          |      |
|          |      |



# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## NOMOGRAPH - INLET CONTROL RCP



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

## **APPENDIX E**

---

### **Storm Drain Analyses**



Skye Pointe Drive (Edgestone Drive)



| Ultimate Condition WSPG Summary                                                   |                        |                            |                        |                       |                       |                        |          |                 |                                                      |                                                          |                        |
|-----------------------------------------------------------------------------------|------------------------|----------------------------|------------------------|-----------------------|-----------------------|------------------------|----------|-----------------|------------------------------------------------------|----------------------------------------------------------|------------------------|
| Mainline in Skye Pointe Drive from 42" RCP Culvert to Regional Mainline (SPD.WSW) |                        |                            |                        |                       |                       |                        |          |                 |                                                      |                                                          |                        |
| WSPG Station                                                                      | Plan Set Project No. * | Equivalent Roadway Station | Improvement Plan Sheet | Storm Drain Dimension | Invert Elevation (ft) | Q <sub>100</sub> (cfs) | WSE (ft) | Velocity (ft/s) | FG Elevation                                         | Facility Description                                     | HGL Check <sup>1</sup> |
| 1000.00                                                                           | LCW: EST1906           | N/A                        | P-8                    | 66" RCP               | 2742.33               | 398.00                 | 2751.00  | 16.75           | 2765.00                                              | Connection to Existing Regional Facility                 | OK                     |
| 1016.00                                                                           |                        | 35+99.98                   |                        | 66" RCP               | 2743.49               | 398.00                 | 2751.44  | 16.75           | 2765.00                                              |                                                          | OK                     |
| 1121.27                                                                           |                        | 34+95.27                   |                        | 66" RCP               | 2746.52               | 398.00                 | 2754.25  | 16.75           | 2766.92                                              |                                                          | OK                     |
| 1169.86                                                                           |                        | 34+93.65                   |                        | 66" RCP               | 2746.76               | 398.00                 | 2755.15  | 16.75           | 2766.92                                              |                                                          | OK                     |
| 1221.49                                                                           | SPD: EST1907           | 39+36.88                   | P-4                    | 66" RCP               | 2747.02               | 398.00                 | 2756.16  | 16.75           | 2765.34                                              | Junction with Basin ECOM3 and SPD2 Drop Inlet Facilities | OK                     |
| 1221.49                                                                           |                        |                            |                        | 66" RCP               | 2747.02               | 351.00                 | 2757.83  | 14.77           | 2765.34                                              |                                                          | OK                     |
| 1307.54                                                                           |                        | 38+48.17                   |                        | 66" RCP               | 2748.92               | 351.00                 | 2759.10  | 14.77           | 2765.55                                              |                                                          | OK                     |
| 1428.06                                                                           |                        | 37+23.9                    |                        | 66" RCP               | 2751.59               | 351.00                 | 2760.73  | 14.77           | 2766.70                                              |                                                          | OK                     |
| 1553.37                                                                           |                        | 35+94.9                    |                        | 66" RCP               | 2754.36               | 351.00                 | 2762.45  | 14.77           | 2769.20                                              |                                                          | OK                     |
| 1678.27                                                                           |                        | 34+66.61                   |                        | 66" RCP               | 2757.12               | 351.00                 | 2760.62  | 22.03           | 2772.77                                              |                                                          | OK                     |
| 1813.82                                                                           |                        | 33+29.14                   | P-3                    | 66" RCP               | 2760.07               | 351.00                 | 2763.64  | 21.53           | 2776.74                                              |                                                          | OK                     |
| 2177.53                                                                           | 29+65.43               | 66" RCP                    |                        | 2767.88               | 351.00                | 2772.91                | 15.42    | 2787.28         | Addition of flow from 6' x 3' RCB Culvert From US 95 | OK                                                       |                        |
| 2177.53                                                                           |                        | 42" RCP                    |                        | 2769.88               | 100.00                | 2774.92                | 10.39    | 2787.28         |                                                      | OK                                                       |                        |
| 2500.22                                                                           | P-2                    | 26+43.11                   | P-2                    | 42" RCP               | 2777.63               | 100.00                 | 2779.83  | 15.67           | 2797.25                                              | Junction with Basin ECOM4 and SPD1 Drop Inlet Facility   | OK                     |
| 2500.22                                                                           |                        |                            |                        | 42" RCP               | 2777.63               | 85.00                  | 2779.49  | 16.37           | 2797.25                                              |                                                          | OK                     |
| 2634.62                                                                           |                        | 25+08.67                   |                        | 42" RCP               | 2780.39               | 85.00                  | 2782.11  | 18.07           | 2801.15                                              |                                                          | OK                     |
| 3007.91                                                                           |                        | 21+34.67                   |                        | 42" RCP               | 2791.76               | 85.00                  | 2793.92  | 13.66           | 2811.18                                              |                                                          | OK                     |
| 3084.25                                                                           | P-5                    | 21+05.45                   | P-5                    | 42" RCP               | 2793.28               | 85.00                  | 2796.15  | 10.06           | 2811.18                                              | Addition of flow from 42" CMP Culvert From US 95         | OK                     |
| 3084.25                                                                           |                        |                            |                        | 42" RCP               | 2793.28               | 85.00                  | 2796.15  | 10.06           | 2811.18                                              |                                                          | OK                     |

SPD.WSW

T1 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
T2 SKY POINTE DRIVE STORM DRAIN SYSTEM (SPD)  
T3 FROM PROPOSED INLET TO REGIONAL MAINLINE

[illegible]

Date: 4-30-2019 Time: 9:57:16

PAGE 1

PAGE 1

[illegible]

|    |    |   |   |       |
|----|----|---|---|-------|
| CD | 18 | 4 | 1 | 1.500 |
| CD | 24 | 4 | 1 | 2.000 |
| CD | 42 | 4 | 1 | 3.500 |
| CD | 48 | 4 | 1 | 4.000 |
| CD | 72 | 4 | 1 | 6.000 |
| CD | 66 | 4 | 1 | 5.500 |

PAGE NO 1

W S F S W  
WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

HEADING LINE NO 2 IS -

SKY POINTE DRIVE STORM DRAIN SYSTEM (SPD)

HEADING LINE NO 3 IS -

FROM PROPOSED INLET TO REGIONAL MAINLINE

PAGE NO 2

WSPGW  
WATER SURFACE PROFILE - ELEMENT CARD LISTING

| WATER SURFACE PROFILE - ELEMENT CARD LISTING |          |                    |          |          |      |          |       |      |        |        |          |          |        |        |
|----------------------------------------------|----------|--------------------|----------|----------|------|----------|-------|------|--------|--------|----------|----------|--------|--------|
| ELEMENT NO                                   | 1        | IS A SYSTEM OUTLET | STATION  | INVERT   | SECT | W S ELEV |       |      |        |        |          |          |        |        |
|                                              | U/S DATA |                    | 1000.000 | 2742.330 | 66   | 2751.000 |       |      |        |        |          |          |        |        |
| ELEMENT NO                                   | 2        | IS A REACH         | STATION  | INVERT   | SECT | N        |       |      | RADIUS | ANGLE  | ANG PT   | MAN H    |        |        |
|                                              | U/S DATA |                    | 1016.000 | 2743.490 | 66   | .013     |       |      | .000   | .000   | .000     | 1        |        |        |
| ELEMENT NO                                   | 3        | IS A REACH         | STATION  | INVERT   | SECT | N        |       |      | RADIUS | ANGLE  | ANG PT   | MAN H    |        |        |
|                                              | U/S DATA |                    | 1121.270 | 2746.520 | 66   | .013     |       |      | .000   | .000   | 77.000   | 1        |        |        |
| ELEMENT NO                                   | 4        | IS A REACH         | STATION  | INVERT   | SECT | N        |       |      | RADIUS | ANGLE  | ANG PT   | MAN H    |        |        |
|                                              | U/S DATA |                    | 1169.860 | 2746.760 | 66   | .013     |       |      | .000   | .000   | .000     | 1        |        |        |
| ELEMENT NO                                   | 5        | IS A REACH         | STATION  | INVERT   | SECT | N        |       |      | RADIUS | ANGLE  | ANG PT   | MAN H    |        |        |
|                                              | U/S DATA |                    | 1221.490 | 2747.020 | 66   | .013     |       |      | .000   | .000   | 5.000    | 1        |        |        |
| 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 |                    | 1221.490 | 2747.020 | 66   | 18       | 24    | .013 | 12.000 | 35.000 | 2747.020 | 2750.520 | 55.000 | 66.000 |
|                                              |          |                    |          |          |      |          |       |      |        |        | 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 | 7  | IS A REACH | STATION  | INVERT   | SECT | N    | RADIUS | ANGLE | ANG PT | MAN H |
|------------|----|------------|----------|----------|------|------|--------|-------|--------|-------|
|            |    | U/S DATA   | 1307.540 | 2748.920 | 66   | .013 | .000   | .000  | 14.000 | 1     |
| ELEMENT NO | 8  | IS A REACH | STATION  | INVERT   | SECT | N    | RADIUS | ANGLE | ANG PT | MAN H |
|            |    | U/S DATA   | 1428.060 | 2751.590 | 66   | .013 | .000   | .000  | 13.000 | 1     |
| ELEMENT NO | 9  | IS A REACH | STATION  | INVERT   | SECT | N    | RADIUS | ANGLE | ANG PT | MAN H |
|            |    | U/S DATA   | 1553.370 | 2754.360 | 66   | .013 | .000   | .000  | 16.000 | 1     |
| ELEMENT NO | 10 | IS A REACH | STATION  | INVERT   | SECT | N    | RADIUS | ANGLE | ANG PT | MAN H |
|            |    | U/S DATA   | 1678.270 | 2757.120 | 66   | .013 | .000   | .000  | 14.000 | 1     |
| ELEMENT NO | 11 | IS A REACH | STATION  | INVERT   | SECT | N    | RADIUS | ANGLE | ANG PT | MAN H |
|            |    | U/S DATA   | 1813.820 | 2760.070 | 66   | .013 | .000   | .000  | 2.000  | 1     |

PAGE NO 3

WSPGW  
WATER SURFACE PROFILE - ELEMENT CARD LISTING

| 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      | 2177.530 | 2767.880 | 66     |    |      |       | .013  |   | .000    | .000 | 4.000    | 1        |        |       |
| ELEMENT NO                                   | 13 | IS A JUNCTION | STATION  |          | INVERT |    | SECT | LAT-1 | LAT-2 | N | Q3      | Q4   | INVERT-3 | INVERT-4 | PHI 3  | PHI 4 |
|                                              |    | U/S DATA      | 2177.530 | 2769.880 | 42     | 48 | 0    | .013  |       |   | 251.000 | .000 | 2769.380 | .000     | 46.000 | .000  |
|                                              |    |               |          |          |        |    |      |       |       |   |         |      | RADIUS   | ANGLE    |        |       |
|                                              |    |               |          |          |        |    |      |       |       |   |         |      | .000     | .000     |        |       |
| ELEMENT NO                                   | 14 | IS A REACH    | STATION  |          | INVERT |    | SECT | N     |       |   | RADIUS  |      | ANGLE    | ANG PT   | MAN H  |       |
|                                              |    | U/S DATA      | 2500.220 | 2777.630 | 42     |    |      |       | .013  |   | .000    | .000 | 5.000    | 1        |        |       |
| ELEMENT NO                                   | 15 | IS A JUNCTION | STATION  |          | INVERT |    | SECT | LAT-1 | LAT-2 | N | Q3      | Q4   | INVERT-3 | INVERT-4 | PHI 3  | PHI 4 |
|                                              |    | U/S DATA      | 2500.220 | 2777.630 | 42     | 24 | 0    | .013  |       |   | 15.000  | .000 | 2779.630 | .000     | 42.000 | .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

| THE ABOVE ELEMENT CONTAINS AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING |    |                       |          |          |          |      |   |          |       |        |       |
|--------------------------------------------------------------------------------------------------------|----|-----------------------|----------|----------|----------|------|---|----------|-------|--------|-------|
| ELEMENT NO                                                                                             | 16 | IS A REACH            | U/S DATA | STATION  | INVERT   | SECT |   | RADIUS   | ANGLE | ANG PT | MAN H |
|                                                                                                        |    |                       |          | 2634.620 | 2780.390 | 42   | N | .000     | .000  | 9.000  | 1     |
| ELEMENT NO                                                                                             | 17 | IS A REACH            | U/S DATA | STATION  | INVERT   | SECT |   | RADIUS   | ANGLE | ANG PT | MAN H |
|                                                                                                        |    |                       |          | 3007.910 | 2791.760 | 42   | N | .000     | .000  | 68.000 | 1     |
| ELEMENT NO                                                                                             | 18 | IS A REACH            | U/S DATA | STATION  | INVERT   | SECT |   | RADIUS   | ANGLE | ANG PT | MAN H |
|                                                                                                        |    |                       |          | 3084.250 | 2793.280 | 42   | N | .000     | .000  | .000   | 1     |
| ELEMENT NO                                                                                             | 19 | IS A SYSTEM HEADWORKS | U/S DATA | STATION  | INVERT   | SECT |   | W S ELEV |       |        |       |

W S ELEV



3084.250 2793.280 42

SPD.EDT

.000

WATER SURFACE PROFILE LISTING  
EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
SKY POINTE DRIVE STORM DRAIN SYSTEM (SPD)  
FROM PROPOSED INLET TO REGIONAL MAINLINE

Date: 4-30-2019 Time: 9:57:19

| 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  | 2742.330    | 8.670      | 2751.000   | 398.00  | 16.75     | 4.36     | 2755.36        | .00        | 5.19           | .00            | 5.500          | .000            | .00 | 1 .0           |
| 16.000    | .0725       |            |            |         |           | .0140    | .22            | 8.67       | .00            | 2.55           | .013           | .00             | .00 | PIPE           |
| 1016.000  | 2743.490    | 7.953      | 2751.443   | 398.00  | 16.75     | 4.36     | 2755.80        | .00        | 5.19           | .00            | 5.500          | .000            | .00 | 1 .0           |
| 105.270   | .0288       |            |            |         |           | .0140    | 1.48           | 7.95       | .00            | 3.39           | .013           | .00             | .00 | PIPE           |
| 1121.270  | 2746.520    | 7.726      | 2754.247   | 398.00  | 16.75     | 4.36     | 2758.60        | .00        | 5.19           | .00            | 5.500          | .000            | .00 | 1 .0           |
| 48.590    | .0049       |            |            |         |           | .0140    | .68            | 7.73       | .00            | 5.50           | .013           | .00             | .00 | PIPE           |
| 1169.860  | 2746.760    | 8.387      | 2755.147   | 398.00  | 16.75     | 4.36     | 2759.50        | .00        | 5.19           | .00            | 5.500          | .000            | .00 | 1 .0           |
| 51.630    | .0050       |            |            |         |           | .0140    | .73            | 8.39       | .00            | 5.50           | .013           | .00             | .00 | PIPE           |
| 1221.490  | 2747.020    | 9.142      | 2756.162   | 398.00  | 16.75     | 4.36     | 2760.52        | .00        | 5.19           | .00            | 5.500          | .000            | .00 | 1 .0           |
| JUNCT STR | .0000       |            |            |         |           | .0125    | .00            | 9.14       | .00            |                | .013           | .00             | .00 | PIPE           |
| 1221.490  | 2747.020    | 10.810     | 2757.830   | 351.00  | 14.77     | 3.39     | 2761.22        | .00        | 5.03           | .00            | 5.500          | .000            | .00 | 1 .0           |
| 86.050    | .0221       |            |            |         |           | .0109    | .94            | 10.81      | .00            | 3.40           | .013           | .00             | .00 | PIPE           |
| 1307.540  | 2748.920    | 10.177     | 2759.096   | 351.00  | 14.77     | 3.39     | 2762.49        | .00        | 5.03           | .00            | 5.500          | .000            | .00 | 1 .0           |
| 120.520   | .0222       |            |            |         |           | .0109    | 1.32           | 10.18      | .00            | 3.40           | .013           | .00             | .00 | PIPE           |
| 1428.060  | 2751.590    | 9.138      | 2760.728   | 351.00  | 14.77     | 3.39     | 2764.12        | .00        | 5.03           | .00            | 5.500          | .000            | .00 | 1 .0           |
| 125.310   | .0221       |            |            |         |           | .0109    | 1.37           | 9.14       | .00            | 3.40           | .013           | .00             | .00 | PIPE           |
| 1553.370  | 2754.360    | 8.085      | 2762.446   | 351.00  | 14.77     | 3.39     | 2765.83        | .00        | 5.03           | .00            | 5.500          | .000            | .00 | 1 .0           |
| 113.948   | .0221       |            |            |         |           | .0109    | 1.24           | 8.09       | .00            | 3.40           | .013           | .00             | .00 | PIPE           |

WATER SURFACE PROFILE LISTING  
EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
SKY POINTE DRIVE STORM DRAIN SYSTEM (SPD)  
FROM PROPOSED INLET TO REGIONAL MAINLINE

Date: 4-30-2019 Time: 9:57:19

| 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        |
| 1667.318       | 2756.878    | 7.109      | 2763.987   | 351.00  | 14.77     | 3.39     | 2767.38        | .00        | 5.03           | .00            | 5.500          | .000            | .00 | 1 .0           |
| HYDRAULIC JUMP |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |
| 1667.318       | 2756.878    | 3.493      | 2760.371   | 351.00  | 22.06     | 7.55     | 2767.93        | .00        | 5.03           | 5.30           | 5.500          | .000            | .00 | 1 .0           |
| 10.952         | .0221       |            |            |         |           | .0204    | .22            | 3.49       | 2.24           | 3.40           | .013           | .00             | .00 | PIPE           |
| 1678.270       | 2757.120    | 3.496      | 2760.616   | 351.00  | 22.03     | 7.54     | 2768.15        | .00        | 5.03           | 5.29           | 5.500          | .000            | .00 | 1 .0           |
| 135.550        | .0218       |            |            |         |           | .0198    | 2.68           | 3.50       | 2.24           | 3.42           | .013           | .00             | .00 | PIPE           |
| 1813.820       | 2760.070    | 3.566      | 2763.636   | 351.00  | 21.53     | 7.20     | 2770.84        | .00        | 5.03           | 5.25           | 5.500          | .000            | .00 | 1 .0           |
| 2.485          | .0215       |            |            |         |           | .0192    | .05            | 3.57       | 2.15           | 3.43           | .013           | .00             | .00 | PIPE           |
| 1816.305       | 2760.123    | 3.567      | 2763.691   | 351.00  | 21.52     | 7.19     | 2770.88        | .00        | 5.03           | 5.25           | 5.500          | .000            | .00 | 1 .0           |
| 150.581        | .0215       |            |            |         |           | .0181    | 2.73           | 3.57       | 2.15           | 3.43           | .013           | .00             | .00 | PIPE           |
| 1966.886       | 2763.357    | 3.720      | 2767.077   | 351.00  | 20.52     | 6.54     | 2773.62        | .00        | 5.03           | 5.15           | 5.500          | .000            | .00 | 1 .0           |
| 80.884         | .0215       |            |            |         |           | .0162    | 1.31           | 3.72       | 1.98           | 3.43           | .013           | .00             | .00 | PIPE           |
| 2047.770       | 2765.094    | 3.885      | 2768.978   | 351.00  | 19.57     | 5.95     | 2774.92        | .00        | 5.03           | 5.01           | 5.500          | .000            | .00 | 1 .0           |
| 51.449         | .0215       |            |            |         |           | .0144    | .74            | 3.88       | 1.82           | 3.43           | .013           | .00             | .00 | PIPE           |

SPD.OUT

|          |          |       |          |        |       |       |         |      |      |      |       |      |     |      |    |
|----------|----------|-------|----------|--------|-------|-------|---------|------|------|------|-------|------|-----|------|----|
| 2099.219 | 2766.198 | 4.063 | 2770.261 | 351.00 | 18.66 | 5.40  | 2775.67 | .00  | 5.03 | 4.83 | 5.500 | .000 | .00 | 1    | .0 |
| -        | -        | -     | -        | -      | -     | -     | -       | -    | -    | -    | -     | -    | -   | -    | -  |
| 34.752   | .0215    |       |          |        |       | .0129 | .45     | 4.06 | 1.67 | 3.43 | .013  | .00  | .00 | PIPE |    |
| 2133.970 | 2766.945 | 4.257 | 2771.202 | 351.00 | 17.79 | 4.91  | 2776.11 | .00  | 5.03 | 4.60 | 5.500 | .000 | .00 | 1    | .0 |
| -        | -        | -     | -        | -      | -     | -     | -       | -    | -    | -    | -     | -    | -   | -    | -  |
| 23.457   | .0215    |       |          |        |       | .0117 | .27     | 4.26 | 1.51 | 3.43 | .013  | .00  | .00 | PIPE |    |

\* FILE: SPD.WSW  
 W S P G W - CIVILDESIGN Version 14.08  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING  
 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
 SKY POINTE DRIVE STORM DRAIN SYSTEM (SPD)  
 FROM PROPOSED INLET TO REGIONAL MAINLINE  
 Date: 4-30-2019 Time: 9:57:19  
 PAGE 3

| 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        |
| 2157.427       | 2767.448    | 4.474      | 2771.922   | 351.00  | 16.96     | 4.47     | 2776.39        | .00        | 5.03           | 4.29           | 5.500          | .000            | .00 | 1 .0           |
| -              | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -   | -              |
| 14.524         | .0215       |            |            |         |           | .0106    | .15            | 4.47       | 1.36           | 3.43           | .013           | .00             | .00 | PIPE           |
| 2171.951       | 2767.760    | 4.722      | 2772.482   | 351.00  | 16.17     | 4.06     | 2776.54        | .00        | 5.03           | 3.83           | 5.500          | .000            | .00 | 1 .0           |
| -              | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -   | -              |
| 5.579          | .0215       |            |            |         |           | .0098    | .05            | 4.72       | 1.20           | 3.43           | .013           | .00             | .00 | PIPE           |
| 2177.530       | 2767.880    | 5.027      | 2772.907   | 351.00  | 15.42     | 3.69     | 2776.60        | .00        | 5.03           | 3.08           | 5.500          | .000            | .00 | 1 .0           |
| -              | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -   | -              |
| JUNCT STR      | .0000       |            |            |         |           | .0097    | .00            | 5.03       | 1.00           |                | .013           | .00             | .00 | PIPE           |
| 2177.530       | 2769.880    | 5.040      | 2774.920   | 100.00  | 10.39     | 1.68     | 2776.60        | .00        | 3.07           | .00            | 3.500          | .000            | .00 | 1 .0           |
| -              | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -   | -              |
| 43.609         | .0240       |            |            |         |           | .0099    | .43            | 5.04       | .00            | 2.04           | .013           | .00             | .00 | PIPE           |
| 2221.139       | 2770.927    | 4.444      | 2775.371   | 100.00  | 10.39     | 1.68     | 2777.05        | .00        | 3.07           | .00            | 3.500          | .000            | .00 | 1 .0           |
| -              | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -   | -              |
| HYDRAULIC JUMP |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |
| 2221.139       | 2770.927    | 2.047      | 2772.974   | 100.00  | 17.11     | 4.55     | 2777.52        | .00        | 3.07           | 3.45           | 3.500          | .000            | .00 | 1 .0           |
| -              | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -   | -              |
| 202.799        | .0240       |            |            |         |           | .0225    | 4.57           | 2.05       | 2.32           | 2.04           | .013           | .00             | .00 | PIPE           |
| 2423.938       | 2775.798    | 2.116      | 2777.914   | 100.00  | 16.44     | 4.20     | 2782.11        | .00        | 3.07           | 3.42           | 3.500          | .000            | .00 | 1 .0           |
| -              | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -   | -              |
| 76.282         | .0240       |            |            |         |           | .0202    | 1.54           | 2.12       | 2.17           | 2.04           | .013           | .00             | .00 | PIPE           |
| 2500.220       | 2777.630    | 2.204      | 2779.833   | 100.00  | 15.67     | 3.81     | 2783.65        | .00        | 3.07           | 3.38           | 3.500          | .000            | .00 | 1 .0           |
| -              | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -   | -              |
| JUNCT STR      | .0000       |            |            |         |           | .0211    | .00            | 2.20       | 2.01           |                | .013           | .00             | .00 | PIPE           |
| 2500.220       | 2777.630    | 1.859      | 2779.489   | 85.00   | 16.37     | 4.16     | 2783.65        | .00        | 2.87           | 3.49           | 3.500          | .000            | .00 | 1 .0           |
| -              | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -   | -              |
| 8.347          | .0205       |            |            |         |           | .0234    | .20            | 1.86       | 2.37           | 1.93           | .013           | .00             | .00 | PIPE           |

\* FILE: SPD.WSW  
 W S P G W - CIVILDESIGN Version 14.08  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING  
 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
 SKY POINTE DRIVE STORM DRAIN SYSTEM (SPD)  
 FROM PROPOSED INLET TO REGIONAL MAINLINE  
 Date: 4-30-2019 Time: 9:57:19  
 PAGE 4

| 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        |
| 2508.567 | 2777.801    | 1.854      | 2779.655   | 85.00   | 16.43     | 4.19     | 2783.85        | .00        | 2.87           | 3.49           | 3.500          | .000            | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -   | -              |
| 76.452   | .0205       |            |            |         |           | .0251    | 1.92           | 1.85       | 2.38           | 1.93           | .013           | .00             | .00 | PIPE           |
| 2585.020 | 2779.371    | 1.785      | 2781.156   | 85.00   | 17.23     | 4.61     | 2785.77        | .00        | 2.87           | 3.50           | 3.500          | .000            | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -   | -              |
| 49.600   | .0205       |            |            |         |           | .0285    | 1.41           | 1.79       | 2.56           | 1.93           | .013           | .00             | .00 | PIPE           |
| 2634.620 | 2780.390    | 1.719      | 2782.109   | 85.00   | 18.07     | 5.07     | 2787.18        | .00        | 2.87           | 3.50           | 3.500          | .000            | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -   | -              |
| 202.939  | .0305       |            |            |         |           | .0287    | 5.83           | 1.72       | 2.75           | 1.72           | .013           | .00             | .00 | PIPE           |
| 2837.559 | 2786.571    | 1.776      | 2788.347   | 85.00   | 17.34     | 4.67     | 2793.02        | .00        | 2.87           | 3.50           | 3.500          | .000            | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -   | -              |
| 72.490   | .0305       |            |            |         |           | .0255    | 1.85           | 1.78       | 2.58           | 1.72           | .013           | .00             | .00 | PIPE           |
| 2910.049 | 2788.779    | 1.844      | 2790.624   | 85.00   | 16.53     | 4.24     | 2794.87        | .00        | 2.87           | 3.49           | 3.500          | .000            | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -   | -              |
| 39.570   | .0305       |            |            |         |           | .0225    | .89            | 1.84       | 2.40           | 1.72           | .013           | .00             | .00 | PIPE           |
| 2949.619 | 2789.985    | 1.916      | 2791.901   | 85.00   | 15.76     | 3.86     | 2795.76        | .00        | 2.87           | 3.48           | 3.500          | .000            | .00 | 1 .0           |



SPD.OUT

|          |          |       |          |       |       |      |         |     |      |      |       |      |     |     |      |
|----------|----------|-------|----------|-------|-------|------|---------|-----|------|------|-------|------|-----|-----|------|
| 26.000   | .0305    |       |          |       |       |      | .0199   | .52 | 1.92 | 2.23 | 1.72  | .013 | .00 | .00 | PIPE |
| 2975.619 | 2790.777 | 1.992 | 2792.769 | 85.00 | 15.03 | 3.51 | 2796.28 | .00 | 2.87 | 3.47 | 3.500 | .000 | .00 | 1   | .0   |
| 18.533   | .0305    |       |          |       |       |      | .0176   | .33 | 1.99 | 2.07 | 1.72  | .013 | .00 | .00 | PIPE |
| 2994.152 | 2791.341 | 2.072 | 2793.413 | 85.00 | 14.33 | 3.19 | 2796.60 | .00 | 2.87 | 3.44 | 3.500 | .000 | .00 | 1   | .0   |
| 13.758   | .0305    |       |          |       |       |      | .0155   | .21 | 2.07 | 1.92 | 1.72  | .013 | .00 | .00 | PIPE |
| 3007.910 | 2791.760 | 2.157 | 2793.917 | 85.00 | 13.66 | 2.90 | 2796.82 | .00 | 2.87 | 3.40 | 3.500 | .000 | .00 | 1   | .0   |
| 13.364   | .0199    |       |          |       |       |      | .0142   | .19 | 2.16 | 1.78 | 1.95  | .013 | .00 | .00 | PIPE |

FILE: SPD.WSW  
 W S P G W - CIVILDESIGN Version 14.08  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING  
 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
 SKY POINTE DRIVE STORM DRAIN SYSTEM (SPD)  
 FROM PROPOSED INLET TO REGIONAL MAINLINE  
 Date: 4-30-2019 Time: 9:57:19  
 PAGE 5

| Station  | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt or I.D. | ZL      | No Wth Prs/Pip |    |
|----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|-----------------|---------|----------------|----|
| L/Elem   | Ch Slope    |            |            |         | SF Ave    | HF       | SE Dpth        | Froude N   | Norm Dp        | "N"            | X-Fall         | ZR              | Type Ch |                |    |
| 3021.274 | 2792.026    | 2.193      | 2794.219   | 85.00   | 13.40     | 2.79     | 2797.01        | .00        | 2.87           | 3.39           | 3.500          | .000            | .00     | 1              | .0 |
| 23.655   | .0199       |            |            |         | .0131     | .31      | 2.19           | 1.72       | 1.95           | .013           | .00            | .00             | PIPE    |                |    |
| 3044.929 | 2792.497    | 2.285      | 2794.782   | 85.00   | 12.77     | 2.53     | 2797.32        | .00        | 2.87           | 3.33           | 3.500          | .000            | .00     | 1              | .0 |
| 15.943   | .0199       |            |            |         | .0116     | .19      | 2.29           | 1.59       | 1.95           | .013           | .00            | .00             | PIPE    |                |    |
| 3060.872 | 2792.814    | 2.384      | 2795.198   | 85.00   | 12.18     | 2.30     | 2797.50        | .00        | 2.87           | 3.26           | 3.500          | .000            | .00     | 1              | .0 |
| 10.839   | .0199       |            |            |         | .0104     | .11      | 2.38           | 1.47       | 1.95           | .013           | .00            | .00             | PIPE    |                |    |
| 3071.711 | 2793.030    | 2.490      | 2795.520   | 85.00   | 11.61     | 2.09     | 2797.61        | .00        | 2.87           | 3.17           | 3.500          | .000            | .00     | 1              | .0 |
| 7.111    | .0199       |            |            |         | .0093     | .07      | 2.49           | 1.35       | 1.95           | .013           | .00            | .00             | PIPE    |                |    |
| 3078.822 | 2793.172    | 2.604      | 2795.776   | 85.00   | 11.07     | 1.90     | 2797.68        | .00        | 2.87           | 3.05           | 3.500          | .000            | .00     | 1              | .0 |
| 4.072    | .0199       |            |            |         | .0083     | .03      | 2.60           | 1.23       | 1.95           | .013           | .00            | .00             | PIPE    |                |    |
| 3082.895 | 2793.253    | 2.730      | 2795.983   | 85.00   | 10.56     | 1.73     | 2797.71        | .00        | 2.87           | 2.90           | 3.500          | .000            | .00     | 1              | .0 |
| 1.355    | .0199       |            |            |         | .0075     | .01      | 2.73           | 1.12       | 1.95           | .013           | .00            | .00             | PIPE    |                |    |
| 3084.250 | 2793.280    | 2.871      | 2796.151   | 85.00   | 10.06     | 1.57     | 2797.72        | .00        | 2.87           | 2.69           | 3.500          | .000            | .00     | 1              | .0 |

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
 SKY POINTE DRIVE STORM DRAIN SYSTEM (SPD)  
 FROM PROPOSED INLET TO REGIONAL MAINLINE

|         |    |    |   |   |  |   |
|---------|----|----|---|---|--|---|
| 1000.00 | .I | H  | W | E |  | R |
| 1024.52 | .I | CH | W | E |  | R |
| 1049.04 | .  |    |   |   |  |   |
| 1073.56 | .  |    |   |   |  |   |
| 1098.08 | .  |    |   |   |  |   |
| 1122.60 | .I | CH | W | E |  | R |
| 1147.12 | .  |    |   |   |  |   |

|         |   |   |    |    |   |         |   |    |
|---------|---|---|----|----|---|---------|---|----|
| 1171.64 | . | I | H  | W  | E | SPD.OUT | . | R  |
| 1196.16 | . |   |    |    |   |         | . |    |
| 1220.69 | . |   |    |    |   |         | . |    |
| 1245.21 | . | I | CH | W  | E |         | . | JX |
| 1269.73 | . | I | CH | W  | E |         | . | R  |
| 1294.25 | . |   |    |    |   |         | . |    |
| 1318.77 | . | I | CH | W  | E |         | . | R  |
| 1343.29 | . |   |    |    |   |         | . |    |
| 1367.81 | . |   |    |    |   |         | . |    |
| 1392.33 | . |   |    |    |   |         | . |    |
| 1416.85 | . |   |    |    |   |         | . |    |
| 1441.37 | . | I | CH | W  | E |         | . | R  |
| 1465.89 | . |   |    |    |   |         | . |    |
| 1490.41 | . |   |    |    |   |         | . |    |
| 1514.93 | . |   |    |    |   |         | . |    |
| 1539.45 | . |   |    |    |   |         | . |    |
| 1563.97 | . | I | CH | W  | E |         | . | R  |
| 1588.49 | . |   |    |    |   |         | . |    |
| 1613.01 | . |   |    |    |   |         | . |    |
| 1637.54 | . |   |    |    |   |         | . |    |
| 1662.06 | . |   |    |    |   |         | . |    |
| 1686.58 | . | I | CH | W  | E |         | . | R  |
| 1711.10 | . | I | W  | CH | E |         | . | R  |
| 1735.62 | . | I | W  | CH | E |         | . | R  |
| 1760.14 | . |   |    |    |   |         | . |    |
| 1784.66 | . |   |    |    |   |         | . |    |
| 1809.18 | . |   |    |    |   |         | . |    |
| 1833.70 | . | I | W  | H  | E |         | . | R  |
| 1858.22 | . | I | W  | CH | E |         | . | R  |
| 1882.74 | . |   |    |    |   |         | . |    |

## SPD.OUT

|         |   |   |    |    |    |        |
|---------|---|---|----|----|----|--------|
| 1907.26 | . |   |    |    |    | .      |
| 1931.78 | . |   |    |    |    | .      |
| 1956.30 | . |   |    |    |    | .      |
| 1980.82 | . | I | W  | H  | E  | . R    |
| 2005.34 | . |   |    |    |    | .      |
| 2029.86 | . |   |    |    |    | .      |
| 2054.39 | . | I | W  | CH | E  | . R    |
| 2078.91 | . |   |    |    |    | .      |
| 2103.43 | . | I | W  | CH | E  | . R    |
| 2127.95 | . |   |    |    |    | .      |
| 2152.47 | . | I | W  | CH | E  | . R    |
| 2176.99 | . | I | W  | CH | E  | . R    |
| 2201.51 | . | I | W  | H  | E  | . R    |
| 2226.03 | . | I | W  | H  | E  | . JX   |
| 2250.55 | . | I | CH | W  | E  | . R    |
| 2275.07 | . | I | H  | W  | E  | . R    |
| 2299.59 | . | I | W  | H  | E  | . R    |
| 2324.11 | . |   |    |    |    | .      |
| 2348.63 | . |   |    |    |    | .      |
| 2373.15 | . |   |    |    |    | .      |
| 2397.67 | . |   |    |    |    | .      |
| 2422.19 | . |   |    |    |    | .      |
| 2446.71 | . |   | I  | W  | CH | E . R  |
| 2471.24 | . |   |    |    |    | .      |
| 2495.76 | . |   |    |    |    | .      |
| 2520.28 | . |   | I  | W  | CH | E . JX |
| 2544.80 | . |   | I  | W  | CH | E . R  |
| 2569.32 | . |   | I  | W  | CH | E . R  |
| 2593.84 | . |   | I  | W  | CH | E . R  |
| 2618.36 | . |   |    |    |    | .      |



SPD.OUT

|         |   |  |   |   |   |   |   |   |   |
|---------|---|--|---|---|---|---|---|---|---|
| 2642.88 | . |  | I | W | C | H | E | . | R |
| 2667.40 | . |  |   |   |   |   |   | . |   |
| 2691.92 | . |  |   |   |   |   |   | . |   |
| 2716.44 | . |  |   |   |   |   |   | . |   |
| 2740.96 | . |  |   |   |   |   |   | . |   |
| 2765.48 | . |  |   |   |   |   |   | . |   |
| 2790.00 | . |  |   |   |   |   |   | . |   |
| 2814.52 | . |  |   |   |   |   |   | . |   |
| 2839.04 | . |  | I | W | C | H | E | . | R |
| 2863.56 | . |  |   |   |   |   |   | . |   |
| 2888.09 | . |  |   |   |   |   |   | . |   |
| 2912.61 | . |  | I | W | C | H | E | . | R |
| 2937.13 | . |  |   |   |   |   |   | . |   |
| 2961.65 | . |  | I | W | C | H | E | . | R |
| 2986.17 | . |  | I | W | C | H | E | . | R |
| 3010.69 | . |  | I | W | C | H | E | . | R |
| 3035.21 | . |  | I | W | C | H | E | . | R |
| 3059.73 | . |  | I | W | C | H | E | . | R |
| 3084.25 | . |  | I | W | C | H | E | . | R |

2742.330 2747.869 2753.409 2758.948 2764.487 2770.027 2775.566 2781.105 2786.645 2792.184 2797.724

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                                    |                        |                            |                        |                       |                       |                        |          |                 |              |                                        |                        |
|--------------------------------------------------------------------|------------------------|----------------------------|------------------------|-----------------------|-----------------------|------------------------|----------|-----------------|--------------|----------------------------------------|------------------------|
| Lateral Line From Basin ECOM3 to Skye Pointe SPD Model (SLAT1.WSW) |                        |                            |                        |                       |                       |                        |          |                 |              |                                        |                        |
| WSPG Station                                                       | Plan Set Project No. * | Equivalent Roadway Station | Improvement Plan Sheet | Storm Drain Dimension | Invert Elevation (ft) | Q <sub>100</sub> (cfs) | WSE (ft) | Velocity (ft/s) | FG Elevation | Facility Description                   | HGL Check <sup>1</sup> |
| 1000.00                                                            | LCD: EST1906           | 39+36.88                   | P-5                    | 24" RCP               | 2750.52               | 35.00                  | 2751.17  | 39.41           | 2765.34      | Connection to SPD Mainline Model       | OK                     |
| 1015.09                                                            | LCD: EST1906           | 39+28.93                   |                        | 7.5' x 12' RCB        | 2752.03               | 35.00                  | 2752.63  | 7.82            | 2764.57      | Wall Entrance                          | OK                     |
| 1015.09                                                            | LCD: EST1906           |                            |                        | 7.5' x 12' RCB        | 2752.03               | 35.00                  | 2752.63  | 7.82            | 2764.57      | Junction with SP2a Drop Inlet Facility | OK                     |
| 1017.59                                                            | LCD: EST1906           |                            |                        | 7.5' x 12' RCB        | 2752.28               | 35.00                  | 2753.16  | 5.32            | 2764.57      |                                        | OK                     |
| 1017.59                                                            | SPD: EST1907           |                            |                        | 7.5' x 12' RCB        | 2752.28               | 17.00                  | 2753.73  | 1.57            | 2764.57      |                                        | OK                     |
| 1020.09                                                            | SPD: EST1907           |                            |                        | 7.5' x 12' RCB        | 2752.53               | 17.00                  | 2753.71  | 1.93            | 2764.57      |                                        | OK                     |
| 1020.09                                                            | SPD: EST1907           |                            |                        | 7.5' x 12' RCB        | 2752.53               | 17.00                  | 2753.71  | 1.93            | 2764.57      | Wall Exit                              | OK                     |
| 1069.08                                                            | SPD: EST1907           | 39+28.93                   |                        | 24" RCP               | 2757.43               | 17.00                  | 2758.92  | 6.79            | 2765.00      | Addition of Flow from Basin ECOM3      | OK                     |
| 1069.08                                                            | SPD: EST1907           |                            |                        | 24" RCP               | 2757.43               | 17.00                  | 2758.92  | 6.79            | 2765.00      |                                        | OK                     |

## SLAT1.WSW

T1 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

T2 SKYE POINTE DRIVE STORM DRAIN SYSTEM (SLAT1)

T3 FROM PARCEL ECOM3 TO SKYE POINTE MAINLINE SD (SPD)

|    |                  |    |   |       |          |          |       |       |           |      |
|----|------------------|----|---|-------|----------|----------|-------|-------|-----------|------|
| SO | 1000.0002750.520 | 24 |   |       | 2757.830 |          |       |       |           |      |
| R  | 1015.0902752.030 | 24 |   | .013  |          |          |       |       | 26.0      |      |
| WE | 1015.0902752.030 | 24 |   | .013  |          |          |       |       |           |      |
| R  | 1017.5902752.280 | 3  |   | .013  |          |          |       |       | 0.0       |      |
| JX | 1017.5902752.280 | 3  | 3 | .013  | 18.0     | 2752.280 |       | 90.0  |           |      |
| R  | 1020.0902752.530 | 3  |   | .013  |          |          |       |       | 0.0       |      |
| WX | 1020.0902752.530 | 3  |   | .013  |          |          |       |       |           |      |
| R  | 1069.0802757.430 | 24 |   | .013  |          |          |       |       |           |      |
| SH | 1069.0802757.430 | 24 |   |       |          |          |       |       |           |      |
| CD | 1                | 3  | 0 | 0.000 | 13.000   | 20.000   | 0.000 | 0.000 | 0.0000.00 | 0.00 |
| CD | 2                | 3  | 0 | 0.000 | 12.000   | 12.500   | 0.000 | 0.000 | 0.0000.00 | 0.00 |
| CD | 3                | 3  | 0 | 0.000 | 12.000   | 7.500    | 0.000 | 0.000 | 0.0000.00 | 0.00 |
| CD | 4                | 3  | 0 | 0.000 | 17.000   | 5.000    | 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 |
| Q  |                  |    |   |       | 17.000   |          |       |       |           |      |



FILE: SLAT1.WSW

SLAT1.EDT  
W S P G W - EDIT LISTING - Version 14.10  
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

Date: 4-30-2019 Time: 6:59:26  
PAGE 1

| CARD | SECT | CHN  | NO OF    | AVE PIER | HEIGHT 1 | BASE   | ZL   | ZR   | INV  | Y(1) | Y(2) | Y(3) | Y(4) | Y(5) | Y(6) | Y(7) | Y(8) | Y(9) | Y(10) |
|------|------|------|----------|----------|----------|--------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| CODE | NO   | TYPE | PIER/PIP | WIDTH    | DIAMETER | WIDTH  |      |      | DROP |      |      |      |      |      |      |      |      |      |       |
| CD   | 1    | 3    | 0        | .000     | 13.000   | 20.000 | .000 | .000 | .00  |      |      |      |      |      |      |      |      |      |       |
| CD   | 2    | 3    | 0        | .000     | 12.000   | 12.500 | .000 | .000 | .00  |      |      |      |      |      |      |      |      |      |       |
| CD   | 3    | 3    | 0        | .000     | 12.000   | 7.500  | .000 | .000 | .00  |      |      |      |      |      |      |      |      |      |       |
| CD   | 4    | 3    | 0        | .000     | 17.000   | 5.000  | .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    |        |      |      |      |      |      |      |      |      |      |      |      |      |       |

W S P G W

PAGE NO 1

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

HEADING LINE NO 2 IS - EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

HEADING LINE NO 3 IS - SKYE POINTE DRIVE STORM DRAIN SYSTEM (SLAT1)

FROM PARCEL ECOM3 TO SKYE POINTE MAINLINE SD (SPD)

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

| ELEMENT NO                                                                                              | IS A | SYSTEM OUTLET    | STATION  | INVERT   | SECT | W S ELEV |    |      |  |        |          |          |        |       |      |  |  |  |  |
|---------------------------------------------------------------------------------------------------------|------|------------------|----------|----------|------|----------|----|------|--|--------|----------|----------|--------|-------|------|--|--|--|--|
| 1                                                                                                       | IS A | SYSTEM OUTLET    | 1000.000 | 2750.520 | 24   | 2757.830 |    |      |  |        |          |          |        |       |      |  |  |  |  |
| 2                                                                                                       | IS A | REACH            | 1015.090 | 2752.030 | 24   |          | N  | .013 |  | RADIUS | ANGLE    | ANG PT   | MAN H  |       |      |  |  |  |  |
| 3                                                                                                       | IS A | WALL ENTRANCE    | 1015.090 | 2752.030 | 24   |          | FP | .013 |  |        |          |          |        |       |      |  |  |  |  |
| 4                                                                                                       | IS A | REACH            | 1017.590 | 2752.280 | 3    |          | N  | .013 |  | RADIUS | ANGLE    | ANG PT   | MAN H  |       |      |  |  |  |  |
| 5                                                                                                       | IS A | JUNCTION         | 1017.590 | 2752.280 | 3    |          | N  | .013 |  |        |          |          |        |       |      |  |  |  |  |
|                                                                                                         |      |                  |          |          |      |          | Q3 |      |  | Q4     | INVERT-3 | INVERT-4 | PHI 3  | PHI 4 |      |  |  |  |  |
|                                                                                                         |      |                  |          |          |      |          |    |      |  |        | 2752.280 |          | 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 |      |                  |          |          |      |          |    |      |  |        |          |          |        |       |      |  |  |  |  |
| 6                                                                                                       | IS A | REACH            | 1020.090 | 2752.530 | 3    |          | N  | .013 |  | RADIUS | ANGLE    | ANG PT   | MAN H  |       |      |  |  |  |  |
| 7                                                                                                       | IS A | WALL EXIT        | 1020.090 | 2752.530 | 3    |          |    |      |  |        |          |          |        |       |      |  |  |  |  |
| WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS             |      |                  |          |          |      |          |    |      |  |        |          |          |        |       |      |  |  |  |  |
| 8                                                                                                       | IS A | REACH            | 1069.080 | 2757.430 | 24   |          | N  | .013 |  | RADIUS | ANGLE    | ANG PT   | MAN H  |       |      |  |  |  |  |
| 9                                                                                                       | IS A | SYSTEM HEADWORKS | 1069.080 | 2757.430 | 24   |          |    |      |  |        |          |          |        |       |      |  |  |  |  |
|                                                                                                         |      |                  |          |          |      |          |    |      |  |        | W S ELEV |          |        |       |      |  |  |  |  |
|                                                                                                         |      |                  |          |          |      |          |    |      |  |        | .000     |          |        |       |      |  |  |  |  |

FILE: SLAT1.WSW

SLAT1.OUT  
W S P G W - CIVILDESIGN Version 14.08  
Program Package Serial Number: 7189

PAGE 1

WATER SURFACE PROFILE LISTING  
EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
SKYE POINTE DRIVE STORM DRAIN SYSTEM (SLAT1)  
FROM PARCEL ECOM3 TO SKYE POINTE MAINLINE SD (SPD)

Date: 4-30-2019 Time: 6:59:29

| Station  | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt I.D. | ZL  | No Wth Prs/Pip |
|----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|--------------|-----|----------------|
| L/Elem   | Ch Slope    |            |            |         |           | SF Ave   | HF             | SE Dpth    | Froude N       | Norm Dp        | "N"            | X-Fall       | ZR  | Type Ch        |
| 1000.000 | 2750.520    | .652       | 2751.172   | 35.00   | 39.41     | 24.11    | 2775.28        | .00        | 1.92           | 1.87           | 2.000          | .000         | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -            | -   | -              |
| 3.593    | .1001       |            |            |         |           | .4727    | 1.70           | .65        | 10.09          | .99            | .013           | .00          | .00 | PIPE           |
| 1003.593 | 2750.880    | .639       | 2751.518   | 35.00   | 40.50     | 25.48    | 2776.99        | .00        | 1.92           | 1.86           | 2.000          | .000         | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -            | -   | -              |
| 5.936    | .1001       |            |            |         |           | .5256    | 3.12           | .64        | 10.49          | .99            | .013           | .00          | .00 | PIPE           |
| 1009.529 | 2751.474    | .617       | 2752.091   | 35.00   | 42.48     | 28.02    | 2780.11        | .00        | 1.92           | 1.85           | 2.000          | .000         | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -            | -   | -              |
| 5.561    | .1001       |            |            |         |           | .6002    | 3.34           | .62        | 11.21          | .99            | .013           | .00          | .00 | PIPE           |
| 1015.090 | 2752.030    | .597       | 2752.627   | 35.00   | 7.82      | .95      | 2753.58        | .00        | .88            | 7.50           | 12.000         | 7.500        | .00 | 0 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -            | -   | -              |
| .057     | .1000       |            |            |         |           | .0113    | .00            | .60        | 1.78           | .30            | .013           | .00          | .00 | BOX            |
| 1015.147 | 2752.036    | .599       | 2752.635   | 35.00   | 7.79      | .94      | 2753.58        | .00        | .88            | 7.50           | 12.000         | 7.500        | .00 | 0 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -            | -   | -              |
| .630     | .1000       |            |            |         |           | .0104    | .01            | .60        | 1.77           | .30            | .013           | .00          | .00 | BOX            |
| 1015.777 | 2752.099    | .628       | 2752.727   | 35.00   | 7.43      | .86      | 2753.58        | .00        | .88            | 7.50           | 12.000         | 7.500        | .00 | 0 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -            | -   | -              |
| .519     | .1000       |            |            |         |           | .0090    | .00            | .63        | 1.65           | .30            | .013           | .00          | .00 | BOX            |
| 1016.296 | 2752.151    | .659       | 2752.810   | 35.00   | 7.08      | .78      | 2753.59        | .00        | .88            | 7.50           | 12.000         | 7.500        | .00 | 0 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -            | -   | -              |
| .419     | .1000       |            |            |         |           | .0077    | .00            | .66        | 1.54           | .30            | .013           | .00          | .00 | BOX            |
| 1016.715 | 2752.193    | .691       | 2752.884   | 35.00   | 6.75      | .71      | 2753.59        | .00        | .88            | 7.50           | 12.000         | 7.500        | .00 | 0 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -            | -   | -              |
| .328     | .1000       |            |            |         |           | .0067    | .00            | .69        | 1.43           | .30            | .013           | .00          | .00 | BOX            |
| 1017.043 | 2752.226    | .725       | 2752.950   | 35.00   | 6.44      | .64      | 2753.59        | .00        | .88            | 7.50           | 12.000         | 7.500        | .00 | 0 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -            | -   | -              |
| .246     | .1000       |            |            |         |           | .0057    | .00            | .72        | 1.33           | .30            | .013           | .00          | .00 | BOX            |

FILE: SLAT1.WSW

W S P G W - CIVILDESIGN Version 14.08  
Program Package Serial Number: 7189

PAGE 2

WATER SURFACE PROFILE LISTING  
EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
SKYE POINTE DRIVE STORM DRAIN SYSTEM (SLAT1)  
FROM PARCEL ECOM3 TO SKYE POINTE MAINLINE SD (SPD)

Date: 4-30-2019 Time: 6:59:29

| Station   | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt I.D. | ZL  | No Wth Prs/Pip |
|-----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|--------------|-----|----------------|
| L/Elem    | Ch Slope    |            |            |         |           | SF Ave   | HF             | SE Dpth    | Froude N       | Norm Dp        | "N"            | X-Fall       | ZR  | Type Ch        |
| 1017.289  | 2752.250    | .760       | 2753.010   | 35.00   | 6.14      | .59      | 2753.60        | .00        | .88            | 7.50           | 12.000         | 7.500        | .00 | 0 .0           |
| -         | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -            | -   | -              |
| .169      | .1000       |            |            |         |           | .0050    | .00            | .76        | 1.24           | .30            | .013           | .00          | .00 | BOX            |
| 1017.458  | 2752.267    | .797       | 2753.064   | 35.00   | 5.85      | .53      | 2753.60        | .00        | .88            | 7.50           | 12.000         | 7.500        | .00 | 0 .0           |
| -         | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -            | -   | -              |
| .099      | .1000       |            |            |         |           | .0043    | .00            | .80        | 1.16           | .30            | .013           | .00          | .00 | BOX            |
| 1017.557  | 2752.277    | .836       | 2753.113   | 35.00   | 5.58      | .48      | 2753.60        | .00        | .88            | 7.50           | 12.000         | 7.500        | .00 | 0 .0           |
| -         | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -            | -   | -              |
| .033      | .1000       |            |            |         |           | .0037    | .00            | .84        | 1.08           | .30            | .013           | .00          | .00 | BOX            |
| 1017.590  | 2752.280    | .878       | 2753.158   | 35.00   | 5.32      | .44      | 2753.60        | .00        | .88            | 7.50           | 12.000         | 7.500        | .00 | 0 .0           |
| -         | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -            | -   | -              |
| JUNCT STR | .0000       |            |            |         |           | .0018    | .00            | .88        | 1.00           |                | .013           | .00          | .00 | BOX            |
| 1017.590  | 2752.280    | 1.446      | 2753.726   | 17.00   | 1.57      | .04      | 2753.76        | .00        | .54            | 7.50           | 12.000         | 7.500        | .00 | 0 .0           |
| -         | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -            | -   | -              |
| .636      | .1000       |            |            |         |           | .0002    | .00            | 1.45       | .23            | .19            | .013           | .00          | .00 | BOX            |
| 1018.226  | 2752.344    | 1.379      | 2753.722   | 17.00   | 1.64      | .04      | 2753.76        | .00        | .54            | 7.50           | 12.000         | 7.500        | .00 | 0 .0           |
| -         | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -            | -   | -              |
| .601      | .1000       |            |            |         |           | .0002    | .00            | 1.38       | .25            | .19            | .013           | .00          | .00 | BOX            |
| 1018.827  | 2752.404    | 1.314      | 2753.718   | 17.00   | 1.72      | .05      | 2753.76        | .00        | .54            | 7.50           | 12.000         | 7.500        | .00 | 0 .0           |
| -         | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -            | -   | -              |
| .567      | .1000       |            |            |         |           | .0003    | .00            | 1.31       | .27            | .19            | .013           | .00          | .00 | BOX            |

SLAT1.OUT

|          |          |        |          |       |      |     |         |     |     |      |        |       |     |   |    |
|----------|----------|--------|----------|-------|------|-----|---------|-----|-----|------|--------|-------|-----|---|----|
| 1019.394 | 2752.460 | 1.253  | 2753.714 | 17.00 | 1.81 | .05 | 2753.76 | .00 | .54 | 7.50 | 12.000 | 7.500 | .00 | 0 | .0 |
| -.534    | -.1000   | -.0003 | -.00     | 1.25  | .28  | .19 | .013    | .00 | .00 | BOX  |        |       |     |   |    |
| 1019.928 | 2752.514 | 1.195  | 2753.709 | 17.00 | 1.90 | .06 | 2753.76 | .00 | .54 | 7.50 | 12.000 | 7.500 | .00 | 0 | .0 |
| -.162    | -.1000   | -.0003 | -.00     | 1.19  | .31  | .19 | .013    | .00 | .00 | BOX  |        |       |     |   |    |

FILE: SLAT1.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 3

Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING  
 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
 SKYE POINTE DRIVE STORM DRAIN SYSTEM (SLAT1)  
 FROM PARCEL ECOM3 TO SKYE POINTE MAINLINE SD (SPD)  
 Date: 4-30-2019 Time: 6:59:29

| 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        |
| 1020.090  | 2752.530    | 1.177      | 2753.708   | 17.00   | 1.93      | .06      | 2753.76        | .00        | .54            | 7.50           | 12.000         | 7.500           | .00 | 0 .0           |
| WALL EXIT |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |
| 1020.090  | 2752.530    | 1.177      | 2753.708   | 17.00   | 1.93      | .06      | 2753.76        | .00        | .54            | 7.50           | 12.000         | 7.500           | .00 | 0 .0           |
| 1020.090  | 2752.530    | .729       | 2753.259   | 17.00   | 16.42     | 4.19     | 2757.45        | .00        | 1.49           | 1.93           | 2.000          | .000            | .00 | 1 .0           |
| 6.039     | .1000       |            |            |         |           | .0679    | .41            | .73        | 3.95           | .66            | .013           | .00             | .00 | PIPE           |
| 1026.129  | 2753.134    | .742       | 2753.876   | 17.00   | 16.03     | 3.99     | 2757.86        | .00        | 1.49           | 1.93           | 2.000          | .000            | .00 | 1 .0           |
| 8.738     | .1000       |            |            |         |           | .0616    | .54            | .74        | 3.81           | .66            | .013           | .00             | .00 | PIPE           |
| 1034.867  | 2754.008    | .769       | 2754.777   | 17.00   | 15.28     | 3.63     | 2758.40        | .00        | 1.49           | 1.95           | 2.000          | .000            | .00 | 1 .0           |
| 6.562     | .1000       |            |            |         |           | .0540    | .35            | .77        | 3.56           | .66            | .013           | .00             | .00 | PIPE           |
| 1041.428  | 2754.665    | .797       | 2755.461   | 17.00   | 14.57     | 3.30     | 2758.76        | .00        | 1.49           | 1.96           | 2.000          | .000            | .00 | 1 .0           |
| 5.144     | .1000       |            |            |         |           | .0474    | .24            | .80        | 3.33           | .66            | .013           | .00             | .00 | PIPE           |
| 1046.573  | 2755.179    | .826       | 2756.005   | 17.00   | 13.89     | 3.00     | 2759.00        | .00        | 1.49           | 1.97           | 2.000          | .000            | .00 | 1 .0           |
| 4.148     | .1000       |            |            |         |           | .0416    | .17            | .83        | 3.11           | .66            | .013           | .00             | .00 | PIPE           |
| 1050.720  | 2755.594    | .856       | 2756.450   | 17.00   | 13.24     | 2.72     | 2759.17        | .00        | 1.49           | 1.98           | 2.000          | .000            | .00 | 1 .0           |
| 3.404     | .1000       |            |            |         |           | .0366    | .12            | .86        | 2.90           | .66            | .013           | .00             | .00 | PIPE           |
| 1054.125  | 2755.935    | .887       | 2756.822   | 17.00   | 12.63     | 2.48     | 2759.30        | .00        | 1.49           | 1.99           | 2.000          | .000            | .00 | 1 .0           |
| 2.830     | .1000       |            |            |         |           | .0321    | .09            | .89        | 2.70           | .66            | .013           | .00             | .00 | PIPE           |
| 1056.955  | 2756.218    | .920       | 2757.138   | 17.00   | 12.04     | 2.25     | 2759.39        | .00        | 1.49           | 1.99           | 2.000          | .000            | .00 | 1 .0           |
| 2.370     | .1000       |            |            |         |           | .0283    | .07            | .92        | 2.52           | .66            | .013           | .00             | .00 | PIPE           |

FILE: SLAT1.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 4

Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING  
 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
 SKYE POINTE DRIVE STORM DRAIN SYSTEM (SLAT1)  
 FROM PARCEL ECOM3 TO SKYE POINTE MAINLINE SD (SPD)  
 Date: 4-30-2019 Time: 6:59:29

| 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        |
| 1059.324 | 2756.455    | .955       | 2757.410   | 17.00   | 11.48     | 2.05     | 2759.46        | .00        | 1.49           | 2.00           | 2.000          | .000            | .00 | 1 .0           |
| 1.995    | .1000       |            |            |         |           | .0249    | .05            | .96        | 2.35           | .66            | .013           | .00             | .00 | PIPE           |
| 1061.319 | 2756.654    | .991       | 2757.645   | 17.00   | 10.95     | 1.86     | 2759.51        | .00        | 1.49           | 2.00           | 2.000          | .000            | .00 | 1 .0           |
| 1.680    | .1000       |            |            |         |           | .0219    | .04            | .99        | 2.19           | .66            | .013           | .00             | .00 | PIPE           |
| 1062.999 | 2756.822    | 1.029      | 2757.851   | 17.00   | 10.44     | 1.69     | 2759.54        | .00        | 1.49           | 2.00           | 2.000          | .000            | .00 | 1 .0           |
| 1.411    | .1000       |            |            |         |           | .0193    | .03            | 1.03       | 2.04           | .66            | .013           | .00             | .00 | PIPE           |
| 1064.411 | 2756.963    | 1.069      | 2758.032   | 17.00   | 9.95      | 1.54     | 2759.57        | .00        | 1.49           | 2.00           | 2.000          | .000            | .00 | 1 .0           |
| 1.179    | .1000       |            |            |         |           | .0170    | .02            | 1.07       | 1.90           | .66            | .013           | .00             | .00 | PIPE           |
| 1065.590 | 2757.081    | 1.111      | 2758.192   | 17.00   | 9.49      | 1.40     | 2759.59        | .00        | 1.49           | 1.99           | 2.000          | .000            | .00 | 1 .0           |



SLAT1.OUT

| Station  | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia. | Base Wt/I.D. | ZL  | No Wth Prs/Pip |
|----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|-------------|--------------|-----|----------------|
| 1066.566 | 2757.179    | 1.155      | 2758.333   | 17.00   | 9.05      | 1.27     | 2759.60        | .00        | 1.49           | 1.98           | 2.000       | .000         | .00 | 1 .0           |
| .794     | .1000       |            |            |         |           | .0133    | .01            | 1.15       | 1.63           | .66            | .013        | .00          | .00 | PIPE           |
| 1067.360 | 2757.258    | 1.201      | 2758.459   | 17.00   | 8.63      | 1.16     | 2759.61        | .00        | 1.49           | 1.96           | 2.000       | .000         | .00 | 1 .0           |
| .630     | .1000       |            |            |         |           | .0118    | .01            | 1.20       | 1.52           | .66            | .013        | .00          | .00 | PIPE           |
| 1067.990 | 2757.321    | 1.251      | 2758.572   | 17.00   | 8.22      | 1.05     | 2759.62        | .00        | 1.49           | 1.94           | 2.000       | .000         | .00 | 1 .0           |
| .479     | .1000       |            |            |         |           | .0104    | .00            | 1.25       | 1.40           | .66            | .013        | .00          | .00 | PIPE           |
| 1068.470 | 2757.369    | 1.303      | 2758.672   | 17.00   | 7.84      | .95      | 2759.63        | .00        | 1.49           | 1.91           | 2.000       | .000         | .00 | 1 .0           |
| .338     | .1000       |            |            |         |           | .0093    | .00            | 1.30       | 1.30           | .66            | .013        | .00          | .00 | PIPE           |

W S P G W - CIVILDESIGN Version 14.08  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING  
 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
 SKYE POINTE DRIVE STORM DRAIN SYSTEM (SLAT1)  
 FROM PARCEL ECOM3 TO SKYE POINTE MAINLINE SD (SPD)  
 Date: 4-30-2019 Time: 6:59:29  
 FILE: SLAT1.WSW  
 PAGE 5

| Station  | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia. | Base Wt/I.D. | ZL  | No Wth Prs/Pip |
|----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|-------------|--------------|-----|----------------|
| 1068.808 | 2757.403    | 1.359      | 2758.762   | 17.00   | 7.48      | .87      | 2759.63        | .00        | 1.49           | 1.87           | 2.000       | .000         | .00 | 1 .0           |
| .203     | .1000       |            |            |         |           | .0082    | .00            | 1.36       | 1.19           | .66            | .013        | .00          | .00 | PIPE           |
| 1069.011 | 2757.423    | 1.420      | 2758.843   | 17.00   | 7.13      | .79      | 2759.63        | .00        | 1.49           | 1.82           | 2.000       | .000         | .00 | 1 .0           |
| .069     | .1000       |            |            |         |           | .0074    | .00            | 1.42       | 1.10           | .66            | .013        | .00          | .00 | PIPE           |
| 1069.080 | 2757.430    | 1.486      | 2758.916   | 17.00   | 6.79      | .72      | 2759.63        | .00        | 1.49           | 1.75           | 2.000       | .000         | .00 | 1 .0           |

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

SKYE POINTE DRIVE STORM DRAIN SYSTEM (SLAT1)

FROM PARCEL ECOM3 TO SKYE POINTE MAINLINE SD (SPD)

| 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. | Base Wt/I.D. | ZL | No Wth Prs/Pip |
|---------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|-------------|--------------|----|----------------|
| 1000.00 | . I W H     |            |            |         |           |          |                |            |                |                |             |              |    | R              |
| 1000.87 | .           |            |            |         |           |          |                |            |                |                |             |              |    | .              |
| 1001.75 | .           |            |            |         |           |          |                |            |                |                |             |              |    | .              |
| 1002.62 | .           |            |            |         |           |          |                |            |                |                |             |              |    | .              |
| 1003.50 | .           |            |            |         |           |          |                |            |                |                |             |              |    | .              |
| 1004.37 | . I W H     |            |            |         |           |          |                |            |                |                |             |              |    | R              |
| 1005.25 | .           |            |            |         |           |          |                |            |                |                |             |              |    | .              |
| 1006.12 | .           |            |            |         |           |          |                |            |                |                |             |              |    | .              |
| 1007.00 | .           |            |            |         |           |          |                |            |                |                |             |              |    | .              |
| 1007.87 | .           |            |            |         |           |          |                |            |                |                |             |              |    | .              |
| 1008.74 | .           |            |            |         |           |          |                |            |                |                |             |              |    | .              |
| 1009.62 | . I W H     |            |            |         |           |          |                |            |                |                |             |              |    | R              |

## SLAT1.OUT

[illegible]

