Revised Draft SEIR Appendix 5.5a (Continued)

Entrada South Hydrology and Drainage Concept (Part 6 of 6)

ENTRADA SOUTH - LID
DIVERSION CALCUALTINS FOR 80% LONG TERM CAPTURE (Qpm)

DIVERSION CALCULATIONS - BASIN A

BASIN	DIVERTER	TRIB DA	TRIB AREA	PIPE SIZE	SLOPE	Qpm	Qmax
			ac	in	%	cfs	cfs
A	A1	S	1.3	4	2.0	0.24	0.28
	A2	R	2.1	6	0.5	0.39	0.43
	MAIN	S, R	3.4	6	2.0	0.63	0.86
	A3	C, D, F	21.9	8	13.0	4.03	4.78
TOTAL	OUTLET	ALL	25.3	8	13.0	4.66	4.78

DIVERSION CALCULATIONS - BASIN B

BASIN	DIVERTER	TRIB DA	TRIB AREA	PIPE SIZE	SLOPE	Qpm	Qmax
			ac	in	%	cfs	cfs
B	B1	B1	45.0	10	3.5	10.73	10.84
	B2	P, W	17.9	15	2.4	4.27	4.39
TOTAL	OUTLET	ALL	62.9	18	1.8	15.00	15.27

DIVERSION CALCULATIONS - BASIN C

BASIN	DIVERTER	TRIB DA	TRIB AREA	PIPE SIZE	SLOPE	Qpm	Qmax
			ac	in	%	cfs	cfs
C	C	B2	24.7	8	15.0	4.50	5.14

BASIN A1 - 4" @ 2% = 0.28 cfs

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.02000	ft/ft
Normal Depth	0.33	ft
Diameter	0.33	ft

Results

Discharge	0.28	ft^3/s
Flow Area	0.09	ft^2
Wetted Perimeter	1.04	ft
Hydraulic Radius	0.08	ft
Top Width	0.00	ft
Critical Depth	0.29	ft
Percent Full	100.0	%
Critical Slope	0.01779	ft/ft
Velocity	3.32	ft/s
Velocity Head	0.17	ft
Specific Energy	0.50	ft
Froude Number	0.00	
Maximum Discharge	0.31	ft^3/s
Discharge Full	0.28	ft^3/s
Slope Full	0.02000	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

BASIN A1 - 4" @ 2% = 0.28 cfs

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.33	ft
Critical Depth	0.29	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.01779	ft/ft

BASIN A2 - 6" @ 0.5% = 0.43 cfs

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.00500	ft/ft
Normal Depth	0.50	ft
Diameter	0.50	ft

Results

Discharge	0.43	ft^3/s
Flow Area	0.20	ft^2
Wetted Perimeter	1.57	ft
Hydraulic Radius	0.13	ft
Top Width	0.00	ft
Critical Depth	0.33	ft
Percent Full	100.0	%
Critical Slope	0.00809	ft/ft
Velocity	2.19	ft/s
Velocity Head	0.07	ft
Specific Energy	0.57	ft
Froude Number	0.00	
Maximum Discharge	0.46	ft^3/s
Discharge Full	0.43	ft^3/s
Slope Full	0.00500	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

BASIN A2 - 6" @ 0.5% = 0.43 cfs

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.50	ft
Critical Depth	0.33	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00809	ft/ft

BASIN A1/A2 MAIN - 6" @ 2% = 0.86 cfs

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.02000	ft/ft
Normal Depth	0.50	ft
Diameter	0.50	ft

Results

Discharge	0.86	ft^3/s
Flow Area	0.20	ft^2
Wetted Perimeter	1.57	ft
Hydraulic Radius	0.13	ft
Top Width	0.00	ft
Critical Depth	0.45	ft
Percent Full	100.0	%
Critical Slope	0.01747	ft/ft
Velocity	4.38	ft/s
Velocity Head	0.30	ft
Specific Energy	0.80	ft
Froude Number	0.00	
Maximum Discharge	0.92	ft^3/s
Discharge Full	0.86	ft^3/s
Slope Full	0.02000	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

BASIN A1/A2 MAIN - 6" @ 2% = 0.86 cfs

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.50	ft
Critical Depth	0.45	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.01747	ft/ft

BASIN A3 - 8" @ 13% = 4.78 cfs

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.13000	ft/ft
Normal Depth	0.67	ft
Diameter	0.67	ft

Results

Discharge	4.78	ft^3/s
Flow Area	0.35	ft^2
Wetted Perimeter	2.10	ft
Hydraulic Radius	0.17	ft
Top Width	0.00	ft
Critical Depth	0.67	ft
Percent Full	100.0	%
Critical Slope	0.12501	ft/ft
Velocity	13.57	ft/s
Velocity Head	2.86	ft
Specific Energy	3.53	ft
Froude Number	0.00	
Maximum Discharge	5.15	ft^3/s
Discharge Full	4.78	ft^3/s
Slope Full	0.13000	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

BASIN A3 - 8" @ 13% = 4.78 cfs

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.67	ft
Critical Depth	0.67	ft
Channel Slope	0.13000	ft/ft
Critical Slope	0.12501	ft/ft

BASIN B1 - 10" @ 3.5% = 4.39 cfs

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.03500	ft/ft
Normal Depth	0.83	ft
Diameter	0.83	ft

Results

Discharge	4.39	ft^3/s
Flow Area	0.54	ft^2
Wetted Perimeter	2.61	ft
Hydraulic Radius	0.21	ft
Top Width	0.00	ft
Critical Depth	0.81	ft
Percent Full	100.0	%
Critical Slope	0.03106	ft/ft
Velocity	8.12	ft/s
Velocity Head	1.02	ft
Specific Energy	1.85	ft
Froude Number	0.00	
Maximum Discharge	4.73	ft^3/s
Discharge Full	4.39	ft^3/s
Slope Full	0.03500	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

BASIN B1 - 10" @ 3.5% = 4.39 cfs

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.83	ft
Critical Depth	0.81	ft
Channel Slope	0.03500	ft/ft
Critical Slope	0.03106	ft/ft

BASIN B2 - 15" @ 2.4% = 10.84 cfs

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.02400	ft/ft
Normal Depth	1.25	ft
Diameter	1.25	ft

Results

Discharge	10.84	ft^3/s
Flow Area	1.23	ft^2
Wetted Perimeter	3.93	ft
Hydraulic Radius	0.31	ft
Top Width	0.00	ft
Critical Depth	1.20	ft
Percent Full	100.0	%
Critical Slope	0.02092	ft/ft
Velocity	8.83	ft/s
Velocity Head	1.21	ft
Specific Energy	2.46	ft
Froude Number	0.00	
Maximum Discharge	11.66	ft^3/s
Discharge Full	10.84	ft^3/s
Slope Full	0.02400	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

BASIN B2 - 15" @ 2.4% = 10.84 cfs

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.25	ft
Critical Depth	1.20	ft
Channel Slope	0.02400	ft/ft
Critical Slope	0.02092	ft/ft

BASIN B - OUTLET - 18" @ 1.8% = 15.27 cfs

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.01800	ft/ft
Normal Depth	1.50	ft
Diameter	1.50	ft

Results

Discharge	15.27	ft^3/s
Flow Area	1.77	ft^2
Wetted Perimeter	4.71	ft
Hydraulic Radius	0.38	ft
Top Width	0.00	ft
Critical Depth	1.41	ft
Percent Full	100.0	%
Critical Slope	0.01556	ft/ft
Velocity	8.64	ft/s
Velocity Head	1.16	ft
Specific Energy	2.66	ft
Froude Number	0.00	
Maximum Discharge	16.42	ft^3/s
Discharge Full	15.27	ft^3/s
Slope Full	0.01800	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

BASIN B - OUTLET - 18" @ 1.8% = 15.27 cfs

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.50	ft
Critical Depth	1.41	ft
Channel Slope	0.01800	ft/ft
Critical Slope	0.01556	ft/ft

BASIN C - 8" @ 15% = 5.14 cfs

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.15000	ft/ft
Normal Depth	0.67	ft
Diameter	0.67	ft

Results

Discharge	5.14	ft^3/s
Flow Area	0.35	ft^2
Wetted Perimeter	2.10	ft
Hydraulic Radius	0.17	ft
Top Width	0.00	ft
Critical Depth	0.67	ft
Percent Full	100.0	%
Critical Slope	0.14499	ft/ft
Velocity	14.57	ft/s
Velocity Head	3.30	ft
Specific Energy	3.97	ft
Froude Number	0.00	
Maximum Discharge	5.53	ft^3/s
Discharge Full	5.14	ft^3/s
Slope Full	0.15000	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

BASIN C - 8" @ 15% = 5.14 cfs

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.67	ft
Critical Depth	0.67	ft
Channel Slope	0.15000	ft/ft
Critical Slope	0.14499	ft/ft

DRAINAGE BASIN AT GOLF COURSE
ENTRADA SOUTH

EXISTING 36" RCP FROM GOLF COURSE (LOW/MID LEVEL FLOWS)

LIMITS OF CONSTRUCTION

ACCESS ROAD

PROPOSED HIGH FLOW SPILLWAY GROUTED RIPRAP

WSEL=1252.0

PROPOSED TOP OF CONCRETE 1253 FS

(1245.0) IE

EXISTING TO REMAIN

EXISTING

2:1 CONCRETE

1:1

PROPERTY LINE

PRIVATE

LACDPW TO MAINTAIN

BASIN INVERT 1240.0

WARP TO EXISTING

PROPOSED RCB INLET
Q_{50B} = 746 CFS

PROPOSED PIPE INLET
$Q_{MID-FLOW}$ = 13 CFS

RCB — TRANSITION — RCP

RCP

15% ACCESS ROAD

12'

4%

6%

8%

TURN-AROUND PAD

40'

40'

SCE OH

SCE OH

SCE OH

SCE OH

PROPOSED TOP OF BANK 1253 FG

PROPOSED TOP OF CONCRETE 1253 FS

OUTLET

PROPOSED GRADE STABILIZER

1260 1255 1250 1245 1240 1235 1230

SCALE: 1" = 20'

GRAPHIC SCALE

20 10 0 20 40

(IN FEET)

1 inch = 20 ft.

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DRAINAGE BASIN AT GOLF COURSE
ENTRADA SOUTH
10/18/17

EXISTING 36" RCP FROM GOLF COURSE (LOW/MID LEVEL FLOWS)

LIMITS OF CONSTRUCTION

ACCESS ROAD

PROPOSED HIGH FLOW SPILLWAY GROUTED RIPRAP

WSEL=1252.0

PROPOSED TOP OF CONCRETE 1253 FS

(1245.0) TF

EXISTING TO REMAIN

EXISTING

PROPERTY LINE

PRIVATE

LACDPW TO MAINTAIN

LIMITS OF CONSTRUCTION

WARP TO EXISTING

BASIN INVERT 1240.0

PROPOSED RCB INLET
Q_{50B} = 746 CFS

PROPOSED PIPE INLET
$Q_{MID-FLOW}$ = 13 CFS

WSEL=1252.0

PROPOSED TOP OF BANK 1253 FG

PROPOSED TOP OF CONCRETE 1253 FS

2:1 CONCRETE

12'

15% ACCESS ROAD

RCB TRANSITION RCP

RCP

8%

12'

4%

6%

TURN-AROUND PAD

40'

40'

SCE OH

SCE OH

OUTLET

PROPOSED GRADE STABILIZER

SCE OH

SCE OH

SCE OH

SCALE: 1"=20'

GRAPHIC SCALE

20 10 0 20 40

(IN FEET)
1 inch = 20 ft.

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Memorandum

Date:	24 October 2017
To:	Miles Helfrich, Newhall Land
From:	Aaron Poresky and Austin Orr, Geosyntec Consultants
Subject:	Entrada South – Evaluation of Conformance with Newhall LID Performance Standard

1. INTRODUCTION

The Entrada South Project (Tentative Tract Map (TTM) No. 53295) (Project) includes low impact development (LID) best management practices (BMPs) as shown in the *LID/SUSMP/Water Quality Maintenance Plan Map for Entrada South* (Water Quality Exhibit, Alliance, 2017). The purpose of this memorandum is to verify that the LID BMPs proposed for the Project have been selected and sized in a manner consistent with the Project LID Performance Standard as defined by the Los Angeles County Municipal Separate Storm Sewer System (MS4) Permit (Order No. R4-2012-0175). The Newhall Waste Discharge Requirements (WDRs) (Order No. R4-2012-0139) and the *Newhall Ranch Sub-Regional Stormwater Mitigation Plan (NRSSMP)* (Geosyntec, 2009) also serve as benchmarks for evaluating conformance.

The Project LID Performance Standard establishes three separate conformance metrics, including BMP selection, sizing of individual BMPs for each drainage area, and sizing of BMPs to provide adequate retention volume or equivalent biofiltration volume at the tract map-scale. In summary, this memorandum demonstrates conformance with these three different conformance metrics, including:

- **BMP selection analysis.** LID BMPs have been selected in a manner consistent with the LID selection criteria (i.e., infiltration feasibility criteria) contained in the LID Performance Standard;

- **BMP sizing analysis.** The combination of parcel-based, regional infiltration/ bioinfiltration facilities, and "green street" facilities provide capture and treatment of at least 80 percent of average annual runoff volume for each drainage area within the Project, consistent with the LID Performance Standard; and

- **Tract map-scale retention analysis.** The Project provides retention plus equivalent biofiltration volume consistent with the retention requirements of the Project LID Performance Standard.

Collectively, these findings, which are supported by the analyses in this memorandum, demonstrate that the improvements proposed as part of the Project conform to the applicable standards for managing stormwater quality.

This memorandum also explains why the requirements of the Los Angeles County Department of Public Works' (LACDPW) *Development Planning for Storm Water Management, A Manual for the Standard Urban Stormwater Mitigation Plan* (SUSMP) (Los Angeles County, 2002) and the Los Angeles County LID Ordinance and Manual (LACDPW, 2008, 2009) are met or exceeded when the Project's LID Performance Standard is met.

Section 2 describes the applicable LID Performance Standards which are used to demonstrate Project conformance. Section 3 describes the Project's water quality project design features (PDFs). Section 4 demonstrates conformance of the water quality PDFs to each of the three conformance metrics identified above.

Chronology note: The Entrada South Drainage Concept was previously approved by LACDPW in January 2014. Updates to the project design have been made to preserve a greater portion of Unnamed Canyon 2. This resulted in reduction in project footprint and relocation of the three regional water quality facilities located in the Unnamed Canyon 2 drainage corridor (referred to as Facilities A, B, and C). This memorandum incorporates updates associated with these relatively isolated changes.

2. LID PERFORMANCE STANDARD

2.1 Newhall WDR LID Performance Standard

The Newhall WDR (Order No. R4-2012-0139)[1] was adopted by the Los Angeles Regional Board on September 14, 2012. The Newhall WDR does not directly apply to the Project; however, it serves as the basis for the Newhall LID Performance Standard and as a benchmark for the Project. The Newhall WDR prescribes the LID Performance Standard for the villages within the Newhall Ranch (General Conditions, Paragraph 10):

> Each development area within the Resource Management and Development Plan (RMDP) shall incorporate the following measures. Development areas within the RMDP site shall

[1] http://www.waterboards.ca.gov/rwqcb4/water_issues/programs/401_water_quality_certification/Newhall/index.shtml

comply with all applicable regulatory requirements of the Los Angeles County MS4 Permit in place at the time of the preparation of the Water Quality Technical Report (WQTR) unless an equivalent requirement in the RMDP Clean Water Act Section 401 Water Quality Certification and Waste Discharge Requirements (WDR) is more stringent. Project design features shall be selected and sized to retain the volume of stormwater runoff produced from a 1.1 inch storm event[2] (LID design volume) to reduce the percentage of Effective Impervious Area (EIA) to 5 percent or less of the total project area within the Newhall Ranch Specific Plan. When it has been demonstrated that 100 percent of the LID design volume cannot be feasibly[3] infiltrated, then biofiltration shall be provided for 1.5 times the portion of the LID design volume that is not retained. Runoff from all EIA shall be treated with effective treatment control measures that are selected to address the pollutants of concern and are sized to capture and treat 80 percent of the average annual runoff volume. Each village-level project shall achieve the LID Performance Standard cumulatively, considering the retention volume and equivalent biofiltration volume[4] provided by the project itself and by all previous development phases within the RMDP area. The LID Performance Standard shall be implemented as follows:

Institutional, commercial, multi-family residential, recreation, and park land use parcels shall implement retention or biofiltration BMPs within the parcel footprint. Runoff from roofs, patios, and walkways in single family residential parcels shall be dispersed over landscaped areas to retain runoff. Runoff from the remaining developed area and that which is not retained within the parcel footprints shall flow through the storm drain system to the regional infiltration/ biofiltration facilities. Based on an assessment of feasibility, one of three BMP strategies shall be applied to each project (i.e., village) as follows:

a. If it is feasible to infiltrate all of the runoff produced from the 1.1 inch storm from the developed area (i.e., soil infiltration rates are at least 0.5 inches per hour, and no other technical infeasibility concerns exist), infiltration BMPs *[Category 1]* shall be used. Infiltration BMPs include bioretention (without an underdrain), permeable pavement, infiltration galleries, infiltration basins or trenches, or an equivalent infiltration BMP.

b. If it has been demonstrated in the Project WQTR and Drainage Concept Report that the BMP strategy of subsection (a), of this condition is infeasible, and if the project has low soil infiltration rates (i.e., the soil infiltration rate is less than 0.5 inches per hour), but no other technical infeasibility concerns exist, bioinfiltration BMPs *[Category 2]* shall be

[2] The 85th percentile, 24-hour storm depth is equal to 1.1 inches as determined from the Los Angeles County 85th Percentile 24-hr Rainfall Isohyetal Map (February 2004).
[3] Feasibility shall be based on the approved Ventura County Technical Guidance Manual for Stormwater Quality Control Measures (7-13-2011)).
[4] Biofiltration volume shall be equated to retention volume at a ratio of 1.5 (biofiltration) to 1.0 (retention).

used. Bioinfiltration facilities are similar to bioretention facilities with an underdrain, but they include storage below the underdrain to maximize the volume infiltrated. These facilities shall retain a portion of the runoff from the 1.1 inch design storm, then biofilter 1.5 times the remaining runoff from the 1.1 inch design storm.

c. If it has been demonstrated in the Project WQTR and Drainage Concept Report that the BMP strategies of subsections (a) and (b) of this condition are infeasible, then biofiltration BMPs *[Category 3]* shall be used. These BMPs shall biofilter the runoff produced from the 1.5 times the 1.1 inch design storm.

Runoff from roadways shall be retained or biofiltered in retention or biofiltration BMPs sized to capture the design storm volume or flow, per the guidance in USEPA's *Managing Wet Weather with Green Infrastructure: Green Streets*.

No more than 5% of the total project area shall be treated using conventional treatment methods that address the pollutants of concern. Media filters (or equivalent BMPs that address the pollutants of concern) shall be sized to capture and treat 80% of the average annual runoff volume from the allowable EIA.

Regional facilities shall be implemented to infiltrate or biofilter the runoff volume from the 1.1 inch design storm volume that has not been retained or biofiltered within parcels, single family lots, or road right of ways. Additionally, regional facilities shall be designed to provide extended detention treatment for the additional runoff volume required to provide 80% capture and treatment of the average annual runoff volume for the tributary area to the regional facility per the Newhall Ranch Specific Plan Sub-Regional Stormwater Mitigation Plan treatment performance standard.

[alternative terminology provided in brackets]

The WDR requires that Projects also conform to any aspects of the Los Angeles County MS4 Permit in effect at the time of Project approval that are more stringent than the respective provisions of the WDR.

2.2 Los Angeles MS4 Permit

The Los Angeles County MS4 Permit (Order No. R4-2012-0175) was adopted by the Los Angeles Regional Board on November 8, 2012, and includes an LID Performance Standard that differs slightly from the Newhall WDR LID Performance Standard. Notably, the MS4 Permit varies from the WDR in that:

- The MS4 Permit does not include five percent allowable EIA.

- The MS4 Permit defines biofiltration such that the storage volume provided in such systems cannot be less than the stormwater quality design volume (SWQDv), defined as the runoff from the 1.1 inch precipitation event.

These differences are considered more stringent or equivalently stringent than the Newhall WDR, therefore they replace the respective provisions in the Newhall WDR in the Project LID Performance Standard. In other respects, the Newhall WDR LID Performance Standard is equivalent to that required by the Los Angeles County MS4 Permit, as demonstrated in the subsequent sections. The LID Performance Standard for the project is based on the more stringent provisions of the 2012 MS4 Permit and the Newhall WDR as illustrated in Figure 1.

2.3 Newhall Ranch Sub-Regional Stormwater Mitigation Plan

The approved NRSSMP (Geosyntec, 2008) was developed in 2008 and subsequently amended in November 2010 to include the Project area. The BMP selection and sizing criteria described in the NRSSMP were incorporated into the Newhall WDR LID Performance Standard and made more stringent as part of this incorporation, therefore the NRSSMP does not establish a separate LID Performance Standard for the Project water quality design features proposed as part of this Project.

2.4 Los Angeles County SUSMP

The LACDPW *Development Planning for Storm Water Management, A Manual for the Standard Urban Stormwater Mitigation Plan* (SUSMP) (Los Angeles County, 2002) specifies a design storm volume of 0.75 inches. In comparison, the Newhall WDR LID Performance Standard specifies a design storm of 1.1 inches, with an overlaid requirement of capture and treatment of at least 80 percent of average annual runoff volume. As such, BMPs sized for the Newhall WDR Performance Standard significantly exceed the size of BMPs that would be required for compliance the SUSMP.

2.5 Los Angeles County LID Ordinance

The Los Angeles County LID Manual (LACDPW, 2014) implements the provisions of the 2012 MS4 Permit. This Manual establishes the same standard as the 2012 MS4 Permit.

3. PROPOSED WATER QUALITY PROJECT DESIGN FEATURES

The water quality PDFs include parcel-based LID BMPs, “green streets” BMPs, single family residential hydrologic source controls, and regional infiltration/bioinfiltration facilities. The sections below describe the water quality PDFs that are proposed as part of the Project and how these features have been considered in this conformance analysis.

3.1 Parcel-Based LID BMPs

3.1.1 Parcel-based BMP Commitments

Parcel-based LID BMPs will be implemented within multi-family, commercial, institutional, and park/recreation land uses (see Figure 2) as part of the construction of final parcel improvements. Parcel-based LID BMPs include infiltration (Category 1), bioinfiltration (Category 2), and biofiltration (Category 3) as described in the LID Performance Standard (Section 2.1) and illustrated in Figure 1. Three different applications for parcel-based BMPs occur within the project, depending on the presence and type of downstream regional BMPs:

- Where discharge from parcels drains to a downstream regional infiltration system that is designed to fully infiltrate runoff up to the 80 percent capture sizing standard, specific numeric commitments to parcel-based LID BMPs are not required as part of demonstrating conformance. Regional facilities alone meet the numeric commitments of the LID Performance Standard. This applies to parcels that drain to Regional Facilities A, B, and C.

- Where discharge from parcels drains to a downstream regional biofiltration/bioinfiltration facility that is not a full infiltration facility, parcel-based BMPs are designed for the full SWQDv, and their treated discharge is also treated in the downstream regional facility. The combined effect of parcel-based BMPs and regional LID facilities meets the full LID Performance Standard. This applies to runoff from parcels that drain to Regional Facility D.

- Where discharge from parcels drains to receiving waters without first flowing to a regional LID facility (i.e., "stand alone parcel-based BMPs"), these parcel-based BMPs are designed to: 1) have a minimum storage volume equivalent to the SWQDv, (2) infiltrate to the maximum extent feasible based on parcel-specific infiltration feasibility, (3) biofilter 1.5 times the remaining runoff that cannot be feasibly infiltrated from the 1.1 inch design storm, and (4) achieve 80 percent capture of the average annual runoff. By meeting these criteria, these facilities fully meet the LID Performance Standard as supported by analyses contained in Appendix A.

Parcel-based BMPs have been incorporated into the Project Water Quality Exhibit based on these criteria. See Figure 3 for infeasibility screening results based on analysis by RTF&A (2013, 2017) and Figure 4 for the spatial distribution of the parcel-based treatment categories within the Project. Based on these factors and the estimated impervious cover of each parcel, the Project includes commitments for specific LID volumes for each parcel (see Figure 4). Newhall Land will condition the development of these parcels to require that the volumetric commitments must be provided by

the developers of the parcels (except as adjusted for imperviousness or as part of an approved equivalent approach, as described in Sections 3.1.2 and 3.1.3, below).

3.1.2 Requirements for Imperviousness Different than Planned

The final imperviousness of parcel development plans may deviate from the assumptions made in this submittal, requiring lesser or greater commitments than shown in Figure 4. Developers of parcels shall be required to estimate parcel imperviousness at the final design stage.

- If imperviousness is less than planned, the developer may adjust volume-based commitments downward by the ratio of the final design imperviousness to the planned impervious shown in Figure 4. This will result in lower volume commitments. It will also result in a credit toward overall lower imperviousness within the tributary to the respective regional facility, which will be recorded in a tracking system to be administered by Newhall Land (See Section 3.1.4) and made available to parcels that have higher imperviousness than planned.

- If imperviousness is greater than estimated in Figure 4, the developer shall be required to adjust parcel-based commitments upward by the ratio of actual imperviousness to planned imperviousness. In this case, the parcel-based commitment will be higher. Additionally, the developer will be required to obtain a credit from the tracking system described in Section 3.1.4 to offset the addition of impervious surface tributary to the regional facility.

3.1.3 Equivalent Options for Complying with Parcel-based Commitments

Constraints may be identified in the development of parcel plans that render it infeasible or impracticable to meet the volumetric commitments shown in Figure 4 within the boundaries of the parcel. Alternative approaches may be used that are consistent with applicable requirements and provide equivalent control at the scale of the tributary area to each regional facility:

- As one option, developers of parcels may enter into agreements with adjacent or nearby parcels to provide volume-based commitments in adjacent or nearby parcels. The parcels where volume commitments are provided must be within the regional facility tributary area as the parcel claiming these benefit and shall be constructed prior to occupancy of any parcel that utilizes them for compliance. Parcel-level submittals shall describe how, where, and when commitments will be met and how these BMPs will be maintained.

- Other equivalent options may be considered for approval with demonstration of equivalency and consistency with applicable requirements.

3.1.4 Tracking System for Parcel-based Commitments

Newhall Land shall develop and administer a system for tracking parcel-based commitments within the tributary area to each regional facility. This system shall track adjustments to imperviousness compared to planned imperviousness shown in Figure 4 and shall track implementation of parcel-based BMPs in comparison to commitments. This system shall ensure that:

1) Where parcels have imperviousness greater than shown in Figure 4, other parcels have a reduction in imperviousness such that the overall effect is that the imperviousness to the regional facility does not increase significantly,

2) Where parcels provide a portion of volume on adjacent or nearby parcels, total commitments are met.

3.2 Green Streets

The Project will utilize "green streets" techniques to treat runoff from public right-of-ways in a manner consistent with the USEPA's *Managing Wet Weather with Green Infrastructure: Green Streets* (USEPA, 2008). Two forms of green streets implementation have been incorporated into the Project:

- Where streets are tributary to regional LID facilities, the full requirements of the LID Performance Standard will be met in regional LID facilities. Additionally, the Project will consider the use of swales, biofiltration, and/or bioinfiltration systems where conditions are favorable, however credit for credit for green streets BMPs has not been applied toward sizing the regional LID facilities. In other words, the regional facilities have been sized assuming that no green streets BMPs will be installed, which is considered conservative at this phase of project planning; no specific numeric commitments are made for green streets implementation in these areas.

- For streets that are not tributary to regional LID facilities (i.e., Magic Mountain Parkway and adjacent portions of connecting streets), proprietary flow-based biofiltration BMPs (e.g., Filterra® or equivalent) have been sized per the criteria specified by the LID Performance Standard and the Los Angeles County LID Calculator.

3.3 Single Family Hydrologic Source Controls

Single family residential hydrologic source controls (HSCs) will be implemented across the single family residential portions of the Project. These controls will consist primarily of disconnecting downspouts to areas of amended soil in the front yards of residences, or an equivalent approach.

Because benefits of single family HSCs may vary depending on lot size and soil conditions, a conservative quantification of effectiveness of HSCs was used as part of sizing regional LID facilities. These approaches were not considered at all as part of areas tributary to Facility A, B, and C. They were evaluated in a conservative manner as part of sizing of Regional Facility D. The covenants, codes, and restrictions (CC&Rs) associated with these land uses will require the implementation of HSCs.

3.4 Regional LID Facilities

There are three regional LID facilities proposed within the Project. Regional Facilities A, B, and C are each proposed as infiltration facilities (Category 1) based on feasibility screening results (RTF&A, 2013, 2017, Figure 3). These facilities have been sized and designed to fully infiltrate 80 percent of average annual runoff from the tributary area. While hydrologic source controls will be applied in the tributary area to these watersheds, the effect of these hydrologic source controls has not been claimed in sizing.

Runoff from subwatersheds in the western portion of the Project are proposed to be directed to Mission Village Regional Facility D (See Figure 4), which is sized for its ultimate conditions in which it will accept runoff from Mission Village, Legacy Village, Entrada South, and portions of the existing Westridge community. The ultimate condition of Regional Facility D is considerably more conservative than the interim condition, in which only the Entrada South Project is constructed and the remainder of the tributary area remains undeveloped. Mission Village Facility D is described and analyzed as part of the Mission Village Phase I Final Hydrology Study and associated conformance memorandum (Geosyntec, 2016).

The detailed designs of regional LID facilities will be developed at a later time, and will be developed to be consistent with design and maintenance standards acceptable to LACDPW.

4. CONFORMANCE TO APPLICABLE LID PERFORMANCE STANDARD

This section summarizes the conformance of the Project's proposed LID design features to each element of the Project LID Performance Standard.

4.1 BMP Selection per LID Hierarchy

The Entrada South LID Performance Standard requires that LID BMPs be selected based on an analysis of infiltration feasibility. The follow paragraphs describe how the Project conforms to this requirement.

4.1.1 Parcel-based LID BMPs

Parcel-based LID BMPs were selected using a Project-wide feasibility screening for applicable lots. Parcel-based infiltration feasibility was estimated based on BMP siting recommendations included in the *Geotechnical Infiltration Evaluation Update for Vesting Tentative Tract Map No. 53295* (Infiltration Feasibility Report, RTF&A, 2013). The categorization of parcel-based LID BMPs included in the report was based upon the infiltration rates of the on-site materials, presence of geotechnical hazards, depth to groundwater, and location of fill materials. Additionally, where downstream regional LID facilities would retain the entire SWQDv and would fully infiltration at least 80 percent of average annual runoff, parcel-based BMPs were not required to fully comply with numeric LID sizing and selection criteria. The results of infeasibility screening are presented in Figure 3.

4.1.2 Regional LID Facilities

The Infiltration Feasibility Report (RTF&A, 2013) included results from site-specific infiltration feasibility investigations of Regional Facilities A, B, and C. RTF&A completed one infiltration test per regional infiltration basin area. The average of testing results was 18 inches per hour, with a low of 3.2 inches per hour and a high of 34 inches per hour. Geological studies for all three facilities show the presence of alluvial deposits in the subsurface that extend at least 15 feet below the proposed invert, which indicates the limited potential for groundwater mounding if the full water quality design volume is infiltrated in this area. Groundwater was not encountered in any of the boring tests and was determined to be at least 10 feet below the proposed facilities. RTF&A updated their geotechnical evaluations in 2017 based on the revised Regional Facility locations and found that the current basin locations also support infiltration of the full SWQDv at a preliminary recommended design infiltration rate of 3 inches per hour. Based on these findings, Facilities A, B, and C are proposed as complete infiltration facilities (Category 1), which is consist with the preferred hierarchy for BMP selection.

For Facility D, Leighton and Associates (2013) completed an investigation of infiltration feasibility as part of the Phase 1 Final Hydrology Study for Mission Village. This investigation found that infiltration into Facility D would result in potential geotechnical concerns that cannot be reasonably mitigated. The report stated that infiltration in the facility would likely migrate laterally towards the active river channel, which could adversely impact the stability of the existing bluffs located along the river channel. Thus, the report concluded that a biofiltration facility, designed with limited incidental infiltration, is recommended for Facility D. Facility D is proposed as a biofiltration facility (Category 3). Therefore Regional Facility D is consistent with the selection hierarchy required as part of the LID Performance Standard.

4.2 BMP Sizing for 80 Percent Capture of Drainage Area Runoff

4.2.1 Regional Facilities

The LID Performance Standard requires that regional facilities provide infiltration, biofiltration, and/or extended detention treatment for runoff volume not already addressed within the watershed, to provide 80 percent capture and treatment of the average annual runoff volume for the tributary area to the regional facility regional facilities. The designs of Facilities A, B, C and Regional Facility D were modeled using the EPA SWMM model for a long term continuous simulation period to demonstrate that this standard is met based on the WQ volume contained in the basin below the overflow elevation. This standard must be met for all areas draining to the facility, therefore, the entire tributary area was modeled. A summary of the facility sizing results is described in Table 1. A detailed description of modeling methodology and assumptions used to evaluate sizing is provided in Attachment A. SWMM model files are provided as Appendix A.1 Regional Facility D was modeled based on the ultimate proposed condition of its drainage area, as described in the memorandum: "Mission Village Phase 1 Final Hydrology Study – Evaluation of Conformance with Newhall LID Performance Standard" (Geosyntec Consultants, May 23, 2016).

Table 1: Catchment Parameters and Regional Facility Sizing Results

BMP ID	Tributary Area (acres)[1]	Impervious Fraction of Catchment (%)[1]	WQ Volume Required (volume below overflow) (ac-ft)[2,3]	WQ Volume Provided (volume below overflow) (ac-ft)[3]
Facility A	25.3	74.9	1.6	1.7
Facility B	62.9	61.6	3.4	3.4
Facility C	24.7	51.0	1.1	1.1
Regional Facility D	720.3[4]	45.6[4]	35.2[4]	35.2[4]

[1]Imperviousness based on area weighted average of land use-based values from LA County Hydrology Manual; calculated for purposes of water quality analysis; see Attachment A.
[2] WQ volumes below overflow elevation needed for 80% capture of annual average runoff volume from tributary area.
[3]WQ volume includes pore volume in gravel and media, as well as ponded volume above the media surface and below the overflow elevation; system controlled at outlet, therefore fills from the bottom.
[4]Regional Facility D analysis includes all areas draining to Regional Facility D in the ultimate build-out condition (i.e., Mission Village, Legacy Village constructed). Regional Facility D sizing demonstrated in Mission Village Conformance Memorandum

As shown in Table 1 the provided WQ volumes equal or exceed the required WQ volumes for all facilities and are considered to satisfy the requirements of the LID Performance Standard. While the LID Performance Standard allows some of the 80 percent capture standard to be met via extended detention, the proposed LID facilities include only retention (for Regional Facilities A, B, and C) and biofiltration (Regional Facility D), which provides a superior level of treatment

treatment compared to extended detention, therefore this aspect of the LID Performance Standard is met and exceeded.

Basins A, B, and C will be offline. Water will be diverted to these basins from a diversion structure. Diversion structure capacity has been calculated to ensure that the total system will capture and infiltrate 80 percent of long term runoff volume. The required diversion structure capacity was calculated using SWMM as explained in Attachment A, to determine the flowrate that would provide 80 percent long term infiltration of runoff volume. This flowrate was compared to the based the peak flowrate for the 1.1-inch storm calculated using LACPDW HydroCalc (See Alliance, 2017). Table 2 shows the required and provided diversion flowrates.

Table 2: Required and Provided Diversion Structure Flowrates

BMP ID	Qpm from HydroCalc for 1.1-inch Storm, cfs (Alliance, 2017)	Required Diversion Q from SWMM Model for 80% Long Term Capture, cfs	Provided Diversion Q, cfs
Facility A	4.7	4.7	4.7
Facility B	8.2	15	15
Facility C	2.8	4.5	4.5

As shown in Table 2, the provided diversion flowrates for regional facilities are equal to the larger of the required flowrate for 80 percent long term capture and the Qpm. Refinement of diversion flowrates may be warranted as part of more detailed hydrologic study and water quality plan development.

4.2.2 Parcel-based LID BMPs

Stand-alone parcel-based LID BMPs within the Project were sized with physical storage equal to the SWQDv as calculated using the Los Angeles County LID Calculator. The SWQDv is the controlling sizing factor for these facilities to meet all aspects of the LID Performance Standard, as discussed below and detailed in Attachment A.

For Category 1 facilities, providing the SWQDv equates to retaining the full SWQDv. Analyses provided in Attachment A demonstrate that when the physical storage volume of the facility is set to the SWQDv and the system infiltrates in no greater than 21 hours, average annual capture efficiency is equal to 80 percent and the entire SWQDv is reliably retained.

If retention is not fully feasible or not feasible (Category 2 and Category 3 facilities), the facility shall be sized to store at least the SWQDv and provide biofiltration for 1.5 times the runoff that

cannot be reliably retained. Analyses provided in Attachment A demonstrate that when the physical storage volume of the facility is set to the SWQDv and the media filtration rate is set to 5 inches per hour (minimum allowed per MS4 Permit Attachment H), these facilities biofilter significantly greater than 1.5 times the SWQDv that is not retained and also achieve significantly greater than 80 percent capture of average annual runoff.

The parcel-based BMPs that drain to Regional Facility D do not have a minimum sizing required by the LID Performance Standard, but must be consistent with the selection hierarchy described in the LID Performance Standard and attempt to achieve the maximum feasible retention. Regional Facility D is sized to capture 80 percent of average annual runoff from the entire area tributary to the facility, accounting for the commitments to parcel-based BMPs. Parcel-based facilities were sized following the same criteria as used for stand-alone parcel-based facilities (Category 2), which meets and exceeds the required standard.

As shown in Table 3, the provided volume commitment for parcel-based BMPs is greater than or equal to the required volume.

Table 3: Catchment Parameters and Parcel-based Facility Sizing Results

Basin	Area, ac	Impervious-ness[1]	SWQDv Required[2] (ac-ft)	SWQDv Provided (ac-ft)
Stand-alone Parcel-based LID BMPs in Basin E	29.2	91	2.13	2.13
Stand-alone Parcel-based LID BMPs in Basin X	10.2	80	0.74	0.74
Stand-alone Parcel-based LID BMPs in Basin Y	2.95	88	0.22	0.22
Parcel-based LID BMPs Draining to Regional Facility D	39.6	84	2.82	2.82

[1] See Attachment A for calculations used to estimate impervious cover.
[2]The SWQDv required refers to the total stormwater quality design volume determined by the LA County LID Volume Calculation; this volume is the required storage volume of the system.

4.2.3 Green Street Biofiltration BMPs

Green Streets biofiltration BMPs within the Project area were sized to treat runoff from roadways and areas draining to roadways that are not treated by regional facilities. The Green Streets biofilters (Filterra® or equivalent) are designed as flow-through treatment. The BMPs are sized to treat a design flow rate equivalent to the runoff from a 0.3 in/hr rainfall intensity, which is equivalent to achieving 80 percent average annual capture efficiency (Geosyntec, 2008). The

design intensity of 0.3 in/hour was entered into the Los Angeles County Flow-based LID Calculator to compute the required design flowrates. As illustrated in Table 4, the provided flowrate equals or exceeds the design flowrate in all cases.

Table 4: Catchment Parameters and Green Street Biofilter Sizing Results

Basin	Area (Acres)	Imperviousness (%)	Q Design (cfs)	Q Provided (cfs)
Basin AA	0.93	90	0.23	0.23
Basin BB	1.36	91	0.34	0.34
Basin CC	3.08	89	0.75	0.75
Basin DD	0.61	89	0.15	0.15
Basin EE	0.71	64	0.13	0.13
Basin G	0.63	89	0.15	0.15
Basin H	1.10	78	0.20	0.20
Basin I	2.31	79	0.50	0.50
Basin J	2.68	91	0.59	0.59
Basin K	2.37	69	0.59	0.59
Basin L	3.71	67	0.72	0.72
Basin M	4.01	39	0.77	0.77
Basin N	1.11	57	0.14	0.14
Basin O	3.33	69	0.56	0.56
Basin T	1.20	84	0.28	0.28
Basin U	2.32	50	0.35	0.35
Basin V	1.22	49	0.18	0.18
Total	**32.68**	**70**	**6.62**	**6.62**

4.3 Project Retention of 85th Percentile, 24-hour Storm Event (SWQDv)

The LID Performance Standard requires that project design features be selected and sized to retain the volume of stormwater runoff produced from a 1.1 inch storm event (i.e., the SWQDv) for the Project site. Where it has been demonstrated that 100 percent of the SWQDv cannot be feasibly infiltrated, biofiltration shall be provided for 1.5 times the portion of the SWQDv that is not retained. For the purpose of demonstrating conformance, this standard has been applied to the overall Entrada South Project as well as the portion of the biofiltration storage in Regional Facility D that is allocated for treatment of runoff from the Entrada South Project. The following stepwise process is used to demonstrate conformance with the LID Performance Standard for the Project.

4.3.1 Step 1: Calculate LID Performance Standard

The equivalent retention plus biofiltration volume required to meet the LID Performance Standard was calculated by calculating the runoff from the Project's impervious area for the first 1.1 inches of precipitation using the LA County LID Volume Calculator. A one acre representative catchment was used to determine the runoff volume for one acre of impervious area. This volume was scaled up to the total impervious area within the project. This resulting retention storage volume is the required equivalent retention volume (performance standard) that applies to the project. The performance standard is expressed in acre-feet.

Step 1 Summary - Entrada South LID Performance Standard

Parameter	Value	Source
Total Project Area, ac	382.4	Tentative Tract Map 53295
Project Impervious Area, ac	186.7	Tentative Tract Map 53295, land use-based Impervious estimation
Required Equivalent Retention Volume, ac-ft	**15.3**	V (ac-ft) = Project Impervious Area (ac) × 3,561 [1] cubic feet × (1 acre/43,560 square feet conversion)

[1] Equivalent to the volume calculated from the LA County LID Volume Calculator for a 1-acre representative catchment (100% imperviousness, flow path length of 250 feet, slope of 5%, LA County Soil #098)

4.3.2 Step 2: Calculate Volume in Parcel-based BMPs and Single Family HSCs

The parcel-based LID BMP commitments described in Section 3.1 and the single family HSC commitments described in Section 3.3 are tabulated to compute the total retention volume and biofiltration volume commitments included in the Project. For parcel-based BMPs, retention volume is calculated as follows:

- *Category 1 – Infiltration Feasible – Infiltration BMPs*: Include all water volume provided in BMPs below the overflow elevation.
- *Category 2 – Infiltration Partially Feasible – Bioinfiltration BMPs*: Include all volume provided below underdrains and retained in soil pores for subsequent evapotranspiration.
- *Category 3 - Infiltration Infeasible – Biofiltration BMPs*: Include all volume retained in soil pores for subsequent evapotranspiration.

For the purpose of this analysis, biofiltration volume was counted as the remaining volume of the BMPs (after subtracting retained volume). Water that is biofiltered during the design storm event (i.e., routed) can also be claimed as biofiltration volume; however, this volume is not claimed at this time as it is not necessary to conform to the LID Performance Standard.

Step 2 Summary - Entrada South Parcel-based BMP Retention Volume and Biofiltration Volume

Parcel-based LID and Single Family HSC Tabulations	Sum of Parcel-based Volume Commitments
Parcel-based Retention Volume, ac-ft	2.2
SFD Disconnection Retention Volume[1], ac-ft	0.5
Total parcel-based and SFD Retention Volume, ac-ft	2.7
Total Parcel-based Biofiltration Volume, ac-ft	4.6

[1]SFD Disconnection will be implemented for the Project consistent with the Project LID Performance Standard; however, retention volume credit from SFD Disconnections was not claimed in this performance standard conformance calculation for areas draining to Facilities A, B or C..

4.3.3 Step 3: Calculate Volume Provided in Regional Facilities

The retention volume provided in regional infiltration/bioinfiltration facilities is calculated as the volume stored below the lowest discharge point. The retention volumes provided in each of the three Entrada regional infiltration facilities and the regional biofiltration facility (Basin D) receiving runoff from Entrada were combined to estimate the total retention volume provided by facilities.

- *Category 1 – Infiltration Feasible – Infiltration BMPs*: Include all water volume provided in BMPs below the overflow elevation.
- *Category 2 – Infiltration Partially Feasible – Bioinfiltration BMPs*: Include all volume provided below underdrains and retained in soil pores for subsequent evapotranspiration.
- *Category 3 - Infiltration Infeasible – Biofiltration BMPs*: Include all volume retained in soil pores for subsequent evapotranspiration.

For the purpose of this analysis, biofiltration volume was counted as the remaining volume of the BMPs (after subtracting retained volume) up to the overflow elevation of the BMP. Water that is biofiltered during the design storm event (i.e., routed) can also be claimed as biofiltration volume; however, this volume is not claimed at this time as it is not necessary to conform to the LID Performance Standard.

Step 3 Summary - Entrada South Regional Facility Retention Volume and Biofiltration Volume

Regional Infiltration/ Biofiltration Facilities	Entrada South Regional Facility WQ Volume[1] (ac-ft)	Entrada South Retention Volume[2] (ac-ft)	Entrada South Biofiltration Volume[4] (ac-ft)
Infiltration Facility A	1.7	1.7	0.0
Infiltration Facility B	3.4	3.4	0.0
Infiltration Facility C	1.1	1.1	0.0
Regional Biofiltration Facility D	6.4[3]	0.0	6.4[3]
Regional Facility Total, ac-ft		**6.2**	**6.4**

[1] Includes volume allocated to managing Entrada South runoff only.
[2]Volume below lowest surface discharge, ac-ft
[3]WQ volume of Facility D is larger than shown, however remainder is allocated to treating off-site runoff from other projects therefore is not claimed for Entrada South conformance calculations.
[4]Volume discharged through media, tabulated as volume above underdrain elevation and below overflow elevation.

4.3.4 Step 4: Final Conformance Calculations

Step 4a: Compare Total Feasible Retention Volume Provided to LID Performance Standard

The sum of the total feasible retention volume provided in parcel-based and regional facilities from Steps 2 and 3, respectively, was compared to the performance standard computed in Step 1. The Project is considered to meet the LID Performance Standard if the total retention storage volume provided is equal to or greater than the LID Performance Standard retention volume.

Step 4b: Compute Required Biofiltration Volume and Compare to Provided Biofiltration Volume

The total retention volume provided in the parcel-based and regional facilities is less than the LID Performance Standard design volume. Therefore, the remaining volume not retained was multiplied by 1.5 to compute the required biofiltration volume. This volume was compared to the biofiltration volume provided. As demonstrated in Line 6 and 7 in the table below, the system provides excess retention and biofiltration volume in comparison to the LID Performance Standard, therefore the Project conforms to the LID Performance Standard.

Step 4 Summary - Comparison with LID Performance Standard

Line	Parameter	Value	Explanation
1	Required Retention Volume[1], ac-ft	15.3	From Step 1
2	Volume Reliably Retained, ac-ft	10.8	From Step 2 plus Step 3
3	Remaining Volume Not Reliably Retained, ac-ft	4.5	Line 1 minus Line 2
4	Required Biofiltration Volume, ac-ft	6.8	Line 3 x 1.5
5	Biofiltration Volume Provided, ac-ft	10.8	From Step 2 plus Step 3
6	Excess Biofiltration Volume, ac-ft	4.0	Line 5 minus Line 4
7	Excess Equivalent Retention Volume, ac-ft (surplus)	2.7	Line 6 / 1.5

4.4 Conformance Summary

In summary, this memorandum demonstrates that:

- LID BMPs have been selected in a manner consistent with the LID selection hierarchy (i.e., infiltration feasibility criteria) contained in the LID Performance Standard (Section 4.1);
- The combination of parcel-based LID BMPs and/or regional LID facilities within each watershed provides capture and retention or biofiltration of at least 80 percent of average annual runoff volume, consistent with the LID Performance Standard (Section 4.2); and
- The LID project design features proposed as part of the Entrada South Project provide retention and biofiltration volume consistent with the SWQDv retention and biofiltration requirements at the tract map scale per the LID Performance Standard (Section 4.3).

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USEPA, 2008. Managing Wet Weather with Green Infrastructure: Green Streets. Prepared by the Low Impact Development Center. Document # EPA-F-08-009.

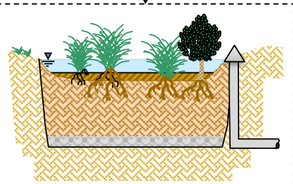
ENTRADA SOUTH LID PERFORMANCE STANDARD

LID project design features (PDFs) shall be selected and sized to retain the volume of stormwater runoff produced from the 1.1-inch design storm event (LID design volume). When it has been demonstrated that 100 percent of the LID design volume cannot be feasibly infiltrated, then biofiltration shall be provided for 1.5 times the portion of the LID design volume that is not retained. Runoff from all impervious area shall be treated with effective treatment control measures that are selected to address the pollutants of concern and are sized to capture and treat 80 percent of the average annual runoff volume.

Institutional, Commercial, Multi-Family Residential, Recreation, and Park Land Uses

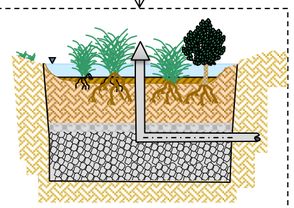
Assess infiltration feasibility

Infiltration Feasible
Category 1: Retain



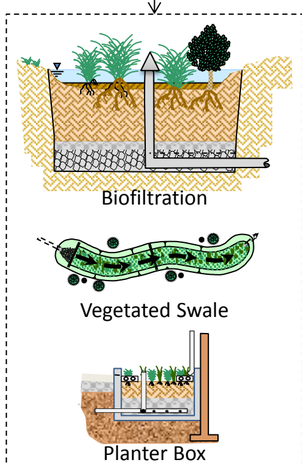
Or equivalent

Infiltration infeasible due to marginal infiltration rate, otherwise feasible
Category 2: Bioinfiltrate
Retain as feasible, then biofilter



Or equivalent

Infiltration infeasible due to hazards (geotechnical, etc.)
Category 3: Biofilter
Or route to regional facility



Or equivalent

Single Family Residential

Roofs, Patios and Walkways

Hydrologic Source Controls
Disconnect Roof Drains;
Disperse Impervious Areas in Landscaped Areas

Remaining Area

Roads

EPA Green Streets Manual

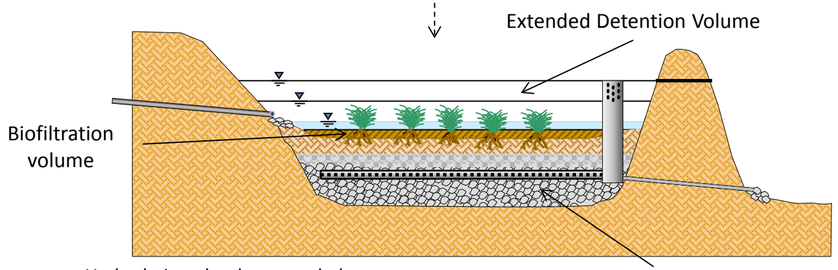
Retain/biofilter as feasible per opportunities and constraints; Retain/biofilter remaining in Regional Facilities

Allowable EIA

Treatment
80% capture of runoff

Media Filters
or equivalent

Regional Infiltration / Biofiltration Facility
Retain where feasible and biofilter remainder to provide equivalent retention of the 1.1-inch LID design storm, plus provide additional volume required for extended detention for 80% capture of all runoff.

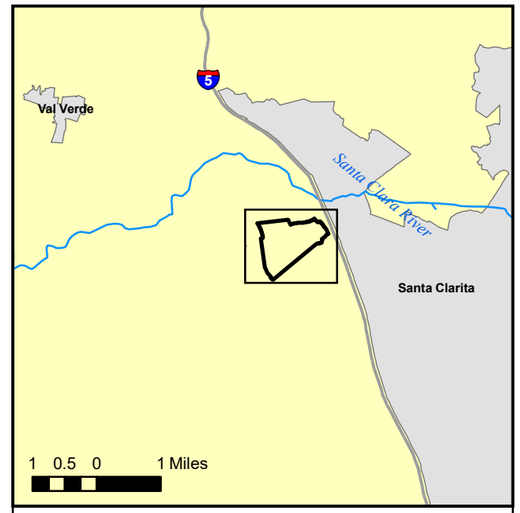


Underdrain Discharge (Category 2 and 3) and Bypassed Runoff

Entrada South LID Performance Standard	Geosyntec consultants	**Figure** 1

N

600 300 0 600 Feet



Legend

Entrada South Tract Boundary

Land Use

- Commercial
- Education
- Major Road
- Minor Road
- Multi-Family Residential
- Open Space
- Park
- Recreation
- Single-Family Residential
- Water Quality

Figure 2: Land Use

Entrada South
Conformance Memo

October 2017

Geosyntec consultants

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Prepared By: A. Orr

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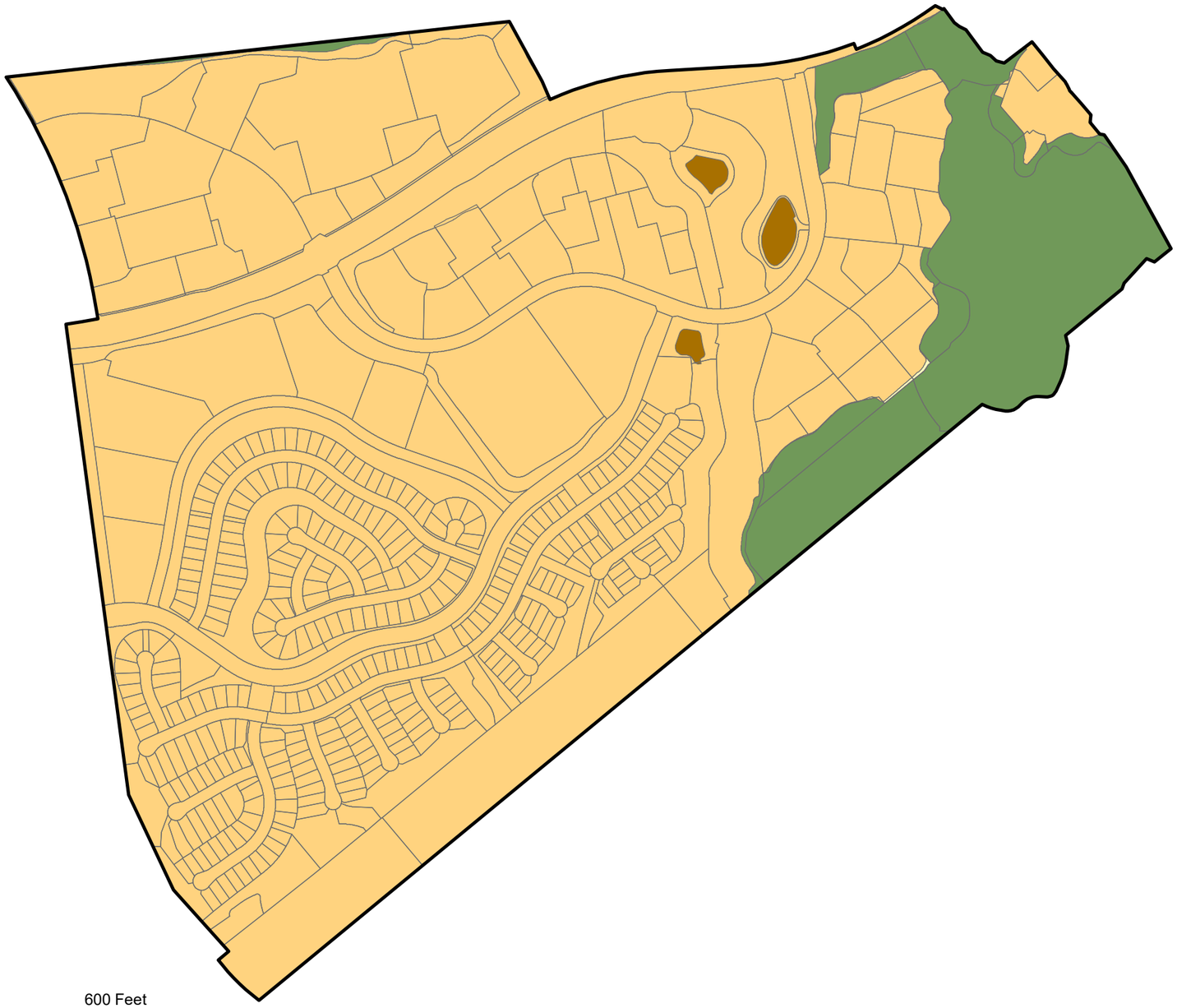

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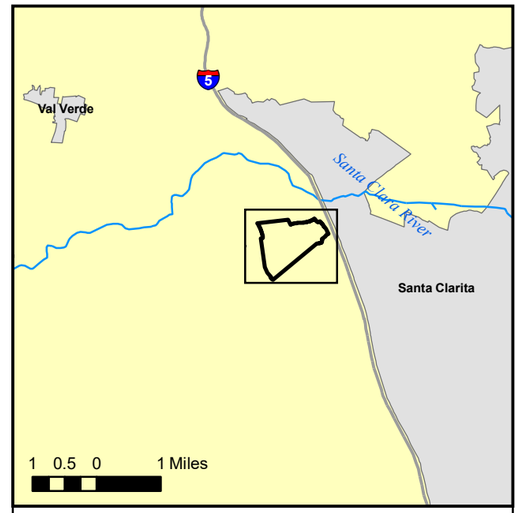

Legend

Entrada South Tract Boundary

Treatment Category

- Open Space; No Category Reported
- Category 1
- Category 2
- Category 3

Figure 3: Infiltration Feasibility Categories

Entrada South
Conformance Memo

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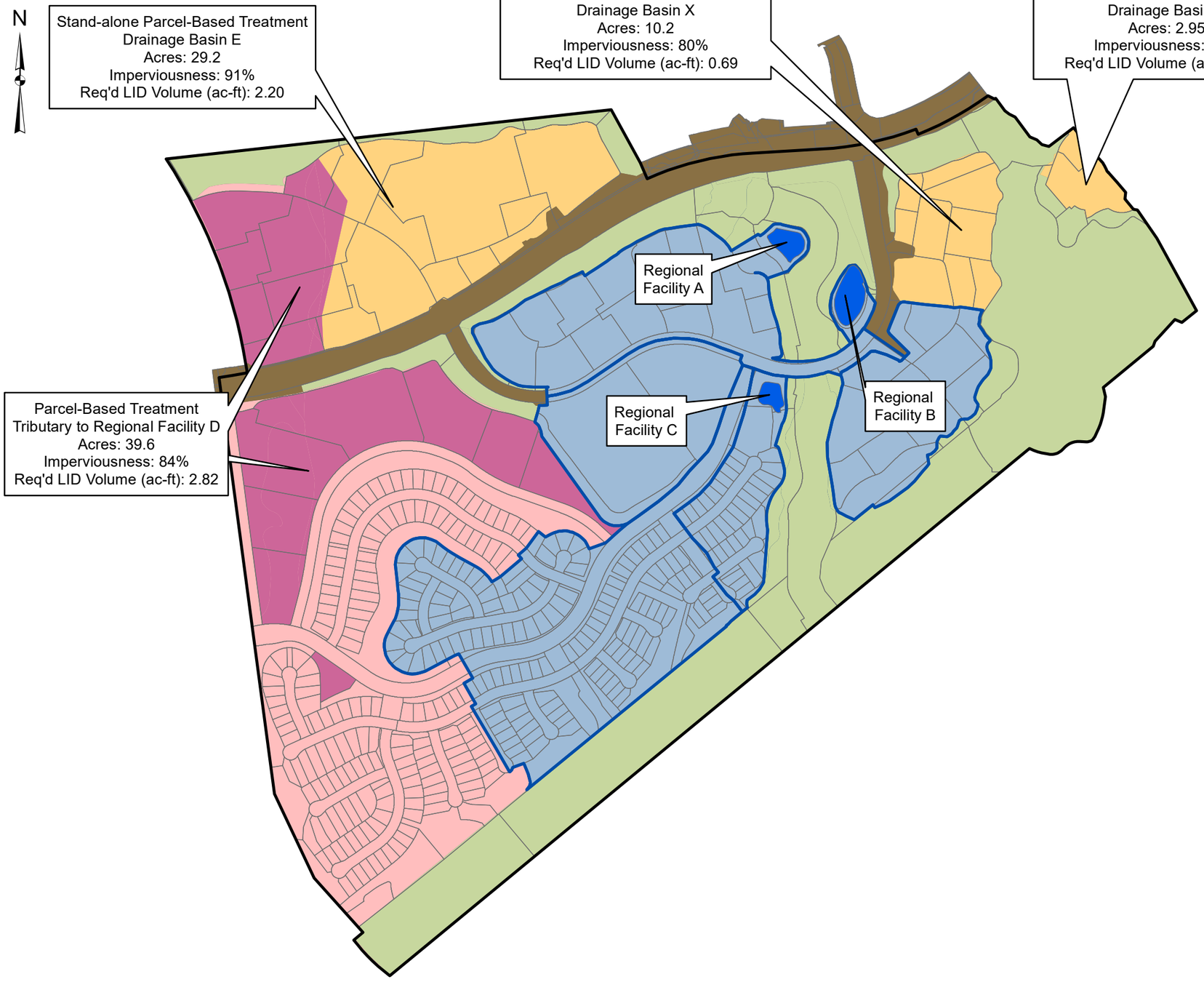
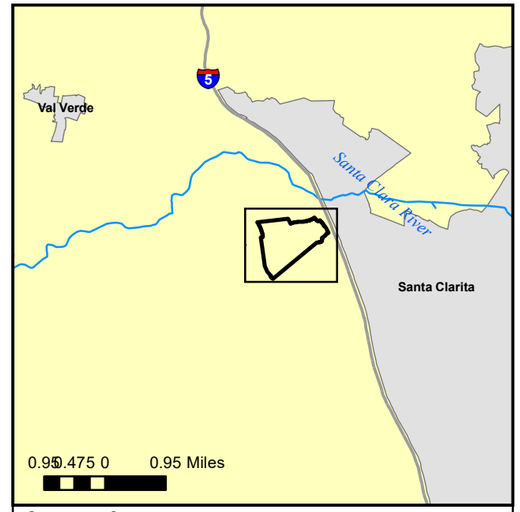
Prepared By: A. Orr





Legend

- Entrada South Tract Boundary
- Parcel-based Treatment Tributary to Regional Facility D

Treatment Category

- Regional Facilities
- Green Street Biofilters
- Tributary to Regional Facility D
- No Treatment Required
- On-Parcel Stand-alone Treatment

Figure 4: Treatment Categories

Entrada South
Conformance Memo

October 2017

Geosyntec consultants

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Prepared By: A. Orr

Attachment A

Modeling Methodology in Support of LID Conformance Analysis

1. INTRODUCTION

The purpose of this attachment is to describe the modeling methodology used to size regional infiltration/bioinfiltration facilities, analyze stand-alone parcel-based LID BMPs, and quantify low impact development (LID) best management practice (BMP) implementation for the Entrada South Project (Project). The model used to size and/or analyze facilities is a nested continuous simulation hydrologic model developed using USEPA Stormwater Management Model (SWMM). The model simulates a continuous runoff hydrograph from watershed tributary to each regional facility using a 40 year rainfall record and conducts continuous hydraulic storage routing to compute the capture efficiency and volume reduction provided in single family, parcel-based, and regional LID BMP. Facilities are sized and evaluated to ensure the that the combined system of water quality project design features (i.e., combination of parcel-based LID, single family hydrologic source controls (HSCs), green streets BMPs, and regional LID facilities) achieves 80 percent capture of watershed runoff per the Project LID Performance Standard. In some cases, the Los Angeles County LID Calculator was used for BMP sizing and SWMM was used to analyze performance to ensure that the 80 percent capture criterion was met.