## SLAT1.OUT

|         |   |   |   |    |   |   |   |
|---------|---|---|---|----|---|---|---|
| 1035.85 | . |   |   |    | . |   |   |
| 1036.73 | . |   |   |    | . |   |   |
| 1037.60 | . |   |   |    | . |   |   |
| 1038.47 | . |   |   |    | . |   |   |
| 1039.35 | . |   |   |    | . |   |   |
| 1040.22 | . |   |   |    | . |   |   |
| 1041.10 | . |   |   |    | . |   |   |
| 1041.97 | . | I | W | CH | E | . | R |
| 1042.85 | . |   |   |    |   | . |   |
| 1043.72 | . |   |   |    |   | . |   |
| 1044.60 | . |   |   |    |   | . |   |
| 1045.47 | . |   |   |    |   | . |   |
| 1046.34 | . |   |   |    |   | . |   |
| 1047.22 | . | I | W | CH | E | . | R |
| 1048.09 | . |   |   |    |   | . |   |
| 1048.97 | . |   |   |    |   | . |   |
| 1049.84 | . |   |   |    |   | . |   |
| 1050.72 | . |   |   |    |   | . |   |
| 1051.59 | . | I | W | CH | E | . | R |
| 1052.47 | . |   |   |    |   | . |   |
| 1053.34 | . |   |   |    |   | . |   |
| 1054.21 | . | I | W | CH | E | . | R |
| 1055.09 | . |   |   |    |   | . |   |
| 1055.96 | . |   |   |    |   | . |   |
| 1056.84 | . |   |   |    |   | . |   |
| 1057.71 | . | I | W | CH | E | . | R |
| 1058.59 | . |   |   |    |   | . |   |
| 1059.46 | . | I | W | CH | E | . | R |
| 1060.34 | . |   |   |    |   | . |   |
| 1061.21 | . |   |   |    |   | . |   |



## SLAT1.OUT

|         |   |   |    |   |   |   |   |
|---------|---|---|----|---|---|---|---|
| 1062.08 | . | I | WC | H | E | . | R |
| 1062.96 | . |   |    |   |   | . |   |
| 1063.83 | . | I | WC | H | E | . | R |
| 1064.71 | . | I | WC | H | E | . | R |
| 1065.58 | . |   |    |   |   | . |   |
| 1066.46 | . | I | WC | H | E | . | R |
| 1067.33 | . | I | WC | H | E | . | R |
| 1068.21 | . | I | WC | H | E | . | R |
| 1069.08 | . | I | WC | H | E | . | R |

2750.520 2753.479 2756.438 2759.398 2762.357 2765.316 2768.275 2771.235 2774.194 2777.153 2780.113

## NOTES

## 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                                    |                        |                            |                        |                       |                       |                        |          |                 |              |                                       |                        |  |
|--------------------------------------------------------------------|------------------------|----------------------------|------------------------|-----------------------|-----------------------|------------------------|----------|-----------------|--------------|---------------------------------------|------------------------|--|
| Lateral Line From Basin ECOM4 to Skye Pointe SPD Model (SLAT2.WSW) |                        |                            |                        |                       |                       |                        |          |                 |              |                                       |                        |  |
| WSPG Station                                                       | Plan Set Project No. * | Equivalent Roadway Station | Improvement Plan Sheet | Storm Drain Dimension | Invert Elevation (ft) | Q <sub>100</sub> (cfs) | WSE (ft) | Velocity (ft/s) | FG Elevation | Facility Description                  | HGL Check <sup>1</sup> |  |
| 1000.00                                                            | SPD: EST1907           | 26+43.11                   | P-5                    | 24" RCP               | 2779.13               | 18.00                  | 2779.60  | 31.57           | 2797.25      | Connection to SPD Mainline Model      | OK                     |  |
| 1035.07                                                            |                        | 26+11.44                   |                        | 7.5' x 17" RCB        | 2783.32               | 18.00                  | 2783.66  | 7.06            | 2797.60      | Junction with SP1 Drop Inlet Facility | OK                     |  |
| 1035.07                                                            |                        |                            |                        | 7.5' x 17" RCB        | 2783.32               | 18.00                  | 2783.66  | 7.06            | 2797.60      |                                       | OK                     |  |
| 1037.57                                                            |                        |                            |                        | 7.5' x 17" RCB        | 2783.62               | 18.00                  | 2784.18  | 4.26            | 2797.60      |                                       | OK                     |  |
| 1037.57                                                            |                        |                            |                        | 7.5' x 17" RCB        | 2783.62               | 15.00                  | 2784.42  | 2.50            | 2797.60      |                                       | OK                     |  |
| 1040.07                                                            |                        | 26+11.54                   |                        | 7.5' x 17" RCB        | 2783.90               | 15.00                  | 2784.40  | 4.01            | 2797.60      | Addition of Flow From Basin ECOM4     | OK                     |  |
| 1040.07                                                            |                        |                            |                        | 7.5' x 17" RCB        | 2783.90               | 15.00                  | 2784.40  | 4.01            | 2797.60      |                                       | OK                     |  |
| 1073.75                                                            |                        |                            |                        | 24" RCP               | 2787.67               | 15.00                  | 2789.07  | 6.41            | 2795.00      |                                       | OK                     |  |
| 1073.75                                                            |                        |                            |                        | 24" RCP               | 2787.67               | 15.00                  | 2789.07  | 6.41            | 2795.00      |                                       | OK                     |  |

T1 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
 T2 SKYE POINTE DRIVE STORM DRAIN SYSTEM (SLAT2)  
 T3 FROM PARCEL ECOM4 TO SKYE POINTE MAINLINE SD (SPD)

|    |          |          |     |       |        |          |       |       |                |
|----|----------|----------|-----|-------|--------|----------|-------|-------|----------------|
| SO | 1000.000 | 2779.130 | 24  |       |        | 2779.833 |       |       |                |
| R  | 1042.370 | 2783.370 | 24  | .013  |        |          | 45.0  |       |                |
| WE | 1042.370 | 2783.370 | 24  | .013  |        |          |       |       |                |
| R  | 1044.870 | 2783.620 | 4   | .013  |        |          | 0.0   |       |                |
| JX | 1044.870 | 2783.620 | 4 4 | .013  | 3.0    | 2783.620 | 90.0  |       |                |
| R  | 1047.370 | 2783.670 | 4   | .013  |        |          | 0.0   |       |                |
| WX | 1047.370 | 2783.670 | 4   | .013  |        |          |       |       |                |
| R  | 1097.670 | 2784.670 | 24  | .013  |        |          |       |       |                |
| SH | 1097.670 | 2784.670 | 24  |       |        |          |       |       |                |
| CD | 1        | 3        | 0   | 0.000 | 13.000 | 20.000   | 0.000 | 0.000 | 0.0000.00 0.00 |
| CD | 2        | 3        | 0   | 0.000 | 12.000 | 12.500   | 0.000 | 0.000 | 0.0000.00 0.00 |
| CD | 3        | 3        | 0   | 0.000 | 12.000 | 7.500    | 0.000 | 0.000 | 0.0000.00 0.00 |
| CD | 4        | 3        | 0   | 0.000 | 17.000 | 5.000    | 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 |
| Q  |          |          |     |       | 15.000 |          |       |       |                |



FILE: SLAT2.WSW SLAT2.EDT  
W S P G W - EDIT LISTING - Version 14.10 Date: 5- 5-2019 Time: 5:42:59  
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

| CARD CODE | SECT NO | CHN TYPE | NO OF PIER/PIP | AVE WIDTH | PIER DIAMETER | HEIGHT 1 BASE | ZL   | ZR   | INV DROP | Y(1) | Y(2) | Y(3) | Y(4) | Y(5) | Y(6) | Y(7) | Y(8) | Y(9) | Y(10) |
|-----------|---------|----------|----------------|-----------|---------------|---------------|------|------|----------|------|------|------|------|------|------|------|------|------|-------|
| CD        | 1       | 3        | 0              | .000      | 13.000        | 20.000        | .000 | .000 | .00      |      |      |      |      |      |      |      |      |      |       |
| CD        | 2       | 3        | 0              | .000      | 12.000        | 12.500        | .000 | .000 | .00      |      |      |      |      |      |      |      |      |      |       |
| CD        | 3       | 3        | 0              | .000      | 12.000        | 7.500         | .000 | .000 | .00      |      |      |      |      |      |      |      |      |      |       |
| CD        | 4       | 3        | 0              | .000      | 17.000        | 5.000         | .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         |               |      |      |          |      |      |      |      |      |      |      |      |      |       |

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

HEADING LINE NO 1 IS - EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
HEADING LINE NO 2 IS - SKYE POINTE DRIVE STORM DRAIN SYSTEM (SLAT2)  
HEADING LINE NO 3 IS - FROM PARCEL ECOM4 TO SKYE POINTE MAINLINE SD (SPD)

W S P G W WATER SURFACE PROFILE - ELEMENT CARD LISTING PAGE NO 2

| ELEMENT NO                                                                                              | IS A | SYSTEM OUTLET    | U/S DATA | STATION  | INVERT   | SECT | W S ELEV | RADIUS | ANGLE | ANG PT | MAN H |
|---------------------------------------------------------------------------------------------------------|------|------------------|----------|----------|----------|------|----------|--------|-------|--------|-------|
| ELEMENT NO 1                                                                                            | IS A | SYSTEM OUTLET    | U/S DATA | 1000.000 | 2779.130 | 24   | 2779.833 |        |       |        |       |
| ELEMENT NO 2                                                                                            | IS A | REACH            | U/S DATA | 1042.370 | 2783.370 | 24   |          | .013   | .000  | 45.000 | 0     |
| ELEMENT NO 3                                                                                            | IS A | WALL ENTRANCE    | U/S DATA | 1042.370 | 2783.370 | 24   |          | .013   |       |        |       |
| WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS             |      |                  |          |          |          |      |          |        |       |        |       |
| ELEMENT NO 4                                                                                            | IS A | REACH            | U/S DATA | 1044.870 | 2783.620 | 4    |          | .013   | .000  | 90.000 | 0     |
| ELEMENT NO 5                                                                                            | IS A | JUNCTION         | U/S DATA | 1044.870 | 2783.620 | 4    |          | .013   | .000  | 90.000 | 0     |
| THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING |      |                  |          |          |          |      |          |        |       |        |       |
| THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING |      |                  |          |          |          |      |          |        |       |        |       |
| ELEMENT NO 6                                                                                            | IS A | REACH            | U/S DATA | 1047.370 | 2783.670 | 4    |          | .013   | .000  | 90.000 | 0     |
| ELEMENT NO 7                                                                                            | IS A | WALL EXIT        | U/S DATA | 1047.370 | 2783.670 | 4    |          | .013   | .000  | 90.000 | 0     |
| WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS             |      |                  |          |          |          |      |          |        |       |        |       |
| ELEMENT NO 8                                                                                            | IS A | REACH            | U/S DATA | 1097.670 | 2784.670 | 24   |          | .013   | .000  | 90.000 | 0     |
| ELEMENT NO 9                                                                                            | IS A | SYSTEM HEADWORKS | U/S DATA | 1097.670 | 2784.670 | 24   |          | .013   | .000  | 90.000 | 0     |

WATER SURFACE PROFILE LISTING  
EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
SKYE POINTE DRIVE STORM DRAIN SYSTEM (SLAT2)  
FROM PARCEL ECOM4 TO SKYE POINTE MAINLINE SD (SPD)

Date: 5- 5-2019 Time: 5:43: 4

| Station  | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt/I.D. | ZL  | No Wth Prs/Pip |
|----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|--------------|-----|----------------|
| L/Elem   | Ch Slope    |            |            |         |           | SF Ave   | HF             | SE Dpth    | Froude N       | Norm Dp        | "N"            | X-Fall       | ZR  | Type Ch        |
| 1000.000 | 2779.130    | .597       | 2779.727   | 18.00   | 22.84     | 8.10     | 2787.83        | .00        | 1.53           | 1.83           | 2.000          | .000         | .00 | 1 .0           |
| 9.783    | .1001       |            |            |         |           | .1796    | 1.76           | .60        | 6.14           | .68            | .013           | .00          | .00 | PIPE           |
| 1009.783 | 2780.109    | .578       | 2780.687   | 18.00   | 23.94     | 8.90     | 2789.59        | .00        | 1.53           | 1.81           | 2.000          | .000         | .00 | 1 .0           |
| 8.299    | .1001       |            |            |         |           | .2050    | 1.70           | .58        | 6.55           | .68            | .013           | .00          | .00 | PIPE           |
| 1018.082 | 2780.939    | .558       | 2781.498   | 18.00   | 25.11     | 9.79     | 2791.29        | .00        | 1.53           | 1.79           | 2.000          | .000         | .00 | 1 .0           |
| 7.158    | .1001       |            |            |         |           | .2342    | 1.68           | .56        | 7.00           | .68            | .013           | .00          | .00 | PIPE           |
| 1025.239 | 2781.656    | .540       | 2782.195   | 18.00   | 26.33     | 10.77    | 2792.96        | .00        | 1.53           | 1.78           | 2.000          | .000         | .00 | 1 .0           |
| 6.316    | .1001       |            |            |         |           | .2677    | 1.69           | .54        | 7.48           | .68            | .013           | .00          | .00 | PIPE           |
| 1031.555 | 2782.288    | .522       | 2782.809   | 18.00   | 27.62     | 11.85    | 2794.65        | .00        | 1.53           | 1.76           | 2.000          | .000         | .00 | 1 .0           |
| 5.667    | .1001       |            |            |         |           | .3060    | 1.73           | .52        | 7.99           | .68            | .013           | .00          | .00 | PIPE           |
| 1037.222 | 2782.855    | .504       | 2783.359   | 18.00   | 28.97     | 13.03    | 2796.39        | .00        | 1.53           | 1.74           | 2.000          | .000         | .00 | 1 .0           |
| 5.148    | .1001       |            |            |         |           | .3499    | 1.80           | .50        | 8.53           | .68            | .013           | .00          | .00 | PIPE           |
| 1042.370 | 2783.370    | .488       | 2783.858   | 18.00   | 7.38      | .85      | 2784.70        | .00        | .74            | 5.00           | 17.000         | 5.000        | .00 | 0 .0           |
| .419     | .1000       |            |            |         |           | .0131    | .01            | .49        | 1.86           | .26            | .013           | .00          | .00 | BOX            |
| 1042.789 | 2783.412    | .504       | 2783.916   | 18.00   | 7.15      | .79      | 2784.71        | .00        | .74            | 5.00           | 17.000         | 5.000        | .00 | 0 .0           |
| .538     | .1000       |            |            |         |           | .0116    | .01            | .50        | 1.78           | .26            | .013           | .00          | .00 | BOX            |
| 1043.327 | 2783.466    | .528       | 2783.994   | 18.00   | 6.82      | .72      | 2784.72        | .00        | .74            | 5.00           | 17.000         | 5.000        | .00 | 0 .0           |
| .442     | .1000       |            |            |         |           | .0100    | .00            | .53        | 1.65           | .26            | .013           | .00          | .00 | BOX            |

WATER SURFACE PROFILE LISTING  
EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
SKYE POINTE DRIVE STORM DRAIN SYSTEM (SLAT2)  
FROM PARCEL ECOM4 TO SKYE POINTE MAINLINE SD (SPD)

Date: 5- 5-2019 Time: 5:43: 4

| Station   | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt/I.D. | ZL  | No Wth Prs/Pip |
|-----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|--------------|-----|----------------|
| L/Elem    | Ch Slope    |            |            |         |           | SF Ave   | HF             | SE Dpth    | Froude N       | Norm Dp        | "N"            | X-Fall       | ZR  | Type Ch        |
| 1043.770  | 2783.510    | .554       | 2784.064   | 18.00   | 6.50      | .66      | 2784.72        | .00        | .74            | 5.00           | 17.000         | 5.000        | .00 | 0 .0           |
| .357      | .1000       |            |            |         |           | .0086    | .00            | .55        | 1.54           | .26            | .013           | .00          | .00 | BOX            |
| 1044.126  | 2783.546    | .581       | 2784.127   | 18.00   | 6.20      | .60      | 2784.72        | .00        | .74            | 5.00           | 17.000         | 5.000        | .00 | 0 .0           |
| .279      | .1000       |            |            |         |           | .0075    | .00            | .58        | 1.43           | .26            | .013           | .00          | .00 | BOX            |
| 1044.405  | 2783.574    | .609       | 2784.183   | 18.00   | 5.91      | .54      | 2784.73        | .00        | .74            | 5.00           | 17.000         | 5.000        | .00 | 0 .0           |
| .209      | .1000       |            |            |         |           | .0064    | .00            | .61        | 1.33           | .26            | .013           | .00          | .00 | BOX            |
| 1044.614  | 2783.594    | .639       | 2784.234   | 18.00   | 5.63      | .49      | 2784.73        | .00        | .74            | 5.00           | 17.000         | 5.000        | .00 | 0 .0           |
| .144      | .1000       |            |            |         |           | .0056    | .00            | .64        | 1.24           | .26            | .013           | .00          | .00 | BOX            |
| 1044.758  | 2783.609    | .670       | 2784.279   | 18.00   | 5.37      | .45      | 2784.73        | .00        | .74            | 5.00           | 17.000         | 5.000        | .00 | 0 .0           |
| .084      | .1000       |            |            |         |           | .0048    | .00            | .67        | 1.16           | .26            | .013           | .00          | .00 | BOX            |
| 1044.842  | 2783.617    | .703       | 2784.320   | 18.00   | 5.12      | .41      | 2784.73        | .00        | .74            | 5.00           | 17.000         | 5.000        | .00 | 0 .0           |
| .028      | .1000       |            |            |         |           | .0042    | .00            | .70        | 1.08           | .26            | .013           | .00          | .00 | BOX            |
| 1044.870  | 2783.620    | .738       | 2784.358   | 18.00   | 4.88      | .37      | 2784.73        | .00        | .74            | 5.00           | 17.000         | 5.000        | .00 | 0 .0           |
| JUNCT STR | .0000       |            |            |         |           | .0024    | .00            | .74        | 1.00           |                | .013           | .00          | .00 | BOX            |

SLAT2.OUT

|          |          |       |          |       |      |       |         |      |     |      |        |       |     |     |    |
|----------|----------|-------|----------|-------|------|-------|---------|------|-----|------|--------|-------|-----|-----|----|
| 1044.870 | 2783.620 | 1.050 | 2784.670 | 15.00 | 2.86 | .13   | 2784.80 | .00  | .65 | 5.00 | 17.000 | 5.000 | .00 | 0   | .0 |
| 1.914    | .0199    |       |          |       |      | .0010 | .00     | 1.05 | .49 | .39  | .013   | .00   | .00 | BOX |    |
| 1046.784 | 2783.658 | 1.001 | 2784.659 | 15.00 | 3.00 | .14   | 2784.80 | .00  | .65 | 5.00 | 17.000 | 5.000 | .00 | 0   | .0 |
| .586     | .0199    |       |          |       |      | .0011 | .00     | 1.00 | .53 | .39  | .013   | .00   | .00 | BOX |    |

W S P G W - CIVILDESIGN Version 14.08  
 FILE: SLAT2.WSW  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING  
 Date: 5- 5-2019 Time: 5:43: 4  
 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
 SKYE POINTE DRIVE STORM DRAIN SYSTEM (SLAT2)  
 FROM PARCEL ECOM4 TO SKYE POINTE MAINLINE SD (SPD)  
 PAGE 3

| Station   | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt/or I.D. | ZL      | No Wth Prs/Pip |
|-----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|-----------------|---------|----------------|
| L/Elem    | Ch Slope    |            |            |         | SF Ave    | HF       | SE Dpth        | Froude N   | Norm Dp        | "N"            | X-Fall         | ZR              | Type Ch |                |
| 1047.370  | 2783.670    | .986       | 2784.656   | 15.00   | 3.04      | .14      | 2784.80        | .00        | .65            | 5.00           | 17.000         | 5.000           | .00     | 0              |
| WALL EXIT |             |            |            |         |           |          |                |            |                |                |                |                 |         |                |
| 1047.370  | 2783.670    | .987       | 2784.657   | 15.00   | 3.04      | .14      | 2784.80        | .00        | .65            | 5.00           | 17.000         | 5.000           | .00     | 0              |
| 1047.370  | 2783.670    | 1.019      | 2784.689   | 15.00   | 9.32      | 1.35     | 2786.04        | .00        | 1.40           | 2.00           | 2.000          | .000            | .00     | 1              |
| 17.511    | .0199       |            |            |         | .0156     | .27      | 1.02           | 1.83       | .96            | .013           | .00            | .00             | PIPE    |                |
| 1064.881  | 2784.018    | 1.053      | 2785.071   | 15.00   | 8.95      | 1.24     | 2786.31        | .00        | 1.40           | 2.00           | 2.000          | .000            | .00     | 1              |
| 12.108    | .0199       |            |            |         | .0139     | .17      | 1.05           | 1.72       | .96            | .013           | .00            | .00             | PIPE    |                |
| 1076.989  | 2784.259    | 1.094      | 2785.352   | 15.00   | 8.53      | 1.13     | 2786.48        | .00        | 1.40           | 1.99           | 2.000          | .000            | .00     | 1              |
| 7.852     | .0199       |            |            |         | .0123     | .10      | 1.09           | 1.60       | .96            | .013           | .00            | .00             | PIPE    |                |
| 1084.841  | 2784.415    | 1.137      | 2785.552   | 15.00   | 8.14      | 1.03     | 2786.58        | .00        | 1.40           | 1.98           | 2.000          | .000            | .00     | 1              |
| 5.303     | .0199       |            |            |         | .0109     | .06      | 1.14           | 1.49       | .96            | .013           | .00            | .00             | PIPE    |                |
| 1090.144  | 2784.520    | 1.182      | 2785.703   | 15.00   | 7.76      | .93      | 2786.64        | .00        | 1.40           | 1.97           | 2.000          | .000            | .00     | 1              |
| 3.576     | .0199       |            |            |         | .0096     | .03      | 1.18           | 1.38       | .96            | .013           | .00            | .00             | PIPE    |                |
| 1093.720  | 2784.591    | 1.231      | 2785.822   | 15.00   | 7.40      | .85      | 2786.67        | .00        | 1.40           | 1.95           | 2.000          | .000            | .00     | 1              |
| 2.280     | .0199       |            |            |         | .0085     | .02      | 1.23           | 1.28       | .96            | .013           | .00            | .00             | PIPE    |                |
| 1096.000  | 2784.637    | 1.282      | 2785.919   | 15.00   | 7.05      | .77      | 2786.69        | .00        | 1.40           | 1.92           | 2.000          | .000            | .00     | 1              |
| 1.266     | .0199       |            |            |         | .0076     | .01      | 1.28           | 1.18       | .96            | .013           | .00            | .00             | PIPE    |                |
| 1097.266  | 2784.662    | 1.337      | 2785.998   | 15.00   | 6.72      | .70      | 2786.70        | .00        | 1.40           | 1.88           | 2.000          | .000            | .00     | 1              |
| .404      | .0199       |            |            |         | .0067     | .00      | 1.34           | 1.09       | .96            | .013           | .00            | .00             | PIPE    |                |

W S P G W - CIVILDESIGN Version 14.08  
 FILE: SLAT2.WSW  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING  
 Date: 5- 5-2019 Time: 5:43: 4  
 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
 SKYE POINTE DRIVE STORM DRAIN SYSTEM (SLAT2)  
 FROM PARCEL ECOM4 TO SKYE POINTE MAINLINE SD (SPD)  
 PAGE 4

| 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 |                |
| 1097.670 | 2784.670    | 1.396      | 2786.066   | 15.00   | 6.41      | .64      | 2786.70        | .00        | 1.40           | 1.84           | 2.000          | .000            | .00     | 1              |

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

SKYE POINTE DRIVE STORM DRAIN SYSTEM (SLAT2)

FROM PARCEL ECOM4 TO SKYE POINTE MAINLINE SD (SPD)

1000.00 .I W C H

E

R



## SLAT2.OUT

|         |   |   |   |     |       |
|---------|---|---|---|-----|-------|
| 1001.71 | . |   |   |     | .     |
| 1003.43 | . |   |   |     | .     |
| 1005.14 | . |   |   |     | .     |
| 1006.85 | . |   |   |     | .     |
| 1008.57 | . |   |   |     | .     |
| 1010.28 | . | I | W | C H | E . R |
| 1011.99 | . |   |   |     | .     |
| 1013.71 | . |   |   |     | .     |
| 1015.42 | . |   |   |     | .     |
| 1017.14 | . |   |   |     | .     |
| 1018.85 | . | I | W | C H | E . R |
| 1020.56 | . |   |   |     | .     |
| 1022.28 | . |   |   |     | .     |
| 1023.99 | . |   |   |     | .     |
| 1025.70 | . | I | W | C H | E . R |
| 1027.42 | . |   |   |     | .     |
| 1029.13 | . |   |   |     | .     |
| 1030.84 | . |   |   |     | .     |
| 1032.56 | . | I | W | C H | E . R |
| 1034.27 | . |   |   |     | .     |
| 1035.98 | . |   |   |     | .     |
| 1037.70 | . | I | W | C H | E . R |
| 1039.41 | . |   |   |     | .     |
| 1041.12 | . |   |   |     | .     |
| 1042.84 | . | I | W | C E | H . R |
| 1044.55 | . | I | W | C E | H . R |
| 1046.26 | . | I | W | C E | H . R |
| 1047.98 | . | I | W | C E | H . R |
| 1049.69 | . | I | W | E   | H . R |

|         |   | SLAT2.OUT |        |
|---------|---|-----------|--------|
| 1051.41 | . | I WCE     | H . R  |
| 1053.12 | . | I WCE     | H . R  |
| 1054.83 | . | I WCE     | H . R  |
| 1056.55 | . | I WE      | H . R  |
| 1058.26 | . | I WE      | H . JX |
| 1059.97 | . | I C WE    | H . R  |
| 1061.69 | . | I CWE     | H . R  |
| 1063.40 | . | IYYCWEY   | YH. WX |
| 1065.11 | . | IYYCWEY   | YH. WX |
| 1066.83 | . | I W C H E | . R    |
| 1068.54 | . | I W C H E | . R    |
| 1070.25 | . |           | .      |
| 1071.97 | . |           | .      |
| 1073.68 | . |           | .      |
| 1075.39 | . |           | .      |
| 1077.11 | . | I W C H E | . R    |
| 1078.82 | . |           | .      |
| 1080.53 | . |           | .      |
| 1082.25 | . |           | .      |
| 1083.96 | . |           | .      |
| 1085.68 | . | I W C H E | . R    |
| 1087.39 | . |           | .      |
| 1089.10 | . |           | .      |
| 1090.82 | . | I WC H    | . R    |
| 1092.53 | . |           | .      |
| 1094.24 | . | I W H E   | . R    |
| 1095.96 | . |           | .      |
| 1097.67 | . | I WC H E  | . R    |

2779.130 2781.284 2783.438 2785.592 2787.746 2789.900 2792.054 2794.208 2796.362 2798.516 2800.670

## NOTES

## 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





Log Cabin Way (Sunstone Parkway)



| Ultimate Condition WSPG Summary                                              |                        |                            |                        |                       |                       |                        |          |                 |              |                                        |                        |  |
|------------------------------------------------------------------------------|------------------------|----------------------------|------------------------|-----------------------|-----------------------|------------------------|----------|-----------------|--------------|----------------------------------------|------------------------|--|
| Lateral Line From Basin EPI1 to Regional Facility Mainline Model (LLAT1.WSW) |                        |                            |                        |                       |                       |                        |          |                 |              |                                        |                        |  |
| WSPG Station                                                                 | Plan Set Project No. * | Equivalent Roadway Station | Improvement Plan Sheet | Storm Drain Dimension | Invert Elevation (ft) | Q <sub>100</sub> (cfs) | WSE (ft) | Velocity (ft/s) | FG Elevation | Facility Description                   | HGL Check <sup>1</sup> |  |
| 1000.00                                                                      | LCW:<br>EST1906        | 37+64.81                   | P-7                    | 18" RCP               | 2739.04               | 26.00                  | 2747.00  | 14.71           | 2760.00      | Connection to Regional Model           | OK                     |  |
| 1075.94                                                                      |                        | 37+10.64                   |                        | 18" RCP               | 2747.11               | 26.00                  | 2747.76  | 35.97           | 2762.17      |                                        | OK                     |  |
| 1075.94                                                                      |                        |                            |                        | 5' x 15' RCB          | 2747.11               | 26.00                  | 2747.76  | 35.94           | 2762.17      | Wall Entrance                          | OK                     |  |
| 1078.44                                                                      |                        |                            |                        | 5' x 15' RCB          | 2747.38               | 23.00                  | 2752.18  | 0.96            | 2762.17      | Junction with LC1a Drop Inlet Facility | OK                     |  |
| 1078.44                                                                      |                        |                            |                        | 5' x 15' RCB          | 2747.38               | 23.00                  | 2752.18  | 0.96            | 2762.17      |                                        | OK                     |  |
| 1080.94                                                                      |                        |                            |                        | 5' x 15' RCB          | 2747.43               | 23.00                  | 2752.18  | 0.97            | 2762.17      |                                        | OK                     |  |
| 1080.94                                                                      |                        | 37+10.64                   |                        | 30" RCP               | 2747.43               | 23.00                  | 2752.18  | 13.02           | 2762.17      | Wall Exit                              | OK                     |  |
| 1147.24                                                                      |                        |                            |                        | 30" RCP               | 2748.76               | 23.00                  | 2755.36  | 13.02           | 2760.00      | Addition of Flow from EPI1             | OK                     |  |
| 1147.24                                                                      |                        |                            |                        | 30" RCP               | 2748.76               | 23.00                  | 2755.36  | 13.02           | 2760.00      |                                        | OK                     |  |

LLAT1.WSW

T1 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

T2 LOG CABIN STORM DRAIN SYSTEM LATERAL 1 (LLAT1)

T3 FROM PARCEL EPI1 TO REGIONAL FACILITY MAINLINE IN LOG CABIN

|    |                  |    |   |       |        |          |       |       |
|----|------------------|----|---|-------|--------|----------|-------|-------|
| SO | 1000.0002739.040 | 18 |   |       |        | 2747.000 |       |       |
| R  | 1075.9402747.114 | 18 |   | .013  |        |          | 47.0  |       |
| WE | 1075.9402747.114 | 18 |   | .013  |        |          |       |       |
| R  | 1078.4402747.380 | 4  |   | .013  |        |          | 0.0   |       |
| JX | 1078.4402747.380 | 4  | 4 | .013  | 3.0    | 2747.380 | 90.0  |       |
| R  | 1080.9402747.430 | 4  |   | .013  |        |          | 0.0   |       |
| WX | 1080.9402747.430 | 4  |   | .013  |        |          |       |       |
| R  | 1147.2402748.760 | 18 |   | .013  |        |          |       |       |
| SH | 1147.2402748.760 | 18 |   |       |        |          |       |       |
| CD | 1                | 3  | 0 | 0.000 | 13.000 | 20.000   | 0.000 | 0.000 |
| CD | 2                | 3  | 0 | 0.000 | 12.000 | 12.500   | 0.000 | 0.000 |
| CD | 3                | 3  | 0 | 0.000 | 12.000 | 7.500    | 0.000 | 0.000 |
| CD | 4                | 3  | 0 | 0.000 | 15.000 | 5.000    | 0.000 | 0.000 |
| CD | 18               | 4  | 1 | 0.000 | 1.500  | 0.000    | 0.000 | 0.000 |
| CD | 24               | 4  | 1 | 0.000 | 2.000  | 0.000    | 0.000 | 0.000 |
| CD | 30               | 4  | 1 | 0.000 | 2.500  | 0.000    | 0.000 | 0.000 |
| CD | 36               | 4  | 1 | 0.000 | 3.000  | 0.000    | 0.000 | 0.000 |
| CD | 42               | 4  | 1 | 0.000 | 3.500  | 0.000    | 0.000 | 0.000 |
| CD | 48               | 4  | 1 | 0.000 | 4.000  | 0.000    | 0.000 | 0.000 |
| Q  |                  |    |   |       | 23.000 |          |       |       |



PAGE 1

PAGE NO 1

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

LOG CABIN STORM DRAIN SYSTEM LATERAL 1 (LLAT1)

PAGE NO 2

| ELEMENT NO | 9 | IS A SYSTEM HEADWORKS | STATION  | INVERT   | SECT | W S ELEV |
|------------|---|-----------------------|----------|----------|------|----------|
|            |   | U/S DATA              | 1147.240 | 2748.760 | 18   | .000     |



WATER SURFACE PROFILE LISTING  
EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
LOG CABIN STORM DRAIN SYSTEM LATERAL 1 (LLAT1)  
FROM PARCEL EPI1 TO REGIONAL FACILITY MAINLINE IN LOG CABIN

Date: 5- 3-2019 Time: 4:28: 0

| 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       | 2739.040    | 7.960      | 2747.000   | 26.00   | 14.71     | 3.36     | 2750.36        | .00        | 1.49           | .00            | 1.500          | .000            | .00 | 1 .0           |
| 31.008         | .1063       |            |            |         |           | .0613    | 1.90           | 7.96       | .00            | .98            | .013           | .00             | .00 | PIPE           |
| 1031.008       | 2742.337    | 6.774      | 2749.111   | 26.00   | 14.71     | 3.36     | 2752.47        | .00        | 1.49           | .00            | 1.500          | .000            | .00 | 1 .0           |
| HYDRAULIC JUMP |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |
| 1031.008       | 2742.337    | .791       | 2743.128   | 26.00   | 27.52     | 11.76    | 2754.89        | .00        | 1.49           | 1.50           | 1.500          | .000            | .00 | 1 .0           |
| 6.854          | .1063       |            |            |         |           | .2135    | 1.46           | .79        | 6.11           | .98            | .013           | .00             | .00 | PIPE           |
| 1037.862       | 2743.065    | .773       | 2743.838   | 26.00   | 28.34     | 12.47    | 2756.31        | .00        | 1.49           | 1.50           | 1.500          | .000            | .00 | 1 .0           |
| 9.345          | .1063       |            |            |         |           | .2367    | 2.21           | .77        | 6.38           | .98            | .013           | .00             | .00 | PIPE           |
| 1047.207       | 2744.059    | .744       | 2744.803   | 26.00   | 29.72     | 13.72    | 2758.52        | .00        | 1.49           | 1.50           | 1.500          | .000            | .00 | 1 .0           |
| 8.274          | .1063       |            |            |         |           | .2689    | 2.22           | .74        | 6.86           | .98            | .013           | .00             | .00 | PIPE           |
| 1055.481       | 2744.939    | .717       | 2745.656   | 26.00   | 31.18     | 15.09    | 2760.75        | .00        | 1.49           | 1.50           | 1.500          | .000            | .00 | 1 .0           |
| 7.444          | .1063       |            |            |         |           | .3056    | 2.27           | .72        | 7.36           | .98            | .013           | .00             | .00 | PIPE           |
| 1062.925       | 2745.730    | .691       | 2746.421   | 26.00   | 32.70     | 16.60    | 2763.02        | .00        | 1.49           | 1.50           | 1.500          | .000            | .00 | 1 .0           |
| 6.780          | .1063       |            |            |         |           | .3475    | 2.36           | .69        | 7.90           | .98            | .013           | .00             | .00 | PIPE           |
| 1069.705       | 2746.451    | .666       | 2747.117   | 26.00   | 34.29     | 18.26    | 2765.38        | .00        | 1.49           | 1.49           | 1.500          | .000            | .00 | 1 .0           |
| 6.235          | .1063       |            |            |         |           | .3954    | 2.47           | .67        | 8.47           | .98            | .013           | .00             | .00 | PIPE           |
| 1075.940       | 2747.114    | .643       | 2747.757   | 26.00   | 35.97     | 20.09    | 2767.84        | .00        | 1.49           | 1.48           | 1.500          | .000            | .00 | 1 .0           |
| WALL ENTRANCE  |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |

WATER SURFACE PROFILE LISTING  
EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
LOG CABIN STORM DRAIN SYSTEM LATERAL 1 (LLAT1)  
FROM PARCEL EPI1 TO REGIONAL FACILITY MAINLINE IN LOG CABIN

Date: 5- 3-2019 Time: 4:28: 0

| 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        |
| 1075.940       | 2747.114    | .643       | 2747.757   | 26.00   | 35.94     | 20.05    | 2767.81        | .00        | 1.49           | 1.48           | 1.500          | .000            | .00 | 0 .0           |
| HYDRAULIC DROP |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |
| 1075.940       | 2747.114    | 5.060      | 2752.174   | 26.00   | 1.03      | .02      | 2752.19        | .00        | .94            | 5.00           | 15.000         | 5.000           | .00 | 0 .0           |
| 2.200          | .1063       |            |            |         |           | .0000    | .00            | 5.06       | .08            | .32            | .013           | .00             | .00 | BOX            |
| 1078.140       | 2747.348    | 4.824      | 2752.172   | 26.00   | 1.08      | .02      | 2752.19        | .00        | .94            | 5.00           | 15.000         | 5.000           | .00 | 0 .0           |
| .300           | .1063       |            |            |         |           | .0000    | .00            | 4.82       | .09            | .32            | .013           | .00             | .00 | BOX            |
| JUNCT STR      | .0000       |            |            |         |           | .0000    | .00            | 4.79       | .09            |                | .013           | .00             | .00 | BOX            |
| 1078.440       | 2747.380    | 4.800      | 2752.180   | 23.00   | .96       | .01      | 2752.19        | .00        | .87            | 5.00           | 15.000         | 5.000           | .00 | 0 .0           |
| 2.500          | .0200       |            |            |         |           | .0000    | .00            | 4.80       | .08            | .51            | .013           | .00             | .00 | BOX            |
| 1080.940       | 2747.430    | 4.751      | 2752.180   | 23.00   | .97       | .01      | 2752.20        | .00        | .87            | 5.00           | 15.000         | 5.000           | .00 | 0 .0           |
| WALL EXIT      |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |
| 1080.940       | 2747.430    | 4.751      | 2752.181   | 23.00   | 13.02     | 2.63     | 2754.81        | .00        | 1.48           | .00            | 1.500          | .000            | .00 | 1 .0           |
| 66.300         | .0201       |            |            |         |           | .0479    | 3.18           | 4.75       | .00            | 1.50           | .013           | .00             | .00 | PIPE           |
| 1147.240       | 2748.760    | 6.600      | 2755.360   | 23.00   | 13.02     | 2.63     | 2757.99        | .00        | 1.48           | .00            | 1.500          | .000            | .00 | 1 .0           |

## EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

## LOG CABIN STORM DRAIN SYSTEM LATERAL 1 (LLAT1)

FROM PARCEL EPI1 TO REGIONAL FACILITY MAINLINE IN LOG CABIN

|         |   |   |   |   |   |   |   |   |   |
|---------|---|---|---|---|---|---|---|---|---|
| 1000.00 | . | I | H |   | W | E |   | . | R |
| 1003.00 | . |   |   |   |   |   |   | . |   |
| 1006.01 | . |   |   |   |   |   |   | . |   |
| 1009.01 | . |   |   |   |   |   |   | . |   |
| 1012.02 | . |   |   |   |   |   |   | . |   |
| 1015.02 | . |   |   |   |   |   |   | . |   |
| 1018.03 | . |   |   |   |   |   |   | . |   |
| 1021.03 | . |   |   |   |   |   |   | . |   |
| 1024.04 | . |   |   |   |   |   |   | . |   |
| 1027.04 | . |   |   |   |   |   |   | . |   |
| 1030.05 | . |   |   |   |   |   |   | . |   |
| 1033.05 | . |   | I | H |   | W | E | . | R |
| 1036.06 | . |   | I | W | H |   | E | . | R |
| 1039.06 | . |   | I | W | H |   | E | . | R |
| 1042.07 | . |   |   |   |   |   |   | . |   |
| 1045.07 | . |   |   |   |   |   |   | . |   |
| 1048.08 | . |   |   | I | W | H |   | E | . |
| 1051.08 | . |   |   |   |   |   |   | . |   |
| 1054.09 | . |   |   |   |   |   |   | . |   |
| 1057.09 | . |   |   | I | W | H |   | E | . |
| 1060.10 | . |   |   |   |   |   |   | . |   |
| 1063.10 | . |   |   | I | W | H |   | E | . |
| 1066.11 | . |   |   |   |   |   |   | . |   |
| 1069.11 | . |   |   |   |   |   |   | . |   |
| 1072.12 | . |   |   | I | W | H |   | E | . |

|           | LLAT1.OUT                             |   |   |   |       |
|-----------|---------------------------------------|---|---|---|-------|
| 1075.12 . |                                       |   |   |   | .     |
| 1078.13 . | IYWYYH                                |   |   |   | E. WE |
| 1081.13 . | IYWYYH                                |   |   |   | E. WE |
| 1084.14 . | I C                                   | W |   | H | . R   |
| 1087.14 . | I C                                   | W |   | H | . R   |
| 1090.15 . | I C                                   | W |   | H | . R   |
| 1093.15 . | IYCYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYH |   |   |   | . WX  |
| 1096.16 . | I H                                   | W | E |   | . R   |
| 1099.16 . |                                       |   |   |   | .     |
| 1102.17 . |                                       |   |   |   | .     |
| 1105.17 . |                                       |   |   |   | .     |
| 1108.18 . |                                       |   |   |   | .     |
| 1111.18 . |                                       |   |   |   | .     |
| 1114.19 . |                                       |   |   |   | .     |
| 1117.19 . |                                       |   |   |   | .     |
| 1120.20 . |                                       |   |   |   | .     |
| 1123.20 . |                                       |   |   |   | .     |
| 1126.21 . |                                       |   |   |   | .     |
| 1129.21 . |                                       |   |   |   | .     |
| 1132.22 . |                                       |   |   |   | .     |
| 1135.22 . |                                       |   |   |   | .     |
| 1138.23 . |                                       |   |   |   | .     |
| 1141.23 . |                                       |   |   |   | .     |
| 1144.24 . |                                       |   |   |   | .     |
| 1147.24 . | I H                                   | W | E |   | . R   |

2739.040 2741.920 2744.801 2747.681 2750.562 2753.442 2756.322 2759.203 2762.083 2764.963 2767.844

#### NOTES

##### 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



LLAT1.OUT

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                                              |                        |                            |                        |                       |                       |                        |          |                 |              |                                   |                        |  |
|------------------------------------------------------------------------------|------------------------|----------------------------|------------------------|-----------------------|-----------------------|------------------------|----------|-----------------|--------------|-----------------------------------|------------------------|--|
| Lateral Line From Basin EAA3 to Regional Facility Mainline Model (LLAT2.WSW) |                        |                            |                        |                       |                       |                        |          |                 |              |                                   |                        |  |
| WSPG Station                                                                 | Plan Set Project No. * | Equivalent Roadway Station | Improvement Plan Sheet | Storm Drain Dimension | Invert Elevation (ft) | Q <sub>100</sub> (cfs) | WSE (ft) | Velocity (ft/s) | FG Elevation | Facility Description              | HGL Check <sup>1</sup> |  |
| 1000.00                                                                      | LCW:<br>EST1906        | 44+40.11                   | P-7                    | 54" RCP               | 2718.87               | 102.10                 | 2726.50  | 6.42            | 2735.00      | Connection to Regional Model      | OK                     |  |
| 1103.89                                                                      |                        | 43+66.65                   |                        | 54" RCP               | 2724.07               | 102.00                 | 2725.83  | 17.69           | 2739.87      | Junction with Nuisance Drop Inlet | OK                     |  |
| 1103.89                                                                      |                        |                            |                        | 54" RCP               | 2724.07               | 102.00                 | 2725.83  | 17.69           | 2739.87      |                                   | OK                     |  |
| 1308.89                                                                      |                        | 43+66.65                   |                        | 54" RCP               | 2730.22               | 102.00                 | 2733.19  | 9.17            | 2740.00      | Addition of Flow from EAA3        | OK                     |  |
| 1308.89                                                                      |                        |                            |                        | 54" RCP               | 2730.22               | 102.00                 | 2733.19  | 9.17            | 2740.00      |                                   | OK                     |  |

LLAT2.WSW

T1 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
T2 LOG CABIN STORM DRAIN SYSTEM LATERAL 2 (LLAT2)  
T3 FROM PARCEL EAA3 TO REGIONAL FACILITY MAINLINE IN LOG CABIN  
SO 1000.0002718.870 54 2726.500  
R 1103.8902724.070 54 .013 45.0 1  
JX 1103.8902724.070 54 18 .013 0.1 2727.070 8.3  
R 1308.8902730.220 54 .013 1  
SH 1308.8902730.220 54  
CD 1 3 0 0.000 13.000 20.000 0.000 0.000 0.0000.00 0.00  
CD 2 3 0 0.000 12.000 12.500 0.000 0.000 0.0000.00 0.00  
CD 3 3 0 0.000 12.000 7.500 0.000 0.000 0.0000.00 0.00  
CD 4 3 0 0.000 15.000 5.000 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  
Q 102.000



FILE: LLAT2.WSW W S P G W - EDIT LISTING - Version 14.10 Date: 5- 3-2019 Time: 4:31: 6  
 WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING  
 CARD SECT CHN NO OF AVE PIER HEIGHT 1 BASE ZL ZR INV Y(1) Y(2) Y(3) Y(4) Y(5) Y(6) Y(7) Y(8) Y(9) Y(10)  
 CODE NO TYPE PIER/PIP WIDTH DIAMETER WIDTH DROP

|    |    |   |   |      |        |        |      |      |     |
|----|----|---|---|------|--------|--------|------|------|-----|
| CD | 1  | 3 | 0 | .000 | 13.000 | 20.000 | .000 | .000 | .00 |
| CD | 2  | 3 | 0 | .000 | 12.000 | 12.500 | .000 | .000 | .00 |
| CD | 3  | 3 | 0 | .000 | 12.000 | 7.500  | .000 | .000 | .00 |
| CD | 4  | 3 | 0 | .000 | 15.000 | 5.000  | .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  |        |      |      |     |

W S P G W

PAGE NO 1

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

HEADING LINE NO 2 IS - EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

HEADING LINE NO 3 IS - LOG CABIN STORM DRAIN SYSTEM LATERAL 2 (LLAT2)

FROM PARCEL EAA3 TO REGIONAL FACILITY MAINLINE IN LOG CABIN

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 | 2718.870 | 54   | 2726.500 |        |       |        |       |          |          |       |       |  |  |
| ELEMENT NO | 2 IS A | REACH         | U/S DATA | STATION  | INVERT   | SECT |          | RADIUS | ANGLE | ANG PT | MAN H |          |          |       |       |  |  |
|            |        |               |          | 1103.890 | 2724.070 | 54   |          | .000   | .000  | 45.000 | 1     |          |          |       |       |  |  |
| 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 |  |  |
|            |        |               |          | 1103.890 | 2724.070 | 54   | 18       | 0      | .013  | .100   | .000  | 2727.070 | .000     | 8.300 | .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 |
|            |        |                  |          | 1308.890 | 2730.220 | 54   | .013 | .000     | .000  | .000   | 1     |
| ELEMENT NO | 5 IS A | SYSTEM HEADWORKS | U/S DATA | STATION  | INVERT   | SECT |      | W S ELEV |       |        |       |
|            |        |                  |          | 1308.890 | 2730.220 | 54   |      | .000     |       |        |       |

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING

Date: 5- 3-2019 Time: 4:31: 9

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

LOG CABIN STORM DRAIN SYSTEM LATERAL 2 (LLAT2)

FROM PARCEL EAA3 TO REGIONAL FACILITY MAINLINE IN LOG CABIN

| 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       | 2718.870    | 7.630      | 2726.500   | 102.10  | 6.42      | .64      | 2727.14       | .00        | 2.97           | .00            | 4.500          | .000            | .00 | 1 .0           |
| 55.599         | .0501       |            |            |         |           | .0027    | .15           | 7.63       | .00            | 1.47           | .013           | .00             | .00 | PIPE           |
| 1055.599       | 2721.653    | 5.089      | 2726.742   | 102.10  | 6.42      | .64      | 2727.38       | .00        | 2.97           | .00            | 4.500          | .000            | .00 | 1 .0           |
| HYDRAULIC JUMP |             |            |            |         |           |          |               |            |                |                |                |                 |     |                |
| 1055.599       | 2721.653    | 1.632      | 2723.285   | 102.10  | 19.61     | 5.97     | 2729.26       | .00        | 2.97           | 4.33           | 4.500          | .000            | .00 | 1 .0           |
| 4.402          | .0501       |            |            |         |           | .0337    | .15           | 1.63       | 3.15           | 1.47           | .013           | .00             | .00 | PIPE           |
| 1060.001       | 2721.873    | 1.643      | 2723.516   | 102.10  | 19.44     | 5.87     | 2729.38       | .00        | 2.97           | 4.33           | 4.500          | .000            | .00 | 1 .0           |
| 25.206         | .0501       |            |            |         |           | .0312    | .79           | 1.64       | 3.11           | 1.47           | .013           | .00             | .00 | PIPE           |
| 1085.207       | 2723.135    | 1.702      | 2724.837   | 102.10  | 18.53     | 5.33     | 2730.17       | .00        | 2.97           | 4.36           | 4.500          | .000            | .00 | 1 .0           |
| 18.683         | .0501       |            |            |         |           | .0274    | .51           | 1.70       | 2.91           | 1.47           | .013           | .00             | .00 | PIPE           |
| 1103.890       | 2724.070    | 1.760      | 2725.830   | 102.00  | 17.69     | 4.86     | 2730.69       | .00        | 2.97           | 4.39           | 4.500          | .000            | .00 | 1 .0           |
| 54.496         | .0300       |            |            |         |           | .0245    | 1.33          | 1.76       | 2.72           | 1.69           | .013           | .00             | .00 | PIPE           |
| 1158.386       | 2725.705    | 1.810      | 2727.515   | 102.00  | 17.04     | 4.51     | 2732.02       | .00        | 2.97           | 4.41           | 4.500          | .000            | .00 | 1 .0           |
| 41.819         | .0300       |            |            |         |           | .0218    | .91           | 1.81       | 2.58           | 1.69           | .013           | .00             | .00 | PIPE           |
| 1200.205       | 2726.959    | 1.876      | 2728.836   | 102.00  | 16.24     | 4.10     | 2732.93       | .00        | 2.97           | 4.44           | 4.500          | .000            | .00 | 1 .0           |
| 27.918         | .0300       |            |            |         |           | .0191    | .53           | 1.88       | 2.41           | 1.69           | .013           | .00             | .00 | PIPE           |
| 1228.123       | 2727.797    | 1.945      | 2729.742   | 102.00  | 15.49     | 3.73     | 2733.47       | .00        | 2.97           | 4.46           | 4.500          | .000            | .00 | 1 .0           |
| 20.203         | .0300       |            |            |         |           | .0168    | .34           | 1.95       | 2.25           | 1.69           | .013           | .00             | .00 | PIPE           |

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING

Date: 5- 3-2019 Time: 4:31: 9

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

LOG CABIN STORM DRAIN SYSTEM LATERAL 2 (LLAT2)

FROM PARCEL EAA3 TO REGIONAL FACILITY MAINLINE IN LOG CABIN

| 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        |
| 1248.326 | 2728.403    | 2.017      | 2730.420   | 102.00  | 14.77     | 3.39     | 2733.81       | .00        | 2.97           | 4.48           | 4.500          | .000            | .00 | 1 .0           |
| 15.275   | .0300       |            |            |         |           | .0148    | .23           | 2.02       | 2.10           | 1.69           | .013           | .00             | .00 | PIPE           |
| 1263.601 | 2728.861    | 2.093      | 2730.954   | 102.00  | 14.08     | 3.08     | 2734.03       | .00        | 2.97           | 4.49           | 4.500          | .000            | .00 | 1 .0           |
| 11.832   | .0300       |            |            |         |           | .0130    | .15           | 2.09       | 1.95           | 1.69           | .013           | .00             | .00 | PIPE           |
| 1275.432 | 2729.216    | 2.171      | 2731.387   | 102.00  | 13.43     | 2.80     | 2734.19       | .00        | 2.97           | 4.50           | 4.500          | .000            | .00 | 1 .0           |
| 9.259    | .0300       |            |            |         |           | .0114    | .11           | 2.17       | 1.82           | 1.69           | .013           | .00             | .00 | PIPE           |
| 1284.691 | 2729.494    | 2.254      | 2731.748   | 102.00  | 12.80     | 2.54     | 2734.29       | .00        | 2.97           | 4.50           | 4.500          | .000            | .00 | 1 .0           |
| 7.269    | .0300       |            |            |         |           | .0101    | .07           | 2.25       | 1.70           | 1.69           | .013           | .00             | .00 | PIPE           |
| 1291.960 | 2729.712    | 2.340      | 2732.052   | 102.00  | 12.20     | 2.31     | 2734.37       | .00        | 2.97           | 4.50           | 4.500          | .000            | .00 | 1 .0           |
| 5.655    | .0300       |            |            |         |           | .0089    | .05           | 2.34       | 1.58           | 1.69           | .013           | .00             | .00 | PIPE           |
| 1297.615 | 2729.882    | 2.431      | 2732.313   | 102.00  | 11.64     | 2.10     | 2734.42       | .00        | 2.97           | 4.49           | 4.500          | .000            | .00 | 1 .0           |
| 4.310    | .0300       |            |            |         |           | .0078    | .03           | 2.43       | 1.47           | 1.69           | .013           | .00             | .00 | PIPE           |
| 1301.925 | 2730.011    | 2.526      | 2732.538   | 102.00  | 11.10     | 1.91     | 2734.45       | .00        | 2.97           | 4.47           | 4.500          | .000            | .00 | 1 .0           |
| 3.161    | .0300       |            |            |         |           | .0069    | .02           | 2.53       | 1.36           | 1.69           | .013           | .00             | .00 | PIPE           |

LLAT2.OUT

|          |          |       |          |        |       |       |         |      |      |      |       |      |     |      |     |
|----------|----------|-------|----------|--------|-------|-------|---------|------|------|------|-------|------|-----|------|-----|
| 1305.086 | 2730.106 | 2.627 | 2732.733 | 102.00 | 10.58 | 1.74  | 2734.47 | .00  | 2.97 | 4.44 | 4.500 | .000 | .00 | 1    | .0  |
| - -      | - -      | - -   | - -      | - -    | - -   | - -   | - -     | - -  | - -  | - -  | - -   | - -  | - - | - -  | - - |
| 2.151    | .0300    |       |          |        |       | .0061 | .01     | 2.63 | 1.26 | 1.69 | .013  | .00  | .00 | PIPE |     |
| 1307.237 | 2730.170 | 2.734 | 2732.904 | 102.00 | 10.09 | 1.58  | 2734.48 | .00  | 2.97 | 4.39 | 4.500 | .000 | .00 | 1    | .0  |
| - -      | - -      | - -   | - -      | - -    | - -   | - -   | - -     | - -  | - -  | - -  | - -   | - -  | - - | - -  | - - |
| 1.245    | .0300    |       |          |        |       | .0054 | .01     | 2.73 | 1.17 | 1.69 | .013  | .00  | .00 | PIPE |     |

FILE: LLAT2.WSW W S P G W - CIVILDESIGN Version 14.08  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING  
 Date: 5- 3-2019 Time: 4:31: 9  
 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
 LOG CABIN STORM DRAIN SYSTEM LATERAL 2 (LLAT2)  
 FROM PARCEL EAA3 TO REGIONAL FACILITY MAINLINE IN LOG CABIN

| 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 |
|----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|-----------------|-----|----------------|
| 1308.483 | 2730.208    | 2.847      | 2733.055   | 102.00  | 9.62      | 1.44     | 2734.49        | .00        | 2.97           | 4.34           | 4.500          | .000            | .00 | 1 .0           |
| - -      | - -         | - -        | - -        | - -     | - -       | - -      | - -            | - -        | - -            | - -            | - -            | - -             | - - | - -            |
| .407     | .0300       |            |            |         |           | .0048    | .00            | 2.85       | 1.08           | 1.69           | .013           | .00             | .00 | PIPE           |
| 1308.890 | 2730.220    | 2.968      | 2733.188   | 102.00  | 9.17      | 1.30     | 2734.49        | .00        | 2.97           | 4.26           | 4.500          | .000            | .00 | 1 .0           |
| - -      | - -         | - -        | - -        | - -     | - -       | - -      | - -            | - -        | - -            | - -            | - -            | - -             | - - | - -            |

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

LOG CABIN STORM DRAIN SYSTEM LATERAL 2 (LLAT2)

FROM PARCEL EAA3 TO REGIONAL FACILITY MAINLINE IN LOG CABIN

|         |    |  |   |   |   |   |   |   |  |  |  |  |  |   |
|---------|----|--|---|---|---|---|---|---|--|--|--|--|--|---|
| 1000.00 | .I |  | C | H |   | W | E |   |  |  |  |  |  | R |
| 1006.30 | .  |  |   |   |   |   |   |   |  |  |  |  |  | . |
| 1012.61 | .  |  |   |   |   |   |   |   |  |  |  |  |  | . |
| 1018.91 | .  |  |   |   |   |   |   |   |  |  |  |  |  | . |
| 1025.22 | .  |  |   |   |   |   |   |   |  |  |  |  |  | . |
| 1031.52 | .  |  |   |   |   |   |   |   |  |  |  |  |  | . |
| 1037.82 | .  |  |   |   |   |   |   |   |  |  |  |  |  | . |
| 1044.13 | .  |  |   |   |   |   |   |   |  |  |  |  |  | . |
| 1050.43 | .  |  |   |   |   |   |   |   |  |  |  |  |  | . |
| 1056.73 | .  |  | I |   | C | H | W | E |  |  |  |  |  | R |
| 1063.04 | .  |  | I | W | C | H |   | E |  |  |  |  |  | R |
| 1069.34 | .  |  | I | W | C | H |   | E |  |  |  |  |  | R |
| 1075.65 | .  |  |   |   |   |   |   |   |  |  |  |  |  | . |
| 1081.95 | .  |  |   |   |   |   |   |   |  |  |  |  |  | . |
| 1088.25 | .  |  | I | W | C | H |   | E |  |  |  |  |  | R |
| 1094.56 | .  |  |   |   |   |   |   |   |  |  |  |  |  | . |



LLAT2.OUT

|         |   |   |   |   |   |   |  |  |   |
|---------|---|---|---|---|---|---|--|--|---|
| 1100.86 | . |   |   |   |   |   |  |  |   |
| 1107.17 | . | I | W | C | H | E |  |  | R |
| 1113.47 | . |   |   |   |   |   |  |  |   |
| 1119.77 | . |   |   |   |   |   |  |  |   |
| 1126.08 | . |   |   |   |   |   |  |  |   |
| 1132.38 | . |   |   |   |   |   |  |  |   |
| 1138.69 | . |   |   |   |   |   |  |  |   |
| 1144.99 | . |   |   |   |   |   |  |  |   |
| 1151.29 | . |   |   |   |   |   |  |  |   |
| 1157.60 | . |   |   |   |   |   |  |  |   |
| 1163.90 | . | I | W | C | H | E |  |  | R |
| 1170.20 | . |   |   |   |   |   |  |  |   |
| 1176.51 | . |   |   |   |   |   |  |  |   |
| 1182.81 | . |   |   |   |   |   |  |  |   |
| 1189.12 | . |   |   |   |   |   |  |  |   |
| 1195.42 | . |   |   |   |   |   |  |  |   |
| 1201.72 | . | I | W | C | H | E |  |  | R |
| 1208.03 | . |   |   |   |   |   |  |  |   |
| 1214.33 | . |   |   |   |   |   |  |  |   |
| 1220.64 | . |   |   |   |   |   |  |  |   |
| 1226.94 | . |   |   |   |   |   |  |  |   |
| 1233.24 | . | I | W | C | H | E |  |  | R |
| 1239.55 | . |   |   |   |   |   |  |  |   |
| 1245.85 | . |   |   |   |   |   |  |  |   |
| 1252.16 | . | I | W | C | H | E |  |  | R |
| 1258.46 | . |   |   |   |   |   |  |  |   |
| 1264.76 | . | I | W | C | H | E |  |  | R |
| 1271.07 | . |   |   |   |   |   |  |  |   |
| 1277.37 | . | I | W | C | H | E |  |  | R |
| 1283.67 | . |   |   |   |   |   |  |  |   |

# LLAT2.OUT

|         |   |   |   |   |   |   |   |   |
|---------|---|---|---|---|---|---|---|---|
| 1289.98 | . | I | W | C | H | E | . | R |
| 1296.28 | . | I | W | C | H | E | . | R |
| 1302.59 | . | I | W | C | H | E | . | R |
| 1308.89 | . | I | W | C | H | . | R |   |

2718.870 2720.455 2722.040 2723.625 2725.210 2726.795 2728.380 2729.965 2731.550 2733.135 2734.720

## NOTES

### 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                                              |                        |                            |                        |                       |                       |                        |          |                 |              |                                        |                        |  |
|------------------------------------------------------------------------------|------------------------|----------------------------|------------------------|-----------------------|-----------------------|------------------------|----------|-----------------|--------------|----------------------------------------|------------------------|--|
| Lateral Line From Basin EAA4 to Regional Facility Mainline Model (LLAT3.WSW) |                        |                            |                        |                       |                       |                        |          |                 |              |                                        |                        |  |
| WSPG Station                                                                 | Plan Set Project No. * | Equivalent Roadway Station | Improvement Plan Sheet | Storm Drain Dimension | Invert Elevation (ft) | Q <sub>100</sub> (cfs) | WSE (ft) | Velocity (ft/s) | FG Elevation | Facility Description                   | HGL Check <sup>1</sup> |  |
| 1000.00                                                                      | LCW:<br>EST1906        | 48+95.17                   | P-7                    | 42" RCP               | 2705.60               | 47.50                  | 2713.50  | 4.94            | 2725.00      | Connection to Regional Model           | OK                     |  |
| 1024.01                                                                      |                        | 48+76.43                   |                        | 42" RCP               | 2712.81               | 47.50                  | 2713.65  | 11.34           | 2725.27      |                                        | OK                     |  |
| 1024.01                                                                      |                        |                            |                        | 5' x 15' RCB          | 2712.81               | 47.50                  | 2713.65  | 11.34           | 2725.27      | Wall Entrance                          | OK                     |  |
| 1026.51                                                                      |                        |                            |                        | 5' x 15' RCB          | 2713.56               | 47.50                  | 2714.97  | 6.74            | 2725.27      | Junction with LC4b Drop Inlet Facility | OK                     |  |
| 1026.51                                                                      |                        |                            |                        | 5' x 15' RCB          | 2713.56               | 45.00                  | 2715.32  | 5.10            | 2725.27      |                                        | OK                     |  |
| 1029.01                                                                      |                        | 48+76.38                   |                        | 5' x 15' RCB          | 2713.67               | 45.00                  | 2715.19  | 5.90            | 2725.27      |                                        | OK                     |  |
| 1029.01                                                                      |                        |                            |                        | 42" RCP               | 2713.67               | 45.00                  | 2715.19  | 5.90            | 2725.27      | Wall Exit                              | OK                     |  |
| 1091.49                                                                      |                        |                            |                        | 42" RCP               | 2716.38               | 45.00                  | 2718.47  | 7.50            | 2725.00      | Addition of Flow from EAA4             | OK                     |  |
| 1091.49                                                                      |                        |                            |                        | 42" RCP               | 2716.38               | 45.00                  | 2718.47  | 7.50            | 2725.00      |                                        | OK                     |  |



LLAT3.WSW

T1 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

T2 LOG CABIN STORM DRAIN SYSTEM LATERAL 3 (LLAT3)

T3 FROM PARCEL EAA4 TO REGIONAL FACILITY MAINLINE IN LOG CABIN

|    |                  |    |      |       |          |          |       |       |                |
|----|------------------|----|------|-------|----------|----------|-------|-------|----------------|
| SO | 1000.0002705.600 | 42 |      |       | 2713.500 |          |       |       |                |
| R  | 1024.0102712.809 | 42 | .013 |       |          |          |       | 45.0  |                |
| WE | 1024.0102712.809 | 42 | .013 |       |          |          |       |       |                |
| R  | 1026.5102713.560 | 4  | .013 |       |          |          |       | 0.0   |                |
| JX | 1026.5102713.560 | 4  | 4    | .013  | 2.5      | 2713.560 |       | 90.0  |                |
| R  | 1029.0102713.668 | 4  | .013 |       |          |          |       | 0.0   |                |
| WX | 1029.0102713.668 | 4  | .013 |       |          |          |       |       |                |
| R  | 1091.4902716.380 | 42 | .013 |       |          |          |       |       |                |
| SH | 1091.4902716.380 | 42 |      |       |          |          |       |       |                |
| CD | 1                | 3  | 0    | 0.000 | 13.000   | 20.000   | 0.000 | 0.000 | 0.0000.00 0.00 |
| CD | 2                | 3  | 0    | 0.000 | 12.000   | 12.500   | 0.000 | 0.000 | 0.0000.00 0.00 |
| CD | 3                | 3  | 0    | 0.000 | 12.000   | 7.500    | 0.000 | 0.000 | 0.0000.00 0.00 |
| CD | 4                | 3  | 0    | 0.000 | 15.000   | 5.000    | 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 |
| Q  |                  |    |      |       |          |          |       |       | 45.000         |

FILE: LLAT3.WSW W S P G W - EDIT LISTING - Version 14.10 Date: 5- 5-2019 Time:12:44:40  
 WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING  
 CARD SECT CHN NO OF AVE PIER HEIGHT 1 BASE ZL ZR INV Y(1) Y(2) Y(3) Y(4) Y(5) Y(6) Y(7) Y(8) Y(9) Y(10)  
 CODE NO TYPE PIER/PIP WIDTH DIAMETER WIDTH DROP

|    |    |   |   |      |        |        |      |      |     |
|----|----|---|---|------|--------|--------|------|------|-----|
| CD | 1  | 3 | 0 | .000 | 13.000 | 20.000 | .000 | .000 | .00 |
| CD | 2  | 3 | 0 | .000 | 12.000 | 12.500 | .000 | .000 | .00 |
| CD | 3  | 3 | 0 | .000 | 12.000 | 7.500  | .000 | .000 | .00 |
| CD | 4  | 3 | 0 | .000 | 15.000 | 5.000  | .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  |        |      |      |     |

W S P G W

PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

HEADING LINE NO 2 IS -

LOG CABIN STORM DRAIN SYSTEM LATERAL 3 (LLAT3)

HEADING LINE NO 3 IS -

FROM PARCEL EAA4 TO REGIONAL FACILITY MAINLINE IN LOG CABIN

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

| ELEMENT NO                                                                                              | IS | A | SYSTEM OUTLET    | STATION  | INVERT   | SECT | W S ELEV |    |      |        |       |          |          |        |       |
|---------------------------------------------------------------------------------------------------------|----|---|------------------|----------|----------|------|----------|----|------|--------|-------|----------|----------|--------|-------|
| 1                                                                                                       | IS | A | SYSTEM OUTLET    | 1000.000 | 2705.600 | 42   | 2713.500 |    |      |        |       |          |          |        |       |
| 2                                                                                                       | IS | A | REACH            | 1024.010 | 2712.809 | 42   |          | N  | .013 | RADIUS | ANGLE | ANG PT   | MAN H    |        |       |
| 3                                                                                                       | IS | A | WALL ENTRANCE    | 1024.010 | 2712.809 | 42   |          | FP | .013 |        |       |          |          |        |       |
| WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS             |    |   |                  |          |          |      |          |    |      |        |       |          |          |        |       |
| 4                                                                                                       | IS | A | REACH            | 1026.510 | 2713.560 | 4    |          | N  | .013 | RADIUS | ANGLE | ANG PT   | MAN H    |        |       |
| 5                                                                                                       | IS | A | JUNCTION         | 1026.510 | 2713.560 | 4    |          | N  | .013 | Q3     | Q4    | INVERT-3 | INVERT-4 | PHI 3  | PHI 4 |
|                                                                                                         |    |   |                  |          |          |      |          |    |      | 2.500  | .000  | 2713.560 | .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 |    |   |                  |          |          |      |          |    |      |        |       |          |          |        |       |
| 6                                                                                                       | IS | A | REACH            | 1029.010 | 2713.668 | 4    |          | N  | .013 | RADIUS | ANGLE | ANG PT   | MAN H    |        |       |
| 7                                                                                                       | IS | A | WALL EXIT        | 1029.010 | 2713.668 | 4    |          |    |      |        |       |          |          |        |       |
| WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS             |    |   |                  |          |          |      |          |    |      |        |       |          |          |        |       |
| 8                                                                                                       | IS | A | REACH            | 1091.490 | 2716.380 | 42   |          | N  | .013 | RADIUS | ANGLE | ANG PT   | MAN H    |        |       |
| 9                                                                                                       | IS | A | SYSTEM HEADWORKS | 1091.490 | 2716.380 | 42   |          |    |      |        |       |          |          |        |       |
|                                                                                                         |    |   |                  |          |          |      |          |    |      |        |       | W S ELEV | .000     |        |       |

WATER SURFACE PROFILE LISTING  
EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
LOG CABIN STORM DRAIN SYSTEM LATERAL 3 (LLAT3)  
FROM PARCEL EAA4 TO REGIONAL FACILITY MAINLINE IN LOG CABIN

Date: 5- 5-2019 Time:12:44:44

| Station        | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt I.D. | ZL  | No Wth Prs/Pip |
|----------------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|--------------|-----|----------------|
| L/Elem         | Ch Slope    |            |            |         |           | SF Ave   | HF             | SE Dpth    | Froude N       | Norm Dp        | "N"            | X-Fall       | ZR  | Type Ch        |
| 1000.000       | 2705.600    | 7.900      | 2713.500   | 47.50   | 4.94      | .38      | 2713.88        | .00        | 2.15           | .00            | 3.500          | .000         | .00 | 1 .0           |
|                | 7.941       | .3002      |            |         |           | .0022    | .02            | 7.90       | .00            | .69            | .013           | .00          | .00 | PIPE           |
| 1007.941       | 2707.984    | 5.560      | 2713.544   | 47.50   | 4.94      | .38      | 2713.92        | .00        | 2.15           | .00            | 3.500          | .000         | .00 | 1 .0           |
|                |             |            |            |         |           |          |                |            |                |                |                |              |     |                |
| HYDRAULIC JUMP |             |            |            |         |           |          |                |            |                |                |                |              |     |                |
| 1007.941       | 2707.984    | .783       | 2708.767   | 47.50   | 29.57     | 13.57    | 2722.34        | .00        | 2.15           | 2.92           | 3.500          | .000         | .00 | 1 .0           |
|                | 8.689       | .3002      |            |         |           | .1737    | 1.51           | .78        | 7.02           | .69            | .013           | .00          | .00 | PIPE           |
| 1016.630       | 2710.593    | .809       | 2711.403   | 47.50   | 28.20     | 12.35    | 2723.75        | .00        | 2.15           | 2.95           | 3.500          | .000         | .00 | 1 .0           |
|                | 7.380       | .3002      |            |         |           | .1519    | 1.12           | .81        | 6.58           | .69            | .013           | .00          | .00 | PIPE           |
| 1024.010       | 2712.809    | .838       | 2713.647   | 47.50   | 11.34     | 2.00     | 2715.64        | .00        | 1.41           | 5.00           | 15.000         | 5.000        | .00 | 0 .0           |
|                | .458        | .3004      |            |         |           | .0172    | .01            | .84        | 2.18           | .34            | .013           | .00          | .00 | BOX            |
| 1024.469       | 2712.947    | .875       | 2713.821   | 47.50   | 10.86     | 1.83     | 2715.65        | .00        | 1.41           | 5.00           | 15.000         | 5.000        | .00 | 0 .0           |
|                | .434        | .3004      |            |         |           | .0150    | .01            | .87        | 2.05           | .34            | .013           | .00          | .00 | BOX            |
| 1024.902       | 2713.077    | .918       | 2713.994   | 47.50   | 10.35     | 1.66     | 2715.66        | .00        | 1.41           | 5.00           | 15.000         | 5.000        | .00 | 0 .0           |
|                | .371        | .3004      |            |         |           | .0130    | .00            | .92        | 1.90           | .34            | .013           | .00          | .00 | BOX            |
| 1025.273       | 2713.188    | .962       | 2714.151   | 47.50   | 9.87      | 1.51     | 2715.66        | .00        | 1.41           | 5.00           | 15.000         | 5.000        | .00 | 0 .0           |
|                | .313        | .3004      |            |         |           | .0113    | .00            | .96        | 1.77           | .34            | .013           | .00          | .00 | BOX            |
| 1025.587       | 2713.282    | 1.009      | 2714.292   | 47.50   | 9.41      | 1.38     | 2715.67        | .00        | 1.41           | 5.00           | 15.000         | 5.000        | .00 | 0 .0           |
|                | .261        | .3004      |            |         |           | .0098    | .00            | 1.01       | 1.65           | .34            | .013           | .00          | .00 | BOX            |

WATER SURFACE PROFILE LISTING  
EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
LOG CABIN STORM DRAIN SYSTEM LATERAL 3 (LLAT3)  
FROM PARCEL EAA4 TO REGIONAL FACILITY MAINLINE IN LOG CABIN

Date: 5- 5-2019 Time:12:44:44

| Station   | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt I.D. | ZL  | No Wth Prs/Pip |
|-----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|--------------|-----|----------------|
| L/Elem    | Ch Slope    |            |            |         |           | SF Ave   | HF             | SE Dpth    | Froude N       | Norm Dp        | "N"            | X-Fall       | ZR  | Type Ch        |
| 1025.847  | 2713.361    | 1.059      | 2714.419   | 47.50   | 8.97      | 1.25     | 2715.67        | .00        | 1.41           | 5.00           | 15.000         | 5.000        | .00 | 0 .0           |
|           | .213        | .3004      |            |         |           | .0086    | .00            | 1.06       | 1.54           | .34            | .013           | .00          | .00 | BOX            |
| 1026.060  | 2713.425    | 1.110      | 2714.535   | 47.50   | 8.56      | 1.14     | 2715.67        | .00        | 1.41           | 5.00           | 15.000         | 5.000        | .00 | 0 .0           |
|           | .168        | .3004      |            |         |           | .0074    | .00            | 1.11       | 1.43           | .34            | .013           | .00          | .00 | BOX            |
| 1026.228  | 2713.475    | 1.164      | 2714.640   | 47.50   | 8.16      | 1.03     | 2715.67        | .00        | 1.41           | 5.00           | 15.000         | 5.000        | .00 | 0 .0           |
|           | .126        | .3004      |            |         |           | .0065    | .00            | 1.16       | 1.33           | .34            | .013           | .00          | .00 | BOX            |
| 1026.354  | 2713.513    | 1.221      | 2714.734   | 47.50   | 7.78      | .94      | 2715.67        | .00        | 1.41           | 5.00           | 15.000         | 5.000        | .00 | 0 .0           |
|           | .088        | .3004      |            |         |           | .0056    | .00            | 1.22       | 1.24           | .34            | .013           | .00          | .00 | BOX            |
| 1026.442  | 2713.540    | 1.281      | 2714.820   | 47.50   | 7.42      | .85      | 2715.67        | .00        | 1.41           | 5.00           | 15.000         | 5.000        | .00 | 0 .0           |
|           | .051        | .3004      |            |         |           | .0049    | .00            | 1.28       | 1.15           | .34            | .013           | .00          | .00 | BOX            |
| 1026.493  | 2713.555    | 1.343      | 2714.898   | 47.50   | 7.07      | .78      | 2715.67        | .00        | 1.41           | 5.00           | 15.000         | 5.000        | .00 | 0 .0           |
|           | .017        | .3004      |            |         |           | .0043    | .00            | 1.34       | 1.08           | .34            | .013           | .00          | .00 | BOX            |
| 1026.510  | 2713.560    | 1.410      | 2714.970   | 47.50   | 6.74      | .70      | 2715.68        | .00        | 1.41           | 5.00           | 15.000         | 5.000        | .00 | 0 .0           |
|           |             |            |            |         |           | .0029    | .00            | 1.41       | 1.00           |                | .013           | .00          | .00 | BOX            |
| JUNCT STR | .0000       |            |            |         |           |          |                |            |                |                |                |              |     |                |



LLAT3.OUT

|          |          |       |          |       |      |       |         |      |      |      |        |       |     |     |    |
|----------|----------|-------|----------|-------|------|-------|---------|------|------|------|--------|-------|-----|-----|----|
| 1026.510 | 2713.560 | 1.764 | 2715.324 | 45.00 | 5.10 | .40   | 2715.73 | .00  | 1.36 | 5.00 | 15.000 | 5.000 | .00 | 0   | .0 |
| 1.013    | .0432    |       |          |       |      | .0020 | .00     | 1.76 | .68  | .61  | .013   | .00   | .00 | BOX |    |
| 1027.523 | 2713.604 | 1.682 | 2715.286 | 45.00 | 5.35 | .44   | 2715.73 | .00  | 1.36 | 5.00 | 15.000 | 5.000 | .00 | 0   | .0 |
| .828     | .0432    |       |          |       |      | .0023 | .00     | 1.68 | .73  | .61  | .013   | .00   | .00 | BOX |    |

W S P G W - CIVILDESIGN Version 14.08  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING  
 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
 LOG CABIN STORM DRAIN SYSTEM LATERAL 3 (LLAT3)  
 FROM PARCEL EAA4 TO REGIONAL FACILITY MAINLINE IN LOG CABIN  
 Date: 5- 5-2019 Time:12:44:44  
 FILE: LLAT3.WSW  
 PAGE 3

| 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        |    |
| 1028.351 | 2713.639    | 1.604      | 2715.243   | 45.00   | 5.61      | .49      | 2715.73        | .00        | 1.36           | 5.00           | 15.000         | 5.000           | .00 | 0              | .0 |
| .635     | .0432       |            |            |         |           | .0027    | .00            | 1.60       | .78            | .61            | .013           | .00             | .00 | BOX            |    |
| 1028.986 | 2713.667    | 1.529      | 2715.196   | 45.00   | 5.89      | .54      | 2715.73        | .00        | 1.36           | 5.00           | 15.000         | 5.000           | .00 | 0              | .0 |
| .024     | .0432       |            |            |         |           | .0029    | .00            | 1.53       | .84            | .61            | .013           | .00             | .00 | BOX            |    |
| 1029.010 | 2713.668    | 1.526      | 2715.194   | 45.00   | 5.90      | .54      | 2715.73        | .00        | 1.36           | 5.00           | 15.000         | 5.000           | .00 | 0              | .0 |
|          |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |    |
| 1029.010 | 2713.668    | 1.526      | 2715.194   | 45.00   | 5.90      | .54      | 2715.73        | .00        | 1.36           | 5.00           | 15.000         | 5.000           | .00 | 0              | .0 |
|          |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |    |
| 1029.010 | 2713.667    | 1.250      | 2714.917   | 45.00   | 14.59     | 3.31     | 2718.22        | .00        | 2.09           | 3.35           | 3.500          | .000            | .00 | 1              | .0 |
| 13.527   | .0434       |            |            |         |           | .0253    | .34            | 1.25       | 2.68           | 1.10           | .013           | .00             | .00 | PIPE           |    |
| 1042.537 | 2714.255    | 1.292      | 2715.547   | 45.00   | 13.94     | 3.02     | 2718.57        | .00        | 2.09           | 3.38           | 3.500          | .000            | .00 | 1              | .0 |
| 10.758   | .0434       |            |            |         |           | .0222    | .24            | 1.29       | 2.51           | 1.10           | .013           | .00             | .00 | PIPE           |    |
| 1053.295 | 2714.722    | 1.339      | 2716.061   | 45.00   | 13.29     | 2.74     | 2718.80        | .00        | 2.09           | 3.40           | 3.500          | .000            | .00 | 1              | .0 |
| 8.409    | .0434       |            |            |         |           | .0195    | .16            | 1.34       | 2.35           | 1.10           | .013           | .00             | .00 | PIPE           |    |
| 1061.704 | 2715.087    | 1.387      | 2716.474   | 45.00   | 12.68     | 2.49     | 2718.97        | .00        | 2.09           | 3.42           | 3.500          | .000            | .00 | 1              | .0 |
| 6.704    | .0434       |            |            |         |           | .0171    | .11            | 1.39       | 2.19           | 1.10           | .013           | .00             | .00 | PIPE           |    |
| 1068.407 | 2715.378    | 1.438      | 2716.815   | 45.00   | 12.09     | 2.27     | 2719.08        | .00        | 2.09           | 3.44           | 3.500          | .000            | .00 | 1              | .0 |
| 5.410    | .0434       |            |            |         |           | .0150    | .08            | 1.44       | 2.05           | 1.10           | .013           | .00             | .00 | PIPE           |    |
| 1073.818 | 2715.613    | 1.490      | 2717.103   | 45.00   | 11.52     | 2.06     | 2719.16        | .00        | 2.09           | 3.46           | 3.500          | .000            | .00 | 1              | .0 |
| 4.387    | .0434       |            |            |         |           | .0132    | .06            | 1.49       | 1.91           | 1.10           | .013           | .00             | .00 | PIPE           |    |

W S P G W - CIVILDESIGN Version 14.08  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING  
 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
 LOG CABIN STORM DRAIN SYSTEM LATERAL 3 (LLAT3)  
 FROM PARCEL EAA4 TO REGIONAL FACILITY MAINLINE IN LOG CABIN  
 Date: 5- 5-2019 Time:12:44:44  
 FILE: LLAT3.WSW  
 PAGE 4

| 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        |    |
| 1078.204 | 2715.803    | 1.545      | 2717.348   | 45.00   | 10.99     | 1.87     | 2719.22        | .00        | 2.09           | 3.48           | 3.500          | .000            | .00 | 1              | .0 |
| 3.552    | .0434       |            |            |         |           | .0116    | .04            | 1.55       | 1.78           | 1.10           | .013           | .00             | .00 | PIPE           |    |
| 1081.757 | 2715.957    | 1.603      | 2717.560   | 45.00   | 10.48     | 1.70     | 2719.26        | .00        | 2.09           | 3.49           | 3.500          | .000            | .00 | 1              | .0 |
| 2.855    | .0434       |            |            |         |           | .0102    | .03            | 1.60       | 1.66           | 1.10           | .013           | .00             | .00 | PIPE           |    |
| 1084.611 | 2716.081    | 1.663      | 2717.744   | 45.00   | 9.99      | 1.55     | 2719.29        | .00        | 2.09           | 3.50           | 3.500          | .000            | .00 | 1              | .0 |
| 2.266    | .0434       |            |            |         |           | .0090    | .02            | 1.66       | 1.55           | 1.10           | .013           | .00             | .00 | PIPE           |    |
| 1086.877 | 2716.180    | 1.726      | 2717.905   | 45.00   | 9.52      | 1.41     | 2719.31        | .00        | 2.09           | 3.50           | 3.500          | .000            | .00 | 1              | .0 |
| 1.750    | .0434       |            |            |         |           | .0079    | .01            | 1.73       | 1.44           | 1.10           | .013           | .00             | .00 | PIPE           |    |
| 1088.627 | 2716.256    | 1.791      | 2718.047   | 45.00   | 9.08      | 1.28     | 2719.33        | .00        | 2.09           | 3.50           | 3.500          | .000            | .00 | 1              | .0 |

W S P G W - CIVILDESIGN Version 14.08  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING  
 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
 LOG CABIN STORM DRAIN SYSTEM LATERAL 3 (LLAT3)  
 FROM PARCEL EAA4 TO REGIONAL FACILITY MAINLINE IN LOG CABIN  
 Date: 5- 5-2019 Time:12:44:44  
 FILE: LLAT3.WSW  
 PAGE 4

| LLAT3.OUT |          |       |          |       |       |       |         |      |      |      |       |      |          |
|-----------|----------|-------|----------|-------|-------|-------|---------|------|------|------|-------|------|----------|
| 1.295     | .0434    |       |          |       | .0070 | .01   | 1.79    | 1.34 | 1.10 | .013 | .00   | .00  | PIPE     |
| 1089.922  | 2716.312 | 1.861 | 2718.172 | 45.00 | 8.66  | 1.16  | 2719.34 | .00  | 2.09 | 3.49 | 3.500 | .000 | .00 1 .0 |
| .886      | .0434    |       |          |       |       | .0061 | .01     | 1.86 | 1.25 | 1.10 | .013  | .00  | .00 PIPE |
| 1090.807  | 2716.350 | 1.933 | 2718.283 | 45.00 | 8.25  | 1.06  | 2719.34 | .00  | 2.09 | 3.48 | 3.500 | .000 | .00 1 .0 |
| .516      | .0434    |       |          |       |       | .0054 | .00     | 1.93 | 1.16 | 1.10 | .013  | .00  | .00 PIPE |
| 1091.323  | 2716.373 | 2.010 | 2718.383 | 45.00 | 7.87  | .96   | 2719.34 | .00  | 2.09 | 3.46 | 3.500 | .000 | .00 1 .0 |
| .167      | .0434    |       |          |       |       | .0048 | .00     | 2.01 | 1.08 | 1.10 | .013  | .00  | .00 PIPE |
| 1091.490  | 2716.380 | 2.092 | 2718.472 | 45.00 | 7.50  | .87   | 2719.35 | .00  | 2.09 | 3.43 | 3.500 | .000 | .00 1 .0 |

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

LOG CABIN STORM DRAIN SYSTEM LATERAL 3 (LLAT3)

FROM PARCEL EAA4 TO REGIONAL FACILITY MAINLINE IN LOG CABIN

|         |    |   |   |    |    |   |
|---------|----|---|---|----|----|---|
| 1000.00 | .I | C | H | WE |    | R |
| 1001.25 | .  |   |   |    |    | . |
| 1002.51 | .  |   |   |    |    | . |
| 1003.76 | .  |   |   |    |    | . |
| 1005.01 | .  |   |   |    |    | . |
| 1006.27 | .  |   |   |    |    | . |
| 1007.52 | .  |   |   |    |    | . |
| 1008.77 | .  | I | C | H  | WE | R |
| 1010.03 | .  | I | W | C  | H  | E |
| 1011.28 | .  |   |   |    |    | . |
| 1012.53 | .  |   |   |    |    | . |
| 1013.79 | .  |   |   |    |    | . |
| 1015.04 | .  |   |   |    |    | . |
| 1016.29 | .  |   |   |    |    | . |
| 1017.55 | .  | I | W | C  | H  | E |
| 1018.80 | .  |   |   |    |    | . |
| 1020.05 | .  |   |   |    |    | . |
| 1021.31 | .  |   |   |    |    | . |
| 1022.56 | .  |   |   |    |    | . |
| 1023.81 | .  |   |   |    |    | . |

## LLAT3.OUT

|         |   |            |        |
|---------|---|------------|--------|
| 1025.07 | . | I W C E    | H . R  |
| 1026.32 | . | I W C E    | H . R  |
| 1027.57 | . | I W C E    | H . R  |
| 1028.83 | . | I W C E    | H . R  |
| 1030.08 | . | I W C E    | H . R  |
| 1031.33 | . | I WC E     | H . R  |
| 1032.59 | . | I W C E    | H . R  |
| 1033.84 | . | I WC E     | H . R  |
| 1035.09 | . | I WC E     | H . R  |
| 1036.35 | . | I WC E     | H . R  |
| 1037.60 | . | I W E      | H . R  |
| 1038.85 | . | I W E      | H . JX |
| 1040.11 | . | I C WE     | H . R  |
| 1041.36 | . | I CW E     | H . R  |
| 1042.61 | . | I CW E     | H . R  |
| 1043.87 | . | I CW E     | H . R  |
| 1045.12 | . | IVYYYYCWYE | YH. WX |
| 1046.37 | . | IVYYYYCWYE | YH. WX |
| 1047.62 | . | I W C H E  | . R    |
| 1048.88 | . | I W C H E  | . R    |
| 1050.13 | . |            | .      |
| 1051.38 | . |            | .      |
| 1052.64 | . |            | .      |
| 1053.89 | . | I W C H E  | . R    |
| 1055.14 | . |            | .      |
| 1056.40 | . |            | .      |
| 1057.65 | . |            | .      |
| 1058.90 | . |            | .      |
| 1060.16 | . |            | .      |



|         |   |  |   |   |   |    |           |   |   |
|---------|---|--|---|---|---|----|-----------|---|---|
| 1061.41 | . |  |   |   |   |    | LLAT3.OUT |   | . |
| 1062.66 | . |  | I | W | C | HE |           | . | R |
| 1063.92 | . |  |   |   |   |    |           | . |   |
| 1065.17 | . |  |   |   |   |    |           | . |   |
| 1066.42 | . |  |   |   |   |    |           | . |   |
| 1067.68 | . |  |   |   |   |    |           | . |   |
| 1068.93 | . |  | I | W | C | HE |           | . | R |
| 1070.18 | . |  |   |   |   |    |           | . |   |
| 1071.44 | . |  |   |   |   |    |           | . |   |
| 1072.69 | . |  |   |   |   |    |           | . |   |
| 1073.94 | . |  | I | W | C | H  |           | . | R |
| 1075.20 | . |  |   |   |   |    |           | . |   |
| 1076.45 | . |  |   |   |   |    |           | . |   |
| 1077.70 | . |  |   |   |   |    |           | . |   |
| 1078.96 | . |  | I | W | C | H  |           | . | R |
| 1080.21 | . |  |   |   |   |    |           | . |   |
| 1081.46 | . |  |   |   |   |    |           | . |   |
| 1082.72 | . |  | I | W | C | EH |           | . | R |
| 1083.97 | . |  |   |   |   |    |           | . |   |
| 1085.22 | . |  | I | W | C | EH |           | . | R |
| 1086.48 | . |  |   |   |   |    |           | . |   |
| 1087.73 | . |  | I | W | C | EH |           | . | R |
| 1088.98 | . |  | I | W | C | EH |           | . | R |
| 1090.24 | . |  | I | W | C | EH |           | . | R |
| 1091.49 | . |  | I | W | C | EH |           | . | R |

2705.600 2707.907 2710.214 2712.521 2714.828 2717.135 2719.441 2721.748 2724.055 2726.362 2728.668

#### 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

LLAT3.OUT

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                                              |                        |                            |                        |                       |                       |                        |          |                 |                            |                                        |                        |  |
|------------------------------------------------------------------------------|------------------------|----------------------------|------------------------|-----------------------|-----------------------|------------------------|----------|-----------------|----------------------------|----------------------------------------|------------------------|--|
| Lateral Line From Basin EPF1 to Regional Facility Mainline Model (LLAT4.WSW) |                        |                            |                        |                       |                       |                        |          |                 |                            |                                        |                        |  |
| WSPG Station                                                                 | Plan Set Project No. * | Equivalent Roadway Station | Improvement Plan Sheet | Storm Drain Dimension | Invert Elevation (ft) | Q <sub>100</sub> (cfs) | WSE (ft) | Velocity (ft/s) | FG Elevation               | Facility Description                   | HGL Check <sup>1</sup> |  |
| 1000.00                                                                      | LCW: EST1906           | 56+33.93                   | P-7                    | 42" RCP               | 2684.82               | 34.00                  | 2685.64  | 19.83           | 2700.00                    | Connection to Regional Model           | OK                     |  |
| 1066.01                                                                      |                        | 55+94.91                   |                        | 42" RCP               | 2690.10               | 34.00                  | 2690.93  | 8.21            | 2700.97                    |                                        | OK                     |  |
| 1066.01                                                                      |                        |                            |                        | 5' x 15' RCB          | 2690.10               | 34.00                  | 2690.93  | 8.21            | 2700.97                    | Wall Entrance                          | OK                     |  |
| 1068.51                                                                      |                        |                            |                        | 5' x 15' RCB          | 2690.30               | 34.00                  | 2691.40  | 6.18            | 2700.97                    | Junction with LC5a Drop Inlet Facility | OK                     |  |
| 1068.51                                                                      |                        |                            |                        | 5' x 15' RCB          | 2690.30               | 31.00                  | 2691.02  | 8.56            | 2700.97                    |                                        | OK                     |  |
| 1071.01                                                                      |                        |                            |                        | 5' x 15' RCB          | 2690.52               | 31.00                  | 2691.38  | 7.22            | 2700.97                    |                                        | OK                     |  |
| 1071.01                                                                      |                        | 55+91.9                    |                        | 42" RCP               | 2690.52               | 31.00                  | 2691.38  | 16.94           | 2700.97                    | Wall Exit                              | OK                     |  |
| 1124.64                                                                      | 42" RCP                |                            |                        | 2695.22               | 31.00                 | 2696.94                | 6.58     | 2700.00         | Addition of Flow from EPF1 | OK                                     |                        |  |
| 1124.64                                                                      | 42" RCP                |                            |                        | 2695.22               | 31.00                 | 2696.94                | 6.58     | 2700.00         |                            | OK                                     |                        |  |



T1 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

T2 LOG CABIN STORM DRAIN SYSTEM LATERAL 4 (LLAT4)

T3 FROM PARCEL EPF1 TO REGIONAL FACILITY MAINLINE IN LOG CABIN

|    |                  |       |        |        |       |          |           |      |  |
|----|------------------|-------|--------|--------|-------|----------|-----------|------|--|
| SO | 1000.0002684.820 | 42    |        |        |       | 2687.250 |           |      |  |
| R  | 1066.0102690.100 | 42    | .013   |        |       |          |           | 31.0 |  |
| WE | 1066.0102690.100 | 42    | .013   |        |       |          |           |      |  |
| R  | 1068.5102690.300 | 4     | .013   |        |       |          |           | 0.0  |  |
| JX | 1068.5102690.300 | 4 4   | .013   | 3.0    |       | 2690.300 |           | 90.0 |  |
| R  | 1071.0102690.519 | 4     | .013   |        |       |          |           | 0.0  |  |
| WX | 1071.0102690.519 | 4     | .013   |        |       |          |           |      |  |
| R  | 1124.6402695.220 | 42    | .013   |        |       |          |           |      |  |
| SH | 1124.6402695.220 | 42    |        |        |       |          |           |      |  |
| CD | 1 3 0            | 0.000 | 13.000 | 20.000 | 0.000 | 0.000    | 0.0000.00 | 0.00 |  |
| CD | 2 3 0            | 0.000 | 12.000 | 12.500 | 0.000 | 0.000    | 0.0000.00 | 0.00 |  |
| CD | 3 3 0            | 0.000 | 12.000 | 7.500  | 0.000 | 0.000    | 0.0000.00 | 0.00 |  |
| CD | 4 3 0            | 0.000 | 15.000 | 5.000  | 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 |  |
| Q  |                  |       | 31.000 |        |       |          |           |      |  |

FILE: LLAT4.WSW W S P G W - EDIT LISTING - Version 14.10 LLAT4.EDT Date: 5- 3-2019 Time: 4:29:18  
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1  
CARD SECT CHN NO OF AVE PIER HEIGHT 1 BASE ZL ZR INV Y(1) Y(2) Y(3) Y(4) Y(5) Y(6) Y(7) Y(8) Y(9) Y(10)  
CODE NO TYPE PIER/PIP WIDTH DIAMETER WIDTH DROP

|    |    |   |   |      |        |        |      |      |     |
|----|----|---|---|------|--------|--------|------|------|-----|
| CD | 1  | 3 | 0 | .000 | 13.000 | 20.000 | .000 | .000 | .00 |
| CD | 2  | 3 | 0 | .000 | 12.000 | 12.500 | .000 | .000 | .00 |
| CD | 3  | 3 | 0 | .000 | 12.000 | 7.500  | .000 | .000 | .00 |
| CD | 4  | 3 | 0 | .000 | 15.000 | 5.000  | .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  |        |      |      |     |

W S P G W

PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
HEADING LINE NO 2 IS - LOG CABIN STORM DRAIN SYSTEM LATERAL 4 (LLAT4)  
HEADING LINE NO 3 IS - FROM PARCEL EPF1 TO REGIONAL FACILITY MAINLINE IN LOG CABIN

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

| ELEMENT NO                                                                                              | IS | A | SYSTEM OUTLET    | U/S DATA | STATION  | INVERT   | SECT | W S ELEV | RADIUS | ANGLE | ANG PT | MAN H |
|---------------------------------------------------------------------------------------------------------|----|---|------------------|----------|----------|----------|------|----------|--------|-------|--------|-------|
| 1                                                                                                       | IS | A | SYSTEM OUTLET    | U/S DATA | 1000.000 | 2684.820 | 42   | 2687.250 |        |       |        |       |
| 2                                                                                                       | IS | A | REACH            | U/S DATA | 1066.010 | 2690.100 | 42   |          | .013   | .000  | 31.000 | 0     |
| 3                                                                                                       | IS | A | WALL ENTRANCE    | U/S DATA | 1066.010 | 2690.100 | 42   |          | .013   |       |        |       |
| WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS             |    |   |                  |          |          |          |      |          |        |       |        |       |
| 4                                                                                                       | IS | A | REACH            | U/S DATA | 1068.510 | 2690.300 | 4    |          | .013   | .000  | .000   | 0     |
| 5                                                                                                       | IS | A | JUNCTION         | U/S DATA | 1068.510 | 2690.300 | 4    |          | .013   | .000  | .000   | 0     |
| 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 |    |   |                  |          |          |          |      |          |        |       |        |       |
| 6                                                                                                       | IS | A | REACH            | U/S DATA | 1071.010 | 2690.519 | 4    |          | .013   | .000  | .000   | 0     |
| 7                                                                                                       | IS | A | WALL EXIT        | U/S DATA | 1071.010 | 2690.519 | 4    |          |        |       |        |       |
| WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS             |    |   |                  |          |          |          |      |          |        |       |        |       |
| 8                                                                                                       | IS | A | REACH            | U/S DATA | 1124.640 | 2695.220 | 42   |          | .013   | .000  | .000   | 0     |
| 9                                                                                                       | IS | A | SYSTEM HEADWORKS | U/S DATA | 1124.640 | 2695.220 | 42   |          |        |       |        |       |

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING

Date: 5- 3-2019 Time: 4:29:21

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

LOG CABIN STORM DRAIN SYSTEM LATERAL 4 (LLAT4)

FROM PARCEL EPF1 TO REGIONAL FACILITY MAINLINE IN LOG CABIN

| 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  | 2684.820    | .820       | 2685.640   | 34.00   | 19.83     | 6.11     | 2691.75        | .00        | 1.81           | 2.96           | 3.500          | .000            | .00 | 1 .0           |
| 66.010    | .0800       |            |            |         |           | .0774    | 5.11           | .82        | 4.59           | .82            | .013           | .00             | .00 | PIPE           |
| 1066.010  | 2690.100    | .829       | 2690.929   | 34.00   | 8.21      | 1.05     | 2691.97        | .00        | 1.13           | 5.00           | 15.000         | 5.000           | .00 | 0 .0           |
| .732      | .0800       |            |            |         |           | .0091    | .01            | .83        | 1.59           | .42            | .013           | .00             | .00 | BOX            |
| 1066.742  | 2690.159    | .866       | 2691.025   | 34.00   | 7.85      | .96      | 2691.98        | .00        | 1.13           | 5.00           | 15.000         | 5.000           | .00 | 0 .0           |
| .620      | .0800       |            |            |         |           | .0079    | .00            | .87        | 1.49           | .42            | .013           | .00             | .00 | BOX            |
| 1067.362  | 2690.208    | .909       | 2691.117   | 34.00   | 7.48      | .87      | 2691.99        | .00        | 1.13           | 5.00           | 15.000         | 5.000           | .00 | 0 .0           |
| .475      | .0800       |            |            |         |           | .0069    | .00            | .91        | 1.38           | .42            | .013           | .00             | .00 | BOX            |
| 1067.837  | 2690.246    | .953       | 2691.199   | 34.00   | 7.14      | .79      | 2691.99        | .00        | 1.13           | 5.00           | 15.000         | 5.000           | .00 | 0 .0           |
| .343      | .0800       |            |            |         |           | .0060    | .00            | .95        | 1.29           | .42            | .013           | .00             | .00 | BOX            |
| 1068.180  | 2690.274    | 1.000      | 2691.273   | 34.00   | 6.80      | .72      | 2691.99        | .00        | 1.13           | 5.00           | 15.000         | 5.000           | .00 | 0 .0           |
| .221      | .0800       |            |            |         |           | .0052    | .00            | 1.00       | 1.20           | .42            | .013           | .00             | .00 | BOX            |
| 1068.401  | 2690.291    | 1.048      | 2691.340   | 34.00   | 6.49      | .65      | 2691.99        | .00        | 1.13           | 5.00           | 15.000         | 5.000           | .00 | 0 .0           |
| .109      | .0800       |            |            |         |           | .0045    | .00            | 1.05       | 1.12           | .42            | .013           | .00             | .00 | BOX            |
| 1068.510  | 2690.300    | 1.099      | 2691.399   | 34.00   | 6.18      | .59      | 2691.99        | .00        | 1.13           | 5.00           | 15.000         | 5.000           | .00 | 0 .0           |
| JUNCT STR | .0000       |            |            |         |           | .0081    | .00            | 1.10       | 1.04           | .013           | .00            | .00             | .00 | BOX            |
| 1068.510  | 2690.300    | .724       | 2691.024   | 31.00   | 8.56      | 1.14     | 2692.16        | .00        | 1.06           | 5.00           | 15.000         | 5.000           | .00 | 0 .0           |
| .543      | .0876       |            |            |         |           | .0116    | .01            | .72        | 1.77           | .38            | .013           | .00             | .00 | BOX            |

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING

Date: 5- 3-2019 Time: 4:29:21

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

LOG CABIN STORM DRAIN SYSTEM LATERAL 4 (LLAT4)

FROM PARCEL EPF1 TO REGIONAL FACILITY MAINLINE IN LOG CABIN

| 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        |
| 1069.053  | 2690.348    | .745       | 2691.092   | 31.00   | 8.33      | 1.08     | 2692.17        | .00        | 1.06           | 5.00           | 15.000         | 5.000           | .00 | 0 .0           |
| .797      | .0876       |            |            |         |           | .0104    | .01            | .74        | 1.70           | .38            | .013           | .00             | .00 | BOX            |
| 1069.850  | 2690.417    | .781       | 2691.198   | 31.00   | 7.94      | .98      | 2692.18        | .00        | 1.06           | 5.00           | 15.000         | 5.000           | .00 | 0 .0           |
| .647      | .0876       |            |            |         |           | .0090    | .01            | .78        | 1.58           | .38            | .013           | .00             | .00 | BOX            |
| 1070.497  | 2690.474    | .819       | 2691.293   | 31.00   | 7.57      | .89      | 2692.18        | .00        | 1.06           | 5.00           | 15.000         | 5.000           | .00 | 0 .0           |
| .513      | .0876       |            |            |         |           | .0078    | .00            | .82        | 1.47           | .38            | .013           | .00             | .00 | BOX            |
| 1071.010  | 2690.519    | .859       | 2691.378   | 31.00   | 7.22      | .81      | 2692.19        | .00        | 1.06           | 5.00           | 15.000         | 5.000           | .00 | 0 .0           |
| WALL EXIT |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |
| 1071.010  | 2690.520    | .858       | 2691.377   | 31.00   | 16.94     | 4.46     | 2695.83        | .00        | 1.72           | 3.01           | 3.500          | .000            | .00 | 1 .0           |
| 8.750     | .0877       |            |            |         |           | .0518    | .45            | .86        | 3.83           | .76            | .013           | .00             | .00 | PIPE           |
| 1079.760  | 2691.286    | .882       | 2692.169   | 31.00   | 16.29     | 4.12     | 2696.29        | .00        | 1.72           | 3.04           | 3.500          | .000            | .00 | 1 .0           |
| 8.245     | .0877       |            |            |         |           | .0459    | .38            | .88        | 3.63           | .76            | .013           | .00             | .00 | PIPE           |
| 1088.004  | 2692.009    | .913       | 2692.922   | 31.00   | 15.53     | 3.75     | 2696.67        | .00        | 1.72           | 3.07           | 3.500          | .000            | .00 | 1 .0           |
| 6.507     | .0877       |            |            |         |           | .0402    | .26            | .91        | 3.40           | .76            | .013           | .00             | .00 | PIPE           |



LLAT4.OUT

|          |          |      |          |       |       |       |         |     |      |      |       |      |     |   |      |
|----------|----------|------|----------|-------|-------|-------|---------|-----|------|------|-------|------|-----|---|------|
| 1094.511 | 2692.579 | .944 | 2693.523 | 31.00 | 14.81 | 3.41  | 2696.93 | .00 | 1.72 | 3.11 | 3.500 | .000 | .00 | 1 | .0   |
| -        | -        | -    | -        | -     | -     | -     | -       | -   | -    | -    | -     | -    | -   | - | -    |
| 5.272    | .0877    |      |          |       |       | .0351 | .19     | .94 | 3.18 | .76  | .013  | .00  | .00 |   | PIPE |
| 1099.783 | 2693.042 | .977 | 2694.018 | 31.00 | 14.12 | 3.10  | 2697.11 | .00 | 1.72 | 3.14 | 3.500 | .000 | .00 | 1 | .0   |
| -        | -        | -    | -        | -     | -     | -     | -       | -   | -    | -    | -     | -    | -   | - | -    |
| 4.348    | .0877    |      |          |       |       | .0307 | .13     | .98 | 2.98 | .76  | .013  | .00  | .00 |   | PIPE |

FILE: LLAT4.WSW W S P G W - CIVILDESIGN Version 14.08  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING  
 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
 LOG CABIN STORM DRAIN SYSTEM LATERAL 4 (LLAT4)  
 FROM PARCEL EPF1 TO REGIONAL FACILITY MAINLINE IN LOG CABIN  
 Date: 5- 3-2019 Time: 4:29:21  
 PAGE 3

| Station  | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt I.D. | ZL  | No Wth Prs/Pip |
|----------|-------------|------------|------------|---------|-----------|----------|---------------|------------|----------------|----------------|----------------|--------------|-----|----------------|
| L/Elem   | Ch Slope    |            |            |         |           | SF Ave   | HF            | SE Dpth    | Froude N       | Norm Dp        | "N"            | X-Fall       | ZR  | Type Ch        |
| 1104.132 | 2693.423    | 1.011      | 2694.433   | 31.00   | 13.46     | 2.81     | 2697.25       | .00        | 1.72           | 3.17           | 3.500          | .000         | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -             | -          | -              | -              | -              | -            | -   | -              |
| 3.633    | .0877       |            |            |         |           | .0269    | .10           | 1.01       | 2.79           | .76            | .013           | .00          | .00 | PIPE           |
| 1107.764 | 2693.741    | 1.046      | 2694.787   | 31.00   | 12.84     | 2.56     | 2697.35       | .00        | 1.72           | 3.20           | 3.500          | .000         | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -             | -          | -              | -              | -              | -            | -   | -              |
| 3.058    | .0877       |            |            |         |           | .0236    | .07           | 1.05       | 2.61           | .76            | .013           | .00          | .00 | PIPE           |
| 1110.823 | 2694.009    | 1.083      | 2695.092   | 31.00   | 12.24     | 2.33     | 2697.42       | .00        | 1.72           | 3.24           | 3.500          | .000         | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -             | -          | -              | -              | -              | -            | -   | -              |
| 2.588    | .0877       |            |            |         |           | .0206    | .05           | 1.08       | 2.44           | .76            | .013           | .00          | .00 | PIPE           |
| 1113.411 | 2694.236    | 1.121      | 2695.356   | 31.00   | 11.67     | 2.11     | 2697.47       | .00        | 1.72           | 3.27           | 3.500          | .000         | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -             | -          | -              | -              | -              | -            | -   | -              |
| 2.194    | .0877       |            |            |         |           | .0181    | .04           | 1.12       | 2.28           | .76            | .013           | .00          | .00 | PIPE           |
| 1115.604 | 2694.428    | 1.160      | 2695.588   | 31.00   | 11.13     | 1.92     | 2697.51       | .00        | 1.72           | 3.30           | 3.500          | .000         | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -             | -          | -              | -              | -              | -            | -   | -              |
| 1.862    | .0877       |            |            |         |           | .0158    | .03           | 1.16       | 2.13           | .76            | .013           | .00          | .00 | PIPE           |
| 1117.467 | 2694.592    | 1.201      | 2695.793   | 31.00   | 10.61     | 1.75     | 2697.54       | .00        | 1.72           | 3.32           | 3.500          | .000         | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -             | -          | -              | -              | -              | -            | -   | -              |
| 1.573    | .0877       |            |            |         |           | .0139    | .02           | 1.20       | 1.99           | .76            | .013           | .00          | .00 | PIPE           |
| 1119.040 | 2694.729    | 1.244      | 2695.973   | 31.00   | 10.12     | 1.59     | 2697.56       | .00        | 1.72           | 3.35           | 3.500          | .000         | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -             | -          | -              | -              | -              | -            | -   | -              |
| 1.325    | .0877       |            |            |         |           | .0122    | .02           | 1.24       | 1.86           | .76            | .013           | .00          | .00 | PIPE           |
| 1120.365 | 2694.846    | 1.288      | 2696.134   | 31.00   | 9.64      | 1.44     | 2697.58       | .00        | 1.72           | 3.38           | 3.500          | .000         | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -             | -          | -              | -              | -              | -            | -   | -              |
| 1.104    | .0877       |            |            |         |           | .0107    | .01           | 1.29       | 1.74           | .76            | .013           | .00          | .00 | PIPE           |
| 1121.469 | 2694.942    | 1.335      | 2696.277   | 31.00   | 9.20      | 1.31     | 2697.59       | .00        | 1.72           | 3.40           | 3.500          | .000         | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -             | -          | -              | -              | -              | -            | -   | -              |
| .908     | .0877       |            |            |         |           | .0094    | .01           | 1.33       | 1.63           | .76            | .013           | .00          | .00 | PIPE           |

FILE: LLAT4.WSW W S P G W - CIVILDESIGN Version 14.08  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING  
 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
 LOG CABIN STORM DRAIN SYSTEM LATERAL 4 (LLAT4)  
 FROM PARCEL EPF1 TO REGIONAL FACILITY MAINLINE IN LOG CABIN  
 Date: 5- 3-2019 Time: 4:29:21  
 PAGE 4

| Station  | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt I.D. | ZL  | No Wth Prs/Pip |
|----------|-------------|------------|------------|---------|-----------|----------|---------------|------------|----------------|----------------|----------------|--------------|-----|----------------|
| L/Elem   | Ch Slope    |            |            |         |           | SF Ave   | HF            | SE Dpth    | Froude N       | Norm Dp        | "N"            | X-Fall       | ZR  | Type Ch        |
| 1122.377 | 2695.022    | 1.383      | 2696.405   | 31.00   | 8.77      | 1.19     | 2697.60       | .00        | 1.72           | 3.42           | 3.500          | .000         | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -             | -          | -              | -              | -              | -            | -   | -              |
| .733     | .0877       |            |            |         |           | .0082    | .01           | 1.38       | 1.52           | .76            | .013           | .00          | .00 | PIPE           |
| 1123.109 | 2695.086    | 1.433      | 2696.520   | 31.00   | 8.36      | 1.09     | 2697.60       | .00        | 1.72           | 3.44           | 3.500          | .000         | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -             | -          | -              | -              | -              | -            | -   | -              |
| .575     | .0877       |            |            |         |           | .0072    | .00           | 1.43       | 1.42           | .76            | .013           | .00          | .00 | PIPE           |
| 1123.684 | 2695.136    | 1.486      | 2696.622   | 31.00   | 7.97      | .99      | 2697.61       | .00        | 1.72           | 3.46           | 3.500          | .000         | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -             | -          | -              | -              | -              | -            | -   | -              |
| .430     | .0877       |            |            |         |           | .0063    | .00           | 1.49       | 1.32           | .76            | .013           | .00          | .00 | PIPE           |
| 1124.115 | 2695.174    | 1.540      | 2696.715   | 31.00   | 7.60      | .90      | 2697.61       | .00        | 1.72           | 3.47           | 3.500          | .000         | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -             | -          | -              | -              | -              | -            | -   | -              |
| .296     | .0877       |            |            |         |           | .0056    | .00           | 1.54       | 1.24           | .76            | .013           | .00          | .00 | PIPE           |
| 1124.411 | 2695.200    | 1.598      | 2696.798   | 31.00   | 7.25      | .82      | 2697.61       | .00        | 1.72           | 3.49           | 3.500          | .000         | .00 | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -             | -          | -              | -              | -              | -            | -   | -              |
| .173     | .0877       |            |            |         |           | .0049    | .00           | 1.60       | 1.15           | .76            | .013           | .00          | .00 | PIPE           |
| 1124.584 | 2695.215    | 1.657      | 2696.873   | 31.00   | 6.91      | .74      | 2697.61       | .00        | 1.72           | 3.50           | 3.500          | .000         | .00 | 1 .0           |

| LLAT4.OUT |          |       |          |       |      |       |         |      |      |      |       |      |      |
|-----------|----------|-------|----------|-------|------|-------|---------|------|------|------|-------|------|------|
| - -       | - -      | - -   | - -      | - -   | - -  | - -   | - -     | - -  | - -  | - -  | - -   | - -  | - -  |
| .056      | .0877    |       |          |       |      | .0043 | .00     | 1.66 | 1.07 | .76  | .013  | .00  | .00  |
| 1124.640  | 2695.220 | 1.721 | 2696.941 | 31.00 | 6.58 | .67   | 2697.61 | .00  | 1.72 | 3.50 | 3.500 | .000 | .00  |
| - -       | - -      | - -   | - -      | - -   | - -  | - -   | - -     | - -  | - -  | - -  | - -   | - -  | - -  |
|           |          |       |          |       |      |       |         |      |      |      |       |      | PIPE |
|           |          |       |          |       |      |       |         |      |      |      |       |      | 1 .0 |

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

LOG CABIN STORM DRAIN SYSTEM LATERAL 4 (LLAT4)

FROM PARCEL EPF1 TO REGIONAL FACILITY MAINLINE IN LOG CABIN

| 1000.00 | .I | W | C | H | E | R |
|---------|----|---|---|---|---|---|
| 1001.86 | .  |   |   |   |   | . |
| 1003.72 | .  |   |   |   |   | . |
| 1005.58 | .  |   |   |   |   | . |
| 1007.44 | .  |   |   |   |   | . |
| 1009.30 | .  |   |   |   |   | . |
| 1011.16 | .  |   |   |   |   | . |
| 1013.02 | .  |   |   |   |   | . |
| 1014.88 | .  |   |   |   |   | . |
| 1016.74 | .  |   |   |   |   | . |
| 1018.60 | .  |   |   |   |   | . |
| 1020.46 | .  |   |   |   |   | . |
| 1022.32 | .  |   |   |   |   | . |
| 1024.18 | .  |   |   |   |   | . |
| 1026.04 | .  |   |   |   |   | . |
| 1027.90 | .  |   |   |   |   | . |
| 1029.76 | .  |   |   |   |   | . |
| 1031.63 | .  |   |   |   |   | . |
| 1033.49 | .  |   |   |   |   | . |
| 1035.35 | .  |   |   |   |   | . |
| 1037.21 | .  |   |   |   |   | . |
| 1039.07 | .  |   |   |   |   | . |
| 1040.93 | .  |   |   |   |   | . |

[illegible]



LLAT4.OUT

|         |   |   |   |   |   |   |  |  |  |   |
|---------|---|---|---|---|---|---|--|--|--|---|
| 1098.60 | . |   |   |   |   |   |  |  |  | . |
| 1100.46 | . | I | W | C | H | E |  |  |  | R |
| 1102.32 | . |   |   |   |   |   |  |  |  | . |
| 1104.18 | . | I | W | C | H | E |  |  |  | R |
| 1106.04 | . |   |   |   |   |   |  |  |  | . |
| 1107.90 | . | I | W | C | H |   |  |  |  | R |
| 1109.76 | . |   |   |   |   |   |  |  |  | . |
| 1111.62 | . | I | W | C | E | H |  |  |  | R |
| 1113.48 | . | I | W | C | E | H |  |  |  | R |
| 1115.34 | . |   |   |   |   |   |  |  |  | . |
| 1117.20 | . | I | W | C | E | H |  |  |  | R |
| 1119.06 | . | I | W | C | E | H |  |  |  | R |
| 1120.92 | . | I | W | C | E | H |  |  |  | R |
| 1122.78 | . | I | W | C | E | H |  |  |  | R |
| 1124.64 | . | I | W | C | E | H |  |  |  | R |

|          |          |          |          |          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 2684.820 | 2686.890 | 2688.960 | 2691.030 | 2693.099 | 2695.169 | 2697.239 | 2699.309 | 2701.379 | 2703.448 | 2705.519 |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|

## NOTES

## 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                                             |                        |                            |                        |                       |                       |                        |          |                 |              |                                        |                        |  |  |
|-----------------------------------------------------------------------------|------------------------|----------------------------|------------------------|-----------------------|-----------------------|------------------------|----------|-----------------|--------------|----------------------------------------|------------------------|--|--|
| Lateral Line From Basin EPD to Regional Facility Mainline Model (LLAT5.WSW) |                        |                            |                        |                       |                       |                        |          |                 |              |                                        |                        |  |  |
| WSPG Station                                                                | Plan Set Project No. * | Equivalent Roadway Station | Improvement Plan Sheet | Storm Drain Dimension | Invert Elevation (ft) | Q <sub>100</sub> (cfs) | WSE (ft) | Velocity (ft/s) | FG Elevation | Facility Description                   | HGL Check <sup>1</sup> |  |  |
| 1000.00                                                                     | LCW: EST1906           | 67+86.1                    | P-8                    | 42" RCP               | 2652.49               | 69.50                  | 2661.00  | 7.22            | 2664.00      | Connection to Regional Model           | OK                     |  |  |
| 1073.57                                                                     |                        | 67+40.51                   |                        | 42" RCP               | 2653.96               | 69.50                  | 2661.45  | 0.93            | 2664.57      |                                        | OK                     |  |  |
| 1073.57                                                                     |                        |                            |                        | 10' x 13' RCB         | 2653.96               | 69.50                  | 2661.45  | 0.93            | 2664.57      | Wall Entrance                          | OK                     |  |  |
| 1076.07                                                                     |                        |                            |                        | 10' x 13' RCB         | 2654.01               | 65.00                  | 2661.45  | 0.87            | 2664.57      | Junction with LC7a Drop Inlet Facility | OK                     |  |  |
| 1076.07                                                                     |                        |                            |                        | 10' x 13' RCB         | 2654.01               | 65.00                  | 2661.45  | 0.87            | 2664.57      |                                        | OK                     |  |  |
| 1078.57                                                                     |                        |                            |                        | 10' x 13' RCB         | 2654.08               | 65.00                  | 2661.45  | 0.88            | 2664.57      |                                        | OK                     |  |  |
| 1078.57                                                                     |                        | 67+40.14                   |                        | 42" RCP               | 2654.08               | 65.00                  | 2661.45  | 6.76            | 2664.57      | Wall Exit                              | OK                     |  |  |
| 1129.21                                                                     |                        |                            |                        | 42" RCP               | 2655.50               | 65.00                  | 2661.67  | 6.76            | 2665.00      | Addition of Flow from EPD              | OK                     |  |  |
| 1129.21                                                                     |                        |                            |                        | 42" RCP               | 2655.50               | 65.00                  | 2661.67  | 6.76            | 2665.00      |                                        | OK                     |  |  |



T1 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

T2 LOG CABIN STORM DRAIN SYSTEM LATERAL 5 (LLATS)

T3 FROM PARCEL EPD TO REGIONAL FACILITY MAINLINE IN LOG CABIN

|    |                  |    |   |       |          |          |       |       |                |
|----|------------------|----|---|-------|----------|----------|-------|-------|----------------|
| SO | 1000.0002652.490 | 42 |   |       | 2661.000 |          |       |       |                |
| R  | 1073.5702653.960 | 42 |   | .013  |          |          |       | 37.0  |                |
| WE | 1073.5702653.960 | 42 |   | .013  |          |          |       |       |                |
| R  | 1076.0702654.010 | 1  |   | .013  |          |          |       | 0.0   |                |
| JX | 1076.0702654.010 | 1  | 1 | .013  | 4.5      | 2654.010 |       | 90.0  |                |
| R  | 1078.5702654.080 | 1  |   | .013  |          |          |       | 0.0   |                |
| WX | 1078.5702654.080 | 1  |   | .013  |          |          |       |       |                |
| R  | 1129.2102655.500 | 42 |   | .013  |          |          |       |       |                |
| SH | 1129.2102655.500 | 42 |   |       |          |          |       |       |                |
| CD | 1                | 3  | 0 | 0.000 | 13.000   | 10.000   | 0.000 | 0.000 | 0.0000.00 0.00 |
| CD | 2                | 3  | 0 | 0.000 | 12.000   | 12.500   | 0.000 | 0.000 | 0.0000.00 0.00 |
| CD | 3                | 3  | 0 | 0.000 | 12.000   | 7.500    | 0.000 | 0.000 | 0.0000.00 0.00 |
| CD | 4                | 3  | 0 | 0.000 | 15.000   | 5.000    | 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 |
| Q  |                  |    |   |       | 65.000   |          |       |       |                |



FILE: LLAT5.WSW

LLAT5.EDT

W S P G W - EDIT LISTING - Version 14.10

Date: 5- 5-2019 Time:12:42:47

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

| CARD | SECT | CHN  | NO OF    | AVE PIER | HEIGHT 1 | BASE   | ZL   | ZR   | INV  | Y(1) | Y(2) | Y(3) | Y(4) | Y(5) | Y(6) | Y(7) | Y(8) | Y(9) | Y(10) |
|------|------|------|----------|----------|----------|--------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| CODE | NO   | TYPE | PIER/PIP | WIDTH    | DIAMETER | WIDTH  |      |      | DROP |      |      |      |      |      |      |      |      |      |       |
| CD   | 1    | 3    | 0        | .000     | 13.000   | 10.000 | .000 | .000 | .00  |      |      |      |      |      |      |      |      |      |       |
| CD   | 2    | 3    | 0        | .000     | 12.000   | 12.500 | .000 | .000 | .00  |      |      |      |      |      |      |      |      |      |       |
| CD   | 3    | 3    | 0        | .000     | 12.000   | 7.500  | .000 | .000 | .00  |      |      |      |      |      |      |      |      |      |       |
| CD   | 4    | 3    | 0        | .000     | 15.000   | 5.000  | .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    |        |      |      |      |      |      |      |      |      |      |      |      |      |       |

W S P G W

PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

HEADING LINE NO 2 IS -

LOG CABIN STORM DRAIN SYSTEM LATERAL 5 (LLAT5)

HEADING LINE NO 3 IS -

FROM PARCEL EPD TO REGIONAL FACILITY MAINLINE IN LOG CABIN

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

| ELEMENT NO | IS | A | SYSTEM OUTLET    | U/S DATA | STATION  | INVERT   | SECT | W S ELEV | RADIUS | ANGLE | ANG PT | MAN H |
|------------|----|---|------------------|----------|----------|----------|------|----------|--------|-------|--------|-------|
| 1          | IS | A | SYSTEM OUTLET    | U/S DATA | 1000.000 | 2652.490 | 42   | 2661.000 |        |       |        |       |
| 2          | IS | A | REACH            | U/S DATA | 1073.570 | 2653.960 | 42   |          | N      | .013  |        |       |
| 3          | IS | A | WALL ENTRANCE    | U/S DATA | 1073.570 | 2653.960 | 42   |          | FP     |       |        |       |
| 4          | IS | A | REACH            | U/S DATA | 1076.070 | 2654.010 | 1    |          | N      | .013  |        |       |
| 5          | IS | A | JUNCTION         | U/S DATA | 1076.070 | 2654.010 | 1    |          | N      | .013  |        |       |
| 6          | IS | A | REACH            | U/S DATA | 1078.570 | 2654.080 | 1    |          | N      | .013  |        |       |
| 7          | IS | A | WALL EXIT        | U/S DATA | 1078.570 | 2654.080 | 1    |          | N      | .013  |        |       |
| 8          | IS | A | REACH            | U/S DATA | 1129.210 | 2655.500 | 42   |          | N      | .013  |        |       |
| 9          | IS | A | SYSTEM HEADWORKS | U/S DATA | 1129.210 | 2655.500 | 42   |          | N      | .013  |        |       |

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

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

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
LOG CABIN STORM DRAIN SYSTEM LATERAL 5 (LLAT5)  
FROM PARCEL EPD TO REGIONAL FACILITY MAINLINE IN LOG CABIN

| Station   | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top | Height/Width | Base Wt | No Wth |
|-----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------|--------------|---------|--------|
| L/Elem    | Ch Slope    |            |            |         |           | SF Ave   | HF             | SE Dpth    | Froude N       | Norm Dp  | "N"          | X-Fall  | ZR     |
| *****     | *****       | *****      | *****      | *****   | *****     | *****    | *****          | *****      | *****          | *****    | *****        | *****   | *****  |
| 1000.000  | 2652.490    | 8.510      | 2661.000   | 69.50   | 7.22      | .81      | 2661.81        | .00        | 2.61           | .00      | 3.500        | .000    | .00    |
| - -       | - -         | - -        | - -        | - -     | - -       | - -      | - -            | - -        | - -            | - -      | - -          | - -     | - -    |
| 73.570    | .0200       |            |            |         |           | .0048    | .35            | 8.51       | .00            | 1.73     | .013         | .00     | .00    |
| WALL      | ENTRANCE    |            |            |         |           |          |                |            |                |          |              |         | PIPE   |
| 1073.570  | 2653.960    | 7.490      | 2661.450   | 69.50   | .93       | .01      | 2661.46        | .00        | 1.14           | 10.00    | 13.000       | 10.000  | .00    |
| - -       | - -         | - -        | - -        | - -     | - -       | - -      | - -            | - -        | - -            | - -      | - -          | - -     | - -    |
| 2.500     | .0200       |            |            |         |           | .0000    | .00            | 7.49       | .06            | .63      | .013         | .00     | .00    |
| JUNCT STR | .0000       |            |            |         |           | .0000    | .00            | 7.44       | .06            | .013     | .00          | .00     | BOX    |
| 1076.070  | 2654.010    | 7.443      | 2661.453   | 65.00   | .87       | .01      | 2661.47        | .00        | 1.09           | 10.00    | 13.000       | 10.000  | .00    |
| - -       | - -         | - -        | - -        | - -     | - -       | - -      | - -            | - -        | - -            | - -      | - -          | - -     | - -    |
| 2.500     | .0280       |            |            |         |           | .0000    | .00            | 7.44       | .06            | .55      | .013         | .00     | .00    |
| 1078.570  | 2654.080    | 7.373      | 2661.453   | 65.00   | .88       | .01      | 2661.47        | .00        | 1.09           | 10.00    | 13.000       | 10.000  | .00    |
| - -       | - -         | - -        | - -        | - -     | - -       | - -      | - -            | - -        | - -            | - -      | - -          | - -     | - -    |
| WALL      | EXIT        |            |            |         |           |          |                |            |                |          |              |         |        |
| 1078.570  | 2654.080    | 7.374      | 2661.454   | 65.00   | 6.76      | .71      | 2662.16        | .00        | 2.53           | .00      | 3.500        | .000    | .00    |
| - -       | - -         | - -        | - -        | - -     | - -       | - -      | - -            | - -        | - -            | - -      | - -          | - -     | - -    |
| 50.640    | .0280       |            |            |         |           | .0042    | .21            | 7.37       | .00            | 1.51     | .013         | .00     | .00    |
| 1129.210  | 2655.500    | 6.165      | 2661.665   | 65.00   | 6.76      | .71      | 2662.37        | .00        | 2.53           | .00      | 3.500        | .000    | .00    |
| - -       | - -         | - -        | - -        | - -     | - -       | - -      | - -            | - -        | - -            | - -      | - -          | - -     | - -    |

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

LOG CABIN STORM DRAIN SYSTEM LATERAL 5 (LLAT5)

FROM PARCEL EPD TO REGIONAL FACILITY MAINLINE IN LOG CABIN

|         |    |   |   |   |   |   |
|---------|----|---|---|---|---|---|
| 1000.00 | .I | C | H | W | E | R |
| 1002.64 | .  |   |   |   |   | . |
| 1005.27 | .  |   |   |   |   | . |
| 1007.91 | .  |   |   |   |   | . |
| 1010.55 | .  |   |   |   |   | . |
| 1013.18 | .  |   |   |   |   | . |
| 1015.82 | .  |   |   |   |   | . |
| 1018.46 | .  |   |   |   |   | . |
| 1021.10 | .  |   |   |   |   | . |
| 1023.73 | .  |   |   |   |   | . |
| 1026.37 | .  |   |   |   |   | . |
| 1029.01 | .  |   |   |   |   | . |
| 1031.64 | .  |   |   |   |   | . |

## LLAT5.OUT

[illegible]



LLAT5.OUT





## North Connector Road (Sunbridge Pointe Drive)



# **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 <sub>100</sub> (cfs) | WSE (ft) | Velocity (ft/s) | FG Elevation | Facility Description                                  | HGL Check <sup>1</sup> |
|--------------|------------------------|----------------------------|------------------------|-----------------------|-----------------------|------------------------|----------|-----------------|--------------|-------------------------------------------------------|------------------------|
| 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                   | P-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               | 85.00                  | 2690.02  | 8.83            | 2699.63      |                                                       | OK                     |
| 1261.07      |                        | 41+94.58                   |                        | 42" RCP               | 2687.59               | 85.00                  | 2689.73  | 13.78           | 2700.41      |                                                       | OK                     |
| 1431.05      |                        | 40+26.23                   |                        | 42" RCP               | 2690.31               | 85.00                  | 2692.78  | 11.70           | 2702.09      |                                                       | OK                     |
| 1601.03      |                        | 38+57.81                   |                        | 42" RCP               | 2692.00               | 85.00                  | 2694.47  | 11.73           | 2703.78      |                                                       | OK                     |
| 1771.01      |                        | 36+89.39                   |                        | 42" RCP               | 2693.70               | 85.00                  | 2696.17  | 11.73           | 2705.46      |                                                       | OK                     |
| 1940.99      |                        | 35+20.97                   |                        | 42" RCP               | 2695.40               | 85.00                  | 2697.85  | 11.83           | 2707.15      |                                                       | OK                     |
| 2110.97      |                        | 33+52.55                   |                        | 42" RCP               | 2697.10               | 85.00                  | 2699.43  | 12.53           | 2708.83      |                                                       | OK                     |
| 2281.02      |                        | 34+84.07                   |                        | 42" RCP               | 2698.80               | 85.00                  | 2700.78  | 15.13           | 2710.52      |                                                       | OK                     |
| 2632.17      |                        | 28+21.33                   |                        |                       | P-2                   | 42" RCP                | 2705.13  | 85.00           | 2706.68      | 20.75                                                 | 2716.92                |
| 2689.50      |                        | 27+90.9                    | P-5                    | 7.5' x 12' RCB        | 2706.27               | 85.00                  | 2707.67  | 8.10            | 2716.97      | Wall Entrance                                         | OK                     |
| 2689.50      |                        |                            |                        | 7.5' x 12' RCB        | 2706.27               | 85.00                  | 2707.67  | 8.10            | 2716.97      |                                                       | OK                     |
| 2692.00      |                        |                            |                        | 7.5' x 12' RCB        | 2706.32               | 85.00                  | 2707.91  | 7.15            | 2716.97      | Junction with NC2 Drop Inlet Facility                 | OK                     |
| 2692.00      |                        |                            |                        | 7.5' x 12' RCB        | 2706.32               | 82.00                  | 2708.24  | 5.71            | 2716.97      |                                                       | OK                     |
| 2694.50      |                        |                            |                        | 7.5' x 12' RCB        | 2706.37               | 82.00                  | 2708.18  | 6.04            | 2716.97      |                                                       | OK                     |
| 2694.50      |                        |                            |                        | 7.5' x 12' RCB        | 2706.37               | 82.00                  | 2708.18  | 6.04            | 2716.97      | Wall Exit                                             | OK                     |
| 2725.02      |                        |                            |                        | 42" RCP               | 2706.98               | 82.00                  | 2709.81  | 9.85            | 2720.00      | Stub to Basin EAA2                                    | OK                     |
| 2725.02      |                        |                            |                        | 42" RCP               | 2706.98               | 82.00                  | 2709.81  | 9.85            | 2720.00      |                                                       | OK                     |