Subcatchments tributary to each facility were defined based on land use delineations, drainage boundaries, results of infiltration feasibility screening, and soil parameters. The watershed model takes into account commitments to implement parcel-based BMPs and single-family dwelling (SFD) hydrologic source controls (e.g., downspout disconnects). Green Streets are part of the LID Performance Standard, but were not modeled in SWMM in evaluating overall system performance. Regional infiltration facilities within the Project were modeled based on a standard infiltration facility cross section and underlying soil infiltration rates determined by site-specific infiltration testing (R.T Frankian & Associates, 2013, interpreted for new basin locations in 2017). Another regional facility in an adjacent Project (the Mission Village Project), Regional Facility D, receives flows from Entrada South (see Figure 3 of Hydrology Study). The model calculations and inputs associated with sizing of Regional Facility D are provided in the memorandum: "Mission Village Phase 1 Final Hydrology Study – Evaluation of Conformance with Newhall LID Performance Standard" (Geosyntec Consultants, May 23, 2016).

Based on the proposed facility sizes and configurations watershed total LID performance results were evaluated to demonstrate that the combination of Project water quality design features achieves 80 percent capture of average annual subcatchment runoff.

1.1. Project Approval and Revision Chronology

The Entrada South Drainage Concept was previously approved by LACDPW in January 2014. Since that approval, the project design has changed to reduce the footprint of development and preserve a greater portion of Unnamed Canyon 2. This has resulted in changes to the drainage concept and water quality design in the vicinity of Unnamed Canyon 2, particularly water quality treatment basins A, B, and C (regional infiltration facilities). This attachment includes updates to only the portions of the project that have changed.

2. WATERSHED MODELING

The watershed tributary to each regional BMP is modeled as a collection of subcatchments in SWMM. Parameters input into the hydrologic watershed model and the data sources are included in Table 1 below.

Table 2-1: Watershed Model Parameters and Sources

Parameter	Description	Parameter Value/Source
Wet time step	Time step for wet weather runoff calculations	15 min
Dry time step	Time step for dry weather runoff calculations	4 hours
Routing time step	Seconds	30 sec
Routing Option	Method of routing flows through the system	Kinematic Wave method
Infiltration Option	Defines parameters and method used to estimate infiltration in catchment	The Green Ampt method was used; see section 2.3 for more information
Rainfall	Long-term precipitation record	Newhall (NCDC gauge # 046162), 1968-2008
Climate	Evaporation data	CIMIS monthly normal ET data, 60% of Zone 14 (see Table 2); selected based on CIMIS guidance to represent typical drought-tolerant native and non-native/non-invasive landscape.
For subcatchment models:		
Total Area	Area in acres	Land use GIS and CAD layers (see Tables 3 and 4)
Imperviousness	Percent imperviousness of subcatchment area	Determined by area-weighting of land uses in subcatchment (see Tables 3, 4).
Soil parameters	Soil parameters describe how water is infiltrated into soils in pervious areas	Soil types and locations were determined using NRCS Soil Survey and LA County soils data. See section 2.3 for specific soil parameters used in the model.

Parameter	Description	Parameter Value/Source
Depression storage	Surface storage in depressions in pervious or impervious land areas	0.02 inches for impervious areas (James & James, 2000); 0.06 inches for pervious areas (James & James, 2000) In some catchments, depression storage is adjusted to simulate the effects of parcel-based BMPs as discussed in section 4.2.1 and 4.2.2.
Other catchment parameters	Shape and Flowpath	Rectangular; 500 ft flow path length for pervious areas, 250 ft flow path length for impervious area (represents typical overland flow path lengths, a sensitive parameter in regional facility watershed-scale analysis)
	Slope	0.05 ft/ft (represents approximate average of landscaping, streets, and roofs)
	Impervious Manning's n	0.012 (Manning's n for smooth concrete)
	Pervious Manning's n	0.25 (Manning's n for dense grass or shallow flow through decorative bark/rock; either of which is typical of urban landscaping)

2.1. Rainfall & Storm Characteristics

Rainfall analysis was conducted with hourly precipitation data from a 40 year period of record (water year (WY) 1969-2008) recorded at the National Climatic Data Center (NCDC) Newhall rain gauge (station number 046162), located in the town of Newhall, California. Figure 1 shows the location of the Newhall gauge in relation to the Project area. This gauge is located approximately 4 miles from the Project. The gauge elevation of 1,243 ft above mean sea level (AMSL) is comparable to the Project area elevation of approximately 1,000-1,200 ft AMSL.

While the period of record rainfall data collected at the Newhall rain gauge is quite long (40 years), there are some gaps in the record. In order to improve the characterization of rainfall at the project site, estimates of the missing rainfall data were made through correlation of the Newhall rain gauge with the San Fernando rain gauge (NCDC station number 047762) which is located approximately 6 miles away from the Newhall gauge, and 10 miles away from the Project (south and slightly east).

The Castaic Junction gauge monitored by LACDPW is located closer to the Project; however the usable period of record at this gauge is limited to approximately 12 years which is considered too short to produce significant results in long-term simulation. Other gauges in the area report daily rainfall totals only. Hourly data are required to support hydrologic modeling efforts.

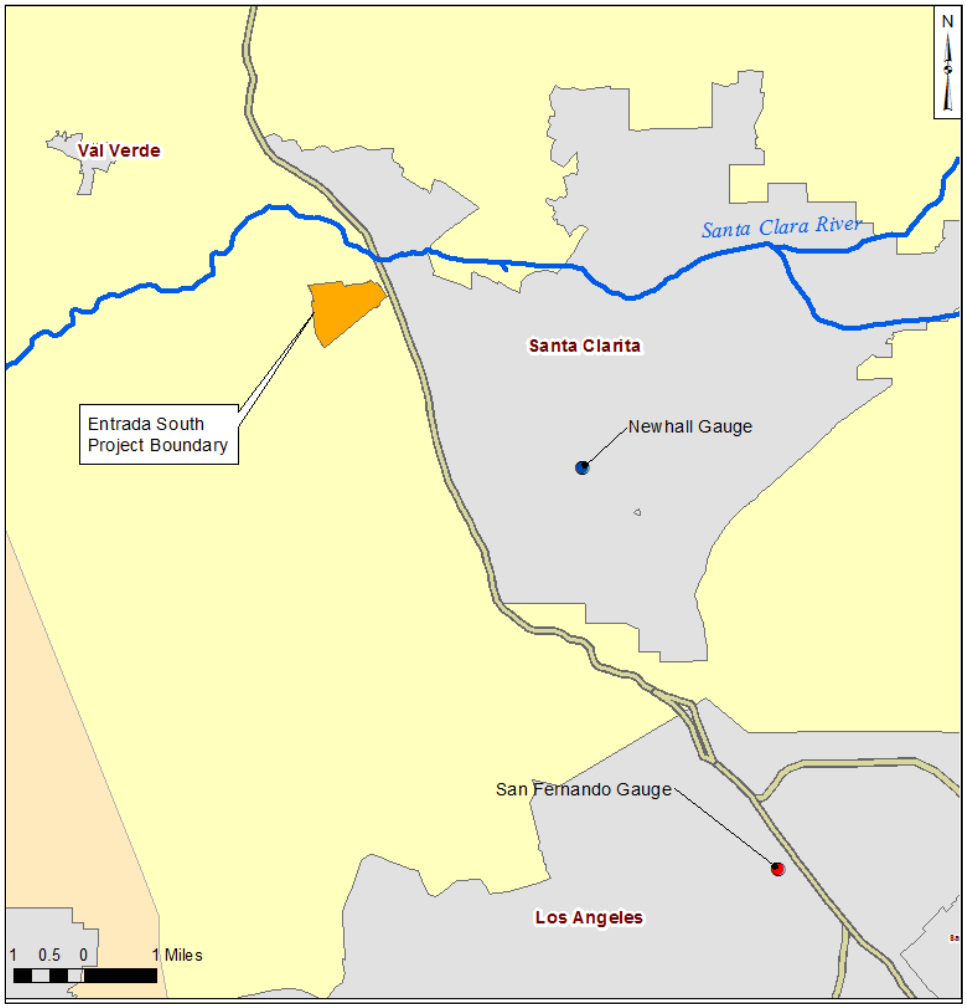


Figure 1: Location of Newhall Rain Gauge in the Vicinity of the Project Area

San Fernando rainfall data was adjusted based on comparison between the two gauges over periods for which they both contained data. A comparison of hourly or daily rainfall totals is not expected to yield a strong correlation as spatial variability is exaggerated on short time scales (i.e. a single storm could result in appreciable rainfall at one gauge and little rainfall at the other). However, monthly correlations are expected to yield meaningful comparison between the gauges when taken over a long period of record. Data from the gauges from WY 1969 to 2008 were screened to keep only the months without missing data and with measured rainfall at both stations. Correlation of the monthly rainfall totals is shown in Figure 2. This monthly correlation indicated slightly higher rainfall amounts at the Newhall gauge compared to the San Fernando gauge.

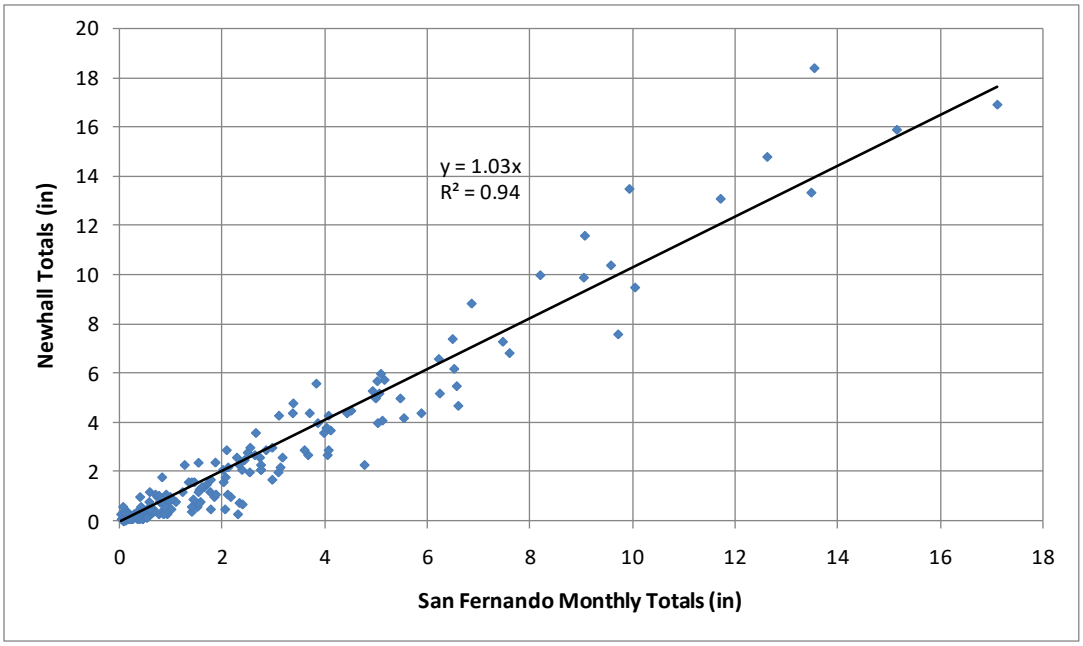


Figure 2: Correlation of Monthly Totals between Newhall & San Fernando Gauges (excluding months with missing data or zero rainfall)

Based on the relationship developed through the monthly comparison, a multiplier of 1.03 was applied to the hourly rainfall data from the San Fernando gauge to fill in the missing periods of rainfall data at the Newhall gauge. Values were rounded to the nearest 1/100 inch after the adjustment.

Summary rainfall analysis was conducted for two data groups: all storm events; and only the storms that were expected to contribute to stormwater runoff (storms >0.1 inches). The rainfall data were analyzed using a code similar in performance to EPA's Synoptic Rainfall Analysis Program (SYNOP). The customized code (GeoSYNOP) facilitates resolving missing periods of data and is more robust when handling the date and time of storms. GeoSYNOP subdivides the rainfall record into discrete events separated by an inter-event dry period, which in this case was set to a minimum of 6 hours. Small rainfall events, which resulted in rainfall of less than or equal to 0.10 inches, were deleted from the record for the purpose of calculating summary statistics. For the Newhall gauge, a total of 609 storm events (>0.1 inches) were segregated from the continuous data from October 1, 1968 to September 30, 2008. Storm statistics for the full (all storms) and the trimmed (storms > 0.1 inch) data sets are shown in Table 2-2. The full rainfall record is used for modeling analysis, however small storm events tend to produce less runoff because of initial abstractions represented in the model.

Table 2-2: Analysis Results for the Actual and Filled Newhall Rainfall Data

Storms	Newhall Gauge WY 1969 – 2008	Patched Record
All Storms	Average annual rainfall (in):	18.4
	Total number of storms:	1011
	Average number of storms per year:	25.3
	Average storm volume (in):	0.73
	Average storm duration (hrs):	7.3
	Average storm intensity (in/hr):	0.097
Storms >0.1 inch	Average annual rainfall (in):	17.4
	Total number of storms:	609
	Average number of storms per year:	15.2
	Average storm volume (in):	1.14
	Average storm duration (hrs):	11.4
	Average storm intensity (in/hr):	0.102

[1] Augmented record includes adjusted data from San Fernando gauge to fill gaps in Newhall gauge record.

2.2. Evapotranspiration

Reference ET values for estimating actual ET rates was taken from the California Irrigation Management Information System (CIMIS) Reference Evapotranspiration Zones map produced by the California Department of Water Resources. The Entrada South Project site is located in zone 14. Reference ET values for zone 14 are reproduced in Table 2-3 below. A model input of 60 percent of reference ET was used per CIMIS guidance to reflect a mix of irrigated and drought tolerant landscape species.

Table 2-3: Evaporation Parameters for Hydrology Model (from CA ET map)

Month	Evapotranspiration Rates			60%
	inch / day	days / month	inch / month	inch / month
January	0.05	31	1.55	0.93
February	0.08	28	2.24	1.34
March	0.12	31	3.72	2.23
April	0.17	30	5.1	3.06
May	0.22	31	6.82	4.09
June	0.26	30	7.8	4.68
July	0.28	31	8.68	5.21
August	0.25	31	7.75	4.65
September	0.19	30	5.7	3.42
October	0.13	31	4.03	2.42
November	0.07	30	2.1	1.26
December	0.05	31	1.55	0.93
Total (year)		**365**	**57.0**	**34.2**

2.3. Regional Facility Tributary Area and Imperviousness

The tributary drainages treated by each of the Project regional facilities were represented per the *LID/SUSMP/Water Quality Maintenance Plan Map for Entrada South* (Water Quality Exhibit, Alliance, 2017) and accompanying *Entrada South Mitigated Flow Table* (Appendix A, Alliance, 2017).

Table 2-4 includes the drainage subbasins and imperviousness values used for areas within the Entrada South boundary for Facilities A, B and C.

Table 2-4: Modeled Developed Conditions Project– Facilities A, B, and C

Facility	Land Use	Acreage	Imperviousness
Facility A	Drainage Basin C	2.0	5
	Drainage Basin D	10.8	80
	Drainage Basin F	9.1	80
	Drainage Basin R	2.1	91
	Drainage Basin S	1.3	80
Facility A Total		**25.3**	**75**
Facility B	Drainage Basin B1	45.0	57
	Drainage Basin P	16.2	80
	Drainage Basin W	1.7	5
Facility B Total		**62.9**	**62**
Facility C	Drainage Basin B2	16.5	45
	Drainage Basin B3	7.2	60
	Drainage Basin Q	1.0	85
Facility C Total		**24.7**	**51**

2.4. Soil Parameters

Drainage basins were divided into sub-catchments based on hydrologic soil group (HSG). The HSGs were identified based on catchment-specific soils distributions obtained from the Natural Resources Conservation Service (NRCS) Soil Survey CA675, and were divided as follows for modeling purposes: HSG A/B, HSG C, and HSG D. Group A soils were grouped with B soils because of the extreme scarcity of soil group A on the Project site and the similarity in infiltration parameters between A and B soils.

Hydrologic soil groups (HSG) and soil texture classes provided in the NRCS soil survey, as well as information provided in the Los Angeles County soils maps, were used to classify soils on the Project site and assign typical ranges of soil parameters to these soil groups. Spatial analyses were used to composite these values by subcatchment. The breakdown by soil type within each subcatchment is included in Table 2-5 below.

Table 2-5: SWMM Modeled Soils Distribution by Drainage Basin – Facilities A, B, and C

Location	Hydrologic Soil Group	Area (acres)	% Total
Facility A	A/B	2.8	11.3%
	C	22.5	88.7%
Facility A Total		**25.3**	
Facility B	A/B	18.4	29.3%
	C	44.5	70.7%
Facility B Total		**62.9**	
Facility C	A/B	0.3	1.1%
	C	24.4	98.9%
Facility C Total		**24.7**	

Green-Ampt suction head and initial moisture deficit values for each HSG were based on the soil texture class reported by the NRCS soil survey for the dominant texture class within the respective HSGs. Green-Ampt saturated hydraulic conductivities (the infiltration capacity of soils in inches of water infiltrated per hour) for each soil group were determined on an area weighted basis as the average of: 1) the low range of saturated hydraulic conductivity (K_{sat}) reported in the NRCS soil survey, 2) infiltration rates by HSG recommended by Musgrave (1955), and 3) characteristics infiltration rates for LACDPW soil classes interpreted from Appendix C of the LA County Hydrology Manual. Spatial analyses were used to composite these infiltration rate values by tributary area. It has been assumed that compaction during construction will reduce the bulk hydraulic conductivity across the development site by approximately 25 percent, on average, in the post-development condition in areas where construction is planned. While localized effects of incidental compaction may be greater, this assumption is believed to represent a reasonable estimate of drainage basin-wide reduction in long term infiltration rate considering that not all pervious areas will be subjected to incidental compaction and vegetation and other natural process tend to restore infiltration rates with time. Infiltration at the location of infiltration BMPs will be avoided to the extent possible. LACDPW soil classes present on the project include soil 020 and 098. Modeled soil parameters are provided in Table 2-6.

Table 2-6: Green-Ampt Soil Parameters – Facilities A, B, and C

Location	Hydrologic Soil Group	Suction Head[1] (in)	IMD[2] (in/in)	Pre- Development Ksat (in/hr)	Post- Development Ksat (in/hr)
Facility A	A/B	8	0.32	0.37	0.28
	C	8	0.29	0.19	0.15
Facility B	A/B	8	0.32	0.37	0.28
	C	8	0.29	0.19	0.15
Facility C	A/B	8	0.32	0.37	0.28
	C	8	0.29	0.19	0.15

[1] Average capillary suction of soils (inches), estimated based on texture class from Rawls, et al., (1983).
[2] Fractional difference between soil porosity and actual moisture content, estimated based on texture class from Rawls, et al., (1983).

2.5. Parcel-based LID BMPs

Parcel-based LID BMPs on the Project include "stand-alone" BMPs, which do not drain to a regional facility, and parcel-based LID BMPs draining to Regional Facility D. Modeling analyses to justify the sizing of parcel-based stand-alone BMPs are stand-alone parcel-based LID BMPs are discussed in this section. Modeling parameters for areas draining to Regional Facility D are discussed in the Mission Village Conformance Memorandum (Geosyntec, 2016).

The controlling sizing factor for parcel-based stand-alone BMPs is the SWQDv, as calculated using the Los Angeles County LID Calculator. Unit area modeling analyses were conducted in SWMM to demonstrate that when parcel-based BMPs are sized for the SWQDv using MS4 Permit requirements to provide minimum 5 inches per hour media filtration rate, they result in greater than 80 percent capture of average annual runoff as well as biofiltration of much greater than 150% of the SWQDv that is not reliably retained.

Table 2-7. Unit Area Model Scenarios to Demonstrate that LA County SWQDv Meets Newhall LID Performance Standard for Parcel-based BMPs

Model Scenario	Category 1 (Infiltration Feasible)	Category 2 (Infiltration Partially Feasible)	Category 3 (Biofiltration, with minor incidental volume reduction)
Tributary Area, Ac	1.0	1.0	1.0
SWQDv, cu-ft	3,561 [1]	3,561 [1]	3,561 [1]
BMP Type	Infiltration (any type); Geometry not relevant; modeling simply assumes SWQDv is reliably infiltrated in 24 hours.	Bioinfiltration (bioretention with elevated underdrain); 18 inches ponding; 18 inches gravel below underdrain	Bioretention with underdrains, negligible incidental infiltration assumed; 18 inches ponding
BMP Volume, cu-ft	3,561	3,561	3,561
Effective Storage Depth Above Underdrain, ft	2 ft depth assumed; no underdrain	1.5	1.5
Effective Storage Depth Below Underdrain, ft		0.6	0
Footprint Area, sq-ft	1,781	1,696	2,374
Media Filtration Rate, controls when underdrain discharges, in/hr	NA	5	5
Underlying Infiltration Rate, in/hr	1.3 in/hr (set based on assumed 18-hour drawdown time)	0.15	0
Head effects on infiltration	Assumed negligible for modeling; conservative	Assumed negligible for modeling; conservative	Assumed negligible for modeling; conservative
Long Term Average Capture Efficiency from SWMM Simulations, %	80%	96%	99%
Percent of SWQDv Retained, %	100%	29%[2]	0%[3]
Percent of Remaining SWQDv Biofiltered, %	NA	267%[2]	267%[3]

[1] Equivalent to the volume calculated from the LA County LID Volume Calculator for a 1-acre representative catchment (100% imperviousness, flow path length of 250 feet, slope of 5%, LA County Soil #098)

[2] See calculations below for Category 2

- 0.6 ft retained × 1,696 sq-ft = 1,018 cu-ft/3,561 = 29%. Remaining SWQDv = 3,561 – 1,018 = 2,543 cu-ft.
- Biofiltration provided as percent of remaining SWQDv = 2,543 cu-ft physical storage + 2.5 ft biofiltration routed during event (6 hours within-storm routing @ 5 in/hr) × 1,696 sq-ft = 6,783 cu-ft. 6783/2,543 = 267%

[3] See calculations below for Category 3

- No retention claimed; remaining SWQDv = 3,561 cu-ft
- Biofiltration provided as percent of remaining SWQDv = 3,561 cu-ft physical storage + 2.5 ft biofiltration routed during event (6 hours within-storm routing @ 5 in/hr) × 2,374 = 9,496 cu-ft. 9,496/3,561 = 267%

A 6 hour routing time in these calculations is considered to be conservative as the design storm duration is 24-hours, by definition, and typical real storm events have durations that typically exceed 6 to 12 hours.

2.6. Single Family Areas

The LID Performance Standard includes hydrologic source controls (HSCs) in single family detached (SFD) land uses, entailing routing of a portion of the impervious area to the pervious area. Single-family HSCs were modeled for parcels that drain to Regional Facility D only; these HSCs were not considered in the sizing of WQ Treatment Basin A, B, or C.

Table 2-8: SFD Disconnect Modeling Parameters for Regional Facility D

Parameter	Input	Source of Parameter Input
Percent of SFD land use disconnected	28%	Analysis of typical 5,000 SF parcels; represents rooftops and sidewalks
Disconnection ratio	4 parts impervious to 1 part pervious receiving flow	Analysis of typical area that can be used for disconnection within typical parcels
Depression storage of receiving pervious area (inches)	0.06	Depression storage set equivalent to pervious area depression storage; this is conservative as these areas are proposed to be amended to provide additional pore space
Infiltration rate of receiving pervious area	Set equivalent to underlying soil infiltration rate used in watershed modeling	Set equivalent to pervious area soil Ksat corresponding to the hydrologic soil group associated with the area

2.7. Summary of BMPs within Watershed Tributary to Each Regional Facility

A summary of the Project areas draining to each of the regional facilities is shown in Table 2-9. Facilities A, B, and C were modeled to receive Project flows directly[1], while Regional Facility D receives flows from areas that are routed through on-parcel and single family areas first.

[1] Note that single family areas draining to Facilities A, B, and C will have HSCs, but they are not modeled for conservatism.

Table 2-9: Areas Draining to Parcel-based BMP Types within Water Quality Facility Drainage Areas

Regional Infiltration/ Biofiltration Facility Drainage Area	Category 2 Parcel-based BMPs		SFD HSC[1]		Directly to Regional Facility		Total	
	Area (Ac)	Imp (%)	Area (Ac)	Imp (%)	Area (Ac)	Imp (%)	Area (Ac)	Imp (%)
Facility A	-	-	-	-	25.3	75	25.3	75
Facility B	-	-	-	-	62.9	62	62.9	62
Facility C	-	-	-	-	24.7	51	24.7	51
Regional Facility D	39.6	84	35.1	60	27.4	21	102.1	59

1 - Includes single-family roofs, patios and sidewalks, draining to a pervious area with an equivalent square-footage.

3. REGIONAL FACILITY MODELING

3.1. Model Representation

Regional infiltration/biofiltration facilities were modeled using a stage-area table to define volume properties and SWMM's built-in hydraulic control elements (e.g., orifices, weirs, outlets) to define discharge from the system (e.g., treated discharge, infiltration, overflow) as a function of the depth of stored water. These facilities were modeled to receive runoff from developed portions of the Project not addressed by stand-alone parcel-based BMPs, including a accounting for diversion structures. Regional Facility D was modeled to receive runoff from tributary areas in Mission Village, Legacy Village, and Entrada South and was simulated to receive runoff not addressed by parcel-based BMPs as well as bypass and treated discharge from parcel-based BMPs and SFD HSCs. Modeling of Mission Village Facility D is described in the Mission Village Phase I Conformance Memo (Geosyntec, 2016).

The continuous inflow hydrograph generated from the subcatchments (accounting for parcel-based retention where applicable) is routed through the regional facilities, accounting for the hydrologic water balance, conceptual diversion structure, hydraulic flow control. The total volumes that are treated, infiltrated, and overflow or bypass over the long term period of record are tabulated and used to evaluate whether the combined LID system achieves 80 percent capture of average annual watershed runoff. Watershed total capture was quantified by comparing the total runoff from the watershed without any BMPs (i.e., the baseline runoff volume) versus the total amount of water that bypasses (at the diversion structure) or overflows (via the overflow structure) the regional LID facilities with BMPs in place. If the total amount bypassing or overflowing is less than or equal to 20 percent of the baseline runoff volume, then the overall system is considered to capture at least 80 percent of watershed runoff volume.

Facility sizing was conducted with model infiltration rates, which incorporate factor(s) of safety on measured infiltration rates to account for the potential for lower infiltration rates in operation due to soil compaction during construction, accumulation of fines in infiltrating surface, and other effects. Measured infiltration rates were obtained via field testing by RTF&A (2013) and are shown in Table 3-1.

Subsequent to Frankian's 2013 investigation, the location of the infiltration facilities changed. The current facility locations were evaluated by Frankian (2017) and found to be in similar geologic formations. Therefore, Frankian (2017) concluded that the results of 2013 testing, with appropriate factors of safety, are considered to be reliable for the current facility locations.

Table 3-1: Measured Infiltration Rates

Location of Sample	Measured Infiltration Rate (in/hr)
Facility A (based on 2013 naming convention)	34
Facility B (based on 2013 naming convention)	17
Facility C (based on 2013 naming convention)	3.2
Vicinity Average Measured Infiltration Rate[1]	***18***
Default Factor of Safety (unitless)	5.0
Default Infiltration Rate (in/hr)	3.6

[1]Variability between samples is believed to represent overall site variability across the discrete points where samples were taken, not necessarily a significant difference between different basin locations. Infiltration testing conducted by Frankian (2013) is still considered to be reliable for the adjusted basin locations (Frankian, 2017).
[2]Based on guidance for selecting factors of safety contained in the Ventura County Technical Guidance Document, and best professional judgments; rates will be confirmed and designs will be adjusted as needed following mass grading.

The default design infiltration rate was further adjusted for modeling to provide for conservatism and an additional margin of safety in designs. Based on recommendations by Frankian (2017), a modeled infiltration rate of 3 inch/hr was used for all facilities. Rates will be confirmed and designs will be adjusted as needed via infiltration testing conducted after the facilities are graded. Design and modeled infiltration rates are included in Table 3-2 below.

Table 3-2: Modeled Infiltration Rates

Location of Sample	Facility WQ Depth, ft	Default Design Infiltration Rate (in/hr) (See Table 3-1	Modeled Infiltration Rate (in/hr)
Facility A	3 ft	3.6	3.0
Facility B	3.75 ft	3.6	3.0
Facility C	3.5 ft	3.6	3.0

Other modeling parameters are provided in Table 3-3 and 3-4 below. A schematic of the regional infiltration facilities A, B, and C is illustrated in Figure 3.

Regional Facility D was modeled and documented as part of the Mission Village Phase 1 Conformance Analysis (Geosyntec 2016).

Table 3-3: Regional Basin Modeling Parameters

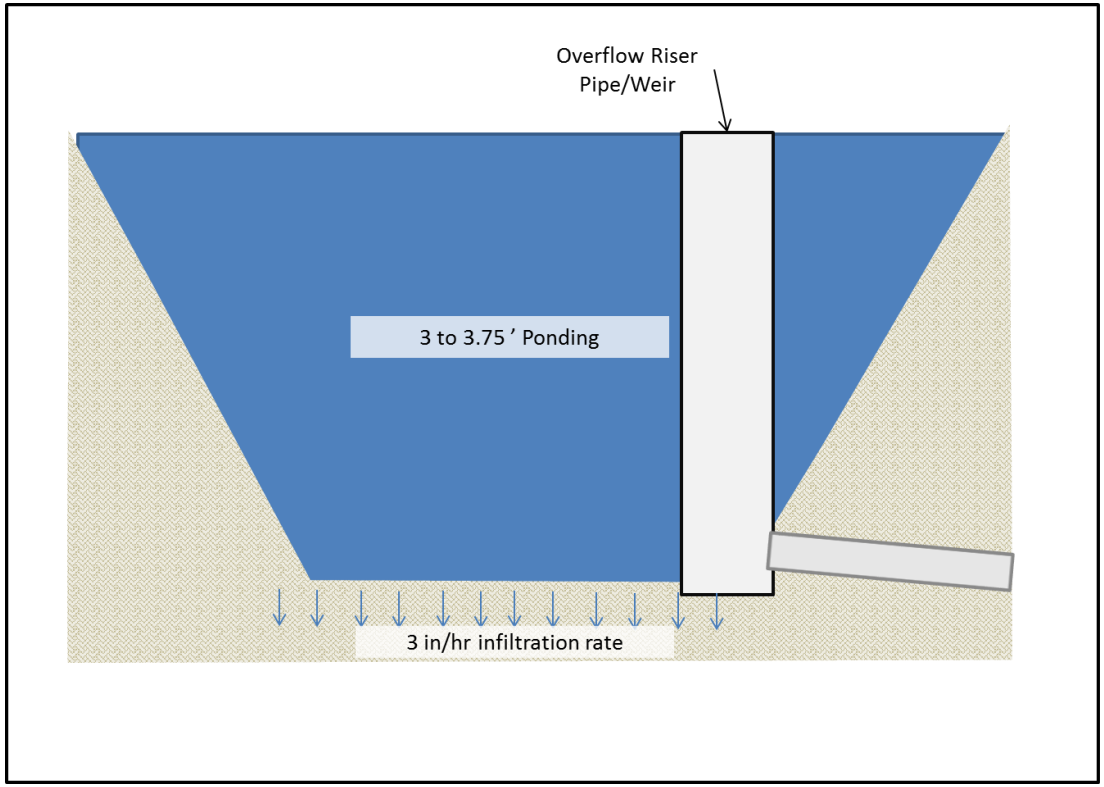
Parameter	Input	Source
Basin volumetric storage	Storage curve of facility	Model representation accounts for ponded water stored above the finished grade.
Basin flow controls	Weir dimensions and elevation to control the overflow elevation of the facility.	Subject to refinement in detailed design of facility. Designs will provide flexibility to adapt control dimensions per operational feedback.
Infiltration	Infiltration losses represented by an "outlet" in SWMM, which is tabular as a function of the wetted surface area and the modeled infiltration rate.	Outflow equals wetted area multiplied by modeled infiltration rate (See Table 3-1 and Table 3-2).
Evapotranspiration	Rate of evaporation from surface ponding and transpiration from amended sand media.	Same as overall watershed (See Table 2-3)
Diversion Structure	A SWMM "divider" was used with a cutoff flow.	Diversion structures have been designed to divert at least this flowrate before bypass.

Each facility's diversion cutoff flowrate is shown in Table 3-4. These rates were iteratively adjusted until the overall long term capture efficiency was at least 80 percent of long term runoff volume.

Table 3-4: Facility Diversion Cutoff Flowrate

LID Facility	Diversion Cutoff Flowrate (cfs)[1]
Facility A	4.7
Facility B	15
Facility C	4.5

[1]Runoff inflow rates greater than the cutoff flowrate bypass the LID facility.



Facility	Ponding Depth (ft)	Infiltration Rate (in/hr)	Facility Volume (acre-ft)
A	3	3	1.6
B	3.75	3	3.4
C	3.5	3	1.1

Figure 3: Schematic and Respective Cross-Section Depths of Entrada South Infiltration Facilities A, B, and C

3.2. Regional Facility Modeling Results

The long-term estimated hydrologic performance of regional facilities (capture efficiency and volume reduction) is reported in Table 3-5, along with the overall watershed capture and volume reduction. The overall watershed capture is inclusive of volume reductions achieved in nested parcel-based BMPs, hydrologic source controls, and regional facilities.

Table 3-5: Regional Facility Performance and Watershed Total Performance

Regional Facility Drainage Area	Tributary Area	Percent Imperviousness of Tributary Area	Regional Facility		Volume Reduction Upstream of Regional Facility[1]	Watershed Capture	Watershed Volume Reduction
			Capture Efficiency of Runoff Volume	Volume Reduction of Captured Water			
A	25.3	74.9%	80%	100%	--	80%	80%
B	62.9	61.6%	80%	100%	--	80%	80%
C	24.7	51.0%	80%	100%	--	80%	80%
Regional Facility D[1]	720.3	45.6%	74%	0.1%	16%	80%	16%

[1] Includes all areas draining to Regional Facility D, including SFD and parcel-based facilities (Source: Geosyntec, 2016)

4. MODEL PARAMETER RELIABILITY AND ASSUMPTIONS

This section discusses the reliability of the model parameters and assumptions that were used as part of this modeling analysis.

4.1. Parcel-based BMP Infiltration Feasibility Screening

The types of parcel-based BMPs applied to commercial, multi-family, institutional, recreation and park land uses was determined based on infiltration feasibility constraints, as described in Section 2. The criteria used to categorize parcel-based treatment based on infiltration constraints are in agreement with the infiltration constraints listed in the *Ventura Technical Guidance Manual* (Ventura County, 2010), the *LA County LID Ordinance and Manual* (LACDPW, 20014), and the *LID BMP Design, Investigation and Reporting Requirements Administrative Manual* (LACDPW, 2014). Constraints were mapped as accurately as possible at this phase of analysis. More detailed site investigation performed at the time of development of parcels may result in somewhat different distributions of parcel-based BMPs, however developers of parcels will obligated to provide the BMP volumes that were assumed in this model analysis. Therefore, the build-out performance of parcel-based BMPs is expected to be reasonably similar to the assumptions used for modeling at this time.

4.2. Parcel-based BMP Infiltration Rates

Infiltration rates beneath parcel-based BMP were assumed based on input from project geotechnical consultant (R.T Franklin & Associates, 2013) based on review of geologic information and proposed sources of fill material. While it is expected that infiltration rates may vary across the Project depending on the source of fill material, the assumed values are believed to be representative of anticipated average conditions and are relatively low. Detailed parcel designs will be supported by site-specific infiltration testing; parcel-based BMP performance is expected to be reasonably similar, on average, to assumptions made for the purpose of this analysis.

4.3. Single Family Hydrologic Source Controls

Single-family hydrologic source controls were not claimed in modeling conducted as part of this analysis. This is a conservative approach that somewhat under predicts the performance of proposed regional LID facilities.

4.4. Regional Facility Infiltration Rates and Model Representations

Infiltration rates in the locations of proposed regional infiltration/biofiltration facilities were estimated based on geologic information, soils data, and testing results available at the time of analysis (R.T Franklin & Associates, 2013, 2017). To account for uncertainty in these estimates, facility sizing was conducted with model infiltration rates, which incorporate factor(s) of safety to account for the potential for lower infiltration rates in operation due to soil compaction during construction, accumulation of fines in infiltrating surface, and other effects. As such, it is believed that infiltration rates are somewhat conservatively selected for the purpose of this analysis and it is anticipated that higher design infiltration rates may be supported through site-specific analysis conducted after bulk grading occurs. Should detailed testing show infiltration rates are lower than assumed, additional design features such as dry wells and/or selectively graded fill material could be used to achieve at least the assumed design infiltration rate.

5. SUMMARY

This attachment describes the modeling methodology used to evaluate the overall performance of water quality/LID design features proposed within the watersheds tributary to Facilities A, B, and C. Modeling of the portion of the Project that drains to Regional Facility D is documented in the Mission Village Phase 1 Conformance Memorandum (Geosyntec, 2016). This approach incorporates, in a conservative manner, the commitments to parcel-based LID and single family HSCs that have been made within the watershed. It also incorporates civil and geotechnical design information that is available at this time for the facilities. This approach results in an estimate of overall performance that is considered to be reliable for evaluating the conformance to the LID Performance Standard applicable to the Project.

6. REFERENCES

Alliance, 2017. Entrada South Major Land Division VTTM No. 53295 – Updated Land Use and Planning Areas, Job No 0930. Prepared for Newhall Land by Alliance.

Alliance, 2017. LID/SUSMP/Water Quality Maintenance Plan Map for Entrada South VTTM No. 53295, Job No 0930. Prepared for Newhall Land by Alliance. Prepared August 2017.

Geosyntec Consultants, 2016. Mission Village Phase 1 Final Hydrology Study – Evaluation of Conformance with Newhall LID Performance Standard. Geosyntec Consultants, May 23, 2016. Edits are currently in progress in response to LACDPW comments.

James and James, 2002. Water Systems Models, Hydrology, A guide to the Rain, Temperature, Runoff, Combine, and Statistics modules of the USEPA SWMM4. CHI publications, Ontario, Canada, 1988-2002. .

LACDPW, 2006. Los Angeles County Hydrology Manual.

LACDPW, 2014. Los Angeles County Low Impact Development Standards Manual. Prepared by County of Los Angeles, Department of Public Works, January 2014.

LACDPW, 2014. Low Impact Development Best Management Practices Design, Investigation and Reporting Requirements Administrative Manual. Prepared by the County of Los Angeles, Department of Public Works, Geotechnical and Materials Engineering Division December 31, 2014.

Musgrave, G.W., 1955. "How Much Water Enters the Soils," U.S.D.A. Yearbook, U.S. Department of Agriculture, Washington, DC, pp. 151-159.

R.T. Frankian and Associates (RTF&A), 2010. Geotechnical Evaluation of Infiltration, Vesting Tentative Tract Map Number 61105, Mission Village, Newhall Ranch, Los Angeles County, California. Prepared for Newhall Land by RTF&A. January 2010.

R.T. Frankian and Associates (RTF&A), 2013. Geotechnical Infiltration Evaluation Update, Vesting Tentative Tract Map Number 53295, Entrada South, Newhall Ranch, Los Angeles County, California. Prepared for Newhall Land by RTF&A. August 2013.

R.T. Frankian and Associates (RTF&A), 2017. Geotechnical Review, Revised LID Infiltration Plans, Proposed Water Quality Treatment Basins A, B, and C. Prepared for Newhall Land by RTF&A. August 2017.

Ventura County, 2010. Ventura County Technical Guidance Manual for Stormwater Quality Control Measures. October 2010. http://www.vcstormwater.org/technicalguidancemanual.html

ATTACHMENT A.1: SWMM INPUT AND OUTPUT FILES

Regional Facility Input File (Facilities A, B, and C)[1] (SWMM 5.1) p. 1-4

Regional Facility Output File (SWMM 5.1) p. 5-8

Representative Stand-alone Parcel-based BMP Case Study (SWMM 5.0) p. 9-14

KEY
Annotation is provided in red text and boxes to help orient the reviewer to the key information contained in each file.

[1] Model calculations for Regional Facility D are provided with the Mission Village Phase 1 Conformance Memorandum

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           10/01/1968
START_TIME           00:00:00
REPORT_START_DATE    10/01/1968
REPORT_START_TIME    00:00:00
END_DATE             10/01/2008
END_TIME             06:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:10:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:00:30

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
MAX_TRIALS           0
HEAD_TOLERANCE       0
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
MONTHLY          0.03   0.0479 0.0719 0.102  0.132  0.156  0.168  0.15   0.114  0.0781 0.042  0.03
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
Newhall          INTENSITY 1:00     1        FILE       "NEWHALL_PATCHED_20091119.NCD" 46162      IN

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnapPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ----------
A-AB             Newhall          DivA             2.85     60.96    496.13   5        0
A-C              Newhall          DivA             22.45    76.70    3912.14  5        0
B-AB             Newhall          DivB             18.40    72.64    3206.33  5        0
B-C              Newhall          DivB             44.48    56.99    7749.89  5        0
C-AB             Newhall          DivC             0.28     49.53    48.26    5        0
C-C              Newhall          DivC             24.40    50.99    4251.11  5        0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
A-AB             0.012      0.25       0.02       0.06       25         OUTLET
A-C              0.012      0.25       0.02       0.06       25         OUTLET
B-AB             0.012      0.25       0.02       0.06       25         OUTLET
B-C              0.012      0.25       0.02       0.06       25         OUTLET
C-AB             0.012      0.25       0.02       0.06       25         OUTLET
C-C              0.012      0.25       0.02       0.06       25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
A-AB             8          0.275      0.32
```

This model contains each of the three regional facilities. The tributary areas to these regional facilities are divided along soil unit delineations. Within each soil unit, watershed properties are lumped. This model demonstrates that the regional facilities A, B, and C are sized to infiltration at least 80 percent of average annual runoff. Hydrologic source controls and parcel-based BMPs are not considered in this sizing. Diversion structures are included in the capture efficiency analysis.

```
A-C             8          0.145      0.29
B-AB            8          0.275      0.32
B-C             8          0.145      0.29
C-AB            8          0.275      0.32
C-C             8          0.145      0.29

[JUNCTIONS]
;;Name           Elevation  MaxDepth   InitDepth  SurDepth   Aponded
;;-------------- ---------- ---------- ---------- ---------- ----------
J-DivA-OF       100        0          0          0          0
J-DivB-OF       100        0          0          0          0
J-DivC-OF       100        0          0          0          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
1               0          FREE                        NO
2               0          FREE                        NO
3               0          FREE                        NO

[DIVIDERS]
;;Name           Elevation  Diverted Link    Type       Parameters
;;-------------- ---------- ---------------- ---------- ----------
DivA            110        D-DivA-OF        CUTOFF     4.66       0          0          0          0
DivB            110        D-DivB-OF        CUTOFF     15         0          0          0          0
DivC            110        D-DivC-OF        CUTOFF     4.5        0          0          0          0

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params            N/A      Fevap    Psi      Ksat     IMD
;;-------------- -------- ---------- ---------- ---------- ---------------------------- -------- --------          -------- -----
---
FacilityA       100      18         0          TABULAR    FacilityA                    0        0        0.1      3.000    0.1
FacilityB       100      18         0          TABULAR    FacilityB                    0        0        0.1      3.000    0.1
FacilityC       100      18         0          TABULAR    FacilityC                    0        0        0.1      3.000    0.1

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset   OutOffset  InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ---------- ----------
8               J-DivC-OF        3                10         0.01       0          0          0          0
9               J-DivB-OF        2                10         0.01       0          0          0          0
10              J-DivA-OF        1                10         0.01       0          0          0          0
D-DivA-OF       DivA             J-DivA-OF        20         0.01       0          0          0          0
D-DivA-TR       DivA             FacilityA        20         0.01       0          0          0          0
D-DivB-OF       DivB             J-DivB-OF        20         0.01       0          0          0          0
D-DivB-TR       DivB             FacilityB        20         0.01       0          0          0          0
D-DivC-OF       DivC             J-DivC-OF        20         0.01       0          0          0          0
D-DivC-TR       DivC             FacilityC        20         0.01       0          0          0          0

[WEIRS]
;;Name           From Node        To Node          Type         CrestHt    Qcoeff     Gated    EndCon   EndCoeff   Surcharge
RoadWidth  RoadSurf
;;-------------- ---------------- ---------------- ------------ ---------- ---------- -------- -------- ---------- ---------- ----
------ ----------
1               FacilityA        1                TRANSVERSE   3          3.33       NO       0        0          YES
2               FacilityB        2                TRANSVERSE   3.75       3.33       NO       0        0          YES
3               FacilityC        3                TRANSVERSE   3.5        3.33       NO       0        0          YES

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ---------- ----------
8               DUMMY        0                0          0          0          1
9               DUMMY        0                0          0          0          1
10              DUMMY        0                0          0          0          1
D-DivA-OF       DUMMY        0                0          0          0          1
D-DivA-TR       DUMMY        0                0          0          0          1
D-DivB-OF       DUMMY        0                0          0          0          1
D-DivB-TR       DUMMY        0                0          0          0          1
D-DivC-OF       DUMMY        0                0          0          0          1
D-DivC-TR       DUMMY        0                0          0          0          1
1               RECT_OPEN    10               9.424777961 0          0
2               RECT_OPEN    10               18.84955592 0          0
3               RECT_OPEN    10               9.424777961 0          0

[CURVES]
;;Name           Type       X-Value    Y-Value

2
```

Diversion structure cutoff flowrates.

```
;;-------------- ---------- ---------- ----------
FacilityA        Storage    0.00       24413.00
FacilityA                   0.15       24413.00
FacilityA                   0.24       24413.00
FacilityA                   0.30       24413.00
FacilityA                   0.45       24413.00
FacilityA                   0.60       24413.00
FacilityA                   0.90       24413.00
FacilityA                   1.20       24413.00
FacilityA                   1.50       24413.00
FacilityA                   1.95       24413.00
FacilityA                   2.10       24413.00
FacilityA                   2.25       24413.00
FacilityA                   2.40       24413.00
FacilityA                   2.64       24413.00
FacilityA                   2.70       24413.00
FacilityA                   3.00       24413.00
FacilityA                   10.00      24413.00
;
FacilityB        Storage    0.00       39374.00
FacilityB                   0.19       39374.00
FacilityB                   0.30       39374.00
FacilityB                   0.38       39374.00
FacilityB                   0.56       39374.00
FacilityB                   0.75       39374.00
FacilityB                   1.13       39374.00
FacilityB                   1.50       39374.00
FacilityB                   1.88       39374.00
FacilityB                   2.44       39374.00
FacilityB                   2.63       39374.00
FacilityB                   2.81       39374.00
FacilityB                   3.00       39374.00
FacilityB                   3.30       39374.00
FacilityB                   3.38       39374.00
FacilityB                   3.75       39374.00
FacilityB                   10.00      39374.00
;
FacilityC        Storage    0.00       15515.00
FacilityC                   0.18       15515.00
FacilityC                   0.28       15515.00
FacilityC                   0.35       15515.00
FacilityC                   0.53       15515.00
FacilityC                   0.70       15515.00
FacilityC                   1.05       15515.00
FacilityC                   1.40       15515.00
FacilityC                   1.75       15515.00
FacilityC                   2.28       15515.00
FacilityC                   2.45       15515.00
FacilityC                   2.63       15515.00
FacilityC                   2.80       15515.00
FacilityC                   3.08       15515.00
FacilityC                   3.15       15515.00
FacilityC                   3.50       15515.00
FacilityC                   10.00      15515.00

[REPORT]
;;Reporting Options
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
J-DivA-OF        1577.869           4084.699
J-DivB-OF        4446.721           3961.749
J-DivC-OF        7411.202           3989.071
```

Top of Water Quality Volume at 3 ft.

Top of Water Quality Volume at 3.75 ft.

Top of Water Quality Volume at 3.5 ft.

```
1                993.151            2000.000
2                3773.973           1931.507
3                6787.671           1958.904
DivA             949.454            4521.858
DivB             3777.322           4603.825
DivC             6741.803           4562.842
FacilityA        293.716            4057.377
FacilityB        3066.940           3934.426
FacilityC        6127.049           3907.104

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
A-AB             308.219            7410.959
A-C              1554.795           7465.753
B-AB             3267.123           7410.959
B-C              4294.521           7452.055
C-AB             6404.110           7342.466
C-C              7226.027           7342.466

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Newhall          2806.122           8992.347
```

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.011)
--------------------------------------------------------------

WARNING 08: elevation drop exceeds length for Conduit 8
WARNING 08: elevation drop exceeds length for Conduit 9
WARNING 08: elevation drop exceeds length for Conduit 10

**********
Rainfall File Summary
**********
Station    First        Last         Recording   Periods    Periods    Periods
ID         Date         Date         Frequency  w/Precip    Missing    Malfunc.
-------------------------------------------------------------------------------
46162      10/02/1968   12/25/2008      60 min      5324          0          0


*****************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*****************************************************

***************
Analysis Options
***************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Flow Routing Method ...... KINWAVE
Starting Date ............ 10/01/1968 00:00:00
Ending Date .............. 10/01/2008 06:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:10:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 04:00:00
Routing Time Step ........ 30.00 sec


*************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
*************************     ---------       -------
Total Precipitation ......      6895.087       733.130
Evaporation Loss .........       192.962        20.517
Infiltration Loss ........      2300.540       244.608
Surface Runoff ...........      4438.329       471.912
Final Storage ............         0.000         0.000
Continuity Error (%) .....        -0.533


*************************        Volume         Volume
Flow Routing Continuity        acre-feet      10^6 gal
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......      4438.329      1446.296
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........       860.406       280.376
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........      3579.477      1166.426
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....        -0.035
```

```
*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.


************************
Routing Time Step Summary
************************
Minimum Time Step           :    30.00 sec
Average Time Step           :    30.00 sec
Maximum Time Step           :    30.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     1.00
Percent Not Converging      :     0.00


**************************
Subcatchment Runoff Summary
**************************

-----------------------------------------------------------------------------------------------------------
                         Total      Total      Total      Total      Total       Total     Peak  Runoff
                        Precip      Runon       Evap      Infil     Runoff      Runoff   Runoff   Coeff
Subcatchment                in         in         in         in         in    10^6 gal      CFS
-----------------------------------------------------------------------------------------------------------
A-AB                    733.13       0.00      19.57     273.20     444.12       34.37     3.79   0.606
A-C                     733.13       0.00      25.06     148.26     564.27      343.98    31.36   0.770
B-AB                    733.13       0.00      23.36     191.22     522.74      261.17    25.10   0.713
B-C                     733.13       0.00      18.98     274.93     442.96      535.00    60.46   0.604
C-AB                    733.13       0.00      15.92     353.58     366.92        2.79     0.36   0.500
C-C                     733.13       0.00      17.16     313.64     405.83      268.88    32.87   0.554


******************
Node Depth Summary
******************

-------------------------------------------------------------------------------
                            Average  Maximum  Maximum  Time of Max    Reported
                              Depth    Depth      HGL   Occurrence   Max Depth
Node                 Type      Feet     Feet     Feet  days hr:min        Feet
-------------------------------------------------------------------------------
J-DivA-OF            JUNCTION  0.00     0.00   100.00     0  00:00        0.00
J-DivB-OF            JUNCTION  0.00     0.00   100.00     0  00:00        0.00
J-DivC-OF            JUNCTION  0.00     0.00   100.00     0  00:00        0.00
1                    OUTFALL   0.00     0.00     0.00     0  00:00        0.00
2                    OUTFALL   0.00     0.00     0.00     0  00:00        0.00
3                    OUTFALL   0.00     0.00     0.00     0  00:00        0.00
DivA                 DIVIDER   0.00     0.00   110.00     0  00:00        0.00
DivB                 DIVIDER   0.00     0.00   110.00     0  00:00        0.00
DivC                 DIVIDER   0.00     0.00   110.00     0  00:00        0.00
FacilityA            STORAGE   0.01     3.21   103.21  13237  09:08        3.21
FacilityB            STORAGE   0.03     4.09   104.09  9597  13:09        4.09
FacilityC            STORAGE   0.02     3.73   103.73  14339  23:09        3.73
```

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
J-DivA-OF	JUNCTION	0.00	30.49	10721 20:00	0	59.2	0.000
J-DivB-OF	JUNCTION	0.00	70.55	10721 20:00	0	69.2	0.000
J-DivC-OF	JUNCTION	0.00	28.74	10721 20:00	0	35.8	0.000
1	OUTFALL	0.00	30.49	10721 20:00	0	69.3	0.000
2	OUTFALL	0.00	70.55	10721 20:00	0	157	0.000
3	OUTFALL	0.00	28.74	10721 20:00	0	53.9	0.000
DivA	DIVIDER	35.15	35.15	10721 20:00	378	378	0.000
DivB	DIVIDER	85.55	85.55	10721 20:00	796	796	0.000
DivC	DIVIDER	33.24	33.24	10721 20:00	272	272	0.000
FacilityA	STORAGE	0.00	4.66	110 13:09	0	319	-0.031
FacilityB	STORAGE	0.00	15.00	110 16:10	0	727	-0.043
FacilityC	STORAGE	0.00	4.50	110 13:58	0	236	-0.041

Total Bypass

Total Inflow

****
Node Surcharge Summary
****

No nodes were surcharged.

Example calculation - Facility A
% Capture = 1-(Total Bypass/Total Inflow)
= 1-(69.3/378)
= 81.6%

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
FacilityA	0.362	0	0	97	78.302	18	13237 09:08	4.66
FacilityB	1.300	0	0	88	160.911	23	9597 13:09	15.00
FacilityC	0.353	0	0	92	57.844	21	14339 23:09	4.50

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
1	0.23	3.25	30.49	69.317
2	0.22	7.42	70.55	157.148
3	0.19	3.04	28.74	53.890
System	0.21	13.71	129.78	280.355

****
Link Flow Summary
****

	Maximum	Time of Max	Maximum	Max/	Max/

Link	Type	Flow| CFS	Occurrence days	Occurrence hr:min	Veloc| ft/sec	Full Flow	Full Depth
8	DUMMY	28.74	10721	20:00			
9	DUMMY	70.55	10721	20:00			
10	DUMMY	30.49	10721	20:00			
D-DivA-OF	DUMMY	30.49	10721	20:00			
D-DivA-TR	DUMMY	4.66	110	13:09			
D-DivB-OF	DUMMY	70.55	10721	20:00			
D-DivB-TR	DUMMY	15.00	110	16:10			
D-DivC-OF	DUMMY	28.74	10721	20:00			
D-DivC-TR	DUMMY	4.50	110	13:58			
1	WEIR	2.96	13237	09:08			0.00
2	WEIR	12.27	9597	13:09			0.00
3	WEIR	3.42	14339	23:09			0.00

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Tue Oct 24 08:57:50 2017
Analysis ended on: Tue Oct 24 08:59:17 2017
Total elapsed time: 00:01:27

```
[TITLE]

[OPTIONS]
FLOW_UNITS              CFS
INFILTRATION            GREEN_AMPT
FLOW_ROUTING            KINWAVE
START_DATE              10/01/1968
START_TIME              00:00:00
REPORT_START_DATE       10/01/1968
REPORT_START_TIME       00:00:00
END_DATE                10/01/2008
END_TIME                06:00:00
SWEEP_START             01/01
SWEEP_END               12/31
DRY_DAYS                0
REPORT_STEP             00:10:00
WET_STEP                00:15:00
DRY_STEP                04:00:00
ROUTING_STEP            0:00:30
ALLOW_PONDING           NO
INERTIAL_DAMPING        PARTIAL
VARIABLE_STEP           0.75
LENGTHENING_STEP        0
MIN_SURFAREA            0
NORMAL_FLOW_LIMITED     BOTH
SKIP_STEADY_STATE       NO
FORCE_MAIN_EQUATION     H-W
LINK_OFFSETS            DEPTH
MIN_SLOPE               0

[EVAPORATION]
;;Type           Parameters
;;-----------    ----------
MONTHLY          0.03    0.0479  0.0719  0.102   0.132   0.156   0.168   0.15    0.114   0.0781  0.042   0.03
DRY_ONLY     NO

[RAINGAGES]
;;               Rain            Time    Snow    Data
;;Name           Type            Intrvl  Catch   Source
;;-------------- ---------       ------  ------  ----------
Newhall          INTENSITY       1:00    1.0     FILE            "NEWHALL_PATCHED_20091119.NCD"   46162           IN

[SUBCATCHMENTS]
;;                                                Total   Pcnt.           Pcnt.   Curb    Snow
;;Name           Raingage        Outlet          Area    Imperv  Width   Slope   Length  Pack
;;-------------- --------------- --------------- ------- ------- ------- ------- ------- ----------
Category1        Newhall         FacilityA       1       100     174.2   5       0
Category2        Newhall         FacilityB       1       100     174.2   5       0
Category3        Newhall         FacilityC       1       100     174.2   5       0

[SUBAREAS]
;;Subcatchment   N-Imperv        N-Perv          S-Imperv        S-Perv          PctZero         RouteTo         PctRouted
;;-------------- ----------      ----------      ----------      ----------      ----------      ----------      ----------
Category1        0.012           0.25            0.02            0.06            25              OUTLET
Category2        0.012           0.25            0.02            0.06            25              OUTLET
Category3        0.012           0.25            0.02            0.06            25              OUTLET

[INFILTRATION]
;;Subcatchment   Suction         HydCon          IMDmax
;;-------------- ----------      ----------      ----------
Category1        8               0.275           0.32
Category2        8               0.275           0.32
Category3        8               0.275           0.32

[JUNCTIONS]
;;               Invert          Max.            Init.           Surcharge       Ponded
;;Name           Elev.           Depth           Depth           Depth           Area
;;-------------- ----------      ----------      ----------      ----------      ----------
Cat2Weir         0               0               0               0               0
Cat3Weir         0               0               0               0               0
Cat1Weir         0               0               0               0               0

[OUTFALLS]
;;               Invert          Outfall         Stage/Table     Tide
;;Name           Elev.           Type            Time Series     Gate
```

A 1-acre unit area was modeled with 100% imperviousness and soil parameters consistent with Regional Facility model.