NCR1.WSW

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   |       |       |                  | -3.5      |      | 1 |  |
| JX | 1122.4502685.370 | 42 18 48 | .013   | 11.0  | 54.0  | 2686.3702683.870 | 45.0-40.0 |      |   |  |
| R  | 1261.0702687.590 | 42       | .013   |       |       |                  | -8.0      |      | 1 |  |
| R  | 1431.0502690.310 | 42       | .013   |       |       |                  | -7.5      |      | 1 |  |
| R  | 1601.0302692.000 | 42       | .013   |       |       |                  | -7.5      |      | 1 |  |
| R  | 1771.0102693.700 | 42       | .013   |       |       |                  | -7.5      |      | 1 |  |
| R  | 1940.9902695.400 | 42       | .013   |       |       |                  | -7.5      |      | 1 |  |
| R  | 2110.9702697.100 | 42       | .013   |       |       |                  | -7.5      |      | 1 |  |
| R  | 2281.0202698.800 | 42       | .013   |       |       |                  | -7.5      |      | 1 |  |
| R  | 2632.1702705.130 | 42       | .013   |       |       |                  | -40.0     |      | 1 |  |
| R  | 2689.5002706.270 | 42       | .013   |       |       |                  |           |      | 1 |  |
| WE | 2689.5002706.270 | 42       | .013   |       |       |                  |           |      |   |  |
| R  | 2692.0002706.320 | 3        | .013   |       |       |                  |           |      | 1 |  |
| JX | 2692.0002706.320 | 3 3      | .013   | 3.0   |       | 2706.320         | 90.0      |      |   |  |
| R  | 2694.5002706.370 | 3        | .013   |       |       |                  | -44.0     |      | 1 |  |
| WX | 2694.5002706.370 | 3        | .013   |       |       |                  |           |      |   |  |
| R  | 2725.0202706.980 | 42       | .013   |       |       |                  |           |      |   |  |
| SH | 2725.0202706.980 | 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   |        |       |       |                  |           |      |   |  |



FILE: NCR1.WSW

NCR1.EDT  
W S P G W - EDIT LISTING - Version 14.10  
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

Date: 4-30-2019 Time: 2:54:36  
PAGE 1

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

PAGE NO 1

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

PAGE NO 2

| 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 |          | RADIUS | ANGLE | ANG PT | MAN H  |          |          |        |         |  |  |  |  |
|            |         |               |          | 1008.000 | 2682.720 | 60   |          | .000   | .000  | .000   | 0      |          |          |        |         |  |  |  |  |
| ELEMENT NO | 3 IS A  | REACH         | U/S DATA | STATION  | INVERT   | SECT |          | RADIUS | ANGLE | ANG PT | MAN H  |          |          |        |         |  |  |  |  |
|            |         |               |          | 1030.760 | 2682.950 | 60   |          | .000   | .000  | 36.000 | 1      |          |          |        |         |  |  |  |  |
| ELEMENT NO | 4 IS A  | REACH         | U/S DATA | STATION  | INVERT   | SECT |          | RADIUS | ANGLE | ANG PT | MAN H  |          |          |        |         |  |  |  |  |
|            |         |               |          | 1069.710 | 2683.340 | 60   |          | .000   | .000  | .000   | 1      |          |          |        |         |  |  |  |  |
| ELEMENT NO | 5 IS A  | REACH         | U/S DATA | STATION  | INVERT   | SECT |          | RADIUS | ANGLE | ANG PT | MAN H  |          |          |        |         |  |  |  |  |
|            |         |               |          | 1122.450 | 2683.870 | 60   |          | .000   | .000  | -3.500 | 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   | 18       | 48     | .013  | 11.000 | 54.000 | 2686.370 | 2683.870 | 45.000 | -40.000 |  |  |  |  |
|            |         |               |          |          |          |      |          |        |       |        |        | RADIUS   | ANGLE    |        |         |  |  |  |  |
|            |         |               |          |          |          |      |          |        |       |        |        | .000     | .000     |        |         |  |  |  |  |
| ELEMENT NO | 7 IS A  | REACH         | U/S DATA | STATION  | INVERT   | SECT |          | RADIUS | ANGLE | ANG PT | MAN H  |          |          |        |         |  |  |  |  |
|            |         |               |          | 1261.070 | 2687.590 | 42   |          | .013   |       | .000   | .000   | -8.000   | 1        |        |         |  |  |  |  |
| ELEMENT NO | 8 IS A  | REACH         | U/S DATA | STATION  | INVERT   | SECT |          | RADIUS | ANGLE | ANG PT | MAN H  |          |          |        |         |  |  |  |  |
|            |         |               |          | 1431.050 | 2690.310 | 42   |          | .013   |       | .000   | .000   | -7.500   | 1        |        |         |  |  |  |  |
| ELEMENT NO | 9 IS A  | REACH         | U/S DATA | STATION  | INVERT   | SECT |          | RADIUS | ANGLE | ANG PT | MAN H  |          |          |        |         |  |  |  |  |
|            |         |               |          | 1601.030 | 2692.000 | 42   |          | .013   |       | .000   | .000   | -7.500   | 1        |        |         |  |  |  |  |
| ELEMENT NO | 10 IS A | REACH         | U/S DATA | STATION  | INVERT   | SECT |          | RADIUS | ANGLE | ANG PT | MAN H  |          |          |        |         |  |  |  |  |
|            |         |               |          | 1771.010 | 2693.700 | 42   |          | .013   |       | .000   | .000   | -7.500   | 1        |        |         |  |  |  |  |
| ELEMENT NO | 11 IS A | REACH         | U/S DATA | STATION  | INVERT   | SECT |          | RADIUS | ANGLE | ANG PT | MAN H  |          |          |        |         |  |  |  |  |
|            |         |               |          | 1940.990 | 2695.400 | 42   |          | .013   |       | .000   | .000   | -7.500   | 1        |        |         |  |  |  |  |
| ELEMENT NO | 12 IS A | REACH         | U/S DATA | STATION  | INVERT   | SECT |          | RADIUS | ANGLE | ANG PT | MAN H  |          |          |        |         |  |  |  |  |
|            |         |               |          | 2110.970 | 2697.100 | 42   |          | .013   |       | .000   | .000   | -7.500   | 1        |        |         |  |  |  |  |

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

PAGE NO 3

| ELEMENT NO                                                                                  | 13 IS A | REACH         | U/S DATA | STATION  | INVERT   | SECT |       | RADIUS | ANGLE | ANG PT | MAN H |          |          |        |       |  |  |  |  |
|---------------------------------------------------------------------------------------------|---------|---------------|----------|----------|----------|------|-------|--------|-------|--------|-------|----------|----------|--------|-------|--|--|--|--|
|                                                                                             |         |               |          | 2281.020 | 2698.800 | 42   |       | .013   |       | .000   | .000  | -7.500   | 1        |        |       |  |  |  |  |
| ELEMENT NO                                                                                  | 14 IS A | REACH         | U/S DATA | STATION  | INVERT   | SECT |       | RADIUS | ANGLE | ANG PT | MAN H |          |          |        |       |  |  |  |  |
|                                                                                             |         |               |          | 2632.170 | 2705.130 | 42   |       | .013   |       | .000   | .000  | -40.000  | 1        |        |       |  |  |  |  |
| ELEMENT NO                                                                                  | 15 IS A | REACH         | U/S DATA | STATION  | INVERT   | SECT |       | RADIUS | ANGLE | ANG PT | MAN H |          |          |        |       |  |  |  |  |
|                                                                                             |         |               |          | 2689.500 | 2706.270 | 42   |       | .013   |       | .000   | .000  | .000     | 1        |        |       |  |  |  |  |
| ELEMENT NO                                                                                  | 16 IS A | WALL ENTRANCE | U/S DATA | STATION  | INVERT   | SECT |       |        |       |        |       |          |          |        |       |  |  |  |  |
|                                                                                             |         |               |          | 2689.500 | 2706.270 | 42   |       | .013   |       |        |       |          |          |        |       |  |  |  |  |
| WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS |         |               |          |          |          |      |       |        |       |        |       |          |          |        |       |  |  |  |  |
| ELEMENT NO                                                                                  | 17 IS A | REACH         | U/S DATA | STATION  | INVERT   | SECT |       | RADIUS | ANGLE | ANG PT | MAN H |          |          |        |       |  |  |  |  |
|                                                                                             |         |               |          | 2692.000 | 2706.320 | 3    |       | .013   |       | .000   | .000  | .000     | 1        |        |       |  |  |  |  |
| ELEMENT NO                                                                                  | 18 IS A | JUNCTION      | U/S DATA | STATION  | INVERT   | SECT | LAT-1 | LAT-2  | N     | Q3     | Q4    | INVERT-3 | INVERT-4 | PHI 3  | PHI 4 |  |  |  |  |
|                                                                                             |         |               |          | 2692.000 | 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



NCR1.EDT

|                                                                                             |    |                       |          |          |      |      |          |       |         |       |
|---------------------------------------------------------------------------------------------|----|-----------------------|----------|----------|------|------|----------|-------|---------|-------|
| ELEMENT NO                                                                                  | 19 | IS A REACH            | *        | *        | *    |      |          |       |         |       |
|                                                                                             |    | U/S DATA              | STATION  | INVERT   | SECT | N    | RADIUS   | ANGLE | ANG PT  | MAN H |
|                                                                                             |    |                       | 2694.500 | 2706.370 | 3    | .013 | .000     | .000  | -44.000 | 1     |
| ELEMENT NO                                                                                  | 20 | IS A WALL EXIT        | *        |          | *    |      |          |       |         |       |
|                                                                                             |    | U/S DATA              | STATION  | INVERT   | SECT |      |          |       |         |       |
|                                                                                             |    |                       | 2694.500 | 2706.370 | 3    |      |          |       |         |       |
| WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS |    |                       |          |          |      |      |          |       |         |       |
| ELEMENT NO                                                                                  | 21 | IS A REACH            | *        | *        | *    |      |          |       |         |       |
|                                                                                             |    | U/S DATA              | STATION  | INVERT   | SECT | N    | RADIUS   | ANGLE | ANG PT  | MAN H |
|                                                                                             |    |                       | 2725.020 | 2706.980 | 42   | .013 | .000     | .000  | .000    | 0     |
| ELEMENT NO                                                                                  | 22 | IS A SYSTEM HEADWORKS | *        |          | *    |      |          |       |         |       |
|                                                                                             |    | U/S DATA              | STATION  | INVERT   | SECT |      | W S ELEV |       |         |       |
|                                                                                             |    |                       | 2725.020 | 2706.980 | 42   |      | .000     |       |         |       |

FILE: NCR1.WSW

W S P G W - CIVILDESIGN Version 14.08  
Program Package Serial Number: 7189

PAGE 1

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

Date: 4-30-2019 Time: 2:54:38

| Station        | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt/ I.D. | ZL  | No Wth Prs/Pip |
|----------------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|---------------|-----|----------------|
| L/Elem         | Ch Slope    |            |            |         |           | SF Ave   | HF             | SE Dpth    | Froude N       | Norm Dp        | "N"            | X-Fall        | ZR  | Type Ch        |
| 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    | 5.790      | 2689.660   | 150.00  | 7.64      | .91      | 2690.57        | .00        | 3.51           | .00            | 5.000          | .000          | .00 | 1 .0           |
| JUNCT STR      | .0000       |            |            |         |           | .0052    | .00            | 5.79       | .00            |                | .013           | .00           | .00 | PIPE           |
| 1122.450       | 2685.370    | 4.649      | 2690.019   | 85.00   | 8.83      | 1.21     | 2691.23        | .00        | 2.87           | .00            | 3.500          | .000          | .00 | 1 .0           |
| 114.193        | .0160       |            |            |         |           | .0071    | .82            | 4.65       | .00            | 2.09           | .013           | .00           | .00 | PIPE           |
| 1236.643       | 2687.199    | 3.711      | 2690.910   | 85.00   | 8.83      | 1.21     | 2692.12        | .00        | 2.87           | .00            | 3.500          | .000          | .00 | 1 .0           |
| HYDRAULIC JUMP |             |            |            |         |           |          |                |            |                |                |                |               |     |                |
| 1236.643       | 2687.199    | 2.134      | 2689.333   | 85.00   | 13.83     | 2.97     | 2692.30        | .00        | 2.87           | 3.41           | 3.500          | .000          | .00 | 1 .0           |
| 24.427         | .0160       |            |            |         |           | .0150    | .37            | 2.13       | 1.82           | 2.09           | .013           | .00           | .00 | PIPE           |
| 1261.070       | 2687.590    | 2.142      | 2689.731   | 85.00   | 13.78     | 2.95     | 2692.68        | .00        | 2.87           | 3.41           | 3.500          | .000          | .00 | 1 .0           |
| 55.046         | .0160       |            |            |         |           | .0145    | .80            | 2.14       | 1.81           | 2.09           | .013           | .00           | .00 | PIPE           |

FILE: NCR1.WSW

W S P G W - CIVILDESIGN Version 14.08

PAGE 2

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

Date: 4-30-2019 Time: 2:54:38

| Station  | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt/ I.D. | ZL  | No Wth Prs/Pip |
|----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|---------------|-----|----------------|
| L/Elem   | Ch Slope    |            |            |         |           | SF Ave   | HF             | SE Dpth    | Froude N       | Norm Dp        | "N"            | X-Fall        | ZR  | Type Ch        |
| 1316.116 | 2688.471    | 2.179      | 2690.650   | 85.00   | 13.50     | 2.83     | 2693.48        | .00        | 2.87           | 3.39           | 3.500          | .000          | .00 | 1 .0           |
| 62.334   | .0160       |            |            |         |           | .0133    | .83            | 2.18       | 1.75           | 2.09           | .013           | .00           | .00 | PIPE           |
| 1378.450 | 2689.468    | 2.271      | 2691.739   | 85.00   | 12.87     | 2.57     | 2694.31        | .00        | 2.87           | 3.34           | 3.500          | .000          | .00 | 1 .0           |
| 32.828   | .0160       |            |            |         |           | .0118    | .39            | 2.27       | 1.61           | 2.09           | .013           | .00           | .00 | PIPE           |
| 1411.278 | 2689.994    | 2.368      | 2692.362   | 85.00   | 12.27     | 2.34     | 2694.70        | .00        | 2.87           | 3.27           | 3.500          | .000          | .00 | 1 .0           |
| 19.772   | .0160       |            |            |         |           | .0105    | .21            | 2.37       | 1.49           | 2.09           | .013           | .00           | .00 | PIPE           |
| 1431.050 | 2690.310    | 2.473      | 2692.783   | 85.00   | 11.70     | 2.12     | 2694.91        | .00        | 2.87           | 3.19           | 3.500          | .000          | .00 | 1 .0           |
| 2.842    | .0099       |            |            |         |           | .0099    | .03            | 2.47       | 1.37           | 2.47           | .013           | .00           | .00 | PIPE           |
| 1433.892 | 2690.338    | 2.473      | 2692.811   | 85.00   | 11.70     | 2.12     | 2694.94        | .00        | 2.87           | 3.19           | 3.500          | .000          | .00 | 1 .0           |
| 167.138  | .0099       |            |            |         |           | .0100    | 1.67           | 2.47       | 1.37           | 2.47           | .013           | .00           | .00 | PIPE           |
| 1601.030 | 2692.000    | 2.467      | 2694.467   | 85.00   | 11.73     | 2.14     | 2696.60        | .00        | 2.87           | 3.19           | 3.500          | .000          | .00 | 1 .0           |
| 169.980  | .0100       |            |            |         |           | .0100    | 1.70           | 2.47       | 1.37           | 2.47           | .013           | .00           | .00 | PIPE           |
| 1771.010 | 2693.700    | 2.467      | 2696.167   | 85.00   | 11.73     | 2.14     | 2698.30        | .00        | 2.87           | 3.19           | 3.500          | .000          | .00 | 1 .0           |
| 169.980  | .0100       |            |            |         |           | .0101    | 1.72           | 2.47       | 1.37           | 2.47           | .013           | .00           | .00 | PIPE           |

NCR1.OUT

|          |          |       |          |       |       |       |         |      |      |      |       |      |     |      |    |
|----------|----------|-------|----------|-------|-------|-------|---------|------|------|------|-------|------|-----|------|----|
| 1940.990 | 2695.400 | 2.447 | 2697.846 | 85.00 | 11.83 | 2.17  | 2700.02 | .00  | 2.87 | 3.21 | 3.500 | .000 | .00 | 1    | .0 |
| -        | -        | -     | -        | -     | -     | -     | -       | -    | -    | -    | -     | -    | -   | -    | -  |
| 59.495   | .0100    |       |          |       |       | .0103 | .61     | 2.45 | 1.39 | 2.47 | .013  | .00  | .00 | PIPE |    |
| 2000.485 | 2695.995 | 2.426 | 2698.421 | 85.00 | 11.94 | 2.21  | 2700.64 | .00  | 2.87 | 3.23 | 3.500 | .000 | .00 | 1    | .0 |
| -        | -        | -     | -        | -     | -     | -     | -       | -    | -    | -    | -     | -    | -   | -    | -  |
| 110.485  | .0100    |       |          |       |       | .0111 | 1.23    | 2.43 | 1.42 | 2.47 | .013  | .00  | .00 | PIPE |    |

FILE: NCR1.WSW      W S P G W - CIVILDESIGN Version 14.08      PAGE 3  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING      Date: 4-30-2019      Time: 2:54:38  
 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        |
| *****    | *****       | *****      | *****      | *****   | *****     | *****    | *****          | *****      | *****          | *****          | *****          | *****           | ***** | *****          |
| 2110.970 | 2697.100    | 2.325      | 2699.425   | 85.00   | 12.53     | 2.44     | 2701.86        | .00        | 2.87           | 3.31           | 3.500          | .000            | .00   | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |
| 58.310   | .0100       |            |            |         |           | .0124    | .73            | 2.32       | 1.54           | 2.47           | .013           | .00             | .00   | PIPE           |
| 2169.279 | 2697.683    | 2.234      | 2699.917   | 85.00   | 13.11     | 2.67     | 2702.59        | .00        | 2.87           | 3.36           | 3.500          | .000            | .00   | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |
| 44.543   | .0100       |            |            |         |           | .0140    | .62            | 2.23       | 1.66           | 2.47           | .013           | .00             | .00   | PIPE           |
| 2213.822 | 2698.128    | 2.145      | 2700.273   | 85.00   | 13.75     | 2.94     | 2703.21        | .00        | 2.87           | 3.41           | 3.500          | .000            | .00   | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |
| 36.186   | .0100       |            |            |         |           | .0158    | .57            | 2.14       | 1.80           | 2.47           | .013           | .00             | .00   | PIPE           |
| 2250.008 | 2698.490    | 2.061      | 2700.551   | 85.00   | 14.42     | 3.23     | 2703.78        | .00        | 2.87           | 3.44           | 3.500          | .000            | .00   | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |
| 31.012   | .0100       |            |            |         |           | .0179    | .55            | 2.06       | 1.94           | 2.47           | .013           | .00             | .00   | PIPE           |
| 2281.020 | 2698.800    | 1.982      | 2700.781   | 85.00   | 15.13     | 3.55     | 2704.34        | .00        | 2.87           | 3.47           | 3.500          | .000            | .00   | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |
| 100.159  | .0100       |            |            |         |           | .0197    | 1.98           | 1.98       | 2.09           | 2.01           | .013           | .00             | .00   | PIPE           |
| 2381.179 | 2700.605    | 1.934      | 2702.539   | 85.00   | 15.59     | 3.77     | 2706.31        | .00        | 2.87           | 3.48           | 3.500          | .000            | .00   | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |
| 79.269   | .0100       |            |            |         |           | .0219    | 1.73           | 1.93       | 2.19           | 2.01           | .013           | .00             | .00   | PIPE           |
| 2460.448 | 2702.034    | 1.861      | 2703.896   | 85.00   | 16.35     | 4.15     | 2708.05        | .00        | 2.87           | 3.49           | 3.500          | .000            | .00   | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |
| 51.079   | .0100       |            |            |         |           | .0248    | 1.27           | 1.86       | 2.36           | 2.01           | .013           | .00             | .00   | PIPE           |
| 2511.526 | 2702.955    | 1.792      | 2704.747   | 85.00   | 17.15     | 4.57     | 2709.31        | .00        | 2.87           | 3.50           | 3.500          | .000            | .00   | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |
| 38.612   | .0100       |            |            |         |           | .0281    | 1.09           | 1.79       | 2.54           | 2.01           | .013           | .00             | .00   | PIPE           |
| 2550.138 | 2703.651    | 1.726      | 2705.377   | 85.00   | 17.98     | 5.02     | 2710.40        | .00        | 2.87           | 3.50           | 3.500          | .000            | .00   | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |
| 31.514   | .0100       |            |            |         |           | .0320    | 1.01           | 1.73       | 2.73           | 2.01           | .013           | .00             | .00   | PIPE           |

FILE: NCR1.WSW      W S P G W - CIVILDESIGN Version 14.08      PAGE 4  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING      Date: 4-30-2019      Time: 2:54:38  
 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        |
| *****    | *****       | *****      | *****      | *****   | *****     | *****    | *****          | *****      | *****          | *****          | *****          | *****           | ***** | *****          |
| 2581.652 | 2704.219    | 1.663      | 2705.882   | 85.00   | 18.86     | 5.52     | 2711.41        | .00        | 2.87           | 3.50           | 3.500          | .000            | .00   | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |
| 26.898   | .0100       |            |            |         |           | .0363    | .98            | 1.66       | 2.93           | 2.01           | .013           | .00             | .00   | PIPE           |
| 2608.551 | 2704.704    | 1.603      | 2706.307   | 85.00   | 19.78     | 6.08     | 2712.38        | .00        | 2.87           | 3.49           | 3.500          | .000            | .00   | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |
| 23.619   | .0100       |            |            |         |           | .0413    | .98            | 1.60       | 3.14           | 2.01           | .013           | .00             | .00   | PIPE           |
| 2632.170 | 2705.130    | 1.546      | 2706.676   | 85.00   | 20.75     | 6.68     | 2713.36        | .00        | 2.87           | 3.48           | 3.500          | .000            | .00   | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |
| 17.755   | .0199       |            |            |         |           | .0463    | .82            | 1.55       | 3.37           | 1.95           | .013           | .00             | .00   | PIPE           |
| 2649.925 | 2705.483    | 1.502      | 2706.986   | 85.00   | 21.53     | 7.20     | 2714.19        | .00        | 2.87           | 3.46           | 3.500          | .000            | .00   | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |
| 20.750   | .0199       |            |            |         |           | .0520    | 1.08           | 1.50       | 3.56           | 1.95           | .013           | .00             | .00   | PIPE           |
| 2670.675 | 2705.896    | 1.449      | 2707.345   | 85.00   | 22.59     | 7.92     | 2715.27        | .00        | 2.87           | 3.45           | 3.500          | .000            | .00   | 1 .0           |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |
| 18.825   | .0199       |            |            |         |           | .0593    | 1.12           | 1.45       | 3.81           | 1.95           | .013           | .00             | .00   | PIPE           |
| 2689.500 | 2706.270    | 1.399      | 2707.669   | 85.00   | 8.10      | 1.02     | 2708.69        | .00        | 1.59           | 7.50           | 12.000         | 7.500           | .00   | 0 .0           |



NCR1.OUT

|           |          |       |          |       |      |     |         |     |      |      |        |       |     |     |     |
|-----------|----------|-------|----------|-------|------|-----|---------|-----|------|------|--------|-------|-----|-----|-----|
| 1.082     | .0200    | - -   | - -      | - -   | - -  | - - | .0047   | .01 | 1.40 | 1.21 | .88    | .013  | .00 | .00 | BOX |
| 2690.582  | 2706.292 | 1.441 | 2707.733 | 85.00 | 7.87 | .96 | 2708.69 | .00 | 1.59 | 7.50 | 12.000 | 7.500 | .00 | 0   | .0  |
| 1.074     | .0200    | - -   | - -      | - -   | - -  | - - | .0042   | .00 | 1.44 | 1.15 | .88    | .013  | .00 | .00 | BOX |
| 2691.656  | 2706.313 | 1.511 | 2707.824 | 85.00 | 7.50 | .87 | 2708.70 | .00 | 1.59 | 7.50 | 12.000 | 7.500 | .00 | 0   | .0  |
| .344      | .0200    | - -   | - -      | - -   | - -  | - - | .0036   | .00 | 1.51 | 1.08 | .88    | .013  | .00 | .00 | BOX |
| 2692.000  | 2706.320 | 1.586 | 2707.906 | 85.00 | 7.15 | .79 | 2708.70 | .00 | 1.59 | 7.50 | 12.000 | 7.500 | .00 | 0   | .0  |
| JUNCT STR | .0000    | - -   | - -      | - -   | - -  | - - | .0026   | .00 | 1.59 | 1.00 | .013   | .00   | .00 | BOX |     |

FILE: NCR1.WSW      W S P G W - CIVILDESIGN Version 14.08      PAGE 5  
 Program Package Serial Number: 7189

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

Date: 4-30-2019 Time: 2:54:38

| Station   | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt I.D. | ZL    | No Wth Prs/Pip |
|-----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|--------------|-------|----------------|
| L/Elem    | Ch Slope    |            |            |         |           | SF Ave   | HF             | SE Dpth    | Froude N       | Norm Dp        | "N"            | X-Fall       | ZR    | Type Ch        |
| *****     | *****       | *****      | *****      | *****   | *****     | *****    | *****          | *****      | *****          | *****          | *****          | *****        | ***** | *****          |
| 2692.000  | 2706.320    | 1.916      | 2708.236   | 82.00   | 5.71      | .51      | 2708.74        | .00        | 1.55           | 7.50           | 12.000         | 7.500        | .00   | 0 .0           |
| 2.134     | .0200       | - -        | - -        | - -     | - -       | .0020    | .00            | 1.92       | .73            | .86            | .013           | .00          | .00   | BOX            |
| 2694.134  | 2706.363    | 1.826      | 2708.189   | 82.00   | 5.99      | .56      | 2708.75        | .00        | 1.55           | 7.50           | 12.000         | 7.500        | .00   | 0 .0           |
| .366      | .0200       | - -        | - -        | - -     | - -       | .0021    | .00            | 1.83       | .78            | .86            | .013           | .00          | .00   | BOX            |
| 2694.500  | 2706.370    | 1.809      | 2708.180   | 82.00   | 6.04      | .57      | 2708.75        | .00        | 1.55           | 7.50           | 12.000         | 7.500        | .00   | 0 .0           |
| WALL EXIT | - -         | - -        | - -        | - -     | - -       | - -      | - -            | - -        | - -            | - -            | - -            | - -          | - -   | -              |
| 2694.500  | 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           |
| 2694.500  | 2706.370    | 2.284      | 2708.654   | 82.00   | 12.33     | 2.36     | 2711.02        | .00        | 2.83           | 3.33           | 3.500          | .000         | .00   | 1 .0           |
| 9.471     | .0200       | - -        | - -        | - -     | - -       | .0110    | .10            | 2.28       | 1.54           | 1.91           | .013           | .00          | .00   | PIPE           |
| 2703.971  | 2706.559    | 2.352      | 2708.911   | 82.00   | 11.93     | 2.21     | 2711.12        | .00        | 2.83           | 3.29           | 3.500          | .000         | .00   | 1 .0           |
| 9.757     | .0200       | - -        | - -        | - -     | - -       | .0100    | .10            | 2.35       | 1.45           | 1.91           | .013           | .00          | .00   | PIPE           |
| 2713.728  | 2706.754    | 2.455      | 2709.210   | 82.00   | 11.37     | 2.01     | 2711.22        | .00        | 2.83           | 3.20           | 3.500          | .000         | .00   | 1 .0           |
| 6.407     | .0200       | - -        | - -        | - -     | - -       | .0089    | .06            | 2.46       | 1.34           | 1.91           | .013           | .00          | .00   | PIPE           |
| 2720.135  | 2706.882    | 2.567      | 2709.449   | 82.00   | 10.84     | 1.83     | 2711.27        | .00        | 2.83           | 3.10           | 3.500          | .000         | .00   | 1 .0           |
| 3.667     | .0200       | - -        | - -        | - -     | - -       | .0080    | .03            | 2.57       | 1.22           | 1.91           | .013           | .00          | .00   | PIPE           |
| 2723.802  | 2706.956    | 2.689      | 2709.645   | 82.00   | 10.34     | 1.66     | 2711.30        | .00        | 2.83           | 2.95           | 3.500          | .000         | .00   | 1 .0           |
| 1.218     | .0200       | - -        | - -        | - -     | - -       | .0072    | .01            | 2.69       | 1.11           | 1.91           | .013           | .00          | .00   | PIPE           |
| 2725.020  | 2706.980    | 2.825      | 2709.805   | 82.00   | 9.85      | 1.51     | 2711.31        | .00        | 2.83           | 2.76           | 3.500          | .000         | .00   | 1 .0           |
| - -       | - -         | - -        | - -        | - -     | - -       | - -      | - -            | - -        | - -            | - -            | - -            | - -          | - -   | -              |

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 |
| 1018.96 | .I | C | H | W | E | . | R |
| 1037.91 | .I | C | H | W | E | . | R |
| 1056.87 | .  |   |   |   |   | . |   |

## NCR1.OUT

|         |   |   |   |   |   |   |   |    |
|---------|---|---|---|---|---|---|---|----|
| 1075.83 | . | I | C | H | W | E | . | R  |
| 1094.78 | . |   |   |   |   |   | . |    |
| 1113.74 | . |   |   |   |   |   | . |    |
| 1132.69 | . | I | C | H | W | E | . | JX |
| 1151.65 | . | I | C | H | W | E | . | R  |
| 1170.61 | . |   |   |   |   |   | . |    |
| 1189.56 | . |   |   |   |   |   | . |    |
| 1208.52 | . |   |   |   |   |   | . |    |
| 1227.48 | . |   |   |   |   |   | . |    |
| 1246.43 | . | I | C | H | W | E | . | R  |
| 1265.39 | . | I | W | C | H | E | . | R  |
| 1284.34 | . | I | W | C | H | E | . | R  |
| 1303.30 | . |   |   |   |   |   | . |    |
| 1322.26 | . | I | W | C | H | E | . | R  |
| 1341.21 | . |   |   |   |   |   | . |    |
| 1360.17 | . |   |   |   |   |   | . |    |
| 1379.13 | . | I | W | C | H | E | . | R  |
| 1398.08 | . |   |   |   |   |   | . |    |
| 1417.04 | . | I | W | C | H | E | . | R  |
| 1435.99 | . | I | W | C | H | E | . | R  |
| 1454.95 | . | I | W | C | H | E | . | R  |
| 1473.91 | . |   |   |   |   |   | . |    |
| 1492.86 | . |   |   |   |   |   | . |    |
| 1511.82 | . |   |   |   |   |   | . |    |
| 1530.78 | . |   |   |   |   |   | . |    |
| 1549.73 | . |   |   |   |   |   | . |    |
| 1568.69 | . |   |   |   |   |   | . |    |
| 1587.64 | . |   |   |   |   |   | . |    |
| 1606.60 | . | I | W | C | H | E | . | R  |

|         |   |           |     |
|---------|---|-----------|-----|
| 1625.56 | . |           | .   |
| 1644.51 | . |           | .   |
| 1663.47 | . |           | .   |
| 1682.43 | . |           | .   |
| 1701.38 | . |           | .   |
| 1720.34 | . |           | .   |
| 1739.29 | . |           | .   |
| 1758.25 | . |           | .   |
| 1777.21 | . | I W C H E | . R |
| 1796.16 | . |           | .   |
| 1815.12 | . |           | .   |
| 1834.08 | . |           | .   |
| 1853.03 | . |           | .   |
| 1871.99 | . |           | .   |
| 1890.94 | . |           | .   |
| 1909.90 | . |           | .   |
| 1928.86 | . |           | .   |
| 1947.81 | . | I W C H E | . R |
| 1966.77 | . |           | .   |
| 1985.73 | . |           | .   |
| 2004.68 | . | I W C H E | . R |
| 2023.64 | . |           | .   |
| 2042.59 | . |           | .   |
| 2061.55 | . |           | .   |
| 2080.51 | . |           | .   |
| 2099.46 | . |           | .   |
| 2118.42 | . | I W C H E | . R |
| 2137.38 | . |           | .   |
| 2156.33 | . |           | .   |
| 2175.29 | . | I W C H E | . R |



## NCR1.OUT

[illegible]

2681.640 2685.313 2688.986 2692.659 2696.332 2700.005 2703.678 2707.352 2711.025 2714.698 2718.370

Page 6

NCR1.OUT

# 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 <sub>100</sub> (cfs) | WSE (ft) | Velocity (ft/s) | FG Elevation | Facility Description                   | HGL Check <sup>1</sup> |
|--------------|------------------------|----------------------------|------------------------|-----------------------|-----------------------|------------------------|----------|-----------------|--------------|----------------------------------------|------------------------|
| 1000.00      | NCR: EST1912           | 14+08.84                   | P-5                    | 60" RCP               | 2712.06               | 120.00                 | 2713.77  | 20.19           | 2720.00      | Headwall Outwall                       | OK                     |
| 1094.40      |                        | 14+51.                     |                        | 10' x 11' RCB         | 2713.41               | 120.00                 | 2714.90  | 8.06            | 2724.17      | Wall Entrance                          | OK                     |
| 1094.40      |                        |                            |                        | 10' x 11' RCB         | 2713.41               | 120.00                 | 2714.90  | 8.06            | 2724.17      | Junction with NC1b Drop Inlet Facility | OK                     |
| 1096.90      |                        |                            |                        | 10' x 11' RCB         | 2713.45               | 120.00                 | 2715.10  | 7.28            | 2724.17      |                                        | OK                     |
| 1096.90      |                        |                            |                        | 10' x 11' RCB         | 2713.45               | 117.50                 | 2715.36  | 6.14            | 2724.17      |                                        | OK                     |
| 1099.40      |                        |                            |                        |                       | 2713.49               | 117.50                 | 2715.31  | 6.46            | 2724.17      | OK                                     |                        |
| 1099.40      |                        |                            |                        |                       | 2713.49               | 117.50                 | 2715.31  | 6.46            | 2724.17      | Wall Exit                              | OK                     |
| 1119.05      |                        | 16+52.1                    | P-1                    | 60" RCP               | 2713.78               | 117.50                 | 2716.88  | 9.20            | 2724.90      | Junction with NC1a Drop Inlet Facility | OK                     |
| 1119.05      |                        |                            |                        | 60" RCP               | 2713.78               | 115.00                 | 2717.29  | 7.81            | 2724.90      |                                        | OK                     |
| 1309.38      |                        |                            |                        | 60" RCP               | 2714.73               | 115.00                 | 2717.18  | 12.03           | 2726.49      |                                        | OK                     |
| 1423.31      |                        | 16+93.03                   | P-5                    |                       | 2715.87               | 115.00                 | 2718.93  | 9.13            | 2720.00      | Addition of Flow from Basin EAA1       | OK                     |
| 1423.31      |                        |                            |                        |                       | 2715.87               | 115.00                 | 2718.93  | 9.13            | 2720.00      |                                        | OK                     |



NCR2.WSW

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 | 1000.0002712.060 | 60    |       |         |        | 2717.060 |       |      |
| R  | 1094.4002713.414 | 60    |       | .013    |        |          |       |      |
| WE | 1094.4002713.414 | 60    |       | .013    |        |          |       |      |
| R  | 1096.9002713.450 | 5     |       | .013    |        |          |       |      |
| JX | 1096.9002713.450 | 5 5   |       | .013    | 2.5    | 2713.450 | 90.0  |      |
| R  | 1099.4002713.487 | 5     |       | .013    |        |          |       |      |
| WX | 1099.4002713.487 | 5     |       | .013    |        |          |       |      |
| R  | 1119.0502713.780 | 60    |       | .013    |        |          | -62.0 | 1    |
| JX | 1119.0502713.780 | 60 18 |       | .013    | 2.5    | 2717.280 | 42.0  |      |
| R  | 1309.3802714.730 | 60    |       | .013    |        |          | 66.0  | 1    |
| R  | 1423.3102715.870 | 60    |       | .013    |        |          |       |      |
| SH | 1423.3102715.870 | 60    |       |         |        |          |       |      |
| CD | 5                | 3 0   | 0.000 | 11.000  | 10.000 | 0.000    | 0.000 | 0.00 |
| CD | 18               | 4 1   | 0.000 | 1.500   | 0.000  | 0.000    | 0.000 | 0.00 |
| CD | 24               | 4 1   | 0.000 | 2.000   | 0.000  | 0.000    | 0.000 | 0.00 |
| CD | 30               | 4 1   | 0.000 | 2.500   | 0.000  | 0.000    | 0.000 | 0.00 |
| CD | 36               | 4 1   | 0.000 | 3.000   | 0.000  | 0.000    | 0.000 | 0.00 |
| CD | 42               | 4 1   | 0.000 | 3.500   | 0.000  | 0.000    | 0.000 | 0.00 |
| CD | 48               | 4 1   | 0.000 | 4.000   | 0.000  | 0.000    | 0.000 | 0.00 |
| CD | 54               | 4 1   | 0.000 | 4.500   | 0.000  | 0.000    | 0.000 | 0.00 |
| CD | 60               | 4 1   | 0.000 | 5.000   | 0.000  | 0.000    | 0.000 | 0.00 |
| CD | 66               | 4 1   | 0.000 | 5.500   | 0.000  | 0.000    | 0.000 | 0.00 |
| CD | 72               | 4 1   | 0.000 | 6.000   | 0.000  | 0.000    | 0.000 | 0.00 |
| Q  |                  |       |       | 115.000 |        |          |       |      |

FILE: NCR2.WSW

NCR2.EDT

W S P G W - EDIT LISTING - Version 14.10

Date: 5- 5-2019 Time:12:46:16

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

| CARD CODE | SECT NO | CHN TYPE | NO OF PIER/PIP | AVE WIDTH | PIER WIDTH | HEIGHT 1 BASE DIAMETER | W S P G W | 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      | 11.000     | 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                                                                                              | IS A | SYSTEM OUTLET | STATION  | INVERT   | SECT | W S ELEV | RADIUS | ANGLE | ANG PT  | MAN H |
|---------------------------------------------------------------------------------------------------------|------|---------------|----------|----------|------|----------|--------|-------|---------|-------|
| ELEMENT NO 1                                                                                            | IS A | SYSTEM OUTLET | 1000.000 | 2712.060 | 60   | 2717.060 |        |       |         |       |
| ELEMENT NO 2                                                                                            | IS A | REACH         | 1094.400 | 2713.414 | 60   |          | .000   | .000  | .000    | 0     |
| ELEMENT NO 3                                                                                            | IS A | WALL ENTRANCE | 1094.400 | 2713.414 | 60   |          |        |       |         |       |
| WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS             |      |               |          |          |      |          |        |       |         |       |
| ELEMENT NO 4                                                                                            | IS A | REACH         | 1096.900 | 2713.450 | 5    |          | .000   | .000  | .000    | 0     |
| ELEMENT NO 5                                                                                            | IS A | JUNCTION      | 1096.900 | 2713.450 | 5    |          |        |       |         |       |
| THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING |      |               |          |          |      |          |        |       |         |       |
| THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING |      |               |          |          |      |          |        |       |         |       |
| ELEMENT NO 6                                                                                            | IS A | REACH         | 1099.400 | 2713.487 | 5    |          | .000   | .000  | .000    | 0     |
| ELEMENT NO 7                                                                                            | IS A | WALL EXIT     | 1099.400 | 2713.487 | 5    |          |        |       |         |       |
| WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS             |      |               |          |          |      |          |        |       |         |       |
| ELEMENT NO 8                                                                                            | IS A | REACH         | 1119.050 | 2713.780 | 60   |          | .000   | .000  | -62.000 | 1     |
| ELEMENT NO 9                                                                                            | IS A | JUNCTION      | 1119.050 | 2713.780 | 60   |          |        |       |         |       |
| THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING |      |               |          |          |      |          |        |       |         |       |
| THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING |      |               |          |          |      |          |        |       |         |       |

W S P G W

PAGE NO 3

WATER SURFACE PROFILE - ELEMENT CARD LISTING

| ELEMENT NO    | IS A | SYSTEM HEADWORKS | STATION  | INVERT   | SECT | W S ELEV | RADIUS | ANGLE | ANG PT | MAN H |
|---------------|------|------------------|----------|----------|------|----------|--------|-------|--------|-------|
| ELEMENT NO 10 | IS A | REACH            | 1309.380 | 2714.730 | 60   |          | .000   | .000  | 66.000 | 1     |
| ELEMENT NO 11 | IS A | REACH            | 1423.310 | 2715.870 | 60   |          | .000   | .000  | .000   | 0     |
| ELEMENT NO 12 | IS A | SYSTEM HEADWORKS | 1423.310 | 2715.870 | 60   |          |        |       |        |       |

WATER SURFACE PROFILE LISTING  
EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
NORTHERN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR2)  
FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2 (PROPOSED FLOW)

Date: 5- 5-2019 Time:12:46:21

| 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  | 2712.060    | 1.712      | 2713.772   | 120.00  | 20.19     | 6.33     | 2720.10        | .00        | 3.13           | 4.75           | 5.000          | .000            | .00 | 1 .0           |
| 1.342     | .0143       |            |            |         |           | .0335    | .04            | 1.71       | 3.18           | 2.15           | .013           | .00             | .00 | PIPE           |
| 1001.342  | 2712.079    | 1.709      | 2713.788   | 120.00  | 20.24     | 6.36     | 2720.15        | .00        | 3.13           | 4.74           | 5.000          | .000            | .00 | 1 .0           |
| 26.709    | .0143       |            |            |         |           | .0360    | .96            | 1.71       | 3.19           | 2.15           | .013           | .00             | .00 | PIPE           |
| 1028.050  | 2712.462    | 1.650      | 2714.113   | 120.00  | 21.23     | 7.00     | 2721.11        | .00        | 3.13           | 4.70           | 5.000          | .000            | .00 | 1 .0           |
| 24.085    | .0143       |            |            |         |           | .0411    | .99            | 1.65       | 3.41           | 2.15           | .013           | .00             | .00 | PIPE           |
| 1052.135  | 2712.808    | 1.594      | 2714.402   | 120.00  | 22.27     | 7.70     | 2722.10        | .00        | 3.13           | 4.66           | 5.000          | .000            | .00 | 1 .0           |
| 21.992    | .0143       |            |            |         |           | .0469    | 1.03           | 1.59       | 3.65           | 2.15           | .013           | .00             | .00 | PIPE           |
| 1074.127  | 2713.123    | 1.540      | 2714.663   | 120.00  | 23.35     | 8.47     | 2723.13        | .00        | 3.13           | 4.62           | 5.000          | .000            | .00 | 1 .0           |
| 20.273    | .0143       |            |            |         |           | .0536    | 1.09           | 1.54       | 3.90           | 2.15           | .013           | .00             | .00 | PIPE           |
| 1094.400  | 2713.414    | 1.488      | 2714.902   | 120.00  | 8.06      | 1.01     | 2715.91        | .00        | 1.65           | 10.00          | 11.000         | 10.000          | .00 | 0 .0           |
| .300      | .0144       |            |            |         |           | .0041    | .00            | 1.49       | 1.16           | .99            | .013           | .00             | .00 | BOX            |
| 1094.700  | 2713.418    | 1.497      | 2714.915   | 120.00  | 8.02      | 1.00     | 2715.91        | .00        | 1.65           | 10.00          | 11.000         | 10.000          | .00 | 0 .0           |
| 1.672     | .0144       |            |            |         |           | .0038    | .01            | 1.50       | 1.15           | .99            | .013           | .00             | .00 | BOX            |
| 1096.372  | 2713.442    | 1.570      | 2715.012   | 120.00  | 7.64      | .91      | 2715.92        | .00        | 1.65           | 10.00          | 11.000         | 10.000          | .00 | 0 .0           |
| .528      | .0144       |            |            |         |           | .0033    | .00            | 1.57       | 1.08           | .99            | .013           | .00             | .00 | BOX            |
| 1096.900  | 2713.450    | 1.648      | 2715.098   | 120.00  | 7.28      | .82      | 2715.92        | .00        | 1.65           | 10.00          | 11.000         | 10.000          | .00 | 0 .0           |
| JUNCT STR | .0000       |            |            |         |           | .0025    | .00            | 1.65       | 1.00           |                | .013           | .00             | .00 | BOX            |

WATER SURFACE PROFILE LISTING  
EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
NORTHERN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR2)  
FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2 (PROPOSED FLOW)

Date: 5- 5-2019 Time:12:46:21

| 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        |
| 1096.900  | 2713.450    | 1.913      | 2715.363   | 117.50  | 6.14      | .59      | 2715.95        | .00        | 1.62           | 10.00          | 11.000         | 10.000          | .00 | 0 .0           |
| 2.375     | .0148       |            |            |         |           | .0020    | .00            | 1.91       | .78            | .97            | .013           | .00             | .00 | BOX            |
| 1099.275  | 2713.485    | 1.824      | 2715.309   | 117.50  | 6.44      | .64      | 2715.95        | .00        | 1.62           | 10.00          | 11.000         | 10.000          | .00 | 0 .0           |
| .125      | .0148       |            |            |         |           | .0022    | .00            | 1.82       | .84            | .97            | .013           | .00             | .00 | BOX            |
| 1099.400  | 2713.487    | 1.819      | 2715.306   | 117.50  | 6.46      | .65      | 2715.95        | .00        | 1.62           | 10.00          | 11.000         | 10.000          | .00 | 0 .0           |
| WALL EXIT |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |
| 1099.400  | 2713.487    | 1.819      | 2715.306   | 117.50  | 6.46      | .65      | 2715.95        | .00        | 1.62           | 10.00          | 11.000         | 10.000          | .00 | 0 .0           |
| 1099.400  | 2713.487    | 2.628      | 2716.115   | 117.50  | 11.23     | 1.96     | 2718.07        | .00        | 3.10           | 4.99           | 5.000          | .000            | .00 | 1 .0           |
| 1.913     | .0149       |            |            |         |           | .0068    | .01            | 2.63       | 1.37           | 2.10           | .013           | .00             | .00 | PIPE           |
| 1101.313  | 2713.515    | 2.646      | 2716.162   | 117.50  | 11.14     | 1.93     | 2718.09        | .00        | 3.10           | 4.99           | 5.000          | .000            | .00 | 1 .0           |
| 8.380     | .0149       |            |            |         |           | .0063    | .05            | 2.65       | 1.35           | 2.10           | .013           | .00             | .00 | PIPE           |
| 1109.693  | 2713.640    | 2.750      | 2716.390   | 117.50  | 10.62     | 1.75     | 2718.14        | .00        | 3.10           | 4.98           | 5.000          | .000            | .00 | 1 .0           |
| 5.412     | .0149       |            |            |         |           | .0056    | .03            | 2.75       | 1.26           | 2.10           | .013           | .00             | .00 | PIPE           |
| 1115.105  | 2713.721    | 2.858      | 2716.580   | 117.50  | 10.13     | 1.59     | 2718.17        | .00        | 3.10           | 4.95           | 5.000          | .000            | .00 | 1 .0           |



NCR2.OUT

| Station   | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt or I.D. | ZL  | No Wth Prs/Pip |
|-----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|-----------------|-----|----------------|
| 3.005     | .0149       |            |            |         |           | .0049    | .01            | 2.86       | 1.17           | 2.10           | .013           | .00             | .00 | PIPE           |
| 1118.110  | 2713.766    | 2.973      | 2716.739   | 117.50  | 9.66      | 1.45     | 2718.19        | .00        | 3.10           | 4.91           | 5.000          | .000            | .00 | 1 .0           |
| .940      | .0149       |            |            |         |           | .0044    | .00            | 2.97       | 1.08           | 2.10           | .013           | .00             | .00 | PIPE           |
| 1119.050  | 2713.780    | 3.096      | 2716.876   | 117.50  | 9.20      | 1.32     | 2718.19        | .00        | 3.10           | 4.86           | 5.000          | .000            | .00 | 1 .0           |
| JUNCT STR | .0000       |            |            |         |           | .0034    | .00            | 3.10       | 1.00           |                | .013           | .00             | .00 | PIPE           |

W S P G W - CIVILDESIGN Version 14.08  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING  
 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
 NORTHERN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR2)  
 FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2 (PROPOSED FLOW)  
 Date: 5- 5-2019 Time:12:46:21  
 PAGE 3

\*\*\*\*\*

| 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 |
|----------------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|-----------------|-----|----------------|
| 1119.050       | 2713.780    | 3.509      | 2717.290   | 115.00  | 7.81      | .95      | 2718.24        | .00        | 3.06           | 4.57           | 5.000          | .000            | .00 | 1 .0           |
| 23.542         | .0050       |            |            |         |           | .0029    | .07            | 3.51       | .77            | 2.86           | .013           | .00             | .00 | PIPE           |
| 1142.592       | 2713.897    | 3.377      | 2717.274   | 115.00  | 8.15      | 1.03     | 2718.31        | .00        | 3.06           | 4.68           | 5.000          | .000            | .00 | 1 .0           |
| HYDRAULIC JUMP |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |
| 1142.592       | 2713.897    | 2.766      | 2716.663   | 115.00  | 10.32     | 1.65     | 2718.32        | .00        | 3.06           | 4.97           | 5.000          | .000            | .00 | 1 .0           |
| 24.746         | .0050       |            |            |         |           | .0057    | .14            | 2.77       | 1.21           | 2.86           | .013           | .00             | .00 | PIPE           |
| 1167.338       | 2714.021    | 2.742      | 2716.763   | 115.00  | 10.43     | 1.69     | 2718.45        | .00        | 3.06           | 4.98           | 5.000          | .000            | .00 | 1 .0           |
| 58.484         | .0050       |            |            |         |           | .0061    | .36            | 2.74       | 1.23           | 2.86           | .013           | .00             | .00 | PIPE           |
| 1225.822       | 2714.313    | 2.639      | 2716.952   | 115.00  | 10.94     | 1.86     | 2718.81        | .00        | 3.06           | 4.99           | 5.000          | .000            | .00 | 1 .0           |
| 45.083         | .0050       |            |            |         |           | .0069    | .31            | 2.64       | 1.33           | 2.86           | .013           | .00             | .00 | PIPE           |
| 1270.905       | 2714.538    | 2.541      | 2717.079   | 115.00  | 11.47     | 2.04     | 2719.12        | .00        | 3.06           | 5.00           | 5.000          | .000            | .00 | 1 .0           |
| 38.475         | .0050       |            |            |         |           | .0079    | .30            | 2.54       | 1.43           | 2.86           | .013           | .00             | .00 | PIPE           |
| 1309.380       | 2714.730    | 2.448      | 2717.178   | 115.00  | 12.03     | 2.25     | 2719.43        | .00        | 3.06           | 5.00           | 5.000          | .000            | .00 | 1 .0           |
| 44.349         | .0100       |            |            |         |           | .0080    | .35            | 2.45       | 1.53           | 2.33           | .013           | .00             | .00 | PIPE           |
| 1353.729       | 2715.174    | 2.521      | 2717.695   | 115.00  | 11.59     | 2.08     | 2719.78        | .00        | 3.06           | 5.00           | 5.000          | .000            | .00 | 1 .0           |
| 32.154         | .0100       |            |            |         |           | .0071    | .23            | 2.52       | 1.45           | 2.33           | .013           | .00             | .00 | PIPE           |
| 1385.883       | 2715.496    | 2.618      | 2718.114   | 115.00  | 11.05     | 1.90     | 2720.01        | .00        | 3.06           | 4.99           | 5.000          | .000            | .00 | 1 .0           |
| 18.900         | .0100       |            |            |         |           | .0063    | .12            | 2.62       | 1.35           | 2.33           | .013           | .00             | .00 | PIPE           |

W S P G W - CIVILDESIGN Version 14.08  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING  
 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
 NORTHERN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR2)  
 FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2 (PROPOSED FLOW)  
 Date: 5- 5-2019 Time:12:46:21  
 PAGE 4

\*\*\*\*\*

| 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 |
|----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|-----------------|-----|----------------|
| 1404.783 | 2715.685    | 2.720      | 2718.405   | 115.00  | 10.53     | 1.72     | 2720.13        | .00        | 3.06           | 4.98           | 5.000          | .000            | .00 | 1 .0           |
| 11.075   | .0100       |            |            |         |           | .0055    | .06            | 2.72       | 1.25           | 2.33           | .013           | .00             | .00 | PIPE           |
| 1415.859 | 2715.796    | 2.827      | 2718.623   | 115.00  | 10.04     | 1.57     | 2720.19        | .00        | 3.06           | 4.96           | 5.000          | .000            | .00 | 1 .0           |
| 5.733    | .0100       |            |            |         |           | .0049    | .03            | 2.83       | 1.16           | 2.33           | .013           | .00             | .00 | PIPE           |
| 1421.591 | 2715.853    | 2.941      | 2718.793   | 115.00  | 9.58      | 1.42     | 2720.22        | .00        | 3.06           | 4.92           | 5.000          | .000            | .00 | 1 .0           |
| 1.719    | .0100       |            |            |         |           | .0043    | .01            | 2.94       | 1.08           | 2.33           | .013           | .00             | .00 | PIPE           |
| 1423.310 | 2715.870    | 3.061      | 2718.931   | 115.00  | 9.13      | 1.29     | 2720.22        | .00        | 3.06           | 4.87           | 5.000          | .000            | .00 | 1 .0           |

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

NCR2.OUT

NORTHERN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR2)

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

|         |     |                                                            |     |   |   |     |    |
|---------|-----|------------------------------------------------------------|-----|---|---|-----|----|
| 1000.00 | .I  | W                                                          | C   | H | E | .   | R  |
| 1006.72 | .I  | W                                                          | C   | H | E | .   | R  |
| 1013.44 | .   |                                                            |     |   |   | .   |    |
| 1020.16 | .   |                                                            |     |   |   | .   |    |
| 1026.88 | .   |                                                            |     |   |   | .   |    |
| 1033.60 | . I | W                                                          | C   | H | E | .   | R  |
| 1040.32 | .   |                                                            |     |   |   | .   |    |
| 1047.03 | .   |                                                            |     |   |   | .   |    |
| 1053.75 | . I | W                                                          | C   | H | E | .   | R  |
| 1060.47 | .   |                                                            |     |   |   | .   |    |
| 1067.19 | .   |                                                            |     |   |   | .   |    |
| 1073.91 | .   |                                                            |     |   |   | .   |    |
| 1080.63 | . I | W                                                          | C   | H | E | .   | R  |
| 1087.35 | .   |                                                            |     |   |   | .   |    |
| 1094.07 | .   |                                                            |     |   |   | .   |    |
| 1100.79 | . I | W C                                                        | E   |   |   | H . | R  |
| 1107.51 | . I | W C                                                        | E   |   |   | H . | R  |
| 1114.23 | . I | WC                                                         | E   |   |   | H . | R  |
| 1120.95 | . I | W                                                          | E   |   |   | H . | JX |
| 1127.66 | . I | C W                                                        | E   |   |   | H . | R  |
| 1134.38 | . I | C W                                                        | E   |   |   | H . | R  |
| 1141.10 | .   | IYYYYYYYYCYWYYYEYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYH. |     |   |   |     | WX |
| 1147.82 | .   | IYYYYYYYYCYWYYYEYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYH. |     |   |   |     | WX |
| 1154.54 | . I | W C                                                        | E H |   |   | .   | R  |
| 1161.26 | . I | W C                                                        | E H |   |   | .   | R  |
| 1167.98 | . I | W C                                                        | E H |   |   | .   | R  |

|         |   |   |     |     |          |   |    |
|---------|---|---|-----|-----|----------|---|----|
| 1174.70 | . | I | W C | E H | NCR2.OUT | . | R  |
| 1181.42 | . | I | WC  | E H |          | . | R  |
| 1188.14 | . | I | W   | E H |          | . | JX |
| 1194.86 | . | I | C W | E H |          | . | R  |
| 1201.58 | . | I | C W | E H |          | . | R  |
| 1208.30 | . | I | W C | E H |          | . | R  |
| 1215.01 | . | I | W C | E H |          | . | R  |
| 1221.73 | . |   |     |     |          | . |    |
| 1228.45 | . | I | W C | E H |          | . | R  |
| 1235.17 | . |   |     |     |          | . |    |
| 1241.89 | . |   |     |     |          | . |    |
| 1248.61 | . |   |     |     |          | . |    |
| 1255.33 | . |   |     |     |          | . |    |
| 1262.05 | . |   |     |     |          | . |    |
| 1268.77 | . |   |     |     |          | . |    |
| 1275.49 | . | I | W C | E H |          | . | R  |
| 1282.21 | . |   |     |     |          | . |    |
| 1288.93 | . |   |     |     |          | . |    |
| 1295.65 | . |   |     |     |          | . |    |
| 1302.36 | . |   |     |     |          | . |    |
| 1309.08 | . |   |     |     |          | . |    |
| 1315.80 | . | I | W C | E H |          | . | R  |
| 1322.52 | . |   |     |     |          | . |    |
| 1329.24 | . |   |     |     |          | . |    |
| 1335.96 | . |   |     |     |          | . |    |
| 1342.68 | . |   |     |     |          | . |    |
| 1349.40 | . |   |     |     |          | . |    |
| 1356.12 | . | I | W C | E H |          | . | R  |
| 1362.84 | . |   |     |     |          | . |    |
| 1369.56 | . |   |     |     |          | . |    |



NCR2.OUT

|         |   |   |  |    |   |   |   |  |   |   |
|---------|---|---|--|----|---|---|---|--|---|---|
| 1376.28 | . |   |  |    |   |   |   |  | . | R |
| 1382.99 | . |   |  |    |   |   |   |  | . | R |
| 1389.71 | . | I |  | W  | C | E | H |  | . | R |
| 1396.43 | . |   |  |    |   |   |   |  | . | R |
| 1403.15 | . |   |  |    |   |   |   |  | . | R |
| 1409.87 | . | I |  | W  | C | E | H |  | . | R |
| 1416.59 | . | I |  | W  | C | E | H |  | . | R |
| 1423.31 | . | I |  | WC |   | E | H |  | . | R |

2712.060 2713.303 2714.545 2715.788 2717.031 2718.273 2719.516 2720.759 2722.001 2723.244 2724.487

## NOTES

## 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**  
**Storm Drain Through Basin EMR2 South of Moccasin Road (NCR3.WSW)**

| WSPG Station | Plan Set Project No. * | Equivalent Roadway Station | Improvement Plan Sheet | Storm Drain Dimension | Invert Elevation (ft) | Q <sub>100</sub> (cfs) | WSE (ft) | Velocity (ft/s) | FG Elevation | Facility Description | HGL Check <sup>1</sup> |
|--------------|------------------------|----------------------------|------------------------|-----------------------|-----------------------|------------------------|----------|-----------------|--------------|----------------------|------------------------|
| 1000.00      | NCR:<br>EST1911        | N/A                        | G-4                    | 72" RCP               | 2626.96               | 385.00                 | 2629.58  | 32.43           | 2634.00      |                      | OK                     |
| 1024.00      |                        | 38+85.42                   |                        | 72" RCP               | 2627.44               | 385.00                 | 2630.01  | 33.31           | 2659.28      |                      | OK                     |
| 1093.25      |                        | 38+16.17                   |                        | 72" RCP               | 2631.59               | 385.00                 | 2634.17  | 33.06           | 2660.75      |                      | OK                     |
| 1254.71      |                        | 36+54.72                   |                        | 72" RCP               | 2641.28               | 385.00                 | 2643.94  | 31.89           | 2663.17      |                      | OK                     |
| 1642.97      |                        | 32+66.46                   | G-3                    | 72" RCP               | 2664.58               | 385.00                 | 2669.84  | 14.65           | 2671.00      |                      | OK                     |
| 1642.97      |                        | 32+66.46                   |                        | 72" RCP               | 2664.58               | 385.00                 | 2669.84  | 14.65           | 2671.00      |                      | OK                     |

NCR3.WSW

T1 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

T2 STORM DRAIN THROUGH BASIN EMR2 SOUTH OF MOCCASIN ROAD (NCR3)

|    |                  |    |          |
|----|------------------|----|----------|
| 50 | 1000.0002626.960 | 72 | 2632.960 |
|----|------------------|----|----------|

R 1024.0002627.440 72 .013

0.0 1

R 1093.2502631.590 72 .013

45.0 1

R 1254.7102641.280 72 .013

45.0 1

|   |                  |    |      |
|---|------------------|----|------|
| R | 1642.9702664.580 | 72 | .013 |
|---|------------------|----|------|

0.0 1

SH 1642.9702664.580 72

|    |   |   |   |       |        |        |       |       |           |      |
|----|---|---|---|-------|--------|--------|-------|-------|-----------|------|
| CD | 5 | 3 | 0 | 0.000 | 11.000 | 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 | 385.000 |
|---|---------|



FILE: NCR3.WSW

NCR3.EDT

W S P G W - EDIT LISTING - Version 14.10

Date: 5- 5-2019 Time:12:45:40

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

| CARD<br>CODE | SECT<br>NO | CHN<br>TYPE | NO OF<br>PIER/PIP | AVE PIER<br>WIDTH | HEIGHT 1<br>DIAMETER | BASE<br>WIDTH | ZL   | ZR   | INV<br>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              | 11.000               | 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 -

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

HEADING LINE NO 2 IS -

STORM DRAIN THROUGH BASIN EMR2 SOUTH OF MOCCASIN ROAD (NCR3)