Catchment is 100% impervious; therefore, no sensitivity to soil parameters.

```
;;--------------  ----------      ----------      ----------------  ----
1               0               FREE                              NO
2               0               FREE                              NO
3               0               FREE                              NO

[STORAGE]
;;              Invert  Max.    Init.   Storage         Curve                   Ponded  Evap.
;;Name          Elev.   Depth   Depth   Curve           Params                  Area    Frac.   Infiltration Parameters
;;--------------  ------  ------  ------  ----------      ----------------------  ------  ------  ----------  ----------  ----------
FacilityA       100     18      0       TABULAR         FacilityA               0       0       .01     1.3     .01
FacilityB       100     18      0       TABULAR         FacilityB               0       0       .01     .15     .01
FacilityC       100     18      0       TABULAR         FacilityC               0       0

[CONDUITS]
;;              Inlet           Outlet                          Manning         Inlet           Outlet          Init.
        Max.
;;Name          Node            Node            Length          N               Offset          Offset          Flow
        Flow
;;--------------  ----------------  ----------------  ----------      ----------      ----------      ----------      ----------
        ----------
4               Cat2Weir        2               10              0.01            0               0               0
        0
5               Cat3Weir        3               10              0.01            0               0               0
        0
6               Cat1Weir        1               10              0.01            0               0               0
        0

[WEIRS]
;;              Inlet           Outlet          Weir            Crest           Disch.          Flap    End     End
;;Name          Node            Node            Type            Height          Coeff.          Gate    Con.    Coeff.
;;--------------  ----------------  ----------------  ------------    ----------      ----------      ----    ----------
1               FacilityA       Cat1Weir        TRANSVERSE      2               3.33            NO      0       0
2               FacilityB       Cat2Weir        TRANSVERSE      2.1             3.33            NO      0       0
3               FacilityC       Cat3Weir        TRANSVERSE      1.5             3.33            NO      0       0

[OUTLETS]
;;              Inlet           Outlet          Outflow         Outlet          Qcoeff/                         Flap
;;Name          Node            Node            Height          Type            QTable          Qexpon          Gate
;;--------------  ----------------  ----------------  ----------      ----------------  ----------------  ----------      ----
Cat2Underdrain  FacilityB       2               .6              TABULAR/HEAD    2Underdrain                     NO
Cat3Underdrain  FacilityC       3               0               TABULAR/HEAD    3Underdrain                     NO

[XSECTIONS]
;;Link          Shape           Geom1           Geom2           Geom3           Geom4           Barrels
;;--------------  ------------    ----------------  ----------      ----------      ----------      ----------
4               DUMMY           0               0               0               0               1
5               DUMMY           0               0               0               0               1
6               DUMMY           0               0               0               0               1
1               RECT_OPEN       16              10              0               0
2               RECT_OPEN       16              10              0               0
3               RECT_OPEN       16              10              0               0

[LOSSES]
;;Link          Inlet           Outlet          Average         Flap Gate
;;--------------  ----------      ----------      ----------      ----------

[CURVES]
;;Name          Type            X-Value         Y-Value
;;--------------  ----------      ----------      ----------
2Underdrain     Rating          0               0
2Underdrain                     .01             .2
2Underdrain                     18              .2

3Underdrain     Rating          0               0
3Underdrain                     .01             .27
3Underdrain                     18              .27

FacilityA       Storage         0               1781
FacilityA                       18              1781

FacilityB       Storage         0               1696
FacilityB                       18              1696

FacilityC       Storage         0               2374
FacilityC                       18              2374
```

Infiltration rate for Category 1 set to yield 21-hour drawdown.

Weir crest height establishes the max WQ depth of each BMP Category; depth below overflow consists of effective storage depth in ponding and gravel pores

Underdrain rating curves developed for 5 in/hr media filtration rate.
Category 2 example:
Q(cfs) = (1/12)*(1/3600)*(5)*surface area
= (1/12)*(1/3600)*5*1696
= 0.20 cfs

```
[REPORT]
INPUT           NO
CONTROLS        NO
SUBCATCHMENTS   ALL
NODES   ALL
LINKS   ALL

[TAGS]

[MAP]
DIMENSIONS      0.000   0.000   10000.000       10000.000
Units           None

[COORDINATES]
;;Node          X-Coord                 Y-Coord
;;--------------------------------------------------------
Cat2Weir        3738.602                2750.760
Cat3Weir        6762.918                2720.365
Cat1Weir        1124.620                2462.006
1               993.151                 2000.000
2               3773.973                1931.507
3               6787.671                1958.904
FacilityA       979.452                 3712.329
FacilityB       3760.274                3589.041
FacilityC       6732.877                3479.452

[VERTICES]
;;Link          X-Coord                 Y-Coord
;;--------------------------------------------------------
Cat2Underdrain  4620.061                2963.526
Cat3Underdrain  7887.538                3161.094

[Polygons]
;;Subcatchment  X-Coord                 Y-Coord
;;--------------------------------------------------------
Category1       308.219                 7410.959
Category2       3267.123                7410.959
Category3       6404.110                7342.466

[SYMBOLS]
;;Gage          X-Coord                 Y-Coord
;;--------------------------------------------------------
Newhall         2806.122                8992.347
```

Representative Parcel-based, Stand-alone BMPs

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------

***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Flow Routing Method ...... KINWAVE
Starting Date ............ OCT-01-1968 00:00:00
Ending Date .............. OCT-01-2008 06:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:10:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 04:00:00
Routing Time Step ........ 30.00 sec


WARNING 04: minimum elevation drop used for Conduit 4
WARNING 04: minimum elevation drop used for Conduit 5
WARNING 04: minimum elevation drop used for Conduit 6

*********************
Rainfall File Summary
*********************
Station    First        Last         Recording   Periods    Periods    Periods
ID         Date         Date         Frequency  w/Precip    Missing    Malfunc.
-------------------------------------------------------------------------------
46162      OCT-02-1968  DEC-25-2008     60 min      5324          0          0


*************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
*************************     ---------       -------
Total Precipitation ......       183.282       733.130
Evaporation Loss .........         8.056        32.224
Infiltration Loss ........         0.000         0.000
Surface Runoff ...........       177.318       709.270
Final Surface Storage ....         0.000         0.000
Continuity Error (%) .....        -1.141


*************************        Volume         Volume
Flow Routing Continuity        acre-feet      10^6 gal
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......       177.318        57.782
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........       113.375        36.945
Internal Outflow .........         0.000         0.000
Storage Losses ...........        63.939        20.836
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.002


*******************************
Highest Flow Instability Indexes
```

Three unit-area models were set up to demonstrate that when a BMP is sized per the SWQDv, at least 80% capture is achieved. The three models are as described in Attachment A.

```
*******************************
All links are stable.


************************
Routing Time Step Summary
************************
Minimum Time Step           :    30.00 sec
Average Time Step           :    30.00 sec
Maximum Time Step           :    30.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     1.00


**************************
Subcatchment Runoff Summary
**************************

-----------------------------------------------------------------------------------------------------
                         Total      Total      Total      Total      Total       Total     Peak  Runoff
                        Precip      Runon       Evap      Infil     Runoff      Runoff   Runoff   Coeff
Subcatchment                in         in         in         in         in    10^6 gal      CFS
-----------------------------------------------------------------------------------------------------
Category1               733.13       0.00      32.22       0.00     709.27       19.26     1.44   0.967
Category2               733.13       0.00      32.22       0.00     709.27       19.26     1.44   0.967
Category3               733.13       0.00      32.22       0.00     709.27       19.26     1.44   0.967


******************
Node Depth Summary
******************

-----------------------------------------------------------------
                           Average  Maximum  Maximum  Time of Max
                             Depth    Depth      HGL   Occurrence
Node                 Type     Feet     Feet     Feet  days hr:min
-----------------------------------------------------------------
Cat2Weir             JUNCTION 0.00     0.00     0.00     0  00:00
Cat3Weir             JUNCTION 0.00     0.00     0.00     0  00:00
Cat1Weir             JUNCTION 0.00     0.00     0.00     0  00:00
1                    OUTFALL  0.00     0.00     0.00     0  00:00
2                    OUTFALL  0.00     0.00     0.00     0  00:00
3                    OUTFALL  0.00     0.00     0.00     0  00:00
FacilityA            STORAGE  0.02     2.12   102.12  10721  19:19
FacilityB            STORAGE  0.03     2.21   102.21  10721  19:20
FacilityC            STORAGE  0.00     1.61   101.61  10721  20:00


******************
Node Inflow Summary
******************

-------------------------------------------------------------------------------
                           Maximum  Maximum                  Lateral       Total
                           Lateral    Total  Time of Max      Inflow      Inflow
                            Inflow   Inflow   Occurrence      Volume      Volume
Node                 Type      CFS      CFS  days hr:min    10^6 gal    10^6 gal
-------------------------------------------------------------------------------
Cat2Weir             JUNCTION 0.00     1.24  10721  19:20       0.000       0.732
Cat3Weir             JUNCTION 0.00     1.17  10721  20:00       0.000       0.240
Cat1Weir             JUNCTION 0.00     1.39  10721  19:19       0.000       3.860
1                    OUTFALL  0.00     1.39  10721  19:19       0.000       3.860
2                    OUTFALL  0.00     1.44  10721  19:20       0.000      13.823
3                    OUTFALL  0.00     1.44  10721  20:00       0.000      19.260
FacilityA            STORAGE  1.44     1.44  10721  19:30      19.259      19.259
FacilityB            STORAGE  1.44     1.44  10721  19:30      19.259      19.259
FacilityC            STORAGE  1.44     1.44  10721  19:30      19.259      19.259


**********************
Node Surcharge Summary
**********************

No nodes were surcharged.
```

Total Bypass

Total Inflow

Example calculation - Category 1
% Capture = 1-(Total Bypass/Total Inflow)
= 1-(3.86/19.259)
= 80.0%

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
FacilityA	0.042	0	80	3.776	12	10721 19:18	1.39
FacilityB	0.057	0	28	3.751	12	10721 19:19	1.44
FacilityC	0.003	0	0	3.816	9	10721 20:00	1.44

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
1	0.23	0.17	1.39	3.860
2	1.06	0.14	1.44	13.823
3	2.04	0.10	1.44	19.260
System	1.11	0.41	4.26	36.942

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
4	DUMMY	1.24	10721 19:20			
5	DUMMY	1.17	10721 20:00			
6	DUMMY	1.39	10721 19:19			
1	WEIR	1.39	10721 19:19			0.00
2	WEIR	1.24	10721 19:20			0.00
3	WEIR	1.17	10721 20:00			0.00
Cat2Underdrain	DUMMY	0.20	110 13:10			
Cat3Underdrain	DUMMY	0.27	110 13:15			

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
4	0.01	0.01	0.01	350646.01	0.01
5	0.01	0.01	0.01	350646.01	0.01
6	0.01	0.01	0.01	350646.01	0.01

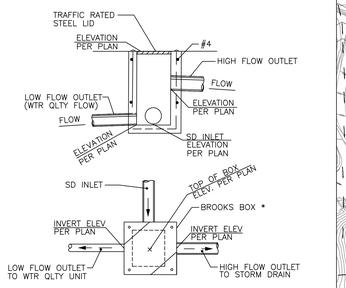
Analysis begun on: Tue Nov 12 09:29:37 2013
Analysis ended on: Tue Nov 12 09:31:12 2013
Total elapsed time: 00:01:35

ENTRADA-SOUTH

LID/WATER QUALITY MAINTENANCE MAP PLAN
PORTION OF TENTATIVE TRACT 53295

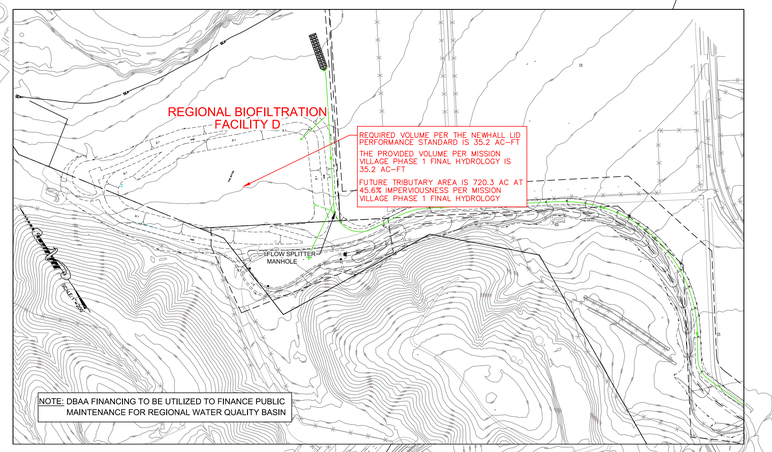
LEGEND

- BIO-RETENTION: – WHOLE AREA NEEDS TO BE SLOPE < 1%
  – MUST HAVE SUB-DRAIN
- PROPOSED STORM DRAIN
- DRAINAGE BASIN BOUNDARIES
- FLOW DIRECTION



* RECOMMENDED PROPRIETARY UNIT BY BROOKS PRODUCTS. KNOCKOUT SIZES, KNOCKOUT LOCATIONS, AND BOX DEPTHS ARE CUSTOMIZABLE PER CONTRACTORS NEEDS.

DIVERSION STRUCTURE DETAIL
NO SCALE



OFFSITE UNDEVELOPED-NORTH
AREA=55.7 AC

TO REGIONAL BIOFILTRATION FACILITY D

STORM DRAIN ACCESS ROAD

BASIN A$_{TOTAL}$=748.3 AC

BASIN A2
AREA=18.4 AC

THE SWQDv MUST BE PROVIDED FOR COMMERCIAL AND MULTI-FAMILY LOTS THAT DRAIN TO MISSION VILLAGE FACILITY D.

CALCULATED TOTAL REQUIRED LID VOLUME = 3.82 AC-FT FOR THE TOTAL AREA OF 39.6 ACRES OF MULTI-FAMILY AND COMMERCIAL THAT DRAINS TO MISSION VILLAGE FACILITY D.

PARCEL-BASED LID BMPS TO BE USED TO THE SATISFACTION OF LACDPW AND TO MEET THE REQUIREMENTS OF THE NEWHALL/ENTRADA SOUTH LID PERFORMANCE STANDARD. TO BE PRIVATELY MAINTAINED.

BASIN I
AREA=2.3 AC

BASIN J
AREA=2.7 AC

BASIN A1
AREA=94.4 AC

BASIN G
AREA=0.6 AC

BASIN E
AREA=29.2 AC
SWQDv =92,783 CF
REQUIRED BMP VOLUME = 92,790 ft³
(OR EQUIVALENT TREATMENT SEE NOTES 1,2, AND 3)

BASIN H
AREA=1.1 AC

BASIN D
AREA=10.8 AC
Qpw=1.91 cfs
V w=31,707.7 ft³

BASIN K
AREA=3.4 AC

BASIN L
AREA=3.7 AC

BASIN N
AREA=1.1 AC

BASIN F
AREA=9.1 AC
Qpw=1.89 cfs
V w=26,565.6 ft³

BASIN M
AREA=0.4 AC

BASIN O
AREA=0.4 AC

BASIN C
AREA=2.0 AC
Qpw=0.19 cfs
V w=3,605.6 ft³

BASIN Q
AREA=1.0 AC

BASIN B2
AREA=16.5 AC
Qpw=1.66 cfs
V w=30,094 ft³

INFILTRATION BASIN "B"
TREATS BASIN: B1, P, & W
13.75 ft. DEEP X 39,374 ft² w
147,654 ft³ TREATMENT VOLUME
Hs=12.9 AC
Qpw=15.00 cfs
Vw=147,601 ft³

BASIN S
AREA=1.3 AC

BASIN T
AREA=1.2 AC

BASIN U
AREA=1.1 AC

BASIN V
AREA=1.2 AC

BASIN BB
AREA=1.4 AC

BASIN AA
AREA=0.9 AC

BASIN R
AREA=2.1 AC

BASIN W
AREA=1.7 AC
Qpw=0.05 cfs
V w=914.9 ft³

BASIN Y
AREA=3.0 AC
SWQDv =9,583.2 CF
REQUIRED LID VOLUME = 9,590 ft³
(OR EQUIVALENT TREATMENT SEE NOTES 1,2, AND 3)

BASIN X
AREA=10.2 AC
SWQDv =32,234.4 CF
REQUIRED BMP VOLUME = 32,240 ft³
(OR EQUIVALENT TREATMENT SEE NOTES 1,2, AND 3)

BASIN P
AREA=16.2 AC
Qpw=1.50 cfs
V w=47,690.5 ft³

BASIN B1
AREA=45.0 AC
Qpw=4.63 cfs
V w=99,086 ft³

BASIN B3
AREA=7.2 AC
Qpw=0.95 cfs
V w=16,423 ft³

INFILTRATION BASIN "C"
TREATS BASIN: B2, B3, & Q
3.50 ft. DEEP X 15,515 ft²w
54,303 ft³ TREATMENT VOLUME
As=24.7 AC
Qpw=4.50 cfs
Vw=49,606 ft³

INFILTRATION BASIN "A"
TREATS BASIN: C, D, T, R, & S
3.00 ft. DEEP X 24,413 ft²w
73,238 ft³ TREATMENT VOLUME
As=25.3 AC
Qpw=4.66 cfs
Vw=70,155 ft³

BASIN DD
AREA=0.6 AC

BASIN CC
AREA=3.1 AC

BASIN EE
AREA=0.7 AC

BIO-FILTRATION SWQDv = 0.50 cfs Qpw=0.34 cfs V w =6,682.9 ft³
BIO-FILTRATION SWQDv = 0.59 cfs Qpw=0.44 cfs V w =8,816.2 ft³
BIO-FILTRATION SWQDv = 0.15 cfs Qpw=0.10 cfs V w =2,026.4 ft³
BIO-FILTRATION SWQDv = 0.20 cfs Qpw=0.16 cfs V w =3,145.6 ft³
BIO-FILTRATION SWQDv = 0.59 cfs Qpw=0.31 cfs V w =6,105.6 ft³
BIO-FILTRATION SWQDv = 0.72 cfs Qpw=0.47 cfs V w =9,400.6 ft³
BIO-FILTRATION SWQDv = 0.14 cfs Qpw=0.12 cfs V w =2,470.0 ft³
BIO-FILTRATION SWQDv = 0.13 cfs Qpw=0.09 cfs V w =1,725.1 ft³
BIO-FILTRATION SWQDv = 0.77 cfs Qpw=0.33 cfs V w =6,498.6 ft³
BIO-FILTRATION SWQDv = 0.15 cfs Qpw=0.10 cfs V w =1,963.9 ft³
BIO-FILTRATION SWQDv = 0.56 cfs Qpw=0.43 cfs V w =8,575.5 ft³
BIO-FILTRATION SWQDv = 0.18 cfs Qpw=0.12 cfs V w =2,371.6 ft³
BIO-FILTRATION SWQDv = 0.75 cfs Qpw=0.50 cfs V w =9,881.5 ft³
BIO-FILTRATION SWQDv = 0.34 cfs Qpw=0.23 cfs V w =4,468.7 ft³
BIO-FILTRATION SWQDv = 0.35 cfs Qpw=0.23 cfs V w =4,595.6 ft³
BIO-FILTRATION SWQDv = 0.23 cfs Qpw=0.15 cfs V w =3,021.1 ft³
BIO-FILTRATION SWQDv = 0.28 cfs Qpw=0.18 cfs V w =3,671.6 ft³
BIO-FILTRATION DESIGN Qpw=0.53 cfs Qpw=0.39 cfs V w =6,885.9 ft³
BIO-FILTRATION DESIGN Qpw=0.35 cfs Qpw=0.26 cfs V w =3,813.7 ft³

PARCEL-BASED LID BMPS TO BE USED TO THE SATISFACTION OF LACDPW AND TO MEET THE REQUIREMENTS OF THE NEWHALL/ENTRADA SOUTH LID PERFORMANCE STANDARD. TO BE PRIVATELY MAINTAINED.

BASIN A
6' LF @ 2.0%
Qmax = 0.96 cfs

BASIN B1
DIVERTER BOX
6' LF @ 2.0%
Qmax = 4.63 cfs

BASIN C
DIVERTER BOX
6' LF @ 2.0%
Qmax = 2.08 cfs

BASIN D
DIVERTER BOX
6' LF @ 2.0%
Qmax = 1.91 cfs

BASIN F
DIVERTER BOX
6' LF @ 2.0%
Qmax = 1.89 cfs

BASIN I
DIVERTER BOX
6' LF @ 2.0%
Qmax = 0.34 cfs

BASIN J
DIVERTER BOX
6' LF @ 2.0%
Qmax = 0.44 cfs

BASIN K
DIVERTER BOX
6' LF @ 2.0%
Qmax = 0.33 cfs

BASIN L
DIVERTER BOX
6' LF @ 2.0%
Qmax = 0.47 cfs

BASIN N
DIVERTER BOX
6' LF @ 2.0%
Qmax = 0.14 cfs

BASIN T
DIVERTER BOX
6' LF @ 2.0%
Qmax = 0.39 cfs

BASIN U
DIVERTER BOX
6' LF @ 2.0%
Qmax = 0.26 cfs

BASIN V
DIVERTER BOX
6' LF @ 2.0%
Qmax = 0.23 cfs

BASIN W
DIVERTER BOX
6' LF @ 2.0%
Qmax = 0.28 cfs

BASIN Y
DIVERTER BOX
6' LF @ 2.0%
Qmax = 0.84 cfs

BASIN X
DIVERTER BOX
6' LF @ 2.0%
Qmax = 0.84 cfs

PARCEL-BASED LID BMP TREATMENT NOTES

1. LID BMPS TO BE DESIGNED AND PLACED WITHIN THE BASIN WITH FINAL IMPROVEMENT PLANS TO THE SATISFACTION OF LACDPW AND TO MEET THE REQUIREMENTS OF THE NEWHALL/ENTRADA SOUTH LID PERFORMANCE STANDARD.
2. LID BMPS SHALL BE SELECTED TO INFILTRATE THE SWQDv TO THE MAXIMUM EXTENT PRACTICABLE BASED ON PARCEL-LEVEL FEASIBILITY SCREENING. IF INFILTRATION IS NOT FULLY FEASIBLE, THE BMPS SHALL BE SELECTED TO INFILTRATE TO THE EXTENT FEASIBLE AND BIOFILTER THE REMAINING VOLUME NOT RELIABLY RETAINED AT A RATE OF 1.5 TO 1.0. BMP SELECTION SHALL BE PER THE NEWHALL/ENTRADA SOUTH LID PERFORMANCE STANDARD.

T.M. 61105

VTTM 61105
MISSION VILLAGE
NOT A PART
(SAME OWNER)

CONDOMINIUM SITE

SINGLE FAMILY HOMES

MULTI-FAMILY SITE

SCHOOL SITE

PARK SITE

ACCESS ROAD

OFFSITE UNDEVELOPED WEST
AREA = 602.5 AC

OFFSITE -SOUTH
AREA=13.4 AC

OFFSITE -SOUTH
AREA=28.7 AC

COMMERCIAL

ENTERTAINMENT

INTERSTATE

SKYVIEW DRIVE

FREEWAY

NOTE: DBAA FINANCING TO BE UTILIZED TO FINANCE MAINTENANCE FOR BIO-FILTRATIONS DEVICES AND INFILTRATION BASINS

NOTE: SWQDv ARE PER NEWHALL/ENTRADA SOUTH LID PERFORMANCE STANDARD. Qpm AND Vm ARE CALCULATED AS THE GREATER OF EITHER THE COUNTY OF LOS ANGELES LID CALCULATOR OR THE NEWHALL/ENTRADA SOUTH PERFORMANCE STANDARD.

SCALE: 1"=200'
FEET 200 100 0 200 400
INCHES 1 1/2 0 1 2

ALLIANCE LAND PLANNING & ENGINEERING INC.
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CIVIL ENGINEERING • LAND PLANNING • HILLSIDE DESIGN • SURVEYING

PLANS PREPARED BY:
ALLIANCE LAND PLANNING & ENGINEERING INC.
2248 FARADAY AVE. CARLSBAD, CA. 92008
(760) 431-9896

PLANS PREPARED UNDER THE DIRECTION OF:
CRAIG M. WHITTEKER R.C.E. 51929 — 10/24/17 DATE

REGISTERED PROFESSIONAL ENGINEER — CRAIG M. WHITTEKER — No. 51929 — CIVIL — STATE OF CALIFORNIA

PLANS PREPARED FOR:
NEWHALL LAND
23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVE : ALEX HERRELL

HYDROLOGY STUDY APPROVED
CHECKED BY: RCE NO. 82680 DATE 11/16/2017
APPROVED BY: DATE 11/16/2017
COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

NO.	DATE	BY	APPR

1 | COUNTY OF LOS ANGELES | 1 SHEETS

LID/WATER QUALITY MAINTENANCE PLAN MAP FOR ENTRADA-SOUTH TENTATIVE TRACT 53295

PLAN PREPARATION DATE: 12/21/15

0930/HYDROLOGY/0930-WQMP.dwg

LID RUNOFF CALCULATIONS									
BASIN	AREA (AC)	PROPORTION IMPERVIOUS	SOIL TYPE	RAINFALL AMOUNT (in)	FLOW PATH LENGTH (ft)	FLOWPATH SLOPE	INTENSITY	24-HOUR RUNOFF VOLUME (cu. ft.)	FLOWRATE (CFS)
A	720.30	0.46	98	N/A	N/A	N/A	N/A	N/A	66.30
B1	45.00	0.57	98	1.1	2,930.00	0.04	0.19	99,086	4.63
B2	16.52	0.45	98	1.1	1,295.00	0.03	0.22	30,094	1.66
B3	7.15	0.60	98	1.1	1,400.00	0.03	0.20	16,423	0.95
C	2.02	0.05	98	1.1	260.00	0.20	0.34	1,182	0.18
D	10.82	0.80	98	1.1	1,700.00	0.04	0.24	31,708	1.91
E	29.20	0.91	98	1.1	2,000.00	0.03	0.23	95,956	4.85
F	9.06	0.80	98	1.1	840.00	0.02	0.28	26,566	1.89
G	0.63	0.89	98	1.1	780.00	0.05	0.32	2,026	0.10
H	1.10	0.78	98	1.1	710.00	0.05	0.31	3,146	0.16
I	2.31	0.79	98	1.1	1,410.00	0.01	0.23	6,683	0.34
J	2.68	0.91	98	1.1	1,330.00	0.01	0.24	8,816	0.44
K	2.37	0.69	98	1.1	1,420.00	0.04	0.24	6,106	0.31
L	3.71	0.67	98	1.1	1,380.00	0.04	0.24	9,401	0.47
M	4.01	0.39	98	1.1	1,240.00	0.01	0.20	6,499	0.33
N	1.11	0.57	98	1.1	360.00	0.03	0.34	2,470	0.12
O	3.33	0.69	98	1.1	900.00	0.12	0.25	8,575	0.43
P	16.23	0.80	98	1.1	760.00	0.02	0.29	47,601	3.50
Q	1.00	0.85	98	1.1	1,200.00	0.02	0.26	3,089	0.20
R	2.10	0.91	98	1.1	1,980.00	0.02	0.22	6,886	0.39
S	1.30	0.80	98	1.1	840.00	0.04	0.30	3,814	0.29
T	1.20	0.84	98	1.1	720.00	0.06	0.33	3,672	0.18
U	2.32	0.50	98	1.1	1,170.00	0.04	0.24	4,596	0.23
V	1.22	0.49	98	1.1	720.00	0.05	0.28	2,372	0.12
W	1.65	0.05	98	1.1	360.00	0.06	0.23	915	0.05
X	10.20	0.80	98	1.1	760.00	0.02	0.29	29,935	1.51
Y	2.95	0.88	98	1.1	700.00	0.02	0.30	9,352	0.47
Z	NOT USED								
AA	0.93	0.90	98	1.1	400.00	0.04	0.38	3,021	0.15
BB	1.36	0.91	98	1.1	1,170.00	0.04	0.28	4,469	0.23
CC	3.08	0.89	98	1.1	1,140.00	0.04	0.28	9,881	0.50
DD	0.61	0.89	98	1.1	380.00	0.01	0.36	1,964	0.10
EE	0.71	0.64	98	1.1	380.00	0.01	0.33	1,725	0.09

Entrada South – Evaluation of Conformance with Project LID Performance Standards

ETSU2022000056

Volume III

County of Los Angeles

Prepared for:

Newhall Land and Farming
25124 Springfield Court Suite 300
Valencia, CA 91355

Prepared by:

GEOSYNTEC CONSULTANTS

DATED:
Dec, 2024

HYDROLOGY STUDY APPROVED

REVIEWED BY: _____ DATE 03/12/2025

APPROVED BY: _____ DATE 03/12/2025

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

Entrada South Tentative Tract Map No. 53295

Evaluation of Conformance with Project LID Performance Standard

Geosyntec Consultants, December 2025

Limitations

The professional engineering seal affixed to this memorandum pertains specifically to the analysis presented in this memorandum. It does not pertain to the design of the storm drain system or the design of regional LID facilities. The analysis presented in this memorandum relies upon information provided by a third party. We have not independently confirmed the accuracy of this information.

Geosyntec consultants

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Memorandum

Date:	December 2024
To:	Alex Herrell, Five Point
	Jason Fukumitsu, Hunsaker and Associates
From:	Lisa Austin, Leon Li, Lindsey Spencer, and Aaron Poresky, Geosyntec Consultants
Subject:	Entrada South – Evaluation of Conformance with Project LID Performance Standard

1. INTRODUCTION

The Entrada South Project (Tentative Tract Map (TTM) No. 53295 (Project) includes low impact development (LID) best management practices (BMPs) as shown in the *Water Quality Exhibit for Entrada South* (Water Quality Exhibit, Hunsaker, 2024). The purpose of this memorandum is to verify that the LID BMPs proposed for the Project have been selected and sized in a manner consistent with the Project LID Performance Standard as defined by the Municipal Separate Storm Sewer System Discharges within the Coastal Watersheds of Los Angeles and Ventura Counties (MS4) Permit (Order No. R4-2021-0105) and the County of Los Angeles LID Standards Manual (LA County, 2014). The *Newhall Ranch Sub-Regional Stormwater Mitigation Plan* (NRSSMP) (Geosyntec, 2010) also serves as benchmarks for evaluating conformance.

The Project LID Performance Standard establishes three separate conformance metrics, including BMP selection, sizing of BMPs to provide adequate retention volume or equivalent biofiltration volume and sizing of BMPs to provide long-term storm water capture:

- **BMP selection.** LID BMPs have been selected in a manner consistent with the LID selection criteria (i.e., infiltration feasibility criteria) contained in the LID Performance Standard; and

- **LID design storm retention and biofiltration.** The proposed BMPs provide retention or equivalent biofiltration of the LID design storm consistent with the LID Performance Standard; and

- **BMP long-term capture.** The proposed BMPs provide capture and treatment of at least 80 percent of average annual runoff volume for each drainage area within the Project, consistent with the LID Performance Standard.

This memorandum demonstrates conformance with the first two conformance metrics (BMP selection and LID design storm retention and biofiltration). The Project's conformance to the 80 percent long-term capture metric is not documented in this memorandum as it is not a requirement of the MS4 Permit, or the LID Standards Manual and is not subject to review by LA County.

Because the proposed Project disturbs greater than one acre of area and adds more than 10,000 square feet of impervious surface area, this Project is categorized as a Designated Project according to LA County's LID Standards Manual (LA County, 2014). This memorandum also explains why the stormwater management requirements for designated projects are met or exceeded when the Project's LID Performance Standard is met.

Section 2 describes the applicable LID Performance Standards which are used to demonstrate Project conformance. Section 3 describes the Project's water quality project design features (PDFs). Section 4 demonstrates conformance of the water quality PDFs to each of the conformance metrics identified above.

A list of figures and attachments are appended to the end of this memorandum, including:

Figure 1: Entrada South Land Use
Figure 2: Entrada South Drainage Areas and Treatment Categories
Attachment A: Entrada South Low Impact Development Exhibit
Attachment B: Modeling Methodology in Support of LID Conformance Analysis
Attachment C: Model Files

2. LID PERFORMANCE STANDARD

The Project LID Performance Standard described in this section complies with the provisions of the 2021 MS4 Permit, and the LID Standards Manual. As benchmarks, the LID Performance Standard is also consistent with the Newhall Ranch Sub-Regional Stormwater Mitigation Plan (NRSSMP) (Geosyntec, 2010). The LID Performance Standard applies to all developed areas within the Project.

The Project LID Performance Standard is based primarily on Section F.1.d and F.4 of the 2021 MS4 Permit. The Newhall NRSSMP influence the manner in which BMP strategies are applied and result in more stringent criteria in some respects. These additional benchmarks do not reduce the requirement to comply with Section F.1.d and F.4 of the 2021 MS4 Permit. The LID Performance Standard would be implemented as follows:

- Based on an assessment of feasibility[1], one of four BMP strategies shall be applied as follows. BMPs may be applied at the scale of individual parcels or at the scale of regional facilities treating multiple parcels.

    a. If it is feasible to infiltrate all of the runoff produced from the 1.1 inch storm event[2] (LID Design Volume) from the developed area (i.e., soil infiltration rates are at least 0.3 inches per hour, and no other technical infeasibility concerns exist), on-site infiltration BMPs [Category 1] shall be used. Harvest and reuse are not applicable to projects in the NRSSMP because non-potable water demands will be met with recycled water and there is no additional demand for harvested stormwater based on an assessment of harvest and reuse feasibility conducted as part of the overall NRSSMP (Geosyntec, 2010).

    b. If it has been demonstrated in the Project WQTR and Drainage Concept Report that the BMP strategy of subsection (a), of this condition is infeasible, and if the project has low soil infiltration rates (i.e., the soil infiltration rate is less than 0.3 inches per hour), but no other technical infeasibility concerns exist, bioinfiltration BMPs [Category 2] shall be used. Bioinfiltration facilities are similar to bioretention facilities with an underdrain, but they include storage below the underdrain to maximize the volume infiltrated. These facilities shall retain a portion of the runoff from the 1.1 inch design storm, then biofilter 1.5 times the remaining runoff from the 1.1 inch design storm.

    c. If it has been demonstrated in the Project WQTR and Drainage Concept Report that the BMP strategies of subsections (a) and (b) above are infeasible, then biofiltration BMPs [Category 3] shall be used. These BMPs shall biofilter the runoff produced from the 1.5 times the 1.1 inch design storm.

    d. If it has been demonstrated in the Project WQTR and Drainage Concept Report that the BMP strategies of subsections (a), (b) and (c) above are infeasible and this demonstration is accepted by the Los Angeles Regional Water Quality Control Board Executive Officer, then flow-based treatment control BMPs shall be used to filter or treat runoff. These BMPs must be sized and designed to: (1) filter or treat the maximum flow rate of runoff produced from a rainfall intensity of 0.3 inch of rainfall for each hour of a storm event and (2) be certified for "Enhanced Treatment" under the

[1] Feasibility shall be assessed per Section F.4.b.ii.
[2] The 85th percentile, 24-hour storm depth is equal to 1.1 inches as determined from the Los Angeles County 85th Percentile 24-hr Rainfall Isohyetal Map (February 2004).

Washington State Department of Ecology's TAPE Program or an appropriate future BMP certification developed by the State of California.

- The BMPs shall also be demonstrated to provide treatment for at least 80 percent capture and treatment of the average annual runoff volume for the tributary area. This sizing criteria was established to be consistent with Newhall NRSSMP but not required by the MS4 Permit or the LID Standards Manual. While this standard continues to apply to the sizing of LID features, conformance to this requirement is not documented in this memorandum.

- Pretreatment must be provided for stormwater BMPs whose function may be adversely affected by sediment or other pollutants, as specified in Section 7.2 of the LID Manual (LA County, 2014).

- Source control measures, including structural and non-structural (good housekeeping, employee training etc.) measures, applicable to designated new development project should be implemented to the maximum extent practicable, as specified in Section 5.2 of the LID Manual (LA County, 2014).

The same standards shall apply to parcel-based, right-of-way, regional LID facilities. Demonstration of conformance to these standards shall be based on the overall system of BMPs proposed for the Project. This may include combinations of BMPs at multiple scales, collectively demonstrating conformance to this standard.

3. PROPOSED WATER QUALITY PROJECT DESIGN FEATURES

The sections below describe the LID BMPs that are proposed as part of the Project and demonstrate that these BMPs conform to the BMP selection and LID design storm retention and biofiltration requirement in the Project LID Performance Standard. These BMPs are also illustrated in Attachment A (LID Exhibit) of this memorandum.

3.1 Regional LID Facilities

There are two regional LID facilities proposed within the Project. Regional Facility B is proposed as an infiltration facility (Category 1), and Regional Facility C is proposed as a bioinfiltration facility (Category 2). Selection of the type of facilities is based on feasibility screening results (Engeo, 2021). These facilities are designed to treat runoff from much of their respective watersheds, with the exception of open space bypassing treatment (which does not require treatment). The detailed designs of regional LID facilities will be developed at a later time and will be developed to be consistent with design and maintenance standards acceptable to LA County.

Runoff from subwatersheds in the western portion of the Project are proposed to be directed to Mission Village Regional Facility D (See Figure 2), which is sized for its ultimate conditions in which it will accept runoff from Mission Village, Entrada South, and portions of the existing Westridge community. Mission Village Facility D was described and analyzed as part of the Mission Village Phase I Final Hydrology Study and associated conformance memorandum (Geosyntec, 2019). It is reanalyzed in this memorandum to account for the current proposed land uses and drainage boundaries in Entrada South to demonstrate that Basin D continues to meet LID Performance Standards. Regional facilities will be maintained by LA County and funded through a Community Facilities District (CFD).

The regional facilities proposed to provide stormwater treatment for the Project are similar to bioretention LIDs and biofiltration LIDs with underdrain as described in the LID Standards Manual (LA County, 2014) with the exception that maximum ponding depths are somewhat deeper, drainage areas are somewhat larger, and resulting footprints are larger. These basins will incorporate several design enhancements to maintain performance and enable O&M for facilities constructed at a larger scale, including:

- Pre-treatment systems will remove sediment. Additionally, open space areas will be bypassed in separate conveyance systems. Both approaches reduce sediment loading to the media bed and support deeper ponding depths without elevated risk of clogging.

- Enhanced energy dissipation and flow distribution will be provided reduce the risk of surface erosion and spread water through the facility, offsetting the effect of larger basin footprints.

- Outlet structures will have hydraulic controls that limit the maximum rate of flow through the media and underdrains, helping to ensure that water spreads over the full footprint of the facility and does not short-circuit.

- Media will have a higher permeability than standard media (combined with outlet control to reduce the actual filtration rate), improving the resistance to clogging.

- Facilities will have an enhanced gravel storage layer below underdrain discharge elevation to retain pollutants and support incidental infiltration, where feasible.

- O&M access will be provided via access ramps and other features consistent with approaches used for extended detention and flow control basins.

- O&M protocols will be detailed for these facilities as part of an O&M manual; these protocols will account for the larger footprint and ponding depth.

- The facilities will continue to meet LID Standards Manual criteria for media flowrate and drawdown time. Treatment performance and plant health should not be affected by the scale of the facilities.

- During most storms, ponding will not exceed 18 inches of depth; larger storms may exceed this depth for very short periods (1-3 hours).

- Access to facilities will be restricted to avoid safety hazards associated with ponding depths that temporarily exceed 18 inches.

Based on these design adaptations, these regional facilities are functionally equivalent to bioretention LIDs and biofiltration LIDs with underdrain as described in the LID Standards Manual (LA County, 2014) and fully conform to the applicable LID design requirement outlined in the LID Standards Manual (BMP selection, sizing, drawdown time, media filtration rate and pretreatment) as demonstrated in Section 4 of this memorandum.

3.2 Right-of-Way LID BMPs

For two segments of connecting streets ("A Street" and "B Street") to Magic Mountain Parkway (MMP), stand-alone right-of-way (ROW) LID BMPs within the public roadways will be used to meet the full requirements of the LID Performance Standard. Two dedicated areas next to the street segments along MMP as shown on Attachment A are proposed as biofiltration basins to provide treatment for the street runoff. The design of the basins include a sedimentation forebay as pretreatment device. The sediment forebays capture sediment, trash, and debris and increase the longevity of the downstream BMPs. Inclusion of pretreatment for BMPs is consistent with the Standards Manual (LA County, 2014). Preliminary design of the biofiltration basins are provided in Attachment A and the detailed designs of the ROW LID facilities will be developed at a later time and will be developed to be consistent with design and maintenance standards acceptable to LA County.

These ROW LID features will be maintained by LA County funded via Community Facilities District (CFD)

3.3 Parcel-based LID BMPs

Parcel-based LID BMPs will be implemented as part of final parcel improvements for the commercial parcels located in Planning Areas (PAs) 1, 2, 3, and 14 in the Project area. These parcels are categorized as "Parcel-Based LID Treatment" in Figure 2.

Parcel-based LID BMPs will be implemented as part of final parcel improvements. Parcel-based LID BMPs applicable for these parcels include infiltration (Category 1), bioinfiltration (Category

2), and biofiltration (Category 3), which will ultimately be selected based on a parcel-scale assessment of infiltration feasibility, as described in the LID Performance Standard (Section 2.1). Factors considered in selection and placement of parcel-based LID BMPs as part of final parcel improvement plans shall include soil infiltration rates, geotechnical risks, setbacks from structures, slopes, and utility alignments, depth to groundwater, programmed density/uses of the parcel, and other factors deemed relevant as part of LA County review of final parcel improvement plans. Areas that are suitable for infiltration shall be considered as part of site design and BMP placement within parcels.

Infiltration BMPs include bioretention without an underdrain (RET-1[3]), infiltration basins (RET-2[3]) or trenches (RET-3[3]), permeable pavement (RET-5[3]), or an equivalent infiltration BMP. Bioinfiltration and biofiltration BMPs are associated with BMP type BIO-1 under the LID Standards Manual. The design and maintenance of these parcel-based BMPs shall be consistent with the specifications detailed on the LID Standards Manual for the respective BMP type proposed for the Project (LA County, 2014).

Parcel-based BMPs will be designed to: 1) capture the LID design volume (as calculated per the LA County HydroCalc program for the 1.1-inch storm event), (2) infiltrate to the maximum extent feasible based on parcel-specific infiltration feasibility, and (3) biofilter 1.5 times the remaining runoff that cannot be feasibly infiltrated from the 1.1-inch design storm. By meeting these criteria, these facilities meet the BMP selection and LID design storm retention and biofiltration requirements of the LID Performance Standard. Alternative sizing and design configurations that meet the LID Performance Standard may be developed. In either case, conformance shall be documented as part of final parcel improvement plans.

Appropriate pretreatment, such as forebays, vegetated swales and filter strips will be designed as part of final parcel improvements and installed upstream of the parcel-based BMPs. These pretreatment devices captures sediment, trash, and debris and increases the longevity of the downstream BMPs. Inclusion of pretreatment for BMPs is consistent with the LID Standards Manual (LA County, 2014)

Parcel-based LIDs will be maintained by private parcel owner via property owner association or home owner association.

3.4 Source Control BMPs

According to Section 5.2 of the LID Manual, source control measures applicable to designated project (new development) should be implemented for the Project (LA County, 2014). Table 1

[3] Equivalent BMP Type on the LID Standards Manual (LA County, 2014)

summarizes the source control requirements of the LID Manual for designated project (new development) and the corresponding proposed source control BMPs that will be incorporated into the Project.

Table 1 Source Control Requirements and Corresponding Project Best Management Practices

Source Control Requirement	Criteria/ Description	Corresponding Project BMPs
S-1: Storm Drain Message and Signage	• All storm drain inlets and catch basins within the Project area must be marked with prohibitive language and/or graphical icons to discourage illegal dumping. • Signs and prohibitive language and/or graphical icons, which prohibit illegal dumping, must be posted at public access points along channels and creeks within the Project area. • Legibility of stencils and signs must be maintained.	• All storm drain inlets and water quality inlets will be stenciled or labeled. • Signs will be posted in areas where dumping could occur. • The Los Angeles County Department of Public Works and/or Homeowners Associations will maintain stencils and signs.
S-2: Outdoor Material Storage Areas	• Where proposed Project plans include outdoor areas for storage of materials that may contribute pollutants to the storm water conveyance system measures to mitigate impacts must be included.	• Pesticides, fertilizers, paints, and other high-risk materials used for maintenance of common areas, parks, commercial areas, and multifamily residential common areas will be kept in enclosed storage areas.
S-3: Outdoor Trash Storage and Waste Handling Areas	All trash containers must meet the following structural or treatment control BMP requirements: • Trash container areas must have drainage from adjoining roofs and pavement diverter around the areas. • Trash container areas must be screened or walled to prevent offsite transport of trash.	• All outdoor trash storage areas will be covered and isolated from stormwater runoff.

Source Control Requirement	Criteria/ Description	Corresponding Project BMPs
S.4: Outdoor Loading/ Unloading Dock Areas	• Cover loading dock areas or design drainage to minimize run-on and runoff of stormwater • Direct connections to storm drains from depressed loading docks (truck wells) are prohibited	• Loading dock areas will be covered or designed to preclude run-on and runoff. • Direct connections to storm drains from depressed loading docks (truck wells) will be prohibited. • Drains or direct drainage from hydraulically isolated loading dock areas will be connected to an approved sediment/oil/water separator system connected a discharge location as determined by LA County. A manual emergency spill diversion valve upstream of will be provided upstream of the separator.
S-5: Outdoor Vehicle/ Equipment Repair/ Maintenance Areas	• Repair/maintenance bays must be indoors or designed in such a way that does not allow stormwater run-on or contact with stormwater runoff. • Design a repair/maintenance bay drainage system to capture all wash water, leaks, and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/ maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.	• Repair/maintenance bays will comply with design requirements.
S6: Outdoor Vehicle/ Equipment/ Accessory Wash Areas	• Self-contained and /or covered, equipped with a clarifier, or other pretreatment facility, and properly connected to a sanitary sewer.	• Areas for washing/steam cleaning of vehicles will be self-contained or covered with a roof or overhang; will be equipped with a wash racks and with the prior approval of the sanitary sewer agency; will be equipped with a clarifier or other pretreatment facility; and will be properly connected to a sanitary sewer.

Source Control Requirement	Criteria/ Description	Corresponding Project BMPs
S7: Fuel and Maintenance Area	• The fuel dispensing area must be covered with an overhanging roof structure or canopy. The cover's minimum dimensions must be greater than the area within the grade break. The cover must not drain onto the fuel dispensing area and the downspouts must be routed to prevent drainage across the fueling area. • The fuel dispensing area must be paved with Portland cement concrete (or equivalent smooth impervious surface). The use of asphalt concrete shall be prohibited. • The fuel dispensing areas must have a 2% to 4% slope to prevent ponding and must be separated from the rest of the site by a grade break that prevents run-on of urban runoff. • At a minimum, the concrete fuel dispensing area must extend 6.5 feet from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.	• Fueling areas will comply with design requirements.
S-8: Landscape Irrigation Practices	• Do not allow irrigation runoff from the landscaped area to drain directly to storm drain system. • Minimize use of fertilizer, pesticides, and herbicides on landscaped areas. • Plan sites with sufficient landscaped area and dispersal capacity (e.g., ability to receive irrigation water without generating runoff). • Consult a landscape professional regarding appropriate plants, fertilizer, mulching applications, and irrigation requirements (if any) to ensure healthy vegetation growth.	• Native and/or non-native/non-invasive, climate appropriate vegetation will be utilized within the development. • Landscape watering in common areas, commercial areas, multiple family residential areas, and in parks will use efficient irrigation technology utilizing evapotranspiration sensors to minimize excess watering. • The use of the parcel-based LID BMPs and regional infiltration/ biofiltration facilities will prevent the discharge of dry weather urban runoff from the Modified Project. • Landscape and irrigation system design will comply with the design requirements or approved alternatives. • An Integrated Pest Management (IPM) Program will be implemented for common area landscaping in commercial areas and multi-family residential areas.

Source Control Requirement	Criteria/ Description	Corresponding Project BMPs
S-9: Building Materials Selection	• Wood that is pressure treated with arsenate, copper, and chromium compounds may be replaced with alternative building materials. • Minimize or avoid the use of copper and galvanized metals on buildings and in fencing. • Reduce the use of pesticides around foundations through the use of alternative barriers where feasible.	• Pressure treated wood that is treated with arsenate, copper, or chromium compounds may be replaced with alternative building materials. • The use of copper and galvanized metals on buildings and in fencing will be minimized or avoided. • The use of alternative barriers for termites will be considered.
S-10: Animal Care and Handling Facilities	• Site animal care and handling facilities away from the storm drain system and receiving waters. • Manage grazing to prevent impacts to receiving waters. • Manage horse access and horse waste to prevent pollutants from entering the storm drain system or receiving waters.	• The Modified Project does not include animal care facilities, grazing, or horse access.
S-11: Outdoor Horticultural Areas	• Do not allow wash water from horticulture areas to drain directly to the storm drain system or receiving waters.	• Wash water from horticultural areas will not drain directly to the storm drain system or to receiving waters.

4. CONFORMANCE TO APPLICABLE LID PERFORMANCE STANDARD

This section summarizes the conformance of the proposed LID design features to each element of the Project LID Performance Standard that is subject to review by LA County.

4.1 BMP Selection

The Project LID Performance Standard requires that LID BMPs be selected based on an analysis of infiltration feasibility. A preliminary infiltration feasibility report for the Project (ENGEO, 2021) [4]was approved by LA County Geotechnical and Materials Engineering Division in October 2022 and used as basis of BMP selection. The following paragraphs describe how the Project conforms to these requirements.

[4] Plan Case Number ESTU2022000058

4.1.1 Regional LID Facilities

The Project LID Performance Standard requires that LID BMPs be selected based on an analysis of infiltration feasibility.

> **Regional Facility B.** Infiltration feasibility screening (Engeo, 2021) was based on results from site-specific infiltration feasibility investigations of Regional Facility B. Regional Facility B is underlain by young alluvial deposits, which has an average corrected infiltration rate of 3 inches per hour. Furthermore, groundwater was not encountered during the geotechnical investigations. Based on these findings, Facility B is proposed as an infiltration facility (Category 1), which is consistent with the preferred hierarchy for BMP selection.
>
> **Regional Facility C.** Based on feasibility screening (Engeo, 2021), Regional Facility C is underlain by young alluvial soil or Saugus Formation bedrock. While the infiltration rate of young alluvial deposits supports the selection of an infiltration facility (Category 1), it is unlikely that the underlying Saugus Formation will yield corrected infiltration rates equal or greater than 0.3 inches per hour. As the Saugus Formation is the limiting layer, this condition supports the selection of a bioinfiltration facility (Category 2). Furthermore, groundwater was not encountered during site investigations in this area, which also meets the criteria of either a Category 1 or a Category 2 facility. Based on these findings, Facility C is proposed as a bioinfiltration facility (Category 2).
>
> **Regional Facility D (Mission Village).** The basis for selection of Regional Facility D is provided in the Mission Village Phase 1, 2, 5 & 6 Water Quality Plan (Regional Facilities B, C and D) – Evaluation of Conformance with Newhall LID Performance Standard (Geosyntec Consultants, 2019). This is a biofiltration facility (Category 3).

Each of the regional facilities has been selected based on an analysis of infiltration feasibility. Therefore, this aspect of the performance standard is met.

4.1.2 Right-of-Way LID BMPs

For the two segments of connecting streets ("A Street" and "B Street") to Magic Mountain Parkway (Figure 2), infiltration feasibility screening (Engeo, 2021) indicated that the ROW areas consists of certified engineered fill and Category 2 facilities were recommended due to the highly variable infiltration rates of the engineered fill material. However, due to the street segments' proximity to the graded slopes next to the existing Magic Mountain Parkway, Category 1 and 2 BMPs are not recommended. Therefore, biofiltration basins (Category 3) were proposed to treat the runoff from these two street segments, which is consistent with the LID performance standard.

4.1.3 Parcel-based LID BMPs

For areas identified as treated by parcel-based and ROW BMPs (Figure 2), LID BMPs shall be selected per the feasibility hierarchy described in Section 2.1 as part of final parcel improvement plans to the satisfaction of LA County. Conformance shall be demonstrated as part of final parcel improvement plans. Additionally, the final selection of BMP categories will be informed by a parcel-scale assessment of infiltration feasibility to meet the BMP selection hierarchy of the LID Performance Standard. Therefore, the proposed application of parcel-based and ROW LID BMPs conforms to the BMP selection requirements of the LID Performance Standard.

4.2 BMP Sizing to Achieve Retention or Equivalent Biofiltration of the 85th Percentile, 24-hour Storm Event

4.2.1 Regional Facilities

The LID Performance Standard requires that project design features be selected and sized to retain the volume of stormwater runoff produced from a 1.1-inch storm event (i.e., the LID Design Volume) for the Project site. Where it has been demonstrated that 100 percent of the LID Design Volume cannot be feasibly infiltrated, biofiltration shall be provided for 1.5 times the portion of the LID Design Volume that is not retained. For the purpose of demonstrating conformance, this standard has been applied for each regional LID facility.

To demonstrate that each regional facility meets this standard, the LID design storm runoff time series were calculated using HydroCalc for tributary area to each regional facility and subsequently used as input inflow times series to storage units representing the detailed hydraulic characteristics of the proposed regional facilities (stage-storage, infiltration, filtration and overflow) in an EPA SWMM model. The SWMM model inputs and outputs are provided in Attachment C.

Table 2: Catchment Parameters and Provided Size of Regional Facilities

BMP ID	Tributary Area (Acres)[1,2]	Flow Path Length (feet)	Flow Path Slope (vft/hft)	Soil Type	Impervious Percentage of Catchment[1]	Total Facility Volume Provided (ac-ft)[3]
Facility B	70.9	250	0.05	98	62%	4.53
Facility C	16.1			98	68%	0.79
Facility D[4,5]	329.4			98	62%	21.6

[1] Imperviousness based on area-weighted average of land use-specific imperviousness values from LA County Hydrology Manual; calculated for purposes of water quality analysis (Attachment B).
[2] HydroCalc program has a default drainage area size limit of 40 acres. However, in this case, the use of larger drainage areas is conservative. Drainage area size does not influence runoff volume; it only has an effect on peak flow. For this purpose, we are primarily using HydroCalc to size volumetric BMPs, so the timing of peaks is unimportant. Secondarily, we are using HydroCalc to determine the required water quality diversion flowrate. Having several smaller drainage areas will tend to reduce peak flows compared to one larger drainage area as there will be variability in time of concentration and offsetting of the peaks. Therefore, for the purpose of sizing diversion structures, a single larger drainage area with a short path length and steep slope produces a conservatively high required diversion flowrate compared to if smaller drainage areas were modeled.
[3] Total facility volume includes pore volume in gravel and media, as well as ponded volume above the media surface.
[4] Regional Facility D analysis includes the tributary areas draining to the facility in the final built-out condition, detailed in Table 3.
[5] Facility D was modeled as designed per the Mission Village project.

Regional Facility D was modeled based on the ultimate proposed condition of its drainage area, as described in the memorandum: "Mission Village Phase 1, 2, 5 & 6 Water Quality Plan (Regional Facilities B, C and D) – Evaluation of Conformance with Newhall LID Performance Standard" (Geosyntec Consultants, 2019). The drainage area from Entrada South and the imperviousness in Mission Village tributary area changed somewhat since the Mission Village memorandum; the current proposed Entrada South drainage area was modeled to demonstrate that Regional Facility D is adequately sized. The currently proposed Entrada South drainage area to Facility D is documented in this memorandum and the remaining tributary area to Facility D are summarized in Table 3 summarizes the volume within Regional Facility D that is allocated to each project that it is designed to treat.

Table 3: Regional Facility D – Volume Allocations by Project Comparison

Model Scenario	Project Location	Tributary Area (Acres)	Impervious Fraction of Catchment (%)	Facility Volume Allocated to Tributary Project (ac-ft)[1]
Mission Village Phase 1, 2, 5 & 6 Conformance Memorandum	Mission Village	115.0	66.6	8.8
	Entrada South	121.5	52.3	7.3
	Existing Westridge	95.6	49.1	5.4
	Total	**332.1**	**56.3**	**21.6**
Entrada South Conformance Memorandum	Mission Village	115.0	68.6	8.4
	Entrada South	118.8	64.7	8.2
	Existing Westridge	95.6	49.1	5.0
	Total	**329.4**	**61.5**	**21.6**

[1]Volume allocated to each project were calculated by multiplying the total volume of the Facility by the ratio between impervious areas in each project and the total impervious areas of the entire tributary areas to Regional Facility D.

The regional facilities will be off-line. Water will be diverted to these basins from diversion structures and/or flow-splitting inlets. The required minimum diversion flowrates to each facility were determined using HydroCalc for the 1.1-inch storm event. Basins C and D include biofiltration; therefore, the diversion was sized for 1.5 times the peak of the 1.1-inch storm. Basin B is an infiltration facility; therefore, the diversion rate was based on the peak flow of the 1.1-inch storm without the use of a multiplier. Table 3 shows the required diversion flowrates and the detailed HydroCalc inputs and outputs are provided in Appendix B.

Table 4: Required Diversion Flowrates to Regional Facilities

BMP ID	Required Minimum Diversion Structure Flowrate, cfs[2]
Facility B	20.3
Facility C	7.7
Entrada South to Facility D[1]	40.3

[1] This diversion flowrate applies only to the area from Entrada South draining to Mission Village Basin D. Water will be split between water quality flows and high flows before it enters the Mission Village drainage system.
[2] Diversion structures will be included in Final Hydrology.

Hydrographs were generated using the LA County HydroCalc program for the subwatersheds tributary to each regional LID facility. Because Facilities C and D include biofiltration, the

resulting hydrographs were multiplied by 1.5, consistent with the LID Performance Standard, to produce an "upsized" hydrograph appropriate for biofiltration sizing. The model was run for the duration of the LID design storm event. Table 5 summarizes the portion of the event that was treated and the maximum volume and ponding depth of the regional LID facilities utilized during this event. Additional detail supporting these calculations is provided in Attachment B.

Table 5: Results of LID Design Storm Routing

BMP ID	Runoff Volume for 1.1-inch, LID Storm Event (ac-ft)	Storm Hydrograph Upsizing Multiplier for SWMM Routing[1]	Percent of Upsized Storm Treated by Regional LID Facility[2]	Maximum Percent of WQ Volume Utilized during LID Storm	Maximum Ponding Depth during LID Storm (ft)
Facility B	3.9	1.0	100%	21%	1.5
Facility C	0.9	1.5	100%	69%	1.9
Facility D[3]	17.8	1.5	100%	49%	1.8

[1] Upsizing of LID storm hydrographs only applies to facilities utilizing biofiltration (C and D). Facility B hydrographs are not upsized because these facilities do not include biofiltration.
[2] Percent of upsized storm captured and retained or biofiltered in Regional LID Facility.
[3] Includes all areas draining to Regional Facility D (Source: Geosyntec, 2019).

As demonstrated in Table 5, the proposed regional LID facilities fully capture the applicable upsized LID design storm event and comply with the requirement to retain or provide equivalent biofiltration for the 85th percentile, 24-hour storm event. These regional facilities are also sized to treat 80 percent of average annual runoff volume (not demonstrated in this memorandum), which is why they have excess capacity to treat the runoff from the 85th percentile storm event.

4.2.2 Right-of-Way LID BMPs

The LID Performance Standard requires that ROW BMPs to be selected and sized to retain the volume of stormwater runoff produced from a 1.1-inch storm event (i.e., the LID Design Volume) for the Project site. Where it has been demonstrated that 100 percent of the LID Design Volume cannot be feasibly infiltrated, biofiltration shall be provided for 1.5 times the portion of the LID Design Volume that is not retained.

Table 6 summarizes the inputs and outputs in HydroCalc. Model files are provided in Attachment C.

Table 6 HydroCalc Inputs and Outputs for Drainage Area Proposed to be Treated by ROW LID

	"A Street"	"B Street"
HydroCalc Inputs		
Area (acres)	0.74	1.7
Length (feet)	250	250
Slope	0.05	0.05
Depth (inches)	1.1	1.1
Imperviousness[1]	0.91	0.80
Soil Type	98	98
Storm Frequency	85th percentile storm	85th percentile storm
HydroCalc Outputs		
Clear Peak Flow Rate (cfs)	0.29	0.58
24-hr Clear Runoff Volume (cubic feet)	2,436	4,935
Upsized Runoff Volume (150%) for Biofiltration Sizing (cubic feet)	3,654	7,402

[1]Imperviousness of the drainage area is calculated by area-weighted average imperviousness between the multi-use trail and riverbank access road area (50% impervious) and the adjacent developed open space (1% impervious).

As shown in Attachment A, the proposed biofiltration basin for segment of A Street is 75 feet in length and 20 feet in width; the proposed biofiltration basin for segment of B Street is 100 feet in length and 30 feet in width. Both basins are proposed with 12 inches of ponding depth, 24 inches of media layer, a gravel layer underneath and perforated underdrains in the gravel layer to discharge the biofiltered runoff. This vertical profile provides an effective storage depth of 18 inches is provided, assuming 25 percent porosity for the media layer (Virginia Department of Conservation and Recreation, 2011). Therefore, a total of 2,250 cubic feet and 4,500 cubic feet of static volumes are provided for the A Street basin and B Street basin respectively.

Table 7 summarizes the dimensions of the biofiltration LIDs for both streets based on the proposed design and how the LIDs meet the applicable sizing standards.

Table 7 Sizing Conformance Demonstration for Right-of-Way LID BMP

Drainage Area	Required Biofiltration Volume (150% of the LID Design Volume) (cubic feet)	Provided Static Biofiltra-tion Volume (cubic feet)	Provided Biofiltra-tion Footprint (square feet)	Additional Volume Biofiltered During Storm Duration (cubic feet)[1]	Total Provided Biofiltration Volume (Static+ Routed Volume, cubic feet)	Drawdown Time to Media Surface hours[2]
A St ROW LID	3,654	2,250	1,500	3,750	6,000	2.4
B St ROW LID	7,402	4,500	3,000	7,500	12,000	2.4

1 – Based on a conservative design storm routing time of 6 hours (reduced from HydroCalc duration of 24-hours) and media flowrate of 5 inches per hour over the footprint of the BMP.
2- Based on 12-inch ponding depth and 5 in/hr media flowrate.

As shown in Table 7, the total provided biofiltered volume for the ROW LIDs proposed for the two street segments is substantially more than 150% of runoff volume from the 1.1-inch 85th percentile storm while drawing down completely within 3 hours. Incidental infiltration is not considered in this analysis as a conservative assumption. Therefore, the proposed biofiltration ROW LID fully complies with the requirement to retain or provide biofiltration 150% of runoff from the 85th percentile, 24-hour storm event. These ROW LID facilities are also sized to treat 80 percent of average annual runoff volume (not demonstrated in this memorandum), which is why they have excess capacity to treat the runoff from the 85th percentile storm event.

4.2.3 Parcel-based BMPs

The LID Performance Standard requires that parcel-based to be sized to retain the volume of stormwater runoff produced from a 1.1-inch storm event (i.e., the LID Design Volume) for the Project site. Where it has been demonstrated that 100 percent of the LID Design Volume cannot be feasibly infiltrated, biofiltration shall be provided for 1.5 times the portion of the LID Design Volume that is not retained.

Parcel-based LIDs will be sized with a static volume equivalent to the 1.1-inch LID Design Volume for each parcel area. An underdrain will be used for Category 2 and 3. By following this sizing approach, we demonstrate that the sizing standard above is met regardless of the infiltration feasibility category that is determined.

HydroCalc was used to generate the 1.1” LID Design Volume assuming flow path width of 250 feet and catchment slope of 5%. The imperviousness of each parcel is based on land use and the dominant LA County soil type (020 or 098) underlays each planning area treated by parcel-based

LID is used as soil type input. The HydroCalc inputs and outputs for each parcel are summarized in Table 8. Model files are provided in Attachment C.

Table 8 HydroCalc Inputs and Outputs for Parcels Treated by Parcel-based LID BMPs

Planning Area	Area (ac)	Land Use	Imperv.	Soil Type	Length (ft.)	Slope	24-hr Clear Runoff Volume (cu. ft.)	Required Biofiltration Volume (150% of the LID Design Volume) (cubic feet)
PA 1	20.8	Commercial	0.91	020	250	0.05	68,337	102,506
PA 2&3	25.6	Commercial	0.91	098			83,960	125940
PA 14	2.7	Commercial	0.91	098			8,829	13,244

If parcel-scale infiltration feasibility study shows that Category 1 (infiltration) BMP is feasible for any parcel proposed to be treated by parcel-based LID BMPs, infiltration BMPs already sized with the static volume equivalent to the LID Design Volume will be able to retain 100% of the LID Design Volume.

If parcel-scale infiltration feasibility study shows that Category 2 (bioinfiltration) or Category 3 (biofiltration) BMP is feasible for any parcel, LID BMPs sized with the static volume equivalent to the LID Design Volume still include an underdrain and media bed with adequate capacity to biofilter 150% of the LID Design Volume with reasonable BMP design assumptions including:

- 12 inches of ponding depth, 24 inches of media layer and a gravel layer underneath with perforated, resulting in 18 inches of effective depth with an assumed media porosity of 0.25 (neglecting the gravel storage);
- 5 inches per hour media filtration rate (the lower limit of the range of filtration rate recommended by the LID Standards Manual);
- 6 hours of routing period during the 24-hour design storm duration (conservative assumption);
- Incidental infiltration into the underlaying soils for Category 2 BMP is not considered (conservative assumption);

Because infiltration is not considered in this analysis, both Category 2 and Category 3 parcel-based LID designs provide an effective storage depth of 18 inches between the ponding and media layer and are identical for the purpose of the conformance analysis. Where some infiltration does occur, the resulting performance would be greater.

The total volume biofiltered is the sum of the static biofiltration volume and the additional volume routed during the storm event. This additional biofiltration volume was calculated by multiplying the media filtration rate (5 inches per hour) by routing time (6 hours) and the provided biofiltration footprint of each parcel. The total capacity of the parcel-based LID is calculated by adding the provided static biofiltration volume and the additional routed biofiltered volume. This sizing conformance demonstration calculation for each parcel is shown in Table 9.

Table 9 shows that providing a static LID volume equal to the runoff from the 1.1" storm results in conformance with sizing criteria regardless of the eventual infiltration feasibility category:

- Where parcels are Category 1, the static volume provided in the LID BMPs (Column D) is equal to the required volume (Column B) without considering any routing. The drawdown (Column H) is well within the 96-hour limit.

- Where parcels are Category 2 or 3, the total biofiltered volume (Column G) substantially exceeds the required biofiltration volume (Column C), even without considering any incidental infiltration and using a conservatively short routing time.

In summary, this sizing analysis demonstrates that parcel-based LIDs sized to the full LID Design Volume can achieve retention or equivalent biofiltration of the LID Design Volume regardless of feasibility conditions that may be encountered during the final parcel improvement phase of the Project.

Table 9 Sizing Conformance Demonstration for Parcel-Based LID BMPs

A	B	C	D	E	F	G	H	I
Parcel ID	**Required Infiltration Volume (if Category 1 Parcel)**	**Required Biofiltration Volume (150% of the LID Design Volume) (cubic feet) (if Category 2 or 3 Parcel)**	**Provided Static LID Volume (cubic feet)**	**Provided LID Footprint (square feet)**	**Additional Volume Biofiltered During Storm Duration from Category 2 or 3 BMPs (cubic feet)[1]**	**Total Biofiltration Volume in Category 2 or 3 BMPs (Static+ Routed Volume, cu-ft)**	**Drawdown of Stored Volume in Category 1 (hours)[2]**	**Drawdown to Media Surface in Category 2 or 3 (hours)[3]**
Planning Area 1	68,337	102,506	68,337	45,558	113,896	182,233	12 - 24	2.4
Planning Area 2&3	83,960	125,940	83,960	55,973	139,933	223,893	12 - 24	2.4
Planning Area 14	8,829	13,244	8,829	5,886	14,716	23,545	12 - 24	2.4

1 – Based on a conservative design storm routing time of 6 hours (reduced from HydroCalc duration of 24-hours) and media flowrate of 5 inches per hour over the footprint of the BMP.

2 – Based on ponding depth of 12 inches and 1 to 2 in/hr infiltration rates, consistent with likely rates in Category 1 areas.

3 – Based on 12-inch ponding depth and 5 in/hr media flowrate.

4.3 Conformance Summary

In summary, this memorandum demonstrates that:

- LID BMPs have been selected in a manner consistent with the LID selection hierarchy (i.e., infiltration feasibility criteria) contained in the LID Performance Standard (Section 4.1), which is consistent with the 2021 MS4 permit;

- The LID project design features proposed as part of the Entrada South Project provide retention and biofiltration volume consistent with the LID Design Volume retention and biofiltration requirements per the LID Performance Standard (Section 4.2), which is consistent with the 2021 MS4 permit.

- Pretreatment and source control BMPs area proposed as part of the Entrada South Project in a manner consistent with the 2021 MS4 permit.

For areas treated by parcel-based BMPs (Figure 2), the BMPs shall be selected and sized to the satisfaction of LA County as part of final parcel improvement plans. Based on the commitments described in Section 4.2, the application of parcel-based BMPs to these areas will satisfy the BMP selection and LID design storm retention and biofiltration requirement in the LID Performance Standard. The basis for this finding is documented in Section 4.1 and 4.2, and the availability of space in typical parcel plans has been demonstrated.

Therefore, the project design features proposed to manage runoff from the Entrada South Project conform to the Project's LID Performance Standard.

5. REFERENCES

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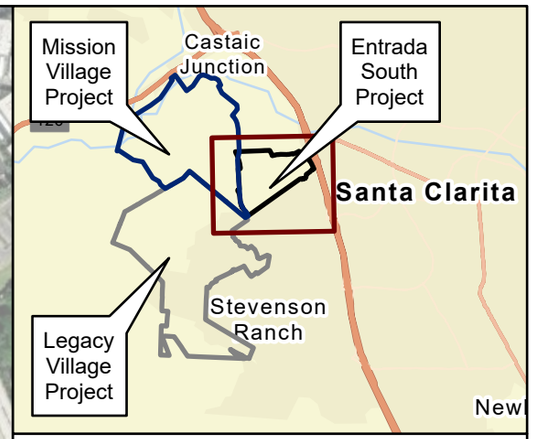
Virginia Department of Conservation and Recreation (VA DCR), 2011. Bioretention VDCR Stormwater Design Specification No. 9, Version 1.9.

Figures



Legend

Entrada South Boundary

Land Use

- Commercial
- Multi-Family Residential
- Open Space
- Recreation
- Recreation Trails
- Road
- Access Road
- Water

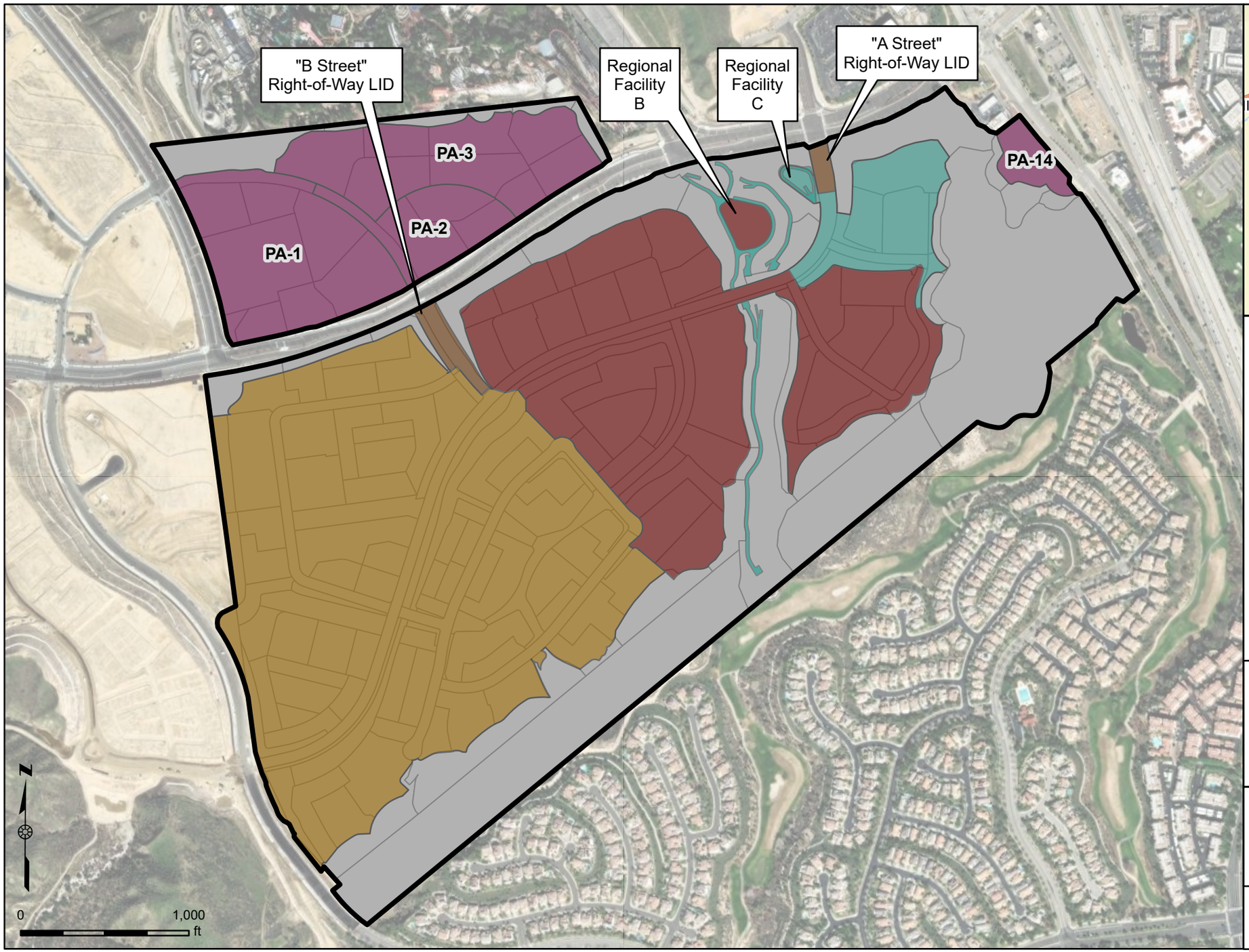
Entrada South Land Use

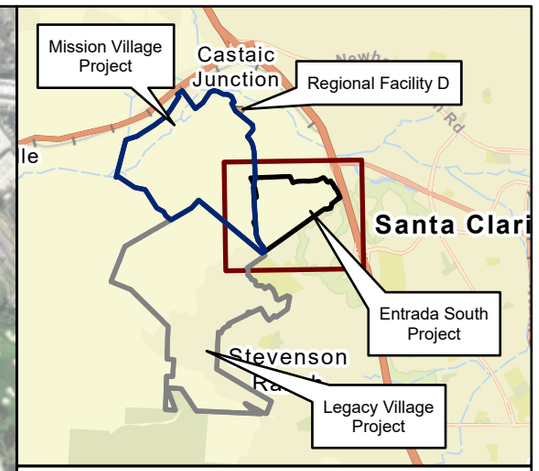
Entrada South Conformance Memo

Geosyntec consultants

November 2024

Figure 1





Legend

Drainage Areas to Proposed Treatment BMPs

- Regional Facility B
- Regional Facility C
- Regional Facility D
- Parcel-Based LID
- Right-of-Way LID
- Open Space Bypassing Treatment

Entrada South Drainage Areas & Treatment Categories

Entrada South Conformance Memo

Geosyntec consultants

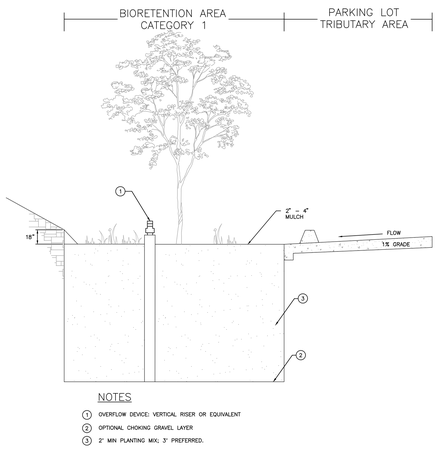
November 2024

Figure 2

Attachments

Attachment A

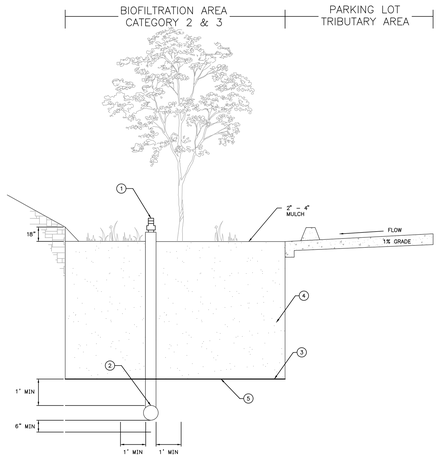
Entrada South LID Exhibit(Geosyntec)-Map



NOTES

1. OVERFLOW DEVICE: VERTICAL RISER OR EQUIVALENT
2. OPTIONAL CHOKING GRAVEL LAYER
3. 2' MIN PLANTING MIX; 3' PREFERRED.

TYPICAL BIORETENTION DETAIL FOR PARCEL BASED LID (CATEGORY 1)
NTS



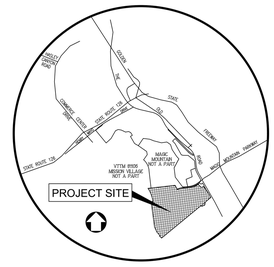
NOTES

1. OVERFLOW DEVICE: VERTICAL RISER OR EQUIVALENT
2. PERFORATED 6" MIN PVC PIPE UNDERDRAIN SYSTEM. WHERE SOIL CONDITIONS ALLOW, OMIT THE UNDERDRAIN AND INSTALL AN APPROPRIATELY SIZED GRAVEL DRAINAGE LAYER (TYPICALLY A WASHED 57 STONE) BENEATH THE PLANTING MEDIA FOR ENHANCED INFILTRATION.
3. OPTIONAL CHOKING GRAVEL LAYER
4. 2' MIN PLANTING MIX; 3' PREFERRED.
5. LINER NOT REQUIRED FOR CATEGORY 2. LINER IS REQUIRED FOR CATEGORY 3.

TYPICAL BIOINFILTRATION DETAIL FOR PARCEL BASED LID (CATEGORY 2 & 3)
NTS

LEGEND:

- EXISTING STORM DRAIN LINE
- PROPOSED STORM DRAIN
- EXISTING WATER QUALITY LINE
- PROPOSED WATER QUALITY LINE
- TRIBUTARY AREA TO BASIN B
- TRIBUTARY AREA TO BASIN C
- TRIBUTARY AREA TO MISSION VILLAGE REGIONAL WATER QUALITY BASIN D
- TRIBUTARY AREA FOR RIGHT-OF-WAY LID "A STREET"
- TRIBUTARY AREA FOR RIGHT-OF-WAY LID "B STREET"
- TRIBUTARY AREA FOR PARCEL BASED TREATMENT AREA PA-1
- TRIBUTARY AREA FOR PARCEL BASED TREATMENT AREA PA-2
- TRIBUTARY AREA FOR PARCEL BASED TREATMENT AREA PA-3
- TRIBUTARY AREA FOR PARCEL BASED TREATMENT AREA PA-14
- AVAILABLE LID FOOTPRINT FOR PARCEL BASED LID
- AVAILABLE LID FOOTPRINT FOR RIGHT-OF-WAY LID
- DIVERSION STRUCTURE
- CDS UNIT

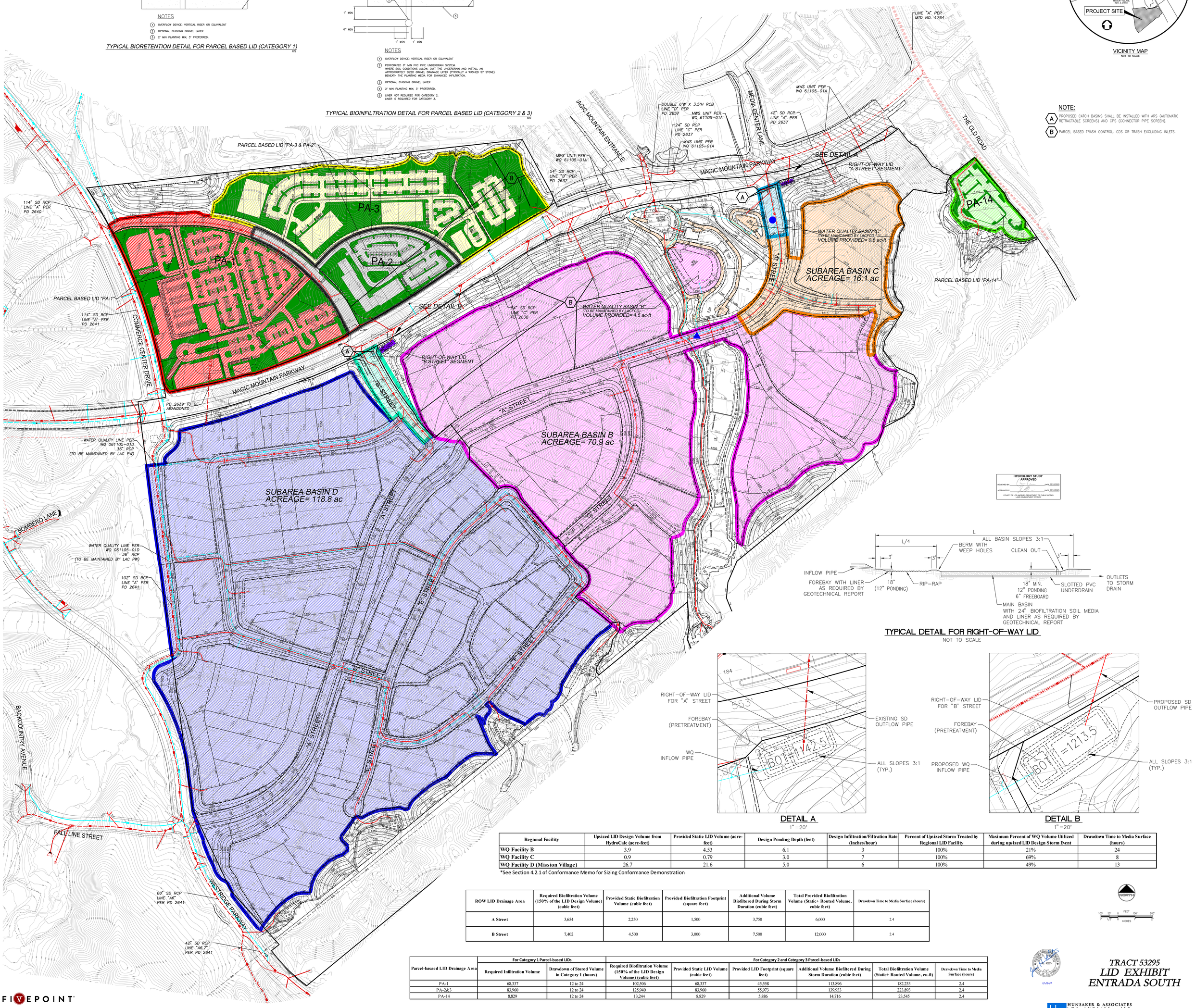


VICINITY MAP
NOT TO SCALE

NOTE:

A. PROPOSED CATCH BASINS SHALL BE INSTALLED WITH ARS (AUTOMATIC RETRACTABLE SCREENS) AND CPS (CONNECTOR PIPE SCREEN).

B. PARCEL BASED TRASH CONTROL. CDS OR TRASH EXCLUDING INLETS.



HYDROLOGY STUDY APPROVED

REVIEWED BY: _____ DATE: 03/12/2025

APPROVED BY: _____ DATE: 03/12/2025

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

TYPICAL DETAIL FOR RIGHT-OF-WAY LID
NOT TO SCALE

DETAIL A
1"=20'

DETAIL B
1"=20'

Regional Facility	Upsized LID Design Volume from HydroCalc (acre-feet)	Provided Static LID Volume (acre-feet)	Design Ponding Depth (feet)	Design Infiltration/Filtration Rate (inches/hour)	Percent of Upsized Storm Treated by Regional LID Facility	Maximum Percent of WQ Volume Utilized during upsized LID Design Storm Event	Drawdown Time to Media Surface (hours)
WQ Facility B	3.9	4.53	6.1	3	100%	21%	24
WQ Facility C	0.9	0.79	3.0	7	100%	69%	8
WQ Facility D (Mission Village)	26.7	21.6	5.0	6	100%	49%	13

*See Section 4.2.1 of Conformance Memo for Sizing Conformance Demonstration

ROW LID Drainage Area	Required Biofiltration Volume (150% of the LID Design Volume) (cubic feet)	Provided Static Biofiltration Volume (cubic feet)	Provided Biofiltration Footprint (square feet)	Additional Volume Biofiltered During Storm Duration (cubic feet)	Total Provided Biofiltration Volume (Static+ Routed Volume, cubic feet)	Drawdown Time to Media Surface (hours)
A Street	3,654	2,250	1,500	3,750	6,000	2.4
B Street	7,402	4,500	3,000	7,500	12,000	2.4

Parcel-based LID Drainage Area	For Category 1 Parcel-based UDs		For Category 2 and Category 3 Parcel-based UDs				
	Required Infiltration Volume	Drawdown of Stored Volume in Category 1 (hours)	Required Biofiltration Volume (150% of the LID Design Volume) (cubic feet)	Provided Static LID Volume (cubic feet)	Provided LID Footprint (square feet)	Additional Volume Biofiltered During Storm Duration (cubic feet)	Total Biofiltration Volume (Static+ Routed Volume, cu-ft)	Drawdown Time to Media Surface (hours)
PA-1	68,337	12 to 24	102,506	68,337	45,558	113,896	182,233	2.4
PA-2&3	83,960	12 to 24	125,940	83,960	55,973	139,933	223,893	2.4
PA-14	8,829	12 to 24	13,244	8,829	5,886	14,716	23,545	2.4

FIVEPOINT

INSIGHTS

FEET
100' 50' 0 100' 200'
1/8" 1/4" INCHES

12-18-24

TRACT 53295
LID EXHIBIT
ENTRADA SOUTH

HUNSAKER & ASSOCIATES
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DATE: 04/25/25 REV. DATE: 11/08/2024
PROJECT NO: 0015-035-019 SHEET 1 OF 1

H15035-01_ENTRADA SOUTH LID EXHIBIT.DWG

Attachment B

Modeling Methodology

Attachment B

Modeling Methodology in Support of LID Conformance Analysis

1. INTRODUCTION

The purpose of this attachment is to describe the modeling methodology used to demonstrate that the proposed regional infiltration/bioinfiltration facilities for the Entrada South Project (Project) are sized to satisfy the retention or equivalent biofiltration of the 85th Percentile, 24-hour Storm Event requirement in the Project LID Performance Standard.

To demonstrate that each regional facility meets this standard, the LID design storm runoff time series were calculated using HydroCalc for tributary area to each regional facility and subsequently used as input inflow times series to storage units representing the detailed hydraulic characteristics of the proposed regional facilities (stage-storage, infiltration, filtration and overflow) in an USEPA Stormwater Management Model (SWMM).

Subcatchments tributary to each facility were defined based on land use delineations, drainage boundaries, results of infiltration feasibility screening, and soil parameters. Regional facilities within the Project were modeled in SWMM. Based on the proposed facility sizes and configurations, watershed LID performance results were evaluated to demonstrate that the regional LID facilities achieve the retention or equivalent biofiltration of the 85th Percentile, 24-hour Storm Event requirement in the LID Performance Standard.

Part of Entrada South drains to Regional Facility D in the adjacent Mission Village Project. The facility design and tributary areas were previously documented in Mission Village Phase 1, 2, 5 & 6 Conformance Memorandum (Geosyntec, 2019). Since the time of that memorandum, the land uses and drainage areas from Entrada South have changed. This memorandum documents the updated Entrada South drainage areas and land uses. It also includes the full updated model files and results to demonstrate that Regional Facility D is still adequately sized. The regional facility itself is not changed compared to the Mission Village Phase 1, 2, 5 & 6 Conformance Memorandum (Geosyntec, 2019). Additionally, drainage areas outside of Entrada South are not changed except for a small difference in imperviousness in Mission Village. Therefore, this memorandum does not include a description of the other areas draining to Regional Facility D as these are still consistent with the Mission Village Phase 1, 2, 5 & 6 Conformance Memorandum.

Detailed model input and output files from HydroCalc and SWMM are annotated and provided in Attachment C.

2. WATERSHED MODELING

Each subcatchment tributary to each regional BMP is modeled using HydroCalc. Subcatchment parameter input and the output are summarized in the following sections. Hydrographs from each tributary during the 85th percentile 1.1-inch 24-hour storm was generated using HydroCalc and used as input for the EPA SWMM model detailed in Section 3.

2.1. Regional Facility Tributary Area and Imperviousness

The tributary drainages treated by each of the Project regional facilities were represented per the *LID Exhibit for Entrada South* (Hunsaker, 2024). Table 2-1 includes the drainage subbasins and imperviousness values used for areas within the Entrada South boundary that are proposed to drain to Facilities B, C and Regional Facility D in Mission Village.

Table 2-1: Modeled Developed Conditions Project– Facilities B, C, and D

Facility	Land Use	Acreage	Imperviousness
Facility B	Multi-Family Residential	50.3	74
	Open Space	9.2	1
	Recreation	2.0	80
	Recreation Trails	4.2	10
	Road	4.6	91
	Water Quality Facility	0.6	100
Facility B Total		**70.9**	**62**
Facility C	Multi-Family Residential	7.9	74
	Open Space	1.9	1
	Recreation Trails	0.3	10
	Road	1.1	91
	Access Road	4.6	80
	Water Quality Facility	0.4	100
Facility C Total		**16.1**	**68**
Facility D	Multi-Family Residential	82.2	74
	Open Space	11.5	1
	Recreation	1.7	80
	Recreation Trails	8.4	10
	Road	15.1	91
Facility D Total[1]		**118.8**	**65**

[1] Facility D Total refers to contributing subbasins within Entrada South project boundary only. See Mission Village Phase 1, 2, 5 & 6 Conformance Memorandum (Geosyntec, 2019) for contributing subbasin characteristics outside Entrada South project boundary.

Regional Facility D was modeled based on the ultimate proposed condition of its drainage area, as described in the memorandum: "Mission Village Phase 1, 2, 5 & 6 Water Quality Plan (Regional Facilities B, C and D) – Evaluation of Conformance with Newhall LID Performance Standard" (Geosyntec Consultants, 2019). The drainage area from Entrada South and the imperviousness in Mission Village tributary area changed somewhat since the Mission Village memorandum; the current proposed Entrada South drainage area was modeled to demonstrate that Regional Facility

D is adequately sized. A comparison of the total tributary area to Regional Facility D between the current model and the model documented in the Mission Village Conformance Memorandum is presented in Table 2-2.

Table 2-2: Summary of Tributary Area to Regional Facility D and Comparison with Scenario Modeled in the Mission Village Conformance Memorandum.

Model Scenario	Project Location	Tributary Area (Acres)	Impervious Fraction of Catchment (%)
Mission Village Phase 1, 2, 5 & 6 Conformance Memorandum	Mission Village	115.0	66.6
	Entrada South	121.5	52.3
	Existing Westridge	95.6	49.1
	Total	**332.1**	**56.3**
Entrada South Conformance Memorandum	Mission Village	115.0	68.6
	Entrada South	118.8	64.7
	Existing Westridge	95.6	49.1
	Total	**329.4**	**61.5**

2.2. Other Subcatchment Input Parameters

According to the LA County Soils Map (LACDPW, 2023), LA County soil type 098 is the underlying soils for vast majority of the Entrada South project area. Therefore, this soil type is used as soil type input for all of the tributary areas to the regional facilities. In addition, flow path length of 250 feet and flow path slope of 5% were assumed inputs for the tributary areas to the regional facilities.

2.3. HydroCalc Output

The peak runoff flow rates and total runoff volumes during the 1.1-inch 24-hour storm from the three tributary areas within the Project boundary draining to Regional Facility B, C and D from HydroCalc output are summarized in Table 2-3. The hydrographs from these three drainage areas are also illustrated in Attachment C. The output hydrograph for area draining to Facility B will be used as inflow input for the SWMM model detailed in Section 3. The output hydrographs for areas draining to Facility C and D will be multiplied by 150% and used as inflow input for the SWMM model because these two facilities because the design of them include biofiltration.

Table 2-3. HydroCalc Output for Tributary Areas within Entrada South Draining to Regional Facility B, C and D during 85th Percentile 1.1-inch 24-hour Storm

HydroCalc Output	Facility B	Facility C	Facility D (within Entrada South Boundary)
Clear Peak Flow Rate (cfs)	20.3	5.1	26.9
24-Hr Clear Runoff Volume (ac-ft)	3.9	0.97	6.7

3. REGIONAL FACILITY MODELING

3.1. EPA SWMM Model Input

A design storm simulation is performed in SWMM using the hydrographs generated by HydroCalc as input the incorporating the hydraulic properties of the proposed regional facilities. The general simulation parameters are provided in Table 3-1.

Table 3-1: SWMM Model Parameters

Parameter	Description	Parameter Value
Routing time step	Seconds	30 sec
Routing Option	Method of routing flows through the system	Kinematic Wave method
Inflow Time Series	Runoff hydrographs from the 1.1-inch 24-hour design storm documented in Section 2 and detailed in Attachment C	HydroCalc output

3.2. Model Representation

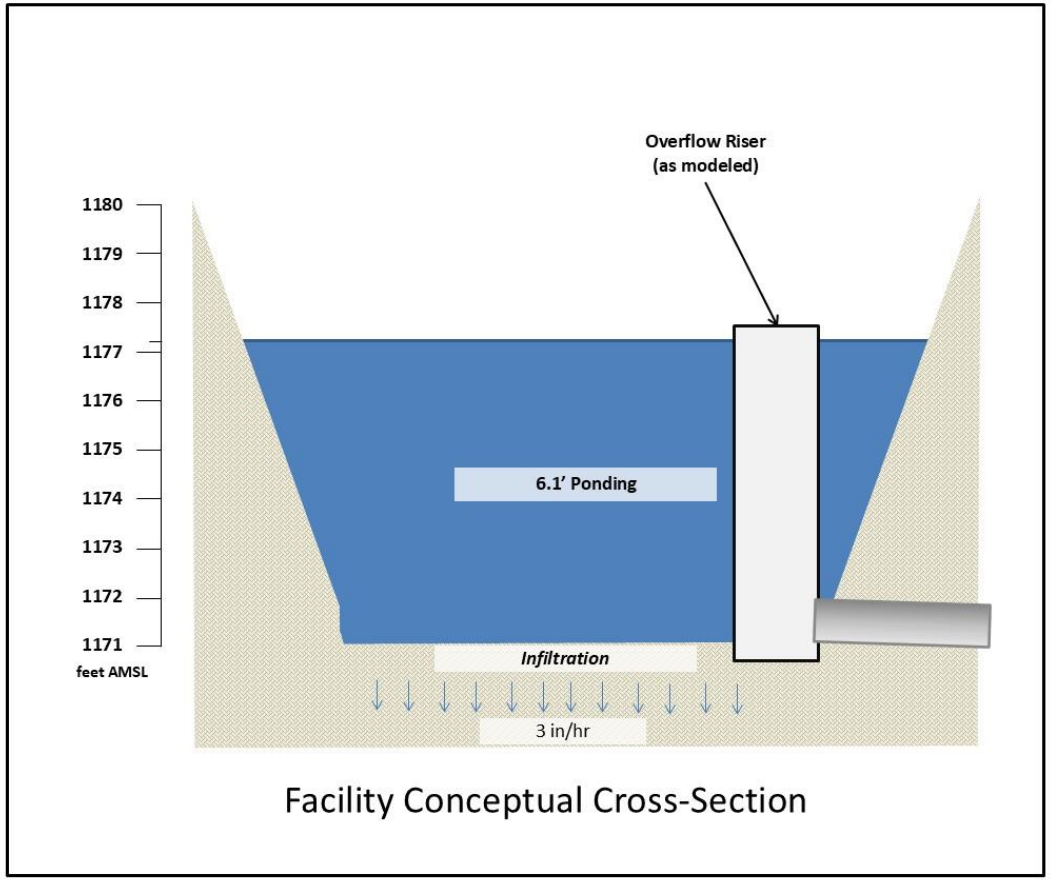
Regional facilities were modeled using a stage-area table to define volume properties and SWMM's built-in hydraulic control elements (e.g., orifices, weirs, outlets) to define discharge from the system (e.g., treated discharge, infiltration, overflow) as a function of the depth of stored water. These facilities were modeled to receive runoff from developed portions of the Project accounting for diversion structures. Regional Facility D was modeled to receive runoff from tributary areas in Mission Village, Legacy Village, and Entrada South. Modeling of Mission Village Facility D is described in the Mission Village Phase 1, 2, 5 & 6 Conformance Memorandum (Geosyntec, 2019).

During the design storm simulation, the inflow hydrograph generated from the HydroCalc is routed into the regional facilities in SWMM, accounting for the hydrologic water balance, conceptual diversion structure, and hydraulic flow control.

Facility sizing was conducted with model infiltration rates, which is consistent with the recommendations by Engeo (2021). The infiltration feasibility report (Engeo, 2021) recommends the design of an infiltration facility for Regional Facility B with a corrected infiltration rate of 3.0 inches per hour based on the infiltration feasibility study (Engeo, 2021). Regional Facility C is a Category 2 basin per the infiltration feasibility study. As a conservative assumption, the underlaying infiltration from the Category 2 Basin A is not modeled in SWMM. Regional Facility D is proposed as a biofiltration facility (lined, no infiltration) due to low soil infiltration rate; the basis for this decision is further discussed in the Mission Village Phase 1, 2, 5 & 6 Conformance Memorandum (Geosyntec, 2019).

Schematic drawings of Regional Facility B, C and D are illustrated in Figure 1 through Figure 3. Regional Facility D was modeled and documented as part of the Mission Village Phase 1, 2, 5 & 6 Conformance Memorandum (Geosyntec, 2019).

Entrada South Regional Facility B - Infiltration



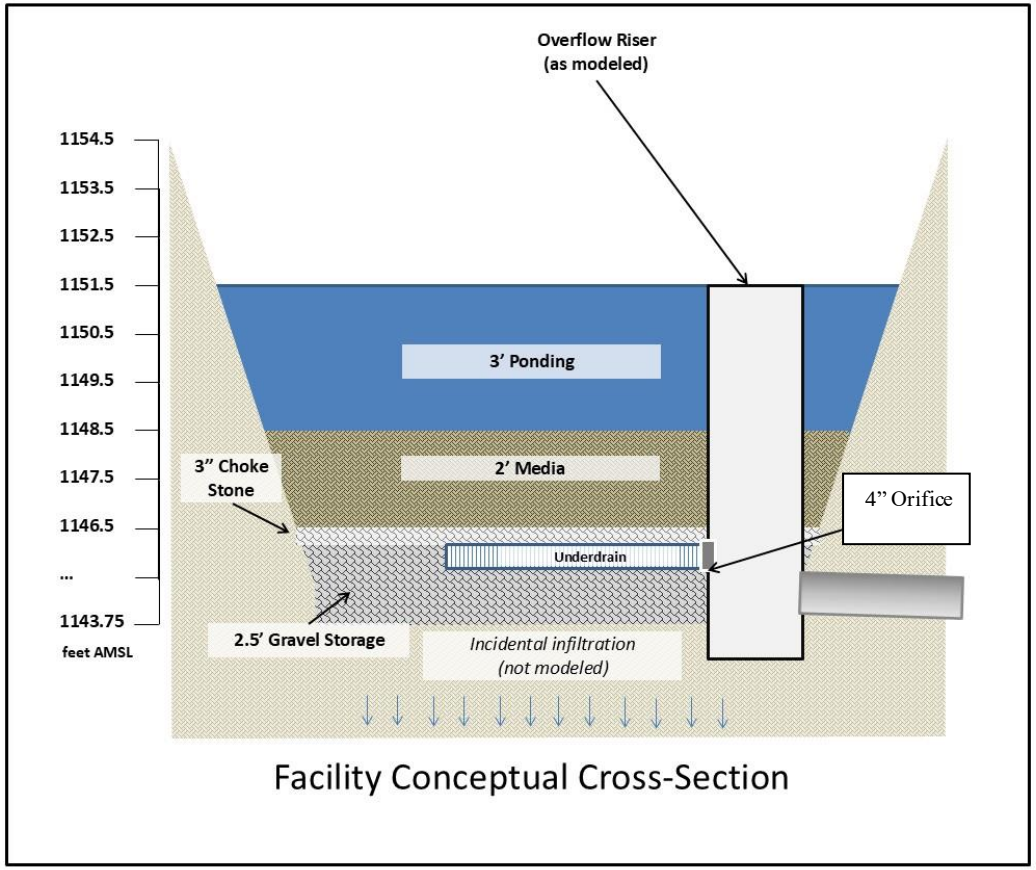
Facility Stage-Area Curve

Elevation, ft AMSL	Depth from Media Surface, ft	Area, sq-ft
1171	**0**	25,987
1172	**1**	27,945
1173	**2**	29,973
1174	**3**	32,063
1175	**4**	34,209
1176	**5**	36,619
1177	**6**	39,156
1177.1	**6.1**	39,441
1178	**7**	42,006
1179	**8**	45,127
1180	**9**	48,619

Total Storage Volume @ 1177.1 ft AMSL:
4.5 ac-ft

Figure 1: Schematic and Respective Cross-Section Depths of Entrada South Infiltration Facility B

Entrada South Regional Facility C - Bioinfiltration



Facility Stage-Area Curve

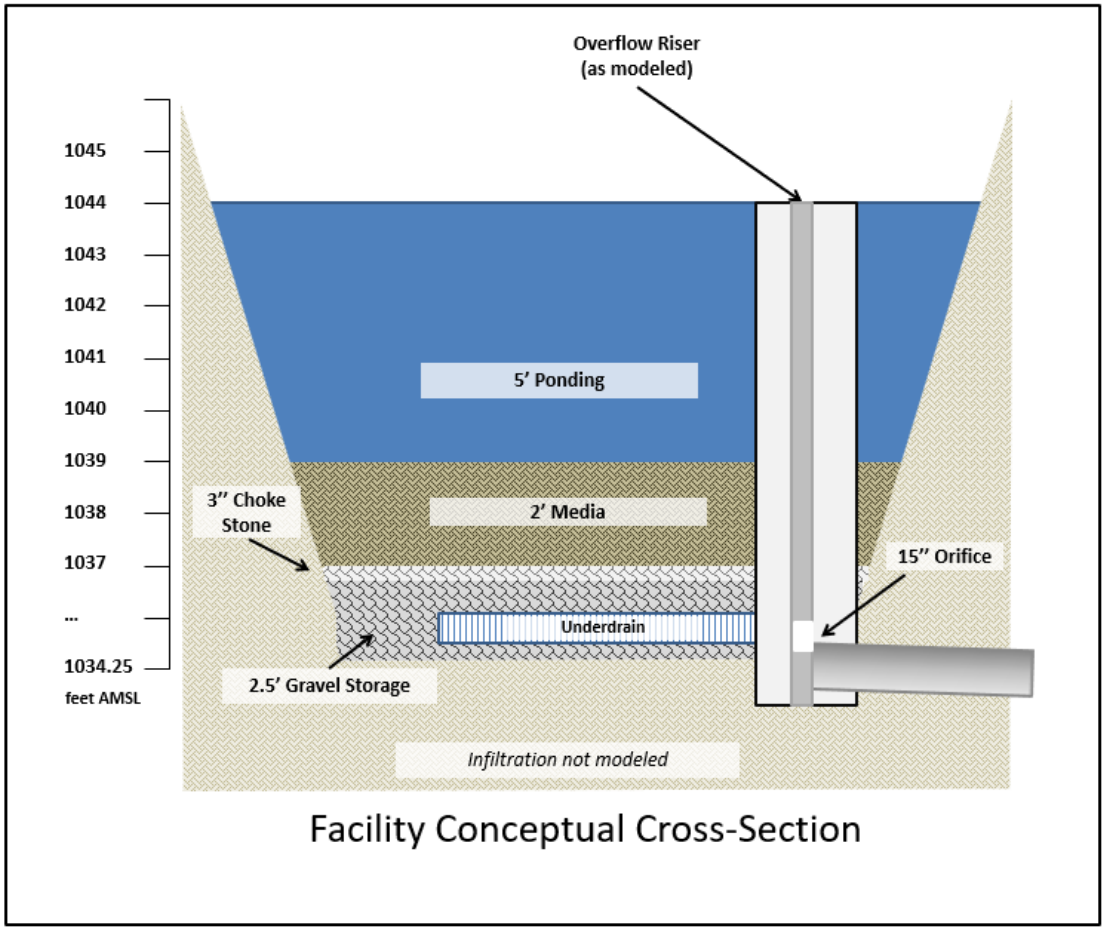
Depth from Media Surface, ft	Layer Base Elevation, ft AMSL	Area, sq-ft	Material	Porosity, %
-	1143.75	6,235	gravel	40
-	1146.25	6,235	choke stone	40
-	1146.5	6,235	media	25
0	1148.5	6,235	ponding	100
1	1149.5	7,432	ponding	100
2	1150.5	8,713	ponding	100
3	1151.5	10,108	ponding	100
4	1152.5	11,647	ponding	100
5	1153.5	13,242	ponding	100
6	1154.5	15,651	ponding	100

Total Ponding Volume @ 1151.5 ft AMSL:
0.56 ac-ft

Total Storage Volume @ 1151.5 ft AMSL (including pore space):
0.79 ac-ft

Figure 2: Schematic and Respective Cross-Section Depths of Entrada South Bioinfiltration Facility C

Mission Village Regional Facility D - Biofiltration



Facility Conceptual Cross-Section

Facility Stage-Area Curve

Depth from Media Surface, ft	Elevation, ft AMSL	Area, sq-ft	Material	Porosity, %
-	1034.25	133,120	base	-
-	1036.75	133,120	gravel	40
-	1037	133,120	choke stone	40
-	1037.01	133,120	media	25
-	1039	133,120	media	25
0	1039.01	133,120	ponding	100
1	1040	137,986	ponding	100
2	1041	142,949	ponding	100
3	1042	147,953	ponding	100
4	1043	153,029	ponding	100
5	1044	158,264	ponding	100
6	1045	163,389	ponding	100

Total Ponding Volume @ 1044 ft AMSL:
16.7 ac-ft

Total Storage Volume @ 1044 ft AMSL (including pore space):
21.6 ac-ft

Figure 3: Schematic and Respective Cross-Section Depths of Mission Village Biofiltration Facility D

The regional facilities will be off-line. Water will be diverted at diversion structures and/or flow-splitting inlets: flow up to the required treatment flowrates will be diverted to the water quality basins and the high flow will bypass the basins. The required minimum diversion flowrates to each facility were determined using HydroCalc for the 1.1-inch storm event. Basin C and D includes biofiltration; therefore, the diversion was sized for 1.5 times the peak of the 1.1-inch storm in the EPA SWMM model. Table 3-2 shows the required diversion flowrates and the detailed HydroCalc inputs and outputs are provided in Attachment C.

Table 3-2: Required Diversion Flowrates to Regional Facilities

BMP ID	Required Minimum Diversion Structure Flowrate, cfs
Regional Facility B	20.3
Regional Facility C	7.7
Regional Facility D	40.3

An example EPA SWMM model with explanation of each element in the model for regional facilities are provided in Figure 4 (Category 1 facilities) and Figure 5 (Category 2 and 3 facilities). Detailed SWMM model input and output files are provided in Attachment C.

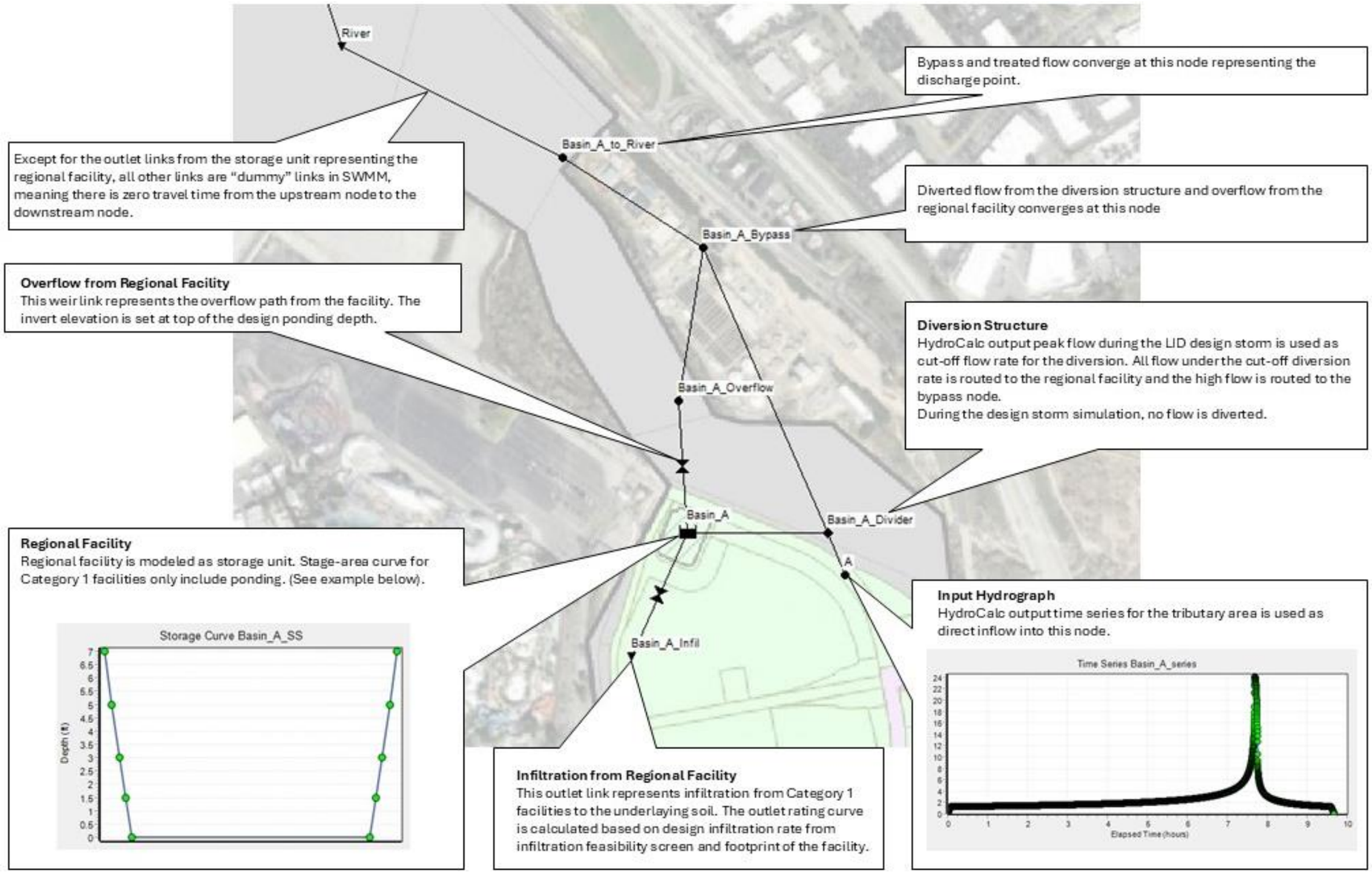


Figure 4 Explanation of EPA SWMM Model of an Example Regional Facility (Category 1)

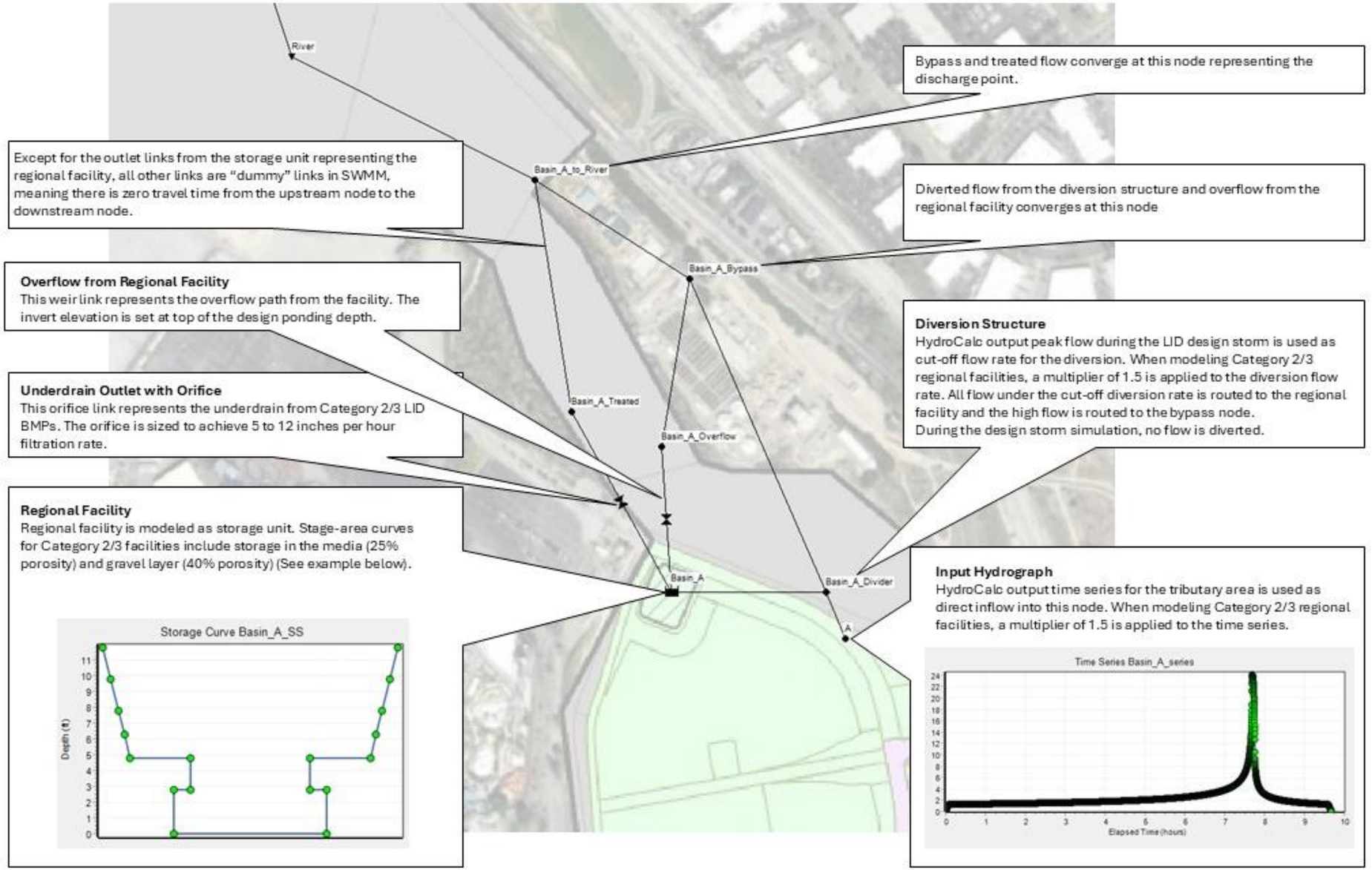


Figure 5 Explanation of EPA SWMM Model of an Example Regional Facility (Category 2 - 3)

3.3. Regional Facility Modeling Results

The provided sizes of the regional facilities is required to satisfy the LID performance standard to infiltrate 100% of the 1.1-inch storm event or biofilter 150% of the 1.1-inch storm event that is not retained. As summarized above, HydroCalc was used to generate input hydrographs that were routed through the SWMM models. These input hydrographs were based on the clear flows for the 1.1-inch LID design event; a multiplier of 1.5 was used for the bioinfiltration and biofiltration basins. The model was run to simulate the duration of the stormwater runoff from the LID design storm. The maximum ponding depth during the simulation were extracted from the SWMM model results and compared to the provided ponding depth for all three proposed regional facilities. As shown in Table 3-3, the maximum ponding depths for all three regional facilities did not exceed the provided ponding depths and therefore the provided sizes of the regional facilities satisfy the sizing requirement to infiltrate 100% of the 1.1-inch storm event or biofilter 150% of the 1.1-inch storm event that is not retained.

Table 3-3: Maximum Depth during 1.1-Inch Storm Event and Ponding Depth Comparison for Regional Facilities

Regional Facility	1.1-inch Storm Event Scaling Factor[1]	Maximum Ponding Depth during Scaled 1.1-inch Storm Event[2] (ft)	WQ Ponding Depth Provided (ft)
B	1.0	1.5	6.1
C	1.5	1.9	3.0
D	1.5	1.8	5.0

1-Scaling factor of 1.0 applies to infiltration basins; scaling factor of 1.5 applies to bioinfiltration and biofiltration basins.
2-Maximum ponding depth above media surface. For Facility B which has no biofiltration component, this is the maximum ponding depth above the basin floor.

To ensure that facilities fall within target operational parameters for regional facilities, including drawdown time and media filtration rate, the inflow time series to the regional facilities in the SWMM model was modified such that the facilities were filled up to their respective overflow stages and the modeling results were extracted during the drawdown process from overflow stage to the media surface. According to the LA County LID Standards Manual, the target drawdown time to the surface of the facility was less than 96 hours and the target media filtration rate was between 5 and 12 inches per hour. As shown in Table 3-4, facility performance was consistent with these targets.

Table 3-4: Regional Facility Operational Parameters

Regional Facility	Estimated Drawdown Time to Surface of Facility from Brim Full, hours	Estimated Maximum Media Filtration Rate when system is at overflow stage, in/hr	Basis
Target	< 96	5 - 12	LA County LID Standards Manual
Regional Facility B	24	N/A	Extracted from model output
Regional Facility C	8	7	Extracted from model output
Regional Facility D	13	6	Extracted from model output

Note: Facility outlet structures subject to refinement as part of detailed design; facility operational parameters are subject to minor revision within target bounds.

4. SUMMARY

This attachment describes the modeling methodology used to evaluate the overall performance of water quality/LID design features proposed within the watersheds tributary to Facilities B, C and Facility D located within Mission Village. The analysis documented in this attachment demonstrated that the regional facilities proposed for the Project are sized to satisfy the retention or equivalent biofiltration of the 85th Percentile, 24-hour Storm Event requirement in the Project LID Performance Standard. The modeling approach incorporates civil and geotechnical design information that is available at this time for the facilities. This approach results in an estimate of overall performance that is considered to be reliable for evaluating the conformance to the LID Performance Standard applicable to the Project.

Note, that modeling of Regional Facility D is documented in the Mission Village Phase 1, 2, 5 & 6 Conformance Memorandum (Geosyntec, 2019). This memorandum does not document the drainage areas for the other projects that drain to Basin D. This memorandum does document the updated drainage area from Entrada South and the updated modeling results for Regional Facility D that incorporate updates from the tributary area draining from within the Entrada South project.

5. REFERENCES

Engeo, 2021. Analysis of Infiltration Feasibility for Entrada South Project. Entrada South – Vesting Tentative Tract Map 53295 Newhall Ranch Preliminary Infiltration Feasibility for Low Impact Design (LID) Stormwater Quality Features.

Geosyntec Consultants (Geosyntec), 2019. Memorandum: Mission Village Phase 1, 2, 5 & 6 Water Quality Plan (Regional Facilities B, C and D) – Evaluation of Conformance with Newhall LID Performance Standard. October 9, 2019.

Hunsaker, 2024. LID Exhibit for Entrada South TTM No. 53295.

Attachment C

Model Files

APPENDIX C: HYDROCALC AND SWMM INPUTS AND OUTPUTS

HydroCalc Regional Facilities B, C, and D, Inputs Table

HydroCalc Parcel-Based and Right-of-Way LIDs, Inputs Table

HydroCalc Regional Facilities B, C, and D, Output Files

HydroCalc Parcel-Based and Right-of-Way LIDs, Output Files

Entrada South Regional Facilities B and C, 1.1-Inch Storm Input File

Entrada South Regional Facility B and C, 1.1-Inch Storm Output File

Entrada South Regional Facility B and C Output Graphs

Mission Village Regional Facility D, 150% 1.1-Inch Storm Input File

Mission Village Regional Facility D, 150% 1.1-Inch Storm Output File

Mission Village Regional Facility D Output Graphs

Text has been inserted in red boxes in key locations to orient the reviewer to critical modeling inputs and outputs.

HydroCalc Inputs – Regional Facilities B, C, and D			
Subarea ID	**B**	**C**	**Basin D - ES**
Area (ac)	70.88	16.14	118.8
Flow Path Length (ft)	250	250	500
Flow Path Slope (vft/hft)	0.05	0.05	0.05
85th Percentile Rainfall Depth (in)	1.1	1.1	1.1
Percent Impervious	0.6229	0.6822	0.6468
Soil Type	98	98	98
Design Storm Frequency	85th percentile storm	85th percentile storm	85th percentile storm
Fire Factor	0	0	0

HydroCalc Inputs – Parcel-Based and Right-of-Way LIDs					
Subarea ID	**PA-1**	**PA-2&3**	**PA-14**	**A St ROW**	**B St ROW**
Area (ac)	20.8	25.6	2.7	0.7	1.7
Flow Path Length (ft)	250	250	250	250	250
Flow Path Slope (vft/hft)	0.05	0.05	0.05	0.05	0.05
85th Percentile Rainfall Depth (in)	1.1	1.1	1.1	1.1	1.1
Percent Impervious	0.91	0.91	0.91	0.91	0.80
Soil Type	20	98	98	98	98
Design Storm Frequency	85th percentile storm	85th percentile storm	85th percentile storm	85th percentile storm	85th percentile storm
Fire Factor	0	0	0	0	0

Peak Flow Hydrologic Analysis

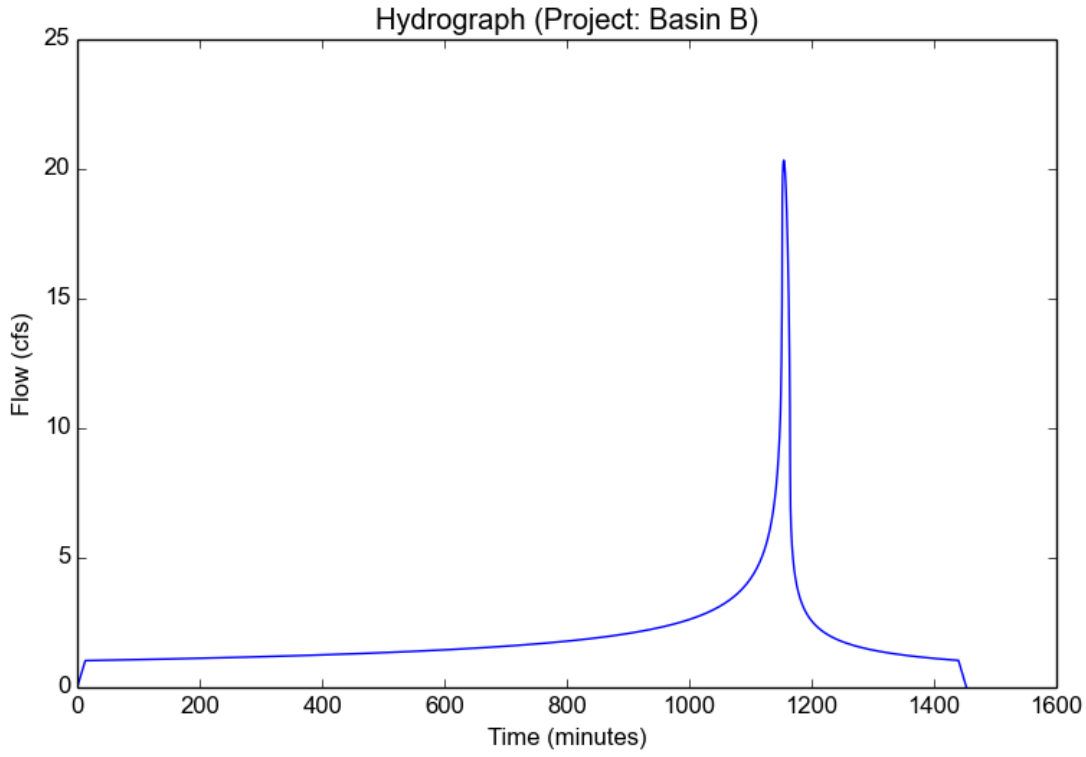
File location: P:/Clients/Newhall_Land/Projects/CWR0782_ES_VCC_Hydrology_2022/Entrada_South/Conformance Memo/Round_4_Dec2023/Project -
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Project
Subarea ID	Basin B
Area (ac)	70.88
Flow Path Length (ft)	250.0
Flow Path Slope (vft/hft)	0.05
85th Percentile Rainfall Depth (in)	1.1
Percent Impervious	0.6229
Soil Type	98
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.1
Peak Intensity (in/hr)	0.4188
Undeveloped Runoff Coefficient (Cu)	0.33
Developed Runoff Coefficient (Cd)	0.685
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	20.3375
Burned Peak Flow Rate (cfs)	20.3375
24-Hr Clear Runoff Volume (ac-ft)	3.8893
24-Hr Clear Runoff Volume (cu-ft)	169416.4834



Peak Flow Hydrologic Analysis

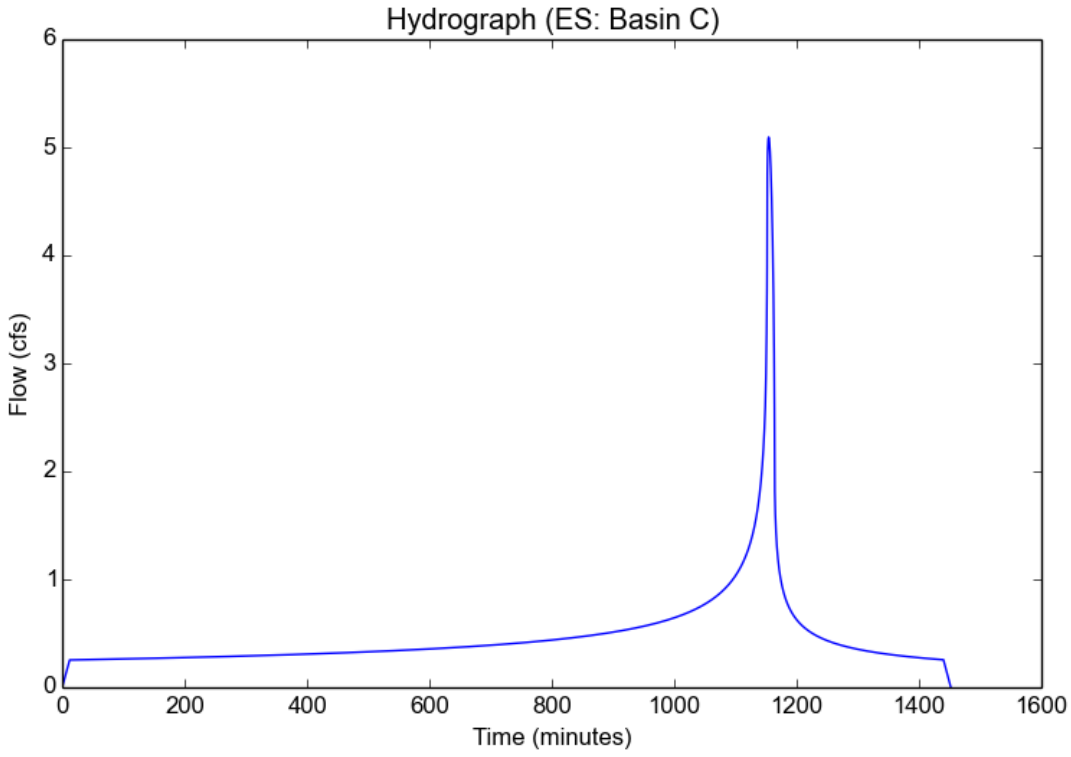
File location: P:/Clients/Newhall_Land/Projects/CWR0782_ES_VCC_Hydrology_2022/Entrada_South/Conformance Memo/Round_5_Oct2024/Attachme
Version: HydroCalc 1.0.3

Input Parameters

Project Name	ES
Subarea ID	Basin C
Area (ac)	16.14
Flow Path Length (ft)	250.0
Flow Path Slope (vft/hft)	0.05
85th Percentile Rainfall Depth (in)	1.1
Percent Impervious	0.6822
Soil Type	98
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.1
Peak Intensity (in/hr)	0.4349
Undeveloped Runoff Coefficient (Cu)	0.3518
Developed Runoff Coefficient (Cd)	0.7258
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	5.0946
Burned Peak Flow Rate (cfs)	5.0946
24-Hr Clear Runoff Volume (ac-ft)	0.9545
24-Hr Clear Runoff Volume (cu-ft)	41577.4298



Peak Flow Hydrologic Analysis

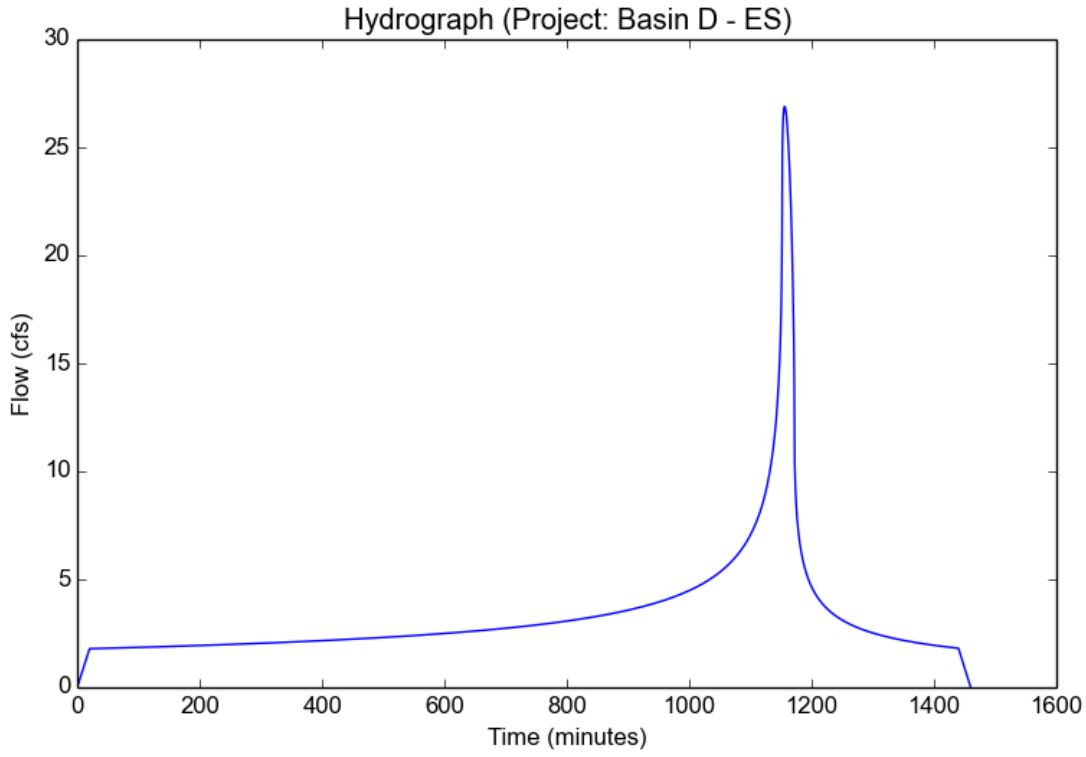
File location: P:/Clients/Newhall_Land/Projects/CWR0782_ES_VCC_Hydrology_2022/Entrada_South/Conformance Memo/Round_4_Dec2023/Project -
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Project
Subarea ID	Basin D - ES
Area (ac)	118.8
Flow Path Length (ft)	500.0
Flow Path Slope (vft/hft)	0.05
85th Percentile Rainfall Depth (in)	1.1
Percent Impervious	0.6468
Soil Type	98
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.1
Peak Intensity (in/hr)	0.3421
Undeveloped Runoff Coefficient (Cu)	0.2254
Developed Runoff Coefficient (Cd)	0.6617
Time of Concentration (min)	20.0
Clear Peak Flow Rate (cfs)	26.8923
Burned Peak Flow Rate (cfs)	26.8923
24-Hr Clear Runoff Volume (ac-ft)	6.6997
24-Hr Clear Runoff Volume (cu-ft)	291836.9449



Peak Flow Hydrologic Analysis

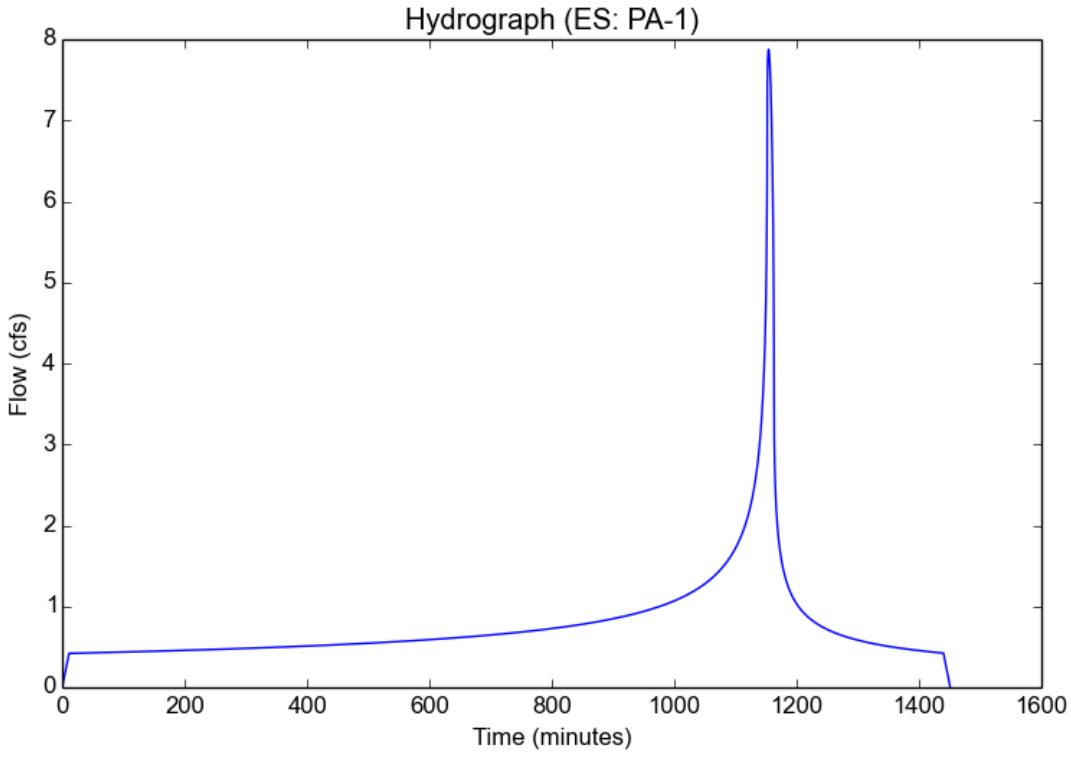
File location: C:/Users/lindsey.spencer/OneDrive - Geosyntec/Desktop/HydroCalc/ES Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	ES
Subarea ID	PA-1
Area (ac)	20.83318466
Flow Path Length (ft)	250.0
Flow Path Slope (vft/hft)	0.05
85th Percentile Rainfall Depth (in)	1.1
Percent Impervious	0.91
Soil Type	20
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.1
Peak Intensity (in/hr)	0.4531
Undeveloped Runoff Coefficient (Cu)	0.1723
Developed Runoff Coefficient (Cd)	0.8345
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	7.8767
Burned Peak Flow Rate (cfs)	7.8767
24-Hr Clear Runoff Volume (ac-ft)	1.5688
24-Hr Clear Runoff Volume (cu-ft)	68337.463



Peak Flow Hydrologic Analysis

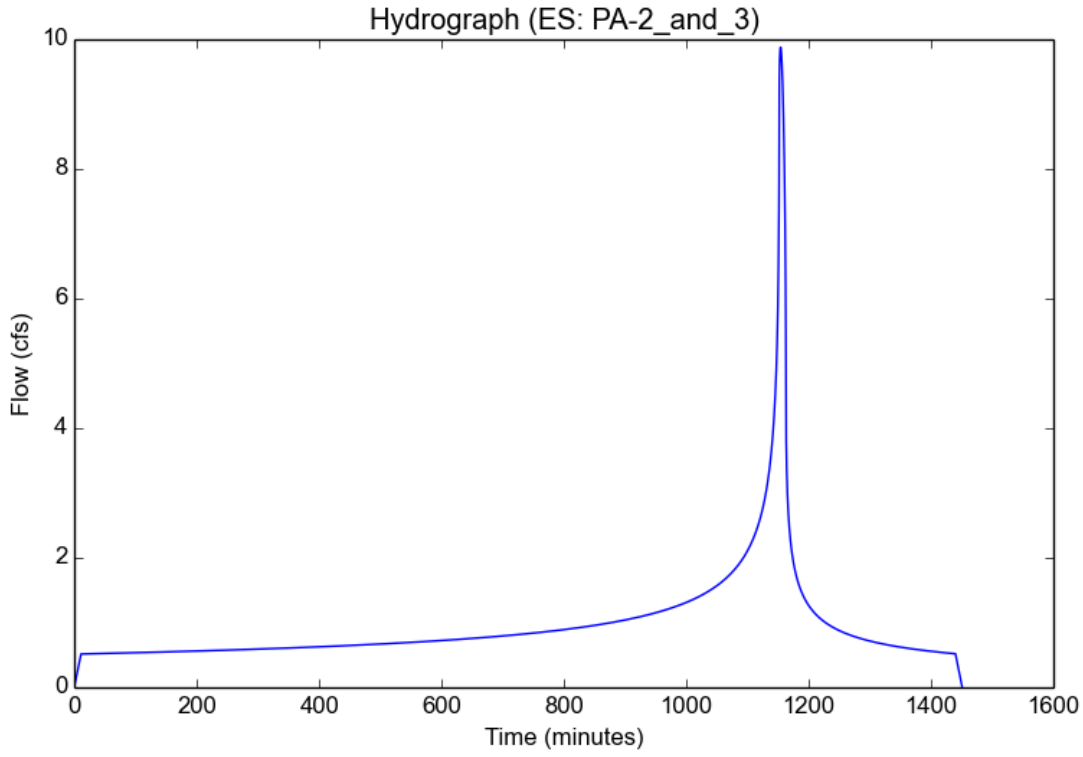
File location: C:/Users/lindsey.spencer/OneDrive - Geosyntec/Desktop/HydroCalc/ES Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	ES
Subarea ID	PA-2_and_3
Area (ac)	25.56162241
Flow Path Length (ft)	250.0
Flow Path Slope (vft/hft)	0.05
85th Percentile Rainfall Depth (in)	1.1
Percent Impervious	0.91
Soil Type	98
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.1
Peak Intensity (in/hr)	0.4531
Undeveloped Runoff Coefficient (Cu)	0.3766
Developed Runoff Coefficient (Cd)	0.8529
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	9.8773
Burned Peak Flow Rate (cfs)	9.8773
24-Hr Clear Runoff Volume (ac-ft)	1.9275
24-Hr Clear Runoff Volume (cu-ft)	83959.8332



Peak Flow Hydrologic Analysis

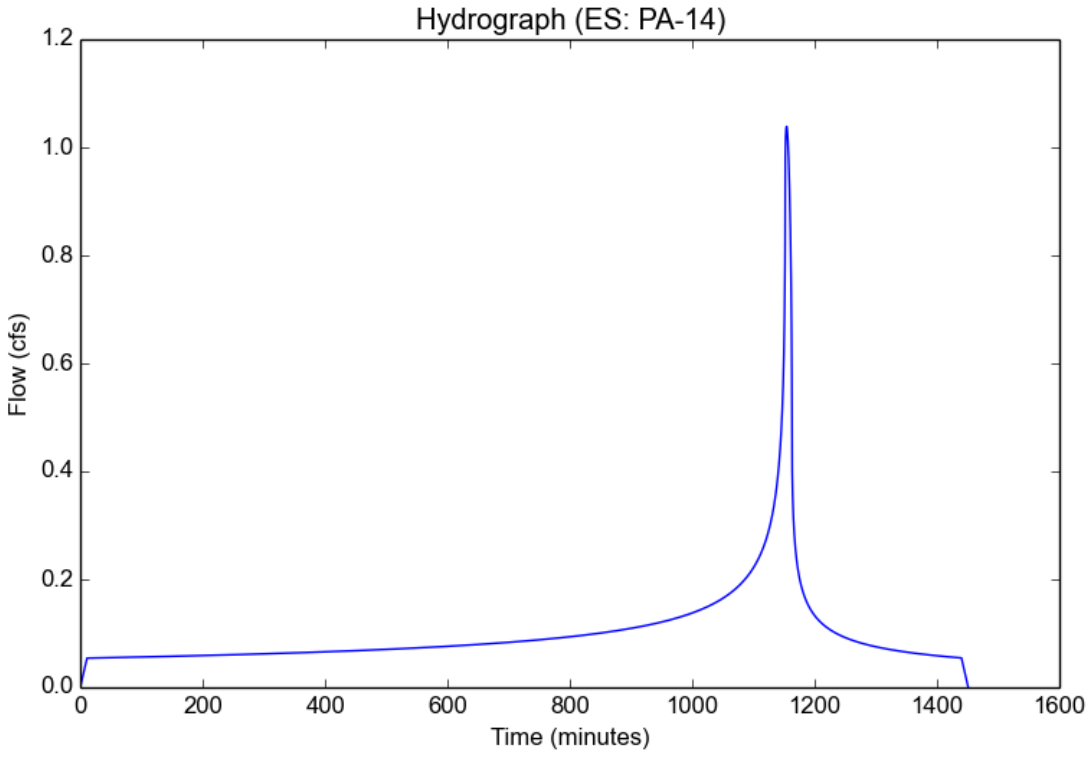
File location: C:/Users/lindsey.spencer/OneDrive - Geosyntec/Desktop/HydroCalc/ES Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	ES
Subarea ID	PA-14
Area (ac)	2.688091755
Flow Path Length (ft)	250.0
Flow Path Slope (vft/hft)	0.05
85th Percentile Rainfall Depth (in)	1.1
Percent Impervious	0.91
Soil Type	98
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.1
Peak Intensity (in/hr)	0.4531
Undeveloped Runoff Coefficient (Cu)	0.3766
Developed Runoff Coefficient (Cd)	0.8529
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	1.0387
Burned Peak Flow Rate (cfs)	1.0387
24-Hr Clear Runoff Volume (ac-ft)	0.2027
24-Hr Clear Runoff Volume (cu-ft)	8829.3197



Peak Flow Hydrologic Analysis

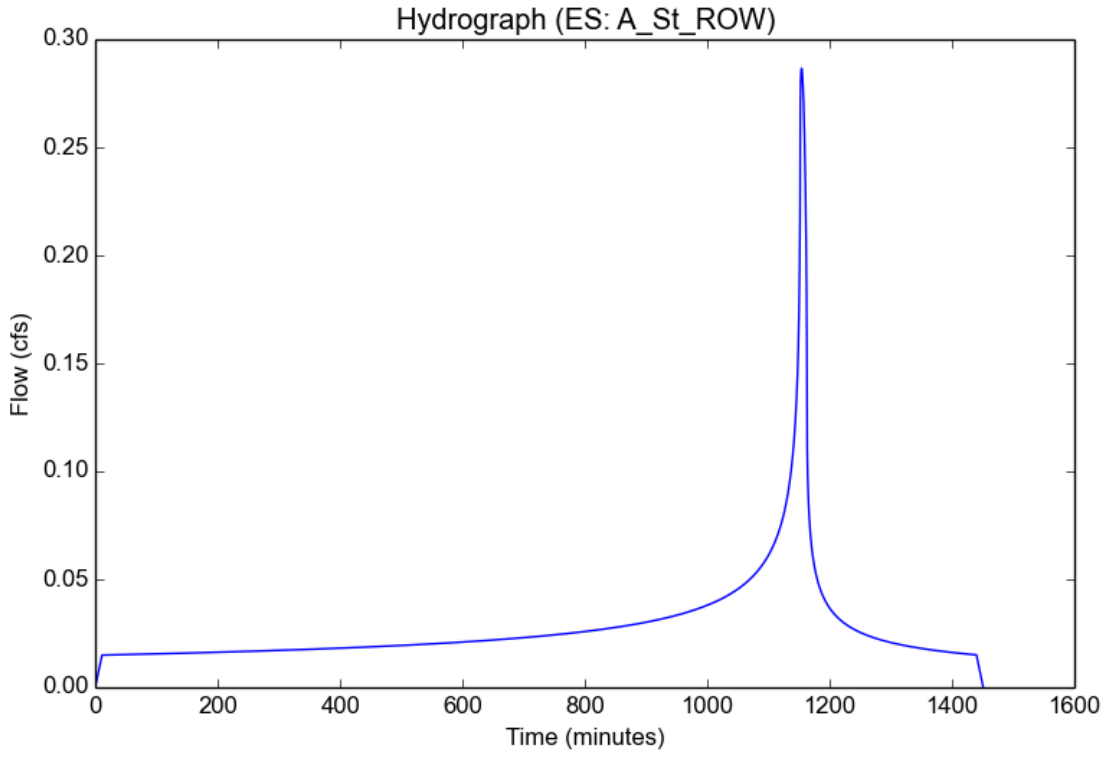
File location: C:/Users/lindsey.spencer/OneDrive - Geosyntec/Desktop/HydroCalc/ES Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	ES
Subarea ID	A_St_ROW
Area (ac)	0.741638422
Flow Path Length (ft)	250.0
Flow Path Slope (vft/hft)	0.05
85th Percentile Rainfall Depth (in)	1.1
Percent Impervious	0.91
Soil Type	98
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.1
Peak Intensity (in/hr)	0.4531
Undeveloped Runoff Coefficient (Cu)	0.3766
Developed Runoff Coefficient (Cd)	0.8529
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	0.2866
Burned Peak Flow Rate (cfs)	0.2866
24-Hr Clear Runoff Volume (ac-ft)	0.0559
24-Hr Clear Runoff Volume (cu-ft)	2435.9893



Peak Flow Hydrologic Analysis

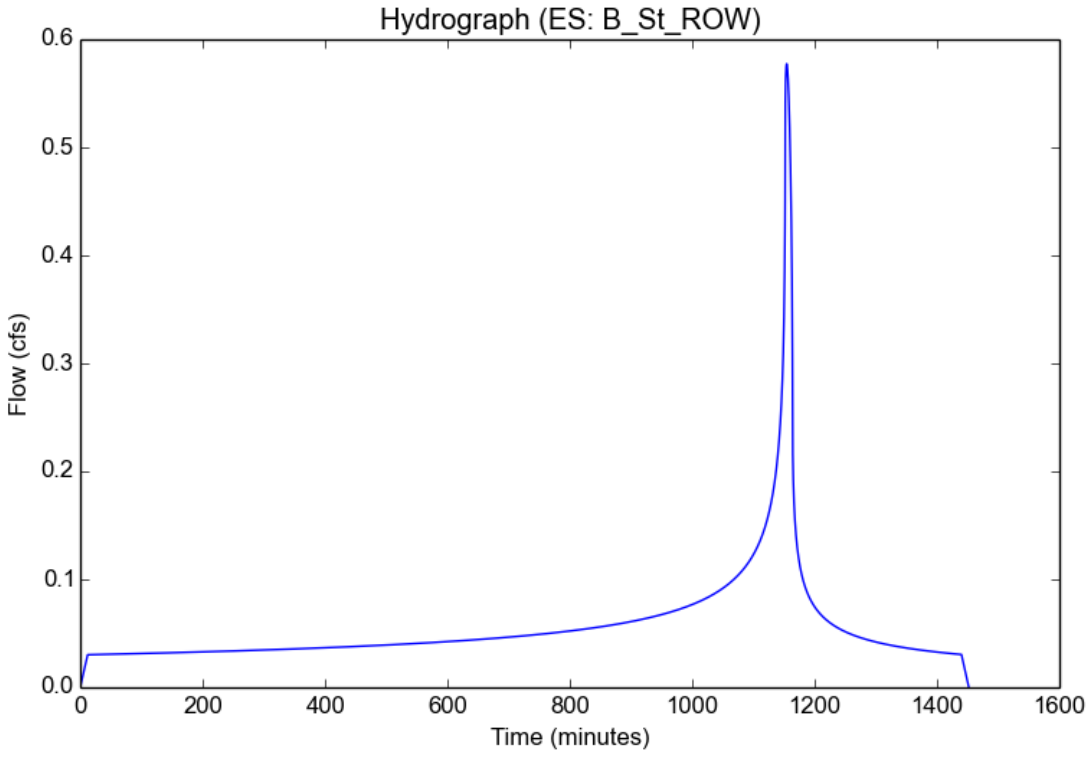
File location: C:/Users/lindsey.spencer/OneDrive - Geosyntec/Desktop/HydroCalc/ES Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	ES
Subarea ID	B_St_ROW
Area (ac)	1.684358968
Flow Path Length (ft)	250.0
Flow Path Slope (vft/hft)	0.05
85th Percentile Rainfall Depth (in)	1.1
Percent Impervious	0.795951275
Soil Type	98
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.1
Peak Intensity (in/hr)	0.4349
Undeveloped Runoff Coefficient (Cu)	0.3518
Developed Runoff Coefficient (Cd)	0.7881
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	0.5773
Burned Peak Flow Rate (cfs)	0.5773
24-Hr Clear Runoff Volume (ac-ft)	0.1133
24-Hr Clear Runoff Volume (cu-ft)	4934.6194