HEADING LINE NO 3 IS -

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 | RADIUS | ANGLE | ANG PT | MAN H |
|------------|--------|------------------|----------|----------|----------|------|----------|--------|-------|--------|-------|
|            |        |                  |          | 1000.000 | 2626.960 | 72   | 2632.960 |        |       |        |       |
| ELEMENT NO | 2 IS A | REACH            | U/S DATA | STATION  | INVERT   | SECT |          |        |       |        |       |
|            |        |                  |          | 1024.000 | 2627.440 | 72   |          | .000   | .000  | .000   | 1     |
| ELEMENT NO | 3 IS A | REACH            | U/S DATA | STATION  | INVERT   | SECT |          |        |       |        |       |
|            |        |                  |          | 1093.250 | 2631.590 | 72   |          | .000   | .000  | 45.000 | 1     |
| ELEMENT NO | 4 IS A | REACH            | U/S DATA | STATION  | INVERT   | SECT |          |        |       |        |       |
|            |        |                  |          | 1254.710 | 2641.280 | 72   |          | .000   | .000  | 45.000 | 1     |
| ELEMENT NO | 5 IS A | REACH            | U/S DATA | STATION  | INVERT   | SECT |          |        |       |        |       |
|            |        |                  |          | 1642.970 | 2664.580 | 72   |          | .000   | .000  | .000   | 1     |
| ELEMENT NO | 6 IS A | SYSTEM HEADWORKS | U/S DATA | STATION  | INVERT   | SECT |          |        |       |        |       |
|            |        |                  |          | 1642.970 | 2664.580 | 72   |          | .000   |       |        |       |

| Station                                                | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt/or I.D. | ZL      | No Wth Prs/Pip |
|--------------------------------------------------------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|-----------------|---------|----------------|
| L/Elem                                                 | Ch Slope    |            |            |         | SF Ave    | HF       | SE Dpth        | Froude N   | Norm Dp        | "N"            | X-Fall         | ZR              | Type Ch |                |
| 1000.000                                               | 2626.960    | 2.621      | 2629.581   | 385.00  | 32.43     | 16.33    | 2645.91        | .00        | 5.26           | 5.95           | 6.000          | .000            | .00     | 1 .0           |
| 24.000                                                 | .0200       |            |            |         | .0549     | 1.32     | 2.62           | 4.05       | 3.50           | .013           | .00            | .00             | PIPE    |                |
| 1024.000                                               | 2627.440    | 2.568      | 2630.008   | 385.00  | 33.31     | 17.23    | 2647.24        | .00        | 5.26           | 5.94           | 6.000          | .000            | .00     | 1 .0           |
| 69.250                                                 | .0599       |            |            |         | .0563     | 3.90     | 2.57           | 4.21       | 2.53           | .013           | .00            | .00             | PIPE    |                |
| 1093.250                                               | 2631.590    | 2.583      | 2634.173   | 385.00  | 33.06     | 16.97    | 2651.15        | .00        | 5.26           | 5.94           | 6.000          | .000            | .00     | 1 .0           |
| 161.460                                                | .0600       |            |            |         | .0531     | 8.58     | 2.58           | 4.16       | 2.53           | .013           | .00            | .00             | PIPE    |                |
| 1254.710                                               | 2641.281    | 2.655      | 2643.936   | 385.00  | 31.89     | 15.79    | 2659.73        | .00        | 5.26           | 5.96           | 6.000          | .000            | .00     | 1 .0           |
| 42.893                                                 | .0600       |            |            |         | .0495     | 2.12     | 2.65           | 3.95       | 2.53           | .013           | .00            | .00             | PIPE    |                |
| 1297.603                                               | 2643.854    | 2.686      | 2646.541   | 385.00  | 31.40     | 15.31    | 2661.85        | .00        | 5.26           | 5.97           | 6.000          | .000            | .00     | 1 .0           |
| 89.380                                                 | .0600       |            |            |         | .0456     | 4.07     | 2.69           | 3.86       | 2.53           | .013           | .00            | .00             | PIPE    |                |
| 1386.983                                               | 2649.218    | 2.787      | 2652.005   | 385.00  | 29.94     | 13.92    | 2665.93        | .00        | 5.26           | 5.98           | 6.000          | .000            | .00     | 1 .0           |
| 58.204                                                 | .0600       |            |            |         | .0401     | 2.33     | 2.79           | 3.60       | 2.53           | .013           | .00            | .00             | PIPE    |                |
| 1445.187                                               | 2652.711    | 2.891      | 2655.603   | 385.00  | 28.55     | 12.66    | 2668.26        | .00        | 5.26           | 6.00           | 6.000          | .000            | .00     | 1 .0           |
| 42.050                                                 | .0600       |            |            |         | .0353     | 1.48     | 2.89           | 3.35       | 2.53           | .013           | .00            | .00             | PIPE    |                |
| 1487.238                                               | 2655.235    | 3.001      | 2658.236   | 385.00  | 27.22     | 11.51    | 2669.74        | .00        | 5.26           | 6.00           | 6.000          | .000            | .00     | 1 .0           |
| 32.143                                                 | .0600       |            |            |         | .0311     | 1.00     | 3.00           | 3.12       | 2.53           | .013           | .00            | .00             | PIPE    |                |
| 1519.380                                               | 2657.164    | 3.116      | 2660.280   | 385.00  | 25.95     | 10.46    | 2670.74        | .00        | 5.26           | 6.00           | 6.000          | .000            | .00     | 1 .0           |
| 25.425                                                 | .0600       |            |            |         | .0274     | .70      | 3.12           | 2.91       | 2.53           | .013           | .00            | .00             | PIPE    |                |
| * FILE: NCR3.WSW W S P G W - CIVILDESIGN Version 14.08 |             |            |            |         |           |          |                |            |                |                |                |                 |         |                |

| *****    |             |            |            |         |           |          |                |            |                |                |                |                 |       |                | ***** |
|----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|-----------------|-------|----------------|-------|
| 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        |       |
| *****    | *****       | *****      | *****      | *****   | *****     | *****    | *****          | *****      | *****          | *****          | *****          | *****           | ***** | *****          |       |
| 1544.806 | 2658.689    | 3.237      | 2661.927   | 385.00  | 24.75     | 9.51     | 2671.44        | .00        | 5.26           | 5.98           | 6.000          | .000            | .00   | 1 .0           |       |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |       |
| 20.554   | .0600       |            |            |         |           | .0241    | .50            | 3.24       | 2.70           | 2.53           | .013           | .00             | .00   | PIPE           |       |
| 1565.359 | 2659.923    | 3.364      | 2663.287   | 385.00  | 23.59     | 8.64     | 2671.93        | .00        | 5.26           | 5.96           | 6.000          | .000            | .00   | 1 .0           |       |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |       |
| 16.843   | .0600       |            |            |         |           | .0213    | .36            | 3.36       | 2.51           | 2.53           | .013           | .00             | .00   | PIPE           |       |
| 1582.202 | 2660.934    | 3.498      | 2664.432   | 385.00  | 22.50     | 7.86     | 2672.29        | .00        | 5.26           | 5.92           | 6.000          | .000            | .00   | 1 .0           |       |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |       |
| 13.912   | .0600       |            |            |         |           | .0189    | .26            | 3.50       | 2.33           | 2.53           | .013           | .00             | .00   | PIPE           |       |
| 1596.114 | 2661.769    | 3.640      | 2665.409   | 385.00  | 21.45     | 7.14     | 2672.55        | .00        | 5.26           | 5.86           | 6.000          | .000            | .00   | 1 .0           |       |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |       |
| 11.520   | .0600       |            |            |         |           | .0167    | .19            | 3.64       | 2.16           | 2.53           | .013           | .00             | .00   | PIPE           |       |
| 1607.634 | 2662.460    | 3.791      | 2666.250   | 385.00  | 20.45     | 6.49     | 2672.75        | .00        | 5.26           | 5.79           | 6.000          | .000            | .00   | 1 .0           |       |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |       |
| 9.521    | .0600       |            |            |         |           | .0148    | .14            | 3.79       | 2.00           | 2.53           | .013           | .00             | .00   | PIPE           |       |
| 1617.155 | 2663.031    | 3.951      | 2666.982   | 385.00  | 19.50     | 5.90     | 2672.89        | .00        | 5.26           | 5.69           | 6.000          | .000            | .00   | 1 .0           |       |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |       |
| 7.802    | .0600       |            |            |         |           | .0132    | .10            | 3.95       | 1.84           | 2.53           | .013           | .00             | .00   | PIPE           |       |
| 1624.957 | 2663.500    | 4.122      | 2667.621   | 385.00  | 18.59     | 5.37     | 2672.99        | .00        | 5.26           | 5.56           | 6.000          | .000            | .00   | 1 .0           |       |
| -        | -           | -          | -          | -       | -         | -        | -              | -          | -              | -              | -              | -               | -     | -              |       |
| 6.291    | .0600       |            |            |         |           | .0117    | .07            | 4.12       | 1.70           | 2.53           | .013           | .00             | .00   | PIPE           |       |

NCR3.OUT

|          |          |       |          |        |       |       |         |      |      |      |       |      |     |      |     |
|----------|----------|-------|----------|--------|-------|-------|---------|------|------|------|-------|------|-----|------|-----|
| 1631.247 | 2663.877 | 4.306 | 2668.183 | 385.00 | 17.73 | 4.88  | 2673.06 | .00  | 5.26 | 5.40 | 6.000 | .000 | .00 | 1    | .0  |
| - -      | - -      | - -   | - -      | - -    | - -   | - -   | - -     | - -  | - -  | - -  | - -   | - -  | - - | - -  | - - |
| 4.916    | .0600    |       |          |        |       | .0105 | .05     | 4.31 | 1.56 | 2.53 | .013  | .00  | .00 | PIPE |     |
| 1636.164 | 2664.172 | 4.506 | 2668.678 | 385.00 | 16.90 | 4.44  | 2673.11 | .00  | 5.26 | 5.19 | 6.000 | .000 | .00 | 1    | .0  |
| - -      | - -      | - -   | - -      | - -    | - -   | - -   | - -     | - -  | - -  | - -  | - -   | - -  | - - | - -  | - - |
| 3.622    | .0600    |       |          |        |       | .0094 | .03     | 4.51 | 1.42 | 2.53 | .013  | .00  | .00 | PIPE |     |

FILE: NCR3.WSW      W S P G W - CIVILDESIGN Version 14.08      Program Package Serial Number: 7189      Date: 5- 5-2019 Time:12:45:43

PAGE 3

WATER SURFACE PROFILE LISTING  
EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
STORM DRAIN THROUGH BASIN EMR2 SOUTH OF MOCCASIN ROAD (NCR3)

| 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 |                |
| 1639.786 | 2664.389    | 4.726      | 2669.115   | 385.00  | 16.12     | 4.03     | 2673.15        | .00        | 5.26           | 4.91           | 6.000          | .000            | .00     | 1 .0           |
| - -      | - -         | - -        | - -        | - -     | - -       | - -      | - -            | - -        | - -            | - -            | - -            | - -             | - -     | - -            |
| 2.321    | .0600       |            |            |         | .0085     | .02      | 4.73           | 1.29       | 2.53           | .013           | .00            | .00             | PIPE    |                |
| 1642.106 | 2664.528    | 4.973      | 2669.501   | 385.00  | 15.37     | 3.67     | 2673.17        | .00        | 5.26           | 4.52           | 6.000          | .000            | .00     | 1 .0           |
| - -      | - -         | - -        | - -        | - -     | - -       | - -      | - -            | - -        | - -            | - -            | - -            | - -             | - -     | - -            |
| .864     | .0600       |            |            |         | .0078     | .01      | 4.97           | 1.15       | 2.53           | .013           | .00            | .00             | PIPE    |                |
| 1642.970 | 2664.580    | 5.262      | 2669.843   | 385.00  | 14.65     | 3.33     | 2673.17        | .00        | 5.26           | 3.94           | 6.000          | .000            | .00     | 1 .0           |
| - -      | - -         | - -        | - -        | - -     | - -       | - -      | - -            | - -        | - -            | - -            | - -            | - -             | - -     | - -            |

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

STORM DRAIN THROUGH BASIN EMR2 SOUTH OF MOCCASIN ROAD (NCR3)

|         |    |   |    |    |   |   |  |  |  |  |  |  |  |   |
|---------|----|---|----|----|---|---|--|--|--|--|--|--|--|---|
| 1000.00 | .I | W | CH |    | E |   |  |  |  |  |  |  |  | R |
| 1013.12 | .  |   |    |    |   |   |  |  |  |  |  |  |  | . |
| 1026.24 | .I | W | CH |    | E |   |  |  |  |  |  |  |  | R |
| 1039.37 | .  |   |    |    |   |   |  |  |  |  |  |  |  | . |
| 1052.49 | .  |   |    |    |   |   |  |  |  |  |  |  |  | . |
| 1065.61 | .  |   |    |    |   |   |  |  |  |  |  |  |  | . |
| 1078.73 | .  |   |    |    |   |   |  |  |  |  |  |  |  | . |
| 1091.85 | .  |   |    |    |   |   |  |  |  |  |  |  |  | . |
| 1104.97 | .  | I | W  | CH |   | E |  |  |  |  |  |  |  | R |
| 1118.10 | .  |   |    |    |   |   |  |  |  |  |  |  |  | . |
| 1131.22 | .  |   |    |    |   |   |  |  |  |  |  |  |  | . |
| 1144.34 | .  |   |    |    |   |   |  |  |  |  |  |  |  | . |
| 1157.46 | .  |   |    |    |   |   |  |  |  |  |  |  |  | . |
| 1170.58 | .  |   |    |    |   |   |  |  |  |  |  |  |  | . |
| 1183.71 | .  |   |    |    |   |   |  |  |  |  |  |  |  | . |



NCR3.OUT

|         |   |  |   |   |    |  |   |  |   |
|---------|---|--|---|---|----|--|---|--|---|
| 1196.83 | . |  |   |   |    |  |   |  |   |
| 1209.95 | . |  |   |   |    |  |   |  |   |
| 1223.07 | . |  |   |   |    |  |   |  |   |
| 1236.19 | . |  |   |   |    |  |   |  |   |
| 1249.31 | . |  |   |   |    |  |   |  |   |
| 1262.44 | . |  | I | W | CH |  | E |  | R |
| 1275.56 | . |  |   |   |    |  |   |  |   |
| 1288.68 | . |  |   |   |    |  |   |  |   |
| 1301.80 | . |  | I | W | CH |  | E |  | R |
| 1314.92 | . |  |   |   |    |  |   |  |   |
| 1328.05 | . |  |   |   |    |  |   |  |   |
| 1341.17 | . |  |   |   |    |  |   |  |   |
| 1354.29 | . |  |   |   |    |  |   |  |   |
| 1367.41 | . |  |   |   |    |  |   |  |   |
| 1380.53 | . |  |   |   |    |  |   |  |   |
| 1393.66 | . |  | I | W | CH |  | E |  | R |
| 1406.78 | . |  |   |   |    |  |   |  |   |
| 1419.90 | . |  |   |   |    |  |   |  |   |
| 1433.02 | . |  |   |   |    |  |   |  |   |
| 1446.14 | . |  | I | W | CH |  | E |  | R |
| 1459.26 | . |  |   |   |    |  |   |  |   |
| 1472.39 | . |  |   |   |    |  |   |  |   |
| 1485.51 | . |  |   |   |    |  |   |  |   |
| 1498.63 | . |  | I | W | CH |  | E |  | R |
| 1511.75 | . |  |   |   |    |  |   |  |   |
| 1524.87 | . |  | I | W | CH |  | E |  | R |
| 1538.00 | . |  |   |   |    |  |   |  |   |
| 1551.12 | . |  | I | W | CH |  | E |  | R |
| 1564.24 | . |  |   |   |    |  |   |  |   |
| 1577.36 | . |  | I | W | CH |  | E |  | R |

# NCR3.OUT

|          |          |          |          |          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 1590.48  | .        | I        | W        | C        | H        | E        | .        | R        |          |          |
| 1603.60  | .        | I        | W        | C        | H        | E        | .        | R        |          |          |
| 1616.73  | .        | I        | W        | C        | H        | E        | .        | R        |          |          |
| 1629.85  | .        | I        | W        | C        | H        | E        | .        | R        |          |          |
| 1642.97  | .        | I        | W        | C        | H        | E        | .        | R        |          |          |
| 2626.960 | 2631.581 | 2636.203 | 2640.824 | 2645.445 | 2650.067 | 2654.688 | 2659.309 | 2663.931 | 2668.552 | 2673.174 |

## NOTES

### 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

## Lateral Line From Basin EPC to NCR1 Mainline (NLAT.WSW)

| WSPG Station | Plan Set Project No. * | Equivalent Roadway Station | Improvement Plan Sheet | Storm Drain Dimension | Invert Elevation (ft) | Q <sub>100</sub> (cfs) | WSE (ft) | Velocity (ft/s) | FG Elevation | Facility Description                    | HGL Check <sup>1</sup> |  |  |
|--------------|------------------------|----------------------------|------------------------|-----------------------|-----------------------|------------------------|----------|-----------------|--------------|-----------------------------------------|------------------------|--|--|
| 1000.00      | NCR:<br>EST1912        | 43+32.05                   | P-5                    | 48" RCP               | 2686.37               | 54.00                  | 2687.58  | 16.75           | 2699.63      | Connection to NCR1 Mainline Model       | OK                     |  |  |
| 1067.16      |                        | 42+76.32                   |                        | 7.5' x 12' RCB        | 2687.37               | 54.00                  | 2688.41  | 6.92            | 2698.97      | Wall Entrance                           | OK                     |  |  |
| 1067.16      |                        |                            |                        | 7.5' x 12' RCB        | 2687.37               | 54.00                  | 2688.41  | 6.92            |              | Junction with Flow from NC3b Drop Inlet | OK                     |  |  |
| 1069.66      |                        |                            |                        | 7.5' x 12' RCB        | 2687.41               | 54.00                  | 2688.58  | 6.14            |              | Facilities                              | OK                     |  |  |
| 1069.66      |                        |                            |                        | 7.5' x 12' RCB        | 2687.41               | 48.00                  | 2689.00  | 4.03            |              | Wall Exit                               | OK                     |  |  |
| 1072.16      |                        |                            |                        | 7.5' x 12' RCB        | 2687.49               | 48.00                  | 2688.96  | 4.34            |              | Addition of flow from Basin EPC         | OK                     |  |  |
| 1072.16      |                        |                            |                        | 7.5' x 12' RCB        | 2687.49               | 48.00                  | 2688.96  | 4.34            |              |                                         | OK                     |  |  |
| 1115.71      |                        | 42+76.03                   |                        | 48" RCP               | 2688.79               | 48.00                  | 2690.87  | 7.28            | 2695.00      |                                         | OK                     |  |  |
| 1115.71      |                        |                            |                        | 48" RCP               | 2688.79               | 48.00                  | 2690.87  | 7.28            |              |                                         | OK                     |  |  |



| T1 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE                          |          |          |    |        |        |        |       |          |           |      |  |      |
|----------------------------------------------------------------------|----------|----------|----|--------|--------|--------|-------|----------|-----------|------|--|------|
| T2 SOUTHERN NORTH COLLECTOR DRIVE STORM DRAIN SYSTEM LATERAL (NLAT1) |          |          |    |        |        |        |       |          |           |      |  |      |
| T3 FROM PARCEL EPC TO NORTH COLLECTOR ROAD MAINLINE SD (NCR)         |          |          |    |        |        |        |       |          |           |      |  |      |
| SO                                                                   | 1000.000 | 2686.370 | 48 |        |        |        |       |          |           |      |  |      |
| R                                                                    | 1067.160 | 2687.373 | 48 |        | .013   |        |       |          |           |      |  | 54.0 |
| WE                                                                   | 1067.160 | 2687.373 | 48 |        | .013   |        |       |          |           |      |  |      |
| R                                                                    | 1069.660 | 2687.410 | 3  |        | .013   |        |       |          |           |      |  | 0.0  |
| JX                                                                   | 1069.660 | 2687.410 | 3  | 3      | .013   | 6.0    |       | 2687.410 |           | 90.0 |  |      |
| R                                                                    | 1072.160 | 2687.485 | 3  |        | .013   |        |       |          |           |      |  | 0.0  |
| WX                                                                   | 1072.160 | 2687.485 | 3  |        | .013   |        |       |          |           |      |  |      |
| R                                                                    | 1115.710 | 2688.790 | 48 |        | .013   |        |       |          |           |      |  |      |
| SH                                                                   | 1115.710 | 2688.790 | 48 |        |        |        |       |          |           |      |  |      |
| CD                                                                   | 1        | 3        | 0  | 0.000  | 13.000 | 20.000 | 0.000 | 0.000    | 0.0000.00 | 0.00 |  |      |
| CD                                                                   | 2        | 3        | 0  | 0.000  | 12.000 | 12.500 | 0.000 | 0.000    | 0.0000.00 | 0.00 |  |      |
| CD                                                                   | 3        | 3        | 0  | 0.000  | 12.000 | 7.500  | 0.000 | 0.000    | 0.0000.00 | 0.00 |  |      |
| CD                                                                   | 4        | 3        | 0  | 0.000  | 17.000 | 5.000  | 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 |  |      |
| Q                                                                    |          |          |    | 48.000 |        |        |       |          |           |      |  |      |

FILE: NLAT1.WSW NLAT1.EDT  
W S P G W - EDIT LISTING - Version 14.10 Date: 4-30-2019 Time: 7:19:40  
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1  
CARD SECT CHN NO OF AVE PIER HEIGHT 1 BASE ZL ZR INV Y(1) Y(2) Y(3) Y(4) Y(5) Y(6) Y(7) Y(8) Y(9) Y(10)  
CODE NO TYPE PIER/PIP WIDTH DIAMETER WIDTH DROP  
CD 1 3 0 .000 13.000 20.000 .000 .000 .00  
CD 2 3 0 .000 12.000 12.500 .000 .000 .00  
CD 3 3 0 .000 12.000 7.500 .000 .000 .00  
CD 4 3 0 .000 17.000 5.000 .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

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 -  
SOUTHERN NORTH COLLECTOR DRIVE STORM DRAIN SYSTEM LATERAL (NLAT1)  
HEADING LINE NO 3 IS -  
FROM PARCEL EPC TO NORTH COLLECTOR ROAD MAINLINE SD (NCR)

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 2686.370 48 2690.019  
ELEMENT NO 2 IS A REACH \* \*  
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H  
1067.160 2687.373 48 .013 .000 .000 54.000 0  
ELEMENT NO 3 IS A WALL ENTRANCE \*  
U/S DATA STATION INVERT SECT FP  
1067.160 2687.373 48 .013  
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  
1069.660 2687.410 3 .013 .000 .000 .000 0  
ELEMENT NO 5 IS A JUNCTION \* \*  
U/S DATA STATION INVERT SECT LAT-1 LAT-2 N Q3 Q4 INVERT-3 INVERT-4 PHI 3 PHI 4  
1069.660 2687.410 3 3 0 .013 6.000 .000 2687.410 .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 6 IS A REACH \* \*  
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H  
1072.160 2687.485 3 .013 .000 .000 .000 0  
ELEMENT NO 7 IS A WALL EXIT \*  
U/S DATA STATION INVERT SECT  
1072.160 2687.485 3  
WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS  
ELEMENT NO 8 IS A REACH \* \*  
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H  
1115.710 2688.790 48 .013 .000 .000 .000 0  
ELEMENT NO 9 IS A SYSTEM HEADWORKS \*  
U/S DATA STATION INVERT SECT W S ELEV  
1115.710 2688.790 48 .000

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING

Date: 4-30-2019 Time: 7:19:43

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

SOUTHERN NORTH COLLECTOR DRIVE STORM DRAIN SYSTEM LATERAL (NLAT1)

FROM PARCEL EPC TO NORTH COLLECTOR ROAD MAINLINE SD (NCR)

| 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  | 2686.370    | 1.215      | 2687.584   | 54.00   | 16.75     | 4.36     | 2691.94        | .00        | 2.21           | 3.68           | 4.000          | .000            | .00 | 1 .0           |
| 9.638     | .0149       |            |            |         |           | .0365    | .35            | 1.21       | 3.15           | 1.52           | .013           | .00             | .00 | PIPE           |
| 1009.638  | 2686.514    | 1.192      | 2687.706   | 54.00   | 17.19     | 4.59     | 2692.29        | .00        | 2.21           | 3.66           | 4.000          | .000            | .00 | 1 .0           |
| 16.373    | .0149       |            |            |         |           | .0405    | .66            | 1.19       | 3.27           | 1.52           | .013           | .00             | .00 | PIPE           |
| 1026.011  | 2686.758    | 1.152      | 2687.910   | 54.00   | 18.03     | 5.05     | 2692.96        | .00        | 2.21           | 3.62           | 4.000          | .000            | .00 | 1 .0           |
| 14.869    | .0149       |            |            |         |           | .0463    | .69            | 1.15       | 3.49           | 1.52           | .013           | .00             | .00 | PIPE           |
| 1040.880  | 2686.980    | 1.113      | 2688.094   | 54.00   | 18.91     | 5.55     | 2693.64        | .00        | 2.21           | 3.59           | 4.000          | .000            | .00 | 1 .0           |
| 13.650    | .0149       |            |            |         |           | .0529    | .72            | 1.11       | 3.73           | 1.52           | .013           | .00             | .00 | PIPE           |
| 1054.530  | 2687.184    | 1.076      | 2688.260   | 54.00   | 19.83     | 6.11     | 2694.37        | .00        | 2.21           | 3.55           | 4.000          | .000            | .00 | 1 .0           |
| 12.630    | .0149       |            |            |         |           | .0604    | .76            | 1.08       | 3.99           | 1.52           | .013           | .00             | .00 | PIPE           |
| 1067.160  | 2687.373    | 1.040      | 2688.413   | 54.00   | 6.92      | .74      | 2689.16        | .00        | 1.17           | 7.50           | 12.000         | 7.500           | .00 | 0 .0           |
| .927      | .0147       |            |            |         |           | .0047    | .00            | 1.04       | 1.20           | .72            | .013           | .00             | .00 | BOX            |
| 1068.087  | 2687.387    | 1.065      | 2688.451   | 54.00   | 6.76      | .71      | 2689.16        | .00        | 1.17           | 7.50           | 12.000         | 7.500           | .00 | 0 .0           |
| 1.195     | .0147       |            |            |         |           | .0042    | .01            | 1.06       | 1.16           | .72            | .013           | .00             | .00 | BOX            |
| 1069.282  | 2687.404    | 1.117      | 2688.521   | 54.00   | 6.45      | .65      | 2689.17        | .00        | 1.17           | 7.50           | 12.000         | 7.500           | .00 | 0 .0           |
| .378      | .0147       |            |            |         |           | .0036    | .00            | 1.12       | 1.08           | .72            | .013           | .00             | .00 | BOX            |
| 1069.660  | 2687.410    | 1.172      | 2688.582   | 54.00   | 6.14      | .59      | 2689.17        | .00        | 1.17           | 7.50           | 12.000         | 7.500           | .00 | 0 .0           |
| JUNCT STR | .0000       |            |            |         |           | .0022    | .00            | 1.17       | 1.00           |                | .013           | .00             | .00 | BOX            |

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING

Date: 4-30-2019 Time: 7:19:43

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

SOUTHERN NORTH COLLECTOR DRIVE STORM DRAIN SYSTEM LATERAL (NLAT1)

FROM PARCEL EPC TO NORTH COLLECTOR ROAD MAINLINE SD (NCR)

| 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        |
| 1069.660  | 2687.410    | 1.587      | 2688.997   | 48.00   | 4.03      | .25      | 2689.25        | .00        | 1.08           | 7.50           | 12.000         | 7.500           | .00 | 0 .0           |
| 1.679     | .0301       |            |            |         |           | .0012    | .00            | 1.59       | .56            | .54            | .013           | .00             | .00 | BOX            |
| 1071.339  | 2687.460    | 1.513      | 2688.973   | 48.00   | 4.23      | .28      | 2689.25        | .00        | 1.08           | 7.50           | 12.000         | 7.500           | .00 | 0 .0           |
| .821      | .0301       |            |            |         |           | .0013    | .00            | 1.51       | .61            | .54            | .013           | .00             | .00 | BOX            |
| 1072.160  | 2687.485    | 1.475      | 2688.960   | 48.00   | 4.34      | .29      | 2689.25        | .00        | 1.08           | 7.50           | 12.000         | 7.500           | .00 | 0 .0           |
| WALL EXIT |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |
| 1072.160  | 2687.485    | 1.475      | 2688.960   | 48.00   | 4.34      | .29      | 2689.25        | .00        | 1.08           | 7.50           | 12.000         | 7.500           | .00 | 0 .0           |
|           |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |
| 1072.160  | 2687.485    | 1.404      | 2688.889   | 48.00   | 12.20     | 2.31     | 2691.20        | .00        | 2.08           | 3.82           | 4.000          | .000            | .00 | 1 .0           |
| 8.839     | .0300       |            |            |         |           | .0152    | .13            | 1.40       | 2.12           | 1.19           | .013           | .00             | .00 | PIPE           |
| 1080.999  | 2687.750    | 1.444      | 2689.194   | 48.00   | 11.74     | 2.14     | 2691.33        | .00        | 2.08           | 3.84           | 4.000          | .000            | .00 | 1 .0           |
| 8.663     | .0300       |            |            |         |           | .0135    | .12            | 1.44       | 2.01           | 1.19           | .013           | .00             | .00 | PIPE           |
| 1089.662  | 2688.010    | 1.496      | 2689.505   | 48.00   | 11.19     | 1.95     | 2691.45        | .00        | 2.08           | 3.87           | 4.000          | .000            | .00 | 1 .0           |
| 6.785     | .0300       |            |            |         |           | .0118    | .08            | 1.50       | 1.87           | 1.19           | .013           | .00             | .00 | PIPE           |
| 1096.447  | 2688.213    | 1.550      | 2689.763   | 48.00   | 10.67     | 1.77     | 2691.53        | .00        | 2.08           | 3.90           | 4.000          | .000            | .00 | 1 .0           |



NLAT1.OUT

|          |          |       |          |       |       |      |         |       |      |      |       |      |      |     |     |      |
|----------|----------|-------|----------|-------|-------|------|---------|-------|------|------|-------|------|------|-----|-----|------|
| 5.339    | .0300    |       |          |       |       |      |         | .0104 | .06  | 1.55 | 1.75  | 1.19 | .013 | .00 | .00 | PIPE |
| 1101.786 | 2688.373 | 1.606 | 2689.979 | 48.00 | 10.18 | 1.61 | 2691.59 | .00   | 2.08 | 3.92 | 4.000 | .000 | .00  | 1   | .0  |      |
| 4.203    | .0300    |       |          |       |       |      |         | .0091 | .04  | 1.61 | 1.64  | 1.19 | .013 | .00 | .00 | PIPE |
| 1105.990 | 2688.499 | 1.664 | 2690.163 | 48.00 | 9.70  | 1.46 | 2691.62 | .00   | 2.08 | 3.94 | 4.000 | .000 | .00  | 1   | .0  |      |
| 3.267    | .0300    |       |          |       |       |      |         | .0080 | .03  | 1.66 | 1.53  | 1.19 | .013 | .00 | .00 | PIPE |

FILE: NLAT1.WSW      W S P G W - CIVILDESIGN Version 14.08      PAGE 3  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING      Date: 4-30-2019 Time: 7:19:43

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
 SOUTHERN NORTH COLLECTOR DRIVE STORM DRAIN SYSTEM LATERAL (NLAT1)  
 FROM PARCEL EPC TO NORTH COLLECTOR ROAD MAINLINE SD (NCR)

| 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        |
| 1109.257 | 2688.597    | 1.726      | 2690.322   | 48.00   | 9.25      | 1.33     | 2691.65        | .00        | 2.08           | 3.96           | 4.000          | .000            | .00 | 1 .0           |
| 2.485    | .0300       |            |            |         |           | .0070    | .02            | 1.73       | 1.42           | 1.19           | .013           | .00             | .00 | PIPE           |
| 1111.742 | 2688.671    | 1.789      | 2690.460   | 48.00   | 8.82      | 1.21     | 2691.67        | .00        | 2.08           | 3.98           | 4.000          | .000            | .00 | 1 .0           |
| 1.812    | .0300       |            |            |         |           | .0062    | .01            | 1.79       | 1.33           | 1.19           | .013           | .00             | .00 | PIPE           |
| 1113.554 | 2688.725    | 1.856      | 2690.581   | 48.00   | 8.41      | 1.10     | 2691.68        | .00        | 2.08           | 3.99           | 4.000          | .000            | .00 | 1 .0           |
| 1.228    | .0300       |            |            |         |           | .0054    | .01            | 1.86       | 1.24           | 1.19           | .013           | .00             | .00 | PIPE           |
| 1114.782 | 2688.762    | 1.926      | 2690.688   | 48.00   | 8.02      | 1.00     | 2691.69        | .00        | 2.08           | 4.00           | 4.000          | .000            | .00 | 1 .0           |
| .701     | .0300       |            |            |         |           | .0048    | .00            | 1.93       | 1.15           | 1.19           | .013           | .00             | .00 | PIPE           |
| 1115.483 | 2688.783    | 1.999      | 2690.782   | 48.00   | 7.65      | .91      | 2691.69        | .00        | 2.08           | 4.00           | 4.000          | .000            | .00 | 1 .0           |
| .227     | .0300       |            |            |         |           | .0042    | .00            | 2.00       | 1.08           | 1.19           | .013           | .00             | .00 | PIPE           |
| 1115.710 | 2688.790    | 2.076      | 2690.866   | 48.00   | 7.28      | .82      | 2691.69        | .00        | 2.08           | 4.00           | 4.000          | .000            | .00 | 1 .0           |

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

SOUTHERN NORTH COLLECTOR DRIVE STORM DRAIN SYSTEM LATERAL (NLAT1)

FROM PARCEL EPC TO NORTH COLLECTOR ROAD MAINLINE SD (NCR)

|         |    |   |   |   |   |  |   |
|---------|----|---|---|---|---|--|---|
| 1000.00 | .I | W | C | H | E |  | R |
| 1002.36 | .  |   |   |   |   |  | . |
| 1004.72 | .  |   |   |   |   |  | . |
| 1007.08 | .  |   |   |   |   |  | . |
| 1009.45 | .  |   |   |   |   |  | . |
| 1011.81 | .I | W | C | H | E |  | R |
| 1014.17 | .  |   |   |   |   |  | . |
| 1016.53 | .  |   |   |   |   |  | . |
| 1018.89 | .  |   |   |   |   |  | . |
| 1021.25 | .  |   |   |   |   |  | . |

## NLAT1.OUT

[illegible]

100

2686.370 2687.682 2688.993 2690.305 2691.616 2692.928 2694.239 2695.551 2696.862 2698.174 2699.485

## 1. GLOSSARY

I = INVER

C = CRITICAL DEPTH

W = WATER SURFACE ELE

S = SUPER-ELEVATION

H = HEIGHT OF CHANNEL

E = ENERGY GRADE LINE  
X = CURVES CROSSING C

X = CURVES CROSSING C  
B = BRIDGE ENTRANCE C

Y = WALL ENTRANCE OR

STATIONS FOR POINTS A

STATIONS FOR POINTS A

2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY







Ft Apache Road / Skye Canyon Park Drive (Sun Park Drive)



| Ultimate Condition WSPG Summary                                                                        |                        |                            |                        |                       |                       |                        |          |                 |              |                                          |                        |
|--------------------------------------------------------------------------------------------------------|------------------------|----------------------------|------------------------|-----------------------|-----------------------|------------------------|----------|-----------------|--------------|------------------------------------------|------------------------|
| Mainline in Skye Canyon Park from Connection to Ohare Mainline to Existing Regional Mainline (SCP.WSW) |                        |                            |                        |                       |                       |                        |          |                 |              |                                          |                        |
| WSPG Station                                                                                           | Plan Set Project No. * | Equivalent Roadway Station | Improvement Plan Sheet | Storm Drain Dimension | Invert Elevation (ft) | Q <sub>100</sub> (cfs) | WSE (ft) | Velocity (ft/s) | FG Elevation | Facility Description                     | HGL Check <sup>1</sup> |
| 1000.00                                                                                                | LCD: EST1906           | N/A                        | P-8                    | 66" RCP               | 2646.75               | 294                    | 2653.00  | 12.37           | 2655.00      | Connection to Existing Regional Mainline | OK                     |
| 1016.65                                                                                                | LCD: EST1906           | 69+87.58                   |                        | 66" RCP               | 2646.92               | 294                    | 2653.47  | 12.37           | 2663.77      | Existing 66" RCP                         | OK                     |
| 1064.02                                                                                                | LCD: EST1906           | 69+84.36                   |                        | 66" RCP               | 2648.29               | 294                    | 2653.96  | 12.37           | 2664.04      |                                          | OK                     |
| 1416.61                                                                                                | SCP: EST1908           | 36+74.89                   | P-4                    | 66" RCP               | 2650.05               | 294                    | 2656.78  | 12.37           | 2665.89      | Junction with SC4 Drop Inlet Facility    | OK                     |
| 1416.61                                                                                                | SCP: EST1908           |                            |                        | 66" RCP               | 2650.05               | 292                    | 2656.84  | 12.29           | 2665.89      |                                          | OK                     |
| 1760.62                                                                                                | SCP: EST1908           |                            |                        | 66" RCP               | 2651.77               | 292                    | 2659.56  | 12.29           | 2667.49      | Junction with SC3 Drop Inlet Facility    | OK                     |
| 1760.62                                                                                                | SCP: EST1908           | 33+30.7                    | P-3                    | 66" RCP               | 2651.77               | 290                    | 2659.62  | 12.21           | 2667.49      |                                          | OK                     |
| 2054.30                                                                                                | SCP: EST1908           |                            |                        | 66" RCP               | 2653.24               | 290                    | 2662.00  | 12.21           | 2668.87      |                                          | OK                     |
| 2187.94                                                                                                | SCP: EST1908           |                            |                        | 66" RCP               | 2653.91               | 290                    | 2663.18  | 12.21           | 2669.01      |                                          | OK                     |
| 2339.09                                                                                                | SCP: EST1908           | 27+54.02                   |                        | 66" RCP               | 2654.66               | 290                    | 2664.43  | 12.21           | 2668.83      | Junction with SC2 Drop Inlet Facility    | OK                     |
| 2339.09                                                                                                | SCP: EST1908           |                            |                        | 66" RCP               | 2654.66               | 276                    | 2664.77  | 11.60           | 2668.83      |                                          | OK                     |
| 2397.02                                                                                                | SCP: EST1908           | 26+96.09                   | P-6                    | 66" RCP               | 2654.95               | 276                    | 2665.66  | 11.60           | 2668.83      | Junction with CLAT Lateral Line          | OK                     |
| 2397.02                                                                                                | SCP: EST1908           |                            |                        | 66" RCP               | 2654.95               | 273                    | 2665.73  | 11.49           | 2668.83      |                                          | OK                     |
| 2460.08                                                                                                | SCP: EST1908           | 26+61.63                   |                        | 66" RCP               | 2655.27               | 273                    | 2666.25  | 11.49           | 2672.52      | Continuation into OHA Mainline           | OK                     |
| 2460.08                                                                                                | SCP: EST1908           |                            |                        | 66" RCP               | 2655.27               | 273                    | 2666.25  | 11.49           | 2672.52      |                                          | OK                     |



T1 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
 T2 SKYE CANYON PARK STORM DRAIN SYSTEM (SCP)  
 T3 FROM FACILITY OH3 DROP INLETS THRU SKYE CANYON PARK TO REGIONAL MAINLINE  
 SO 1000.0002646.750 66 2653.000  
 R 1016.6502646.920 66 .013 29.0 1  
 R 1064.0202648.290 66 .013 0.0 1  
 R 1416.6102650.050 66 .013 0.0 1  
 JX 1416.6102650.050 66 18 .013 2.0 2650.050 60.0  
 R 1760.6202651.770 66 .013 0.0 1  
 JX 1760.6202651.770 66 18 .013 2.0 2651.770 46.0  
 R 2054.3002653.240 66 .013 9.0 1  
 R 2187.9402653.910 66 .013 -10.0 1  
 R 2339.0902654.660 66 .013 0.0 1  
 JX 2339.0902654.660 66 18 .013 14.5 2654.660 45.0  
 R 2397.0202654.950 66 .013 57.0 1  
 JX 2397.0202654.950 66 24 .013 2.5 2654.950 -24.0  
 R 2460.0802655.270 66 .013 1  
 SH 2460.0802655.270 66  
 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 273.000

FILE: SCP.WSW

SCP.EDT

W S P G W - EDIT LISTING - Version 14.10

Date: 5- 5-2019 Time: 1:29:12

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

| CARD<br>CODE | SECT<br>NO | CHN<br>TYPE | NO OF<br>PIER/PIP | AVE<br>WIDTH | PIER<br>DIAMETER | HEIGHT<br>1 BASE<br>WIDTH | ZL   | ZR   | INV<br>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

PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

HEADING LINE NO 2 IS -

SKYE CANYON PARK STORM DRAIN SYSTEM (SCP)

HEADING LINE NO 3 IS -

FROM FACILITY OH3 DROP INLETS THRU SKYE CANYON PARK TO REGIONAL MAINLINE

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 | 2646.750 | 66   | 2653.000 |        |       |        |       |          |          |        |       |  |  |  |  |  |
| ELEMENT NO | 2 IS A REACH         | U/S DATA | STATION  | INVERT   | SECT |          | RADIUS | ANGLE | ANG PT | MAN H |          |          |        |       |  |  |  |  |  |
|            |                      |          | 1016.650 | 2646.920 | 66   | .013     | .000   | .000  | 29.000 | 1     |          |          |        |       |  |  |  |  |  |
| ELEMENT NO | 3 IS A REACH         | U/S DATA | STATION  | INVERT   | SECT |          | RADIUS | ANGLE | ANG PT | MAN H |          |          |        |       |  |  |  |  |  |
|            |                      |          | 1064.020 | 2648.290 | 66   | .013     | .000   | .000  | .000   | 1     |          |          |        |       |  |  |  |  |  |
| ELEMENT NO | 4 IS A REACH         | U/S DATA | STATION  | INVERT   | SECT |          | RADIUS | ANGLE | ANG PT | MAN H |          |          |        |       |  |  |  |  |  |
|            |                      |          | 1416.610 | 2650.050 | 66   | .013     | .000   | .000  | .000   | 1     |          |          |        |       |  |  |  |  |  |
| ELEMENT NO | 5 IS A JUNCTION      | U/S DATA | STATION  | INVERT   | SECT | LAT-1    | LAT-2  | N     | Q3     | Q4    | INVERT-3 | INVERT-4 | PHI 3  | PHI 4 |  |  |  |  |  |
|            |                      |          | 1416.610 | 2650.050 | 66   | 18       | 0      | .013  | 2.000  | .000  | 2650.050 | .000     | 60.000 | .000  |  |  |  |  |  |
|            |                      |          |          |          |      |          |        |       |        |       | RADIUS   | ANGLE    |        |       |  |  |  |  |  |
|            |                      |          |          |          |      |          |        |       |        |       | .000     | .000     |        |       |  |  |  |  |  |

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

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

| ELEMENT NO | 6 IS A REACH    | U/S DATA | STATION  | INVERT   | SECT | N     | RADIUS | ANGLE | ANG PT | MAN H |          |          |        |       |  |  |  |  |  |
|------------|-----------------|----------|----------|----------|------|-------|--------|-------|--------|-------|----------|----------|--------|-------|--|--|--|--|--|
|            |                 |          | 1760.620 | 2651.770 | 66   | .013  | .000   | .000  | .000   | 1     |          |          |        |       |  |  |  |  |  |
| 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 |  |  |  |  |  |
|            |                 |          | 1760.620 | 2651.770 | 66   | 18    | 0      | .013  | 2.000  | .000  | 2651.770 | .000     | 46.000 | .000  |  |  |  |  |  |
|            |                 |          |          |          |      |       |        |       |        |       | RADIUS   | ANGLE    |        |       |  |  |  |  |  |
|            |                 |          |          |          |      |       |        |       |        |       | .000     | .000     |        |       |  |  |  |  |  |

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

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

| ELEMENT NO | 8 IS A REACH | U/S DATA | STATION  | INVERT   | SECT                                                                                                                                                                    | N    | RADIUS | ANGLE | ANG PT  | MAN H |  |  |  |  |  |  |  |  |  |
|------------|--------------|----------|----------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------|-------|---------|-------|--|--|--|--|--|--|--|--|--|
|            |              |          | 2054.300 | 2653.240 | 66                                                                                                                                                                      | .013 | .000   | .000  | 9.000   | 1     |  |  |  |  |  |  |  |  |  |
| ELEMENT NO | 9 IS A REACH | U/S DATA | STATION  | INVERT   | SECT <td>N</td> <td>RADIUS</td> <td>ANGLE</td> <td>ANG PT</td> <td>MAN H</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> | N    | RADIUS | ANGLE | ANG PT  | MAN H |  |  |  |  |  |  |  |  |  |
|            |              |          | 2187.940 | 2653.910 | 66                                                                                                                                                                      | .013 | .000   | .000  | -10.000 | 1     |  |  |  |  |  |  |  |  |  |

W S P G W

PAGE NO 3

WATER SURFACE PROFILE - ELEMENT CARD LISTING

| ELEMENT NO | 10 IS A REACH    | U/S DATA | STATION  | INVERT   | SECT | N     | RADIUS | ANGLE | ANG PT | MAN H |          |          |        |       |  |  |  |  |  |
|------------|------------------|----------|----------|----------|------|-------|--------|-------|--------|-------|----------|----------|--------|-------|--|--|--|--|--|
|            |                  |          | 2339.090 | 2654.660 | 66   | .013  | .000   | .000  | .000   | 1     |          |          |        |       |  |  |  |  |  |
| ELEMENT NO | 11 IS A JUNCTION | U/S DATA | STATION  | INVERT   | SECT | LAT-1 | LAT-2  | N     | Q3     | Q4    | INVERT-3 | INVERT-4 | PHI 3  | PHI 4 |  |  |  |  |  |
|            |                  |          | 2339.090 | 2654.660 | 66   | 18    | 0      | .013  | 14.500 | .000  | 2654.660 | .000     | 45.000 | .000  |  |  |  |  |  |
|            |                  |          |          |          |      |       |        |       |        |       | RADIUS   | ANGLE    |        |       |  |  |  |  |  |
|            |                  |          |          |          |      |       |        |       |        |       | .000     | .000     |        |       |  |  |  |  |  |

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

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

| ELEMENT NO | 12 IS A REACH    | U/S DATA | STATION  | INVERT   | SECT | N     | RADIUS | ANGLE | ANG PT | MAN H |          |          |         |       |  |  |  |  |  |
|------------|------------------|----------|----------|----------|------|-------|--------|-------|--------|-------|----------|----------|---------|-------|--|--|--|--|--|
|            |                  |          | 2397.020 | 2654.950 | 66   | .013  | .000   | .000  | 57.000 | 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 |  |  |  |  |  |
|            |                  |          | 2397.020 | 2654.950 | 66   | 24    | 0      | .013  | 2.500  | .000  | 2654.950 | .000     | -24.000 | .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 | 14 IS A REACH            | U/S DATA | STATION  | INVERT   | SECT | N    | RADIUS | ANGLE | ANG PT | MAN H |          |  |  |  |  |  |  |  |  |
|------------|--------------------------|----------|----------|----------|------|------|--------|-------|--------|-------|----------|--|--|--|--|--|--|--|--|
|            |                          |          | 2460.000 | 2655.270 | 66   | .013 | .000   | .000  | .000   | 1     |          |  |  |  |  |  |  |  |  |
| ELEMENT NO | 15 IS A SYSTEM HEADWORKS | U/S DATA | STATION  | INVERT   | SECT |      |        |       |        |       | W S ELEV |  |  |  |  |  |  |  |  |
|            |                          |          | 2460.000 | 2655.270 | 66   |      |        |       |        |       | .000     |  |  |  |  |  |  |  |  |



WATER SURFACE PROFILE LISTING  
EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
SKYE CANYON PARK STORM DRAIN SYSTEM (SCP)  
FROM FACILITY OH3 DROP INLETS THRU SKYE CANYON PARK TO REGIONAL MAINLI

Date: 5- 5-2019 Time: 1:29:16

| 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  | 2646.750    | 6.250      | 2653.000   | 294.00  | 12.37     | 2.38     | 2655.38        | .00        | 4.73           | .00            | 5.500          | .000            | .00 | 1 .0           |
| 16.650    | .0102       |            |            |         |           | .0077    | .13            | 6.25       | .00            | 3.96           | .013           | .00             | .00 | PIPE           |
| 1016.650  | 2646.920    | 6.554      | 2653.474   | 294.00  | 12.37     | 2.38     | 2655.85        | .00        | 4.73           | .00            | 5.500          | .000            | .00 | 1 .0           |
| 47.370    | .0289       |            |            |         |           | .0077    | .36            | 6.55       | .00            | 2.80           | .013           | .00             | .00 | PIPE           |
| 1064.020  | 2648.290    | 5.666      | 2653.956   | 294.00  | 12.37     | 2.38     | 2656.33        | .00        | 4.73           | .00            | 5.500          | .000            | .00 | 1 .0           |
| 352.590   | .0050       |            |            |         |           | .0077    | 2.70           | 5.67       | .00            | 5.50           | .013           | .00             | .00 | PIPE           |
| 1416.610  | 2650.050    | 6.727      | 2656.778   | 294.00  | 12.37     | 2.38     | 2659.16        | .00        | 4.73           | .00            | 5.500          | .000            | .00 | 1 .0           |
| JUNCT STR | .0000       |            |            |         |           | .0076    | .00            | 6.73       | .00            |                | .013           | .00             | .00 | PIPE           |
| 1416.610  | 2650.050    | 6.790      | 2656.841   | 292.00  | 12.29     | 2.35     | 2659.19        | .00        | 4.71           | .00            | 5.500          | .000            | .00 | 1 .0           |
| 344.010   | .0050       |            |            |         |           | .0076    | 2.60           | 6.79       | .00            | 5.50           | .013           | .00             | .00 | PIPE           |
| 1760.620  | 2651.770    | 7.789      | 2659.559   | 292.00  | 12.29     | 2.35     | 2661.90        | .00        | 4.71           | .00            | 5.500          | .000            | .00 | 1 .0           |
| JUNCT STR | .0000       |            |            |         |           | .0075    | .00            | 7.79       | .00            |                | .013           | .00             | .00 | PIPE           |
| 1760.620  | 2651.770    | 7.851      | 2659.621   | 290.00  | 12.21     | 2.31     | 2661.93        | .00        | 4.70           | .00            | 5.500          | .000            | .00 | 1 .0           |
| 293.680   | .0050       |            |            |         |           | .0075    | 2.19           | 7.85       | .00            | 5.50           | .013           | .00             | .00 | PIPE           |
| 2054.300  | 2653.240    | 8.755      | 2661.995   | 290.00  | 12.21     | 2.31     | 2664.31        | .00        | 4.70           | .00            | 5.500          | .000            | .00 | 1 .0           |
| 133.640   | .0050       |            |            |         |           | .0075    | 1.00           | 8.76       | .00            | 5.50           | .013           | .00             | .00 | PIPE           |
| 2187.940  | 2653.910    | 9.274      | 2663.184   | 290.00  | 12.21     | 2.31     | 2665.50        | .00        | 4.70           | .00            | 5.500          | .000            | .00 | 1 .0           |
| 151.150   | .0050       |            |            |         |           | .0075    | 1.13           | 9.27       | .00            | 5.50           | .013           | .00             | .00 | PIPE           |

Date: 5- 5-2019 Time: 1:29:16

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
SKYE CANYON PARK STORM DRAIN SYSTEM (SCP)  
FROM FACILITY OH3 DROP INLETS THRU SKYE CANYON PARK TO REGIONAL MAINLI

| 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        |
| 2339.090  | 2654.660    | 9.767      | 2664.427   | 290.00  | 12.21     | 2.31     | 2666.74        | .00        | 4.70           | .00            | 5.500          | .000            | .00 | 1 .0           |
| JUNCT STR | .0000       |            |            |         |           | .0071    | .00            | 9.77       | .00            |                | .013           | .00             | .00 | PIPE           |
| 2339.090  | 2654.660    | 10.108     | 2664.768   | 275.50  | 11.60     | 2.09     | 2666.86        | .00        | 4.60           | .00            | 5.500          | .000            | .00 | 1 .0           |
| 57.930    | .0050       |            |            |         |           | .0067    | .39            | 10.11      | .00            | 5.50           | .013           | .00             | .00 | PIPE           |
| 2397.020  | 2654.950    | 10.705     | 2665.655   | 275.50  | 11.60     | 2.09     | 2667.74        | .00        | 4.60           | .00            | 5.500          | .000            | .00 | 1 .0           |
| JUNCT STR | .0000       |            |            |         |           | .0067    | .00            | 10.71      | .00            |                | .013           | .00             | .00 | PIPE           |
| 2397.020  | 2654.950    | 10.778     | 2665.728   | 273.00  | 11.49     | 2.05     | 2667.78        | .00        | 4.59           | .00            | 5.500          | .000            | .00 | 1 .0           |
| 63.060    | .0051       |            |            |         |           | .0066    | .42            | 10.78      | .00            | 5.50           | .013           | .00             | .00 | PIPE           |
| 2460.080  | 2655.270    | 10.978     | 2666.248   | 273.00  | 11.49     | 2.05     | 2668.30        | .00        | 4.59           | .00            | 5.500          | .000            | .00 | 1 .0           |

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

SKYE CANYON PARK STORM DRAIN SYSTEM (SCP)



SCP.OUT  
FROM FACILITY OH3 DROP INLETS THRU SKYE CANYON PARK TO REGIONAL MAINLI

|         |     |   |    |   |   |   |    |
|---------|-----|---|----|---|---|---|----|
| 1000.00 | .I  | C | H  | W | E | . | R  |
| 1029.80 | .I  | C | H  | W | E | . | R  |
| 1059.60 | .   |   |    |   |   | . |    |
| 1089.39 | . I | C | HW | E | . | R |    |
| 1119.19 | .   |   |    |   |   | . |    |
| 1148.99 | .   |   |    |   |   | . |    |
| 1178.79 | .   |   |    |   |   | . |    |
| 1208.58 | .   |   |    |   |   | . |    |
| 1238.38 | .   |   |    |   |   | . |    |
| 1268.18 | .   |   |    |   |   | . |    |
| 1297.98 | .   |   |    |   |   | . |    |
| 1327.77 | .   |   |    |   |   | . |    |
| 1357.57 | .   |   |    |   |   | . |    |
| 1387.37 | .   |   |    |   |   | . |    |
| 1417.17 | .   | I | C  | H | W | E | JX |
| 1446.96 | .   | I | C  | H | W | E | R  |
| 1476.76 | .   |   |    |   |   | . |    |
| 1506.56 | .   |   |    |   |   | . |    |
| 1536.36 | .   |   |    |   |   | . |    |
| 1566.15 | .   |   |    |   |   | . |    |
| 1595.95 | .   |   |    |   |   | . |    |
| 1625.75 | .   |   |    |   |   | . |    |
| 1655.55 | .   |   |    |   |   | . |    |
| 1685.34 | .   |   |    |   |   | . |    |
| 1715.14 | .   |   |    |   |   | . |    |
| 1744.94 | .   |   |    |   |   | . |    |
| 1774.74 | .   | I | C  | H | W | E | JX |
| 1804.53 | .   | I | C  | H | W | E | R  |

| Year    | Country | Value | Unit |
|---------|---------|-------|------|
| 1834.33 |         |       |      |
| 1864.13 |         |       |      |
| 1893.93 |         |       |      |
| 1923.72 |         |       |      |
| 1953.52 |         |       |      |
| 1983.32 |         |       |      |
| 2013.12 |         |       |      |
| 2042.91 |         |       |      |
| 2072.71 | I       | C H   | W E  |
| 2102.51 |         |       |      |
| 2132.31 |         |       |      |
| 2162.10 |         |       |      |
| 2191.90 | I       | C H   | W E  |
| 2221.70 |         |       |      |
| 2251.50 |         |       |      |
| 2281.29 |         |       |      |
| 2311.09 |         |       |      |
| 2340.89 | I       | C H   | W E  |
| 2370.69 | I       | C H   | W E  |
| 2400.48 | I       | C H   | W E  |
| 2430.28 | I       | C H   | W E  |
| 2460.08 | I       | C H   | W E  |

NOTES

## 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                                     |                        |                            |                        |                       |                       |                        |          |                 |              |                                               |                        |
|---------------------------------------------------------------------|------------------------|----------------------------|------------------------|-----------------------|-----------------------|------------------------|----------|-----------------|--------------|-----------------------------------------------|------------------------|
| Lateral Line From Facility SC1 to Skye Canyon Park Model (CLAT.WSW) |                        |                            |                        |                       |                       |                        |          |                 |              |                                               |                        |
| WSPG Station                                                        | Plan Set Project No. * | Equivalent Roadway Station | Improvement Plan Sheet | Storm Drain Dimension | Invert Elevation (ft) | Q <sub>100</sub> (cfs) | WSE (ft) | Velocity (ft/s) | FG Elevation | Facility Description                          | HGL Check <sup>1</sup> |
| 1000.00                                                             | SCP: EST1908           | 26+96.09                   | P-3                    | 24" RCP               | 2654.95               | 3                      | 2665.66  | 0.80            | 2668.83      | Connection to SCP Mainline Model              | OK                     |
| 1030.30                                                             | SCP: EST1908           | 26+68.27                   |                        | 24" RCP               | 2655.35               | 3                      | 2665.66  | 0.80            | 2669.15      |                                               | OK                     |
| 1255.07                                                             | SCP: EST1908           | 26+70.26                   | P-2                    | 24" RCP               | 2658.32               | 3                      | 2665.69  | 0.80            | 2670.26      |                                               | OK                     |
| 1602.74                                                             | SCP: EST1908           | 20+95.83                   |                        | 24" RCP               | 2662.92               | 3                      | 2665.73  | 0.80            | 2671.82      |                                               | OK                     |
| 1650.12                                                             | SCP: EST1908           | 20+62.33                   |                        | 18" RCP               | 2663.55               | 3                      | 2665.74  | 0.80            | 2670.97      | Addition of Flow from SC1 Drop Inlet Facility | OK                     |
| 1650.12                                                             | SCP: EST1908           |                            |                        | 18" RCP               | 2663.55               | 3                      | 2665.74  | 0.80            | 2670.97      |                                               | OK                     |



T1 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
T2 SKY CANYON PARK STORM DRAIN SYSTEM LATERAL (CLAT)  
T3 FROM FACILITY SC1 TO STORM DRAIN MODEL SCP

CLAT.WSW

|    |                  |    |   |       |        |       |       |       |           |          |      |   |
|----|------------------|----|---|-------|--------|-------|-------|-------|-----------|----------|------|---|
| SO | 1000.0002654.950 | 24 |   |       |        |       |       |       |           | 2665.655 |      |   |
| R  | 1030.3002655.350 | 24 |   | .013  |        |       |       |       |           |          | 24.0 | 1 |
| R  | 1255.0702658.320 | 24 |   | .013  |        |       |       |       |           |          | 0.0  | 1 |
| R  | 1602.7402662.920 | 24 |   | .013  |        |       |       |       |           |          | 45.0 | 1 |
| R  | 1650.1202663.550 | 24 |   | .013  |        |       |       |       |           |          |      |   |
| SH | 1650.1202663.550 | 24 |   |       |        |       |       |       |           |          |      |   |
| 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  |                  |    |   |       | 2.500  |       |       |       |           |          |      |   |

FILE: CLAT.WSW

CLAT.EDT

W S P G W - EDIT LISTING - Version 14.10

Date: 5- 5-2019 Time:12:46:34

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

| CARD CODE | SECT NO | CHN TYPE | NO OF PIER/PIP | AVE WIDTH | PIER DIAMETER | HEIGHT 1 | 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

PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

HEADING LINE NO 2 IS -

SKY CANYON PARK STORM DRAIN SYSTEM LATERAL (CLAT)

HEADING LINE NO 3 IS -

FROM FACILITY SC1 TO STORM DRAIN MODEL SCP

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 | RADIUS | ANGLE | ANG PT | MAN H |
|------------|-------------------------|----------|----------|----------|------|----------|--------|-------|--------|-------|
|            |                         |          | 1000.000 | 2654.950 | 24   | 2665.655 |        |       |        |       |
| ELEMENT NO | 2 IS A REACH            | U/S DATA | STATION  | INVERT   | SECT |          |        |       |        |       |
|            |                         |          | 1030.300 | 2655.350 | 24   |          | .000   | .000  | 24.000 | 1     |
| ELEMENT NO | 3 IS A REACH            | U/S DATA | STATION  | INVERT   | SECT |          |        |       |        |       |
|            |                         |          | 1255.070 | 2658.320 | 24   |          | .000   | .000  | .000   | 1     |
| ELEMENT NO | 4 IS A REACH            | U/S DATA | STATION  | INVERT   | SECT |          |        |       |        |       |
|            |                         |          | 1602.740 | 2662.920 | 24   |          | .000   | .000  | 45.000 | 1     |
| ELEMENT NO | 5 IS A REACH            | U/S DATA | STATION  | INVERT   | SECT |          |        |       |        |       |
|            |                         |          | 1650.120 | 2663.550 | 24   |          | .000   | .000  | .000   | 0     |
| ELEMENT NO | 6 IS A SYSTEM HEADWORKS | U/S DATA | STATION  | INVERT   | SECT |          |        |       |        |       |
|            |                         |          | 1650.120 | 2663.550 | 24   |          |        |       |        |       |

WATER SURFACE PROFILE LISTING  
EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
SKY CANYON PARK STORM DRAIN SYSTEM LATERAL (CLAT)  
FROM FACILITY SC1 TO STORM DRAIN MODEL SCP

Date: 5- 5-2019 Time:12:46:37

| Station  | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top | 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 | 2654.950    | 10.705     | 2665.655   | 2.50    | .80       | .01      | 2665.66        | .00        | .55            | .00      | 2.000          | .000            | .00 | 1 .0           |
| 30.300   | .0132       |            |            |         |           | .0001    | .00            | 10.71      | .00            | .42      | .013           | .00             | .00 | PIPE           |
| 1030.300 | 2655.350    | 10.310     | 2665.660   | 2.50    | .80       | .01      | 2665.67        | .00        | .55            | .00      | 2.000          | .000            | .00 | 1 .0           |
| 224.770  | .0132       |            |            |         |           | .0001    | .03            | 10.31      | .00            | .42      | .013           | .00             | .00 | PIPE           |
| 1255.070 | 2658.320    | 7.368      | 2665.688   | 2.50    | .80       | .01      | 2665.70        | .00        | .55            | .00      | 2.000          | .000            | .00 | 1 .0           |
| 347.670  | .0132       |            |            |         |           | .0001    | .04            | 7.37       | .00            | .42      | .013           | .00             | .00 | PIPE           |
| 1602.740 | 2662.920    | 2.812      | 2665.732   | 2.50    | .80       | .01      | 2665.74        | .00        | .55            | .00      | 2.000          | .000            | .00 | 1 .0           |
| 47.380   | .0133       |            |            |         |           | .0001    | .01            | 2.81       | .00            | .42      | .013           | .00             | .00 | PIPE           |
| 1650.120 | 2663.550    | 2.188      | 2665.738   | 2.50    | .80       | .01      | 2665.75        | .00        | .55            | .00      | 2.000          | .000            | .00 | 1 .0           |

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

SKY CANYON PARK STORM DRAIN SYSTEM LATERAL (CLAT)

FROM FACILITY SC1 TO STORM DRAIN MODEL SCP

|         |    |   |   |   |  |  |  |  |  |  |  |  |  |       |
|---------|----|---|---|---|--|--|--|--|--|--|--|--|--|-------|
| 1000.00 | .I | C | H |   |  |  |  |  |  |  |  |  |  | W . R |
| 1013.27 | .  |   |   |   |  |  |  |  |  |  |  |  |  | .     |
| 1026.54 | .  |   |   |   |  |  |  |  |  |  |  |  |  | .     |
| 1039.80 | .  | I | C | H |  |  |  |  |  |  |  |  |  | W . R |
| 1053.07 | .  |   |   |   |  |  |  |  |  |  |  |  |  | .     |
| 1066.34 | .  |   |   |   |  |  |  |  |  |  |  |  |  | .     |
| 1079.61 | .  |   |   |   |  |  |  |  |  |  |  |  |  | .     |
| 1092.87 | .  |   |   |   |  |  |  |  |  |  |  |  |  | .     |
| 1106.14 | .  |   |   |   |  |  |  |  |  |  |  |  |  | .     |
| 1119.41 | .  |   |   |   |  |  |  |  |  |  |  |  |  | .     |
| 1132.68 | .  |   |   |   |  |  |  |  |  |  |  |  |  | .     |
| 1145.95 | .  |   |   |   |  |  |  |  |  |  |  |  |  | .     |
| 1159.21 | .  |   |   |   |  |  |  |  |  |  |  |  |  | .     |
| 1172.48 | .  |   |   |   |  |  |  |  |  |  |  |  |  | .     |
| 1185.75 | .  |   |   |   |  |  |  |  |  |  |  |  |  | .     |



CLAT.OUT

1199.02 .  
1212.28 .  
1225.55 .  
1238.82 .  
1252.09 .  
1265.36 .  
1278.62 .  
1291.89 .  
1305.16 .  
1318.43 .  
1331.69 .  
1344.96 .  
1358.23 .  
1371.50 .  
1384.76 .  
1398.03 .  
1411.30 .  
1424.57 .  
1437.84 .  
1451.10 .  
1464.37 .  
1477.64 .  
1490.91 .  
1504.17 .  
1517.44 .  
1530.71 .  
1543.98 .  
1557.25 .  
1570.51 .

I C H

W . R

1583.78 .

CLAT.OUT

1597.05 .

1610.32 .

I C H W . R

1623.58 .

1636.85 .

1650.12 .