```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           01/01/2017
START_TIME           00:00:00
REPORT_START_DATE    01/01/2017
REPORT_START_TIME    00:00:00
END_DATE             01/10/2017
END_TIME             06:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:10:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:00:30
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.566
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1
```

```
[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
MONTHLY          0.03   0.0479 0.0719 0.102  0.132  0.156  0.168  0.15   0.114  0.0781 0.042  0.03
DRY_ONLY         NO

[JUNCTIONS]
;;Name           Elevation  MaxDepth   InitDepth  SurDepth   Aponded
;;-------------- ---------- ---------- ---------- ---------- ----------
B                0          0          0          0          0
B_Bypass         10         0          0          0          0
B_Overflow       3          900        0          0          0
B_to_River       2          0          0          0          0
C                0          0          0          0          0
C_Bypass         10         0          0          0          0
C_Overflow       3          900        0          0          0
C_to_River       2          0          0          0          0
C_Treated        0          0          0          0          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
River            0          FREE                        NO
C_Infil          0          FREE                        NO
B_Infil          0          FREE                        NO

[DIVIDERS]
;;Name           Elevation  Diverted Link    Type       Parameters
;;-------------- ---------- ---------------- ---------- ----------
WQ_B             20         15               CUTOFF     20.34      0          0          0          0
WQ_C             20         13               CUTOFF     7.70       0          0          0          0

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params            N/A      Fevap    Psi
Ksat     IMD
;;-------------- -------- ---------- ---------- ---------- ---------------------------- -------- --------
RegFac_B         5        25         0          TABULAR    B_Storage                    0        0
RegFac_C         5        25         0          TABULAR    C_Storage                    0        0
```

```
[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset   OutOffset  InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ---------- --------
7                WQ_C             RegFac_C         25         0.01       0          0          0          0
8                WQ_B             RegFac_B         25         0.01       0          0          0          0
10               C_Overflow       C_Bypass         25         0.01       0          0          0          0
12               B                WQ_B             400        0.01       0          0          0          0
13               WQ_C             C_Bypass         25         0.01       0          0          0          0
14               C_Bypass         C_to_River       25         0.01       0          0          0          0
15               WQ_B             B_Bypass         25         0.01       0          0          0          0
16               C                WQ_C             400        0.01       0          0          0          0
17               B_Overflow       B_Bypass         25         0.01       0          0          0          0
29               B_Bypass         B_to_River       25         0.01       0          0          0          0
31               B_to_River       River            25         0.01       0          0          0          0
32               C_to_River       River            25         0.01       0          0          0          0
38               C_Treated        C_to_River       400        0.01       0          0          0          0

[ORIFICES]
;;Name           From Node        To Node          Type         Offset     Qcoeff     Gated    CloseTime
;;-------------- ---------------- ---------------- ------------ ---------- ---------- -------- ----------
C_Treated        RegFac_C         C_Treated        SIDE         2.25       0.65       NO       0

[WEIRS]
;;Name           From Node        To Node          Type         CrestHt    Qcoeff     Gated    EndCon   EndCoeff
Surcharge  RoadWidth  RoadSurf   Coeff. Curve
;;-------------- ---------------- ---------------- ------------ ---------- ---------- -------- -------- ----------
B_Overflow       RegFac_B         B_Overflow       TRANSVERSE   6.1        3.33       NO       0        0      YES
C_Overflow       RegFac_C         C_Overflow       TRANSVERSE   7.75       3.33       NO       0        0      YES

[OUTLETS]
;;Name           From Node        To Node          Offset     Type               QTable/Qcoeff    Qexpon     Gated
;;-------------- ---------------- ---------------- ---------- ---------------- ---------------- ---------- --------
B_Infil          RegFac_B         B_Infil          0          TABULAR/DEPTH    B_Infil                     NO
C_Infil          RegFac_C         C_Infil          0          TABULAR/DEPTH    C_Infil                     NO

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ---------- ----------
7                DUMMY        0                0          0          0          1
8                DUMMY        0                0          0          0          1
10               DUMMY        0                0          0          0          1
12               DUMMY        0                0          0          0          1
```

Design total depths of Regional Facilities B and C

```
13              DUMMY        0               0          0          0          1
14              DUMMY        0               0          0          0          1
15              DUMMY        0               0          0          0          1
16              DUMMY        0               0          0          0          1
17              DUMMY        0               0          0          0          1
29              DUMMY        0               0          0          0          1
31              DUMMY        0               0          0          0          1
32              DUMMY        0               0          0          0          1
38              DUMMY        0               0          0          0          1
C_Treated       CIRCULAR     0.33            0          0          0
B_Overflow      RECT_OPEN    100             12         0          0
C_Overflow      RECT_OPEN    100             12         0          0

[INFLOWS]
;;Node           Constituent      Time Series      Type     Mfactor  Sfactor  Baseline Pattern
;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
B               FLOW             B_Series         FLOW     1.0      1
C               FLOW             C_Series         FLOW     1.0      1.5


[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
B_Infil         Rating     0          1.80
B_Infil                    1          1.94
B_Infil                    2          2.08
B_Infil                    3          2.23
B_Infil                    4          2.38
B_Infil                    5          2.54
B_Infil                    6          2.72
B_Infil                    6.5        2.82
B_Infil                    7          2.92
;
C_Infil         Rating     0          0.0
C_Infil                    2.75       0.0
C_Infil                    2.76       0.0
C_Infil                    4.75       0.0
C_Infil                    4.76       0.0
C_Infil                    5.75       0.0
C_Infil                    6.75       0.0
C_Infil                    7.75       0.0
;
```

```
B_Storage        Storage    0          25987
B_Storage                   1          27945
B_Storage                   2          29973
B_Storage                   3          32063
B_Storage                   4          34209
B_Storage                   5          36619
B_Storage                   6          39156
B_Storage                   7          42006
B_Storage                   8          45127
B_Storage                   9          48619
;
C_Storage        Storage    0          2494
C_Storage                   2.75       2494
C_Storage                   2.76       1559
C_Storage                   4.75       1559
C_Storage                   4.76       6235
C_Storage                   5.76       7432
C_Storage                   6.76       8713
C_Storage                   7.76       10108
C_Storage                   8.76       11647
C_Storage                   9.76       13242
C_Storage                   10.76      15651
```

Storage curves: Regional Facilities B and C

```
[TIMESERIES]
;;Name            Date       Time       Value
;;--------------- ---------- ---------- ----------
[HYDROCALC OUTPUT TIMESERIES - BASIN B]
[HYDROCALC OUTPUT TIMESERIES - BASIN C]

[REPORT]
;;Reporting Options
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -130.293 4579.247 12395.702 13681.120
Units      None
```

```
[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
B                6239.557           7833.385
B_Bypass         7712.688           11286.647
B_Overflow       7840.795           10873.859
B_to_River       9534.651           12610.417
C                9950.246           9154.468
C_Bypass         10815.719          11984.118
C_Overflow       10232.121          11457.456
C_to_River       10602.207          12695.822
C_Treated        9961.673           11941.415
River            10532.017          13225.220
C_Infil          8736.015           9688.730
B_Infil          8056.046           9552.736
WQ_B             6705.821           8678.490
WQ_C             9979.387           9659.588
RegFac_B         8104.615           10067.570
RegFac_C         8833.154           10271.560

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
```

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------


***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ NO
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Flow Routing Method ...... KINWAVE
Starting Date ............ 01/01/2017 00:00:00
Ending Date .............. 01/10/2017 06:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:10:00
Routing Time Step ........ 30.00 sec


*************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.000         0.000
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         5.334         1.738
External Outflow .........         5.182         1.688
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.129         0.042
```

Continuity Error (%) 0.441

****
Highest Flow Instability Indexes
****
Link B_Infil (-3)

****
Routing Time Step Summary
****
Minimum Time Step : 30.00 sec
Average Time Step : 30.00 sec
Maximum Time Step : 30.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.00
Percent Not Converging : 0.00

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
B	JUNCTION	0.00	0.00	0.00	0 00:00	0.00
B_Bypass	JUNCTION	0.00	0.00	10.00	0 00:00	0.00
B_Overflow	JUNCTION	0.00	0.00	3.00	0 00:00	0.00
B_to_River	JUNCTION	0.00	0.00	2.00	0 00:00	0.00
C	JUNCTION	0.00	0.00	0.00	0 00:00	0.00
C_Bypass	JUNCTION	0.00	0.00	10.00	0 00:00	0.00
C_Overflow	JUNCTION	0.00	0.00	3.00	0 00:00	0.00
C_to_River	JUNCTION	0.00	0.00	2.00	0 00:00	0.00
C_Treated	JUNCTION	0.00	0.00	0.00	0 00:00	0.00
River	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
C_Infil	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
B_Infil	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
WQ_B	DIVIDER	0.00	0.00	20.00	0 00:00	0.00
WQ_C	DIVIDER	0.00	0.00	20.00	0 00:00	0.00
RegFac_B	STORAGE	0.05	1.52	6.52	0 20:28	1.52
RegFac_C	STORAGE	2.50	6.63	11.63	0 20:04	6.63

The maximum depths in Regional Facilities B and C during the storm event are lower than the design total depths of:

- B: 6.1 feet (basin bottom at 0 feet)
- C: 7.75 feet (media surface at 4.75 feet)

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent	
B	JUNCTION	20.31	20.31	0 19:15	1.27	1.27	0.000	
B_Bypass	JUNCTION	0.00	0.00	0 00:00	0	0	0.000	gal
B_Overflow	JUNCTION	0.00	0.00	0 00:00	0	0	0.000	gal
B_to_River	JUNCTION	0.00	0.00	0 00:00	0	0	0.000	gal
C	JUNCTION	7.70	7.70	0 19:15	0.473	0.473	0.000	
C_Bypass	JUNCTION	0.00	0.00	0 19:15	0	7.47e-07	0.000	gal
C_Overflow	JUNCTION	0.00	0.00	0 00:00	0	0	0.000	gal
C_to_River	JUNCTION	0.00	0.92	0 20:04	0	0.431	0.000	
C_Treated	JUNCTION	0.00	0.92	0 20:04	0	0.431	0.000	
River	OUTFALL	0.00	0.92	0 20:04	0	0.431	0.000	
C_Infil	OUTFALL	0.00	0.00	0 00:00	0	0	0.000	
B_Infil	OUTFALL	0.00	2.01	0 20:28	0	1.26	0.000	
WQ_B	DIVIDER	0.00	20.31	0 19:15	0	1.27	0.000	
WQ_C	DIVIDER	0.00	7.70	0 19:15	0	0.473	0.000	
RegFac_B	STORAGE	0.00	20.31	0 19:15	0	1.27	0.611	
RegFac_C	STORAGE	0.00	7.70	0 19:15	0	0.473	-0.003	

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS

RegFac_B	1.359	0.1	0	0	41.829	2.7	0	20:28	2.01
RegFac_C	6.316	1.2	0	0	23.805	4.4	0	20:04	0.92

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
River	16.85	0.43	0.92	0.431
C_Infil	0.00	0.00	0.00	0.000
B_Infil	11.74	1.79	2.01	1.258
System	9.53	2.22	2.93	1.688

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days	hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
7	DUMMY	7.70	0	19:15			
8	DUMMY	20.31	0	19:15			
10	DUMMY	0.00	0	00:00			
12	DUMMY	20.31	0	19:15			
13	DUMMY	0.00	0	19:15			
14	DUMMY	0.00	0	19:15			
15	DUMMY	0.00	0	00:00			
16	DUMMY	7.70	0	19:15			
17	DUMMY	0.00	0	00:00			
29	DUMMY	0.00	0	00:00			
31	DUMMY	0.00	0	00:00			
32	DUMMY	0.92	0	20:04			
38	DUMMY	0.92	0	20:04			
C_Treated	ORIFICE	0.92	0	20:04			0.00
B_Overflow	WEIR	0.00	0	00:00			0.00

C_Overflow	WEIR	0.00	0	00:00	0.00
B_Infil	DUMMY	2.01	0	20:28	
C_Infil	DUMMY	0.00	0	00:00	

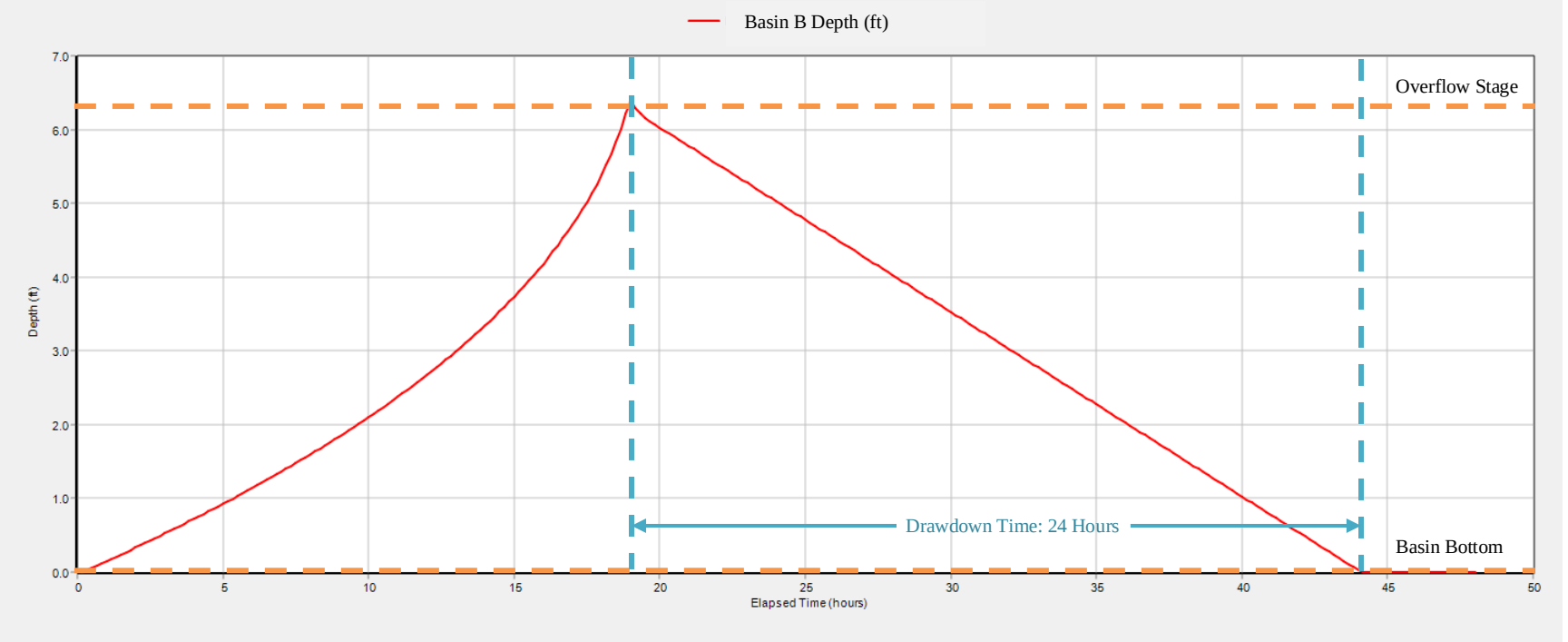
****
Conduit Surcharge Summary
****

No conduits were surcharged.

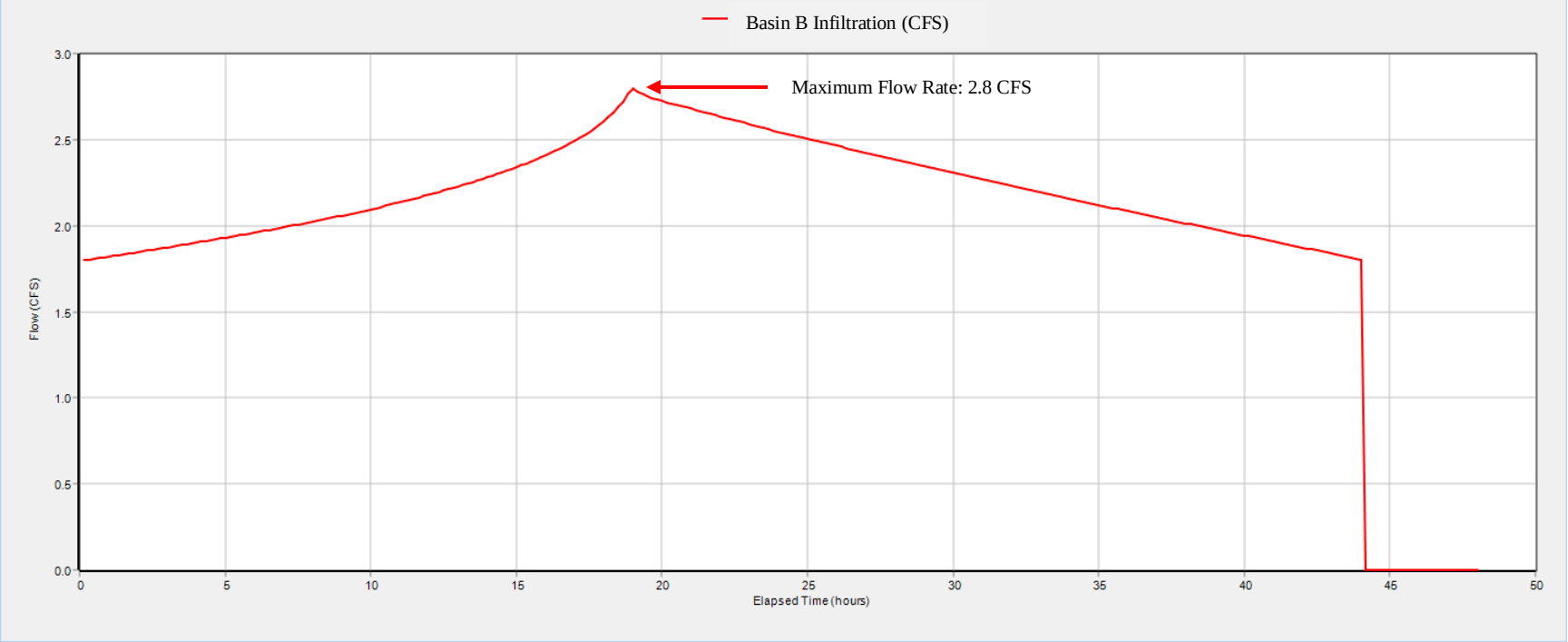
Analysis begun on: Fri Nov 1 11:11:59 2024
Analysis ended on: Fri Nov 1 11:12:00 2024
Total elapsed time: 00:00:01

Basin B

Storage Unit Depth:

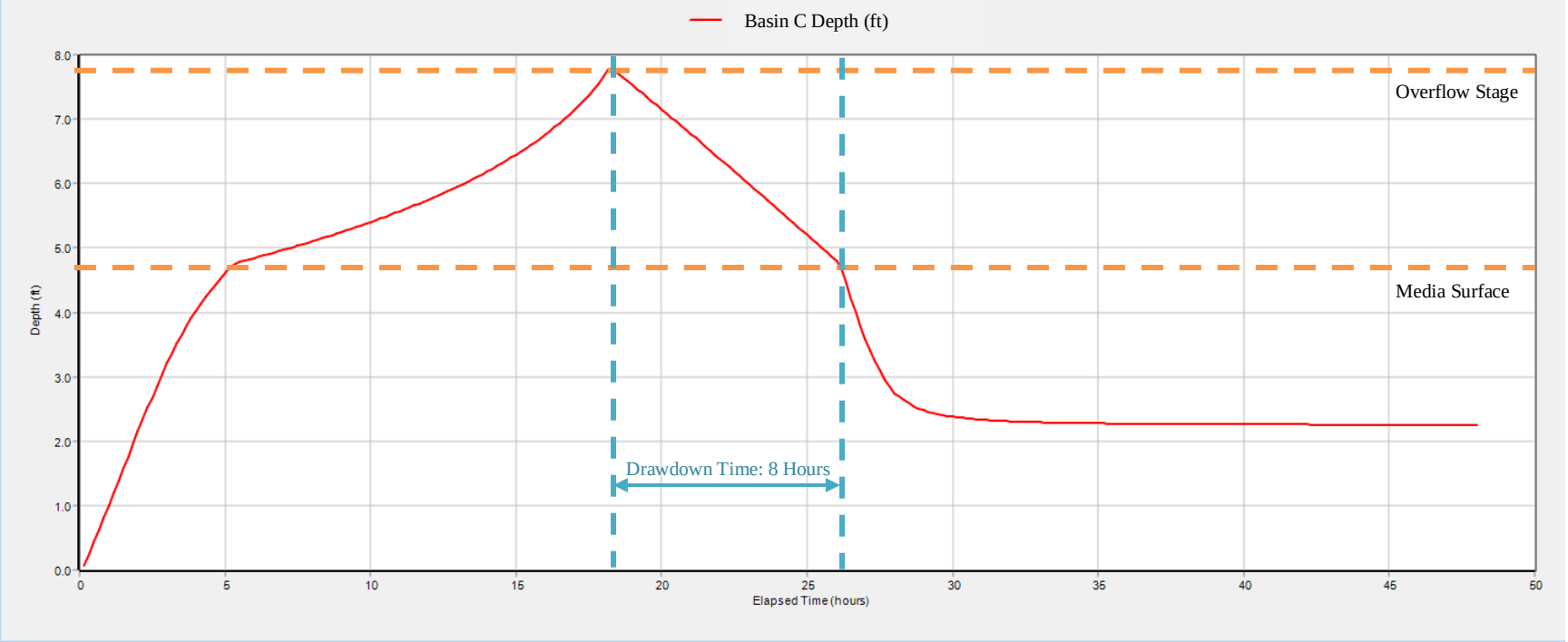


Infiltration Flow:

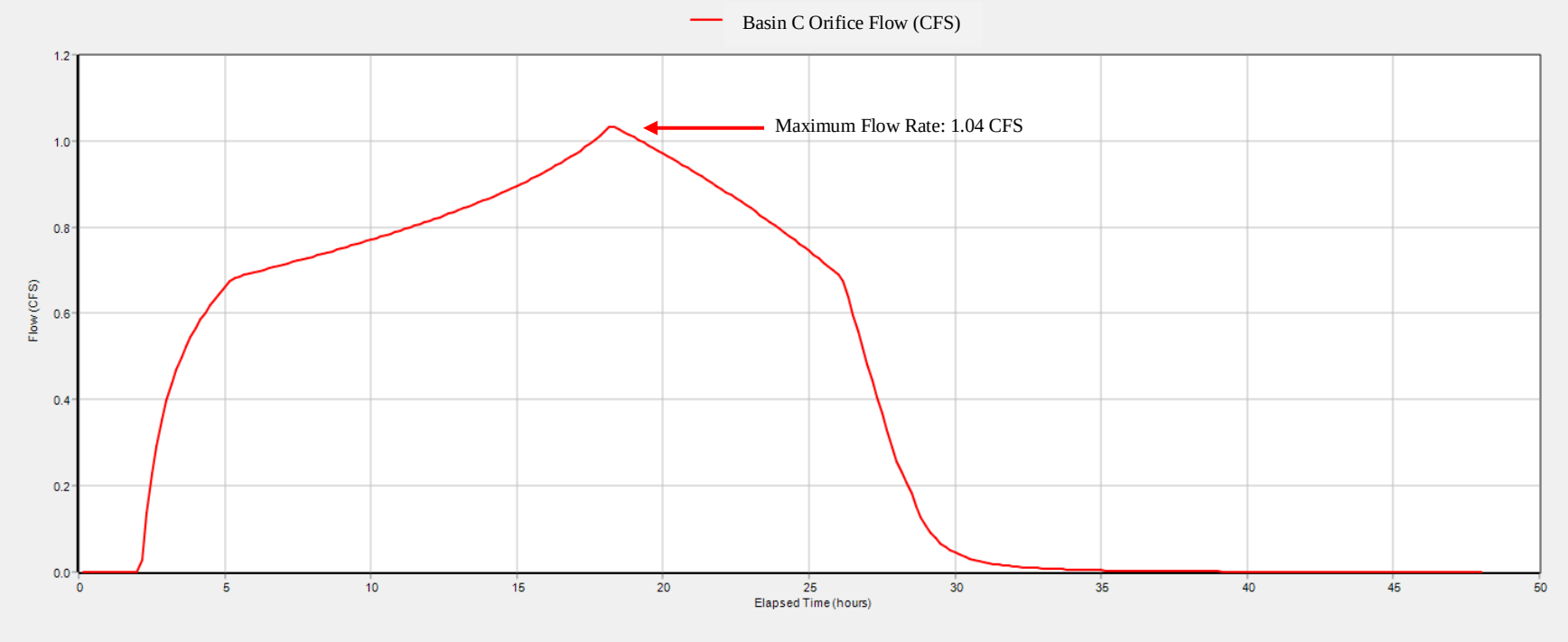


Basin B Infiltration:
2.8 CFS * 3600 seconds/hour = 10,080 cubic feet per hour
10,080 cubic feet per hour / 39,158 square feet basin bottom footprint = 0.25 feet per hour infiltration
0.25 feet/hr * 12 inches/foot = 3 inches per hour

Basin C
Storage Unit Depth:



Treated Flow:



Basin C Media Filtration:
1.04 CFS * 3600 seconds/hour = 3,744 cubic feet per hour
3,744 cubic feet per hour / 6,235 square feet media surface footprint = 0.6 feet per hour filtration
0.6 feet/hr * 12 inches/foot = 7.2 inches per hour

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           01/01/2017
START_TIME           00:00:00
REPORT_START_DATE    01/01/2017
REPORT_START_TIME    00:00:00
END_DATE             01/05/2017
END_TIME             06:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:10:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:00:30
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.566
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
```

```
;;-------------- ----------------
MONTHLY          0.03   0.0479 0.0719 0.102  0.132  0.156  0.168  0.15   0.114  0.0781 0.042  0.03
DRY_ONLY         NO

[JUNCTIONS]
;;Name           Elevation  MaxDepth   InitDepth  SurDepth   Aponded
;;-------------- ---------- ---------- ---------- ---------- ----------
D_Overflow       3          900        0          0          0
D_to_River       2          0          0          0          0
D_Treated        3          900        0          0          0
D1_Bypass        10         0          0          0          0
ES_Bypass        10         0          0          0          0
MV_Bypass        10         0          0          0          0
WQ_D_D1          25         0          0          0          0
WQ_D_ES          25         0          0          0          0
WQ_D_MV          25         0          0          0          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
River            0          FREE                        NO

[DIVIDERS]
;;Name           Elevation  Diverted Link    Type       Parameters
;;-------------- ---------- ---------------- ---------- ----------
D1_Div           20         19               CUTOFF     16.8       0          0          0          0
ES_Div           20         ES_Bypass        CUTOFF     36.75      0          0          0          0
MV_Div           20         1                CUTOFF     40.6       0          0          0          0

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params            N/A      Fevap    Psi
Ksat     IMD
;;-------------- -------- ---------- ---------- ---------- ---------------------------- -------- --------
RegFacD          5        25         0          TABULAR    D_Storage                    0        0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset   OutOffset  InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ---------- --------
--
3                D_Overflow       D_to_River       25         0.01       0          0          0          0
4                D_Treated        D_to_River       25         0.01       0          0          0          0
ES_Direct_to_D   ES_Div           RegFacD          25         0.01       0          0          0          0
D1_Direct_to_D   D1_Div           RegFacD          25         0.01       0          0          0          0
```

```
19              D1_Div          D1_Bypass       25          0.01        0           0           0           0
20              D1_Bypass       River           25          0.01        0           0           0           0
22              D_to_River      River           25          0.01        0           0           0           0
ES_Bypass       ES_Div          ES_Bypass       25          0.01        0           0           0           0
24              MV_Bypass       River           25          0.01        0           0           0           0
1               MV_Div          MV_Bypass       25          0.01        0           0           0           0
MV_Direct_to_D  MV_Div          RegFacD         25          0.01        0           0           0           0
2               ES_Bypass       River           25          0.01        0           0           0           0
5               WQ_D_D1         D1_Div          25          0.01        0           0           0           0
6               WQ_D_MV         MV_Div          25          0.01        0           0           0           0
7               WQ_D_ES         ES_Div          25          0.01        0           0           0           0

[ORIFICES]
;;Name           From Node       To Node         Type         Offset     Qcoeff     Gated    CloseTime
;;-------------- --------------- --------------- ------------ ---------- ---------- -------- -------
D_Treated       RegFacD         D_Treated       SIDE         0          0.61       NO       0

[WEIRS]
;;Name           From Node       To Node         Type         CrestHt    Qcoeff     Gated    EndCon   EndCoeff
Surcharge  RoadWidth  RoadSurf   Coeff. Curve
;;-------------- --------------- --------------- ------------ ---------- ---------- -------- -------- ----------
D_Overflow      RegFacD         D_Overflow      TRANSVERSE   9.75       3.33       NO       0        0          YES

[XSECTIONS]
;;Link           Shape        Geom1           Geom2      Geom3      Geom4      Barrels    Culvert
;;-------------- ------------ --------------- ---------- ---------- ---------- ---------- ----------
3               DUMMY        0               0          0          0          1
4               DUMMY        0               0          0          0          1
ES_Direct_to_D  DUMMY        0               0          0          0          1
D1_Direct_to_D  DUMMY        0               0          0          0          1
19              DUMMY        0               0          0          0          1
20              DUMMY        0               0          0          0          1
22              DUMMY        0               0          0          0          1
ES_Bypass       DUMMY        0               0          0          0          1
24              DUMMY        0               0          0          0          1
1               DUMMY        0               0          0          0          1
MV_Direct_to_D  DUMMY        0               0          0          0          1
2               DUMMY        0               0          0          0          1
5               DUMMY        0               0          0          0          1
6               DUMMY        0               0          0          0          1
7               DUMMY        0               0          0          0          1
D_Treated       CIRCULAR     1.25            0          0          0
D_Overflow      RECT_OPEN    100             12         0          0
```

Design total depth of MV Regional Facility D

```
[INFLOWS]
;;Node           Constituent      Time Series      Type     Mfactor  Sfactor  Baseline Pattern
;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
WQ_D_D1          FLOW             D1_Series        FLOW     1.0      1.5
WQ_D_ES          FLOW             ES_Series        FLOW     1.0      1.5
WQ_D_MV          FLOW             MV_Series        FLOW     1.0      1.5

[CURVES]
;;Name           Type       X-Value     Y-Value
;;-------------- ---------- ----------- -----------
D_Storage        Storage    0           53248
D_Storage                   2.5         53248
D_Storage                   2.75        53248
D_Storage                   2.76        33280
D_Storage                   4.75        33280
D_Storage                   4.76        133120
D_Storage                   5.75        137986
D_Storage                   6.75        142949
D_Storage                   7.75        147953
D_Storage                   8.75        153029
D_Storage                   9.75        158264
D_Storage                   10.75       163389

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
[HYDROCALC OUTPUT TIMESERIES - BASIN D-D1]
[HYDROCALC OUTPUT TIMESERIES - BASIN D-ES]
[HYDROCALC OUTPUT TIMESERIES - BASIN D-MV]

[REPORT]
;;Reporting Options
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None
```

Storage curve: MV Regional Facility D

```
[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
D_Overflow       677.695            3991.462
D_to_River       -1318.036          2700.107
D_Treated        -304.162           4493.063
D1_Bypass        1339.381           3372.465
ES_Bypass        2449.306           3148.346
MV_Bypass        -1147.279          4717.182
WQ_D_D1          2033.084           4322.305
WQ_D_ES          4767.442           4959.302
WQ_D_MV          805.763            7022.412
River            -2203.842          1824.973
D1_Div           1787.620           4738.527
ES_Div           3281.750           4663.821
MV_Div           464.248            6371.398
RegFacD          1275.347           5699.039

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
```

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------


***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ NO
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Flow Routing Method ...... KINWAVE
Starting Date ............ 01/01/2017 00:00:00
Ending Date .............. 01/05/2017 06:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:10:00
Routing Time Step ........ 30.00 sec


*************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.000         0.000
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........        26.670         8.691
External Outflow .........        26.654         8.686
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
```

```
Final Stored Volume ......          0.016          0.005
Continuity Error (%) .....         -0.001
```

```
*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.
```

```
*************************
Routing Time Step Summary
*************************
Minimum Time Step           :    30.00 sec
Average Time Step           :    30.00 sec
Maximum Time Step           :    30.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     1.00
Percent Not Converging      :     0.00
```

```
******************
Node Depth Summary
******************
```

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
D_Overflow	JUNCTION	0.00	0.00	3.00	0 00:00	0.00
D_to_River	JUNCTION	0.00	0.00	2.00	0 00:00	0.00
D_Treated	JUNCTION	0.00	0.00	3.00	0 00:00	0.00
D1_Bypass	JUNCTION	0.00	0.00	10.00	0 00:00	0.00
ES_Bypass	JUNCTION	0.00	0.00	10.00	0 00:00	0.00
MV_Bypass	JUNCTION	0.00	0.00	10.00	0 00:00	0.00
WQ_D_D1	JUNCTION	0.00	0.00	25.00	0 00:00	0.00
WQ_D_ES	JUNCTION	0.00	0.00	25.00	0 00:00	0.00
WQ_D_MV	JUNCTION	0.00	0.00	25.00	0 00:00	0.00
River	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
D1_Div	DIVIDER	0.00	0.00	20.00	0 00:00	0.00
ES_Div	DIVIDER	0.00	0.00	20.00	0 00:00	0.00
MV_Div	DIVIDER	0.00	0.00	20.00	0 00:00	0.00
RegFacD	STORAGE	1.18	6.54	11.54	0 20:29	6.54

The maximum depth in Regional Facility D during the storm event is lower than the design total depth of 9.75 feet (media surface at 4.75 ft).

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
D_Overflow	JUNCTION	0.00	0.00	0 00:00	0	0	0.000 gal
D_to_River	JUNCTION	0.00	14.61	0 20:29	0	8.69	0.000
D_Treated	JUNCTION	0.00	14.61	0 20:29	0	8.69	0.000
D1_Bypass	JUNCTION	0.00	0.04	0 19:21	0	6.14e-05	0.000
ES_Bypass	JUNCTION	0.00	0.00	0 00:00	0	0	0.000 gal
MV_Bypass	JUNCTION	0.00	0.00	0 00:00	0	0	0.000 gal
WQ_D_D1	JUNCTION	16.84	16.84	0 19:21	2.09	2.09	0.000
WQ_D_ES	JUNCTION	40.34	40.34	0 19:16	3.27	3.27	0.000
WQ_D_MV	JUNCTION	40.58	40.58	0 19:16	3.33	3.33	0.000
River	OUTFALL	0.00	14.61	0 20:29	0	8.69	0.000
D1_Div	DIVIDER	0.00	16.84	0 19:21	0	2.09	0.000
ES_Div	DIVIDER	0.00	40.34	0 19:16	0	3.27	0.000
MV_Div	DIVIDER	0.00	40.58	0 19:16	0	3.33	0.000
RegFacD	STORAGE	0.00	97.56	0 19:16	0	8.69	-0.001

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
RegFacD	66.799	2	0	0	459.206	12	0 20:28	14.61

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
River	99.91	3.16	14.61	8.685
System	99.91	3.16	14.61	8.685

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days	hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
3	DUMMY	0.00	0	00:00			
4	DUMMY	14.61	0	20:29			
ES_Direct_to_D	DUMMY	40.34	0	19:16			
D1_Direct_to_D	DUMMY	16.80	0	19:19			
19	DUMMY	0.04	0	19:21			
20	DUMMY	0.04	0	19:21			
22	DUMMY	14.61	0	20:29			
ES_Bypass	DUMMY	0.00	0	00:00			
24	DUMMY	0.00	0	00:00			
1	DUMMY	0.00	0	00:00			
MV_Direct_to_D	DUMMY	40.58	0	19:16			
2	DUMMY	0.00	0	00:00			
5	DUMMY	16.84	0	19:21			
6	DUMMY	40.58	0	19:16			
7	DUMMY	40.34	0	19:16			
D_Treated	ORIFICE	14.61	0	20:29			0.00
D_Overflow	WEIR	0.00	0	00:00			0.00

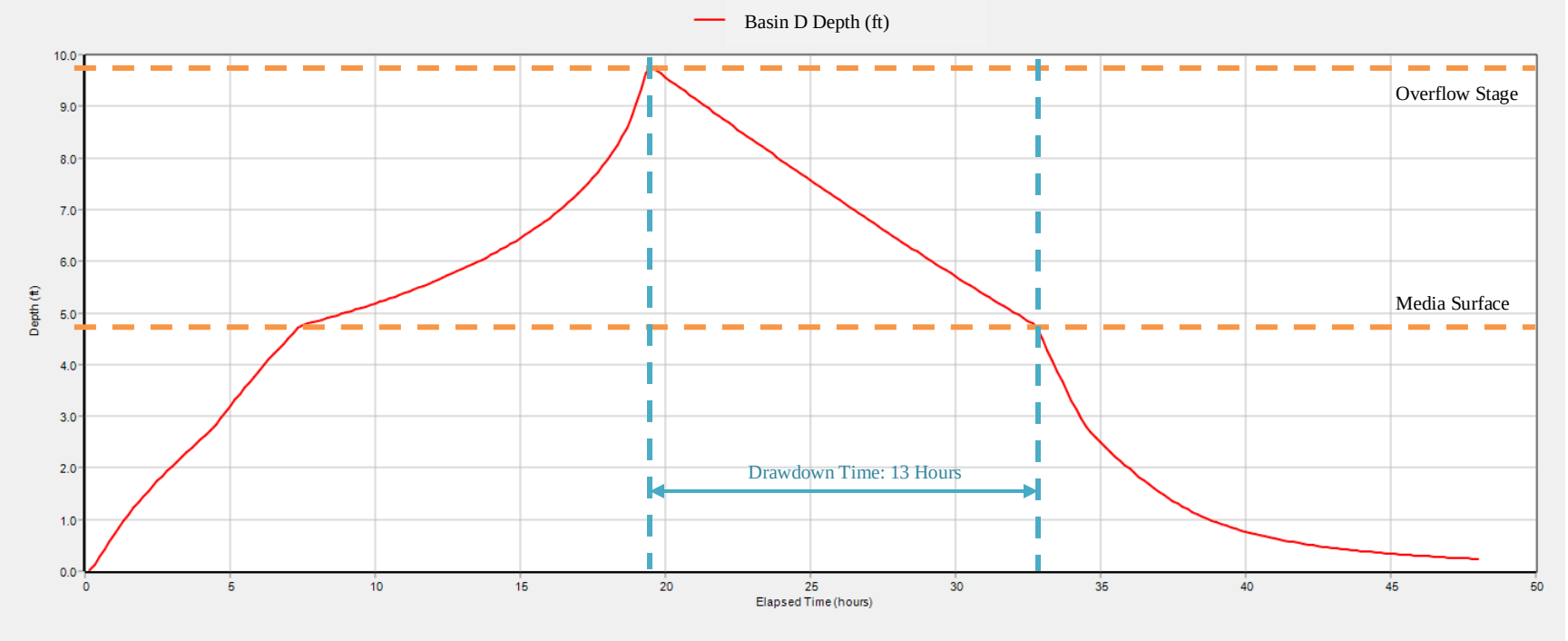
****
Conduit Surcharge Summary

****

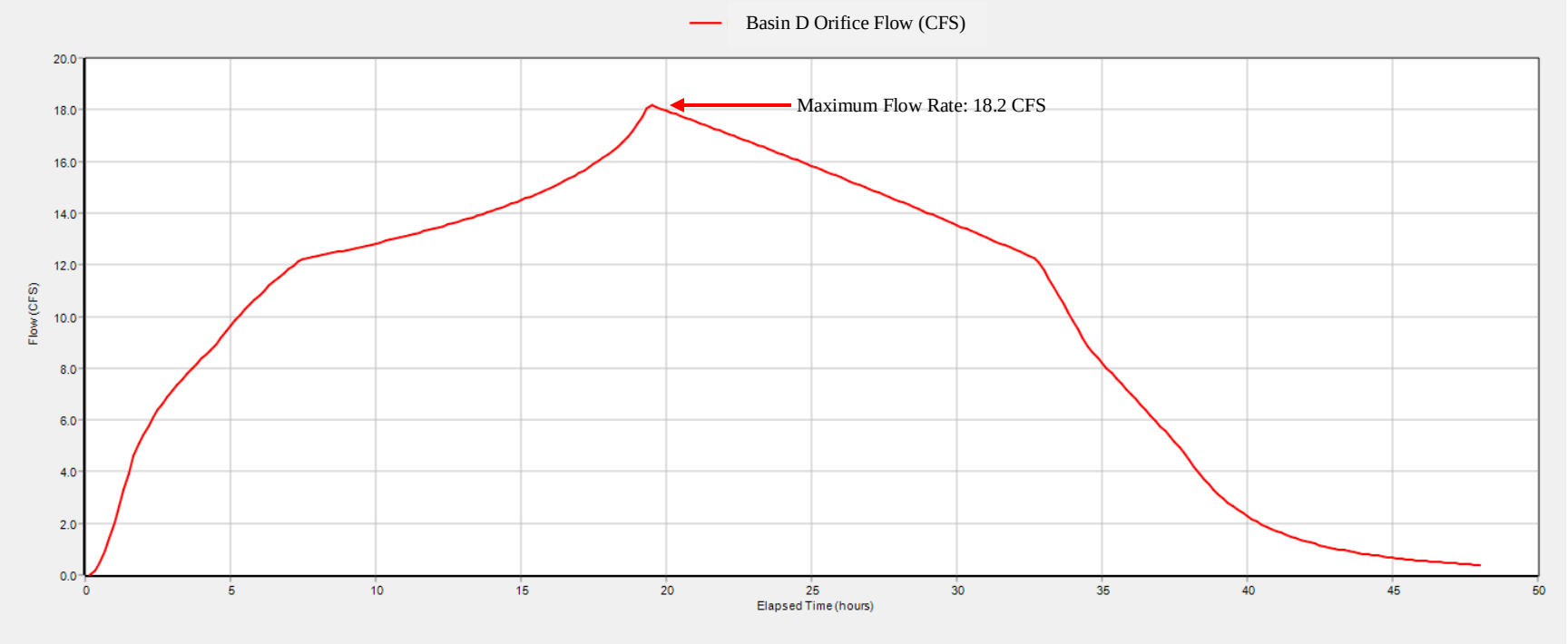
No conduits were surcharged.

Analysis begun on: Mon Dec 12 09:25:19 2022
Analysis ended on: Mon Dec 12 09:25:19 2022
Total elapsed time: < 1 sec

Basin D
Storage Unit Depth:



Treated Flow:



Basin D Media Filtration:
18.2 CFS * 3600 seconds/hour = 65,520 cubic feet per hour
65,520 cubic feet per hour / 133,120 square feet media surface footprint = 0.49 feet per hour filtration
0.49 feet/hr * 12 inches/foot = 5.9 inches per hour

ENTRADA SOUTH DRAINAGE CHANNEL ANALYSIS

Volume IV

County of Los Angeles

Prepared for:

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DATED:
02/13/2025

HYDROLOGY STUDY APPROVED

REVIEWED BY:_____ DATE 03/12/2025

APPROVED BY:_____ DATE 03/12/2025

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

PACE
Advanced Water Engineering

Technical Memorandum

Date: February 13, 2025

To: Jason Fukumitsu, PE; Hunsaker & Associates

Cc: Alex Herrell; Five Point-Newhall Ranch

From: Jose Cruz, PE
Cherise Thompson, EIT

Re: Entrada South Unnamed Canyon 2 – Equilibrium Slope Analysis # A373

1.0 Introduction

The purpose of this technical memorandum is to provide a summary of the hydraulic design of the Unnamed Canyon 2 drainage channel, which is part of the Entrada South development in Santa Clarita, California. In existing conditions, flow enters the channel from the neighboring Westridge golf course to the south, through an existing 36-inch storm drain pipe, as well as overland flow during larger storm events. The drainage channel is approximately 2,500 linear feet in length and flows from the south to the north. On the north end of the channel, flow enters an existing culvert at Magic Mountain Parkway before discharging to the Santa Clara River.

As part of the Entrada South development plan, the existing outlet structure at the upstream end of the channel will be partially demolished and replaced by small basin that will route flows to a bypass storm drain. From the bypass storm drain, smaller flows (average annual flows, equivalent to the 1 to 2-yr historic flow events) will be routed to the Unnamed Canyon 2 drainage channel via a low-flow diversion. The Unnamed Canyon 2 drainage channel will convey the flow to a proposed debris basin at the downstream end of the project reach (Debris Basin #7). During larger storm events, a majority of the flow entering the storm drain will bypass the low flow diversion and flow directly to the downstream debris basin. While peak flow rates in the Unnamed Canyon 2 drainage channel will be significantly reduced from existing conditions, the channel is designed to continue to convey smaller flow rates in order to sustain vegetation in the channel. Portions of the channel are under U.S. Army Corps of Engineers/California Department of Fish and Wildlife (USACE/CDFW) jurisdiction, shown on **Figure 1**. The proposed channel will be completely re-graded, and grade control structures will be installed in order to protect against lateral and vertical erosion. The channel banks will be engineered slopes that will support the adjacent access roads and trails that are proposed to be constructed parallel to the channel.

The drainage channel will be bisected by the proposed “A Street” alignment, beneath which a culvert will be installed, for flow conveyance.

2.0 Hydrology

A Modified Rational Method hydrology analysis was performed by Hunsaker and Associates (ESTU# 2022000056), which provided flow rates tributary to the Unnamed Canyon 2 drainage channel. The hydrology was performed for a 50-yr storm event; however, a majority of the runoff from the tributary watersheds is proposed to be diverted away from the Unnamed Canyon 2 channel and into a proposed storm drain. A fraction of the flow is designed to continue down the Unnamed Canyon 2 channel through a diversion in the proposed storm drain. The amount of diverted flow was determined by Dudek, the environmental consultant for the project, based on the minimum flow required to support vegetation / habitat in the channel (13 cfs). Incremental increases in flow rate occur throughout the channel reach, originating

from local sub-watersheds. The incremental increases are based on the aforementioned 50-yr hydrology; however, the increases are minor and the total cumulative flow at the downstream terminus of the channel is relatively small (37.3 cfs). The design flow rates during a 50-yr storm, shown in **Table 1**, are significantly smaller than in the pre-development condition. A local drainage map exhibit with key node locations can be found in **Enclosure 3** included with this memo. Additionally, a project-wide hydrology drainage concept map has been provided in **Enclosure 5**, which provides greater context for the Unnamed Canyon 2 channel in relation to the project at-large. It should be noted that the flow rates from the hydrology analysis are subject to change, due to ongoing and minor changes to the drainage area as the project approaches final design. During the final design phases, if there are additional changes to the hydrology, all changes will be incorporated into the analysis presented herein.

Table 1: Hydrology Data

Reach	Description of Reach	HEC-RAS Sections	Flow Rate (cfs)
Reach 1	From Node D to Node C on drainage map exhibit (see Enclosures)	STA 1447.98 to STA 2320.35	37.3
Reach 2	From Node C to Node B on drainage map exhibit (see Enclosures)	STA 2320.35 to STA 3440.63	33.6
Reach 3	From Node B to Node A on drainage map exhibit (see Enclosures)	STA 3440.63 to STA 3895.84	25.1
Inlet	Flow diverted from the proposed storm drain to the Unnamed Canyon 2 channel	U/S Conditions	13.0

The flow rates shown in **Table 1** were applied in the hydraulic models and subsequent equilibrium slope analysis discussed in this memo. Reaches were delineated based on the locations of flow changes indicated in the data provided by Hunsaker.

3.0 Preliminary Hydraulic Model Preparation

PACE prepared one-dimensional (1D) hydraulic models using HEC-RAS Version 6.2. A preliminary set of models were run using existing conditions channel invert as a base, in order to provide a realistic estimate of the Unnamed Canyon 2 drainage channel's equilibrium slope. The preliminary equilibrium slope results were used to inform the design of the proposed channel slope. The hydraulic results from the proposed conditions channel geometry were used to re-calculate the equilibrium slope in post-project conditions and verify the results produced by the preliminary analysis.

Two preliminary hydraulic models were created: one representing pre-project invert conditions with post-project flows, and one representing pre-project invert conditions where a self-forming channel has formed, also with post-project flows. It was determined that using pre-project condition flow rates would not produce useful results, since there is no future condition where the full 50-year flow is routed through the channel. Each of the HEC-RAS models developed for this analysis are described herein:

"EX – Unnamed Canyon 2" HEC-RAS Model (Plan 01) represents the channel with sides reflecting post-development grading conditions (banks only), while the invert reflects the pre-development gradient. Additionally, this plan utilizes post-project flows, which are significantly reduced from the existing condition due to the diversion at the upstream end. A composite of the 2011 topographic data and the proposed grading plan was used to cut the sections of this plan. This plan was used to predict what slope the channel would stabilize at (i.e. reach equilibrium). Equilibrium slope calculations were performed using the results of this model; however, it was noted that the flow depths in the existing geometry cross-sections were extremely shallow. In many documented cases, flow that is spread out over a wide area and a shallow depth will carve out a low-flow path where the water travels in a more concentrated and energy-efficient manner toward its downstream destination. For this reason, another model was created, using existing geometry, where a self-forming channel has formed.

"EX – Unnamed Canyon 2 – Self-Form" HEC-RAS Model (Plan 02) is the same geometric configuration as Plan 01, with exception to a self-forming channel, which has formed. Equilibrium slope calculations were

also performed using the results of this model. The parameters used to create the self-forming channel in this model are described in the section titled **"***Self-Forming Channel Parameters***"** herein.

Two additional hydraulic models (Plans 03 and 04) were prepared, where the channel invert was graded to the predicted stable slope using results from Plans 01 and 02, in order to verify the channel slope would not degrade in post-project grading conditions. Plans 03 and 04 are described in the section titled "**Proposed Grading Condition Hydraulic Model**" herein.

3.0.1 Structures

No structures exist in existing conditions in the Unnamed Canyon 2 drainage channel, so none were included in the preliminary hydraulic modeling.

3.0.2 Manning's Roughness Coefficients

A uniform Manning's roughness coefficient was applied to both preliminary models, which was selected from Chow's summary of Manning's roughness values. The Unnamed Canyon 2 channel can be categorized most accurately under Chow's "Main Channels – straight, full stage, no rifts or deep pools – some stones and weeds", where "minimum" Manning's value is 0.03, "normal" is 0.035, and "maximum" is 0.040. For this analysis, the minimum Manning's value from this range was selected – 0.03.

3.0.3 Boundary Conditions

The preliminary hydraulic models were run using the mixed flow regime. Therefore, a boundary condition was required at both upstream and downstream ends. In the Existing (Plan 01) and Existing - Self-Form (Plan 02) channel conditions, normal depth was used as the boundary condition input. The pre-development natural channel continues uninterrupted at the downstream end of Reach 1, absent of any structures or basin-type features.

The slopes used for each model were identical, as they were both determined using 2011 Newhall Ranch topographic data (See **Table 2**).

Table 2: Normal Depth Boundary Conditions – Plan 01 & 02

Plan	Upstream Boundary Condition	Downstream Boundary Condition
Existing	0.009	0.023
Existing Self-Form	0.009	0.023

3.0.4 Cross-Section Spacing

The preliminary models contain 48 sections, with average spacing of 60 feet. The total length of the modeled channel is approximately 2,500 feet. Cross-sections were placed at key locations in the channel where changes to the geometry occur, such as contractions, expansions, bends, and at grade breaks in the invert. Cross sections were cut from 2011 Newhall Ranch topographic data. The geometric changes made to the self-forming channel model sections are described below.

3.0.5 Self-Forming Channel Parameters

"Channel-forming flows" or "dominant discharge flows" describe a condition where a small amount of flow carves an efficient flow path through a wide channel section (a.k.a self-forming channel). These flows are typically not associated with storm events used to evaluate flood risk (i.e. 100-yr or Capital Flood). There is some variation in research as to what exact storm event qualifies as a "channel forming flow", but generally, they fall between a recurrence interval of 1 to 10 years. "Channel-forming flows" will alter a channel until it reaches equilibrium. In existing conditions, a meandering self-forming channel has been observed within the Unnamed Canyon 2 drainage channel and it is assumed the proposed condition will be similar, considering how the channel will regularly convey flows significantly smaller than the pre-development 50-yr event.

The self-forming channel was assumed to have a rectangular shape with a width that was determined using the Dawdy Equation. The Dawdy Equation (Dawdy, 1979) is used in the FEMA approach to identifying regulatory flood hazards on an active alluvial fan. Namely, in the single channel region of the fan, the width and depth of the self-forming channel can be defined as a function of the discharge; and the flow in these channels occurs at critical depth. The width of the self-forming channel is defined as the point where the derivative of the width with respect to the depth is (-200). Given this assumption, the width of the self-forming channel is:

$$W = 9.4Q^{0.4}$$

where,

$W = \text{width of the self-forming channel (ft)}$
$Q = \text{flow (cfs)}$

The depth of the self-forming channel was determined by back-calculating the height of flow in the rectangular self-forming channel using Manning's equation. These dimensions were used to incorporate the self-forming channel into the HEC-RAS model while maintaining the channel's existing longitudinal slope.

3.0.6 Hydraulic Results

The hydraulic results summarized in **Tables 3 and 4** were used to perform the equilibrium slope analysis. The results are averaged by reach, which were defined by locations where the flow rate changes in the channel. The average excludes sections at drop structure tops, slopes, or toes, since those sections exhibit depths and velocities that don't conform with the average channel characteristics.

Table 3: HEC-RAS Results for Plan 01

Hydraulic Parameter	Reach 1	Reach 2	Reach 3
Flow Rate (cfs)	37.3	33.6	25.1
Average Channel Depth (ft)	0.6	0.4	0.7
Average Velocity (ft/s)	3.94	2.71	3.32
Average Top Width (ft)	37	76	26
Average Froude Number	1.13	1.11	1.15
Average Energy Slope (ft/ft)	0.026	0.030	0.052

Table 4: HEC-RAS Results for Plan 02

Hydraulic Parameter	Reach 1	Reach 2	Reach 3
Flow Rate (cfs)	37.3	33.6	25.1
Average Channel Depth (ft)	0.3	0.3	0.4
Average Velocity (ft/s)	3.13	3.19	2.97
Average Top Width (ft)	45	39	34
Average Froude Number	1.06	1.09	1.12
Average Energy Slope (ft/ft)	0.025	0.027	0.036

4.0 Preliminary Equilibrium Slope Analysis

In most alluvial channels, a stable channel slope is achieved when the supply of sediment and the sediment transport capacity of the channel are balanced, or in equilibrium. For Unnamed Canyon 2, the sediment supply has been significantly reduced over time, due to the development of the areas upstream of the project. As a result, the natural channel has experienced considerable erosion and has transformed from a braided stream with multiple threaded channels to a severely incised and widened channel (Geosyntec, 2013).

The equilibrium slope was calculated using a variety of methods including (1) the Incipient Motion Equation from HEC-20 (**Eqn. 6.17**) (2) the Meyer-Peter Muller Equation from HEC-20 (**Eqn. 6.18**), and (3) methodology outlined in the Albuquerque Metropolitan Arroyo Flood Control Agency (AMAFCA) Sediment and Erosion Design Guide.

4.0.1 Sediment Data

PACE used sediment data obtained from the particle size distribution test report prepared by ENGEO in 2021. Two sample points were taken in the streambed and were filtered out to only include particles 3" in diameter or smaller. This prevented larger, superficial grain sizes from skewing the data. Per ENGEO's observation, it is normal for the sediment in alluvial channels to vary in size over a very short distance and to have over-bank deposits consisting of fine-grained silts and clays. The particle size distribution data from the two sample points were averaged and used for the equilibrium slope calculations of the entire channel.

4.0.2 HEC-20 Incipient Motion Equation

Methodology outlined in Hydraulic Engineering Circular No. 20 (HEC-20) was used to estimate the equilibrium slope of the drainage channel at Unnamed Canyon 2. For clear-water releases of flow from dams, detention ponds, or other retention structures, there is no sediment supply delivered to the channel from upstream reaches. Such is the case with the Unnamed Canyon 2 channel, which is preceded by Debris Basin #5. In this case, the channel would be expected to degrade until the reduction in slope results in a boundary shear stress too low to entrain the bed material. In a sand bed channel, such as Unnamed Canyon 2, the channel slope would have to be extremely low to reach incipient motion conditions and the amount of degradation could be significant. Depending on the bed and bank materials, the degrading channel can narrow as it deepens or the banks can become unstable and the channel can widen. Channel widening temporarily replenishes sediment supply. **Equation 6.17** from HEC-20 assumes the channel width remains constant for future conditions.

Equation 6.17 combines the Incipient Motion Relationship (Equation 6.13) and Manning's Equation (Equation 3.3) to calculate the equilibrium slope where bed material movement ceases.

> *The Incipient Motion Relationship* describes the condition where the hydraulic forces acting on a sediment particle are equal to the forces resisting motion. The particle is at a critical condition where a slight increase in the hydraulic forces will cause the particle to move. The hydraulic forces consist of lift and drag and are usually represented in a simplified form by the shear stress of the flow acting on the particle. Incipient motion conditions can be analyzed using the Shields diagram. The Incipient Motion Relationship can be used to calculate a sediment particle size that will move for a particular hydraulic condition or to calculate the shear stress required to move a particular particle size. The average shear stress acting on the channel includes all the factors contributing to resistance of flow.
>
> *The Manning's Equation* recognizes that flow rate is a function of gravitational forces on water in a sloping channel and the resistance produced by friction between the water and wetted surface of the channel. Manning's Equation can be used to determine the velocity and discharge of flow under steady, uniform conditions in open channels.

The Incipient Motion Relationship and Manning's equation are combined to produce the following equation:

$$S_{eq} = \left[K_s D_c \left(\frac{\gamma_s - \gamma}{\gamma}\right)\right]^{10/7} \left(\frac{1.486}{q \times n}\right)^{6/7} \qquad \textbf{Equation 6.17}$$

where,

S_{eq} = Equilibrium slope (ft/ft)
K_s = Shields Parameter (assumed to be 0.047)
D_c = Critical bed material size = D_{90} (ft)
γ_s = Specific weight of sediment (165.4 lb/ft^3)
γ = Specific weight of water (62.4 lb/ft^3)
q = Discharge per unit width (ft^2/s)
n = Manning's roughness coefficient

The critical size (D_C) used in this equation should be D_{90} because the bed will coarsen as degradation occurs.

The Shield's Parameter can range from 0.03 to 0.10 for natural sediments based on particle shape, angularity, gradation, and imbrication. The use of 0.047 for sand sizes provides reasonable results (Meyer-Peter and Muller 1948, Gessler 1971), while lower values (0.03) are commonly used for gravel and cobble sizes. The sediment observed in Unnamed Canyon 2 is sandy; therefore, the Shield's Parameter was assumed to be 0.047.

4.0.3 HEC-20 Meyer-Peter Muller Equation

Another approach described in HEC-20 is also used for determining the equilibrium slope of a channel with no upstream sediment supply. Equation 6.18 is presented by the USBR using the Meyer-Peter Muller equation for beginning of transport (USBR 1984). If adjustment of the hydraulic depth due to the reduction in channel slope is included in the equation, the USBR equation is:

$$S_{eq} = 60.1 \frac{(D_{50})^{10/7} n^{9/7}}{(D_{90})^{5/14} q^{6/7}} \qquad \textbf{Equation 6.18}$$

where,

S_{eq} = Equilibrium slope (ft/ft)
n = Manning's roughness coefficient
q = Discharge per unit width (ft^2/s)
D_{50} = Median particle size (ft)
D_{90} = Particle diameter representing the 90% cumulative diameter (ft)

The stable slope computation is made for the "dominant discharge", which is defined as the flow affecting the ultimate shape and hydraulics of the channel. Unnamed Channel 2 is designed to accept a portion of the 50-yr flow from the proposed storm drain mainline. This diverted water is significantly smaller than the 50-yr pre-development flow, and can be accurately characterized as "dominant discharge". Therefore, the design flow rates for Unnamed Canyon 2 presented in the **Hydrology** section are appropriate for use in the calculation of equilibrium slope using **Equation 6.18**.

4.0.4 AMAFCA Method

A third method was considered, based on the equations provided in the Albuquerque Metropolitan Arroyo Flood Control Agency (AMAFCA) Sediment and Erosion Design Guide. Equations 3.59 and 3.60 from the AMAFCA Design Guide provide an estimate of the maximum stable channel slope in an alluvial channel when the sediment supply cannot be accurately estimated.

These equations were developed for cases where there is an unacceptable uncertainty in the estimated upstream bed material supply, and are based on the observation that stable alluvial channels rarely maintain supercritical flow for extended periods of time. High velocities associated with supercritical flow in sand-bed streams will result in extreme rates of bed material transport. The stream, reacting to this high transport capacity, will erode its bed and banks to a condition that will sustain transport rates consistent with the upstream supply. The typical Froude number range of a stable channel is between 0.7 and 1.0. A Froude number of 0.75 was selected for the present analysis, in order to evaluate the equilibrium slope. A Froude number of 0.75 reflects a condition where flow is sub-critical and stable. Froude numbers approaching 1.0 tend to be unstable and can produce widely varying results.

Using these assumptions, the maximum stable slope for a channel of given geometry and dominant discharge can be computed by combining the relationship for the Froude Number with a uniform flow formula. Using the wide rectangular channel assumption, which is valid for most arroyo channels, the following equations can be derived for stable channel slope:

$$S_{eq} = C \times Q^{-0.133} \quad \textbf{Equation 3.59}$$

where,

S_{eq} = Equilibrium slope (ft/ft)
Q = Discharge (cfs)

$$C = 18.28 \times n^2 \times F^{0.133} \times F_r^{2.133} \quad \textbf{Equation 3.60}$$

where,

Q = Discharge (cfs)
n = Manning's roughness coefficient
F = width to depth ratio of flow in channel (ft/ft)
Fr = Maximum Froude number (0.75)

The AMAFCA Design Guide states that the aforementioned equations can be used to obtain an initial approximation of the stable slope for use in locating grade control structures and bank protection measures.

4.0.5 Results of the Preliminary Equilibrium Slope Analysis

Table 5 shows the results of the three equilibrium slope methods for the pre-project channel conditions (with post-project flows). **Table** 6 shows the results of the three methods for pre-project channel conditions where a self-forming channel has formed (with post-project flows).

Table 5: Equilibrium Slopes Calculated for Plan 01

Existing Geometry, Post-Project Flows			
	Incipient Motion (Eqn. 6-17)	Meyer-Peter Muller (Eqn. 6-18)	AMAFCA
Reach 1	0.023	0.005	0.010
Reach 2	0.052	0.011	0.011
Reach 3	0.032	0.007	0.010
Average	0.035	0.007	0.011

Table 6: Equilibrium Slopes Calculated for Plan 02

Existing Geometry, Self-Forming Channel, Post-Project Flows			
	Incipient Motion (Eqn. 6-17)	Meyer-Peter Muller (Eqn. 6-18)	AMAFCA
Reach 1	0.036	0.007	0.011
Reach 2	0.037	0.008	0.011
Reach 3	0.042	0.009	0.011
Average	0.038	0.008	0.011

The three equilibrium slope methods provide a range of slopes, which are averaged by method in the tables above. The Incipient Motion method generally produced the steepest slopes, 3.5 to 3.8%. The Meyer-Peter Muller method generally produced the smallest slopes, from 0.7% to 0.8%. The AMAFCA method produced results of a median value, around 1.1%. Based on the results of all three methods, a design slope of 1% was selected for the proposed channel. This slope is most in-line with the results from the AMAFCA method, and is a median value.

5.0 Proposed Grading Condition Hydraulic Model

PACE prepared two proposed grading conditions hydraulic models based on the preliminary equilibrium slope calculations. A uniform channel slope was used for both proposed models, set at the estimated equilibrium slope of 1%, which is based on equilibrium slope calculations using results from Plans 01 and 02. Grade control structures were intermittently placed along the channel length in order to make up the height deficit caused by the shallower slope. The hydraulic results from the proposed conditions models (Plans 03 and 04) were then used to re-calculate the equilibrium slope in post-project conditions (with 1% channel slope) to verify the results produced by the preliminary analysis. The proposed conditions HEC-RAS models developed for this analysis are described below:

"PR ND – Unnamed Canyon 2" HEC-RAS Model (Plan 03) represents post-project grading conditions, with post-project flows. The grading plan obtained from Hunsaker & Associates was used to cut sections for this model. Normal depth (ND) was used as the downstream boundary condition for this model, reflecting a design where the downstream culvert and basin do not restrict the flow rate in the channel. Further discussion of the downstream boundary condition is discussed in the section titled **"***Boundary Conditions***"** herein. Equilibrium slope calculations were performed using the results of Plan 03, in order to verify that the design slope selected, based on the preliminary analysis, was appropriate to use.

"PR WSE – Unnamed Canyon 2" HEC-RAS Model (Plan 04) is identical to Plan 03, with exception to the downstream boundary condition. A maximum water surface elevation (WSE) was determined as the downstream boundary condition of this model, reflective of a design where the downstream culvert and basin restrict the flow rate in the channel, to the point that the water surface reaches a maximum elevation (without infringing upon the required freeboard). Further discussion of the downstream boundary condition is discussed in the section titled "*Boundary Conditions*" herein. Equilibrium slope calculations were also performed on this model, in order to verify that the design slope selected, based on the preliminary analysis, was appropriate to use.

5.0.1 Structures

Only one culvert was included in the post-project conditions HEC-RAS models. The proposed development will include the "A Street" road crossing. A 4 ft. diameter culvert will be installed at the base of the road in order to convey flow from one side to the other. The culvert is located between HEC-RAS sections 2320.35 and 2119.93 and has a design slope of 5%.

The proposed drop structures were incorporated into the models using a series of tightly spaced cross sections along the top, slope, and toe of the drop. HEC-RAS guidance was used for the spacing of the sections and general drop structure modeling procedures.

5.0.2 Manning's Roughness Coefficient

For most sections, a uniform manning's coefficient of 0.03 was used, which is the same roughness coefficient used in the preliminary models. However, for sections located at grade control structures and the associated rock apron and invert lining, an increased manning's roughness coefficient of 0.04 was used.

5.0.3 Boundary Conditions

The proposed condition hydraulic models were run using the mixed flow regime. Therefore, a boundary condition was required at both upstream and downstream limits.

In the proposed condition, Debris Basin No.7 will be installed at the downstream end of Reach 1, introducing the potential for water to back up to a depth higher than normal depth. The final design of the pipe leading to Debris Basin No.7 and the surrounding grades will ultimately determine the downstream water surface elevation condition in the Unnamed Canyon 2 channel; however, these design details will be determined at during the final design phase of the project. Due to the uncertainty of the final design condition at the downstream end of the Unnamed Canyon 2 channel, two scenarios were run in the proposed condition hydraulic model: (1) Plan 03 utilizes normal depth as the downstream boundary condition, which produces the smallest flow depths and therefore highest velocities; (2) Plan 04 utilizes a maximum water surface

elevation providing 2.5 ft. of freeboard as the downstream boundary condition, which produces the maximum flow depths and therefore lowest velocities.

The slope used for the Plan 03 downstream boundary condition were determined using the Hunsaker proposed grading plan. The maximum water surface elevation used for the Plan 04 downstream boundary condition was determined by subtracting 2.5 ft. of freeboard from the minimum top of bank elevation shown on the Hunsaker proposed grading plan (1180.0 ft. elev.). Boundary conditions used for each proposed condition plan are summarized in **Table 7**.

Table 7: Boundary Conditions – Plans 03 and 04

Plan	Upstream Boundary Condition	Downstream Boundary Condition
Proposed (Normal Depth)	S = 0.009	S = 0.010
Proposed (Max. Water Surface Elevation)	S = 0.009	WSE = 1177.5'

5.0.4 Cross-Section Spacing

The proposed condition models contain the same 48 cut cross-sections as the preliminary hydraulic models; however, a large number of sections were added to the proposed conditions models in the vicinity of grade control structures, through interpolation. For the areas immediately upstream of the grade control structure crest, immediately downstream of the crest, and immediately downstream of the toe, cross-sections were interpolated at 1-ft. intervals, in order to capture the rapidly varying water depth and velocity at these locations. The total length of the modeled channel was unchanged from the preliminary hydraulic models, at approximately 2,500 feet. Cross sections were cut from a composite of 2011 Newhall Ranch topographic data and the Hunsaker grading plan.

5.0.5 Grade Control Structure Locations

The grade control structures were placed in locations that would reduce impacts to the USACE/CDFW jurisdictional areas to the maximum extent possible. **Figure 1** shows the grade control structures in relation to the USACE/CDFW jurisdictional boundary. Structures were most ideally placed in narrow portions of the channel, where the impact to the jurisdictional areas would be minimal. Due to the irregular spacing of the sections, the drop heights at each grade control structure also vary. However, all structures have several features in common: (1) slope of the grouted rock chute is 1:1, (2) grouted rock extends 5 feet upstream of the grade control structure crest, and (3) a loose rock apron extends 8 feet downstream of each grade control structure. **Figure 2** provides dimensions and layout of a typical structure.

5.0.6 Results of the Proposed Grading Condition Hydraulic Analysis

The HEC-RAS results for the proposed conditions models are shown in **Table 8 and 9**. Results are averaged by reach, which were delineated based on flow change locations.

Table 8: HEC-RAS Results from Plan 03

Hydraulic Parameter	Reach 1	Reach 2	Reach 3
Flow Rate (cfs)	37.3	33.6	25.1
Average Channel Depth (ft)	0.5	0.4	0.9
Average Velocity (ft/s)	2.06	1.57	2.50
Average Top Width (ft)	61	104	32
Average Froude Number	0.66	0.59	0.74
Average Energy Slope (ft/ft)	0.009	0.009	0.012

Table 9: HEC-RAS Results from Plan 04

Hydraulic Parameter	Reach 1	Reach 2	Reach 3
Flow Rate (cfs)	37.3	33.6	25.1
Average Channel Depth (ft)	0.9	0.4	0.9
Average Velocity (ft/s)	1.80	1.57	2.50
Average Top Width (ft)	63	104	31
Average Froude Number	0.56	0.59	0.74
Average Energy Slope (ft/ft)	0.008	0.009	0.012

6.0 Updated Equilibrium Slope Analysis Results

The hydraulic parameters obtained from the proposed conditions hydraulic models were used in the three equilibrium slope equations described in the section titled "**Preliminary Equilibrium Slope Analysis**" herein. The results from that analysis for the proposed conditions are shown in **Table 10 and 11**. These values demonstrate that the channel is not expected to degrade if constructed at a 1% slope, regardless of downstream boundary condition. The results of all three methods applied show that the equilibrium slope will trend toward 1% at a minimum (aggradation). This confirms that the initial slope of 1% selected for design based on the preliminary hydraulic models and equilibrium slope analysis was appropriate to use.

Table 10: Equilibrium Slopes Calculated for Plan 03

Proposed Geometry Condition, Post-Project Flows, Normal Depth Downstream Boundary Condition			
	Incipient Motion (Eqn. 6-17)	Meyer-Peter Muller (Eqn. 6-18)	AMAFCA
Reach 1	0.046	0.010	0.011
Reach 2	0.075	0.016	0.013
Reach 3	0.032	0.007	0.011
Average	0.051	0.011	0.011

Table 11: Equilibrium Slopes Calculated for Plan 04

Proposed Geometry Condition, Post-Project Flows, Max. WSE Downstream Boundary Condition			
	Incipient Motion (Eqn. 6-17)	Meyer-Peter Muller (Eqn. 6-18)	AMAFCA
Reach 1	0.047	0.010	0.011
Reach 2	0.075	0.016	0.013
Reach 3	0.032	0.007	0.011
Average	0.052	0.011	0.011

7.0 Erosion Protection

As mentioned in the previous section, the Unnamed Canyon 2 channel is not expected to degrade in the proposed condition. Additionally, velocities in the channel between drops are relatively low, with a maximum velocity of 4.0 ft/s and an average velocity of 1.9 ft/s, indicating that erosion is unlikely between drop structures. However, some protection is proposed to be installed along the banks between drops, in order to prevent potential undermining if a low-flow channel were to form and migrate to the banks.

The proposed bank protection will be in the form of turf reinforcement mats (TRM), installed along the channel banks for the channel reaches between grade control structures.

A reasonable assumption for the depth of protection below the invert can be taken from the LA County Sedimentation Manual. Chapter 5 recommends incorporating a toe-down depth of 2 ft. at levees, in order to account for local scour. The proposed TRM will, instead, be installed at a minimum of 2.5 feet below the proposed channel invert. The 2.5 ft. depth adds an extra factor of safety and allows for a smooth transition

at the rock at the toe of each drop, which has a minimum thickness of 2.5 ft. The TRM will also extend 1-foot above the invert of the channel (which is greater than the maximum depth found in the channel). **Figure 2** shows a typical section at a grade control structure, which helps demonstrate the TRM placement.

The approach used for sizing the loose and grouted rock at the grade control structures was slightly different than the approach used in the rest of the channel. The velocities observed at each grade control structure vary considerably as the flow transitions between subcritical and supercritical flow regimes. At each grade control structure, additional sections were interpolated within the hydraulic model at 1-foot intervals, in order to capture the rapidly changing depths and velocities. A velocity profile was plotted at each of these sections, as shown in **Figure 3** through **Figure 10**. The zone where rapidly changing velocity occurs was averaged and compared to the peak velocity occurring in that zone. In all cases, it was determined that using the maximum velocity, as opposed to the average, would be suitable for sizing the rock. Rock sizing tables found in Appendix F of the Los Angeles County Hydraulic Design Manual provide guidance on bank protection with respect to channel velocities (See **Table 12**). **Table 13** summarizes the average and maximum velocities at each structure, which can be compared to the minimum LACFCD rock sizes and layer thicknesses shown in **Table 12**. It should be noted that the results from the proposed condition model with downstream boundary condition equal to a maximum water surface elevation were not used in the TRM / rock sizing analysis, as they represent a condition with maximum flow depths and, therefore, minimum velocities.

The grade control structure chute is proposed to consist of grouted rock, which would also extend 5 feet upstream of the crest. A loose rock apron will be installed downstream of each grade control structure for a length of 8 feet. The rock apron downstream of the grade control structures was set at 8 feet uniformly, since this encompasses the zone where the velocities transition back to sub-critical flow regime at all structures. The channel slopes at each drop structure are also proposed to be lined with grouted rock, from 5 feet upstream of the crest to the end of the apron. **Figure 2** shows a typical section at a grade control structure, which helps demonstrate the loose and grouted rock placement.

Table 12: LACFCD Hydraulic Design Manual – Min. Rock Size for Levees

Channel Velocities (ft/s)	LACFCD Rock Size (D_{50})	LACFCD Levee Thickness (2 x D_{50})	LACFCD Filter Thickness
0 – 7	50 lb. (10-in.)	20-inch	6-inch
7 – 9	100 lb. (12-in.)	24-inch	6-inch
10	150 lb. (15-in.)	30-inch	9-inch

Table 13: Summary of Velocities at Grade Control Structures

Grade Control Structure ID	Station at Crest of Grade Control Structure	Maximum Velocity (ft/s)	Average Velocity (ft/s)
1	36+54.26	7.0	5.4
2	35+37.09	6.6	3.1
3	32+53.32	9.0	5.6
4	30+04.33	7.6	5.5
5	27+04.94	7.3	4.4
6	18+11.06	6.8	5.1
7	16+52.33	7.8	5.6
8	15+22.84	7.5	4.6

Table 13 shows the maximum and average velocities at each grade control structure, which can be compared to the minimum rock sizing criteria from the LA County Hydraulic Design Manual in **Table 12**. In all cases, the rock size selected for design was larger than what the Design Manual requires. The chute and side slopes at each structure is proposed to consist of 100-lb grouted rock. The loose rock apron

downstream of each structure is proposed to consist of 150-lb rock. This was done in light of the fact that the rock apron will need to protect against impinging flows, and will therefore need to be more robust.

8.0 Enclosures

1. HEC-RAS Output Data
2. Equilibrium Slope Calculations
3. Drainage Map
4. Digital HEC-RAS Model
    a. Plan 01 – EX – Unnamed Canyon 2
    b. Plan 02 – EX – Unnamed Canyon 2 – Self Form
    c. Plan 03 – PR ND – Unnamed Canyon 2
    d. Plan 04 –PR WSE – Unnamed Canyon 2
5. Drainage Concept Map (Whole Site Hydrology)

MATCHLINE SEE BELOW RIGHT

STA 27+04.79
STRUCTURE #5
INV 1199.00
INV 1202.90

STA 30+09.49
STRUCTURE #4
INV 1205.85
INV 1210.86

STA 32+53.43
STRUCTURE #3
INV 1213.35
INV 1217.41

GRADE CONTROL STRUCTURES

CDFW LIMITS

USACE LIMITS

34" GAS LINE

30' EASEMENT FOR GAS LINE

STA 34+40.63
END REACH 2
BEGIN REACH 3

STA 35+36.59
STRUCTURE #2
INV 1220.20
INV 1225.20

STA 36+52.44
STRUCTURE #1
INV 1226.39
INV 1230.13

EX. OVERHEAD
ELECTRICAL LINES (SCE)

SCE EASEMENT

STA 38+95.84
END REACH 3

LOW FLOW
DIVERSION OUTLET
TO CHANNEL

STORM DRAIN
MAIN LINE

MAGIC MOUNTAIN PKWY

STA 18+10.40
STRUCTURE #6
INV 1181.04
INV 1182.84

STA 16+51.64
STRUCTURE #7
INV 1179.47
INV 1177.56

STA 15+22.85
STRUCTURE #8
INV 1176.29
INV 1174.79

GRADE CONTROL STRUCTURE

STA 14+47.98
BEGIN REACH 1

"A" STREET

4 FT DIA. CULVERT

USACE LIMITS

STA 23+20.35
END REACH 1/
BEGIN REACH 2

MATCHLINE SEE ABOVE LEFT

50 25 0 50 100

NO	BY	DATE	REVISIONS	DATE	APP.

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SCALE	1" = 50'
DESIGNED	JC
DRAWN	BP
CHECKED	JC
DATE	NOVEMBER 2023
JOB NO.	A373

TITLE
UNNAMED CANYON 2
DRAINAGE CHANNEL

JOB
ENTRADA SOUTH
TTM 53295
VALENCIA CA

PACE
Advanced Water Engineering
17520 Newhope Street, Suite 200 | Fountain Valley, CA 92708
P: (714) 481-7300 | www.paceware.com

FIGURE
01

JOB NO. A373

Xrefs: 0930-BASE_DRN.dwg; 0930-EASTMNTS.dwg; 0930-LOTLINES_DRN.dwg; A373-EXISTING TOPO-2011.dwg; SCE OH-LINES.dwg; A373 Prop Site Layout.dwg; A373 Prop Drop Structure.dwg; A373-Jurisdictional Lines (Jurisdiction_20160119).dwg
Dimscale = 1; LTscale = 1; PSltscale = 1; ACAD Ver. = 23.0s (LMS Tech); Viewtabs = 1
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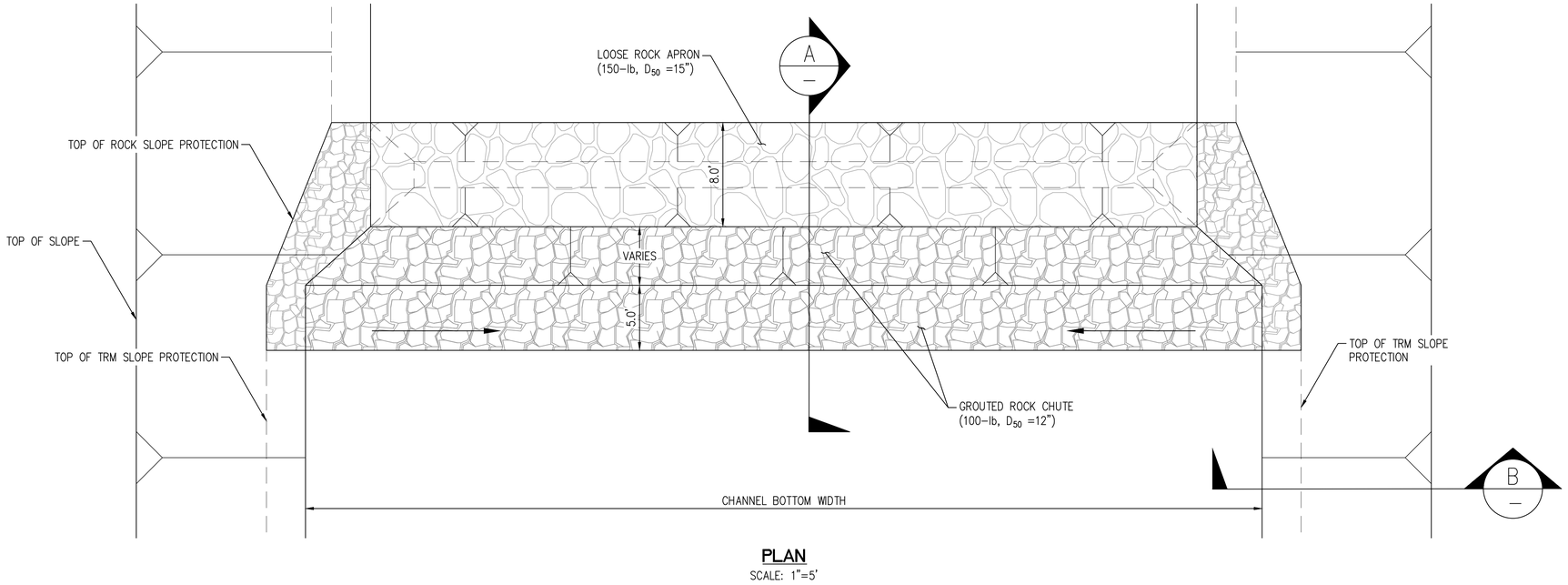

PLAN
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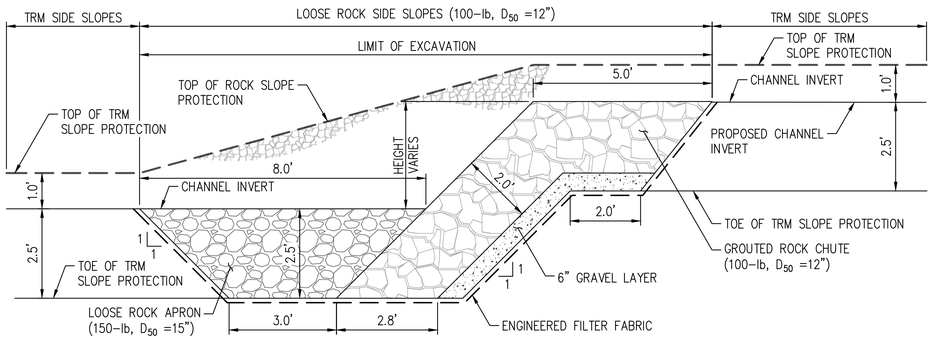

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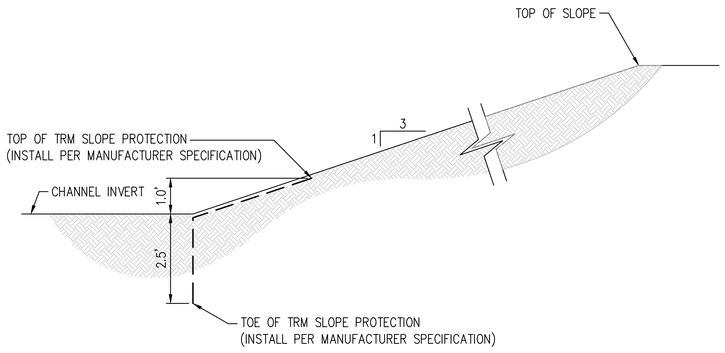


SECTION B
SCALE: 1"=2'

NO	BY	DATE	REVISIONS	DATE	APP.

THESE DRAWINGS ARE THE PROPERTY OF P.A.C.E. AND SHALL NOT BE REPRODUCED IN ANY MANNER NOR BE USED FOR CONSTRUCTION UNLESS STAMPED "ISSUED FOR CONSTRUCTION".

SCALE	1" = 50'
DESIGNED	JC
DRAWN	BP
CHECKED	JC
DATE	JUNE 2022
JOB NO.	A373

TITLE
GRADE CONTROL
STRUCTURE PLAN
AND SECTIONS

JOB
ENTRADA SOUTH
TTM 53295
VALENCIA CA

PACE
Advanced Water Engineering
17520 Newhope Street Suite 200 | Fountain Valley, CA 92708
P: (714) 481-7300 | www.pacewater.com

FIGURE
02

JOB NO. A373

P:\A373\Engineering\GlobalExhibits\A373-Plans and Sections.dwg - Tab: 11X17 PLAN SECTION - by cthompson on 11/22/23 at 4:19:20 PM