I C HWE. R

2654.950 2656.030 2657.110 2658.189 2659.269 2660.349 2661.429 2662.509 2663.589 2664.668 2665.748

#### NOTES

##### 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                                                                     |                        |                            |                        |                       |                       |                        |          |                 |              |                                               |                        |
|-----------------------------------------------------------------------------------------------------|------------------------|----------------------------|------------------------|-----------------------|-----------------------|------------------------|----------|-----------------|--------------|-----------------------------------------------|------------------------|
| Lateral Line From Facility SC1 to Skye Canyon Park Model with Proposed Condition Flows (CLAT-P.WSW) |                        |                            |                        |                       |                       |                        |          |                 |              |                                               |                        |
| WSPG Station                                                                                        | Plan Set Project No. * | Equivalent Roadway Station | Improvement Plan Sheet | Storm Drain Dimension | Invert Elevation (ft) | Q <sub>100</sub> (cfs) | WSE (ft) | Velocity (ft/s) | FG Elevation | Facility Description                          | HGL Check <sup>1</sup> |
| 1000.00                                                                                             | SCP: EST1908           | 26+96.09                   | P-3                    | 24" RCP               | 2654.95               | 14                     | 2665.66  | 4.30            | 2668.83      | Connection to SCP Mainline Model              | OK                     |
| 1030.30                                                                                             | SCP: EST1908           | 26+68.27                   |                        | 24" RCP               | 2655.35               | 14                     | 2665.80  | 4.30            | 2669.15      |                                               | OK                     |
| 1255.07                                                                                             | SCP: EST1908           | 26+70.26                   |                        | 24" RCP               | 2658.32               | 14                     | 2666.62  | 4.30            | 2670.26      |                                               | OK                     |
| 1602.74                                                                                             | SCP: EST1908           | 20+95.83                   | P-2                    | 24" RCP               | 2662.92               | 14                     | 2667.91  | 4.30            | 2671.82      |                                               | OK                     |
| 1647.62                                                                                             | SCP: EST1908           | 20+62.33                   |                        | 5' x 10' RCB          | 2663.52               | 14                     | 2668.11  | 4.30            | 2670.97      | Wall Entrance                                 | OK                     |
| 1647.62                                                                                             | SCP: EST1908           |                            |                        | 5' x 10' RCB          | 2663.52               | 14                     | 2664.05  | 20.35           | 2670.97      |                                               | OK                     |
| 1650.12                                                                                             | SCP: EST1908           | 16+68.21                   |                        | 5' x 10' RCB          | 2663.55               | 11                     | 2668.12  | 0.48            | 2673.38      | Addition of Flow from SC1 Drop Inlet Facility | OK                     |
| 1650.12                                                                                             | SCP: EST1908           | 13+64.25                   |                        | 5' x 10' RCB          | 2663.55               | 11                     | 2668.12  | 0.48            | 2674.94      |                                               | OK                     |
| 1652.62                                                                                             | SCP: EST1908           | 10+60.28                   |                        | 5' x 10' RCB          | 2663.59               | 11                     | 2668.12  | 0.49            | 2670.97      |                                               | OK                     |
| 1652.62                                                                                             | SCP: EST1908           |                            |                        | 5' x 10' RCB          | 2663.59               | 11                     | 2668.12  | 3.50            | 2670.97      | Wall Exit                                     | OK                     |
| 1702.97                                                                                             | SCP: EST1908           | 8+64.87                    | P-6                    | 24" RCP               | 2664.30               | 11                     | 2668.24  | 3.50            | 2673.38      |                                               | OK                     |
| 1702.97                                                                                             | SCP: EST1908           | 6+26.04                    |                        | 24" RCP               | 2664.30               | 11                     | 2668.24  | 3.50            | 2674.94      |                                               | OK                     |



T1 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
 T2 SKY CANYON PARK STORM DRAIN SYSTEM LATERAL (CLAT-P)  
 T3 FROM FACILITY SC1 TO STORM DRAIN MODEL SCP (PROPOSED FLOW)

|    |                  |       |        |       |          |       |       |       |      |
|----|------------------|-------|--------|-------|----------|-------|-------|-------|------|
| SO | 1000.0002654.950 | 24    |        |       | 2665.655 |       |       |       |      |
| R  | 1030.3002655.350 | 24    | .013   |       |          | 24.0  | 1     |       |      |
| R  | 1255.0702658.320 | 24    | .013   |       |          | 0.0   | 1     |       |      |
| R  | 1602.7402662.920 | 24    | .013   |       |          | 45.0  | 1     |       |      |
| R  | 1647.6202663.517 | 24    | .013   |       |          | 45.0  |       |       |      |
| WE | 1647.6202663.517 | 24    | .013   |       |          |       |       |       |      |
| R  | 1650.1202663.550 | 1     | .013   |       |          |       | 1     |       |      |
| JX | 1650.1202663.550 | 1 1   | .013   | 2.5   | 2663.550 |       |       |       |      |
| R  | 1652.6202663.585 | 1     | .013   |       |          |       | 1     |       |      |
| WX | 1652.6202663.585 | 1     | .013   |       |          |       |       |       |      |
| R  | 1702.9702664.300 | 24    | .013   |       |          |       | 1     |       |      |
| SH | 1702.9702664.300 | 24    |        |       |          |       |       |       |      |
| CD | 1 3 0            | 0.000 | 10.000 | 5.000 | 0.000    | 0.000 | 0.000 | 0.000 | 0.00 |
| CD | 18 4 1           | 0.000 | 1.500  | 0.000 | 0.000    | 0.000 | 0.000 | 0.000 | 0.00 |
| CD | 24 4 1           | 0.000 | 2.000  | 0.000 | 0.000    | 0.000 | 0.000 | 0.000 | 0.00 |
| CD | 30 4 1           | 0.000 | 2.500  | 0.000 | 0.000    | 0.000 | 0.000 | 0.000 | 0.00 |
| CD | 36 4 1           | 0.000 | 3.000  | 0.000 | 0.000    | 0.000 | 0.000 | 0.000 | 0.00 |
| CD | 42 4 1           | 0.000 | 3.500  | 0.000 | 0.000    | 0.000 | 0.000 | 0.000 | 0.00 |
| CD | 48 4 1           | 0.000 | 4.000  | 0.000 | 0.000    | 0.000 | 0.000 | 0.000 | 0.00 |
| CD | 54 4 1           | 0.000 | 4.500  | 0.000 | 0.000    | 0.000 | 0.000 | 0.000 | 0.00 |
| CD | 60 4 1           | 0.000 | 5.000  | 0.000 | 0.000    | 0.000 | 0.000 | 0.000 | 0.00 |
| CD | 66 4 1           | 0.000 | 5.500  | 0.000 | 0.000    | 0.000 | 0.000 | 0.000 | 0.00 |
| CD | 72 4 1           | 0.000 | 6.000  | 0.000 | 0.000    | 0.000 | 0.000 | 0.000 | 0.00 |
| Q  |                  |       | 11.000 |       |          |       |       |       |      |

FILE: CLAT-P.WSW

CLAT-P.EDT

W S P G W - EDIT LISTING - Version 14.10

Date: 5- 5-2019 Time:12:46:50

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

| CARD CODE | SECT NO | CHN TYPE | NO OF PIER/PIP | AVE WIDTH | PIER DIAMETER | HEIGHT 1 | BASE WIDTH | ZL   | ZR  | INV DROP | Y(1) | Y(2) | Y(3) | Y(4) | Y(5) | Y(6) | Y(7) | Y(8) | Y(9) | Y(10) |
|-----------|---------|----------|----------------|-----------|---------------|----------|------------|------|-----|----------|------|------|------|------|------|------|------|------|------|-------|
| CD        | 1       | 3        | 0              | .000      | 10.000        | 5.000    | .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 -

SKY CANYON PARK STORM DRAIN SYSTEM LATERAL (CLAT-P)

HEADING LINE NO 3 IS -

FROM FACILITY SC1 TO STORM DRAIN MODEL SCP (PROPOSED FLOW)

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

| ELEMENT NO                                                                                              | IS | A | SYSTEM OUTLET    | STATION  | INVERT   | SECT | W S ELEV | RADIUS | ANGLE | ANG PT | MAN H |
|---------------------------------------------------------------------------------------------------------|----|---|------------------|----------|----------|------|----------|--------|-------|--------|-------|
| ELEMENT NO 1                                                                                            | IS | A | SYSTEM OUTLET    | 1000.000 | 2654.950 | 24   | 2665.655 |        |       |        |       |
| ELEMENT NO 2                                                                                            | IS | A | REACH            | 1030.300 | 2655.350 | 24   |          | .000   | .000  | 24.000 | 1     |
| ELEMENT NO 3                                                                                            | IS | A | REACH            | 1255.070 | 2658.320 | 24   |          | .000   | .000  | .000   | 1     |
| ELEMENT NO 4                                                                                            | IS | A | REACH            | 1602.740 | 2662.920 | 24   |          | .000   | .000  | 45.000 | 1     |
| ELEMENT NO 5                                                                                            | IS | A | REACH            | 1647.620 | 2663.517 | 24   |          | .000   | .000  | 45.000 | 0     |
| ELEMENT NO 6                                                                                            | IS | A | WALL ENTRANCE    | 1647.620 | 2663.517 | 24   |          |        |       |        |       |
| WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS             |    |   |                  |          |          |      |          |        |       |        |       |
| ELEMENT NO 7                                                                                            | IS | A | REACH            | 1650.120 | 2663.550 | 1    |          | .000   | .000  | .000   | 0     |
| ELEMENT NO 8                                                                                            | IS | A | JUNCTION         | 1650.120 | 2663.550 | 1    |          |        |       |        |       |
| THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING |    |   |                  |          |          |      |          |        |       |        |       |
| ELEMENT NO 9                                                                                            | IS | A | REACH            | 1652.620 | 2663.585 | 1    |          | .000   | .000  | .000   | 0     |
| ELEMENT NO 10                                                                                           | IS | A | WALL EXIT        | 1652.620 | 2663.585 | 1    |          |        |       |        |       |
| WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS             |    |   |                  |          |          |      |          |        |       |        |       |
| ELEMENT NO 11                                                                                           | IS | A | REACH            | 1702.970 | 2664.300 | 24   |          | .000   | .000  | .000   | 0     |
| WATER SURFACE PROFILE - ELEMENT CARD LISTING                                                            |    |   |                  |          |          |      |          |        |       |        |       |
| ELEMENT NO 12                                                                                           | IS | A | SYSTEM HEADWORKS | 1702.970 | 2664.300 | 24   |          |        |       |        |       |

PAGE NO 3

WATER SURFACE PROFILE LISTING

Date: 5- 5-2019 Time:12:46:53

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
SKY CANYON PARK STORM DRAIN SYSTEM LATERAL (CLAT-P)  
FROM FACILITY SC1 TO STORM DRAIN MODEL SCP (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       | 2654.950    | 10.705     | 2665.655   | 13.50   | 4.30      | .29      | 2665.94        | .00        | 1.32           | .00            | 2.000          | .000            | .00 | 1 .0           |
| 30.300         | .0132       |            |            |         |           | .0036    | .11            | 10.71      | .00            | 1.02           | .013           | .00             | .00 | PIPE           |
| 1030.300       | 2655.350    | 10.450     | 2665.800   | 13.50   | 4.30      | .29      | 2666.09        | .00        | 1.32           | .00            | 2.000          | .000            | .00 | 1 .0           |
| 224.770        | .0132       |            |            |         |           | .0036    | .80            | 10.45      | .00            | 1.02           | .013           | .00             | .00 | PIPE           |
| 1255.070       | 2658.320    | 8.295      | 2666.615   | 13.50   | 4.30      | .29      | 2666.90        | .00        | 1.32           | .00            | 2.000          | .000            | .00 | 1 .0           |
| 347.670        | .0132       |            |            |         |           | .0036    | 1.24           | 8.29       | .00            | 1.02           | .013           | .00             | .00 | PIPE           |
| 1602.740       | 2662.920    | 4.990      | 2667.910   | 13.50   | 4.30      | .29      | 2668.20        | .00        | 1.32           | .00            | 2.000          | .000            | .00 | 1 .0           |
| 44.880         | .0133       |            |            |         |           | .0036    | .16            | 4.99       | .00            | 1.02           | .013           | .00             | .00 | PIPE           |
| 1647.620       | 2663.517    | 4.595      | 2668.112   | 13.50   | 4.30      | .29      | 2668.40        | .00        | 1.32           | .00            | 2.000          | .000            | .00 | 1 .0           |
| HYDRAULIC JUMP |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |
| 1647.620       | 2663.517    | .528       | 2664.045   | 13.50   | 20.35     | 6.43     | 2670.48        | .00        | 1.32           | 1.76           | 2.000          | .000            | .00 | 0 .0           |
| HYDRAULIC DROP |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |
| 1647.620       | 2663.517    | 4.595      | 2668.112   | 13.50   | .59       | .01      | 2668.12        | .00        | .61            | 5.00           | 10.000         | 5.000           | .00 | 0 .0           |
| 2.500          | .0132       |            |            |         |           | .0000    | .00            | 4.60       | .05            | .41            | .013           | .00             | .00 | BOX            |
| JUNCT STR      | .0000       |            |            |         |           | .0000    | .00            | 4.56       | .05            | .013           | .00            | .00             | .00 | BOX            |
| 1650.120       | 2663.550    | 4.565      | 2668.115   | 11.00   | .48       | .00      | 2668.12        | .00        | .53            | 5.00           | 10.000         | 5.000           | .00 | 0 .0           |
| 2.500          | .0140       |            |            |         |           | .0000    | .00            | 4.57       | .04            | .35            | .013           | .00             | .00 | BOX            |

WATER SURFACE PROFILE LISTING  
EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE  
SKY CANYON PARK STORM DRAIN SYSTEM LATERAL (CLAT-P)  
FROM FACILITY SC1 TO STORM DRAIN MODEL SCP (PROPOSED FLOW)

Date: 5- 5-2019 Time:12:46:53

| 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        |
| 1652.620  | 2663.585    | 4.531      | 2668.115   | 11.00   | .49       | .00      | 2668.12        | .00        | .53            | 5.00           | 10.000         | 5.000           | .00 | 0 .0           |
| WALL EXIT |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |
| 1652.620  | 2663.585    | 4.531      | 2668.116   | 11.00   | 3.50      | .19      | 2668.31        | .00        | 1.19           | .00            | 2.000          | .000            | .00 | 1 .0           |
| 50.350    | .0142       |            |            |         |           | .0024    | .12            | 4.53       | .00            | .89            | .013           | .00             | .00 | PIPE           |
| 1702.970  | 2664.300    | 3.935      | 2668.235   | 11.00   | 3.50      | .19      | 2668.43        | .00        | 1.19           | .00            | 2.000          | .000            | .00 | 1 .0           |

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

SKY CANYON PARK STORM DRAIN SYSTEM LATERAL (CLAT-P)

FROM FACILITY SC1 TO STORM DRAIN MODEL SCP (PROPOSED FLOW)

1000.00 .I C H

WE

R

1014.35 .



|         |   |   |     |            |   |
|---------|---|---|-----|------------|---|
| 1028.69 | . |   |     | CLAT-P.OUT | . |
| 1043.04 | . | I | C H | WE         | R |
| 1057.39 | . |   |     |            | . |
| 1071.73 | . |   |     |            | . |
| 1086.08 | . |   |     |            | . |
| 1100.42 | . |   |     |            | . |
| 1114.77 | . |   |     |            | . |
| 1129.12 | . |   |     |            | . |
| 1143.46 | . |   |     |            | . |
| 1157.81 | . |   |     |            | . |
| 1172.16 | . |   |     |            | . |
| 1186.50 | . |   |     |            | . |
| 1200.85 | . |   |     |            | . |
| 1215.19 | . |   |     |            | . |
| 1229.54 | . |   |     |            | . |
| 1243.89 | . |   |     |            | . |
| 1258.23 | . | I | C H | WE         | R |
| 1272.58 | . |   |     |            | . |
| 1286.93 | . |   |     |            | . |
| 1301.27 | . |   |     |            | . |
| 1315.62 | . |   |     |            | . |
| 1329.97 | . |   |     |            | . |
| 1344.31 | . |   |     |            | . |
| 1358.66 | . |   |     |            | . |
| 1373.00 | . |   |     |            | . |
| 1387.35 | . |   |     |            | . |
| 1401.70 | . |   |     |            | . |
| 1416.04 | . |   |     |            | . |
| 1430.39 | . |   |     |            | . |
| 1444.74 | . |   |     |            | . |

[illegible]

## 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





O'Hare Road

---



| Ultimate Condition WSPG Summary                                                |                        |                            |                        |                       |                       |                        |          |                 |              |                          |                                 |
|--------------------------------------------------------------------------------|------------------------|----------------------------|------------------------|-----------------------|-----------------------|------------------------|----------|-----------------|--------------|--------------------------|---------------------------------|
| Mainline in Ohare Road from from Basin EPJ to SD in Skye Canyon Park (OHA.WSW) |                        |                            |                        |                       |                       |                        |          |                 |              |                          |                                 |
| WSPG Station                                                                   | Plan Set Project No. * | Equivalent Roadway Station | Improvement Plan Sheet | Storm Drain Dimension | Invert Elevation (ft) | Q <sub>100</sub> (cfs) | WSE (ft) | Velocity (ft/s) | FG Elevation | Facility Description     | HGL Check <sup>1</sup>          |
| 1000.00                                                                        | SCP:<br>EST1908        | 26+96.09                   | P-5                    | 66" RCP               | 2654.95               | 273.10                 | 2665.73  | 11.49           | 2696.09      | Connection to SCP Model  | OK                              |
| 1063.06                                                                        |                        | 26+61.63                   |                        | 66" RCP               | 2655.27               | 273.10                 | 2666.48  | 11.49           | 2672.52      |                          | OK                              |
| 1143.76                                                                        |                        | 26+64.                     |                        | 66" RCP               | 2655.67               | 273.10                 | 2667.16  | 11.49           | 2669.80      | Junction with OH3 Inlets | OK                              |
| 1143.76                                                                        |                        |                            |                        | 48" RCP               | 2657.17               | 216.10                 | 2665.64  | 17.20           | 2669.80      |                          | OK                              |
| 1369.51                                                                        | OHA:<br>EST1909        | 39+80.57                   | P-4                    | 48" RCP               | 2663.94               | 216.10                 | 2671.04  | 17.20           | 2677.02      |                          | OK                              |
| 1541.23                                                                        |                        | 38+10.5                    | 48" RCP                | 2670.52               | 216.10                | 2673.33                | 22.90    | 2683.40         |              | OK                       |                                 |
| 1702.52                                                                        |                        |                            | 48" RCP                | 2676.51               | 216.10                | 2679.66                | 20.38    | 2689.40         |              | OK                       |                                 |
| 1879.81                                                                        |                        |                            | 48" RCP                | 2681.07               | 216.10                | 2684.37                | 19.47    | 2694.41         |              | OK                       |                                 |
| 2003.15                                                                        |                        |                            | 33+53.14               | 48" RCP               | 2684.29               | 216.10                 | 2688.18  | 17.34           | 2697.18      | Junction with OH2 Inlets | OK                              |
| 2003.15                                                                        |                        | 48" RCP                    |                        | 2684.29               | 148.10                | 2692.16                | 11.79    | 2697.18         |              | OK                       |                                 |
| 2140.27                                                                        | ENT:<br>EST1910        | 32+16.02                   | P-2                    | 48" RCP               | 2689.09               | 148.10                 | 2693.73  | 11.79           | 2702.38      | Junction with Basin EPF2 | OK                              |
| 2140.27                                                                        |                        |                            |                        | 36" RCP               | 2690.09               | 91.10                  | 2695.54  | 12.89           | 2702.38      |                          | OK                              |
| 2230.60                                                                        |                        | 31+24.62                   |                        | 36" RCP               | 2693.55               | 91.10                  | 2695.60  | 17.68           | 2706.44      |                          | OK                              |
| 2424.84                                                                        |                        |                            |                        | 36" RCP               | 2699.08               | 91.10                  | 2701.19  | 17.12           | 2712.32      |                          | OK                              |
| 2612.76                                                                        |                        |                            |                        | 36" RCP               | 2704.43               | 91.10                  | 2707.28  | 13.13           | 2717.32      | Junction with OH1 Inlets | OK                              |
| 2612.76                                                                        |                        |                            |                        | 36" RCP               | 2704.43               | 55.10                  | 2710.02  | 7.80            | 2717.32      |                          | OK                              |
| 2694.38                                                                        | ENT:<br>EST1910        | 14+86.                     | P-3                    | 36" RCP               | 2705.75               | 55.10                  | 2710.79  | 7.80            | 2717.32      |                          | OK                              |
| 2814.96                                                                        |                        |                            |                        | 36" RCP               | 2707.78               | 55.00                  | 2711.66  | 7.78            | 2721.39      |                          | OK                              |
| 2814.96                                                                        |                        | 36" RCP                    |                        | 2707.78               | 55.00                 | 2711.66                | 7.78     | 2721.39         |              | OK                       |                                 |
| 3122.22                                                                        |                        | 10+58.16                   |                        | 36" RCP               | 2710.85               | 55.00                  | 2713.94  | 7.78            | 2723.09      |                          | OK                              |
| 3177.96                                                                        |                        |                            |                        | 36" RCP               | 2711.41               | 55.00                  | 2714.50  | 7.78            | 2723.56      |                          | OK                              |
| 3224.26                                                                        |                        |                            |                        | 10+18.75              | 36" RCP               | 2711.87                | 55.00    | 2714.86         | 7.78         | 2725.00                  | Addition of Flow from Basin EPJ |
| 3224.26                                                                        | 36" RCP                |                            | 2711.87                |                       | 55.00                 | 2714.86                | 7.78     | 2725.00         |              | OK                       |                                 |

**T1 EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE**

T2 OHARE STORM DRAIN SYSTEM (OHA)

T3 OHARE ROAD SYSTEM FROM PARCEL EPJ TO MAINLINE IN SKYE CANYON PARK DRIVE

[illegible]



FILE: OHA.WSW

OHA.EDT

W S P G W - EDIT LISTING - Version 14.10

Date: 5- 1-2019 Time: 3:39:24

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 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             |         |    |          |      |      |      |      |      |      |      |      |      |       |
| CD        | 48      | 4        | 1              |                | 4.000             |         |    |          |      |      |      |      |      |      |      |      |      |       |
| CD        | 54      | 4        | 1              |                | 4.500             |         |    |          |      |      |      |      |      |      |      |      |      |       |
| CD        | 60      | 4        | 1              |                | 5.000             |         |    |          |      |      |      |      |      |      |      |      |      |       |
| CD        | 66      | 4        | 1              |                | 5.500             |         |    |          |      |      |      |      |      |      |      |      |      |       |

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 -

OHARE STORM DRAIN SYSTEM (OHA)

HEADING LINE NO 3 IS -

OHARE ROAD SYSTEM FROM PARCEL EPJ TO MAINLINE IN SKYE CANYON PARK DRIVE

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

| ELEMENT NO | IS | A | SYSTEM OUTLET | STATION  | INVERT   | SECT | W S ELEV | RADIUS | ANGLE | ANG PT  | MAN H   |
|------------|----|---|---------------|----------|----------|------|----------|--------|-------|---------|---------|
| 1          | IS | A | SYSTEM OUTLET | 1000.000 | 2654.950 | 66   | 2665.726 |        |       |         |         |
| 2          | IS | A | REACH         | 1063.060 | 2655.270 | 66   |          | .013   | .000  | 35.000  | 1       |
| 3          | IS | A | REACH         | 1143.760 | 2655.670 | 66   |          | .013   | .000  | 6.000   | 1       |
| 4          | IS | A | JUNCTION      | 1143.760 | 2657.170 | 48   |          | .013   | .000  | 56.000  | -48.000 |
| 5          | IS | A | REACH         | 1369.510 | 2663.940 | 48   |          | .013   | .000  | -4.000  | 1       |
| 6          | IS | A | REACH         | 1541.230 | 2670.520 | 48   |          | .013   | .000  | -11.500 | 1       |
| 7          | IS | A | REACH         | 1702.520 | 2676.510 | 48   |          | .013   | .000  | -11.500 | 1       |
| 8          | IS | A | REACH         | 1879.810 | 2681.070 | 48   |          | .013   | .000  | -7.000  | 1       |
| 9          | IS | A | REACH         | 2003.150 | 2684.290 | 48   |          | .013   | .000  | .000    | 1       |
| 10         | IS | A | JUNCTION      | 2003.150 | 2684.290 | 48   |          | .013   | .000  | 60.000  | -45.000 |

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

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

W S P G W

PAGE NO 3

WATER SURFACE PROFILE - ELEMENT CARD LISTING

| ELEMENT NO | IS | A | REACH    | STATION  | INVERT   | SECT | N    | Q3     | Q4     | INVERT-3 | INVERT-4 | PHI 3  | PHI 4   |
|------------|----|---|----------|----------|----------|------|------|--------|--------|----------|----------|--------|---------|
| 11         | IS | A | REACH    | 2140.270 | 2689.090 | 48   | .013 |        |        |          |          |        |         |
| 12         | IS | A | JUNCTION | 2140.270 | 2690.090 | 36   | .013 | 57.000 | .000   | 2690.090 | .000     | 90.000 | .000    |
| 13         | IS | A | REACH    | 2230.600 | 2693.550 | 36   | .013 |        |        |          |          |        |         |
| 14         | IS | A | REACH    | 2424.840 | 2699.080 | 36   | .013 |        |        |          |          |        |         |
| 15         | IS | A | REACH    | 2612.760 | 2704.430 | 36   | .013 |        |        |          |          |        |         |
| 16         | IS | A | JUNCTION | 2612.760 | 2704.430 | 36   | .013 | 18.000 | 18.000 | 2705.930 | 2705.930 | 65.000 | -67.000 |

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 | IS | A | REACH | STATION  | INVERT   | SECT | N    | Q3 | Q4 | INVERT-3 | INVERT-4 | PHI 3 | PHI 4 |
|------------|----|---|-------|----------|----------|------|------|----|----|----------|----------|-------|-------|
| 17         | IS | A | REACH | 2694.380 | 2705.750 | 36   | .013 |    |    |          |          |       |       |

OHA.EDT

|            |    |               |          |          |      |       |       |      |      |        |          |          |        |       |  |  |  |  |
|------------|----|---------------|----------|----------|------|-------|-------|------|------|--------|----------|----------|--------|-------|--|--|--|--|
| ELEMENT NO | 18 | IS A REACH    | *        | *        | *    |       |       |      |      |        |          |          |        |       |  |  |  |  |
|            |    | U/S DATA      | STATION  | INVERT   | SECT | N     |       |      |      | RADIUS | ANGLE    | ANG PT   | MAN H  |       |  |  |  |  |
|            |    |               | 2814.960 | 2707.780 | 36   | .013  |       |      |      | .000   | .000     | .000     | 1      |       |  |  |  |  |
| ELEMENT NO | 19 | IS A JUNCTION | *        | *        | *    |       |       |      |      | *      |          |          |        |       |  |  |  |  |
|            |    | U/S DATA      | STATION  | INVERT   | SECT | LAT-1 | LAT-2 | N    | Q3   | Q4     | INVERT-3 | INVERT-4 | PHI 3  | PHI 4 |  |  |  |  |
|            |    |               | 2814.960 | 2707.780 | 36   | 18    | 0     | .013 | .100 | .000   | 2709.280 | .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

W S P G W

PAGE NO 4

WATER SURFACE PROFILE - ELEMENT CARD LISTING

|            |    |                       |          |          |      |      |  |  |   |  |          |       |        |       |  |  |  |  |
|------------|----|-----------------------|----------|----------|------|------|--|--|---|--|----------|-------|--------|-------|--|--|--|--|
| ELEMENT NO | 20 | IS A REACH            | *        | *        | *    |      |  |  |   |  |          |       |        |       |  |  |  |  |
|            |    | U/S DATA              | STATION  | INVERT   | SECT | N    |  |  |   |  | RADIUS   | ANGLE | ANG PT | MAN H |  |  |  |  |
|            |    |                       | 3122.220 | 2710.850 | 36   | .013 |  |  |   |  | .000     | .000  | 45.000 | 1     |  |  |  |  |
| ELEMENT NO | 21 | IS A REACH            | *        | *        | *    |      |  |  |   |  |          |       |        |       |  |  |  |  |
|            |    | U/S DATA              | STATION  | INVERT   | SECT | N    |  |  |   |  | RADIUS   | ANGLE | ANG PT | MAN H |  |  |  |  |
|            |    |                       | 3177.960 | 2711.410 | 36   | .013 |  |  |   |  | .000     | .000  | 45.000 | 1     |  |  |  |  |
| ELEMENT NO | 22 | IS A REACH            | *        | *        | *    |      |  |  |   |  |          |       |        |       |  |  |  |  |
|            |    | U/S DATA              | STATION  | INVERT   | SECT | N    |  |  |   |  | RADIUS   | ANGLE | ANG PT | MAN H |  |  |  |  |
|            |    |                       | 3224.260 | 2711.870 | 36   | .013 |  |  |   |  | .000     | .000  | .000   | 1     |  |  |  |  |
| ELEMENT NO | 23 | IS A SYSTEM HEADWORKS | *        |          | *    |      |  |  | * |  |          |       |        |       |  |  |  |  |
|            |    | U/S DATA              | STATION  | INVERT   | SECT |      |  |  |   |  | W S ELEV |       |        |       |  |  |  |  |
|            |    |                       | 3224.260 | 2711.870 | 36   |      |  |  |   |  | .000     |       |        |       |  |  |  |  |

| Station        | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt or I.D. | ZL  | No Wth Prs/Pip |
|----------------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|-----------------|-----|----------------|
| L/Elem         | Ch Slope    |            |            |         |           | SF Ave   | HF             | SE Dpth    | Froude N       | Norm Dp        | "N"            | X-Fall          | ZR  | Type Ch        |
| 1000.000       | 2654.950    | 10.776     | 2665.726   | 273.10  | 11.49     | 2.05     | 2667.78        | .00        | 4.59           | .00            | 5.500          | .000            | .00 | 1 .0           |
| 63.060         | .0051       |            |            |         |           | .0066    | .42            | 10.78      | .00            | 5.50           | .013           | .00             | .00 | PIPE           |
| 1063.060       | 2655.270    | 11.213     | 2666.483   | 273.10  | 11.49     | 2.05     | 2668.53        | .00        | 4.59           | .00            | 5.500          | .000            | .00 | 1 .0           |
| 80.700         | .0050       |            |            |         |           | .0066    | .53            | 11.21      | .00            | 5.50           | .013           | .00             | .00 | PIPE           |
| 1143.760       | 2655.670    | 11.490     | 2667.160   | 273.10  | 11.49     | 2.05     | 2669.21        | .00        | 4.59           | .00            | 5.500          | .000            | .00 | 1 .0           |
| JUNCT STR      | .0000       |            |            |         |           | .0146    | .00            | 11.49      | .00            |                | .013           | .00             | .00 | PIPE           |
| 1143.760       | 2657.170    | 8.466      | 2665.636   | 216.10  | 17.20     | 4.59     | 2670.23        | .00        | 3.89           | .00            | 4.000          | .000            | .00 | 1 .0           |
| 225.750        | .0300       |            |            |         |           | .0226    | 5.11           | 8.47       | .00            | 2.88           | .013           | .00             | .00 | PIPE           |
| 1369.510       | 2663.940    | 7.096      | 2671.036   | 216.10  | 17.20     | 4.59     | 2675.63        | .00        | 3.89           | .00            | 4.000          | .000            | .00 | 1 .0           |
| 55.483         | .0383       |            |            |         |           | .0226    | 1.26           | 7.10       | .00            | 2.63           | .013           | .00             | .00 | PIPE           |
| 1424.993       | 2666.066    | 6.354      | 2672.420   | 216.10  | 17.20     | 4.59     | 2677.01        | .00        | 3.89           | .00            | 4.000          | .000            | .00 | 1 .0           |
| HYDRAULIC JUMP |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |
| 1424.993       | 2666.066    | 2.722      | 2668.788   | 216.10  | 23.73     | 8.74     | 2677.53        | .00        | 3.89           | 3.73           | 4.000          | .000            | .00 | 1 .0           |
| 116.237        | .0383       |            |            |         |           | .0334    | 3.88           | 2.72       | 2.68           | 2.63           | .013           | .00             | .00 | PIPE           |
| 1541.230       | 2670.520    | 2.811      | 2673.331   | 216.10  | 22.90     | 8.15     | 2681.48        | .00        | 3.89           | 3.66           | 4.000          | .000            | .00 | 1 .0           |
| 47.823         | .0371       |            |            |         |           | .0312    | 1.49           | 2.81       | 2.51           | 2.66           | .013           | .00             | .00 | PIPE           |
| 1589.053       | 2672.296    | 2.867      | 2675.163   | 216.10  | 22.42     | 7.81     | 2682.97        | .00        | 3.89           | 3.60           | 4.000          | .000            | .00 | 1 .0           |
| 69.203         | .0371       |            |            |         |           | .0288    | 1.99           | 2.87       | 2.42           | 2.66           | .013           | .00             | .00 | PIPE           |

| Station   | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt or I.D. | ZL  | No Wth Prs/Pip |
|-----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|-----------------|-----|----------------|
| L/Elem    | Ch Slope    |            |            |         |           | SF Ave   | HF             | SE Dpth    | Froude N       | Norm Dp        | "N"            | X-Fall          | ZR  | Type Ch        |
| 1658.256  | 2674.866    | 3.000      | 2677.866   | 216.10  | 21.38     | 7.10     | 2684.96        | .00        | 3.89           | 3.46           | 4.000          | .000            | .00 | 1 .0           |
| 44.264    | .0371       |            |            |         |           | .0259    | 1.15           | 3.00       | 2.21           | 2.66           | .013           | .00             | .00 | PIPE           |
| 1702.520  | 2676.510    | 3.146      | 2679.656   | 216.10  | 20.38     | 6.45     | 2686.11        | .00        | 3.89           | 3.28           | 4.000          | .000            | .00 | 1 .0           |
| 177.290   | .0257       |            |            |         |           | .0234    | 4.15           | 3.15       | 2.00           | 3.08           | .013           | .00             | .00 | PIPE           |
| 1879.810  | 2681.070    | 3.303      | 2684.373   | 216.10  | 19.47     | 5.89     | 2690.26        | .00        | 3.89           | 3.04           | 4.000          | .000            | .00 | 1 .0           |
| 38.383    | .0261       |            |            |         |           | .0219    | .84            | 3.30       | 1.79           | 3.06           | .013           | .00             | .00 | PIPE           |
| 1918.193  | 2682.072    | 3.381      | 2685.453   | 216.10  | 19.07     | 5.65     | 2691.10        | .00        | 3.89           | 2.89           | 4.000          | .000            | .00 | 1 .0           |
| 57.206    | .0261       |            |            |         |           | .0207    | 1.19           | 3.38       | 1.70           | 3.06           | .013           | .00             | .00 | PIPE           |
| 1975.400  | 2683.566    | 3.587      | 2687.153   | 216.10  | 18.19     | 5.14     | 2692.29        | .00        | 3.89           | 2.43           | 4.000          | .000            | .00 | 1 .0           |
| 27.750    | .0261       |            |            |         |           | .0200    | .55            | 3.59       | 1.45           | 3.06           | .013           | .00             | .00 | PIPE           |
| 2003.150  | 2684.290    | 3.885      | 2688.175   | 216.10  | 17.34     | 4.67     | 2692.84        | .00        | 3.89           | 1.34           | 4.000          | .000            | .00 | 1 .0           |
| JUNCT STR | .0000       |            |            |         |           | .0153    | .00            | 3.89       | 1.00           |                | .013           | .00             | .00 | PIPE           |
| 2003.150  | 2684.290    | 7.872      | 2692.162   | 148.10  | 11.79     | 2.16     | 2694.32        | .00        | 3.58           | .00            | 4.000          | .000            | .00 | 1 .0           |
| 137.120   | .0350       |            |            |         |           | .0106    | 1.46           | 7.87       | .00            | 2.12           | .013           | .00             | .00 | PIPE           |



OHA.OUT

|           |          |       |          |        |       |       |         |      |      |      |       |      |     |      |    |
|-----------|----------|-------|----------|--------|-------|-------|---------|------|------|------|-------|------|-----|------|----|
| 2140.270  | 2689.090 | 4.638 | 2693.728 | 148.10 | 11.79 | 2.16  | 2695.88 | .00  | 3.58 | .00  | 4.000 | .000 | .00 | 1    | .0 |
| JUNCT STR | .0000    |       |          |        |       | .0146 | .00     | 4.64 | .00  |      | .013  | .00  | .00 | PIPE |    |
| 2140.270  | 2690.090 | 5.445 | 2695.535 | 91.10  | 12.89 | 2.58  | 2698.11 | .00  | 2.85 | .00  | 3.000 | .000 | .00 | 1    | .0 |
| 75.467    | .0383    |       |          |        |       | .0187 | 1.41    | 5.44 | .00  | 1.85 | .013  | .00  | .00 | PIPE |    |

FILE: OHA.WSW
 W S P G W - CIVILDESIGN Version 14.08
 PAGE 3

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING

Date: 5- 1-2019 Time: 3:39:28

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

OHARE STORM DRAIN SYSTEM (OHA)

OHARE ROAD SYSTEM FROM PARCEL EPJ TO MAINLINE IN SKYE CANYON PARK DRIV

| 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        |
| 2215.737       | 2692.981    | 4.162      | 2697.143   | 91.10   | 12.89     | 2.58     | 2699.72        | .00        | 2.85           | .00            | 3.000          | .000            | .00 | 1 .0           |
| HYDRAULIC JUMP |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |
| 2215.737       | 2692.981    | 2.020      | 2695.000   | 91.10   | 18.00     | 5.03     | 2700.03        | .00        | 2.85           | 2.81           | 3.000          | .000            | .00 | 1 .0           |
| 14.863         | .0383       |            |            |         |           | .0289    | .43            | 2.02       | 2.37           | 1.85           | .013           | .00             | .00 | PIPE           |
| 2230.600       | 2693.550    | 2.053      | 2695.603   | 91.10   | 17.68     | 4.85     | 2700.45        | .00        | 2.85           | 2.79           | 3.000          | .000            | .00 | 1 .0           |
| 194.240        | .0285       |            |            |         |           | .0272    | 5.29           | 2.05       | 2.29           | 2.05           | .013           | .00             | .00 | PIPE           |
| 2424.840       | 2699.080    | 2.114      | 2701.194   | 91.10   | 17.12     | 4.55     | 2705.74        | .00        | 2.85           | 2.74           | 3.000          | .000            | .00 | 1 .0           |
| 59.483         | .0285       |            |            |         |           | .0254    | 1.51           | 2.11       | 2.16           | 2.05           | .013           | .00             | .00 | PIPE           |
| 2484.323       | 2700.773    | 2.167      | 2702.940   | 91.10   | 16.66     | 4.31     | 2707.25        | .00        | 2.85           | 2.69           | 3.000          | .000            | .00 | 1 .0           |
| 56.128         | .0285       |            |            |         |           | .0233    | 1.31           | 2.17       | 2.06           | 2.05           | .013           | .00             | .00 | PIPE           |
| 2540.451       | 2702.371    | 2.268      | 2704.640   | 91.10   | 15.89     | 3.92     | 2708.56        | .00        | 2.85           | 2.58           | 3.000          | .000            | .00 | 1 .0           |
| 32.471         | .0285       |            |            |         |           | .0209    | .68            | 2.27       | 1.88           | 2.05           | .013           | .00             | .00 | PIPE           |
| 2572.921       | 2703.296    | 2.380      | 2705.676   | 91.10   | 15.15     | 3.56     | 2709.24        | .00        | 2.85           | 2.43           | 3.000          | .000            | .00 | 1 .0           |
| 20.811         | .0285       |            |            |         |           | .0190    | .39            | 2.38       | 1.70           | 2.05           | .013           | .00             | .00 | PIPE           |
| 2593.733       | 2703.888    | 2.506      | 2706.394   | 91.10   | 14.44     | 3.24     | 2709.63        | .00        | 2.85           | 2.23           | 3.000          | .000            | .00 | 1 .0           |
| 13.182         | .0285       |            |            |         |           | .0174    | .23            | 2.51       | 1.51           | 2.05           | .013           | .00             | .00 | PIPE           |
| 2606.915       | 2704.263    | 2.654      | 2706.917   | 91.10   | 13.77     | 2.94     | 2709.86        | .00        | 2.85           | 1.92           | 3.000          | .000            | .00 | 1 .0           |
| 5.845          | .0285       |            |            |         |           | .0164    | .10            | 2.65       | 1.31           | 2.05           | .013           | .00             | .00 | PIPE           |

FILE: OHA.WSW
 W S P G W - CIVILDESIGN Version 14.08
 PAGE 4

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING

Date: 5- 1-2019 Time: 3:39:28

EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

OHARE STORM DRAIN SYSTEM (OHA)

OHARE ROAD SYSTEM FROM PARCEL EPJ TO MAINLINE IN SKYE CANYON PARK DRIV

| 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        |
| 2612.760  | 2704.430    | 2.852      | 2707.282   | 91.10   | 13.13     | 2.68     | 2709.96        | .00        | 2.85           | 1.30           | 3.000          | .000            | .00 | 1 .0           |
| JUNCT STR | .0000       |            |            |         |           | .0115    | .00            | 2.85       | 1.00           |                | .013           | .00             | .00 | PIPE           |
| 2612.760  | 2704.430    | 5.589      | 2710.019   | 55.10   | 7.80      | .94      | 2710.96        | .00        | 2.41           | .00            | 3.000          | .000            | .00 | 1 .0           |
| 81.620    | .0162       |            |            |         |           | .0068    | .56            | 5.59       | .00            | 1.76           | .013           | .00             | .00 | PIPE           |
| 2694.380  | 2705.750    | 5.035      | 2710.785   | 55.10   | 7.80      | .94      | 2711.73        | .00        | 2.41           | .00            | 3.000          | .000            | .00 | 1 .0           |
| 120.580   | .0168       |            |            |         |           | .0068    | .82            | 5.04       | .00            | 1.74           | .013           | .00             | .00 | PIPE           |
| JUNCT STR | .0000       |            |            |         |           | .0068    | .00            | 3.88       | .00            |                | .013           | .00             | .00 | PIPE           |
| 2814.960  | 2707.780    | 3.882      | 2711.662   | 55.00   | 7.78      | .94      | 2712.60        | .00        | 2.41           | .00            | 3.000          | .000            | .00 | 1 .0           |
| 307.260   | .0100       |            |            |         |           | .0068    | 2.09           | 3.88       | .00            | 2.08           | .013           | .00             | .00 | PIPE           |
| 3122.220  | 2710.850    | 3.088      | 2713.938   | 55.00   | 7.78      | .94      | 2714.88        | .00        | 2.41           | .00            | 3.000          | .000            | .00 | 1 .0           |
| 55.740    | .0100       |            |            |         |           | .0068    | .38            | 3.09       | .00            | 2.07           | .013           | .00             | .00 | PIPE           |

| OHA.OUT  |          |       |          |       |      |       |         |      |      |      |       |      |     |      |     |
|----------|----------|-------|----------|-------|------|-------|---------|------|------|------|-------|------|-----|------|-----|
| 3177.960 | 2711.410 | 3.094 | 2714.504 | 55.00 | 7.78 | .94   | 2715.44 | .00  | 2.41 | .00  | 3.000 | .000 | .00 | 1    | .0  |
| - -      | - -      | - -   | - -      | - -   | - -  | - -   | - -     | - -  | - -  | - -  | - -   | - -  | - - | - -  | - - |
| 44.219   | .0099    |       |          |       |      | .0067 | .30     | 3.09 | .00  | 2.08 | .013  | .00  | .00 | PIPE |     |
| 3222.179 | 2711.849 | 3.000 | 2714.849 | 55.00 | 7.78 | .94   | 2715.79 | .00  | 2.41 | .00  | 3.000 | .000 | .00 | 1    | .0  |
| - -      | - -      | - -   | - -      | - -   | - -  | - -   | - -     | - -  | - -  | - -  | - -   | - -  | - - | - -  | - - |
| 2.081    | .0099    |       |          |       |      | .0066 | .01     | 3.00 | .00  | 2.08 | .013  | .00  | .00 | PIPE |     |
| 3224.260 | 2711.870 | 2.992 | 2714.862 | 55.00 | 7.78 | .94   | 2715.80 | .00  | 2.41 | .31  | 3.000 | .000 | .00 | 1    | .0  |
| - -      | - -      | - -   | - -      | - -   | - -  | - -   | - -     | - -  | - -  | - -  | - -   | - -  | - - | - -  | - - |

↑  
↑

# EST1902: SUNSTONE PHASE 1 INFRASTRUCTURE

## OHARE STORM DRAIN SYSTEM (OHA)

### OHARE ROAD SYSTEM FROM PARCEL EPJ TO MAINLINE IN SKYE CANYON PARK DRIV

|         |    |     |       |  |    |
|---------|----|-----|-------|--|----|
| 1000.00 | .I | C H | W E   |  | R  |
| 1032.24 | .  |     |       |  | .  |
| 1064.47 | .I | CH  | W E   |  | R  |
| 1096.71 | .  |     |       |  | .  |
| 1128.94 | .  |     |       |  | .  |
| 1161.18 | .I | C H | W E   |  | JX |
| 1193.41 | .I | H   | W E   |  | R  |
| 1225.65 | .  |     |       |  | .  |
| 1257.89 | .  |     |       |  | .  |
| 1290.12 | .  |     |       |  | .  |
| 1322.36 | .  |     |       |  | .  |
| 1354.59 | .  |     |       |  | .  |
| 1386.83 | .  | I   | H W E |  | R  |
| 1419.06 | .  |     |       |  | .  |
| 1451.30 | .  | I   | H W E |  | R  |
| 1483.53 | .  | I   | W H E |  | R  |
| 1515.77 | .  |     |       |  | .  |
| 1548.01 | .  | I   | WCH E |  | R  |
| 1580.24 | .  |     |       |  | .  |
| 1612.48 | .  | I   | WCH E |  | R  |
| 1644.71 | .  |     |       |  | .  |
| 1676.95 | .  | I   | W H E |  | R  |

## OHA.OUT

|         |   |   |       |     |   |    |
|---------|---|---|-------|-----|---|----|
| 1709.18 | . | I | WCH   | E   | . | R  |
| 1741.42 | . |   |       |     | . |    |
| 1773.66 | . |   |       |     | . |    |
| 1805.89 | . |   |       |     | . |    |
| 1838.13 | . |   |       |     | . |    |
| 1870.36 | . |   |       |     | . |    |
| 1902.60 | . | I | WH    | E   | . | R  |
| 1934.83 | . | I | WH    | E   | . | R  |
| 1967.07 | . |   |       |     | . |    |
| 1999.31 | . | I | WH    | E   | . | R  |
| 2031.54 | . | I | H     | E   | . | JX |
| 2063.78 | . | I | H     | W E | . | R  |
| 2096.01 | . |   |       |     | . |    |
| 2128.25 | . |   |       |     | . |    |
| 2160.48 | . |   | CHW   | E   | . | JX |
| 2192.72 | . | I | H     | W E | . | R  |
| 2224.95 | . |   | H W   | E   | . | R  |
| 2257.19 | . |   | I W H | E   | . | R  |
| 2289.43 | . |   | I W H | E   | . | R  |
| 2321.66 | . |   |       |     | . |    |
| 2353.90 | . |   |       |     | . |    |
| 2386.13 | . |   |       |     | . |    |
| 2418.37 | . |   |       |     | . |    |
| 2450.60 | . |   | I W H | E   | . | R  |
| 2482.84 | . |   |       |     | . |    |
| 2515.08 | . |   | I WCH | E   | . | R  |
| 2547.31 | . |   | I WH  | E   | . | R  |
| 2579.55 | . |   | I WH  | E   | . | R  |
| 2611.78 | . |   | I WH  | E   | . | R  |



|         |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    |
|---------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|----|
| 2644.02 | . |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | </ |
|---------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|----|

# NOTES

## 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                                       |                        |                            |                        |                       |                       |                        |          |                 |              |                                        |                        |  |
|-----------------------------------------------------------------------|------------------------|----------------------------|------------------------|-----------------------|-----------------------|------------------------|----------|-----------------|--------------|----------------------------------------|------------------------|--|
| Lateral Line From Basin EPE1 to Ohare Road Mainline Model (OLAT1.WSW) |                        |                            |                        |                       |                       |                        |          |                 |              |                                        |                        |  |
| WSPG Station                                                          | Plan Set Project No. * | Equivalent Roadway Station | Improvement Plan Sheet | Storm Drain Dimension | Invert Elevation (ft) | Q <sub>100</sub> (cfs) | WSE (ft) | Velocity (ft/s) | FG Elevation | Facility Description                   | HGL Check <sup>1</sup> |  |
| 1000.00                                                               | OHA:<br>EST1909        | 42+06.75                   | P-4                    | 30" RCP               | 2655.67               | 43.00                  | 2656.14  | 66.41           | 2669.80      | Connection to SCP Model                | OK                     |  |
| 1035.07                                                               |                        | 41+83.87                   |                        | 20' x 13' RCB         | 2659.18               | 43.00                  | 2659.50  | 6.65            | 2669.77      |                                        | OK                     |  |
| 1035.07                                                               |                        |                            |                        | 20' x 13' RCB         | 2659.18               | 43.00                  | 2659.50  | 6.65            | 2669.77      | Wall Entrance                          | OK                     |  |
| 1037.57                                                               |                        |                            |                        | 20' x 13' RCB         | 2659.43               | 43.00                  | 2659.95  | 4.11            | 2669.77      | Junction with OH3a Drop Inlet Facility | OK                     |  |
| 1037.57                                                               |                        |                            |                        | 20' x 13' RCB         | 2659.43               | 29.00                  | 2660.24  | 1.78            | 2669.77      |                                        | OK                     |  |
| 1040.07                                                               |                        | 41+83.37                   |                        | 20' x 13' RCB         | 2659.56               | 29.00                  | 2660.22  | 2.18            | 2669.77      |                                        | OK                     |  |
| 1040.07                                                               |                        |                            |                        | 20' x 13' RCB         | 2659.56               | 29.00                  | 2660.22  | 2.18            | 2669.77      | Wall Exit                              | OK                     |  |
| 1073.75                                                               |                        | 41+83.37                   |                        | 30" RCP               | 2661.24               | 29.00                  | 2663.08  | 7.51            | 2670.00      | Addition of Flow from EPE1             | OK                     |  |
| 1073.75                                                               | 30" RCP                |                            |                        | 2661.24               | 29.00                 | 2663.08                | 7.51     | 2670.00         | OK           |                                        |                        |  |

OLAT1.WSW

T1 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
T2 OHARE STORM DRAIN SYSTEM LATERAL 1 (OLAT1)  
T3 FROM PARCEL EPE1 TO OHARE MAINLINE SD (OHA)

|    |                  |       |        |        |          |       |           |      |
|----|------------------|-------|--------|--------|----------|-------|-----------|------|
| SO | 1000.0002655.670 | 30    |        |        | 2667.160 |       |           |      |
| R  | 1035.0702659.180 | 30    | .013   |        |          |       | 37.0      |      |
| WE | 1035.0702659.180 | 30    | .013   |        |          |       |           |      |
| R  | 1037.5702659.430 | 1     | .013   |        |          |       | 0.0       |      |
| JX | 1037.5702659.430 | 1 1   | .013   | 14.0   | 2659.430 | 90.0  |           |      |
| R  | 1040.0702659.555 | 1     | .013   |        |          |       | 0.0       |      |
| WX | 1040.0702659.555 | 1     | .013   |        |          |       |           |      |
| R  | 1073.7502661.240 | 30    | .013   |        |          |       |           |      |
| SH | 1073.7502661.240 | 30    |        |        |          |       |           |      |
| CD | 1 3 0            | 0.000 | 13.000 | 20.000 | 0.000    | 0.000 | 0.0000.00 | 0.00 |
| CD | 2 3 0            | 0.000 | 12.000 | 12.500 | 0.000    | 0.000 | 0.0000.00 | 0.00 |
| CD | 3 3 0            | 0.000 | 12.000 | 7.500  | 0.000    | 0.000 | 0.0000.00 | 0.00 |
| CD | 4 3 0            | 0.000 | 17.000 | 5.000  | 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 |
| Q  |                  |       | 29.000 |        |          |       |           |      |



FILE: OLAT1.WSW OLAT1.EDT  
W S P G W - EDIT LISTING - Version 14.10 Date: 5- 3-2019 Time: 2:45:39  
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1  
CARD SECT CHN NO OF AVE PIER HEIGHT 1 BASE ZL ZR INV Y(1) Y(2) Y(3) Y(4) Y(5) Y(6) Y(7) Y(8) Y(9) Y(10)  
CODE NO TYPE PIER/PIP WIDTH DIAMETER WIDTH DROP

|    |    |   |   |      |        |        |      |      |     |
|----|----|---|---|------|--------|--------|------|------|-----|
| CD | 1  | 3 | 0 | .000 | 13.000 | 20.000 | .000 | .000 | .00 |
| CD | 2  | 3 | 0 | .000 | 12.000 | 12.500 | .000 | .000 | .00 |
| CD | 3  | 3 | 0 | .000 | 12.000 | 7.500  | .000 | .000 | .00 |
| CD | 4  | 3 | 0 | .000 | 17.000 | 5.000  | .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  |        |      |      |     |

W S P G W

PAGE NO 1

HEADING LINE NO 1 IS - WATER SURFACE PROFILE - TITLE CARD LISTING  
HEADING LINE NO 2 IS - EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
HEADING LINE NO 3 IS - OHARE STORM DRAIN SYSTEM LATERAL 1 (OLAT1)  
FROM PARCEL EPE1 TO OHARE MAINLINE SD (OHA)

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

| ELEMENT NO                                                                                              | IS A | SYSTEM OUTLET    | U/S DATA | STATION  | INVERT   | SECT | W S ELEV | RADIUS | ANGLE | ANG PT | MAN H  |
|---------------------------------------------------------------------------------------------------------|------|------------------|----------|----------|----------|------|----------|--------|-------|--------|--------|
| 1                                                                                                       | IS A | SYSTEM OUTLET    | U/S DATA | 1000.000 | 2655.670 | 30   | 2667.160 |        |       |        |        |
| 2                                                                                                       | IS A | REACH            | U/S DATA | 1035.070 | 2659.180 | 30   | N        | .013   | .000  | .000   | 37.000 |
| 3                                                                                                       | IS A | WALL ENTRANCE    | U/S DATA | 1035.070 | 2659.180 | 30   | FP       | .013   |       |        |        |
| WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS             |      |                  |          |          |          |      |          |        |       |        |        |
| 4                                                                                                       | IS A | REACH            | U/S DATA | 1037.570 | 2659.430 | 1    | N        | .013   | .000  | .000   | 0      |
| 5                                                                                                       | IS A | JUNCTION         | U/S DATA | 1037.570 | 2659.430 | 1    | N        | .013   | .000  | .000   | 0      |
| 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 |      |                  |          |          |          |      |          |        |       |        |        |
| 6                                                                                                       | IS A | REACH            | U/S DATA | 1040.070 | 2659.555 | 1    | N        | .013   | .000  | .000   | 0      |
| 7                                                                                                       | IS A | WALL EXIT        | U/S DATA | 1040.070 | 2659.555 | 1    |          |        |       |        |        |
| WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS             |      |                  |          |          |          |      |          |        |       |        |        |
| 8                                                                                                       | IS A | REACH            | U/S DATA | 1073.750 | 2661.240 | 30   | N        | .013   | .000  | .000   | 0      |
| 9                                                                                                       | IS A | SYSTEM HEADWORKS | U/S DATA | 1073.750 | 2661.240 | 30   | W S ELEV | .000   |       |        |        |

WATER SURFACE PROFILE LISTING  
 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
 OHARE STORM DRAIN SYSTEM LATERAL 1 (OLAT1)  
 FROM PARCEL EPE1 TO OHARE MAINLINE SD (OHA)

Date: 5- 3-2019 Time: 2:45:41

| 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                                                                                                   | 2655.670    | .474       | 2656.144   | 43.00   | 66.41     | 68.49    | 2724.63        | .00        | 2.19           | 1.96           | 2.500          | .000            | .00     | 1 .0           |
| 2.449                                                                                                      | .1001       |            |            |         | 1.8598    | 4.55     | .47            | 20.36      | .99            | .013           | .00            | .00             | PIPE    |                |
| WARNING: POSSIBLE ERROR IN CALCULATIONS, PROGRAM USES MANNINGS, EQUATION, AVERAGE FRICTION SLOPE = 1.85977 |             |            |            |         |           |          |                |            |                |                |                |                 |         |                |
| 1002.449                                                                                                   | 2655.915    | .464       | 2656.379   | 43.00   | 68.47     | 72.79    | 2729.17        | .00        | 2.19           | 1.94           | 2.500          | .000            | .00     | 1 .0           |
| 3.668                                                                                                      | .1001       |            |            |         | 2.0803    | 7.63     | .46            | 21.23      | .99            | .013           | .00            | .00             | PIPE    |                |
| WARNING: POSSIBLE ERROR IN CALCULATIONS, PROGRAM USES MANNINGS, EQUATION, AVERAGE FRICTION SLOPE = 2.08031 |             |            |            |         |           |          |                |            |                |                |                |                 |         |                |
| 1006.117                                                                                                   | 2656.282    | .449       | 2656.731   | 43.00   | 71.81     | 80.07    | 2736.80        | .00        | 2.19           | 1.92           | 2.500          | .000            | .00     | 1 .0           |
| 3.503                                                                                                      | .1001       |            |            |         | 2.3817    | 8.34     | .45            | 22.65      | .99            | .013           | .00            | .00             | PIPE    |                |
| WARNING: POSSIBLE ERROR IN CALCULATIONS, PROGRAM USES MANNINGS, EQUATION, AVERAGE FRICTION SLOPE = 2.38166 |             |            |            |         |           |          |                |            |                |                |                |                 |         |                |
| 1009.620                                                                                                   | 2656.633    | .434       | 2657.067   | 43.00   | 75.31     | 88.07    | 2745.14        | .00        | 2.19           | 1.89           | 2.500          | .000            | .00     | 1 .0           |
| 3.348                                                                                                      | .1001       |            |            |         | 2.7269    | 9.13     | .43            | 24.18      | .99            | .013           | .00            | .00             | PIPE    |                |
| WARNING: POSSIBLE ERROR IN CALCULATIONS, PROGRAM USES MANNINGS, EQUATION, AVERAGE FRICTION SLOPE = 2.72690 |             |            |            |         |           |          |                |            |                |                |                |                 |         |                |
| 1012.967                                                                                                   | 2656.968    | .420       | 2657.388   | 43.00   | 78.99     | 96.88    | 2754.27        | .00        | 2.19           | 1.87           | 2.500          | .000            | .00     | 1 .0           |
| 3.201                                                                                                      | .1001       |            |            |         | 3.1222    | 10.00    | .42            | 25.80      | .99            | .013           | .00            | .00             | PIPE    |                |
| WARNING: POSSIBLE ERROR IN CALCULATIONS, PROGRAM USES MANNINGS, EQUATION, AVERAGE FRICTION SLOPE = 3.12224 |             |            |            |         |           |          |                |            |                |                |                |                 |         |                |
| 1016.169                                                                                                   | 2657.288    | .407       | 2657.695   | 43.00   | 82.84     | 106.57   | 2764.27        | .00        | 2.19           | 1.85           | 2.500          | .000            | .00     | 1 .0           |
| 3.063                                                                                                      | .1001       |            |            |         | 3.5751    | 10.95    | .41            | 27.53      | .99            | .013           | .00            | .00             | PIPE    |                |
| WARNING: POSSIBLE ERROR IN CALCULATIONS, PROGRAM USES MANNINGS, EQUATION, AVERAGE FRICTION SLOPE = 3.57510 |             |            |            |         |           |          |                |            |                |                |                |                 |         |                |
| 1019.232                                                                                                   | 2657.595    | .393       | 2657.988   | 43.00   | 86.89     | 117.23   | 2775.22        | .00        | 2.19           | 1.82           | 2.500          | .000            | .00     | 1 .0           |
| 2.932                                                                                                      | .1001       |            |            |         | 4.0943    | 12.00    | .39            | 29.37      | .99            | .013           | .00            | .00             | PIPE    |                |
| WARNING: POSSIBLE ERROR IN CALCULATIONS, PROGRAM USES MANNINGS, EQUATION, AVERAGE FRICTION SLOPE = 4.09432 |             |            |            |         |           |          |                |            |                |                |                |                 |         |                |
| 1022.163                                                                                                   | 2657.888    | .381       | 2658.269   | 43.00   | 91.13     | 128.95   | 2787.22        | .00        | 2.19           | 1.80           | 2.500          | .000            | .00     | 1 .0           |
| 2.807                                                                                                      | .1001       |            |            |         | 4.6894    | 13.16    | .38            | 31.33      | .99            | .013           | .00            | .00             | PIPE    |                |
| WARNING: POSSIBLE ERROR IN CALCULATIONS, PROGRAM USES MANNINGS, EQUATION, AVERAGE FRICTION SLOPE = 4.68941 |             |            |            |         |           |          |                |            |                |                |                |                 |         |                |
| 1024.970                                                                                                   | 2658.169    | .368       | 2658.538   | 43.00   | 95.58     | 141.85   | 2800.38        | .00        | 2.19           | 1.77           | 2.500          | .000            | .00     | 1 .0           |
| 2.689                                                                                                      | .1001       |            |            |         | 5.3712    | 14.44    | .37            | 33.43      | .99            | .013           | .00            | .00             | PIPE    |                |
| WARNING: POSSIBLE ERROR IN CALCULATIONS, PROGRAM USES MANNINGS, EQUATION, AVERAGE FRICTION SLOPE = 5.37121 |             |            |            |         |           |          |                |            |                |                |                |                 |         |                |

 WATER SURFACE PROFILE LISTING  
 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
 OHARE STORM DRAIN SYSTEM LATERAL 1 (OLAT1)  
 FROM PARCEL EPE1 TO OHARE MAINLINE SD (OHA)

Date: 5- 3-2019 Time: 2:45:41

| 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 |                |
| 1027.659                                                                                                   | 2658.438    | .356       | 2658.795   | 43.00   | 100.24    | 156.03   | 2814.82        | .00        | 2.19           | 1.75           | 2.500          | .000            | .00     | 1 .0           |
| 2.576                                                                                                      | .1001       |            |            |         | 6.1525    | 15.85    | .36            | 35.66      | .99            | .013           | .00            | .00             | PIPE    |                |
| WARNING: POSSIBLE ERROR IN CALCULATIONS, PROGRAM USES MANNINGS, EQUATION, AVERAGE FRICTION SLOPE = 6.15252 |             |            |            |         |           |          |                |            |                |                |                |                 |         |                |
| 1030.235                                                                                                   | 2658.696    | .345       | 2659.041   | 43.00   | 105.13    | 171.63   | 2830.67        | .00        | 2.19           | 1.72           | 2.500          | .000            | .00     | 1 .0           |
| 2.469                                                                                                      | .1001       |            |            |         | 7.0481    | 17.40    | .34            | 38.04      | .99            | .013           | .00            | .00             | PIPE    |                |
| WARNING: POSSIBLE ERROR IN CALCULATIONS, PROGRAM USES MANNINGS, EQUATION, AVERAGE FRICTION SLOPE = 7.04811 |             |            |            |         |           |          |                |            |                |                |                |                 |         |                |
| 1032.704                                                                                                   | 2658.943    | .334       | 2659.277   | 43.00   | 110.27    | 188.00   | 2848.07        | .00        | 2.19           | 1.70           | 2.500          | .000            | .00     | 1 .0           |
| 2.366                                                                                                      | .1001       |            |            |         | 8.0750    | 19.11    | .33            | 40.58      | .99            | .013           | .00            | .00             | PIPE    |                |
| WARNING: POSSIBLE ERROR IN CALCULATIONS, PROGRAM USES MANNINGS, EQUATION, AVERAGE FRICTION SLOPE = 8.07502 |             |            |            |         |           |          |                |            |                |                |                |                 |         |                |
| 1035.070                                                                                                   | 2659.180    | .324       | 2659.504   | 43.00   | 6.65      | .69      | 2660.19        | .00        | .52            | 20.00          | 13.000         | 20.000          | .00     | 0 .0           |
| .039                                                                                                       | .1000       |            |            |         | .0158     | .00      | .32            | 2.06       | .19            | .013           | .00            | .00             | BOX     |                |

OLAT1.OUT

|          |          |        |          |        |        |        |         |        |        |        |        |        |        |        |        |
|----------|----------|--------|----------|--------|--------|--------|---------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1035.109 | 2659.184 | .324   | 2659.509 | 43.00  | 6.63   | .68    | 2660.19 | .00    | .52    | 20.00  | 13.000 | 20.000 | .00    | 0      | .0     |
| -.540    | -.1000   | -.1000 | -.1000   | -.1000 | -.1000 | -.1000 | -.1000  | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 |
| .1000    | .1000    | .1000  | .1000    | .1000  | .1000  | .1000  | .1000   | .1000  | .1000  | .1000  | .1000  | .1000  | .1000  | .1000  | .1000  |
| 1035.650 | 2659.238 | .340   | 2659.578 | 43.00  | 6.32   | .62    | 2660.20 | .00    | .52    | 20.00  | 13.000 | 20.000 | .00    | 0      | .0     |
| -.454    | -.1000   | -.1000 | -.1000   | -.1000 | -.1000 | -.1000 | -.1000  | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 |
| .1000    | .1000    | .1000  | .1000    | .1000  | .1000  | .1000  | .1000   | .1000  | .1000  | .1000  | .1000  | .1000  | .1000  | .1000  | .1000  |
| 1036.103 | 2659.283 | .357   | 2659.640 | 43.00  | 6.02   | .56    | 2660.20 | .00    | .52    | 20.00  | 13.000 | 20.000 | .00    | 0      | .0     |
| -.378    | -.1000   | -.1000 | -.1000   | -.1000 | -.1000 | -.1000 | -.1000  | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 |
| .1000    | .1000    | .1000  | .1000    | .1000  | .1000  | .1000  | .1000   | .1000  | .1000  | .1000  | .1000  | .1000  | .1000  | .1000  | .1000  |
| 1036.482 | 2659.321 | .374   | 2659.696 | 43.00  | 5.74   | .51    | 2660.21 | .00    | .52    | 20.00  | 13.000 | 20.000 | .00    | 0      | .0     |
| -.311    | -.1000   | -.1000 | -.1000   | -.1000 | -.1000 | -.1000 | -.1000  | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 |
| .1000    | .1000    | .1000  | .1000    | .1000  | .1000  | .1000  | .1000   | .1000  | .1000  | .1000  | .1000  | .1000  | .1000  | .1000  | .1000  |
| 1036.793 | 2659.352 | .393   | 2659.745 | 43.00  | 5.48   | .47    | 2660.21 | .00    | .52    | 20.00  | 13.000 | 20.000 | .00    | 0      | .0     |
| -.251    | -.1000   | -.1000 | -.1000   | -.1000 | -.1000 | -.1000 | -.1000  | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 | -.1000 |
| .1000    | .1000    | .1000  | .1000    | .1000  | .1000  | .1000  | .1000   | .1000  | .1000  | .1000  | .1000  | .1000  | .1000  | .1000  | .1000  |