Figure 3: Structure 1 Velocity Profile

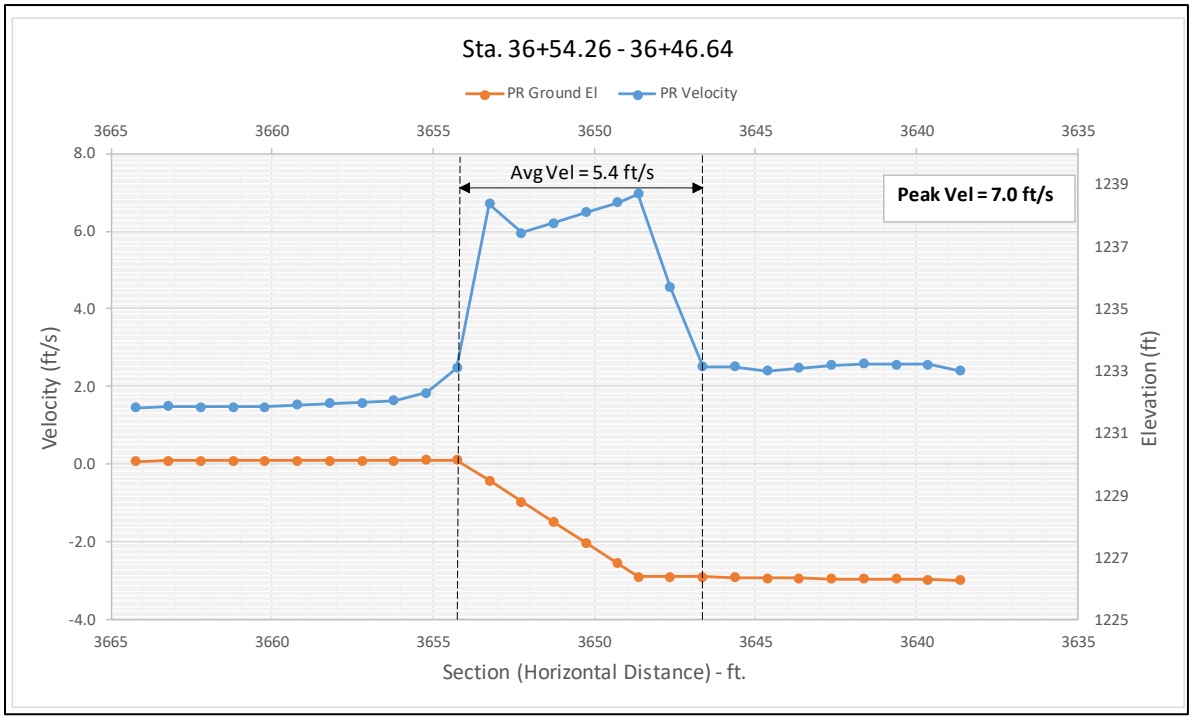


Figure 4: Structure 2 Velocity Profile

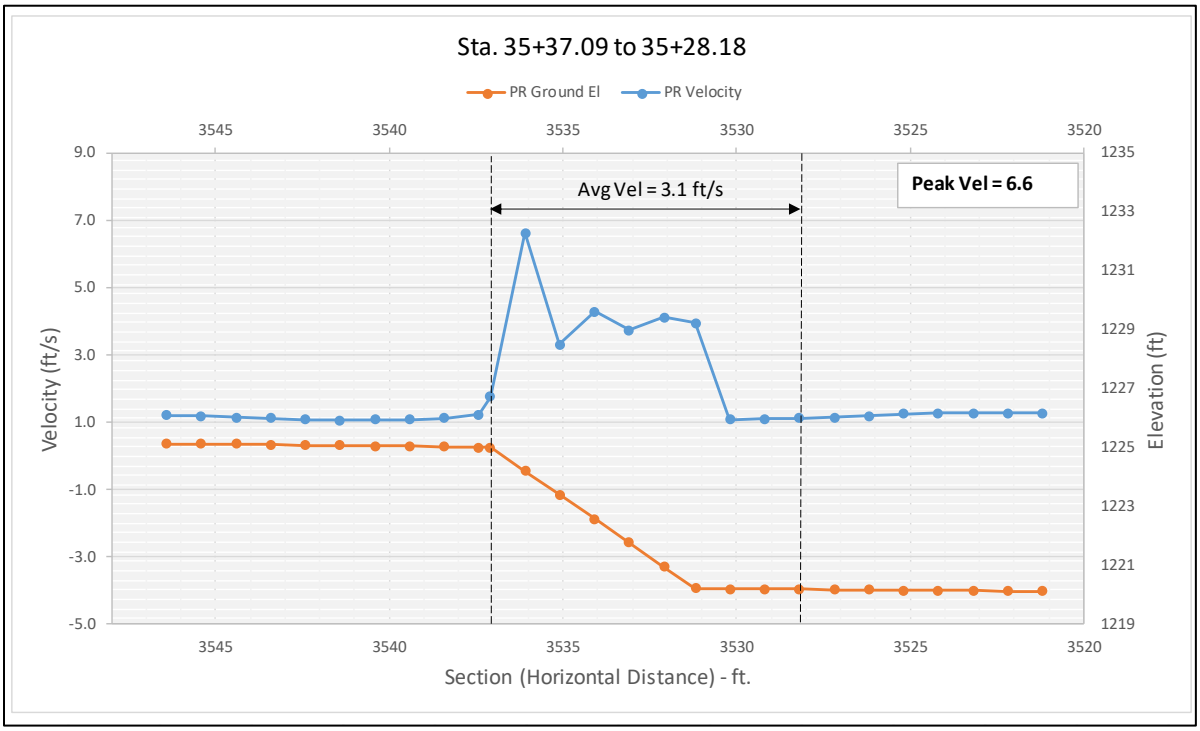


Figure 5: Structure 3 Velocity Profile

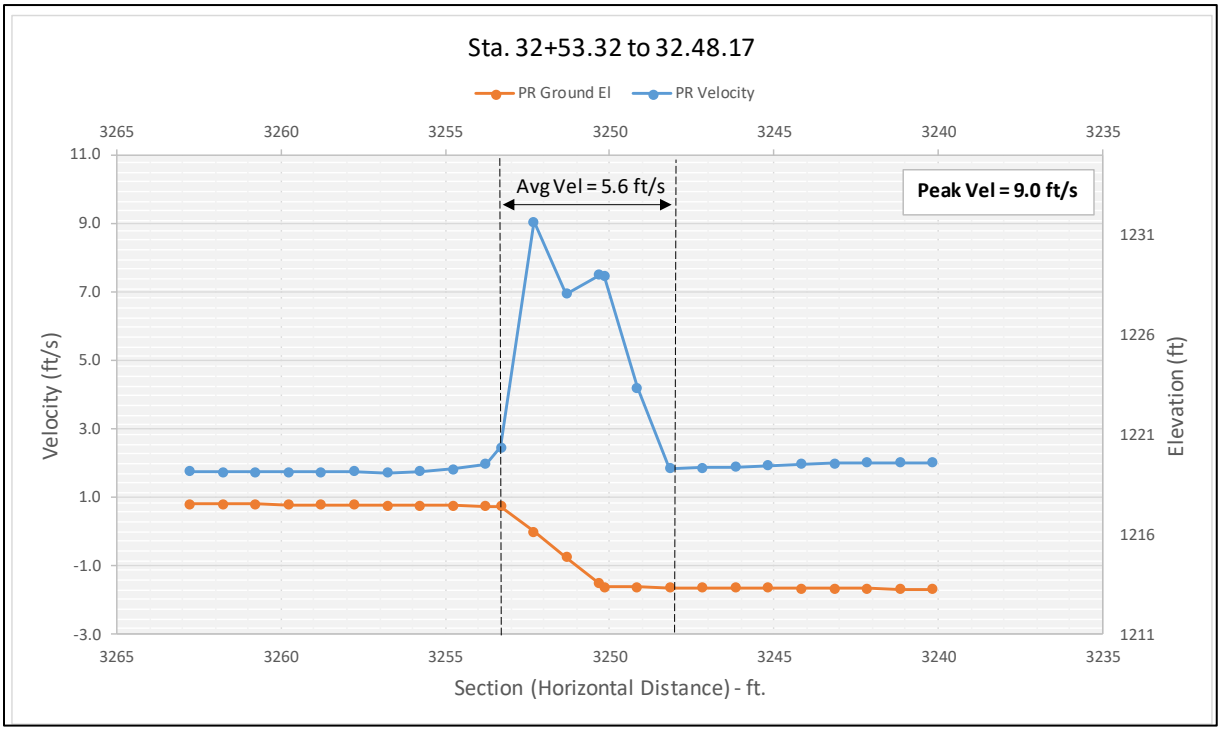


Figure 6: Structure 4 Velocity Profile

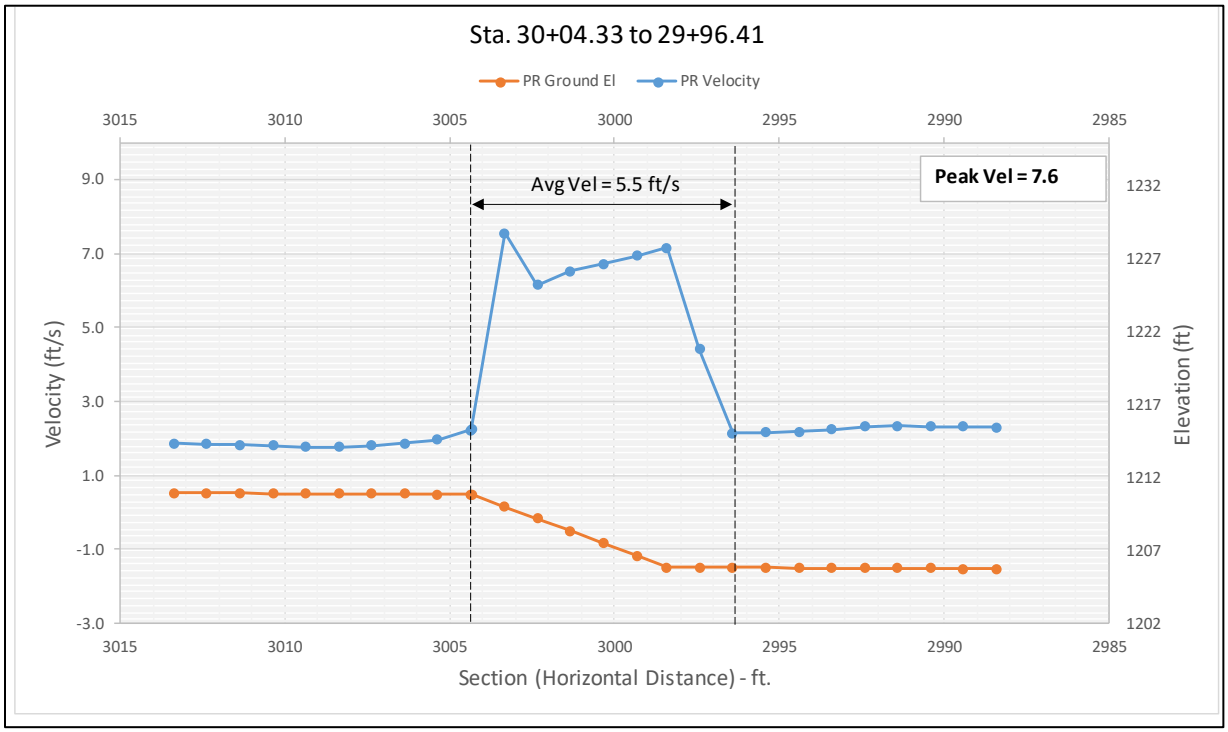


Figure 7: Structure 5 Velocity Profile

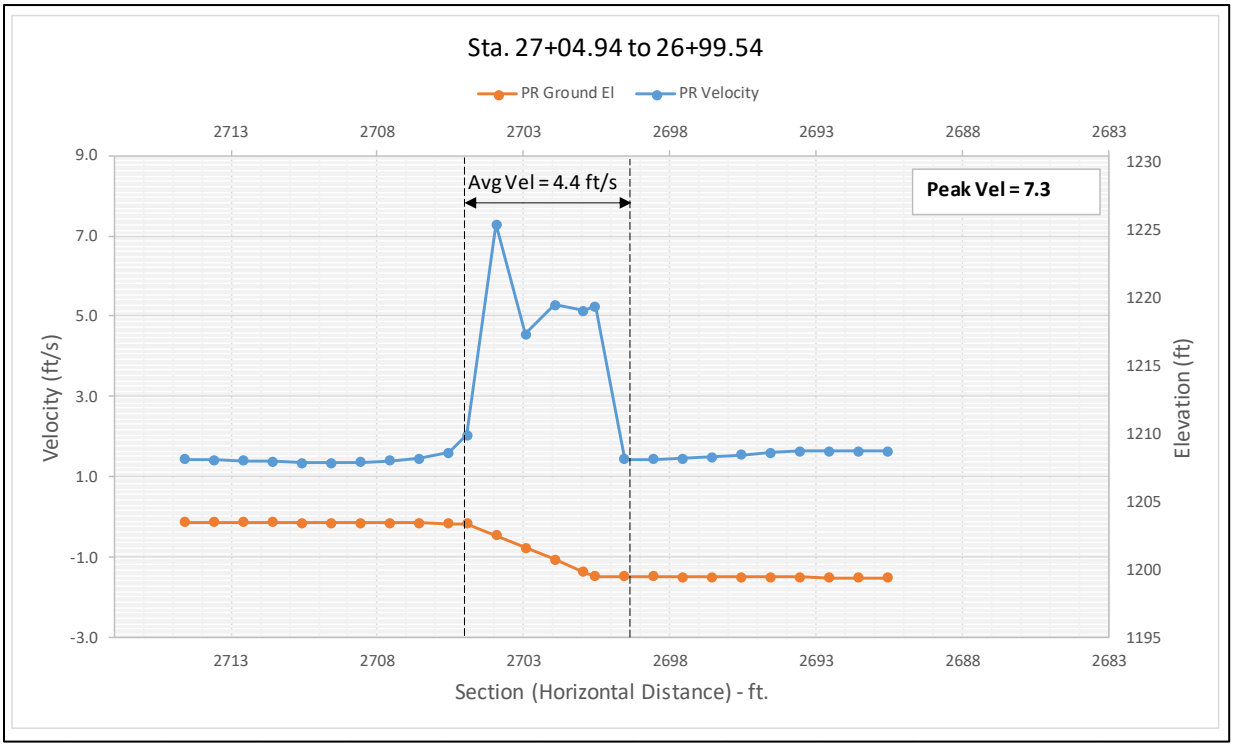


Figure 8: Structure 6 Velocity Profile

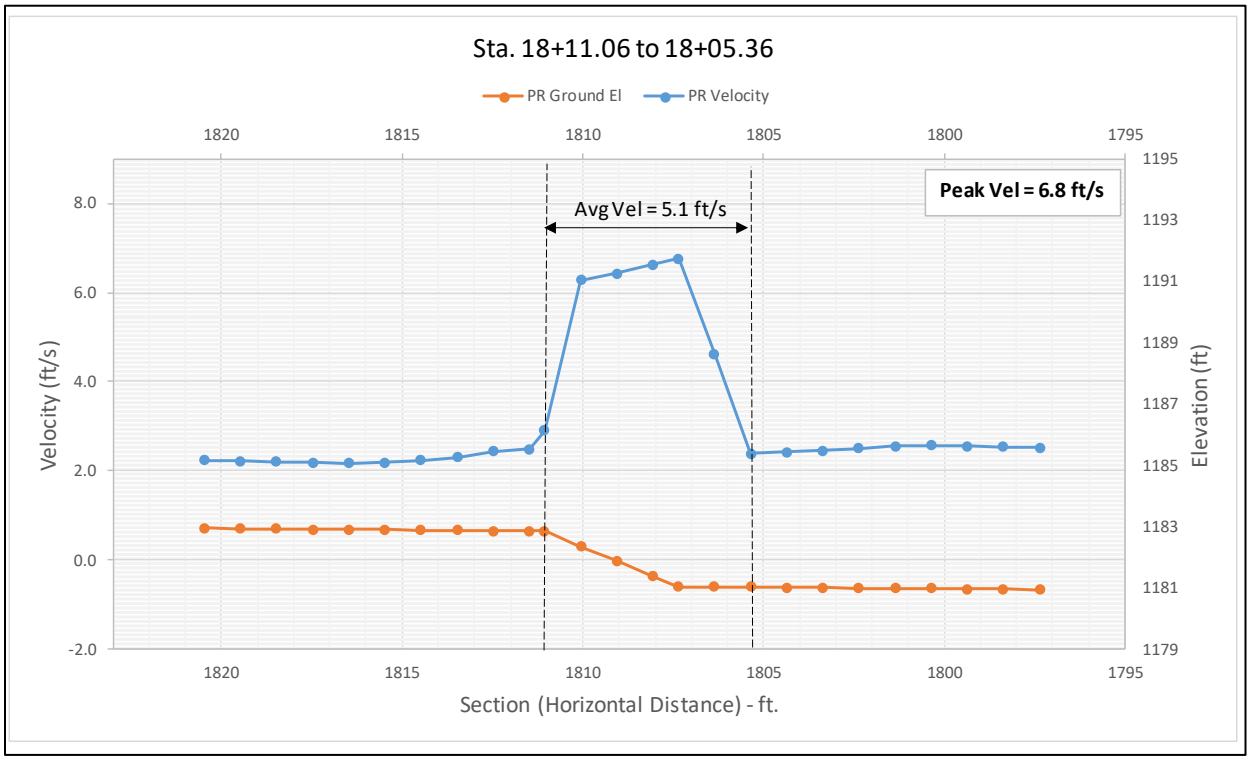


Figure 9: Structure 7 Velocity Profile

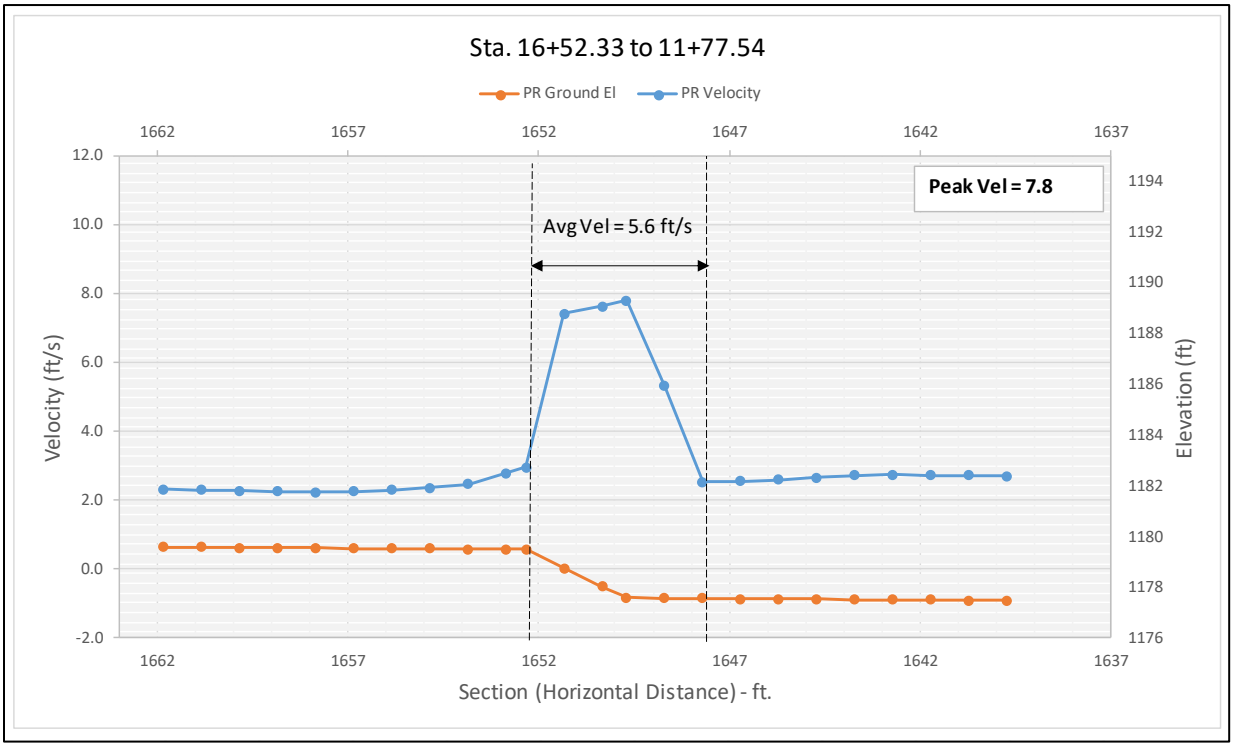
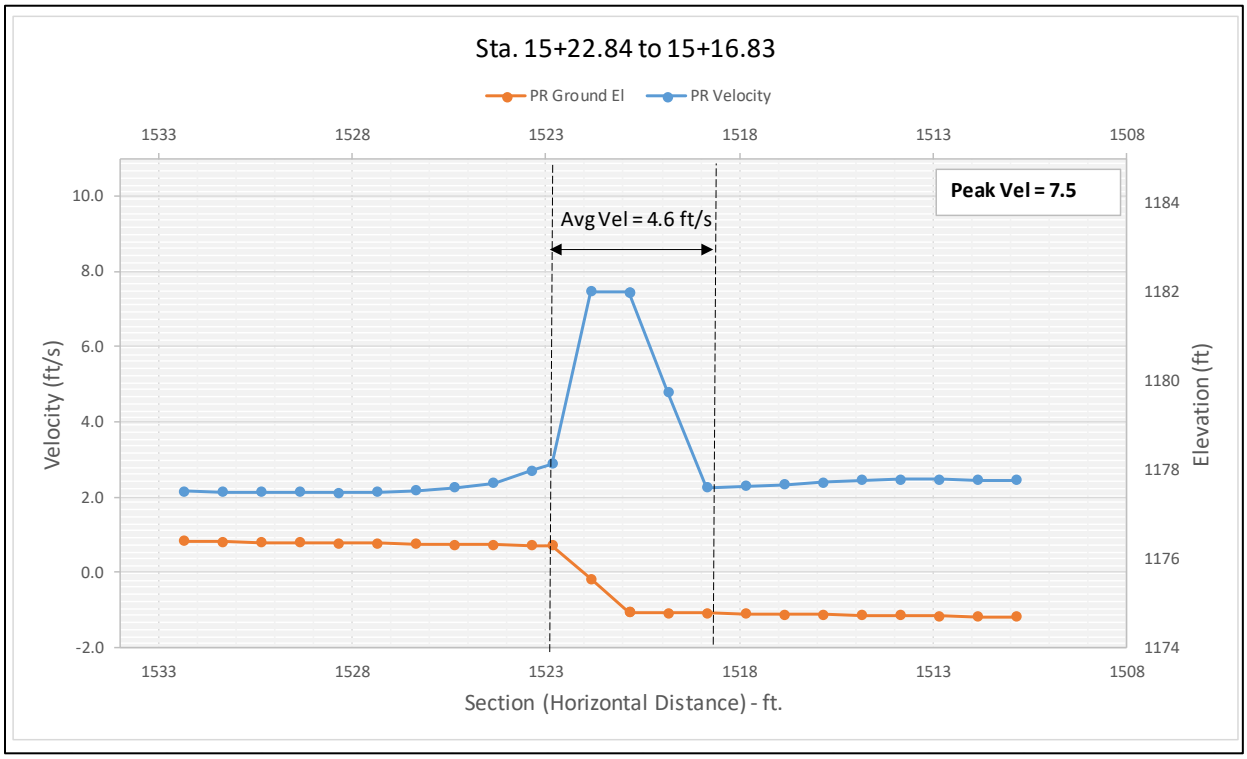


Figure 10: Structure 8 Velocity Profile



1 – HEC-RAS Output Data

HEC-RAS Plan: Plan 01 River: Entrada Reach: 1 Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3895.84	PF 1	25.10	1230.93	1233.074	1231.60900	1233.08	0.000185	0.817	30.71	22.35	0.12
1	3850.61	PF 1	25.10	1232.17	1232.923		1233.05	0.011721	2.819	8.90	23.14	0.80
1	3806.24	PF 1	25.10	1231.73	1232.489		1232.59	0.009020	2.535	9.90	24.71	0.71
1	3765.08	PF 1	25.10	1231.32	1231.907	1231.90700	1232.06	0.019417	3.181	7.89	24.91	1.00
1	3713.23	PF 1	25.10	1229.97	1230.769	1230.79400	1231.02	0.020785	3.978	6.31	15.05	1.08
1	3654.26	PF 1	25.10	1226.59	1226.743	1226.93300	1227.69	0.364465	7.905	3.22	24.12	3.78
1	3648.64	PF 1	25.10	1226.50	1226.911	1226.85200	1227.02	0.010961	2.578	9.67	27.16	0.77
1	3605.41	PF 1	25.10	1225.91	1226.227	1226.21900	1226.31	0.016013	2.345	10.70	46.71	0.86
1	3537.09	PF 1	25.10	1224.36	1224.937	1224.93700	1225.07	0.020576	2.953	8.50	31.24	1.00
1	3531.18	PF 1	25.10	1224.13	1224.630	1224.70700	1224.89	0.042858	4.056	6.19	24.46	1.42
1	3440.63	PF 1	33.60	1221.99	1222.398	1222.39800	1222.51	0.021520	2.674	12.57	55.94	0.99
1	3366.51	PF 1	33.60	1219.32	1219.821	1219.91700	1220.14	0.051341	4.512	7.45	28.95	1.57
1	3305.78	PF 1	33.60	1216.49	1217.065	1217.16000	1217.38	0.040282	4.519	7.44	24.19	1.44
1	3253.32	PF 1	33.60	1214.98	1215.313	1215.33900	1215.45	0.032128	2.947	11.40	59.58	1.19
1	3250.17	PF 1	33.60	1214.88	1215.172	1215.21300	1215.33	0.042625	3.142	10.69	62.75	1.34
1	3186.18	PF 1	33.60	1213.19	1213.534	1213.53400	1213.65	0.021774	2.674	12.56	56.74	1.00
1	3091.83	PF 1	33.60	1210.75	1211.032	1211.06900	1211.23	0.030174	3.547	9.47	35.53	1.21
1	3030.37	PF 1	33.60	1209.00	1209.445	1209.45100	1209.56	0.024090	2.670	12.59	61.16	1.04
1	3004.33	PF 1	33.60	1208.51	1208.849	1208.88100	1209.01	0.033896	3.173	10.59	51.28	1.23
1	2998.41	PF 1	33.60	1208.37	1208.722	1208.73900	1208.86	0.027749	2.948	11.40	53.04	1.12
1	2955.4	PF 1	33.60	1207.24	1207.636	1207.68300	1207.82	0.057739	3.395	9.90	64.60	1.53
1	2914.65	PF 1	33.60	1206.45	1206.777	1206.77700	1206.87	0.022726	2.434	13.81	73.89	0.99
1	2815.59	PF 1	33.60	1204.13	1204.478	1204.47800	1204.56	0.024097	2.232	15.05	96.03	0.99
1	2782.59	PF 1	33.60	1203.00	1203.324	1203.38400	1203.58	0.034498	4.092	8.21	27.60	1.32
1	2743.58	PF 1	33.60	1202.49	1202.818	1202.81500	1202.88	0.023382	2.053	16.37	115.73	0.96
1	2704.94	PF 1	33.60	1201.05	1201.809	1201.80900	1201.91	0.027543	2.499	13.44	79.73	1.07
1	2700.54	PF 1	33.60	1201.55	1201.649	1201.69100	1201.81	0.017389	0.825	11.21	58.29	0.69
1	2661.04	PF 1	33.60	1200.70	1200.957	1200.95600	1201.03	0.024090	2.139	15.81	109.73	0.98
1	2616.7	PF 1	33.60	1199.67	1200.039	1200.02500	1200.08	0.018657	1.710	20.09	172.25	0.85
1	2540.68	PF 1	33.60	1198.01	1198.387	1198.38700	1198.45	0.025221	1.963	17.11	136.97	0.98
1	2481.7	PF 1	33.60	1196.68	1197.060	1197.08400	1197.16	0.016337	1.762	15.44	88.89	0.81
1	2409.33	PF 1	33.60	1195.25	1195.443	1195.48200	1195.61	0.040072	1.596	14.03	164.52	1.11
1	2320.35	PF 1	37.30	1193.00	1193.141	1193.14100	1193.21	0.025410	2.077	17.96	133.12	1.00
1	2119.93	PF 1	37.30	1187.00	1187.403	1187.46700	1187.68	0.029776	4.247	8.78	25.00	1.26
1	2068.55	PF 1	37.30	1186.00	1186.278	1186.37600	1186.62	0.052099	4.682	7.97	29.82	1.60
1	2000.07	PF 1	37.30	1184.00	1185.260	1185.09400	1185.49	0.008253	3.874	9.63	11.54	0.75
1	1943.65	PF 1	37.30	1183.66	1184.639	1184.63900	1184.91	0.012866	4.265	9.41	18.94	0.91
1	1862.48	PF 1	37.30	1181.99	1182.464	1182.63600	1183.03	0.050218	6.044	6.17	15.23	1.67
1	1811.06	PF 1	37.30	1180.69	1181.455	1181.45500	1181.77	0.015897	4.535	8.22	12.98	1.00
1	1807.36	PF 1	37.30	1180.46	1181.059	1181.23100	1181.65	0.044025	6.153	6.06	13.06	1.59
1	1777.34	PF 1	37.30	1180.00	1180.467	1180.55400	1180.80	0.038557	4.631	8.05	24.23	1.42
1	1709.86	PF 1	37.30	1178.12	1178.755	1178.75500	1178.88	0.018323	4.016	13.56	53.46	1.00
1	1652.33	PF 1	37.30	1177.00	1177.479	1177.43900	1177.62	0.012776	3.077	12.53	33.39	0.85
1	1649.71	PF 1	37.30	1177.00	1177.464		1177.58	0.010257	2.714	13.81	35.09	0.76
1	1602.35	PF 1	37.30	1176.22	1176.709	1176.70600	1176.88	0.018520	3.294	11.14	31.01	0.99
1	1522.84	PF 1	37.30	1174.86	1175.215	1175.21500	1175.36	0.018923	3.091	12.59	45.94	0.98
1	1520.83	PF 1	37.30	1174.81	1175.128	1175.16400	1175.31	0.027028	3.464	11.15	45.00	1.16
1	1447.98	PF 1	37.30	1172.71	1173.182	1173.19500	1173.31	0.027504	2.837	13.32	67.98	1.11

HEC-RAS Plan: Plan 02 River: Entrada Reach: 1 Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3895.84	PF 1	25.10	1230.66	1232.306	1230.91600	1232.31	0.000047	0.447	56.14	34.10	0.06
1	3850.61	PF 1	25.10	1231.90	1232.197		1232.29	0.013000	2.482	10.11	34.10	0.80
1	3806.24	PF 1	25.10	1231.46	1231.826		1231.89	0.006487	2.012	12.48	34.10	0.59
1	3765.08	PF 1	25.10	1231.05	1231.306	1231.30600	1231.44	0.021152	2.875	8.73	34.10	1.00
1	3713.23	PF 1	25.10	1229.70	1229.926	1229.95700	1230.09	0.031988	3.258	7.70	34.10	1.21
1	3654.26	PF 1	25.10	1226.32	1226.474	1226.57600	1226.83	0.115252	4.793	5.24	34.10	2.16
1	3648.64	PF 1	25.10	1226.23	1226.399	1226.48600	1226.69	0.083741	4.354	5.77	34.10	1.87
1	3605.41	PF 1	25.10	1225.64	1225.896	1225.89600	1226.03	0.021019	2.870	8.75	34.10	1.00
1	3537.09	PF 1	25.10	1224.09	1224.334	1224.34700	1224.48	0.024665	3.012	8.33	34.10	1.07
1	3531.18	PF 1	25.10	1223.86	1224.064	1224.11600	1224.27	0.045180	3.615	6.94	34.10	1.41
1	3440.63	PF 1	33.60	1221.72	1222.008	1222.00800	1222.15	0.020256	3.041	11.05	38.43	1.00
1	3366.51	PF 1	33.60	1219.05	1219.246	1219.33600	1219.56	0.073104	4.483	7.49	38.30	1.79
1	3305.78	PF 1	33.60	1216.22	1216.469	1216.50800	1216.66	0.032851	3.523	9.54	38.30	1.24
1	3253.32	PF 1	33.60	1214.73	1215.001	1215.01700	1215.16	0.024795	3.236	10.38	38.32	1.10
1	3250.17	PF 1	33.60	1214.61	1214.847	1214.89700	1215.06	0.038546	3.697	9.09	38.30	1.34
1	3186.18	PF 1	33.60	1212.92	1213.148	1213.20900	1213.38	0.044154	3.851	8.72	38.30	1.42
1	3091.83	PF 1	33.60	1210.48	1210.768	1210.76800	1210.91	0.020323	3.048	11.02	38.30	1.00
1	3030.37	PF 1	33.60	1208.73	1208.963	1209.01200	1209.18	0.041011	3.767	8.92	38.30	1.38
1	3004.33	PF 1	33.60	1208.24	1208.529	1208.52900	1208.67	0.020125	3.039	11.06	38.30	1.00
1	2998.41	PF 1	33.60	1208.10	1208.359	1208.38800	1208.54	0.028872	3.388	9.92	38.30	1.17
1	2955.4	PF 1	33.60	1206.97	1207.244	1207.25800	1207.40	0.024057	3.207	10.48	38.30	1.08
1	2914.65	PF 1	33.60	1206.18	1206.485	1206.48500	1206.61	0.021751	2.819	11.92	49.09	1.01
1	2815.59	PF 1	33.60	1203.86	1204.130	1204.14500	1204.29	0.025006	3.245	10.36	38.30	1.10
1	2782.59	PF 1	33.60	1202.73	1203.093	1203.01800	1203.18	0.009456	2.419	13.89	38.30	0.71
1	2743.58	PF 1	33.60	1202.22	1202.507	1202.50700	1202.65	0.020496	3.056	11.00	38.31	1.01
1	2704.94	PF 1	33.60	1200.78	1201.187	1201.06900	1201.26	0.006480	2.154	15.60	38.55	0.60
1	2700.54	PF 1	33.60	1200.73	1201.168		1201.23	0.005124	1.995	16.84	39.16	0.54
1	2661.04	PF 1	33.60	1200.43	1200.717	1200.71700	1200.86	0.021021	3.056	10.99	39.02	1.02
1	2616.7	PF 1	33.60	1199.40	1199.669	1199.68800	1199.83	0.025537	3.265	10.29	38.30	1.11
1	2540.68	PF 1	33.60	1197.74	1197.964	1198.02800	1198.20	0.046678	3.916	8.58	38.30	1.46
1	2481.7	PF 1	33.60	1196.29	1196.578	1196.57800	1196.72	0.020181	3.041	11.05	38.31	1.00
1	2409.33	PF 1	33.60	1194.83	1195.120	1195.11800	1195.26	0.019845	3.026	11.10	38.31	0.99
1	2320.35	PF 1	37.30	1192.71	1193.043	1193.04300	1193.12	0.028909	2.206	16.91	125.56	1.06
1	2119.93	PF 1	37.30	1186.71	1186.974	1187.01000	1187.17	0.030404	3.527	10.58	40.00	1.21
1	2068.55	PF 1	37.30	1185.71	1186.010	1186.01000	1186.16	0.019855	3.100	12.03	40.03	1.00
1	2000.07	PF 1	37.30	1183.71	1184.200	1184.01100	1184.26	0.003957	1.905	19.58	40.00	0.48
1	1943.65	PF 1	37.30	1183.37	1183.670	1183.67000	1183.82	0.019966	3.107	12.01	40.00	1.00
1	1862.48	PF 1	37.30	1181.70	1181.995	1181.99900	1182.15	0.021197	3.163	11.79	40.00	1.03
1	1811.06	PF 1	37.30	1180.40	1180.666	1180.70100	1180.86	0.029943	3.511	10.63	40.00	1.20
1	1807.36	PF 1	37.30	1180.17	1180.381	1180.46900	1180.68	0.063843	4.411	8.46	40.00	1.69
1	1777.34	PF 1	37.30	1179.71	1180.010	1180.01000	1180.16	0.020101	3.113	11.98	40.00	1.00
1	1709.86	PF 1	37.30	1177.83	1178.074	1178.13000	1178.30	0.039607	3.820	9.77	40.00	1.36
1	1652.33	PF 1	37.30	1176.71	1177.113	1177.00700	1177.20	0.007517	2.313	16.13	40.00	0.64
1	1649.71	PF 1	37.30	1176.71	1177.020	1177.00900	1177.16	0.017909	3.006	12.41	40.00	0.95
1	1602.35	PF 1	37.30	1175.93	1176.260	1176.22800	1176.38	0.014576	2.825	13.20	40.00	0.87
1	1522.84	PF 1	37.30	1174.57	1174.869	1174.86900	1175.02	0.020264	3.121	11.95	40.00	1.01
1	1520.83	PF 1	37.30	1174.52	1174.819	1174.82000	1174.97	0.020357	3.128	11.93	39.91	1.01
1	1447.98	PF 1	37.30	1172.42	1172.660	1172.71900	1172.90	0.042210	3.893	9.58	40.00	1.40

HEC-RAS Plan: Plan 03 River: Entrada Reach: 1 Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3895.84	PF 1	25.10	1230.93	1233.074	1231.60900	1233.08	0.000185	0.817	30.71	22.35	0.12
1	3850.61	PF 1	25.10	1232.17	1232.923		1233.05	0.011721	2.819	8.90	23.14	0.80
1	3806.24	PF 1	25.10	1231.73	1232.489		1232.59	0.009020	2.535	9.90	24.71	0.71
1	3765.08	PF 1	25.10	1231.32	1231.907	1231.90700	1232.06	0.019417	3.181	7.89	24.91	1.00
1	3713.23	PF 1	25.10	1229.97	1230.769	1230.79400	1231.02	0.020785	3.978	6.31	15.05	1.08
1	3712.23*	PF 1	25.10	1229.97	1230.673	1230.75100	1230.99	0.028222	4.522	5.55	13.74	1.25
1	3711.23*	PF 1	25.10	1229.98	1230.708	1230.71100	1230.93	0.018258	3.791	6.62	15.41	1.02
1	3710.23*	PF 1	25.10	1229.98	1230.619	1230.67600	1230.91	0.025294	4.304	5.83	14.33	1.19
1	3709.23*	PF 1	25.10	1229.98	1230.626	1230.64100	1230.86	0.019331	3.861	6.50	15.38	1.05
1	3708.23*	PF 1	25.10	1229.98	1230.545	1230.60800	1230.84	0.026710	4.343	5.78	14.62	1.22
1	3707.23*	PF 1	25.10	1229.99	1230.555	1230.58300	1230.80	0.021347	3.959	6.34	15.58	1.09
1	3706.23*	PF 1	25.10	1229.99	1230.605	1230.56100	1230.77	0.013525	3.293	7.62	17.53	0.88
1	3705.23*	PF 1	25.10	1229.99	1230.602		1230.75	0.011739	3.100	8.10	18.34	0.82
1	3704.23*	PF 1	25.10	1229.99	1230.598		1230.73	0.010437	2.943	8.53	19.13	0.78
1	3703.23*	PF 1	25.10	1230.00	1230.593		1230.72	0.009791	2.842	8.83	19.90	0.75
1	3702.23*	PF 1	25.10	1230.00	1230.590		1230.70	0.008773	2.717	9.24	20.52	0.71
1	3701.23*	PF 1	25.10	1230.00	1230.586		1230.69	0.008059	2.608	9.62	21.32	0.68
1	3700.23*	PF 1	25.10	1230.01	1230.581		1230.68	0.007718	2.537	9.89	22.12	0.67
1	3699.23*	PF 1	25.10	1230.01	1230.578		1230.67	0.007148	2.445	10.27	22.93	0.64
1	3698.23*	PF 1	25.10	1230.01	1230.575		1230.66	0.006545	2.347	10.69	23.76	0.62
1	3697.23*	PF 1	25.10	1230.01	1230.572		1230.65	0.006122	2.269	11.06	24.60	0.60
1	3696.23*	PF 1	25.10	1230.02	1230.568		1230.65	0.005999	2.227	11.27	25.39	0.59
1	3695.23*	PF 1	25.10	1230.02	1230.565		1230.64	0.005620	2.157	11.64	26.19	0.57
1	3694.23*	PF 1	25.10	1230.02	1230.562		1230.63	0.005232	2.086	12.03	26.99	0.55
1	3693.23*	PF 1	25.10	1230.02	1230.559		1230.62	0.004928	2.022	12.41	27.89	0.53
1	3692.23*	PF 1	25.10	1230.03	1230.555		1230.62	0.004935	2.002	12.54	28.65	0.53
1	3691.23*	PF 1	25.10	1230.03	1230.552		1230.61	0.004687	1.950	12.87	29.45	0.52
1	3690.23*	PF 1	25.10	1230.03	1230.550		1230.61	0.004426	1.893	13.26	30.35	0.51
1	3689.23*	PF 1	25.10	1230.04	1230.546		1230.60	0.004481	1.882	13.34	31.11	0.51
1	3688.23*	PF 1	25.10	1230.04	1230.543		1230.60	0.004285	1.839	13.65	31.89	0.50
1	3687.23*	PF 1	25.10	1230.04	1230.540		1230.59	0.004098	1.794	13.99	32.81	0.48
1	3686.23*	PF 1	25.10	1230.04	1230.538		1230.59	0.003914	1.753	14.32	33.59	0.47
1	3685.23*	PF 1	25.10	1230.05	1230.534		1230.58	0.003986	1.748	14.36	34.28	0.48
1	3684.23*	PF 1	25.10	1230.05	1230.531		1230.58	0.003806	1.710	14.68	34.97	0.47
1	3683.23*	PF 1	25.10	1230.05	1230.529		1230.57	0.003666	1.677	14.97	35.70	0.46
1	3682.23*	PF 1	25.10	1230.05	1230.526		1230.57	0.003519	1.644	15.27	36.39	0.45
1	3681.23*	PF 1	25.10	1230.06	1230.523		1230.57	0.003624	1.647	15.24	37.05	0.45
1	3680.22*	PF 1	25.10	1230.06	1230.520		1230.56	0.003492	1.616	15.53	37.78	0.44
1	3679.22*	PF 1	25.10	1230.06	1230.517		1230.56	0.003361	1.586	15.83	38.49	0.44
1	3678.22*	PF 1	25.10	1230.06	1230.515		1230.55	0.003262	1.560	16.09	39.21	0.43
1	3677.22*	PF 1	25.10	1230.07	1230.511		1230.55	0.003408	1.571	15.98	39.83	0.44
1	3676.22*	PF 1	25.10	1230.07	1230.509		1230.55	0.003293	1.543	16.26	40.56	0.43
1	3675.22*	PF 1	25.10	1230.07	1230.506		1230.54	0.003213	1.521	16.50	41.29	0.42
1	3674.22*	PF 1	25.10	1230.08	1230.502		1230.54	0.003401	1.538	16.32	41.94	0.43
1	3673.22*	PF 1	25.10	1230.08	1230.499		1230.54	0.003329	1.517	16.55	42.73	0.43
1	3672.22*	PF 1	25.10	1230.08	1230.496		1230.53	0.003254	1.496	16.78	43.49	0.42
1	3671.22*	PF 1	25.10	1230.08	1230.494		1230.53	0.003198	1.477	17.00	44.31	0.42
1	3670.22*	PF 1	25.10	1230.09	1230.490		1230.52	0.003429	1.499	16.75	44.99	0.43
1	3669.22*	PF 1	25.10	1230.09	1230.487		1230.52	0.003386	1.482	16.94	45.86	0.43
1	3668.22*	PF 1	25.10	1230.09	1230.484		1230.52	0.003327	1.464	17.14	46.61	0.43
1	3667.22*	PF 1	25.10	1230.09	1230.481		1230.51	0.003292	1.449	17.32	47.46	0.42
1	3666.22*	PF 1	25.10	1230.10	1230.476		1230.51	0.003573	1.475	17.01	48.23	0.44
1	3665.22*	PF 1	25.10	1230.10	1230.473		1230.51	0.003526	1.463	17.15	48.76	0.43
1	3664.22*	PF 1	25.10	1230.10	1230.470		1230.50	0.003477	1.452	17.29	49.24	0.43
1	3663.22*	PF 1	25.10	1230.11	1230.465		1230.50	0.003834	1.489	16.86	49.71	0.45
1	3662.22*	PF 1	25.10	1230.11	1230.461		1230.50	0.003813	1.481	16.95	50.21	0.45
1	3661.22*	PF 1	25.10	1230.11	1230.458		1230.49	0.003809	1.474	17.02	50.72	0.45
1	3660.22*	PF 1	25.10	1230.11	1230.454		1230.49	0.003826	1.471	17.07	51.21	0.45
1	3659.22*	PF 1	25.10	1230.12	1230.445		1230.48	0.007893	1.532	16.38	51.68	0.48
1	3658.22*	PF 1	25.10	1230.12	1230.436		1230.47	0.008457	1.558	16.11	52.16	0.49
1	3657.22*	PF 1	25.10	1230.12	1230.425		1230.47	0.009227	1.594	15.74	52.61	0.51
1	3656.22*	PF 1	25.10	1230.12	1230.413		1230.46	0.010340	1.644	15.27	53.06	0.54
1	3655.22*	PF 1	25.10	1230.13	1230.389		1230.44	0.015228	1.841	13.63	53.47	0.64
1	3654.26	PF 1	25.10	1230.13	1230.321	1230.32100	1230.42	0.040775	2.472	10.15	53.60	1.00
1	3653.26*	PF 1	25.10	1229.47	1229.547	1229.67300	1230.25	0.998385	6.711	3.74	48.63	4.27
1	3652.26*	PF 1	25.10	1228.80	1228.896	1229.01100	1229.45	0.592154	5.948	4.22	44.43	3.40
1	3651.26*	PF 1	25.10	1228.14	1228.241	1228.36900	1228.84	0.601634	6.222	4.03	40.16	3.46
1	3650.27*	PF 1	25.10	1227.47	1227.579	1227.71800	1228.23	0.593076	6.480	3.87	35.90	3.48
1	3649.27*	PF 1	25.10	1226.81	1226.929	1227.08200	1227.64	0.575445	6.752	3.72	31.65	3.47
1	3648.64	PF 1	25.10	1226.39	1226.516	1226.67800	1227.27	0.565246	6.955	3.61	29.00	3.48
1	3647.64*	PF 1	25.10	1226.38	1226.564	1226.65700	1226.89	0.147542	4.548	5.52	30.61	1.89
1	3646.64*	PF 1	25.10	1226.37	1226.686	1226.64300	1226.78	0.022128	2.507	10.01	32.67	0.80
1	3645.64*	PF 1	25.10	1226.36	1226.662		1226.76	0.023592	2.519	9.96	33.86	0.82
1	3644.64*	PF 1	25.10	1226.34	1226.644		1226.73	0.021447	2.413	10.40	35.12	0.78
1	3643.64*	PF 1	25.10	1226.33	1226.617		1226.71	0.024064	2.465	10.18	36.29	0.82
1	3642.64*	PF 1	25.10	1226.32	1226.588		1226.69	0.028178	2.553	9.83	37.45	0.88
1	3641.64*	PF 1	25.10	1226.31	1226.567	1226.55000	1226.67	0.017156	2.582	9.72	38.64	0.91
1	3640.64*	PF 1	25.10	1226.30	1226.550	1226.53300	1226.65	0.017618	2.570	9.77	39.87	0.92
1	3639.64*	PF 1	25.10	1226.29	1226.532	1226.52100	1226.64	0.018353	2.571	9.76	41.07	0.93

HEC-RAS Plan: Plan 03 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3638.64*	PF 1	25.10	1226.27	1226.520	1226.49600	1226.61	0.015449	2.411	10.41	42.39	0.86
1	3637.64*	PF 1	25.10	1226.26	1226.506		1226.59	0.015399	2.381	10.54	43.63	0.85
1	3636.64*	PF 1	25.10	1226.25	1226.491		1226.58	0.015477	2.358	10.64	44.87	0.85
1	3635.64*	PF 1	25.10	1226.24	1226.476	1226.45300	1226.56	0.015703	2.343	10.71	46.11	0.86
1	3634.64*	PF 1	25.10	1226.23	1226.460		1226.55	0.016210	2.341	10.72	47.34	0.87
1	3633.64*	PF 1	25.10	1226.22	1226.443		1226.53	0.016928	2.347	10.69	48.56	0.88
1	3632.64*	PF 1	25.10	1226.20	1226.432		1226.51	0.014213	2.204	11.39	49.88	0.81
1	3631.64*	PF 1	25.10	1226.19	1226.418		1226.49	0.014167	2.180	11.51	51.12	0.81
1	3630.64*	PF 1	25.10	1226.18	1226.405		1226.48	0.014247	2.163	11.60	52.37	0.81
1	3629.64*	PF 1	25.10	1226.17	1226.391		1226.46	0.014385	2.149	11.68	53.61	0.81
1	3628.64*	PF 1	25.10	1226.16	1226.376		1226.45	0.014700	2.143	11.71	54.85	0.82
1	3627.64*	PF 1	25.10	1226.15	1226.360		1226.43	0.015318	2.151	11.67	56.08	0.83
1	3626.64*	PF 1	25.10	1226.14	1226.344		1226.42	0.016119	2.165	11.59	57.31	0.85
1	3625.64*	PF 1	25.10	1226.12	1226.333		1226.40	0.013497	2.034	12.34	58.63	0.78
1	3624.64*	PF 1	25.10	1226.11	1226.320		1226.38	0.013559	2.020	12.43	59.88	0.78
1	3623.64*	PF 1	25.10	1226.10	1226.306		1226.37	0.013702	2.010	12.49	61.12	0.78
1	3622.64*	PF 1	25.10	1226.09	1226.292		1226.36	0.014006	2.007	12.51	62.37	0.79
1	3621.64*	PF 1	25.10	1226.08	1226.277		1226.34	0.014654	2.019	12.43	63.59	0.80
1	3620.64*	PF 1	25.10	1226.07	1226.262		1226.33	0.015402	2.033	12.34	64.82	0.82
1	3619.64*	PF 1	25.10	1226.05	1226.251		1226.31	0.012831	1.909	13.15	66.14	0.76
1	3618.64*	PF 1	25.10	1226.04	1226.238		1226.29	0.012890	1.898	13.23	67.39	0.76
1	3617.64*	PF 1	25.10	1226.03	1226.225		1226.28	0.012990	1.888	13.29	68.64	0.76
1	3616.64*	PF 1	25.10	1226.02	1226.212		1226.27	0.013163	1.882	13.34	69.89	0.76
1	3615.64*	PF 1	25.10	1226.01	1226.199		1226.25	0.013506	1.884	13.33	71.13	0.77
1	3614.64*	PF 1	25.10	1226.00	1226.184		1226.24	0.014158	1.897	13.23	72.38	0.78
1	3613.64*	PF 1	25.10	1225.99	1226.169		1226.23	0.015056	1.920	13.08	73.60	0.80
1	3612.64*	PF 1	25.10	1225.97	1226.157		1226.21	0.012447	1.800	13.94	74.93	0.74
1	3611.63*	PF 1	25.10	1225.96	1226.145		1226.20	0.012513	1.791	14.01	76.18	0.74
1	3610.63*	PF 1	25.10	1225.95	1226.133		1226.18	0.012652	1.785	14.06	77.43	0.74
1	3609.63*	PF 1	25.10	1225.94	1226.120		1226.17	0.012920	1.785	14.06	78.68	0.74
1	3608.63*	PF 1	25.10	1225.93	1226.106		1226.16	0.013493	1.797	13.96	79.92	0.76
1	3607.63*	PF 1	25.10	1225.92	1226.092		1226.14	0.014053	1.808	13.88	81.16	0.77
1	3606.63*	PF 1	25.10	1225.90	1226.084		1226.13	0.010931	1.666	15.07	82.50	0.69
1	3605.63*	PF 1	25.10	1225.89	1226.074		1226.12	0.010625	1.642	15.29	83.76	0.68
1	3605.41	PF 1	25.10	1225.89	1226.070		1226.11	0.011261	1.669	15.04	84.02	0.70
1	3604.41*	PF 1	25.10	1225.88	1226.060		1226.10	0.010960	1.644	15.27	85.44	0.69
1	3603.41*	PF 1	25.10	1225.86	1226.046		1226.09	0.011393	1.652	15.19	86.86	0.70
1	3602.41*	PF 1	25.10	1225.85	1226.035		1226.08	0.011155	1.631	15.39	88.28	0.69
1	3601.41*	PF 1	25.10	1225.84	1226.025		1226.07	0.010899	1.610	15.59	89.71	0.68
1	3600.41*	PF 1	25.10	1225.82	1226.011		1226.05	0.011372	1.620	15.49	91.13	0.69
1	3599.41*	PF 1	25.10	1225.81	1226.000		1226.04	0.011182	1.602	15.67	92.55	0.69
1	3598.41*	PF 1	25.10	1225.80	1225.990		1226.03	0.010921	1.581	15.87	93.97	0.68
1	3597.41*	PF 1	25.10	1225.79	1225.979		1226.02	0.010672	1.561	16.08	95.38	0.67
1	3596.41*	PF 1	25.10	1225.77	1225.966		1226.00	0.011100	1.570	15.99	96.81	0.68
1	3595.41*	PF 1	25.10	1225.76	1225.955		1225.99	0.010885	1.552	16.17	98.23	0.67
1	3594.41*	PF 1	25.10	1225.75	1225.945		1225.98	0.010627	1.532	16.39	99.65	0.67
1	3593.41*	PF 1	25.10	1225.73	1225.931		1225.97	0.011057	1.541	16.28	101.09	0.68
1	3592.41*	PF 1	25.10	1225.72	1225.921		1225.96	0.010831	1.523	16.48	102.51	0.67
1	3591.41*	PF 1	25.10	1225.71	1225.911		1225.95	0.010589	1.505	16.68	103.92	0.66
1	3590.41*	PF 1	25.10	1225.69	1225.897		1225.93	0.011080	1.517	16.55	105.35	0.67
1	3589.41*	PF 1	25.10	1225.68	1225.886		1225.92	0.010898	1.501	16.72	106.77	0.67
1	3588.41*	PF 1	25.10	1225.67	1225.876		1225.91	0.010667	1.484	16.91	108.19	0.66
1	3587.41*	PF 1	25.10	1225.66	1225.866		1225.90	0.010390	1.465	17.14	109.61	0.65
1	3586.41*	PF 1	25.10	1225.64	1225.853		1225.89	0.010823	1.475	17.02	111.04	0.66
1	3585.41*	PF 1	25.10	1225.63	1225.843		1225.88	0.010575	1.457	17.22	112.47	0.66
1	3584.41*	PF 1	25.10	1225.62	1225.833		1225.87	0.010365	1.441	17.41	113.89	0.65
1	3583.41*	PF 1	25.10	1225.60	1225.819		1225.85	0.010824	1.453	17.27	115.32	0.66
1	3582.41*	PF 1	25.10	1225.59	1225.809		1225.84	0.010618	1.438	17.46	116.73	0.66
1	3581.41*	PF 1	25.10	1225.58	1225.799		1225.83	0.010391	1.421	17.66	118.15	0.65
1	3580.41*	PF 1	25.10	1225.56	1225.786		1225.82	0.010849	1.433	17.52	119.58	0.66
1	3579.41*	PF 1	25.10	1225.55	1225.776		1225.81	0.010654	1.419	17.69	121.00	0.65
1	3578.41*	PF 1	25.10	1225.54	1225.765		1225.80	0.010436	1.403	17.89	122.42	0.65
1	3577.41*	PF 1	25.10	1225.53	1225.755		1225.79	0.010194	1.387	18.10	123.85	0.64
1	3576.41*	PF 1	25.10	1225.51	1225.742		1225.77	0.010639	1.398	17.95	125.29	0.65
1	3575.41*	PF 1	25.10	1225.50	1225.732		1225.76	0.010401	1.383	18.15	126.71	0.64
1	3574.41*	PF 1	25.10	1225.49	1225.722		1225.75	0.010142	1.366	18.37	128.14	0.64
1	3573.41*	PF 1	25.10	1225.47	1225.709		1225.74	0.010578	1.377	18.22	129.57	0.65
1	3572.41*	PF 1	25.10	1225.46	1225.699		1225.73	0.010438	1.366	18.38	130.99	0.64
1	3571.41*	PF 1	25.10	1225.45	1225.689		1225.72	0.010184	1.350	18.59	132.41	0.64
1	3570.41*	PF 1	25.10	1225.43	1225.676		1225.71	0.010676	1.363	18.41	133.84	0.65
1	3569.41*	PF 1	25.10	1225.42	1225.666		1225.69	0.010512	1.351	18.58	135.27	0.64
1	3568.41*	PF 1	25.10	1225.41	1225.656		1225.68	0.010294	1.337	18.77	136.69	0.64
1	3567.41*	PF 1	25.10	1225.40	1225.646		1225.67	0.010053	1.322	18.98	138.11	0.63
1	3566.41*	PF 1	25.10	1225.38	1225.633		1225.66	0.010531	1.335	18.80	139.54	0.64
1	3565.41*	PF 1	25.10	1225.37	1225.623		1225.65	0.010319	1.322	18.99	140.96	0.63
1	3564.41*	PF 1	25.10	1225.36	1225.613		1225.64	0.010084	1.307	19.20	142.38	0.63
1	3563.41*	PF 1	25.10	1225.34	1225.600		1225.63	0.010584	1.321	19.00	143.81	0.64
1	3562.41*	PF 1	25.10	1225.33	1225.590		1225.62	0.010409	1.310	19.17	145.23	0.64
1	3561.41*	PF 1	25.10	1225.32	1225.580		1225.61	0.010206	1.297	19.36	146.66	0.63

HEC-RAS Plan: Plan 03 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3560.41*	PF 1	25.10	1225.30	1225.567		1225.59	0.010769	1.313	19.12	148.09	0.64
1	3559.41*	PF 1	25.10	1225.29	1225.557		1225.58	0.010766	1.308	19.20	149.51	0.64
1	3558.41*	PF 1	25.10	1225.28	1225.546		1225.57	0.010733	1.301	19.29	150.93	0.64
1	3557.41*	PF 1	25.10	1225.26	1225.532		1225.56	0.011734	1.332	18.85	152.35	0.67
1	3556.41*	PF 1	25.10	1225.25	1225.518		1225.55	0.012601	1.356	18.52	153.75	0.69
1	3555.41*	PF 1	25.10	1225.24	1225.504		1225.53	0.013805	1.388	18.08	155.15	0.72
1	3554.41*	PF 1	25.10	1225.23	1225.496		1225.52	0.009810	1.248	20.11	156.61	0.61
1	3553.41*	PF 1	25.10	1225.21	1225.484		1225.51	0.010217	1.259	19.94	158.05	0.62
1	3552.41*	PF 1	25.10	1225.20	1225.474		1225.50	0.010003	1.246	20.14	159.47	0.62
1	3551.41*	PF 1	25.10	1225.19	1225.465		1225.49	0.009702	1.231	20.39	160.90	0.61
1	3550.41*	PF 1	25.10	1225.17	1225.453		1225.48	0.010022	1.238	20.27	162.33	0.62
1	3549.41*	PF 1	25.10	1225.16	1225.443		1225.47	0.009753	1.224	20.51	163.76	0.61
1	3548.41*	PF 1	25.10	1225.15	1225.434		1225.46	0.009431	1.208	20.79	165.18	0.60
1	3547.42*	PF 1	25.10	1225.13	1225.422		1225.45	0.009654	1.212	20.71	166.62	0.61
1	3546.42*	PF 1	25.10	1225.12	1225.413		1225.44	0.009248	1.192	21.05	168.05	0.59
1	3545.42*	PF 1	25.10	1225.11	1225.404		1225.43	0.008747	1.168	21.48	169.50	0.58
1	3544.42*	PF 1	25.10	1225.10	1225.396		1225.42	0.008156	1.140	22.02	171.06	0.56
1	3543.42*	PF 1	25.10	1225.08	1225.389		1225.41	0.007548	1.109	22.62	172.65	0.54
1	3542.42*	PF 1	25.10	1225.07	1225.382		1225.40	0.006811	1.072	23.42	174.23	0.52
1	3541.42*	PF 1	25.10	1225.06	1225.373		1225.39	0.011479	1.051	23.88	175.77	0.50
1	3540.42*	PF 1	25.10	1225.04	1225.360		1225.38	0.012104	1.064	23.59	177.29	0.51
1	3539.42*	PF 1	25.10	1225.03	1225.347		1225.37	0.012831	1.079	23.26	178.82	0.53
1	3538.42*	PF 1	25.10	1225.02	1225.332		1225.35	0.014275	1.111	22.59	180.03	0.55
1	3537.42*	PF 1	25.10	1225.00	1225.312		1225.33	0.018819	1.205	20.83	180.97	0.63
1	3537.09	PF 1	25.10	1225.00	1225.276	1225.27600	1225.32	0.064871	1.747	14.37	181.12	1.09
1	3536.09*	PF 1	25.10	1224.19	1224.369	1224.43700	1225.05	5.312615	6.621	3.79	176.28	7.96
1	3535.09*	PF 1	25.10	1223.38	1223.553	1223.59500	1223.72	0.502339	3.296	7.62	171.95	2.76
1	3534.09*	PF 1	25.10	1222.56	1222.694	1222.74400	1222.98	1.158192	4.280	5.86	167.43	4.03
1	3533.09*	PF 1	25.10	1221.75	1221.861	1221.90700	1222.08	0.700259	3.720	6.75	163.00	3.22
1	3532.09*	PF 1	25.10	1220.94	1221.009	1221.07300	1221.27	0.932716	4.100	6.12	158.48	3.68
1	3531.18	PF 1	25.10	1220.20	1220.241	1220.29200	1220.48	0.790950	3.942	6.37	154.43	3.42
1	3530.18*	PF 1	25.10	1220.19	1220.340	1220.28300	1220.36	0.010728	1.083	23.17	155.00	0.49
1	3529.18*	PF 1	25.10	1220.18	1220.329		1220.35	0.011069	1.094	22.94	154.89	0.50
1	3528.18*	PF 1	25.10	1220.17	1220.317		1220.34	0.011580	1.109	22.63	154.80	0.51
1	3527.18*	PF 1	25.10	1220.16	1220.304		1220.32	0.012365	1.131	22.18	154.70	0.53
1	3526.18*	PF 1	25.10	1220.15	1220.289		1220.31	0.013850	1.171	21.44	154.58	0.55
1	3525.18*	PF 1	25.10	1220.14	1220.272		1220.30	0.016405	1.232	20.37	154.45	0.60
1	3524.18*	PF 1	25.10	1220.13	1220.259		1220.28	0.009954	1.261	19.90	154.36	0.62
1	3523.18*	PF 1	25.10	1220.12	1220.249		1220.27	0.009934	1.261	19.91	154.27	0.62
1	3522.18*	PF 1	25.10	1220.11	1220.239		1220.26	0.009946	1.261	19.90	154.18	0.62
1	3521.18*	PF 1	25.10	1220.10	1220.229		1220.25	0.009925	1.261	19.91	154.10	0.62
1	3520.18*	PF 1	25.10	1220.09	1220.219		1220.24	0.009937	1.262	19.90	154.01	0.62
1	3519.18*	PF 1	25.10	1220.08	1220.210		1220.23	0.009916	1.261	19.90	153.93	0.62
1	3518.18*	PF 1	25.10	1220.07	1220.200		1220.22	0.009928	1.262	19.89	153.84	0.62
1	3517.18*	PF 1	25.10	1220.06	1220.190		1220.21	0.009971	1.264	19.86	153.75	0.62
1	3516.18*	PF 1	25.10	1220.05	1220.180		1220.20	0.009950	1.263	19.87	153.67	0.62
1	3515.18*	PF 1	25.10	1220.04	1220.170		1220.19	0.009961	1.264	19.86	153.58	0.62
1	3514.18*	PF 1	25.10	1220.03	1220.160		1220.19	0.009942	1.263	19.87	153.49	0.62
1	3513.18*	PF 1	25.10	1220.02	1220.150		1220.18	0.009952	1.264	19.86	153.41	0.62
1	3512.18*	PF 1	25.10	1220.01	1220.140		1220.17	0.009933	1.264	19.86	153.32	0.62
1	3511.18*	PF 1	25.10	1220.00	1220.130		1220.16	0.009943	1.264	19.85	153.24	0.62
1	3510.18*	PF 1	25.10	1219.99	1220.120		1220.15	0.009924	1.264	19.86	153.15	0.62
1	3509.18*	PF 1	25.10	1219.98	1220.110		1220.14	0.009934	1.265	19.85	153.07	0.62
1	3508.18*	PF 1	25.10	1219.97	1220.100		1220.13	0.009915	1.264	19.86	152.98	0.62
1	3507.18*	PF 1	25.10	1219.96	1220.090		1220.12	0.009927	1.265	19.84	152.89	0.62
1	3506.18*	PF 1	25.10	1219.95	1220.080		1220.11	0.009906	1.264	19.85	152.81	0.62
1	3505.18*	PF 1	25.10	1219.94	1220.070		1220.10	0.009887	1.264	19.86	152.72	0.62
1	3504.18*	PF 1	25.10	1219.93	1220.060		1220.09	0.009930	1.266	19.83	152.63	0.62
1	3503.18*	PF 1	25.10	1219.92	1220.050		1220.08	0.009971	1.268	19.80	152.55	0.62
1	3502.18*	PF 1	25.10	1219.91	1220.040		1220.07	0.009951	1.267	19.81	152.47	0.62
1	3501.18*	PF 1	25.10	1219.90	1220.030		1220.06	0.009933	1.267	19.81	152.37	0.62
1	3500.18*	PF 1	25.10	1219.89	1220.020		1220.05	0.009943	1.267	19.80	152.29	0.62
1	3499.18*	PF 1	25.10	1219.88	1220.010		1220.04	0.009954	1.268	19.79	152.21	0.62
1	3498.18*	PF 1	25.10	1219.87	1220.000		1220.03	0.009967	1.269	19.78	152.11	0.62
1	3497.18*	PF 1	25.10	1219.86	1219.990		1220.02	0.009946	1.268	19.79	152.03	0.62
1	3496.18*	PF 1	25.10	1219.85	1219.980		1220.01	0.009957	1.269	19.78	151.95	0.62
1	3495.18*	PF 1	25.10	1219.84	1219.970		1220.00	0.009969	1.270	19.77	151.86	0.62
1	3494.18*	PF 1	25.10	1219.83	1219.961		1219.99	0.009949	1.269	19.77	151.77	0.62
1	3493.18*	PF 1	25.10	1219.82	1219.951		1219.98	0.009929	1.269	19.78	151.69	0.62
1	3492.18*	PF 1	25.10	1219.81	1219.941		1219.97	0.009941	1.270	19.77	151.61	0.62
1	3491.18*	PF 1	25.10	1219.80	1219.931		1219.96	0.009953	1.270	19.76	151.51	0.62
1	3490.18*	PF 1	25.10	1219.79	1219.921		1219.95	0.009932	1.270	19.77	151.44	0.62
1	3489.18*	PF 1	25.10	1219.78	1219.911		1219.94	0.009944	1.271	19.75	151.35	0.62
1	3488.18*	PF 1	25.10	1219.77	1219.901		1219.93	0.009955	1.271	19.74	151.27	0.62
1	3487.18*	PF 1	25.10	1219.76	1219.891		1219.92	0.009967	1.272	19.73	151.18	0.62
1	3486.18*	PF 1	25.10	1219.75	1219.881		1219.91	0.009948	1.272	19.74	151.09	0.62
1	3485.18*	PF 1	25.10	1219.74	1219.871		1219.90	0.009958	1.272	19.73	151.01	0.62
1	3484.18*	PF 1	25.10	1219.73	1219.861		1219.89	0.009970	1.273	19.72	150.92	0.62
1	3483.18*	PF 1	25.10	1219.72	1219.851		1219.88	0.009951	1.273	19.72	150.83	0.62