FILE: OLAT1.WSW W S P G W - CIVILDESIGN Version 14.08  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING  
 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
 OHARE STORM DRAIN SYSTEM LATERAL 1 (OLAT1)  
 FROM PARCEL EPE1 TO OHARE MAINLINE SD (OHA)

| Station  | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt/I.D. | ZL     | No Wth Prs/Pip |
|----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|--------------|--------|----------------|
| L/Elem   | Ch Slope    |            |            |         |           | SF Ave   | HF             | SE Dpth    | Froude N       | Norm Dp        | "N"            | X-Fall       | ZR     | Type Ch        |
| 1037.044 | 2659.377    | .412       | 2659.789   | 43.00   | 5.22      | .42      | 2660.21        | .00        | .52            | 20.00          | 13.000         | 20.000       | .00    | 0              |
| -.197    | -.1000      | -.1000     | -.1000     | -.1000  | -.1000    | -.1000   | -.1000         | -.1000     | -.1000         | -.1000         | -.1000         | -.1000       | -.1000 | -.1000         |
| .1000    | .1000       | .1000      | .1000      | .1000   | .1000     | .1000    | .1000          | .1000      | .1000          | .1000          | .1000          | .1000        | .1000  | .1000          |
| 1037.241 | 2659.397    | .432       | 2659.829   | 43.00   | 4.98      | .38      | 2660.21        | .00        | .52            | 20.00          | 13.000         | 20.000       | .00    | 0              |
| -.147    | -.1000      | -.1000     | -.1000     | -.1000  | -.1000    | -.1000   | -.1000         | -.1000     | -.1000         | -.1000         | -.1000         | -.1000       | -.1000 | -.1000         |
| .1000    | .1000       | .1000      | .1000      | .1000   | .1000     | .1000    | .1000          | .1000      | .1000          | .1000          | .1000          | .1000        | .1000  | .1000          |
| 1037.388 | 2659.412    | .453       | 2659.865   | 43.00   | 4.75      | .35      | 2660.21        | .00        | .52            | 20.00          | 13.000         | 20.000       | .00    | 0              |
| -.102    | -.1000      | -.1000     | -.1000     | -.1000  | -.1000    | -.1000   | -.1000         | -.1000     | -.1000         | -.1000         | -.1000         | -.1000       | -.1000 | -.1000         |
| .1000    | .1000       | .1000      | .1000      | .1000   | .1000     | .1000    | .1000          | .1000      | .1000          | .1000          | .1000          | .1000        | .1000  | .1000          |
| 1037.490 | 2659.422    | .475       | 2659.897   | 43.00   | 4.53      | .32      | 2660.22        | .00        | .52            | 20.00          | 13.000         | 20.000       | .00    | 0              |
| -.060    | -.1000      | -.1000     | -.1000     | -.1000  | -.1000    | -.1000   | -.1000         | -.1000     | -.1000         | -.1000         | -.1000         | -.1000       | -.1000 | -.1000         |
| .1000    | .1000       | .1000      | .1000      | .1000   | .1000     | .1000    | .1000          | .1000      | .1000          | .1000          | .1000          | .1000        | .1000  | .1000          |
| 1037.550 | 2659.428    | .498       | 2659.926   | 43.00   | 4.31      | .29      | 2660.22        | .00        | .52            | 20.00          | 13.000         | 20.000       | .00    | 0              |
| -.020    | -.1000      | -.1000     | -.1000     | -.1000  | -.1000    | -.1000   | -.1000         | -.1000     | -.1000         | -.1000         | -.1000         | -.1000       | -.1000 | -.1000         |
| .1000    | .1000       | .1000      | .1000      | .1000   | .1000     | .1000    | .1000          | .1000      | .1000          | .1000          | .1000          | .1000        | .1000  | .1000          |
| 1037.570 | 2659.430    | .524       | 2659.954   | 43.00   | 4.11      | .26      | 2660.22        | .00        | .52            | 20.00          | 13.000         | 20.000       | .00    | 0              |
| -.000    | -.1000      | -.1000     | -.1000     | -.1000  | -.1000    | -.1000   | -.1000         | -.1000     | -.1000         | -.1000         | -.1000         | -.1000       | -.1000 | -.1000         |
| .1000    | .1000       | .1000      | .1000      | .1000   | .1000     | .1000    | .1000          | .1000      | .1000          | .1000          | .1000          | .1000        | .1000  | .1000          |
| 1037.570 | 2659.430    | .814       | 2660.243   | 29.00   | 1.78      | .05      | 2660.29        | .00        | .40            | 20.00          | 13.000         | 20.000       | .00    | 0              |
| -.664    | -.0500      | -.0500     | -.0500     | -.0500  | -.0500    | -.0500   | -.0500         | -.0500     | -.0500         | -.0500         | -.0500         | -.0500       | -.0500 | -.0500         |
| .0500    | .0500       | .0500      | .0500      | .0500   | .0500     | .0500    | .0500          | .0500      | .0500          | .0500          | .0500          | .0500        | .0500  | .0500          |
| 1038.234 | 2659.463    | .776       | 2660.239   | 29.00   | 1.87      | .05      | 2660.29        | .00        | .40            | 20.00          | 13.000         | 20.000       | .00    | 0              |
| -.619    | -.0500      | -.0500     | -.0500     | -.0500  | -.0500    | -.0500   | -.0500         | -.0500     | -.0500         | -.0500         | -.0500         | -.0500       | -.0500 | -.0500         |
| .0500    | .0500       | .0500      | .0500      | .0500   | .0500     | .0500    | .0500          | .0500      | .0500          | .0500          | .0500          | .0500        | .0500  | .0500          |
| 1038.853 | 2659.494    | .740       | 2660.234   | 29.00   | 1.96      | .06      | 2660.29        | .00        | .40            | 20.00          | 13.000         | 20.000       | .00    | 0              |
| -.575    | -.0500      | -.0500     | -.0500     | -.0500  | -.0500    | -.0500   | -.0500         | -.0500     | -.0500         | -.0500         | -.0500         | -.0500       | -.0500 | -.0500         |
| .0500    | .0500       | .0500      | .0500      | .0500   | .0500     | .0500    | .0500          | .0500      | .0500          | .0500          | .0500          | .0500        | .0500  | .0500          |

FILE: OLAT1.WSW W S P G W - CIVILDESIGN Version 14.08  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING  
 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
 OHARE STORM DRAIN SYSTEM LATERAL 1 (OLAT1)  
 FROM PARCEL EPE1 TO OHARE MAINLINE SD (OHA)

| Station  | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt/I.D. | ZL     | No Wth Prs/Pip |
|----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|--------------|--------|----------------|
| L/Elem   | Ch Slope    |            |            |         |           | SF Ave   | HF             | SE Dpth    | Froude N       | Norm Dp        | "N"            | X-Fall       | ZR     | Type Ch        |
| 1039.427 | 2659.523    | .705       | 2660.228   | 29.00   | 2.06      | .07      | 2660.29        | .00        | .40            | 20.00          | 13.000         | 20.000       | .00    | 0              |
| -.531    | -.0500      | -.0500     | -.0500     | -.0500  | -.0500    | -.0500   | -.0500         | -.0500     | -.0500         | -.0500         | -.0500         | -.0500       | -.0500 | -.0500         |
| .0500    | .0500       | .0500      | .0500      | .0500   | .0500     | .0500    | .0500          | .0500      | .0500          | .0500          | .0500          | .0500        | .0500  | .0500          |
| 1039.959 | 2659.550    | .672       | 2660.222   | 29.00   | 2.16      | .07      | 2660.29        | .00        | .40            | 20.00          | 13.000         | 20.000       | .00    | 0              |
| -.111    | -.0500      | -.0500     | -.0500     | -.0500  | -.0500    | -.0500   | -.0500         | -.0500     | -.0500         | -.0500         | -.0500         | -.0500       | -.0500 | -.0500         |
| .0500    | .0500       | .0500      | .0500      | .0500   | .0500     | .0500    | .0500          | .0500      | .0500          | .0500          | .0500          | .0500        | .0500  | .0500          |
| 1040.070 | 2659.555    | .666       | 2660.220   | 29.00   | 2.18      | .07      | 2660.29        | .00        | .40            | 20.00          | 13.000         | 20.000       | .00    | 0              |



OLAT1.OUT

| Station  | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt/or I.D. | ZL  | No Wth Prs/Pip |
|----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|-----------------|-----|----------------|
| 1040.070 | 2659.555    | .666       | 2660.221   | 29.00   | 2.18      | .07      | 2660.29        | .00        | .40            | 20.00          | 13.000         | 20.000          | .00 | 0 .0           |
| 1040.070 | 2659.555    | 1.159      | 2660.714   | 29.00   | 13.02     | 2.63     | 2663.35        | .00        | 1.84           | 2.49           | 2.500          | .000            | .00 | 1 .0           |
| 4.361    | .0500       |            |            |         |           | .0251    | .11            | 1.16       | 2.43           | .97            | .013           | .00             | .00 | PIPE           |
| 1044.431 | 2659.773    | 1.183      | 2660.956   | 29.00   | 12.69     | 2.50     | 2663.45        | .00        | 1.84           | 2.50           | 2.500          | .000            | .00 | 1 .0           |
| 6.687    | .0500       |            |            |         |           | .0227    | .15            | 1.18       | 2.34           | .97            | .013           | .00             | .00 | PIPE           |
| 1051.118 | 2660.108    | 1.227      | 2661.335   | 29.00   | 12.10     | 2.27     | 2663.61        | .00        | 1.84           | 2.50           | 2.500          | .000            | .00 | 1 .0           |
| 5.323    | .0500       |            |            |         |           | .0200    | .11            | 1.23       | 2.18           | .97            | .013           | .00             | .00 | PIPE           |
| 1056.440 | 2660.374    | 1.274      | 2661.648   | 29.00   | 11.53     | 2.07     | 2663.71        | .00        | 1.84           | 2.50           | 2.500          | .000            | .00 | 1 .0           |
| 4.281    | .0500       |            |            |         |           | .0176    | .08            | 1.27       | 2.03           | .97            | .013           | .00             | .00 | PIPE           |
| 1060.721 | 2660.588    | 1.323      | 2661.911   | 29.00   | 11.00     | 1.88     | 2663.79        | .00        | 1.84           | 2.50           | 2.500          | .000            | .00 | 1 .0           |
| 3.451    | .0500       |            |            |         |           | .0156    | .05            | 1.32       | 1.89           | .97            | .013           | .00             | .00 | PIPE           |
| 1064.172 | 2660.761    | 1.375      | 2662.135   | 29.00   | 10.48     | 1.71     | 2663.84        | .00        | 1.84           | 2.49           | 2.500          | .000            | .00 | 1 .0           |
| 2.776    | .0500       |            |            |         |           | .0137    | .04            | 1.37       | 1.75           | .97            | .013           | .00             | .00 | PIPE           |

W S P G W - CIVILDESIGN Version 14.08  
 FILE: OLAT1.WSW  
 Program Package Serial Number: 7189  
 WATER SURFACE PROFILE LISTING  
 Date: 5- 3-2019 Time: 2:45:41  
 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
 OHARE STORM DRAIN SYSTEM LATERAL 1 (OLAT1)  
 FROM PARCEL EPE1 TO OHARE MAINLINE SD (OHA)  
 PAGE 5

| Station  | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/Dia.-FT | Base Wt/or I.D. | ZL  | No Wth Prs/Pip |
|----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|-----------------|-----|----------------|
| 1066.948 | 2660.900    | 1.429      | 2662.329   | 29.00   | 10.00     | 1.55     | 2663.88        | .00        | 1.84           | 2.47           | 2.500          | .000            | .00 | 1 .0           |
| 2.208    | .0500       |            |            |         |           | .0121    | .03            | 1.43       | 1.63           | .97            | .013           | .00             | .00 | PIPE           |
| 1069.155 | 2661.010    | 1.487      | 2662.497   | 29.00   | 9.53      | 1.41     | 2663.91        | .00        | 1.84           | 2.45           | 2.500          | .000            | .00 | 1 .0           |
| 1.716    | .0500       |            |            |         |           | .0107    | .02            | 1.49       | 1.51           | .97            | .013           | .00             | .00 | PIPE           |
| 1070.871 | 2661.096    | 1.547      | 2662.643   | 29.00   | 9.09      | 1.28     | 2663.93        | .00        | 1.84           | 2.43           | 2.500          | .000            | .00 | 1 .0           |
| 1.283    | .0500       |            |            |         |           | .0095    | .01            | 1.55       | 1.40           | .97            | .013           | .00             | .00 | PIPE           |
| 1072.154 | 2661.160    | 1.612      | 2662.772   | 29.00   | 8.67      | 1.17     | 2663.94        | .00        | 1.84           | 2.39           | 2.500          | .000            | .00 | 1 .0           |
| .892     | .0500       |            |            |         |           | .0084    | .01            | 1.61       | 1.29           | .97            | .013           | .00             | .00 | PIPE           |
| 1073.046 | 2661.205    | 1.681      | 2662.886   | 29.00   | 8.26      | 1.06     | 2663.95        | .00        | 1.84           | 2.35           | 2.500          | .000            | .00 | 1 .0           |
| .526     | .0500       |            |            |         |           | .0075    | .00            | 1.68       | 1.19           | .97            | .013           | .00             | .00 | PIPE           |
| 1073.572 | 2661.231    | 1.755      | 2662.986   | 29.00   | 7.88      | .96      | 2663.95        | .00        | 1.84           | 2.29           | 2.500          | .000            | .00 | 1 .0           |
| .178     | .0500       |            |            |         |           | .0067    | .00            | 1.75       | 1.09           | .97            | .013           | .00             | .00 | PIPE           |
| 1073.750 | 2661.240    | 1.836      | 2663.076   | 29.00   | 7.51      | .87      | 2663.95        | .00        | 1.84           | 2.21           | 2.500          | .000            | .00 | 1 .0           |

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
 OHARE STORM DRAIN SYSTEM LATERAL 1 (OLAT1)  
 FROM PARCEL EPE1 TO OHARE MAINLINE SD (OHA)

1000.00 .WH E R  
 1000.85 .

|         |      | OLAT1.OUT |     |
|---------|------|-----------|-----|
| 1001.70 | .    |           | .   |
| 1002.54 | .WH  | E         | . R |
| 1003.39 | .    |           | .   |
| 1004.24 | .    |           | .   |
| 1005.09 | .    |           | .   |
| 1005.93 | .    |           | .   |
| 1006.78 | .WH  | E         | . R |
| 1007.63 | .    |           | .   |
| 1008.48 | .    |           | .   |
| 1009.32 | .    |           | .   |
| 1010.17 | .WH  | E         | . R |
| 1011.02 | .    |           | .   |
| 1011.87 | .    |           | .   |
| 1012.72 | .    |           | .   |
| 1013.56 | .WH  | E         | . R |
| 1014.41 | .    |           | .   |
| 1015.26 | .    |           | .   |
| 1016.11 | .    |           | .   |
| 1016.95 | .IWH | E         | . R |
| 1017.80 | .    |           | .   |
| 1018.65 | .    |           | .   |
| 1019.50 | .WH  | E         | . R |
| 1020.34 | .    |           | .   |
| 1021.19 | .    |           | .   |
| 1022.04 | .    |           | .   |
| 1022.89 | .WH  | E         | . R |
| 1023.74 | .    |           | .   |
| 1024.58 | .    |           | .   |
| 1025.43 | .WH  | E         | . R |
| 1026.28 | .    |           | .   |

OLAT1.OUT

|         |          |  |   |      |
|---------|----------|--|---|------|
| 1027.13 | .        |  |   | .    |
| 1027.97 | . WH     |  | E | . R  |
| 1028.82 | .        |  |   | .    |
| 1029.67 | .        |  |   | .    |
| 1030.52 | . WH     |  | E | . R  |
| 1031.36 | .        |  |   | .    |
| 1032.21 | .        |  |   | .    |
| 1033.06 | . WCH    |  |   | E. R |
| 1033.91 | .        |  |   | .    |
| 1034.76 | .        |  |   | .    |
| 1035.60 | . WE H   |  |   | . R  |
| 1036.45 | . WE H   |  |   | . R  |
| 1037.30 | . IW H   |  |   | . R  |
| 1038.15 | . IW H   |  |   | . R  |
| 1038.99 | . IW H   |  |   | . R  |
| 1039.84 | . IW H   |  |   | . R  |
| 1040.69 | . IW H   |  |   | . R  |
| 1041.54 | . IW H   |  |   | . R  |
| 1042.39 | . IW H   |  |   | . R  |
| 1043.23 | . IW H   |  |   | . R  |
| 1044.08 | . IW H   |  |   | . R  |
| 1044.93 | . IW H   |  |   | . JX |
| 1045.78 | . IW H   |  |   | . R  |
| 1046.62 | . IW H   |  |   | . R  |
| 1047.47 | . IW H   |  |   | . R  |
| 1048.32 | . W H    |  |   | . R  |
| 1049.17 | . W H    |  |   | . R  |
| 1050.01 | . WYYYYH |  |   | . WX |
| 1050.86 | . WYYYYH |  |   | . WX |
| 1051.71 | . WH     |  |   | . R  |



OLAT1.OUT

|         |   |     |   |   |
|---------|---|-----|---|---|
| 1052.56 | . | WHE | . | R |
| 1053.41 | . | WHE | . | R |
| 1054.25 | . |     | . |   |
| 1055.10 | . |     | . |   |
| 1055.95 | . |     | . |   |
| 1056.80 | . | IHE | . | R |
| 1057.64 | . |     | . |   |
| 1058.49 | . |     | . |   |
| 1059.34 | . |     | . |   |
| 1060.19 | . |     | . |   |
| 1061.03 | . | IHE | . | R |
| 1061.88 | . |     | . |   |
| 1062.73 | . |     | . |   |
| 1063.58 | . |     | . |   |
| 1064.43 | . | IHE | . | R |
| 1065.27 | . |     | . |   |
| 1066.12 | . |     | . |   |
| 1066.97 | . | IWH | . | R |
| 1067.82 | . |     | . |   |
| 1068.66 | . |     | . |   |
| 1069.51 | . | IWH | . | R |
| 1070.36 | . |     | . |   |
| 1071.21 | . | IWH | . | R |
| 1072.05 | . |     | . |   |
| 1072.90 | . | IWH | . | R |
| 1073.75 | . | IWH | . | R |

2655.670 2674.910 2694.150 2713.391 2732.631 2751.871 2771.111 2790.352 2809.592 2828.832 2848.073

NOTES

1. GLOSSARY

I = INVERT ELEVATION

C = CRITICAL DEPTH

OLAT1.OUT

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                                       |                        |                            |                        |                       |                       |                        |          |                 |              |                                        |                        |                            |    |
|-----------------------------------------------------------------------|------------------------|----------------------------|------------------------|-----------------------|-----------------------|------------------------|----------|-----------------|--------------|----------------------------------------|------------------------|----------------------------|----|
| Lateral Line From Basin EPH1 to Ohare Road Mainline Model (OLAT2.WSW) |                        |                            |                        |                       |                       |                        |          |                 |              |                                        |                        |                            |    |
| WSPG Station                                                          | Plan Set Project No. * | Equivalent Roadway Station | Improvement Plan Sheet | Storm Drain Dimension | Invert Elevation (ft) | Q <sub>100</sub> (cfs) | WSE (ft) | Velocity (ft/s) | FG Elevation | Facility Description                   | HGL Check <sup>1</sup> |                            |    |
| 1000.00                                                               | OHA:<br>EST1909        | 33+53.14                   | P-4                    | 36" RCP               | 2685.29               | 62.00                  | 2686.23  | 32.87           | 2697.18      | Connection to SCP Model                | OK                     |                            |    |
| 1044.17                                                               |                        |                            |                        | 12.5' x 13' RCB       | 2686.17               | 62.00                  | 2686.95  | 6.39            | 2697.77      |                                        | OK                     |                            |    |
| 1044.17                                                               |                        |                            |                        | 12.5' x 13' RCB       | 2686.17               | 62.00                  | 2686.95  | 6.39            | 2697.77      | Wall Entrance                          | OK                     |                            |    |
| 1046.67                                                               |                        |                            |                        | 12.5' x 13' RCB       | 2686.22               | 62.00                  | 2687.13  | 5.43            | 2697.77      | Junction with OH2a Drop Inlet Facility | OK                     |                            |    |
| 1046.67                                                               |                        |                            |                        | 12.5' x 13' RCB       | 2686.22               | 56.00                  | 2687.44  | 3.68            | 2697.77      |                                        | OK                     |                            |    |
| 1049.17                                                               |                        |                            |                        | 12.5' x 13' RCB       | 2686.23               | 56.00                  | 2687.44  | 3.73            | 2697.77      |                                        | OK                     |                            |    |
| 1049.17                                                               |                        |                            |                        | 12.5' x 13' RCB       | 2686.23               | 56.00                  | 2687.44  | 3.72            | 2697.77      | Wall Exit                              | OK                     |                            |    |
| 1121.67                                                               |                        |                            |                        | 33+20.14              |                       | 36" RCP                | 2686.60  | 56.00           | 2689.37      | 8.20                                   | 2695.00                | Addition of Flow from EPH1 | OK |
| 1121.67                                                               |                        |                            |                        |                       |                       | 36" RCP                | 2686.60  | 56.00           | 2689.37      | 8.20                                   | 2695.00                |                            | OK |



OLAT2.WSW

T1 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE  
T2 OHARE STORM DRAIN SYSTEM (OLAT2)  
T3 FROM PARCEL EPH1 TO OHARE MAINLINE SD (OHA)

|    |                  |       |        |        |          |       |           |      |
|----|------------------|-------|--------|--------|----------|-------|-----------|------|
| SO | 1000.0002685.290 | 36    |        |        | 2692.162 |       |           |      |
| R  | 1044.1702686.170 | 36    | .013   |        |          |       | 0.0       |      |
| WE | 1044.1702686.170 | 36    | .013   |        |          |       |           |      |
| R  | 1046.6702686.220 | 2     | .013   |        |          |       | 0.0       |      |
| JX | 1046.6702686.220 | 2 2   | .013   | 6.0    | 2686.220 | 90.0  |           |      |
| R  | 1049.1702686.233 | 2     | .013   |        |          |       | 37.0      |      |
| WX | 1049.1702686.233 | 2     | .013   |        |          |       |           |      |
| R  | 1121.6702686.600 | 36    | .013   |        |          |       |           |      |
| SH | 1121.6702686.600 | 36    |        |        |          |       |           |      |
| CD | 1 3 0            | 0.000 | 15.000 | 20.000 | 0.000    | 0.000 | 0.0000.00 | 0.00 |
| CD | 2 3 0            | 0.000 | 13.000 | 12.500 | 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 |
| Q  |                  |       | 56.000 |        |          |       |           |      |

FILE: OLAT2.WSW

OLAT2.EDT

W S P G W - EDIT LISTING - Version 14.10

Date: 5- 5-2019 Time:12:44:11

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

| CARD CODE | SECT NO | CHN TYPE | NO OF PIER/PIP | AVE WIDTH | PIER DIAMETER | HEIGHT 1 | BASE WIDTH | ZL   | ZR  | INV DROP | Y(1) | Y(2) | Y(3) | Y(4) | Y(5) | Y(6) | Y(7) | Y(8) | Y(9) | Y(10) |
|-----------|---------|----------|----------------|-----------|---------------|----------|------------|------|-----|----------|------|------|------|------|------|------|------|------|------|-------|
| CD        | 1       | 3        | 0              | .000      | 15.000        | 20.000   | .000       | .000 | .00 |          |      |      |      |      |      |      |      |      |      |       |
| CD        | 2       | 3        | 0              | .000      | 13.000        | 12.500   | .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         |          |            |      |     |          |      |      |      |      |      |      |      |      |      |       |

W S P G W

PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

HEADING LINE NO 2 IS -

OHARE STORM DRAIN SYSTEM (OLAT2)

HEADING LINE NO 3 IS -

FROM PARCEL EPH1 TO OHARE MAINLINE SD (OHA)

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

| ELEMENT NO                                                                                              | IS | TYPE               | STATION  | INVERT   | SECT | W S ELEV | RADIUS | ANGLE | ANG PT | MAN H |
|---------------------------------------------------------------------------------------------------------|----|--------------------|----------|----------|------|----------|--------|-------|--------|-------|
| ELEMENT NO 1                                                                                            | IS | A SYSTEM OUTLET    | 1000.000 | 2685.290 | 36   | 2692.162 |        |       |        |       |
| ELEMENT NO 2                                                                                            | IS | A REACH            | 1044.170 | 2686.170 | 36   |          | .000   | .000  | .000   | 0     |
| ELEMENT NO 3                                                                                            | IS | A WALL ENTRANCE    | 1044.170 | 2686.170 | 36   |          |        |       |        |       |
| WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS             |    |                    |          |          |      |          |        |       |        |       |
| ELEMENT NO 4                                                                                            | IS | A REACH            | 1046.670 | 2686.220 | 2    |          | .000   | .000  | .000   | 0     |
| ELEMENT NO 5                                                                                            | IS | A JUNCTION         | 1046.670 | 2686.220 | 2    |          |        |       |        |       |
| THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING |    |                    |          |          |      |          |        |       |        |       |
| THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING |    |                    |          |          |      |          |        |       |        |       |
| ELEMENT NO 6                                                                                            | IS | A REACH            | 1049.170 | 2686.233 | 2    |          | .000   | .000  | 37.000 | 0     |
| ELEMENT NO 7                                                                                            | IS | A WALL EXIT        | 1049.170 | 2686.233 | 2    |          |        |       |        |       |
| WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS             |    |                    |          |          |      |          |        |       |        |       |
| ELEMENT NO 8                                                                                            | IS | A REACH            | 1121.670 | 2686.600 | 36   |          | .000   | .000  | .000   | 0     |
| ELEMENT NO 9                                                                                            | IS | A SYSTEM HEADWORKS | 1121.670 | 2686.600 | 36   |          |        |       |        |       |

| 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 | 2685.290    | .937       | 2686.227   | 62.00   | 32.87     | 16.77    | 2703.00        | .00        | 2.54           | 2.78           | 3.000          | .000            | .00 | 1 .0           |
| 4.977    | .0199       |            |            |         |           | .2001    | 1.00           | .94        | 7.03           | 1.78           | .013           | .00             | .00 | PIPE           |
| 1004.977 | 2685.389    | .919       | 2686.308   | 62.00   | 33.76     | 17.69    | 2704.00        | .00        | 2.54           | 2.77           | 3.000          | .000            | .00 | 1 .0           |
| 8.588    | .0199       |            |            |         |           | .2224    | 1.91           | .92        | 7.30           | 1.78           | .013           | .00             | .00 | PIPE           |
| 1013.565 | 2685.560    | .888       | 2686.448   | 62.00   | 35.40     | 19.46    | 2705.91        | .00        | 2.54           | 2.74           | 3.000          | .000            | .00 | 1 .0           |
| 8.187    | .0199       |            |            |         |           | .2540    | 2.08           | .89        | 7.80           | 1.78           | .013           | .00             | .00 | PIPE           |
| 1021.752 | 2685.723    | .858       | 2686.582   | 62.00   | 37.13     | 21.41    | 2707.99        | .00        | 2.54           | 2.71           | 3.000          | .000            | .00 | 1 .0           |
| 7.814    | .0199       |            |            |         |           | .2902    | 2.27           | .86        | 8.34           | 1.78           | .013           | .00             | .00 | PIPE           |
| 1029.566 | 2685.879    | .830       | 2686.709   | 62.00   | 38.95     | 23.55    | 2710.26        | .00        | 2.54           | 2.68           | 3.000          | .000            | .00 | 1 .0           |
| 7.466    | .0199       |            |            |         |           | .3317    | 2.48           | .83        | 8.91           | 1.78           | .013           | .00             | .00 | PIPE           |
| 1037.032 | 2686.028    | .802       | 2686.830   | 62.00   | 40.85     | 25.91    | 2712.74        | .00        | 2.54           | 2.66           | 3.000          | .000            | .00 | 1 .0           |
| 7.138    | .0199       |            |            |         |           | .3791    | 2.71           | .80        | 9.52           | 1.78           | .013           | .00             | .00 | PIPE           |
| 1044.170 | 2686.170    | .776       | 2686.946   | 62.00   | 6.39      | .63      | 2687.58        | .00        | .91            | 12.50          | 13.000         | 12.500          | .00 | 0 .0           |
| .612     | .0200       |            |            |         |           | .0050    | .00            | .78        | 1.28           | .51            | .013           | .00             | .00 | BOX            |
| 1044.782 | 2686.182    | .792       | 2686.974   | 62.00   | 6.27      | .61      | 2687.58        | .00        | .91            | 12.50          | 13.000         | 12.500          | .00 | 0 .0           |
| 1.080    | .0200       |            |            |         |           | .0045    | .00            | .79        | 1.24           | .51            | .013           | .00             | .00 | BOX            |
| 1045.862 | 2686.204    | .830       | 2687.034   | 62.00   | 5.97      | .55      | 2687.59        | .00        | .91            | 12.50          | 13.000         | 12.500          | .00 | 0 .0           |
| .610     | .0200       |            |            |         |           | .0038    | .00            | .83        | 1.16           | .51            | .013           | .00             | .00 | BOX            |

| 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        |
| 1046.472  | 2686.216    | .871       | 2687.087   | 62.00   | 5.70      | .50      | 2687.59        | .00        | .91            | 12.50          | 13.000         | 12.500          | .00 | 0 .0           |
| .198      | .0200       |            |            |         |           | .0033    | .00            | .87        | 1.08           | .51            | .013           | .00             | .00 | BOX            |
| 1046.670  | 2686.220    | .914       | 2687.134   | 62.00   | 5.43      | .46      | 2687.59        | .00        | .91            | 12.50          | 13.000         | 12.500          | .00 | 0 .0           |
| JUNCT STR | .0000       |            |            |         |           | .0020    | .00            | .91        | 1.00           |                | .013           | .00             | .00 | BOX            |
| 1046.670  | 2686.220    | 1.218      | 2687.438   | 56.00   | 3.68      | .21      | 2687.65        | .00        | .85            | 12.50          | 13.000         | 12.500          | .00 | 0 .0           |
| 2.500     | .0052       |            |            |         |           | .0010    | .00            | 1.22       | .59            | .73            | .013           | .00             | .00 | BOX            |
| 1049.170  | 2686.233    | 1.202      | 2687.435   | 56.00   | 3.73      | .22      | 2687.65        | .00        | .85            | 12.50          | 13.000         | 12.500          | .00 | 0 .0           |
| WALL EXIT |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |
| 1049.170  | 2686.233    | 1.203      | 2687.436   | 56.00   | 3.72      | .22      | 2687.65        | .00        | .85            | 12.50          | 13.000         | 12.500          | .00 | 0 .0           |
| 1049.170  | 2686.233    | 2.426      | 2688.659   | 56.00   | 9.14      | 1.30     | 2689.96        | .00        | 2.43           | 2.36           | 3.000          | .000            | .00 | 1 .0           |
| 8.085     | .0051       |            |            |         |           | .0069    | .06            | 2.43       | 1.00           | 3.00           | .013           | .00             | .00 | PIPE           |
| 1057.255  | 2686.274    | 2.559      | 2688.833   | 56.00   | 8.72      | 1.18     | 2690.01        | .00        | 2.43           | 2.12           | 3.000          | .000            | .00 | 1 .0           |
| 40.668    | .0051       |            |            |         |           | .0064    | .26            | 2.56       | .88            | 3.00           | .013           | .00             | .00 | PIPE           |
| 1097.923  | 2686.480    | 2.720      | 2689.200   | 56.00   | 8.31      | 1.07     | 2690.27        | .00        | 2.43           | 1.75           | 3.000          | .000            | .00 | 1 .0           |



| OLAT2.OUT |          |       |          |       |      |       |         |      |      |      |       |      |     |      |
|-----------|----------|-------|----------|-------|------|-------|---------|------|------|------|-------|------|-----|------|
| - -       | - -      | - -   | - -      | - -   | - -  | - -   | - -     | - -  | - -  | - -  | - -   | - -  | - - | - -  |
| 23.747    | .0051    |       |          |       |      | .0061 | .15     | 2.72 | .75  | 3.00 | .013  | .00  | .00 | PIPE |
| 1121.670  | 2686.600 | 2.774 | 2689.374 | 56.00 | 8.20 | 1.05  | 2690.42 | .00  | 2.43 | 1.58 | 3.000 | .000 | .00 | 1 .0 |
| - -       | - -      | - -   | - -      | - -   | - -  | - -   | - -     | - -  | - -  | - -  | - -   | - -  | - - | - -  |

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE

OHARE STORM DRAIN SYSTEM (OLAT2)

FROM PARCEL EPH1 TO OHARE MAINLINE SD (OHA)

|         |    |    |    |  |   |  |  |  |  |  |  |  |    |    |
|---------|----|----|----|--|---|--|--|--|--|--|--|--|----|----|
| 1000.00 | .I | W  | CH |  | E |  |  |  |  |  |  |  |    | R  |
| 1002.48 | .  |    |    |  |   |  |  |  |  |  |  |  |    | .  |
| 1004.97 | .  |    |    |  |   |  |  |  |  |  |  |  |    | .  |
| 1007.45 | .I | W  | CH |  | E |  |  |  |  |  |  |  |    | R  |
| 1009.93 | .  |    |    |  |   |  |  |  |  |  |  |  |    | .  |
| 1012.42 | .  |    |    |  |   |  |  |  |  |  |  |  |    | .  |
| 1014.90 | .I | W  | CH |  | E |  |  |  |  |  |  |  |    | R  |
| 1017.38 | .  |    |    |  |   |  |  |  |  |  |  |  |    | .  |
| 1019.86 | .  |    |    |  |   |  |  |  |  |  |  |  |    | .  |
| 1022.35 | .I | W  | CH |  | E |  |  |  |  |  |  |  |    | R  |
| 1024.83 | .  |    |    |  |   |  |  |  |  |  |  |  |    | .  |
| 1027.31 | .  |    |    |  |   |  |  |  |  |  |  |  |    | .  |
| 1029.80 | .I | W  | CH |  | E |  |  |  |  |  |  |  |    | R  |
| 1032.28 | .  |    |    |  |   |  |  |  |  |  |  |  |    | .  |
| 1034.76 | .  |    |    |  |   |  |  |  |  |  |  |  |    | .  |
| 1037.25 | .I | W  | CH |  |   |  |  |  |  |  |  |  | E. | R  |
| 1039.73 | .  |    |    |  |   |  |  |  |  |  |  |  |    | .  |
| 1042.21 | .  |    |    |  |   |  |  |  |  |  |  |  |    | .  |
| 1044.70 | .I | WE |    |  | H |  |  |  |  |  |  |  |    | R  |
| 1047.18 | .I | WE |    |  | H |  |  |  |  |  |  |  |    | R  |
| 1049.66 | .I | WE |    |  | H |  |  |  |  |  |  |  |    | R  |
| 1052.14 | .I | WE |    |  | H |  |  |  |  |  |  |  |    | R  |
| 1054.63 | .I | WE |    |  | H |  |  |  |  |  |  |  |    | JX |

|         |   |         | OLAT2.OUT                            |    |
|---------|---|---------|--------------------------------------|----|
| 1057.11 | . | I       | CWE                                  | H  |
|         |   |         |                                      | R  |
| 1059.59 | . | IYYCWEY | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |    |
|         |   |         |                                      | WX |
| 1062.08 | . | IYYCWEY | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |    |
|         |   |         |                                      | WX |
| 1064.56 | . | I       | W H E                                |    |
|         |   |         |                                      | R  |
| 1067.04 | . | I       | W H E                                |    |
|         |   |         |                                      | R  |
| 1069.53 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1072.01 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1074.49 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1076.97 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1079.46 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1081.94 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1084.42 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1086.91 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1089.39 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1091.87 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1094.36 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1096.84 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1099.32 | . | I       | CWH E                                |    |
|         |   |         |                                      | R  |
| 1101.81 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1104.29 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1106.77 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1109.25 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1111.74 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1114.22 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1116.70 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1119.19 | . |         |                                      |    |
|         |   |         |                                      |    |
| 1121.67 | . | I       | CWH E                                |    |
|         |   |         |                                      | R  |

2685.290 2688.035 2690.779 2693.524 2696.269 2699.013 2701.758 2704.502 2707.247 2709.992 2712.737

# NOTES

## 1. GLOSSARY

I = INVERT ELEVATION

OLAT2.OUT

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







## **APPENDIX F**

### **Reference Material**

#### **Master Drainage Study for Skye Canyon – Update #3**



|                                                                       |                                  |      |                                                                                           |
|-----------------------------------------------------------------------|----------------------------------|------|-------------------------------------------------------------------------------------------|
| <b>CITY OF LAS VEGAS</b>                                              |                                  |      | <b>DATE:</b>                                                                              |
| <b>INTER-OFFICE MEMORANDUM</b>                                        |                                  |      | <b>August 15, 2016</b>                                                                    |
| <b>TO:</b><br>Land Development Services<br>Department of Public Works |                                  |      | <b>FROM:</b><br>Oh Sang Kwon, P.E.<br>Flood Control Section<br>Department of Public Works |
| <b>SUBJECT:</b>                                                       | Drainage Study for:              |      | <b>COPIES TO:</b>                                                                         |
| <b>Skye Canyon Master Drainage Study – Update #3</b>                  |                                  |      | Slater Hanifan Group                                                                      |
| <b>Cross Streets:</b>                                                 | Fort Apache Road & Moccasin Road |      | KAG Development South, LLC                                                                |
| <b>File Number:</b>                                                   | F:\Depot\DSMemos\DS4420N.doc     |      | Bart Anderson, P.E., DevCo                                                                |
| <b>Parcel Number:</b>                                                 | 125-06-001-001                   |      | CCRFCFCD                                                                                  |
| <b>Zoning Action:</b>                                                 |                                  |      | CCPW                                                                                      |
| <b>FEMA Flood Zone</b>                                                | YES                              | NO X | NDOT; NV Energy                                                                           |
| <b>Proposed Storm Drain</b>                                           | YES X                            | NO   | PB America, Inc.                                                                          |

| HISTORY                                    | DATE RECEIVED | DATE REVIEWED         | COMMENTS                   | REVIEW FEES       | FEES PAID Transaction # |
|--------------------------------------------|---------------|-----------------------|----------------------------|-------------------|-------------------------|
| 1 <sup>st</sup> Submittal                  | 6/22/2010     | 7/13/2010             | Not Approved               | \$1,000.00        | 147216: \$1000          |
| 2 <sup>nd</sup> Submittal                  | 9/17/2010     | 10/4/2010             | Not Approved               | \$400.00          | 153788: \$400           |
| 3 <sup>rd</sup> Submittal                  | 10/15/2011    | 11/14/2011            | Not Approved               | \$400.00          | 153788: \$400           |
| 4 <sup>th</sup> Submittal                  | 2/13/2012     | 3/1/2012              | Conditional Approval       | \$400.00          | 274196: \$400           |
| CCRFCFCD                                   | 5/23/2012     | 5/24/2012             | Concurrence Recv'd         | N/C               | N/C                     |
| 5 <sup>th</sup> Submittal<br>NDOT Comments | 9/10/2012     | 9/19/2012             | Conditional Approval       | N/C               | N/C                     |
| 6 <sup>th</sup> Submittal                  | 12/4/2014     | 12/30/2014            | Conditional Approval       | \$400.00          | 378889: \$400           |
| 7 <sup>th</sup> Submittal                  | 2/17/2015     | 3/3/2015              | Conditional Approval       | \$400.00          | 385987: \$400           |
| 8 <sup>th</sup> Submittal                  | 3/16/2015     | 4/6/2015              | See Comments Below         | \$400.00          | 388961: \$400           |
| CCRFCFCD                                   | 4/2/2015      | 4/6/2015              | Concurrence Recv'd         | N/C               | N/C                     |
| 9 <sup>th</sup> Submittal                  | 6/23/2015     | 7/21/2015             | See Comments Below         | \$400.00          | 403025: \$400           |
| Revised Memo                               | 8/12/2015     | 8/12/2015             | See Comments Below         | N/A               | N/A                     |
| 10 <sup>th</sup> Submittal                 | 10/19/2015    | 11/23/2015            | Conditional Approval       | \$400.00          | N/A                     |
| 11 <sup>th</sup> Submittal                 | 4/19/2016     | 5/16/2016 & 8/15/2016 | See Comments Below         | \$400.00          | 440941: \$400           |
|                                            |               |                       | <b>TOTAL FEES (LDDRS):</b> | <b>\$4,600.00</b> | <b>----</b>             |

**REMARKS: 11<sup>th</sup> Submittal: Update # 3 – Overall Master Plan Revision of Skye Canyon development. The proposed size and location of MPU facilities are being changed with the concept of allowing development without impacting the National Monument.**

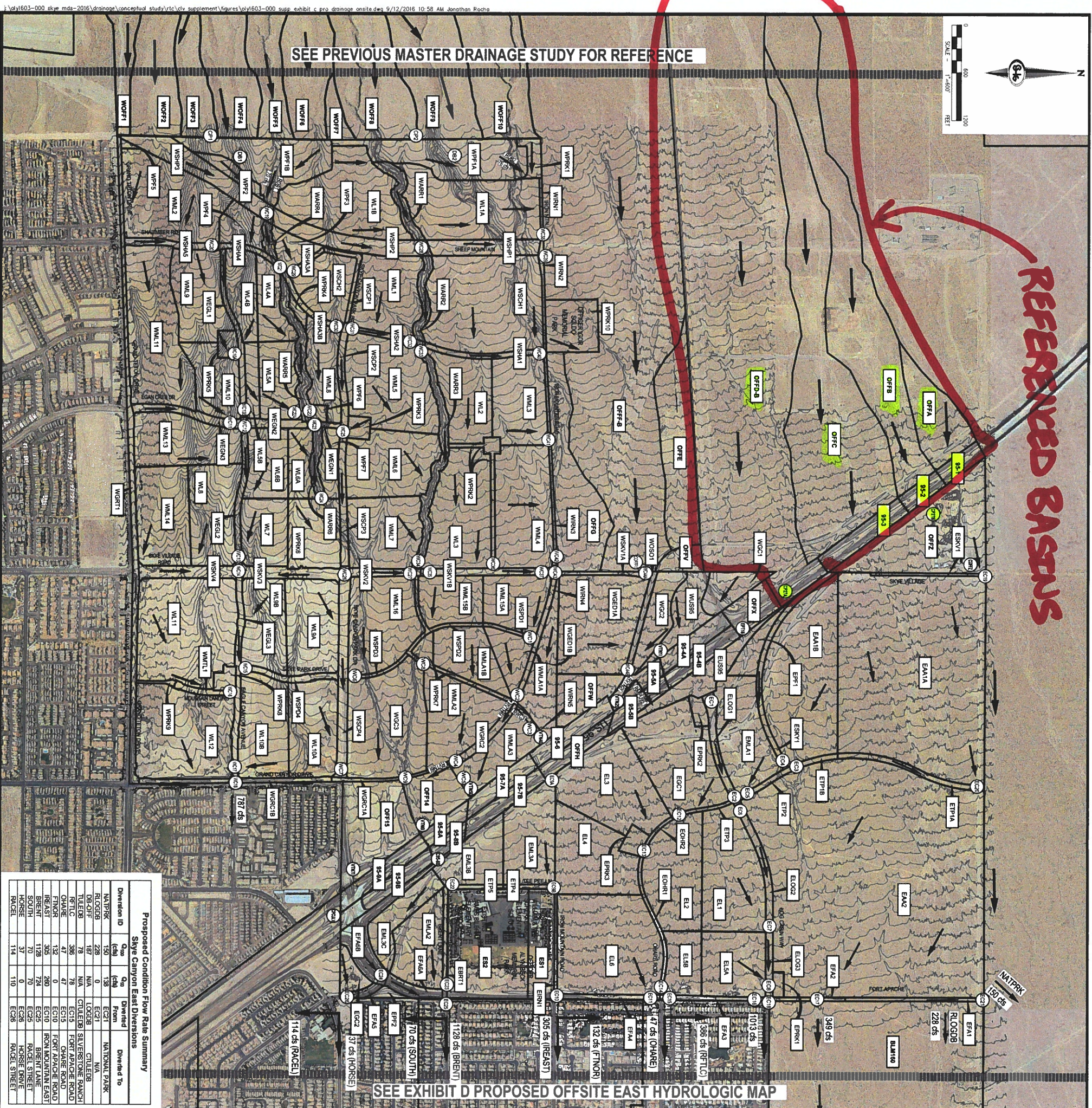
**Skye Canyon Master Drainage Study Update #3 proposes substantial changes to amend the previously approved Master Plan Amendment (MPA). A new MPA must be submitted to City of Las Vegas and CCRFCFCD for approval and shall be adopted by the City of Las Vegas City Council prior to the final approval of the subject Master Study Update #3.**

**The City of Las Vegas will not allow further residential development outside of the limits of Phase 2 at this time until the New Master Plan is approved.**

10<sup>th</sup> Submittal - Phase 2 interim impacts.

Revised Memo – National Monument Drainage Impacts





| Proposed Condition Flow Rate Summary<br>Shay Canyon East Diversions |                          |                           |                  |                    |  |
|---------------------------------------------------------------------|--------------------------|---------------------------|------------------|--------------------|--|
| Diversion ID                                                        | Q <sub>in</sub><br>(cfs) | Q <sub>out</sub><br>(cfs) | Diverted<br>From | Diverted To        |  |
| NA1P8K                                                              | 150                      | 138                       | EC21             | NATIONAL PARK      |  |
| R10D8D                                                              | 228                      | 0                         | EC21             | N/A                |  |
| DU2P2F                                                              | 187                      | N/A                       | 10D08B           | CULEBIDE           |  |
| TU2D5D                                                              | 168                      | N/A                       | CULEBIDE         | SILVERSTONE PARCH  |  |
| DU4D1E                                                              | 385                      | 0                         | EC15             | FORT KANABE ROAD   |  |
| DU4D1E                                                              | 132                      | 0                         | EC10             | EIGHT PARCHER ROAD |  |
| RE4S1T                                                              | 326                      | 280                       | EC10             | IRON MOUNTAIN EAST |  |
| BRE4NT                                                              | 1128                     | 774                       | EC25             | BRENT LANE         |  |
| SOUTH                                                               | 70                       | 0                         | EC25             | RACE1 STREET       |  |
| HORSE                                                               | 37                       | 0                         | EC25             | HORSE GRAVE        |  |
| RACE1                                                               | 114                      | 110                       | EC26             | RACE1 STREET       |  |

[illegible][illegible][illegible][illegible]



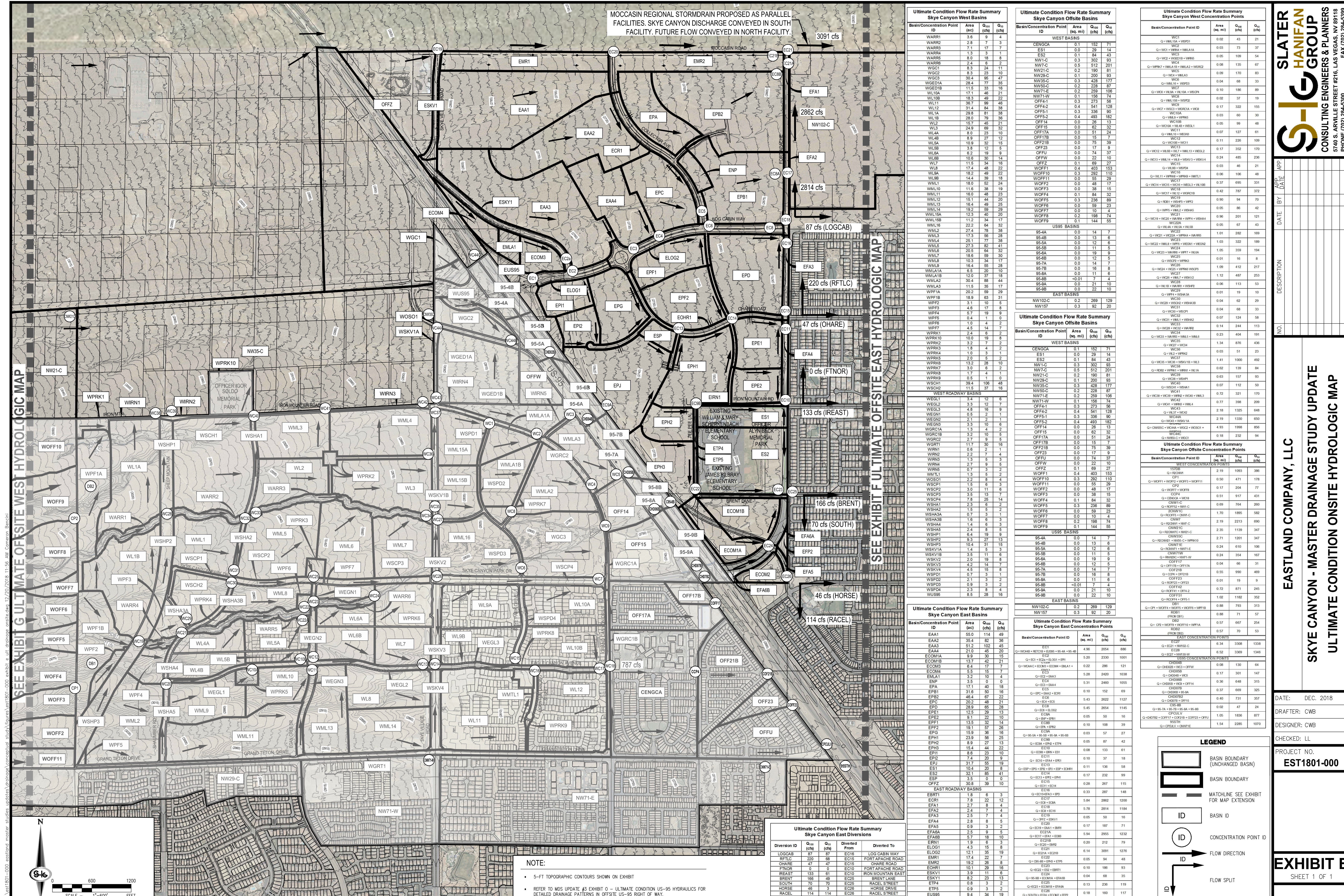
## **APPENDIX G**

---

**Reference Material**

**Sunstone Master Drainage Study**



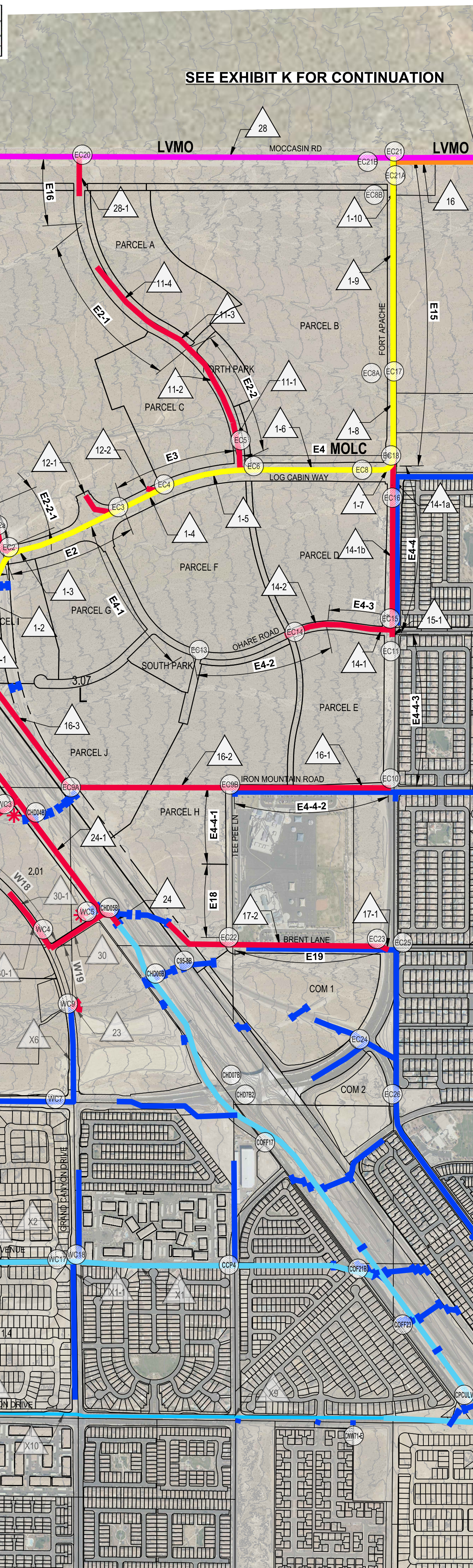




\\est1801-000-eastland-master-studies-updates\workspace\conceptual-study\skye\est1801-000-exhibit-j-ultimate-condition-on-site-drainage-facilities-map.dwg 12/20/2018 9:35 AM Camaron Blevins

| FACILITY HYDRAULICS SUMMARY TABLE |                    |             |                |                 |                   |
|-----------------------------------|--------------------|-------------|----------------|-----------------|-------------------|
| NETWORK                           | STREET ID          | FACILITY ID | FACILITY TYPE  | DESIGN FLOWRATE | PROPOSED FLOWRATE |
| EX SD                             | EAGLE CANYON       | X1          | 6" x 8" RCB    | 800 CFS         | 781 CFS           |
| EX SD                             | EAGLE CANYON       | X1-1        | 48" RCP        | 100 CFS         | 84 CFS            |
| EX SD                             | EAGLE CANYON       | X2          | 6" x 8" RCB    | 729 CFS         | 695 CFS           |
| EX SD                             | MOUNTAIN LANE RD   | X2-2        | 48" RCP        | 110 CFS         | 100 CFS           |
| EX SD                             | EAGLE CANYON       | X3          | 72" RCP        | 728 CFS         | 695 CFS           |
| EX SD                             | SKYE VILLAGE       | X4-1        | 42" RCP        | 117 CFS         | 140 CFS           |
| EX SD                             | EAGLE CANYON       | X4-2        | 72" RCP        | 477 CFS         | 485 CFS           |
| EX SD                             | EAGLE CANYON       | X5          | 48" RCP        | 218 CFS         | 228 CFS           |
| EX SD                             | EAGLE CANYON       | X5-2        | 42" RCP        | 90 CFS          | 90 CFS            |
| EX SD                             | GRAND CANYON DRIVE | X6          | 6" x 8" RCB    | 197 CFS         | 191 CFS           |
| EX SD                             | HORSE              | X7          | 42" RCP        | 92 CFS          | 92 CFS            |
| EX SD                             | SKYE PARK          | X7-1        | 36" RCP        | 47 CFS          | 47 CFS            |
| EX SD                             | HORSE              | X7-2        | 24" RCP        | 1 CFS           | 6 CFS             |
| EX SD                             | SKY VILLAGE RD     | X8          | 6" x 8" RCB    | 367 CFS         | 412 CFS           |
| EX SD                             | SKY VILLAGE RD     | X8-1        | 60" RCP        | 334 CFS         | 412 CFS           |
| EX SD                             | SKYE VILLAGE       | X8-2        | 30" RCP        | 42 CFS          | 42 CFS            |
| EX SD                             | GRAND TETON        | X9          | 10" x 5" RCB   | 690 CFS         | 690 CFS           |
| EX SD                             | GRAND TETON        | X10         | 10" x 5" RCB   | 690 CFS         | 690 CFS           |
| EX SD                             | GRAND TETON        | X11         | 6" x 8" RCB    | 646 CFS         | 646 CFS           |
| EX SD                             | GRAND TETON        | X12         | 6" x 8" RCB    | 594 CFS         | 594 CFS           |
| EX SD                             | GRAND TETON        | X13         | 6" x 8" RCB    | 494 CFS         | 494 CFS           |
| EX SD                             | GRAND TETON        | X14         | 6" x 8" RCB    | 494 CFS         | 494 CFS           |
| EX SD                             | GRAND TETON        | X15         | 6" x 8" RCB    | 498 CFS         | 498 CFS           |
| EX SD                             | GRAND TETON        | X16         | 6" x 8" RCB    | 363 CFS         | 363 CFS           |
| EX SD                             | SHAMBER            | X17         | 36" RCP        | 81 CFS          | 84 CFS            |
| EX SD                             | EAGLE CANYON       | X18         | 48" RCP        | 128 CFS         | 99 CFS            |
| EX SD                             | DBI DISCHARGE      | X20         | 60" RCP        | 71 CFS          | 71 CFS            |
| EX SD                             | DBI COLLECTOR      | X25         | CONC TRAP CHNL | 471 CFS         | 471 CFS           |
| ARROYO WASH                       | EX ARROYO WASH     | XW1         | NATURAL WASH   | 120 CFS         | 120 CFS           |
| ARROYO WASH                       | EX ARROYO WASH     | XW2         | NATURAL WASH   | 404 CFS         | 404 CFS           |
| ARROYO WASH                       | EX ARROYO WASH     | XW3         | NATURAL WASH   | 94 CFS          | 94 CFS            |
| ARROYO WASH                       | EX ARROYO WASH     | XW4         | NATURAL WASH   | 308 CFS         | 308 CFS           |
| ARROYO WASH                       | EX ARROYO WASH     | XW5         | NATURAL WASH   | 385 CFS         | 385 CFS           |

| DETENTION BASIN HYDRAULIC SUMMARY TABLE |         |         |                |                |               |          |
|-----------------------------------------|---------|---------|----------------|----------------|---------------|----------|
| FACILITY ID                             | INFLOW  | OUTFLOW | 100-YR STORAGE | DEBRIS STORAGE | TOTAL STORAGE | PMF FLOW |
| DB1                                     | 784 CFS | 71 CFS  | 57 AC-FT       | 6 AC-FT        | 63 AC-FT      | 6744 CFS |
| DB2                                     | 708 CFS | 57 CFS  | 72 AC-FT       | 6 AC-FT        | 78 AC-FT      | 5899 CFS |



| FACILITY HYDRAULICS SUMMARY TABLE - 100-YR |                                |             |                   |             |         |
|--------------------------------------------|--------------------------------|-------------|-------------------|-------------|---------|
| NETWORK                                    | STREET ID                      | FACILITY ID | FACILITY TYPE     | LENGTH (FT) | SLOPE   |
| WEST SD                                    | DB2 OUTLET                     | 0           | 60" RCP           | 800         | 0.40%   |
| WEST SD                                    | W1                             | 1           | 60" RCP           | 1089        | 0.40%   |
| WEST SD                                    | W2                             | 2           | 42" RCP           | 128         | 5.00%   |
| WEST SD                                    | NFLOW FROM SHEEP MOUNTAIN CHNL | 2-1         | 24" RCP           | 69          | 1.0 CFS |
| WEST SD                                    | W3                             | 3           | 54" RCP           | 1181        | 3.20%   |
| WEST SD                                    | W3-1                           | 3-1         | 42" RCP           | 191         | 3.00%   |
| WEST SD                                    | W3-1                           | 3-2         | 30" RCP           | 595         | 1.70%   |
| WEST SD                                    | W4                             | 4           | 60" RCP           | 109         | 4.50%   |
| WEST SD                                    | W4                             | 4-1         | 60" RCP           | 1500        | 4.50%   |
| WEST SD                                    | W5                             | 5           | 13" x 8" RCB      | 931         | 1.80%   |
| WEST SD                                    | ARROYO WASH INFLOW             | 5-1         | 6" x 8" RCB       | 51          | 14.80%  |
| WEST SD                                    | W5-1                           | 5-1a        | 13" x 8" RCB      | 100         | 2.10%   |
| WEST SD                                    | W5-1b                          | 5-1b        | 11" x 8" RCB      | 1654        | 0.50%   |
| WEST SD                                    | W5-2                           | 5-2         | 7" x 8" RCB       | 779         | 412 CFS |
| WEST SD                                    | W5-2                           | 5-3a        | 60" RCP           | 79          | 3.00%   |
| WEST SD                                    | W5-2                           | 5-3b        | 60" RCP           | 301         | 3.00%   |
| WEST SD                                    | CONVEYS FLOW TO DB2 5-3a       | 5-4a        | 60" RCP           | 491         | 3.00%   |
| WEST SD                                    | NFLOW FROM ARROYO WASH         | 5-4b        | 6" x 8" RCB       | 50          | 2.80%   |
| WEST SD                                    | W5                             | 6           | 13" x 8" RCB      | 445         | 1.80%   |
| WEST SD                                    | N/A                            | 6-1         | (6) 10" x 4" RCB  | 62          | N/A     |
| WEST SD                                    | W6                             | 1-0         | 13" x 8" RCB      | 274         | N/A     |
| WEST SD                                    | W6                             | 7           | 13" x 8" RCB      | 723         | 1.80%   |
| WEST SD                                    | MPU FACILITY                   | 7-1         | 8" x 8" RCB       | 309         | 5.00%   |
| WEST SD                                    | DISCHARGE TO ARROYO WASH       | 20          | 60" RCP           | 109         | 2.00%   |
| WEST SD                                    | W5-2-1                         | 20-1        | 48" RCP           | 194         | 2.00%   |
| WEST SD                                    | NFLOW FROM DB1                 | 20-1-1      | 48" RCP           | 135         | 2.20%   |
| WEST SD                                    | W5-2-1                         | 20-2        | 36" RCP           | 340         | 3.00%   |
| WEST SD                                    | W5-2-1                         | 20-3        | 36" RCP           | 193         | 3.50%   |
| WEST SD                                    | DISCHARGE TO ARROYO WASH       | 21          | 54" RCP           | 42          | 4.00%   |
| WEST SD                                    | W5-4-2                         | 21-1        | 42" RCP           | 100         | 2.50%   |
| WEST SD                                    | NFLOW FROM ARROYO WASH         | 21-1b       | 54" RCP           | 68          | 3.40%   |
| WEST SD                                    | W5-4-2                         | 21-2        | 36" RCP           | 863         | 3.40%   |
| WEST SD                                    | W5-4-1                         | 21-3        | 36" RCP           | 105         | 1.30%   |
| WEST SD                                    | N/A                            | 22          | 36" RCP           | 426         | 2.20%   |
| WEST SD                                    | N/A                            | 22-1        | 36" RCP           | 146         | 2.20%   |
| WEST SD                                    | W17                            | 22-2        | 24" RCP           | 860         | 2.00%   |
| WEST SD                                    | W19 OUTLET TO WASH             | 23          | 36" RCP           | 59          | 3.40%   |
| WEST SD                                    | N/A                            | 24          | 60" RCP           | 248         | 1.50%   |
| WEST SD                                    | N/A                            | 24-1        | 36" RCP           | 1140        | 1.50%   |
| WEST SD                                    | N/A                            | 24-2        | 18" RCP           | 284         | 1.50%   |
| WEST SD                                    | N/A                            | 30          | 42" RCP           | 476         | 2.50%   |
| WEST SD                                    | W18                            | 30-1        | 36" RCP           | 600         | 1.20%   |
| WEST SD                                    | DISCHARGE FROM SB              | 50          | CONC TRAP CHNL    | 1017        | 1.50%   |
| WEST SD                                    | ARROYO WASH CULVERT            | C3          | 6" x 8" RCB       | 164         | 6.10%   |
| WEST SD                                    | SHEEP MOUNTAIN CHNL            | D3          | EARTHEN TRAP CHNL | 815         | 3.60%   |
| WEST SD                                    | SHEEP MOUNTAIN CHNL            | D3-1        | EARTHEN TRAP CHNL | 1239        | 1.70%   |
| WEST SD                                    | SHEEP MOUNTAIN CHNL            | D4          | EARTHEN TRAP CHNL | 534         | 4.50%   |
| WEST SD                                    | SHEEP MOUNTAIN CHNL            | D4-1        | EARTHEN TRAP CHNL | 757         | 1.50%   |
| WEST SD                                    | SHEEP MOUNTAIN CHNL            | D4-2        | EARTHEN TRAP CHNL | 691         | 1.00%   |
| WEST SD                                    | SHEEP MOUNTAIN CHNL            | D5          | EARTHEN TRAP CHNL | 1252        | 1.20%   |
| WEST SD                                    | CHANNEL TO DB2                 | D6          | CONCRETE TRAP CHN | 723         | 3.00%   |
| WEST SD                                    | CHANNEL TO DB2                 | D6-1        | EARTHEN TRAP CHNL | 451         | 0.90%   |
| WEST SD                                    | CHANNEL TO DB2                 | D6-2        | EARTHEN TRAP CHNL | 145         | 1.40%   |

| FACILITY HYDRAULICS SUMMARY TABLE |                        |             |               |             |            |
|-----------------------------------|------------------------|-------------|---------------|-------------|------------|
| NETWORK                           | STREET ID              | FACILITY ID | FACILITY TYPE | LENGTH (FT) | FLOW (CFS) |
| EAST SD                           | US-95 SD CROSSING      | 8           | 13" x 8" RCB  | 605         | 2.90%      |
| EAST SD                           | N/A                    | 1-1         | 12" x 8" RCB  | 193         | 2.85%      |
| EAST SD                           | N/A                    | 1-2         | 12" x 8" RCB  | 710         | 2.85%      |
| EAST SD                           | E2                     | 1-3         | 12" x 8" RCB  | 889         | 2.85%      |
| EAST SD                           | E3                     | 1-4         | 13" x 8" RCB  | 416         | 2.85%      |
| EAST SD                           | E3                     | 1-5         | 13" x 8" RCB  | 753         | 2.85%      |
| EAST SD                           | E4                     | 1-6         | 13" x 8" RCB  | 1148        | 2.85%      |
| EAST SD                           | E4                     | 1-7         | 20" x 10" RCB | 190         | 0.50%      |
| EAST SD                           | E15                    | 1-8         | 20" x 10" RCB | 927         | 0.50%      |
| EAST SD                           | E15                    | 1-9         | 20" x 10" RCB | 1331        | 0.50%      |
| EAST SD                           | E15                    | 1-10        | 20" x 10" RCB | 306         | 0.50%      |
| EAST SD                           | E2-2-1                 | 9-3         | 54" RCP       | 1744        | 2.90%      |
| EAST SD                           | E2-2-1                 | 9-1         | 72" RCP       | 524         | 0.50%      |
| EAST SD                           | N/A                    | 12-1        | 54" RCP       | 304         | 0.50%      |
| EAST SD                           | N/A                    | 12-2        | 42" RCP       | 96          | 1.00%      |
| EAST SD                           | E2-1                   | 11-4        | 30" RCP       | 702         | 0.80%      |
| EAST SD                           | E2-1                   | 11-3        | 30" RCP       | 444         | 0.90%      |
| EAST SD                           | E2-2                   | 11-2        | 42" RCP       | 656         | 0.90%      |
| EAST SD                           | E2-2                   | 11-1        | 72" RCP       | 418         | 0.90%      |
| EAST SD                           | MOCCASIN RD            | 16          | 20" x 8" RCB  | N/A         | 0.50%      |
| EAST SD                           | CHARE AVE              | 14-1        | 54" RCP       | 184         | 2.95%      |
| EAST SD                           | SKYE CANYON PARK DRIVE | 14-1b       | 72" RCP       | 270         | 0.50%      |
| EAST SD                           | SKYE CANYON PARK DRIVE | 14-1c       | 66" RCP       | 1190        | 0.50%      |
| EAST SD                           | CHARE AVE              | 14-2        | 30" RCP       | 746         | 2.95%      |
| EAST SD                           | SKYE CANYON PARK DRIVE | 15-1        | 36" RCP       | 60          | 1.30%      |
| EAST SD                           | SKYE CANYON PARK DRIVE | 16-1        | 48" RCP       | 238         | 2.15%      |
| EAST SD                           | SKYE CANYON PARK DRIVE | 16-2        | 36" RCP       | 3529        | 2.15%      |
| EAST SD                           | PARCEL J               | 16-3        | 24" RCP       | 1018        | 2.50%      |
| EAST SD                           | BRENT LN               | 17-1        | 42" RCP       | 1617        | 2.00%      |
| EAST SD                           | BRENT LN               | 17-2        | 36" RCP       | 1790        | 2.00%      |
| EAST SD                           | E17                    | 28-1        | 66" RCP       | 755         | 0.80%      |
| EAST SD                           | MPU FACILITY           | 28          | N/A           | N/A         | N/A        |
| EAST SD                           | MPU FACILITY           | 28-1        | 60" RCP       | 341         | 0.80%      |
| EAST SD                           | MPU FACILITY           | 28          | N/A           | N/A         | N/A        |

NOTES:

- REFER TO EXHIBIT M - ULTIMATE CONDITION US-95 HYDRAULICS SUMMARY MAP FOR DETAILED FLOW THRU EXISTING US-95 CULVERTS & RCB FACILITIES
- REFER TO EXHIBIT K - ULTIMATE CONDITION OFFSITE EAST FACILITIES MAP FOR EXTENSION OF FACILITIES REQUIRED IN MPU ALIGNMENT EAST OF SKYE CANYON.
- 5-FT TOPOGRAPHIC CONTOURS SHOWN ON EXHIBIT
- TRANSPARENT ID TAG INDICATES A FACILITY THAT HASN'T CHANGED PER UPDATE #5

LEGEND

- PROPOSED LOCAL FACILITIES
- EXISTING LOCAL FACILITIES
- FUTURE LOCAL FACILITIES
- PROP CCRFCD REGIONAL FACILITIES (BY DEVELOPER)
- PROP CCRFCD REGIONAL FACILITIES (BY DEVELOPER W/ CLV COST SHARING)
- FUTURE CCRFCD REGIONAL FACILITIES (BY OTHERS)
- EXISTING CCRFCD REGIONAL FACILITIES
- MPU AMENDMENT FACILITY ALIGNMENT
- STREET SEGMENT ID
- LCHU ID
- FACILITY TAG/ID
- CULVERT TO BE PLUGGED

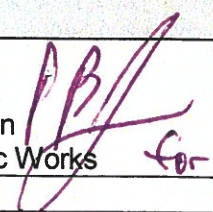
SLATER HANIFAN GROUP  
CONSULTING ENGINEERS & PLANNERS  
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118  
PHONE (702) 284-5300 FAX (702) 284-5399

EASTLAND COMPANY, LLC  
SKYE CANYON - MASTER DRAINAGE STUDY UPDATE  
ULTIMATE CONDITIONS ONSITE DRAINAGE FACILITIES MAP

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

EXHIBIT J  
SHEET 1 OF 1



|                                                                             |                                  |             |                                                                                                                                                                               |
|-----------------------------------------------------------------------------|----------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CITY OF LAS VEGAS<br/>INTER-OFFICE MEMORANDUM</b>                        |                                  |             | <b>DATE:</b><br>January 28, 2019                                                                                                                                              |
| <b>TO:</b><br>Land Development Services<br>Department of Public Works       |                                  |             | <b>FROM:</b><br>Oh Sang Kwon, P.E.<br>Flood Control Section<br>Department of Public Works  |
| <b>SUBJECT:</b>                                                             | Drainage Study for:              |             | <b>COPIES TO:</b>                                                                                                                                                             |
| Master Drainage Study – SUNSTONE (Formally Update #5 to Skye Canyon Master) |                                  |             | Slater Hanifan Group                                                                                                                                                          |
| <b>Cross Streets:</b>                                                       | Fort Apache Road & Moccasin Road |             | Eastland Co., LLC                                                                                                                                                             |
| <b>File Number:</b>                                                         | F:\Depot\DSMemos\DS5081A.doc     |             | Bart Anderson, P.E., DevCo                                                                                                                                                    |
| <b>Parcel Number:</b>                                                       | 125-06-501-001                   |             | CCRFCFCD                                                                                                                                                                      |
| <b>Zoning Action:</b>                                                       | Eastland Development Agreement   |             | CCPW                                                                                                                                                                          |
| <b>FEMA Flood Zone</b>                                                      | YES                              | NO <b>X</b> | NDOT                                                                                                                                                                          |
| <b>Proposed Storm Drain</b>                                                 | YES <b>X</b>                     | NO          | NV Energy                                                                                                                                                                     |

| HISTORY                   | DATE RECEIVED | DATE REVIEWED | COMMENTS               | REVIEW FEES | FEES PAID Transaction # |
|---------------------------|---------------|---------------|------------------------|-------------|-------------------------|
| 1 <sup>st</sup> Submittal | 12/26/2018    | 1/28/2019     | Conditionally Approved | \$400.00    | 502000: \$400           |
|                           |               |               |                        |             |                         |
|                           |               |               |                        |             |                         |
| TOTAL FEES (LDDRS):       |               |               |                        | \$400.00    | ----                    |

**REMARKS: 1st Submittal: Master Study for Development split off from Skye Canyon. SUNSTONE is the Development east of US-95 that was previously incorporated into the Skye Canyon Master Study.**

**The Skye Canyon East (SUNSTONE) / Skye Canyon Master Plan MPU Facilities are being incorporated into the 2018 CCRFCFCD Master Plan. A separate MPA is not required at this time. Further changes to the MPU Facilities within SUNSTONE Master Drainage Study shall require an MPA that must be submitted to City of Las Vegas and CCRFCFCD for approval and shall be adopted by the City of Las Vegas City Council prior to the final approval of the subject Overall Master Study.**

**This Master Study assumes ultimate condition offsite drainage facilities impacting the SUNSTONE development will be 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:

|          |                                                                                                |
|----------|------------------------------------------------------------------------------------------------|
|          | is approved subject to conformance to all City standards and the following conditions:         |
|          | must be resubmitted or supplemented including the following:                                   |
| <b>X</b> | is conditionally approved subject to Clark County Regional Flood Control District concurrence. |
|          | is conditionally approved subject to Clark County Department of Public Works concurrence.      |
| <b>X</b> | is conditionally approved subject to Nevada Department of Transportation concurrence.          |
|          | is conditionally approved subject to BLM concurrence/approval.                                 |

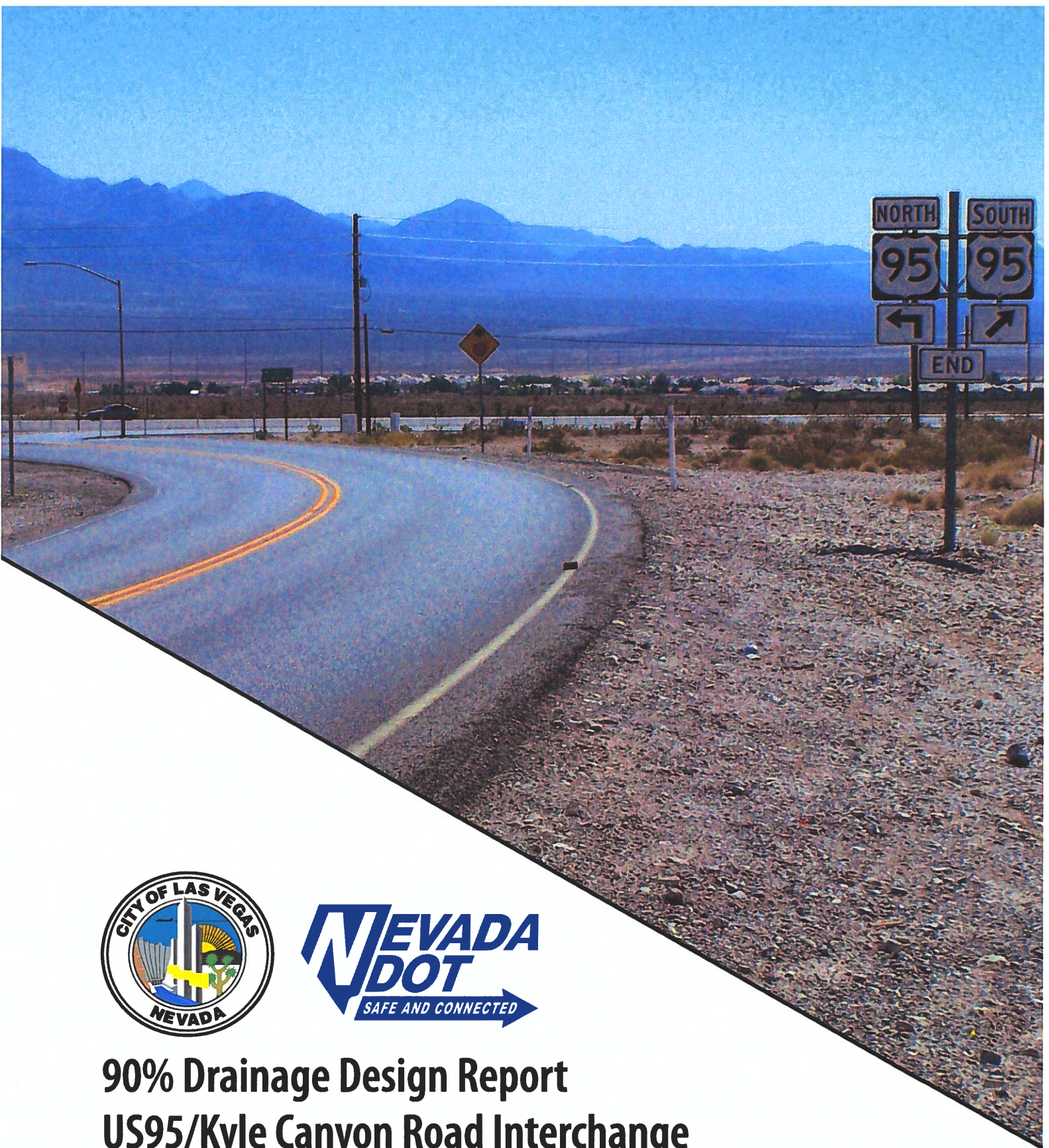


## APPENDIX H

Reference Material

90% Drainage Design Report for Kyle Canyon Interchange





# 90% Drainage Design Report

## US95/Kyle Canyon Road Interchange

### Volume 1 of 2

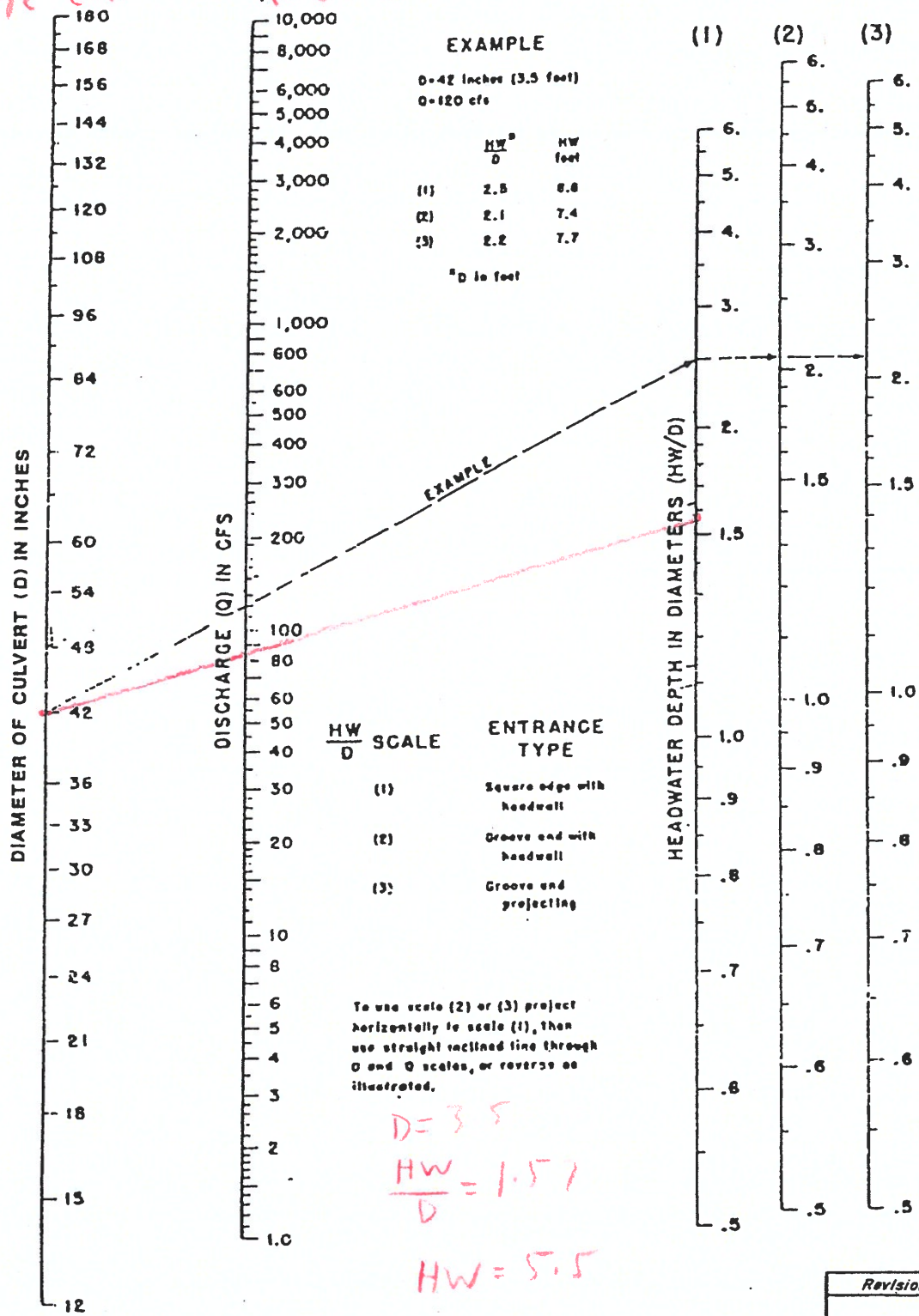


# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## NOMOGRAPH - INLET CONTROL RCP

42" CMP

Q = 85 cfs

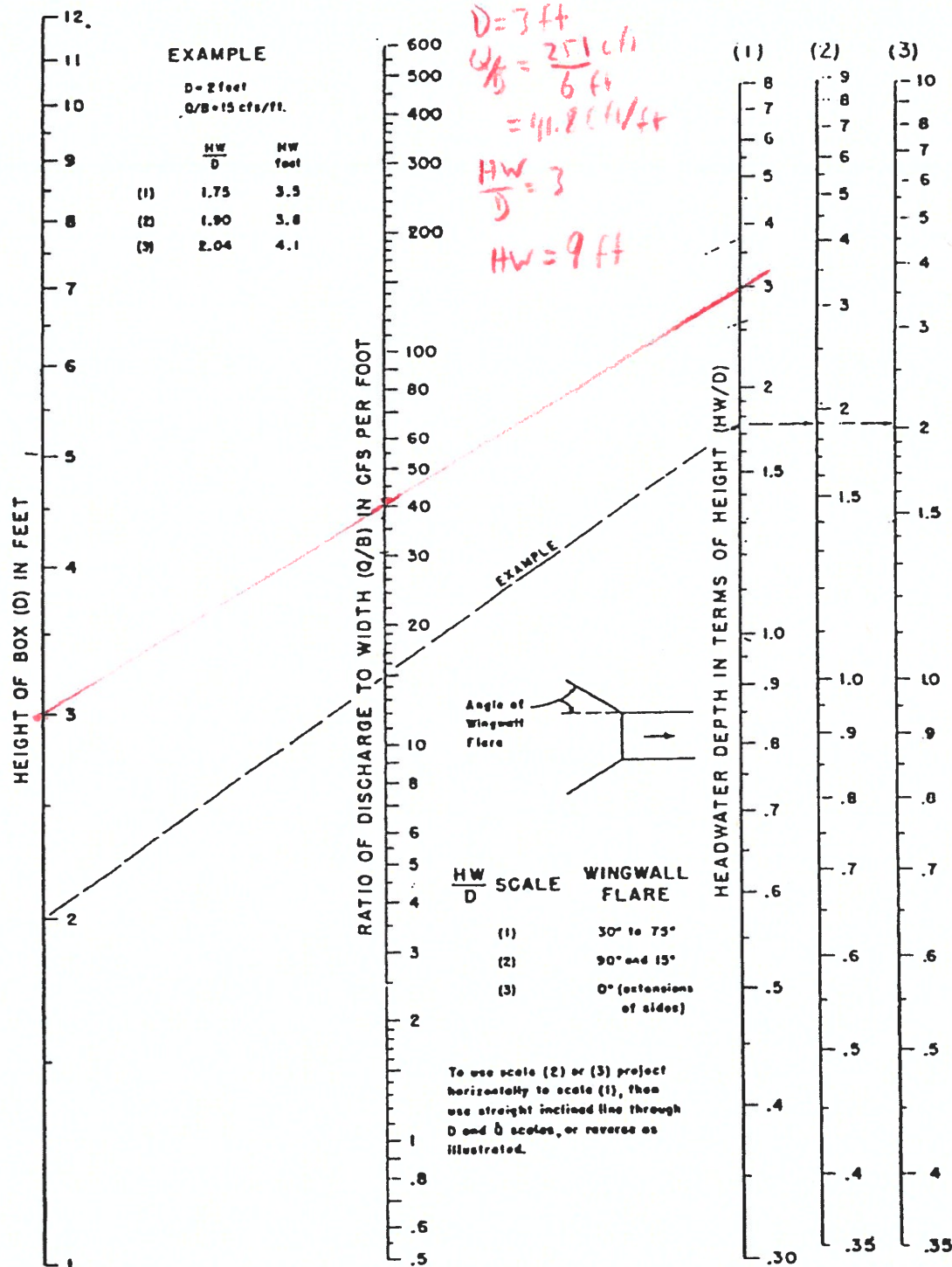


| Revision | Date |
|----------|------|
|          |      |
|          |      |
|          |      |

OFFD-B (50<sub>yr</sub>) 6' Wide x 3' High RCB Q = 251 cfs

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## NOMOGRAPH - INLET CONTROL BOX CULVERT



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

WRC  
ENGINEERING

### REFERENCE:

USDOT, FHWA, HDS No.5, 1985

FIGURE 1004





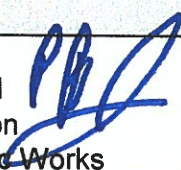


# APPENDIX I

Reference Material

Technical Drainage Study for Moccasin CCRFCD Facility



|                                                                            |                                                                                             |                                                                                                                                                                               |
|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CITY OF LAS VEGAS</b>                                                   |                                                                                             | <b>DATE:</b>                                                                                                                                                                  |
| <b>INTER-OFFICE MEMORANDUM</b>                                             |                                                                                             | April 8, 2019                                                                                                                                                                 |
| <b>TO:</b><br>Land Development Services<br>Department of Building & Safety |                                                                                             | <b>FROM:</b><br>Peter Jackson, CFM<br>Flood Control Section<br>Department of Public Works  |
| <b>SUBJECT:</b>                                                            | Drainage Study for:                                                                         |                                                                                                                                                                               |
|                                                                            | Moccasin Rd CCRFCD Flood Control Facility<br>US95/Kyle Canyon Rd Interchange to Moccasin Rd |                                                                                                                                                                               |
| <b>Cross Streets:</b>                                                      | Moccasin Road and Skye Canyon Park Drive                                                    | Eastland, LLC and Northland, LLC                                                                                                                                              |
| <b>File Number:</b>                                                        | F:\Depot\DSMemos\DS4987C.doc                                                                | Bart Anderson, P.E., DevCo                                                                                                                                                    |
| <b>Parcel Number:</b>                                                      | 125-06-401-001                                                                              |                                                                                                                                                                               |
| <b>Zoning Action:</b>                                                      |                                                                                             |                                                                                                                                                                               |
| <b>FEMA Flood Zone</b>                                                     | YES                                                                                         | NO <input checked="" type="checkbox"/>                                                                                                                                        |
| <b>Proposed Storm Drain</b>                                                | YES <input checked="" type="checkbox"/>                                                     | NO                                                                                                                                                                            |

| HISTORY                                  | DATE<br>RECEIVED | DATE<br>REVIEWED                    | COMMENTS                   | REVIEW<br>FEES   | FEES PAID<br>Payment Trn # |
|------------------------------------------|------------------|-------------------------------------|----------------------------|------------------|----------------------------|
| 1 <sup>st</sup> Submittal                | 5/9/2018         | 6/6/2018                            | See Comments Below         | \$400.00         | 495771: \$400              |
| 2 <sup>nd</sup> Submittal & Supplemental | 9/26/2018        | 10/10/2018 & 11/27/2018 & 1/23/2019 | See Comments Below         | \$400.00         | 499448: \$400              |
| 3 <sup>rd</sup> Submittal                | 3/25/2019        | 4/8/2019                            | See Comments Below         | \$400.00         | 990382: \$400              |
|                                          |                  |                                     | <b>TOTAL FEES (LDDRS):</b> | <b>\$1200.00</b> | ----                       |

**REMARKS: 3rd submittal reflects minor alignment shifts in the main line RCB and lateral locations to mirror the proposed Master Development for SUNSTONE (Skye Canyon East). The Updated includes minor shifts in hydrology to match Master Drainage Study for SUNSTONE (DS 5081).**

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

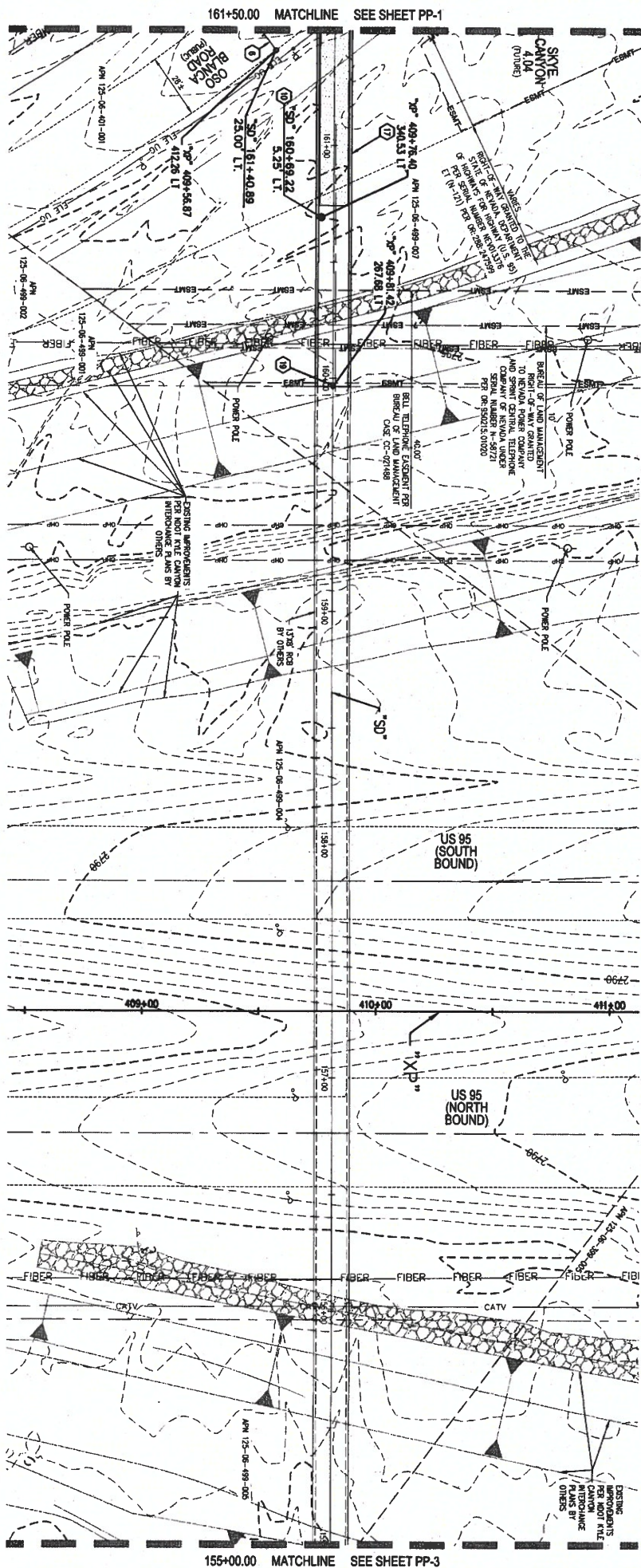
|          |                                                                                                |
|----------|------------------------------------------------------------------------------------------------|
|          | is approved subject to conformance to all City standards and the following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

1. The overall CCRFCD Facilities shown from US95/Kyle Canyon Road Interchange to Moccasin Road complies with the intent of the Master Drainage Study for SUNSTONE (DS5081) that accounts for updated flows and collection locations. The provided Exhibit A4 summarizes the system changes.
2. The proposed sediment basin, pipe & channel system are proposed within a Public Drainage Easement. This is an interim facility and shall be privately maintained by the Skye Canyon Master Developer and needs to be reflected as such on the plans and easements The Master Developer has provided a notarized letter acknowledging the inundation and associated maintenance and liability.
3. The Structural Detail references at the RCP stub connections do not match the call-outs. Clearly reference Sheets S1.30, S2.10, S3.20 and S3.30. Add concrete collar section to details on Sheet S1.30. Connections on Sheets S3.20 & S3.30 are hard to see and need the layer revised for clarity.

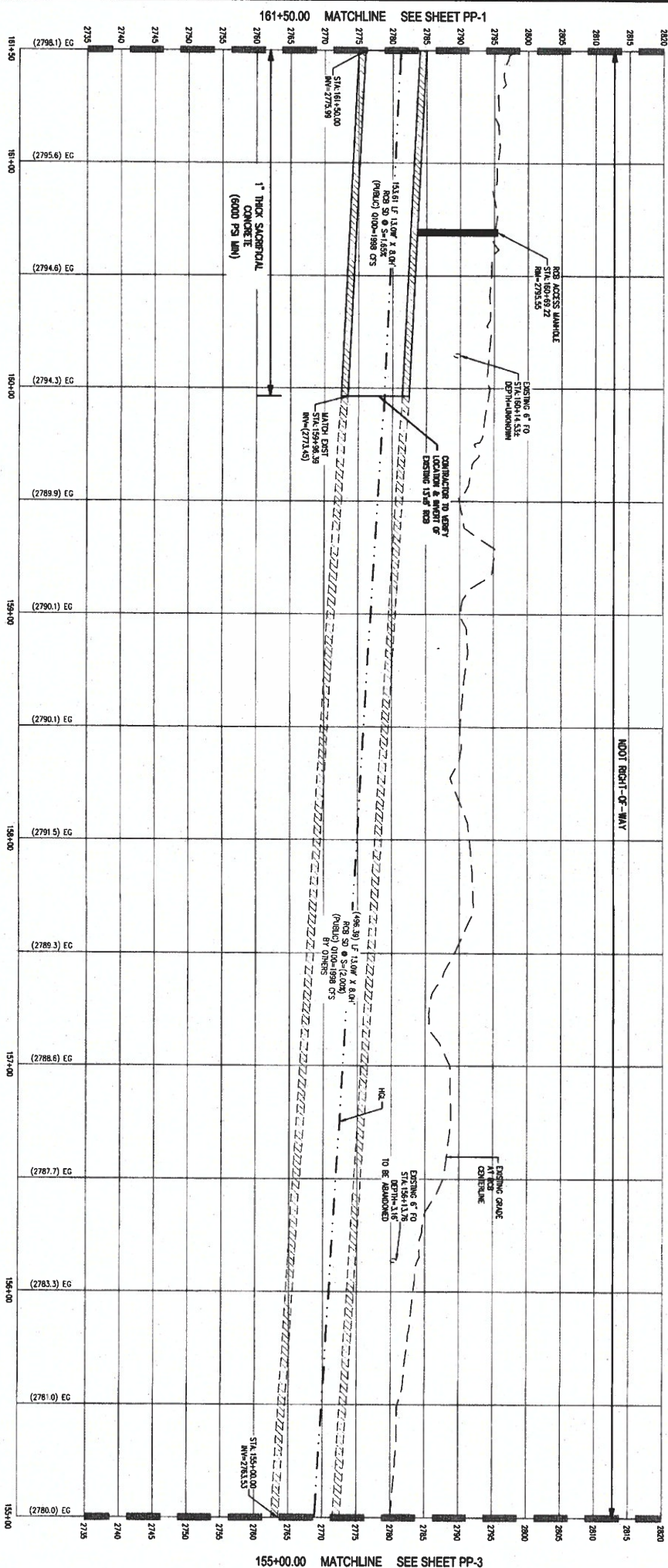








**PLAN VIEW**  
**PRIVATE**

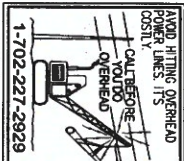


### PROFILE VIEW

HORIZ: 1" = 3'  
VERT: 1" = 10'



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



51-2111 FOR STANDBY WHEN  
HIGH PRESSURE GAS LINES.



3. SEE DETAIL A, SHEET D-3 FOR  
4. ADDITIONAL FUTURE STORAGE

**NOTE**

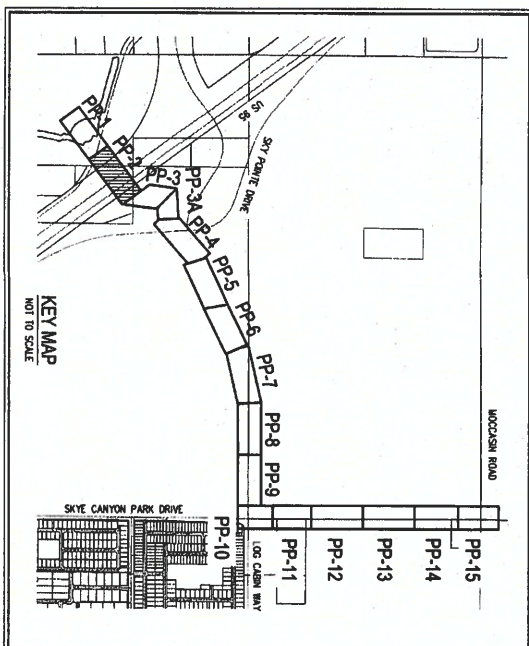
-  STORM DRAIN LATERAL (SEE SHEETS P-16 AND P-17)

STO

- 40 CONNECT TO EXISTING HOOT TYPE 4 MANHOLE

## CONSTRUCTION NOTES

- [illegible]

[illegible]

**S-I-G SLATER  
HANIFAN  
GROUP**  
**CONSULTING ENGINEERS & PLANNERS**  
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118  
PHONE (702) 284-5300 FAX (702) 284-5300

**EASTLAND, LLC AND NORTHLAND, LLC**

CITY OF LAS VEGAS

**MOCCASIN RD CCRFCD FLOOD CONTROL FACILITY  
US 95/KYLE CANYON RD INTERCHANGE TO MOCCASIN RD  
PLAN AND PROFILE**

**PP-2**



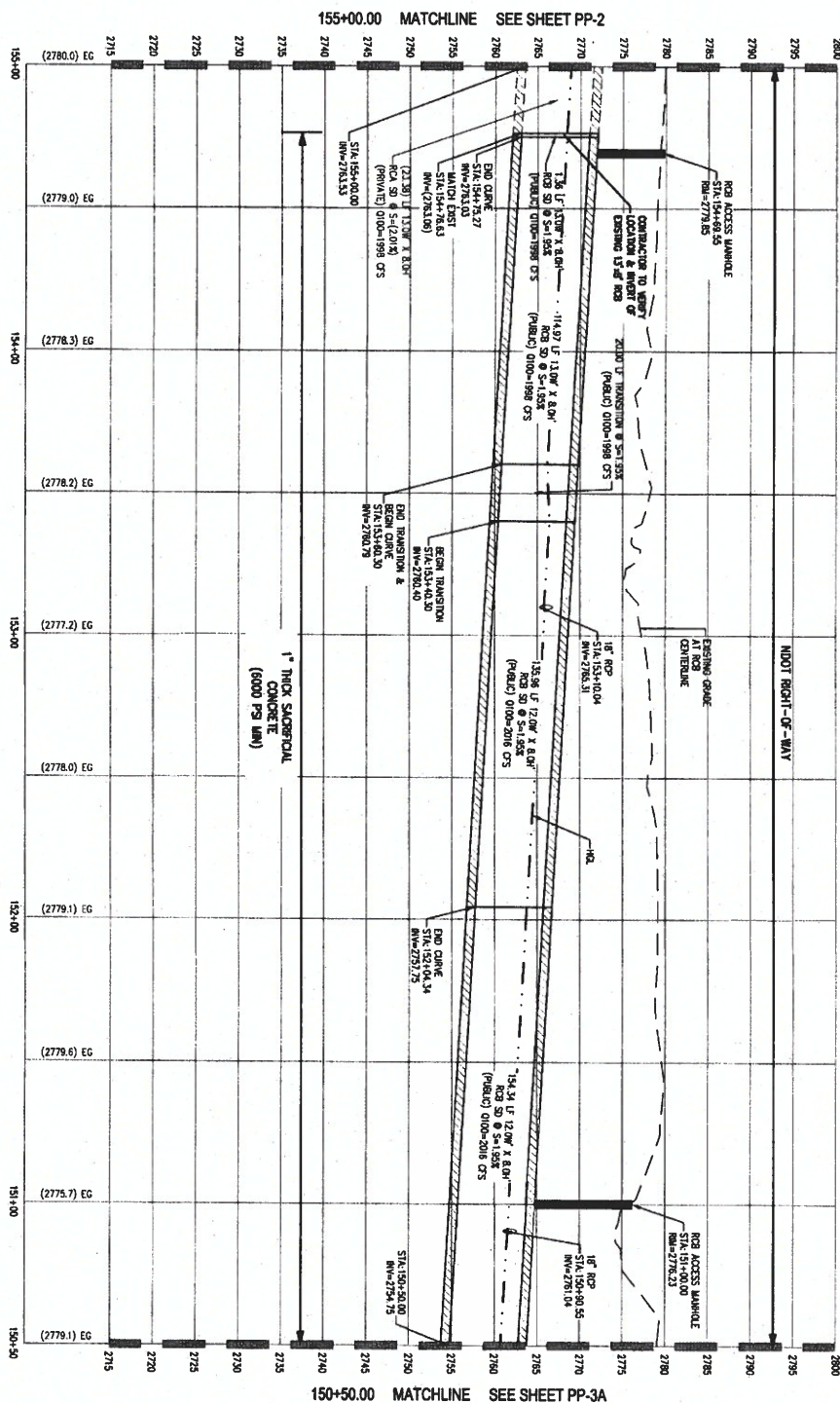
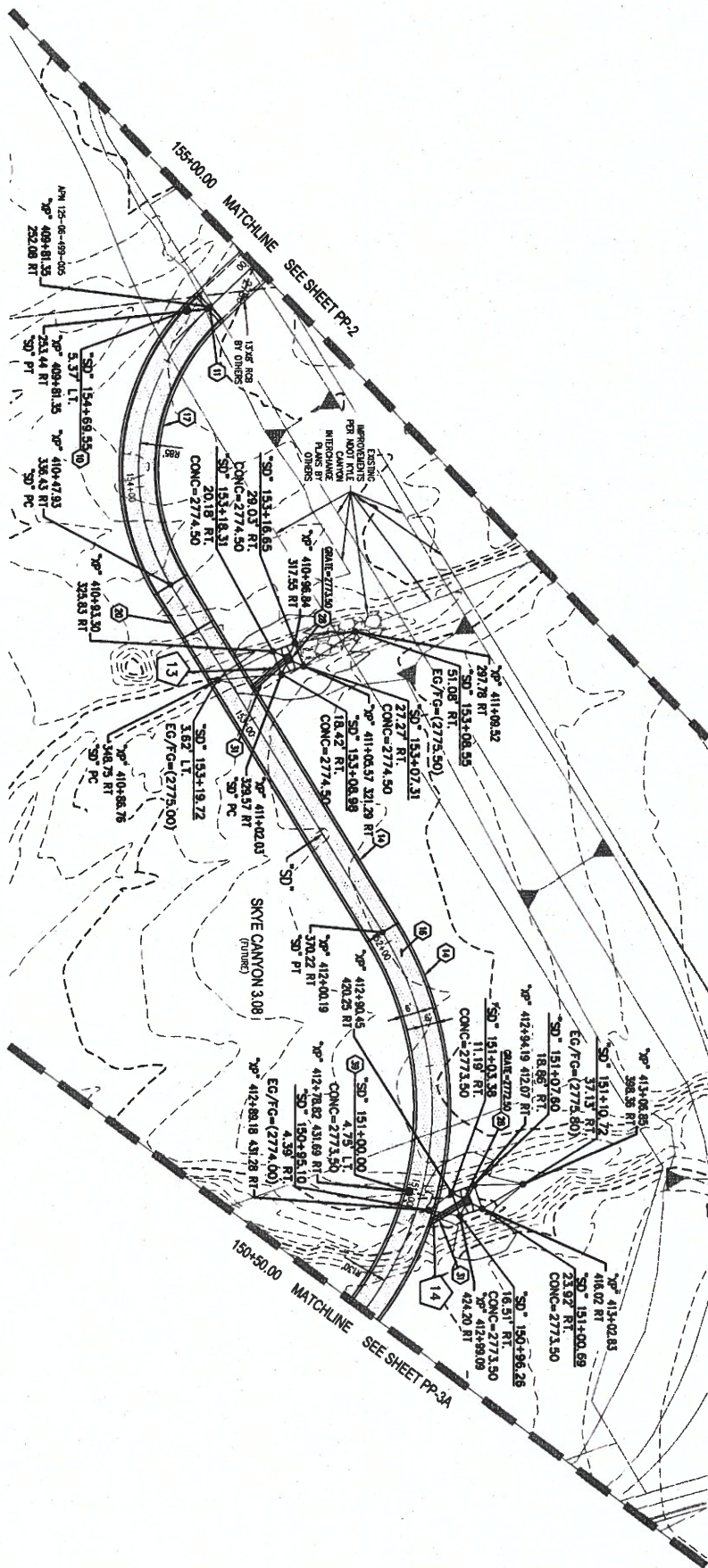
**OLY1715-000**

DESIGNER: CH

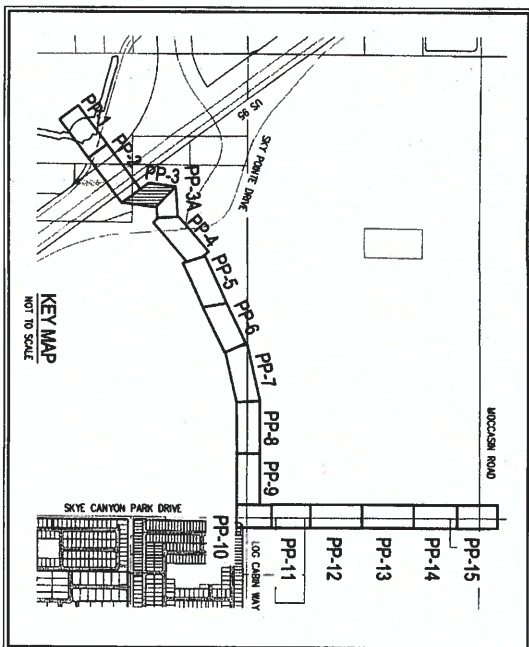
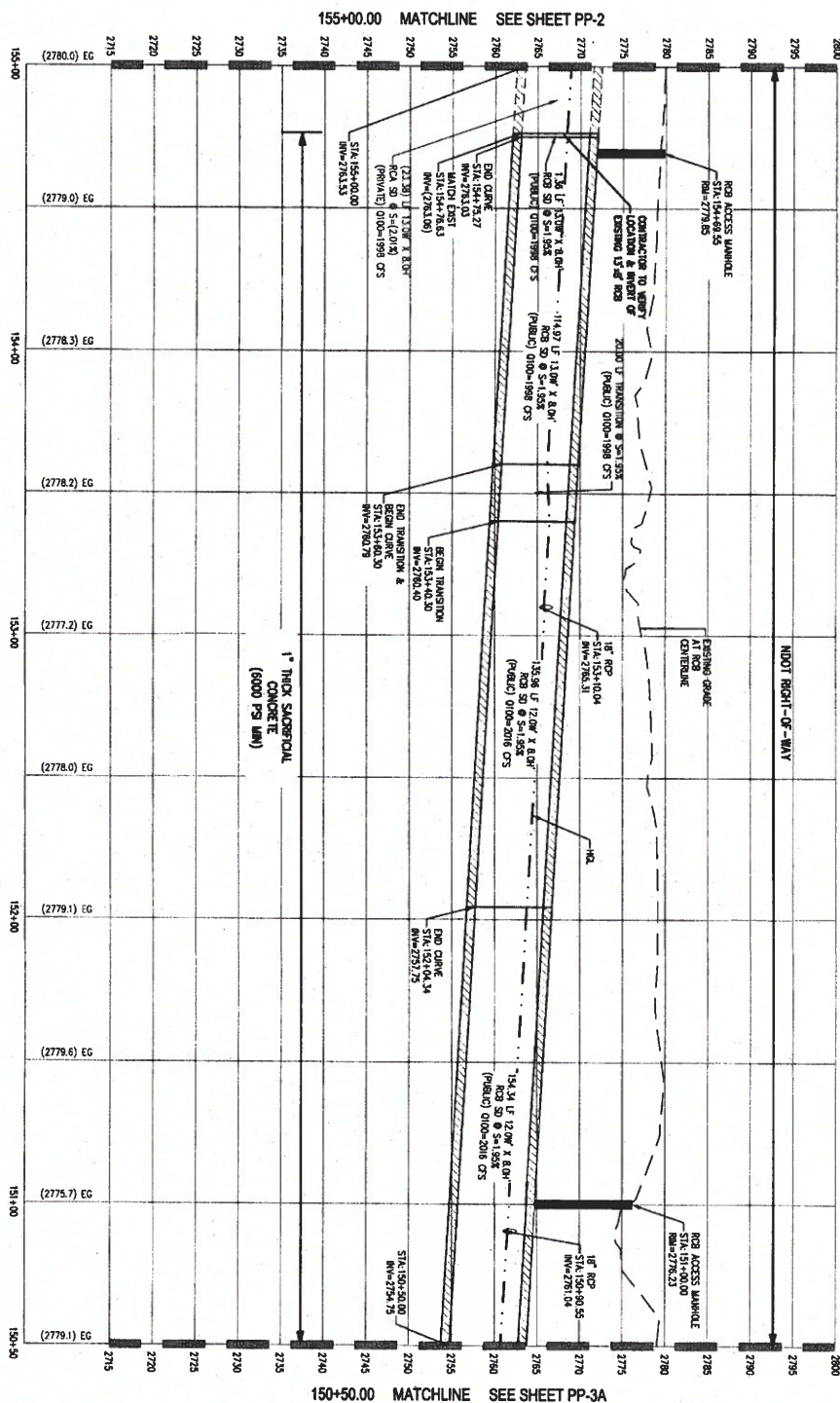
DATE: 03/21/19



**PRIVATE**



HORIZ: 1° = 30'  
VERT: 1" = 10'



### CONSTRUCTION NOTES

- [illegible]

**NOTE**

1. ALL ROB QUANTITIES TO HAVE STARTER WALLS. SEE "S" SHEETS FOR DETAILS.
2. ALL PROPOSED ROB STORM DRAIN TO BE PRECAST EXCEPT WHERE SHOWN ON "S" SHEETS.
3. SEE DETAIL A, SHEET D-3 FOR TYPICAL TRENCH DETAIL.
4. ADDITIONAL FUTURE STORM DRAIN LATERALS WILL BE REQUIRED.

...LINES. IT'S COSTLY.

- Call**



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



1-702-227-2929



OR  
800-227-2600

**EASTLAND, LLC AND NORTHLAND, LLC**

**MOCCASIN RD CCRFCD FLOOD CONTROL FACILITY  
US 95/KYLE CANYON RD INTERCHANGE TO MOCCASIN RD  
PLAN AND PROFILE**

[illegible]

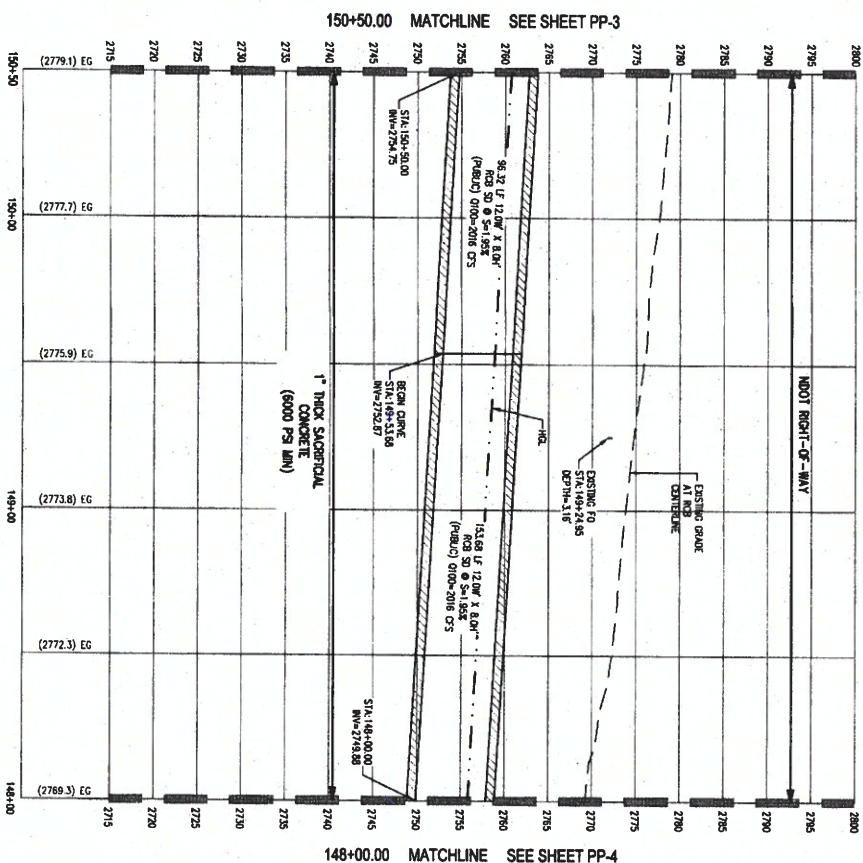
**S-I-G SLATER  
HANIFAN  
GROUP**  
**CONSULTING ENGINEERS & PLANNERS**  
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118  
PHONE (702) 284-4300 FAX (702) 284-4399



**PP-3**

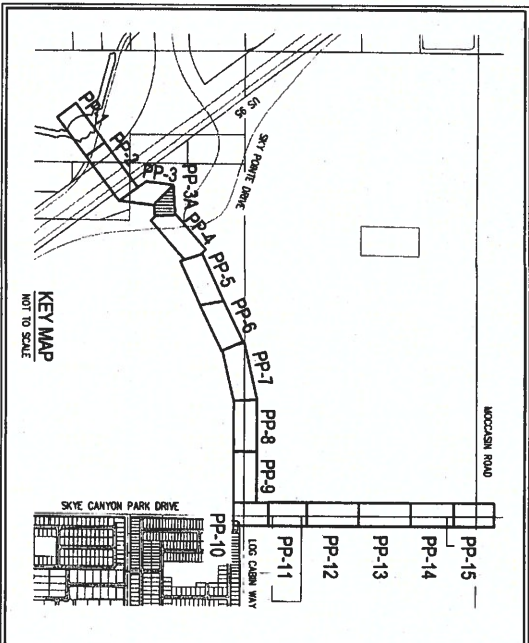


**PROVATE**



### PROFILE VIEW

HORIZ: 1° = 30'  
VERT: 1° = 10'



**KEY MAP**  
**NOT TO SCALE**

- [illegible]

**NOTE**

#7 STORM DRAIN LATERAL (SEE SHEETS P-16 AND P-17)

**NOTE**

1. ALL ROO QUARTERS TO HAVE STAINER WALLS. SEE "S" SHEETS FOR DETAILS.
2. ALL PROPOSED ROO STORM BRANI TO BE PRECAST EXCEPT WHERE SHOWN ON "S" SHEETS
3. SEE DETAIL A, SHEET "A-3" FOR TYPICAL TRENCH DETAIL.
4. ADDITIONAL, FUTURE STORM DRAIN BRANI WILL BE REQUIRED.

Call  
811  
OR  
1-800-227-2600

**FAST**  
Call  
1-702-432-5300  
Underground  
FREEMAN & ARTERIAL SYSTEM  
OF TRANSPORTATION (F.A.S.T.)

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.

CALT BEFORE YOU GO OVERHEAD



1-702-227-2929

Call before you Dig  
AVOID CUTTING UNDERGROUND  
UTILITY LINES. IT'S COSTLY.

Call  
**811**  
OR  
1-800-227-2600

**EASTLAND, LLC AND NORTHLAND, LLC**

**MOCCASIN RD CCRFCD FLOOD CONTROL FACILITY  
US 95/KYLE CANYON RD INTERCHANGE TO MOCCASIN RD  
PLAN AND PROFILE**

CITY OF LAS VEGAS

[illegible]

**S-I SLATER  
HANIFAN  
GROUP**  
**CONSULTING ENGINEERS & PLANNERS**  
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118  
PHONE (702) 284-3300 FAX (702) 284-3390

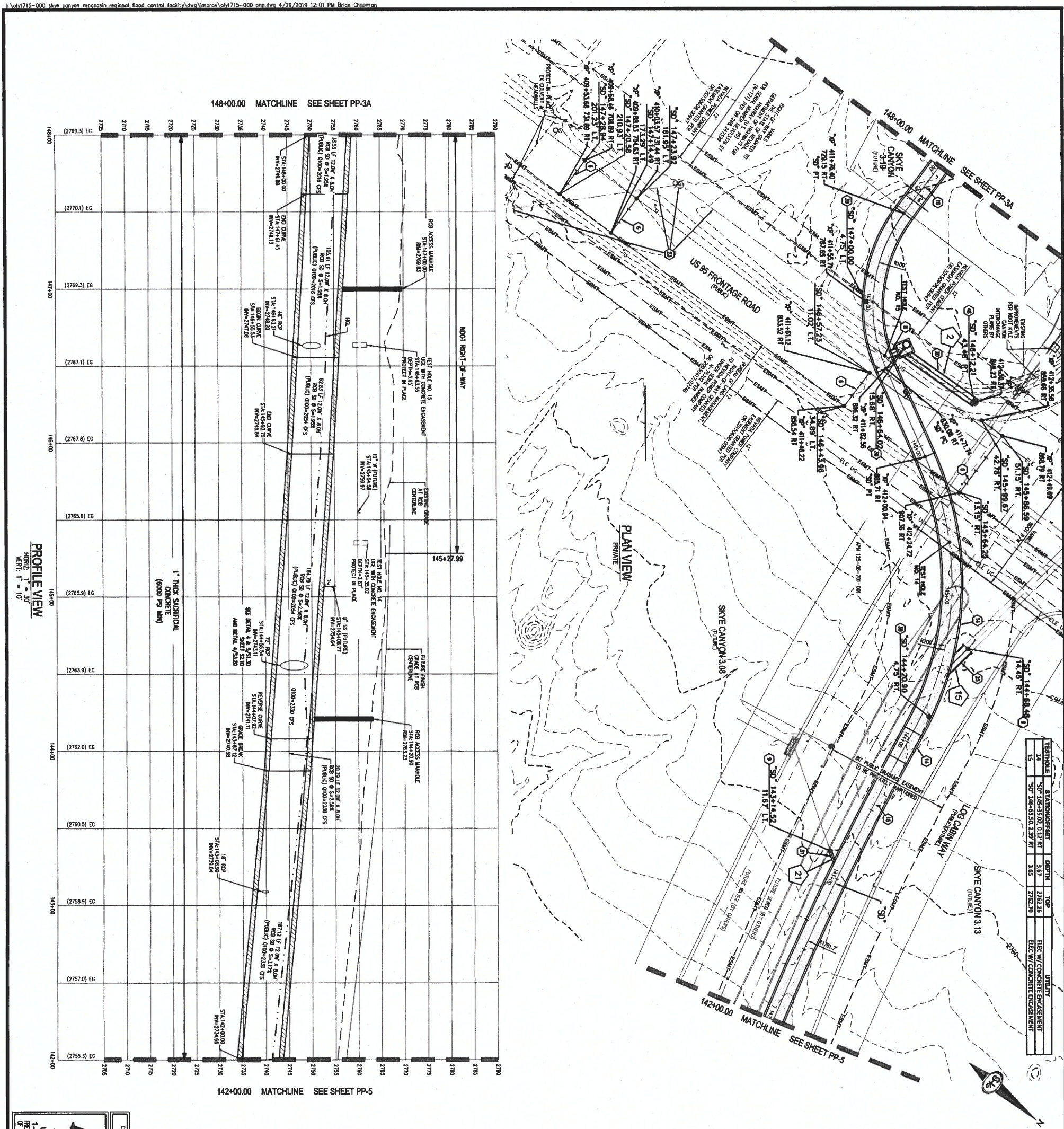
**PP-3A**  
SHEET 20 OF 4



PROJECT NO.

**OLY1715-000**





**EAST**  
Underground  
1-702-432-5300  
FIREARM & AIRPORT SYSTEM  
OR TRANSPORTATION (EAST)

**AVOID HITTING OVERHEAD**  
CUTLERS, LINES, ITS  
YOU DO OVERHEAD  
1-702-227-2929

GRAPHIC SCALE (FEET)  
0 50 100

CALL SOONEST DATE AT 702-432-5300 FOR STAFFING NEEDS  
EXPLAINING OVER OR MEASURING PRESSURE GAS LINES

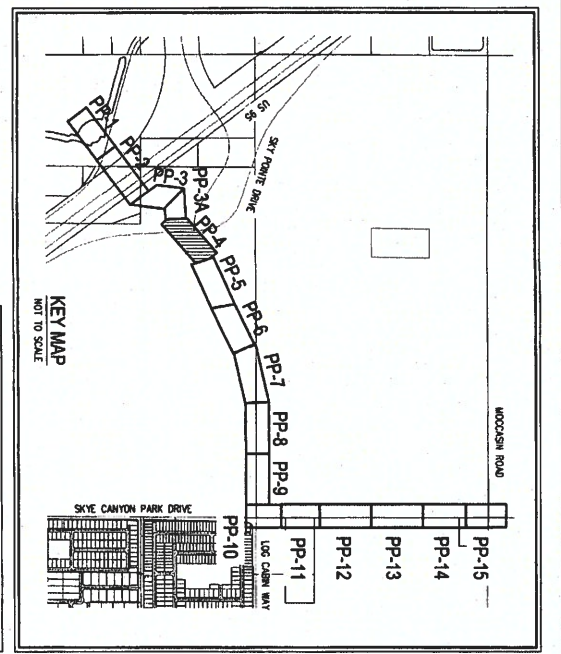
**811**  
Call before you dig  
AND CUTTING UNDERGROUND  
UTILITY LINES (811)  
Call  
1-800-227-2800

**PROFESSIONAL ENGINEER**  
STATE OF NEVADA  
1978  
1-702-432-5300

**RCB NOTE**  
1. ALL RCB CEMENTS TO HAVE STAFFED WALLS SEE 'S' SHEETS  
2. ALL PROPOSED RCB STORM DRAIN TO BE PRECAST EXCEPT  
WHERE SHOWN ON 'S' SHEETS  
3. SEE DETAIL A, SHEET D-3 FOR TYPICAL RCB DETAIL  
4. CONCRETE FLOOR STORM DRAIN (FLOOR) SHALL BE REINFORCED

**STORM DRAIN LATERAL (SEE SHEETS P-16 AND P-17)**

- CONSTRUCTION NOTES**
1. CONSTRUCT HEAD WALL AND WING WALLS (DETAIL 1, SHEET S310 AND DETAIL A, SHEET S-3)
  2. INSTALL REBAR (SEE SHEET C-4 FOR REBAR LAY)
  3. CONSTRUCT CONCRETE JUNCTION (DETAIL 1, SHEET S310 AND DETAIL A, SHEET S-3)
  4. CONSTRUCT CONCRETE SCOUR PROTECTION (DETAIL 1, SHEET S310 AND DETAIL A, SHEET S-3)
  5. CONSTRUCT CONCRETE CHANNEL (DETAIL 1, SHEET S310 AND DETAIL A, SHEET S-3)
  6. CONSTRUCT REINFORCING WALL (DETAIL 5, SHEET S310)
  7. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  8. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  9. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  10. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  11. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  12. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  13. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  14. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  15. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  16. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  17. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  18. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  19. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  20. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  21. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  22. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  23. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  24. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  25. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  26. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  27. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  28. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  29. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  30. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  31. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  32. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  33. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  34. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  35. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  36. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  37. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  38. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  39. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  40. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  41. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  42. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  43. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  44. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  45. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  46. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  47. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  48. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  49. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  50. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  51. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  52. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  53. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  54. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  55. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  56. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  57. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  58. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  59. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  60. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  61. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  62. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  63. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  64. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  65. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  66. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  67. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  68. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  69. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  70. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  71. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  72. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  73. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  74. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  75. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  76. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  77. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  78. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  79. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  80. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  81. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  82. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  83. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  84. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  85. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  86. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  87. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  88. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  89. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  90. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  91. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  92. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  93. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  94. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  95. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  96. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  97. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  98. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  99. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD
  100. CONSTRUCT 12" WIDE, 6" THICK TYPE 1 BASE ACCESS ROAD



**EASTLAND, LLC AND NORTHLAND, LLC**

**MOCCASIN RD CCRFD FLOOD CONTROL FACILITY**  
**US 95/KYLE CANYON RD INTERCHANGE TO MOCCASIN RD**  
**PLAN AND PROFILE**

**PP-4**  
SHEET 21 OF 49

**SLATER HANIFAN GROUP**  
CONSULTING ENGINEERS & PLANNERS  
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118  
PHONE (702) 284-6300 FAX (702) 284-8380





























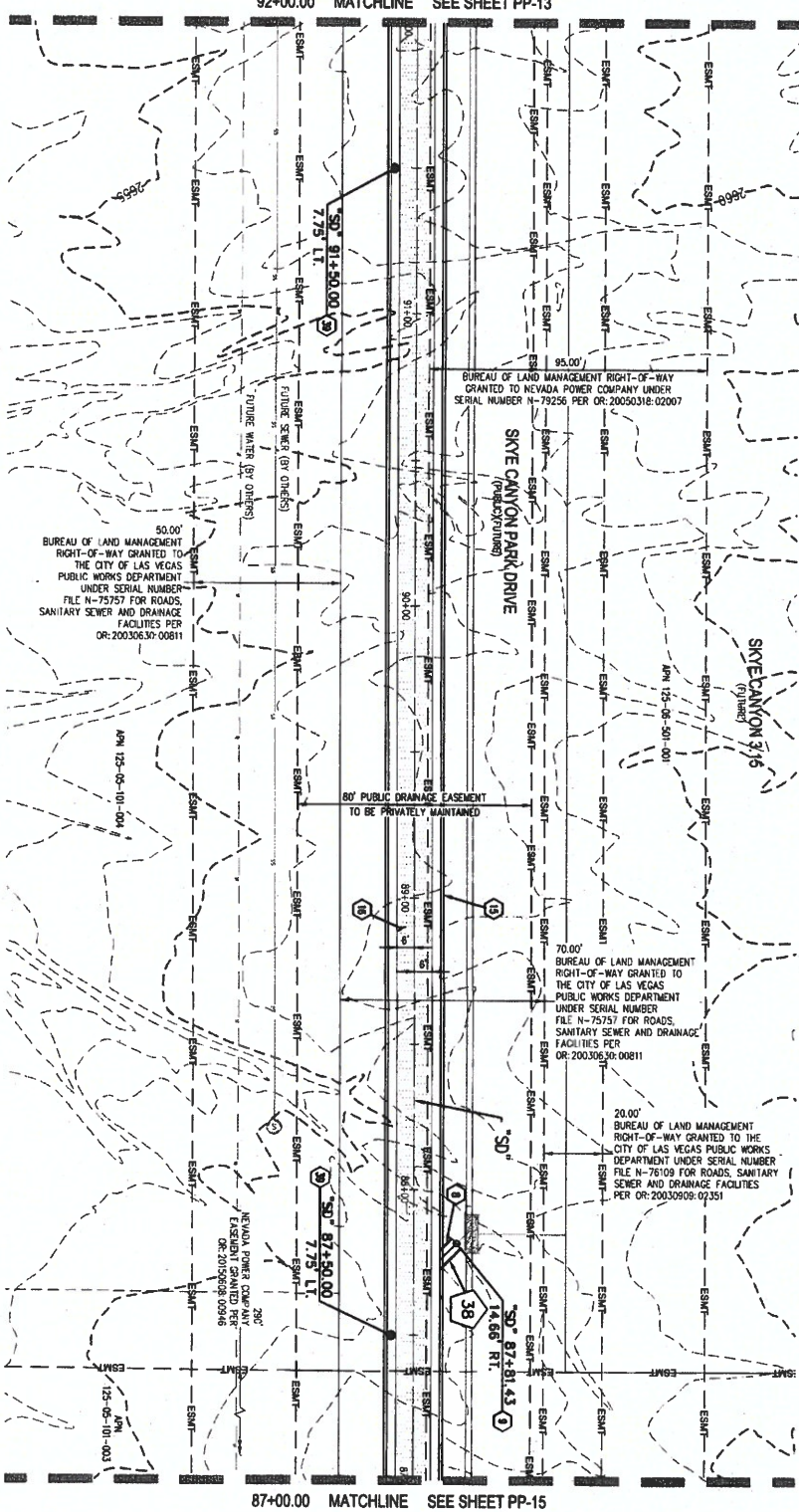




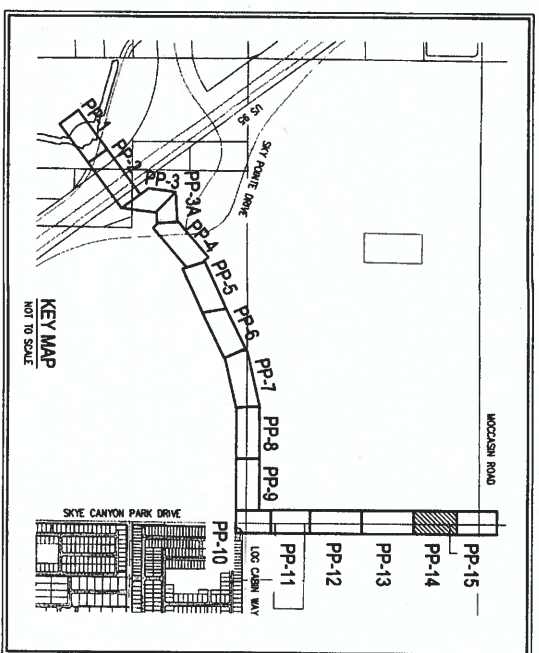








PLAN VIEW  
PRIVATE



- [illegible]

RCB NOTE

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

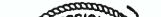
3. SEE DETAIL A, SHEET D-3 FOR TYPICAL TRENCH DETAIL.  
4. ADDITIONAL FUTURE STORM DRAIN LATERALS WILL BE REQUIRED.



**FAST**

Call  
1-800-368-6666  
Underground  
1-702-432-5300  
FIBER & AIRTEL SYSTEM  
OF TRANSPORTATION (F.A.S.T.)

Call before you Dig  
AND DRINK  
UNPOTABLE  
UTILITY LINES. IT'S COSTLY.  
Call  
  
OR  
1-800-227-2600

|                         |                                                                                     |                            |                                                               |                         |                                                                                                                           |                   |     |             |      |    |              |      |
|-------------------------|-------------------------------------------------------------------------------------|----------------------------|---------------------------------------------------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------|-------------------|-----|-------------|------|----|--------------|------|
| PP-14<br>SHEET 31 OF 49 |  | PROJECT NO.<br>OLY1715-000 | CHECKED: FR<br>DESIGNER: CB<br>DRAFTER: BCC<br>DATE: 03/21/19 | \$4,35,86<br>T19<br>R60 | EASTLAND, LLC AND NORTHLAND, LLC                                                                                          | CITY OF LAS VEGAS | NO. | DESCRIPTION | DATE | BY | APP.<br>DATE | APP. |
|                         |                                                                                     |                            |                                                               |                         | <b>MOCCASIN RD CCRFCD FLOOD CONTROL FACILITY<br/>US 95/KYLE CANYON RD INTERCHANGE TO MOCCASIN RD<br/>PLAN AND PROFILE</b> |                   |     |             |      |    |              |      |



**SLATER HANIFAN GROUP**  
CONSULTING ENGINEERS & PLANNERS  
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118  
PHONE (702) 284-5300 FAX (702) 284-5399







## APPENDIX J

### CD of Electronic Files