HEC-RAS Plan: Plan 03 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3482.18*	PF 1	25.10	1219.71	1219.841		1219.87	0.009962	1.273	19.71	150.75	0.62
1	3481.18*	PF 1	25.10	1219.70	1219.831		1219.86	0.009943	1.273	19.72	150.66	0.62
1	3480.18*	PF 1	25.10	1219.69	1219.821		1219.85	0.009924	1.272	19.73	150.57	0.62
1	3479.18*	PF 1	25.10	1219.68	1219.811		1219.84	0.009935	1.273	19.71	150.49	0.62
1	3478.18*	PF 1	25.10	1219.67	1219.801		1219.83	0.009945	1.274	19.70	150.41	0.62
1	3477.18*	PF 1	25.10	1219.66	1219.791		1219.82	0.009957	1.275	19.69	150.32	0.62
1	3476.18*	PF 1	25.10	1219.65	1219.781		1219.81	0.009969	1.275	19.68	150.23	0.62
1	3475.18*	PF 1	25.10	1219.64	1219.771		1219.80	0.009949	1.275	19.69	150.15	0.62
1	3474.18*	PF 1	25.10	1219.63	1219.761		1219.79	0.009961	1.276	19.68	150.06	0.62
1	3473.18*	PF 1	25.10	1219.62	1219.752		1219.78	0.009942	1.275	19.68	149.97	0.62
1	3472.18*	PF 1	25.10	1219.61	1219.742		1219.77	0.009953	1.276	19.67	149.89	0.62
1	3471.18*	PF 1	25.10	1219.60	1219.732		1219.76	0.009963	1.277	19.66	149.81	0.62
1	3470.18*	PF 1	25.10	1219.59	1219.722		1219.75	0.009946	1.276	19.67	149.71	0.62
1	3469.18*	PF 1	25.10	1219.58	1219.712		1219.74	0.009926	1.276	19.67	149.63	0.62
1	3468.18*	PF 1	25.10	1219.57	1219.702		1219.73	0.009906	1.275	19.68	149.55	0.62
1	3467.18*	PF 1	25.10	1219.56	1219.692		1219.72	0.009919	1.276	19.67	149.45	0.62
1	3466.18*	PF 1	25.10	1219.55	1219.682		1219.71	0.009930	1.277	19.66	149.37	0.62
1	3465.18*	PF 1	25.10	1219.54	1219.672		1219.70	0.009910	1.276	19.67	149.29	0.62
1	3464.18*	PF 1	25.10	1219.53	1219.662		1219.69	0.009922	1.277	19.65	149.20	0.62
1	3463.18*	PF 1	25.10	1219.52	1219.652		1219.68	0.009904	1.277	19.66	149.11	0.62
1	3462.18*	PF 1	25.10	1219.51	1219.642		1219.67	0.009884	1.276	19.67	149.03	0.62
1	3461.18*	PF 1	25.10	1219.50	1219.632		1219.66	0.009896	1.277	19.66	148.94	0.62
1	3460.18*	PF 1	25.10	1219.49	1219.622		1219.65	0.009877	1.277	19.66	148.86	0.62
1	3459.18*	PF 1	25.10	1219.48	1219.613		1219.64	0.009858	1.276	19.67	148.78	0.62
1	3458.18*	PF 1	25.10	1219.47	1219.603		1219.63	0.009809	1.274	19.69	148.69	0.62
1	3457.18*	PF 1	25.10	1219.46	1219.593		1219.62	0.009761	1.273	19.72	148.60	0.62
1	3456.18*	PF 1	25.10	1219.45	1219.583		1219.61	0.009712	1.271	19.74	148.52	0.61
1	3455.18*	PF 1	25.10	1219.44	1219.574		1219.60	0.009636	1.269	19.79	148.43	0.61
1	3454.18*	PF 1	25.10	1219.43	1219.564		1219.59	0.009559	1.266	19.83	148.35	0.61
1	3453.18*	PF 1	25.10	1219.42	1219.555		1219.58	0.009455	1.262	19.89	148.27	0.61
1	3452.18*	PF 1	25.10	1219.41	1219.545		1219.57	0.009296	1.256	19.99	148.18	0.60
1	3451.18*	PF 1	25.10	1219.40	1219.536		1219.56	0.009086	1.247	20.12	148.11	0.60
1	3450.18*	PF 1	25.10	1219.39	1219.527		1219.55	0.008830	1.237	20.29	148.03	0.59
1	3449.18*	PF 1	25.10	1219.38	1219.519		1219.54	0.008534	1.225	20.49	147.94	0.58
1	3448.18*	PF 1	25.10	1219.37	1219.511		1219.53	0.008178	1.209	20.75	147.87	0.57
1	3447.18*	PF 1	25.10	1219.36	1219.503		1219.53	0.007753	1.190	21.09	147.81	0.56
1	3446.18*	PF 1	25.10	1219.35	1219.496		1219.52	0.007297	1.169	21.47	147.72	0.54
1	3445.18*	PF 1	25.10	1219.34	1219.489		1219.51	0.006798	1.145	21.92	147.66	0.52
1	3444.18*	PF 1	25.10	1219.33	1219.483		1219.50	0.006259	1.117	22.47	147.61	0.50
1	3443.18*	PF 1	25.10	1219.32	1219.477		1219.50	0.005716	1.087	23.09	147.54	0.48
1	3442.18*	PF 1	25.10	1219.31	1219.472		1219.49	0.005193	1.057	23.76	147.48	0.46
1	3441.18*	PF 1	25.10	1219.30	1219.468		1219.48	0.004617	1.020	24.61	147.43	0.44
1	3440.63	PF 1	33.60	1219.29	1219.445		1219.48	0.010712	1.476	22.77	147.31	0.66
1	3366.51	PF 1	33.60	1218.55	1218.715		1218.75	0.009062	1.412	23.79	145.08	0.61
1	3305.78	PF 1	33.60	1217.94	1218.156		1218.20	0.009037	1.684	19.95	93.19	0.64
1	3304.78*	PF 1	33.60	1217.93	1218.146		1218.19	0.009043	1.687	19.91	92.82	0.64
1	3303.78*	PF 1	33.60	1217.92	1218.137		1218.18	0.009031	1.689	19.89	92.45	0.64
1	3302.78*	PF 1	33.60	1217.91	1218.127		1218.17	0.009022	1.691	19.86	92.07	0.64
1	3301.78*	PF 1	33.60	1217.90	1218.118		1218.16	0.009011	1.694	19.84	91.71	0.64
1	3300.78*	PF 1	33.60	1217.89	1218.109		1218.15	0.009002	1.696	19.81	91.33	0.64
1	3299.78*	PF 1	33.60	1217.88	1218.099		1218.14	0.008993	1.698	19.79	90.96	0.64
1	3298.78*	PF 1	33.60	1217.87	1218.090		1218.14	0.008985	1.700	19.76	90.59	0.64
1	3297.78*	PF 1	33.60	1217.86	1218.080		1218.13	0.008977	1.703	19.73	90.22	0.64
1	3296.78*	PF 1	33.60	1217.85	1218.071		1218.12	0.008987	1.706	19.69	89.84	0.64
1	3295.78*	PF 1	33.60	1217.84	1218.061		1218.11	0.008979	1.708	19.67	89.48	0.64
1	3294.78*	PF 1	33.60	1217.83	1218.052		1218.10	0.008958	1.710	19.65	89.10	0.64
1	3293.78*	PF 1	33.60	1217.82	1218.043		1218.09	0.008935	1.712	19.63	88.74	0.64
1	3292.78*	PF 1	33.60	1217.81	1218.033		1218.08	0.008948	1.715	19.59	88.36	0.64
1	3291.78*	PF 1	33.60	1217.80	1218.024		1218.07	0.008942	1.718	19.56	87.99	0.64
1	3290.78*	PF 1	33.60	1217.79	1218.015		1218.06	0.008923	1.720	19.54	87.62	0.64
1	3289.78*	PF 1	33.60	1217.78	1218.005		1218.05	0.008919	1.722	19.51	87.25	0.64
1	3288.78*	PF 1	33.60	1217.77	1217.996		1218.04	0.008901	1.724	19.49	86.88	0.64
1	3287.78*	PF 1	33.60	1217.76	1217.987		1218.03	0.008882	1.726	19.47	86.51	0.64
1	3286.78*	PF 1	33.60	1217.75	1217.977		1218.02	0.008882	1.729	19.43	86.13	0.64
1	3285.78*	PF 1	33.60	1217.74	1217.968		1218.02	0.008864	1.731	19.41	85.77	0.64
1	3284.78*	PF 1	33.60	1217.73	1217.959		1218.01	0.008849	1.733	19.39	85.39	0.64
1	3283.78*	PF 1	33.60	1217.72	1217.949		1218.00	0.008848	1.736	19.36	85.03	0.64
1	3282.78*	PF 1	33.60	1217.71	1217.940		1217.99	0.008835	1.738	19.33	84.65	0.64
1	3281.78*	PF 1	33.60	1217.70	1217.931		1217.98	0.008822	1.741	19.30	84.28	0.64
1	3280.78*	PF 1	33.60	1217.69	1217.922		1217.97	0.008794	1.742	19.29	83.90	0.64
1	3279.78*	PF 1	33.60	1217.68	1217.912		1217.96	0.008796	1.745	19.25	83.54	0.64
1	3278.78*	PF 1	33.60	1217.67	1217.903		1217.95	0.008769	1.747	19.24	83.16	0.64
1	3277.78*	PF 1	33.60	1217.66	1217.894		1217.94	0.008742	1.748	19.22	82.79	0.64
1	3276.78*	PF 1	33.60	1217.65	1217.885		1217.93	0.008717	1.750	19.20	82.42	0.64
1	3275.78*	PF 1	33.60	1217.64	1217.876		1217.92	0.008676	1.750	19.20	82.06	0.64
1	3274.78*	PF 1	33.60	1217.63	1217.867		1217.92	0.008653	1.752	19.18	81.68	0.64
1	3273.78*	PF 1	33.60	1217.62	1217.858		1217.91	0.008614	1.753	19.17	81.32	0.64
1	3272.78*	PF 1	33.60	1217.61	1217.849		1217.90	0.008564	1.753	19.17	80.94	0.64
1	3271.78*	PF 1	33.60	1217.60	1217.840		1217.89	0.008527	1.754	19.16	80.58	0.63

HEC-RAS Plan: Plan 03 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3270.78*	PF 1	33.60	1217.59	1217.831		1217.88	0.008464	1.753	19.16	80.21	0.63
1	3269.78*	PF 1	33.60	1217.58	1217.822		1217.87	0.008418	1.754	19.16	79.83	0.63
1	3268.78*	PF 1	33.60	1217.57	1217.813		1217.86	0.008370	1.754	19.16	79.47	0.63
1	3267.78*	PF 1	33.60	1217.56	1217.804		1217.85	0.008326	1.754	19.15	79.10	0.63
1	3266.78*	PF 1	33.60	1217.55	1217.796		1217.84	0.008267	1.754	19.16	78.74	0.63
1	3265.78*	PF 1	33.60	1217.54	1217.787		1217.84	0.008198	1.753	19.17	78.36	0.62
1	3264.78*	PF 1	33.60	1217.53	1217.778		1217.83	0.008129	1.752	19.18	78.00	0.62
1	3263.78*	PF 1	33.60	1217.52	1217.770		1217.82	0.008050	1.750	19.20	77.63	0.62
1	3262.78*	PF 1	33.60	1217.51	1217.761		1217.81	0.007946	1.746	19.24	77.27	0.62
1	3261.78*	PF 1	33.60	1217.50	1217.753		1217.80	0.007847	1.743	19.28	76.90	0.61
1	3260.78*	PF 1	33.60	1217.49	1217.745		1217.79	0.007735	1.739	19.32	76.54	0.61
1	3259.78*	PF 1	33.60	1217.48	1217.737		1217.78	0.007606	1.733	19.38	76.17	0.61
1	3258.78*	PF 1	33.60	1217.47	1217.729		1217.78	0.007478	1.728	19.45	75.82	0.60
1	3257.78*	PF 1	33.60	1217.46	1217.718		1217.77	0.013687	1.747	19.24	75.43	0.61
1	3256.78*	PF 1	33.60	1217.44	1217.705		1217.75	0.012629	1.708	19.67	75.10	0.59
1	3255.78*	PF 1	33.60	1217.43	1217.689		1217.74	0.013750	1.756	19.14	74.68	0.61
1	3254.78*	PF 1	33.60	1217.42	1217.671		1217.72	0.015512	1.825	18.41	74.26	0.65
1	3253.78*	PF 1	33.60	1217.41	1217.644		1217.70	0.019777	1.968	17.07	73.78	0.72
1	3253.32	PF 1	33.60	1217.41	1217.599	1217.59900	1217.69	0.040702	2.450	13.72	73.34	1.00
1	3252.32*	PF 1	33.60	1216.12	1216.175	1216.31800	1217.45	2.839276	9.042	3.72	67.66	6.80
1	3251.32*	PF 1	33.60	1214.83	1214.907	1215.03600	1215.66	1.065060	6.936	4.84	62.92	4.41
1	3250.32*	PF 1	33.60	1213.54	1213.618	1213.75800	1214.49	1.239915	7.498	4.48	58.05	4.76
1	3250.17	PF 1	33.60	1213.35	1213.429	1213.57000	1214.30	1.212747	7.484	4.49	57.34	4.72
1	3249.17*	PF 1	33.60	1213.34	1213.480	1213.56100	1213.76	0.177616	4.203	7.99	57.41	1.99
1	3248.17*	PF 1	33.60	1213.33	1213.651	1213.55200	1213.70	0.011308	1.829	18.37	58.21	0.57
1	3247.17*	PF 1	33.60	1213.32	1213.638		1213.69	0.011785	1.856	18.10	57.89	0.59
1	3246.17*	PF 1	33.60	1213.31	1213.624		1213.68	0.012426	1.890	17.78	57.58	0.60
1	3245.17*	PF 1	33.60	1213.30	1213.609		1213.67	0.013266	1.931	17.40	57.25	0.62
1	3244.17*	PF 1	33.60	1213.29	1213.594		1213.65	0.014163	1.974	17.02	56.92	0.64
1	3243.17*	PF 1	33.60	1213.28	1213.583		1213.64	0.008174	1.994	16.85	56.62	0.64
1	3242.17*	PF 1	33.60	1213.27	1213.574		1213.64	0.008161	1.997	16.83	56.33	0.64
1	3241.17*	PF 1	33.60	1213.26	1213.565		1213.63	0.008141	2.000	16.80	56.04	0.64
1	3240.17*	PF 1	33.60	1213.25	1213.556		1213.62	0.008117	2.002	16.79	55.77	0.64
1	3239.17*	PF 1	33.60	1213.24	1213.547		1213.61	0.008109	2.005	16.75	55.47	0.64
1	3238.17*	PF 1	33.60	1213.23	1213.538		1213.60	0.008092	2.008	16.73	55.18	0.64
1	3237.17*	PF 1	33.60	1213.22	1213.530		1213.59	0.008073	2.011	16.71	54.90	0.64
1	3236.17*	PF 1	33.60	1213.21	1213.521		1213.58	0.008058	2.014	16.68	54.61	0.64
1	3235.17*	PF 1	33.60	1213.20	1213.512		1213.58	0.008044	2.018	16.65	54.31	0.64
1	3234.17*	PF 1	33.60	1213.19	1213.503		1213.57	0.008028	2.021	16.63	54.03	0.64
1	3233.17*	PF 1	33.60	1213.18	1213.495		1213.56	0.008013	2.024	16.60	53.75	0.64
1	3232.17*	PF 1	33.60	1213.17	1213.486		1213.55	0.008001	2.027	16.58	53.46	0.64
1	3231.17*	PF 1	33.60	1213.16	1213.477		1213.54	0.007988	2.030	16.55	53.17	0.64
1	3230.17*	PF 1	33.60	1213.15	1213.468		1213.53	0.007968	2.033	16.52	52.88	0.64
1	3229.17*	PF 1	33.60	1213.14	1213.460		1213.52	0.007946	2.036	16.50	52.60	0.64
1	3228.17*	PF 1	33.60	1213.13	1213.451		1213.52	0.007929	2.039	16.48	52.31	0.64
1	3227.17*	PF 1	33.60	1213.12	1213.442		1213.51	0.007909	2.042	16.45	52.02	0.64
1	3226.17*	PF 1	33.60	1213.11	1213.434		1213.50	0.007891	2.045	16.43	51.74	0.64
1	3225.17*	PF 1	33.60	1213.10	1213.425		1213.49	0.007876	2.049	16.40	51.45	0.64
1	3224.17*	PF 1	33.60	1213.09	1213.416		1213.48	0.007873	2.053	16.37	51.16	0.64
1	3223.17*	PF 1	33.60	1213.08	1213.407		1213.47	0.007857	2.056	16.34	50.88	0.64
1	3222.17*	PF 1	33.60	1213.07	1213.399		1213.47	0.007855	2.061	16.30	50.58	0.64
1	3221.17*	PF 1	33.60	1213.06	1213.390		1213.46	0.007864	2.066	16.26	50.29	0.64
1	3220.17*	PF 1	33.60	1213.05	1213.381		1213.45	0.007858	2.070	16.23	50.02	0.64
1	3219.17*	PF 1	33.60	1213.04	1213.373		1213.44	0.007840	2.074	16.20	49.73	0.64
1	3218.17*	PF 1	33.60	1213.03	1213.364		1213.43	0.007842	2.079	16.16	49.43	0.64
1	3217.17*	PF 1	33.60	1213.02	1213.355		1213.42	0.007842	2.083	16.13	49.15	0.64
1	3216.17*	PF 1	33.60	1213.01	1213.346		1213.41	0.007836	2.088	16.09	48.86	0.64
1	3215.17*	PF 1	33.60	1213.00	1213.338		1213.41	0.007842	2.093	16.05	48.57	0.64
1	3214.17*	PF 1	33.60	1212.99	1213.329		1213.40	0.007831	2.097	16.02	48.29	0.64
1	3213.17*	PF 1	33.60	1212.98	1213.320		1213.39	0.007838	2.103	15.98	48.00	0.64
1	3212.17*	PF 1	33.60	1212.97	1213.311		1213.38	0.007843	2.108	15.94	47.72	0.64
1	3211.17*	PF 1	33.60	1212.96	1213.302		1213.37	0.007852	2.114	15.89	47.43	0.64
1	3210.17*	PF 1	33.60	1212.95	1213.294		1213.36	0.007862	2.120	15.85	47.13	0.64
1	3209.17*	PF 1	33.60	1212.94	1213.285		1213.36	0.007870	2.126	15.80	46.85	0.65
1	3208.17*	PF 1	33.60	1212.93	1213.276		1213.35	0.007888	2.133	15.76	46.57	0.65
1	3207.17*	PF 1	33.60	1212.92	1213.267		1213.34	0.007910	2.140	15.70	46.27	0.65
1	3206.17*	PF 1	33.60	1212.91	1213.258		1213.33	0.007930	2.147	15.65	45.99	0.65
1	3205.17*	PF 1	33.60	1212.90	1213.249		1213.32	0.007964	2.155	15.59	45.70	0.65
1	3204.17*	PF 1	33.60	1212.89	1213.240		1213.31	0.007998	2.163	15.53	45.40	0.65
1	3203.17*	PF 1	33.60	1212.88	1213.231		1213.30	0.008031	2.171	15.48	45.12	0.65
1	3202.17*	PF 1	33.60	1212.87	1213.222		1213.30	0.008068	2.180	15.41	44.82	0.66
1	3201.17*	PF 1	33.60	1212.86	1213.213		1213.29	0.008111	2.189	15.35	44.54	0.66
1	3200.17*	PF 1	33.60	1212.85	1213.204		1213.28	0.008156	2.198	15.28	44.25	0.66
1	3199.17*	PF 1	33.60	1212.84	1213.194		1213.27	0.008225	2.210	15.21	43.96	0.66
1	3198.17*	PF 1	33.60	1212.83	1213.185		1213.26	0.008282	2.220	15.13	43.67	0.66
1	3197.17*	PF 1	33.60	1212.82	1213.176		1213.25	0.008364	2.233	15.05	43.37	0.67
1	3196.17*	PF 1	33.60	1212.81	1213.166		1213.25	0.008466	2.247	14.95	43.08	0.67
1	3195.17*	PF 1	33.60	1212.80	1213.156		1213.24	0.008553	2.260	14.87	42.80	0.68
1	3194.17*	PF 1	33.60	1212.79	1213.146		1213.23	0.008680	2.276	14.76	42.50	0.68

HEC-RAS Plan: Plan 03 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3193.17*	PF 1	33.60	1212.78	1213.136		1213.22	0.008809	2.293	14.66	42.20	0.69
1	3192.17*	PF 1	33.60	1212.77	1213.126		1213.21	0.008957	2.311	14.54	41.91	0.69
1	3191.17*	PF 1	33.60	1212.76	1213.116		1213.20	0.009125	2.330	14.42	41.60	0.70
1	3190.17*	PF 1	33.60	1212.75	1213.105		1213.19	0.009328	2.352	14.28	41.30	0.71
1	3189.17*	PF 1	33.60	1212.74	1213.094		1213.18	0.009543	2.375	14.14	41.01	0.71
1	3188.17*	PF 1	33.60	1212.73	1213.083		1213.17	0.009799	2.401	13.99	40.71	0.72
1	3187.17*	PF 1	33.60	1212.72	1213.071		1213.16	0.010115	2.432	13.82	40.40	0.73
1	3186.18	PF 1	33.60	1212.71	1213.059		1213.15	0.010499	2.467	13.62	40.09	0.75
1	3091.83	PF 1	33.60	1211.75	1212.049		1212.13	0.011217	2.315	14.51	49.41	0.75
1	3030.37	PF 1	33.60	1211.13	1211.384		1211.45	0.010925	2.052	16.37	65.54	0.72
1	3029.37*	PF 1	33.60	1211.12	1211.373		1211.44	0.010920	2.048	16.40	65.83	0.72
1	3028.37*	PF 1	33.60	1211.11	1211.362		1211.43	0.010913	2.044	16.44	66.13	0.72
1	3027.37*	PF 1	33.60	1211.10	1211.351		1211.42	0.010927	2.041	16.46	66.42	0.72
1	3026.37*	PF 1	33.60	1211.09	1211.340		1211.41	0.010960	2.040	16.47	66.72	0.72
1	3025.37*	PF 1	33.60	1211.08	1211.330		1211.39	0.010955	2.036	16.51	67.02	0.72
1	3024.37*	PF 1	33.60	1211.07	1211.319		1211.38	0.010972	2.033	16.53	67.32	0.72
1	3023.37*	PF 1	33.60	1211.06	1211.308		1211.37	0.011026	2.032	16.53	67.62	0.72
1	3022.37*	PF 1	33.60	1211.05	1211.297		1211.36	0.011045	2.030	16.55	67.92	0.72
1	3021.37*	PF 1	33.60	1211.04	1211.286		1211.35	0.011098	2.029	16.56	68.23	0.73
1	3020.37*	PF 1	33.60	1211.03	1211.275		1211.34	0.011156	2.029	16.56	68.53	0.73
1	3019.37*	PF 1	33.60	1211.02	1211.263		1211.33	0.011254	2.030	16.55	68.83	0.73
1	3018.37*	PF 1	33.60	1211.01	1211.252		1211.32	0.011369	2.033	16.53	69.14	0.73
1	3017.37*	PF 1	33.60	1211.00	1211.241		1211.31	0.011452	2.034	16.52	69.44	0.74
1	3016.37*	PF 1	33.60	1210.98	1211.234		1211.29	0.009538	1.921	17.49	69.84	0.68
1	3015.37*	PF 1	33.60	1210.97	1211.224		1211.28	0.009325	1.904	17.65	70.17	0.67
1	3014.37*	PF 1	33.60	1210.96	1211.216		1211.27	0.009090	1.886	17.81	70.49	0.66
1	3013.37*	PF 1	33.60	1210.95	1211.207		1211.26	0.008835	1.867	18.00	70.81	0.65
1	3012.37*	PF 1	33.60	1210.94	1211.199		1211.25	0.008558	1.845	18.21	71.15	0.64
1	3011.37*	PF 1	33.60	1210.93	1211.191		1211.24	0.008281	1.824	18.42	71.48	0.63
1	3010.37*	PF 1	33.60	1210.92	1211.183		1211.23	0.007965	1.800	18.67	71.81	0.62
1	3009.37*	PF 1	33.60	1210.91	1211.176		1211.23	0.007640	1.774	18.94	72.14	0.61
1	3008.37*	PF 1	33.60	1210.90	1211.165		1211.21	0.013620	1.772	18.96	72.46	0.61
1	3007.37*	PF 1	33.60	1210.89	1211.149		1211.20	0.014544	1.805	18.62	72.74	0.63
1	3006.37*	PF 1	33.60	1210.88	1211.131		1211.18	0.016042	1.856	18.11	73.01	0.66
1	3005.37*	PF 1	33.60	1210.87	1211.107		1211.17	0.019266	1.958	17.16	73.25	0.71
1	3004.37*	PF 1	33.60	1210.86	1211.067		1211.14	0.029918	2.233	15.05	73.39	0.87
1	3004.33	PF 1	33.60	1210.86	1211.064	1211.06400	1211.14	0.031119	2.259	14.87	73.39	0.88
1	3003.33*	PF 1	33.60	1210.01	1210.076	1210.20700	1210.96	1.574335	7.562	4.44	67.98	5.21
1	3002.33*	PF 1	33.60	1209.17	1209.256	1209.37600	1209.84	0.723334	6.151	5.46	63.55	3.70
1	3001.33*	PF 1	33.60	1208.32	1208.408	1208.53600	1209.07	0.798501	6.528	5.15	58.99	3.90
1	3000.32*	PF 1	33.60	1207.47	1207.562	1207.69900	1208.27	0.794196	6.729	4.99	54.45	3.92
1	2999.32*	PF 1	33.60	1206.62	1206.718	1206.86300	1207.47	0.784689	6.942	4.84	49.92	3.93
1	2998.41	PF 1	33.60	1205.85	1205.953	1206.10600	1206.75	0.773138	7.154	4.70	45.79	3.94
1	2997.41*	PF 1	33.60	1205.84	1206.005	1206.09400	1206.31	0.157463	4.407	7.62	46.59	1.92
1	2996.41*	PF 1	33.60	1205.83	1206.165	1206.08100	1206.24	0.014671	2.135	15.74	48.04	0.66
1	2995.41*	PF 1	33.60	1205.82	1206.148		1206.22	0.015349	2.157	15.58	48.44	0.67
1	2994.41*	PF 1	33.60	1205.81	1206.130		1206.21	0.016398	2.193	15.32	48.82	0.69
1	2993.41*	PF 1	33.60	1205.80	1206.109		1206.19	0.018074	2.252	14.92	49.19	0.72
1	2992.41*	PF 1	33.60	1205.79	1206.088		1206.17	0.020063	2.317	14.50	49.55	0.75
1	2991.41*	PF 1	33.60	1205.78	1206.073		1206.16	0.011727	2.336	14.38	49.96	0.77
1	2990.41*	PF 1	33.60	1205.77	1206.062		1206.15	0.011716	2.327	14.44	50.38	0.77
1	2989.41*	PF 1	33.60	1205.76	1206.050		1206.13	0.011696	2.319	14.49	50.79	0.77
1	2988.41*	PF 1	33.60	1205.75	1206.039		1206.12	0.011691	2.311	14.54	51.21	0.76
1	2987.41*	PF 1	33.60	1205.74	1206.027		1206.11	0.011667	2.302	14.60	51.64	0.76
1	2986.41*	PF 1	33.60	1205.73	1206.016		1206.10	0.011651	2.293	14.65	52.07	0.76
1	2985.41*	PF 1	33.60	1205.72	1206.005		1206.09	0.011637	2.285	14.70	52.49	0.76
1	2984.41*	PF 1	33.60	1205.71	1205.994		1206.07	0.011608	2.276	14.76	52.91	0.76
1	2983.41*	PF 1	33.60	1205.70	1205.982		1206.06	0.011583	2.267	14.82	53.33	0.76
1	2982.41*	PF 1	33.60	1205.69	1205.971		1206.05	0.011555	2.258	14.88	53.77	0.76
1	2981.41*	PF 1	33.60	1205.68	1205.960		1206.04	0.011567	2.252	14.92	54.19	0.76
1	2980.41*	PF 1	33.60	1205.67	1205.949		1206.03	0.011532	2.243	14.98	54.61	0.76
1	2979.41*	PF 1	33.60	1205.66	1205.938		1206.02	0.011498	2.234	15.04	55.03	0.75
1	2978.41*	PF 1	33.60	1205.65	1205.926		1206.00	0.011463	2.225	15.10	55.47	0.75
1	2977.41*	PF 1	33.60	1205.64	1205.915		1205.99	0.011451	2.218	15.15	55.89	0.75
1	2976.41*	PF 1	33.60	1205.63	1205.904		1205.98	0.011441	2.210	15.20	56.31	0.75
1	2975.41*	PF 1	33.60	1205.62	1205.893		1205.97	0.011450	2.204	15.24	56.74	0.75
1	2974.41*	PF 1	33.60	1205.61	1205.882		1205.96	0.011406	2.195	15.31	57.17	0.75
1	2973.41*	PF 1	33.60	1205.60	1205.870		1205.95	0.011385	2.188	15.36	57.59	0.75
1	2972.41*	PF 1	33.60	1205.59	1205.859		1205.93	0.011371	2.180	15.41	58.01	0.75
1	2971.41*	PF 1	33.60	1205.58	1205.848		1205.92	0.011354	2.173	15.46	58.43	0.74
1	2970.41*	PF 1	33.60	1205.57	1205.837		1205.91	0.011339	2.166	15.51	58.85	0.74
1	2969.41*	PF 1	33.60	1205.56	1205.826		1205.90	0.011322	2.159	15.56	59.29	0.74
1	2968.41*	PF 1	33.60	1205.55	1205.815		1205.89	0.011276	2.150	15.63	59.71	0.74
1	2967.41*	PF 1	33.60	1205.54	1205.804		1205.88	0.011250	2.142	15.68	60.14	0.74
1	2966.41*	PF 1	33.60	1205.53	1205.793		1205.86	0.011225	2.135	15.74	60.56	0.74
1	2965.41*	PF 1	33.60	1205.52	1205.782		1205.85	0.011198	2.127	15.79	60.99	0.74
1	2964.41*	PF 1	33.60	1205.51	1205.772		1205.84	0.011142	2.118	15.86	61.42	0.73
1	2963.41*	PF 1	33.60	1205.50	1205.761		1205.83	0.011105	2.110	15.92	61.85	0.73
1	2962.41*	PF 1	33.60	1205.49	1205.750		1205.82	0.011069	2.103	15.98	62.27	0.73

HEC-RAS Plan: Plan 03 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	2961.41*	PF 1	33.60	1205.48	1205.739		1205.81	0.011032	2.095	16.04	62.70	0.73
1	2960.41*	PF 1	33.60	1205.47	1205.728		1205.80	0.010982	2.086	16.11	63.13	0.73
1	2959.41*	PF 1	33.60	1205.46	1205.718		1205.79	0.010917	2.077	16.18	63.56	0.73
1	2958.41*	PF 1	33.60	1205.45	1205.707		1205.77	0.010836	2.067	16.26	63.98	0.72
1	2957.41*	PF 1	33.60	1205.44	1205.697		1205.76	0.010723	2.055	16.35	64.41	0.72
1	2956.41*	PF 1	33.60	1205.43	1205.687		1205.75	0.010642	2.044	16.43	64.85	0.72
1	2955.41*	PF 1	33.60	1205.42	1205.676		1205.74	0.010519	2.032	16.53	65.27	0.71
1	2955.4	PF 1	33.60	1205.42	1205.676		1205.74	0.010550	2.034	16.52	65.28	0.71
1	2914.65	PF 1	33.60	1205.01	1205.243		1205.30	0.010524	1.910	17.59	76.28	0.70
1	2815.59	PF 1	33.60	1204.02	1204.205		1204.25	0.010556	1.648	20.39	110.59	0.68
1	2782.59	PF 1	33.60	1203.69	1203.868		1203.91	0.010073	1.569	21.41	120.68	0.66
1	2743.58	PF 1	33.60	1203.30	1203.473		1203.51	0.010188	1.548	21.70	125.91	0.66
1	2742.58*	PF 1	33.60	1203.29	1203.463		1203.50	0.010166	1.546	21.73	126.05	0.66
1	2741.58*	PF 1	33.60	1203.28	1203.453		1203.49	0.010191	1.547	21.72	126.19	0.66
1	2740.58*	PF 1	33.60	1203.27	1203.443		1203.48	0.010190	1.546	21.73	126.34	0.66
1	2739.58*	PF 1	33.60	1203.26	1203.433		1203.47	0.010192	1.545	21.74	126.48	0.66
1	2738.58*	PF 1	33.60	1203.25	1203.422		1203.46	0.010243	1.547	21.72	126.60	0.66
1	2737.58*	PF 1	33.60	1203.24	1203.412		1203.45	0.010269	1.548	21.71	126.74	0.66
1	2736.58*	PF 1	33.60	1203.23	1203.402		1203.44	0.010319	1.549	21.69	126.88	0.66
1	2735.58*	PF 1	33.60	1203.22	1203.391		1203.43	0.010394	1.552	21.65	127.02	0.66
1	2734.58*	PF 1	33.60	1203.21	1203.380		1203.42	0.010494	1.556	21.60	127.16	0.67
1	2733.58*	PF 1	33.60	1203.20	1203.370		1203.41	0.010648	1.562	21.51	127.30	0.67
1	2732.58*	PF 1	33.60	1203.19	1203.359		1203.40	0.010857	1.570	21.40	127.43	0.68
1	2731.58*	PF 1	33.60	1203.18	1203.347		1203.39	0.011290	1.588	21.16	127.56	0.69
1	2730.58*	PF 1	33.60	1203.17	1203.334		1203.37	0.011952	1.615	20.81	127.68	0.71
1	2729.58*	PF 1	33.60	1203.16	1203.321		1203.36	0.012701	1.644	20.44	127.79	0.72
1	2728.58*	PF 1	33.60	1203.14	1203.312		1203.35	0.010041	1.531	21.94	128.01	0.65
1	2727.58*	PF 1	33.60	1203.13	1203.302		1203.34	0.009995	1.528	21.98	128.15	0.65
1	2726.58*	PF 1	33.60	1203.12	1203.292		1203.33	0.009949	1.526	22.02	128.29	0.65
1	2725.58*	PF 1	33.60	1203.11	1203.282		1203.32	0.009928	1.524	22.05	128.43	0.65
1	2724.58*	PF 1	33.60	1203.10	1203.272		1203.31	0.009883	1.521	22.09	128.57	0.65
1	2723.58*	PF 1	33.60	1203.09	1203.263		1203.30	0.009814	1.517	22.14	128.72	0.64
1	2722.58*	PF 1	33.60	1203.08	1203.253		1203.29	0.009745	1.513	22.20	128.87	0.64
1	2721.58*	PF 1	33.60	1203.07	1203.243		1203.28	0.009656	1.509	22.27	129.01	0.64
1	2720.58*	PF 1	33.60	1203.06	1203.234		1203.27	0.009569	1.504	22.34	129.14	0.64
1	2719.58*	PF 1	33.60	1203.05	1203.224		1203.26	0.009415	1.496	22.46	129.29	0.63
1	2718.57*	PF 1	33.60	1203.04	1203.215		1203.25	0.009264	1.488	22.58	129.43	0.63
1	2717.57*	PF 1	33.60	1203.03	1203.206		1203.24	0.009095	1.479	22.72	129.58	0.62
1	2716.57*	PF 1	33.60	1203.02	1203.197		1203.23	0.008867	1.467	22.90	129.73	0.62
1	2715.57*	PF 1	33.60	1203.01	1203.189		1203.22	0.008608	1.454	23.12	129.88	0.61
1	2714.57*	PF 1	33.60	1203.00	1203.181		1203.21	0.008302	1.437	23.38	130.03	0.60
1	2713.57*	PF 1	33.60	1202.99	1203.173		1203.20	0.007957	1.418	23.69	130.19	0.59
1	2712.57*	PF 1	33.60	1202.98	1203.165		1203.20	0.007596	1.398	24.03	130.34	0.57
1	2711.57*	PF 1	33.60	1202.97	1203.158		1203.19	0.007209	1.376	24.42	130.49	0.56
1	2710.57*	PF 1	33.60	1202.96	1203.151		1203.18	0.006788	1.350	24.88	130.66	0.55
1	2709.57*	PF 1	33.60	1202.95	1203.142		1203.17	0.011863	1.343	25.02	130.80	0.54
1	2708.57*	PF 1	33.60	1202.94	1203.129		1203.16	0.012487	1.363	24.65	130.92	0.55
1	2707.57*	PF 1	33.60	1202.93	1203.115		1203.15	0.013536	1.396	24.07	131.04	0.57
1	2706.57*	PF 1	33.60	1202.92	1203.097		1203.13	0.015497	1.453	23.12	131.13	0.61
1	2705.57*	PF 1	33.60	1202.91	1203.070		1203.11	0.021587	1.605	20.93	131.17	0.71
1	2704.94	PF 1	33.60	1202.90	1203.027	1203.02700	1203.09	0.046785	2.025	16.59	131.06	1.00
1	2703.94*	PF 1	33.60	1202.01	1202.047	1202.14000	1202.87	3.155764	7.289	4.61	125.57	6.71
1	2702.94*	PF 1	33.60	1201.13	1201.191	1201.26400	1201.51	0.625722	4.556	7.37	120.77	3.25
1	2701.94*	PF 1	33.60	1200.24	1200.295	1200.37700	1200.73	0.973389	5.291	6.35	115.78	3.98
1	2700.94*	PF 1	33.60	1199.35	1199.409	1199.49200	1199.82	0.833575	5.139	6.54	110.84	3.73
1	2700.54	PF 1	33.60	1199.00	1199.059	1199.14400	1199.49	0.869761	5.242	6.41	108.89	3.81
1	2699.54*	PF 1	33.60	1198.99	1199.205	1199.13300	1199.24	0.011575	1.429	23.52	110.00	0.54
1	2698.54*	PF 1	33.60	1198.98	1199.193		1199.23	0.011987	1.443	23.29	110.16	0.55
1	2697.54*	PF 1	33.60	1198.97	1199.179		1199.21	0.012562	1.462	22.98	110.32	0.56
1	2696.54*	PF 1	33.60	1198.96	1199.165		1199.20	0.013468	1.492	22.51	110.46	0.58
1	2695.54*	PF 1	33.60	1198.95	1199.148		1199.19	0.014976	1.540	21.82	110.58	0.61
1	2694.54*	PF 1	33.60	1198.94	1199.130		1199.17	0.017108	1.602	20.97	110.70	0.65
1	2693.54*	PF 1	33.60	1198.93	1199.117		1199.16	0.010191	1.629	20.63	110.85	0.67
1	2692.54*	PF 1	33.60	1198.92	1199.107		1199.15	0.010202	1.629	20.63	111.03	0.67
1	2691.54*	PF 1	33.60	1198.91	1199.097		1199.14	0.010193	1.627	20.65	111.20	0.67
1	2690.54*	PF 1	33.60	1198.90	1199.086		1199.13	0.010206	1.627	20.65	111.37	0.67
1	2689.54*	PF 1	33.60	1198.89	1199.076		1199.12	0.010197	1.625	20.67	111.54	0.67
1	2688.54*	PF 1	33.60	1198.88	1199.066		1199.11	0.010188	1.624	20.69	111.71	0.67
1	2687.54*	PF 1	33.60	1198.87	1199.056		1199.10	0.010199	1.623	20.70	111.89	0.67
1	2686.54*	PF 1	33.60	1198.86	1199.046		1199.09	0.010192	1.622	20.71	112.04	0.67
1	2685.54*	PF 1	33.60	1198.85	1199.036		1199.08	0.010161	1.620	20.74	112.21	0.66
1	2684.54*	PF 1	33.60	1198.84	1199.026		1199.07	0.010130	1.617	20.78	112.38	0.66
1	2683.54*	PF 1	33.60	1198.83	1199.016		1199.06	0.010099	1.615	20.81	112.56	0.66
1	2682.54*	PF 1	33.60	1198.82	1199.006		1199.05	0.010067	1.612	20.84	112.73	0.66
1	2681.54*	PF 1	33.60	1198.81	1198.996		1199.04	0.010080	1.612	20.85	112.90	0.66
1	2680.54*	PF 1	33.60	1198.80	1198.986		1199.03	0.010050	1.609	20.88	113.07	0.66
1	2679.54*	PF 1	33.60	1198.79	1198.976		1199.02	0.010019	1.607	20.91	113.24	0.66
1	2678.54*	PF 1	33.60	1198.78	1198.966		1199.01	0.009969	1.604	20.95	113.40	0.66
1	2677.54*	PF 1	33.60	1198.77	1198.956		1199.00	0.009915	1.600	21.00	113.58	0.66

HEC-RAS Plan: Plan 03 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	2676.54*	PF 1	33.60	1198.76	1198.946		1198.99	0.009842	1.596	21.06	113.76	0.65
1	2675.54*	PF 1	33.60	1198.75	1198.936		1198.98	0.009748	1.590	21.13	113.93	0.65
1	2674.54*	PF 1	33.60	1198.74	1198.927		1198.97	0.009656	1.584	21.21	114.10	0.65
1	2673.54*	PF 1	33.60	1198.73	1198.917		1198.96	0.009543	1.578	21.29	114.27	0.64
1	2672.54*	PF 1	33.60	1198.72	1198.908		1198.95	0.009410	1.570	21.40	114.46	0.64
1	2671.54*	PF 1	33.60	1198.71	1198.899		1198.94	0.009241	1.561	21.53	114.63	0.64
1	2670.54*	PF 1	33.60	1198.70	1198.890		1198.93	0.009056	1.550	21.67	114.81	0.63
1	2669.54*	PF 1	33.60	1198.69	1198.881		1198.92	0.008840	1.538	21.84	114.98	0.62
1	2668.54*	PF 1	33.60	1198.68	1198.872		1198.91	0.008610	1.525	22.03	115.15	0.61
1	2667.54*	PF 1	33.60	1198.67	1198.864		1198.90	0.008333	1.509	22.26	115.34	0.61
1	2666.54*	PF 1	33.60	1198.66	1198.856		1198.89	0.008018	1.491	22.53	115.53	0.60
1	2665.54*	PF 1	33.60	1198.65	1198.849		1198.88	0.007671	1.471	22.85	115.71	0.58
1	2664.54*	PF 1	33.60	1198.64	1198.841		1198.87	0.007298	1.448	23.21	115.90	0.57
1	2663.54*	PF 1	33.60	1198.63	1198.834		1198.87	0.006906	1.423	23.61	116.10	0.56
1	2662.54*	PF 1	33.60	1198.62	1198.828		1198.86	0.006515	1.397	24.04	116.29	0.54
1	2661.54*	PF 1	33.60	1198.61	1198.822		1198.85	0.006093	1.369	24.55	116.48	0.53
1	2661.04	PF 1	33.60	1198.60	1198.820	1198.75100	1198.85	0.005362	1.317	25.52	116.61	0.50
1	2616.7	PF 1	33.60	1198.16	1198.294	1198.29400	1198.37	0.029799	2.232	15.05	112.81	1.08
1	2540.68	PF 1	33.60	1197.39	1197.695	1197.53400	1197.71	0.002058	1.012	33.19	109.62	0.32
1	2481.7	PF 1	33.60	1196.79	1197.698		1197.70	0.000040	0.287	117.10	133.07	0.05
1	2409.33	PF 1	33.60	1196.06	1197.698		1197.70	0.000005	0.144	232.68	146.96	0.02
1	2320.35	PF 1	37.30	1195.17	1197.698	1195.34400	1197.70	0.000003	0.151	246.60	105.15	0.02
1	2300		Culvert									
1	2119.93	PF 1	37.30	1185.98	1186.238	1186.22100	1186.34	0.016961	2.587	14.42	56.71	0.90
1	2068.55	PF 1	37.30	1185.47	1185.740		1185.79	0.007149	1.734	21.51	80.60	0.59
1	2000.07	PF 1	37.30	1184.78	1185.088		1185.18	0.011433	2.382	15.66	51.83	0.76
1	1943.65	PF 1	37.30	1184.21	1184.538		1184.61	0.008877	2.188	17.05	52.99	0.68
1	1862.48	PF 1	37.30	1183.39	1183.726		1183.82	0.010728	2.440	15.29	46.50	0.75
1	1861.48*	PF 1	37.30	1183.38	1183.715		1183.81	0.010782	2.442	15.27	46.57	0.75
1	1860.48*	PF 1	37.30	1183.37	1183.704		1183.80	0.010862	2.446	15.25	46.64	0.75
1	1859.48*	PF 1	37.30	1183.36	1183.693		1183.79	0.010966	2.452	15.21	46.70	0.76
1	1858.48*	PF 1	37.30	1183.35	1183.681		1183.78	0.011090	2.459	15.17	46.77	0.76
1	1857.48*	PF 1	37.30	1183.34	1183.670		1183.76	0.011229	2.466	15.12	46.84	0.77
1	1856.48*	PF 1	37.30	1183.33	1183.658		1183.75	0.011429	2.478	15.05	46.91	0.77
1	1855.48*	PF 1	37.30	1183.32	1183.646		1183.74	0.011629	2.490	14.98	46.96	0.78
1	1854.48*	PF 1	37.30	1183.30	1183.635		1183.73	0.010510	2.413	15.46	47.09	0.74
1	1853.48*	PF 1	37.30	1183.29	1183.625		1183.72	0.010525	2.412	15.46	47.17	0.74
1	1852.48*	PF 1	37.30	1183.28	1183.615		1183.71	0.010539	2.412	15.47	47.25	0.74
1	1851.48*	PF 1	37.30	1183.27	1183.604		1183.69	0.010588	2.414	15.45	47.30	0.74
1	1850.48*	PF 1	37.30	1183.26	1183.593		1183.68	0.010616	2.414	15.45	47.38	0.75
1	1849.48*	PF 1	37.30	1183.25	1183.583		1183.67	0.010644	2.415	15.45	47.46	0.75
1	1848.48*	PF 1	37.30	1183.24	1183.572		1183.66	0.010699	2.417	15.43	47.53	0.75
1	1847.48*	PF 1	37.30	1183.23	1183.561		1183.65	0.010759	2.419	15.42	47.60	0.75
1	1846.48*	PF 1	37.30	1183.22	1183.550		1183.64	0.010832	2.423	15.39	47.66	0.75
1	1845.48*	PF 1	37.30	1183.21	1183.539		1183.63	0.010916	2.427	15.37	47.73	0.75
1	1844.48*	PF 1	37.30	1183.20	1183.527		1183.62	0.011015	2.432	15.34	47.81	0.76
1	1843.48*	PF 1	37.30	1183.19	1183.516		1183.61	0.011189	2.443	15.27	47.87	0.76
1	1842.48*	PF 1	37.30	1183.18	1183.504		1183.60	0.011411	2.456	15.19	47.92	0.77
1	1841.48*	PF 1	37.30	1183.17	1183.492		1183.59	0.011589	2.466	15.13	47.99	0.77
1	1840.48*	PF 1	37.30	1183.15	1183.482		1183.57	0.010437	2.387	15.63	48.13	0.74
1	1839.48*	PF 1	37.30	1183.14	1183.471		1183.56	0.010457	2.387	15.63	48.20	0.74
1	1838.48*	PF 1	37.30	1183.13	1183.461		1183.55	0.010473	2.387	15.63	48.27	0.74
1	1837.48*	PF 1	37.30	1183.12	1183.450		1183.54	0.010493	2.387	15.63	48.34	0.74
1	1836.48*	PF 1	37.30	1183.11	1183.440		1183.53	0.010496	2.385	15.64	48.42	0.74
1	1835.48*	PF 1	37.30	1183.10	1183.429		1183.52	0.010517	2.385	15.64	48.49	0.74
1	1834.48*	PF 1	37.30	1183.09	1183.419		1183.51	0.010533	2.385	15.64	48.56	0.74
1	1833.48*	PF 1	37.30	1183.08	1183.408		1183.50	0.010554	2.385	15.64	48.63	0.74
1	1832.48*	PF 1	37.30	1183.07	1183.398		1183.49	0.010584	2.386	15.64	48.71	0.74
1	1831.48*	PF 1	37.30	1183.06	1183.387		1183.48	0.010645	2.388	15.62	48.77	0.74
1	1830.48*	PF 1	37.30	1183.05	1183.376		1183.47	0.010689	2.390	15.61	48.85	0.75
1	1829.48*	PF 1	37.30	1183.04	1183.365		1183.45	0.010751	2.393	15.59	48.91	0.75
1	1828.48*	PF 1	37.30	1183.03	1183.354		1183.44	0.010809	2.395	15.57	48.99	0.75
1	1827.48*	PF 1	37.30	1183.02	1183.344		1183.43	0.010845	2.396	15.57	49.06	0.75
1	1826.48*	PF 1	37.30	1183.00	1183.337		1183.42	0.009470	2.298	16.23	49.21	0.71
1	1825.48*	PF 1	37.30	1182.99	1183.328		1183.41	0.009369	2.289	16.30	49.29	0.70
1	1824.48*	PF 1	37.30	1182.98	1183.318		1183.40	0.009252	2.279	16.37	49.37	0.70
1	1823.48*	PF 1	37.30	1182.97	1183.310		1183.39	0.009125	2.268	16.45	49.45	0.69
1	1822.48*	PF 1	37.30	1182.96	1183.301		1183.38	0.008986	2.256	16.53	49.54	0.69
1	1821.48*	PF 1	37.30	1182.95	1183.292		1183.37	0.008839	2.243	16.63	49.62	0.68
1	1820.48*	PF 1	37.30	1182.94	1183.284		1183.36	0.008688	2.230	16.72	49.70	0.68
1	1819.48*	PF 1	37.30	1182.93	1183.275		1183.35	0.008541	2.217	16.82	49.78	0.67
1	1818.48*	PF 1	37.30	1182.92	1183.267		1183.34	0.008363	2.202	16.94	49.87	0.67
1	1817.48*	PF 1	37.30	1182.91	1183.259		1183.33	0.008180	2.186	17.07	49.97	0.66
1	1816.48*	PF 1	37.30	1182.90	1183.251		1183.32	0.007983	2.168	17.20	50.06	0.65
1	1815.48*	PF 1	37.30	1182.89	1183.239		1183.31	0.014508	2.182	17.10	50.11	0.66
1	1814.48*	PF 1	37.30	1182.88	1183.220		1183.30	0.015656	2.232	16.71	50.14	0.68
1	1813.48*	PF 1	37.30	1182.87	1183.199		1183.28	0.017502	2.307	16.17	50.15	0.72
1	1812.48*	PF 1	37.30	1182.86	1183.172		1183.26	0.020690	2.427	15.37	50.13	0.77
1	1811.48*	PF 1	37.30	1182.84	1183.146		1183.24	0.022135	2.476	15.07	50.15	0.80

HEC-RAS Plan: Plan 03 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	1811.06	PF 1	37.30	1182.84	1183.102	1183.10200	1183.23	0.037106	2.896	12.88	49.92	1.01
1	1810.06*	PF 1	37.30	1182.35	1182.480	1182.62200	1183.09	0.438397	6.273	5.95	46.13	3.08
1	1809.06*	PF 1	37.30	1181.87	1182.006	1182.15800	1182.65	0.435066	6.427	5.80	43.17	3.09
1	1808.06*	PF 1	37.30	1181.38	1181.521	1181.68200	1182.21	0.439747	6.633	5.62	40.21	3.13
1	1807.36	PF 1	37.30	1181.04	1181.187	1181.35000	1181.90	0.435751	6.756	5.52	38.13	3.13
1	1806.36*	PF 1	37.30	1181.03	1181.241	1181.34100	1181.57	0.126484	4.630	8.06	38.76	1.79
1	1805.36*	PF 1	37.30	1181.02	1181.421	1181.32800	1181.51	0.014623	2.389	15.62	40.15	0.68
1	1804.36*	PF 1	37.30	1181.01	1181.404		1181.50	0.015281	2.416	15.44	40.34	0.69
1	1803.36*	PF 1	37.30	1181.00	1181.386		1181.48	0.016190	2.453	15.20	40.54	0.71
1	1802.36*	PF 1	37.30	1180.99	1181.366		1181.46	0.017510	2.507	14.88	40.72	0.73
1	1801.36*	PF 1	37.30	1180.98	1181.346		1181.45	0.018902	2.561	14.57	40.91	0.76
1	1800.36*	PF 1	37.30	1180.97	1181.332		1181.44	0.010851	2.571	14.51	41.13	0.76
1	1799.36*	PF 1	37.30	1180.96	1181.322		1181.42	0.010726	2.556	14.59	41.38	0.76
1	1798.36*	PF 1	37.30	1180.95	1181.312		1181.41	0.010585	2.540	14.69	41.62	0.75
1	1797.36*	PF 1	37.30	1180.94	1181.303		1181.40	0.010418	2.522	14.79	41.88	0.75
1	1796.36*	PF 1	37.30	1180.93	1181.293		1181.39	0.010271	2.505	14.89	42.12	0.74
1	1795.36*	PF 1	37.30	1180.92	1181.284		1181.38	0.010092	2.486	15.00	42.36	0.74
1	1794.36*	PF 1	37.30	1180.91	1181.275		1181.37	0.009880	2.464	15.14	42.62	0.73
1	1793.36*	PF 1	37.30	1180.90	1181.265		1181.36	0.009688	2.444	15.26	42.86	0.72
1	1792.36*	PF 1	37.30	1180.90	1181.249		1181.35	0.011176	2.548	14.64	43.00	0.77
1	1791.36*	PF 1	37.30	1180.89	1181.238		1181.34	0.011101	2.537	14.70	43.26	0.77
1	1790.36*	PF 1	37.30	1180.88	1181.228		1181.33	0.011038	2.527	14.76	43.50	0.76
1	1789.36*	PF 1	37.30	1180.87	1181.217		1181.32	0.010977	2.518	14.82	43.73	0.76
1	1788.36*	PF 1	37.30	1180.86	1181.207		1181.30	0.010898	2.506	14.88	43.98	0.76
1	1787.36*	PF 1	37.30	1180.85	1181.196		1181.29	0.010814	2.495	14.95	44.22	0.76
1	1786.36*	PF 1	37.30	1180.84	1181.186		1181.28	0.010718	2.483	15.02	44.46	0.75
1	1785.36*	PF 1	37.30	1180.83	1181.176		1181.27	0.010593	2.469	15.11	44.71	0.75
1	1784.36*	PF 1	37.30	1180.82	1181.166		1181.26	0.010476	2.456	15.19	44.95	0.74
1	1783.36*	PF 1	37.30	1180.81	1181.156		1181.25	0.010343	2.441	15.28	45.20	0.74
1	1782.36*	PF 1	37.30	1180.80	1181.147		1181.24	0.010182	2.424	15.39	45.44	0.73
1	1781.36*	PF 1	37.30	1180.79	1181.137		1181.23	0.010007	2.406	15.50	45.70	0.73
1	1780.36*	PF 1	37.30	1180.78	1181.128		1181.22	0.009813	2.387	15.63	45.95	0.72
1	1779.36*	PF 1	37.30	1180.77	1181.119		1181.21	0.009605	2.366	15.76	46.20	0.71
1	1778.36*	PF 1	37.30	1180.76	1181.110		1181.20	0.009403	2.346	15.90	46.44	0.71
1	1777.36*	PF 1	37.30	1180.75	1181.102		1181.19	0.009169	2.324	16.05	46.70	0.70
1	1777.34	PF 1	37.30	1180.75	1181.101		1181.19	0.009201	2.326	16.04	46.70	0.70
1	1709.86	PF 1	37.30	1180.06	1180.422		1180.52	0.010674	2.551	14.62	41.44	0.76
1	1708.86*	PF 1	37.30	1180.05	1180.412		1180.51	0.010693	2.550	14.63	41.53	0.76
1	1707.86*	PF 1	37.30	1180.04	1180.401		1180.50	0.010699	2.548	14.64	41.63	0.76
1	1706.86*	PF 1	37.30	1180.03	1180.391		1180.49	0.010706	2.546	14.65	41.72	0.76
1	1705.86*	PF 1	37.30	1180.02	1180.380		1180.48	0.010719	2.545	14.66	41.81	0.76
1	1704.86*	PF 1	37.30	1180.01	1180.369		1180.47	0.010726	2.543	14.67	41.91	0.76
1	1703.86*	PF 1	37.30	1180.00	1180.359		1180.46	0.010734	2.541	14.68	42.00	0.76
1	1702.86*	PF 1	37.30	1179.99	1180.348		1180.45	0.010754	2.540	14.68	42.10	0.76
1	1701.86*	PF 1	37.30	1179.98	1180.337		1180.44	0.010762	2.539	14.69	42.20	0.76
1	1700.86*	PF 1	37.30	1179.97	1180.327		1180.43	0.010771	2.537	14.70	42.29	0.76
1	1699.86*	PF 1	37.30	1179.96	1180.316		1180.42	0.010809	2.538	14.70	42.38	0.76
1	1698.86*	PF 1	37.30	1179.95	1180.305		1180.41	0.010843	2.538	14.70	42.47	0.76
1	1697.86*	PF 1	37.30	1179.94	1180.294		1180.39	0.010877	2.538	14.70	42.57	0.76
1	1696.86*	PF 1	37.30	1179.93	1180.283		1180.38	0.010950	2.541	14.68	42.66	0.76
1	1695.86*	PF 1	37.30	1179.92	1180.272		1180.37	0.011011	2.543	14.67	42.75	0.77
1	1694.86*	PF 1	37.30	1179.91	1180.261		1180.36	0.011086	2.546	14.65	42.85	0.77
1	1693.86*	PF 1	37.30	1179.90	1180.249		1180.35	0.011187	2.551	14.62	42.94	0.77
1	1692.86*	PF 1	37.30	1179.89	1180.237		1180.34	0.011323	2.558	14.58	43.02	0.77
1	1691.86*	PF 1	37.30	1179.88	1180.225		1180.33	0.011483	2.567	14.53	43.11	0.78
1	1690.86*	PF 1	37.30	1179.87	1180.214		1180.32	0.011619	2.574	14.49	43.19	0.78
1	1689.86*	PF 1	37.30	1179.85	1180.203		1180.30	0.010528	2.495	14.95	43.35	0.75
1	1688.86*	PF 1	37.30	1179.84	1180.193		1180.29	0.010519	2.492	14.97	43.44	0.75
1	1687.86*	PF 1	37.30	1179.83	1180.183		1180.28	0.010493	2.488	14.99	43.54	0.75
1	1686.86*	PF 1	37.30	1179.82	1180.172		1180.27	0.010485	2.486	15.01	43.63	0.75
1	1685.86*	PF 1	37.30	1179.81	1180.162		1180.26	0.010483	2.483	15.02	43.72	0.75
1	1684.86*	PF 1	37.30	1179.80	1180.152		1180.25	0.010470	2.480	15.04	43.82	0.75
1	1683.86*	PF 1	37.30	1179.79	1180.141		1180.24	0.010444	2.476	15.06	43.92	0.75
1	1682.86*	PF 1	37.30	1179.78	1180.131		1180.23	0.010419	2.472	15.09	44.02	0.74
1	1681.86*	PF 1	37.30	1179.77	1180.121		1180.22	0.010394	2.468	15.11	44.12	0.74
1	1680.86*	PF 1	37.30	1179.76	1180.111		1180.21	0.010369	2.464	15.14	44.21	0.74
1	1679.86*	PF 1	37.30	1179.75	1180.100		1180.20	0.010349	2.461	15.16	44.30	0.74
1	1678.86*	PF 1	37.30	1179.74	1180.090		1180.18	0.010313	2.456	15.19	44.40	0.74
1	1677.86*	PF 1	37.30	1179.73	1180.080		1180.17	0.010277	2.451	15.22	44.50	0.74
1	1676.86*	PF 1	37.30	1179.72	1180.070		1180.16	0.010241	2.446	15.25	44.60	0.74
1	1675.86*	PF 1	37.30	1179.71	1180.060		1180.15	0.010181	2.440	15.29	44.70	0.74
1	1674.86*	PF 1	37.30	1179.70	1180.050		1180.14	0.010122	2.434	15.33	44.80	0.73
1	1673.86*	PF 1	37.30	1179.69	1180.040		1180.13	0.010068	2.428	15.36	44.89	0.73
1	1672.86*	PF 1	37.30	1179.68	1180.031		1180.12	0.010010	2.421	15.41	44.99	0.73
1	1671.86*	PF 1	37.30	1179.67	1180.021		1180.11	0.009941	2.414	15.45	45.09	0.73
1	1670.86*	PF 1	37.30	1179.66	1180.011		1180.10	0.009849	2.405	15.51	45.20	0.72
1	1669.86*	PF 1	37.30	1179.65	1180.002		1180.09	0.009758	2.396	15.57	45.30	0.72
1	1668.86*	PF 1	37.30	1179.64	1179.992		1180.08	0.009657	2.387	15.63	45.41	0.72
1	1667.86*	PF 1	37.30	1179.63	1179.983		1180.07	0.009535	2.375	15.70	45.51	0.71

HEC-RAS Plan: Plan 03 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	1666.86*	PF 1	37.30	1179.62	1179.974		1180.06	0.009420	2.365	15.77	45.60	0.71
1	1665.86*	PF 1	37.30	1179.61	1179.965		1180.05	0.009291	2.353	15.85	45.71	0.70
1	1664.86*	PF 1	37.30	1179.60	1179.956		1180.04	0.009153	2.340	15.94	45.82	0.70
1	1663.86*	PF 1	37.30	1179.59	1179.947		1180.03	0.009008	2.327	16.03	45.93	0.69
1	1662.86*	PF 1	37.30	1179.58	1179.939		1180.02	0.008856	2.313	16.13	46.03	0.69
1	1661.86*	PF 1	37.30	1179.57	1179.930		1180.01	0.008686	2.297	16.24	46.14	0.68
1	1660.86*	PF 1	37.30	1179.56	1179.922		1180.00	0.008534	2.283	16.34	46.24	0.68
1	1659.86*	PF 1	37.30	1179.55	1179.914		1179.99	0.008344	2.265	16.46	46.35	0.67
1	1658.86*	PF 1	37.30	1179.54	1179.906		1179.98	0.008150	2.247	16.60	46.47	0.66
1	1657.86*	PF 1	37.30	1179.53	1179.898		1179.98	0.007953	2.229	16.74	46.58	0.66
1	1656.86*	PF 1	37.30	1179.52	1179.886		1179.96	0.014376	2.238	16.67	46.67	0.66
1	1655.86*	PF 1	37.30	1179.51	1179.868		1179.95	0.015333	2.281	16.35	46.72	0.68
1	1654.86*	PF 1	37.30	1179.50	1179.848		1179.93	0.016830	2.345	15.91	46.75	0.71
1	1653.86*	PF 1	37.30	1179.49	1179.822		1179.92	0.019636	2.456	15.19	46.75	0.76
1	1652.86*	PF 1	37.30	1179.48	1179.774	1179.75700	1179.89	0.029472	2.778	13.43	46.62	0.91
1	1652.33	PF 1	37.30	1179.47	1179.746	1179.74600	1179.88	0.035992	2.951	12.64	46.57	1.00
1	1651.33*	PF 1	37.30	1178.74	1178.862	1179.03200	1179.71	0.664984	7.396	5.04	41.76	3.75
1	1650.33*	PF 1	37.30	1178.01	1178.140	1178.32000	1179.05	0.648885	7.630	4.89	37.92	3.75
1	1649.71	PF 1	37.30	1177.56	1177.696	1177.88200	1178.64	0.638112	7.790	4.79	35.56	3.74
1	1648.71*	PF 1	37.30	1177.55	1177.747	1177.87400	1178.18	0.182593	5.302	7.04	36.39	2.13
1	1647.71*	PF 1	37.30	1177.54	1177.941	1177.86100	1178.04	0.016359	2.523	14.79	38.08	0.71
1	1646.71*	PF 1	37.30	1177.53	1177.923		1178.02	0.017081	2.545	14.66	38.51	0.73
1	1645.71*	PF 1	37.30	1177.52	1177.902		1178.01	0.018204	2.583	14.44	38.90	0.75
1	1644.71*	PF 1	37.30	1177.51	1177.879		1177.99	0.020030	2.648	14.09	39.29	0.78
1	1643.71*	PF 1	37.30	1177.50	1177.856		1177.97	0.022058	2.715	13.74	39.69	0.81
1	1642.71*	PF 1	37.30	1177.49	1177.840		1177.96	0.012828	2.730	13.66	40.13	0.82
1	1641.71*	PF 1	37.30	1177.48	1177.827		1177.94	0.012786	2.715	13.74	40.58	0.82
1	1640.71*	PF 1	37.30	1177.47	1177.815		1177.93	0.012720	2.699	13.82	41.04	0.82
1	1639.71*	PF 1	37.30	1177.46	1177.803		1177.92	0.012674	2.684	13.90	41.50	0.82
1	1638.71*	PF 1	37.30	1177.45	1177.791		1177.90	0.012618	2.669	13.98	41.96	0.82
1	1637.71*	PF 1	37.30	1177.44	1177.779		1177.89	0.012589	2.656	14.05	42.40	0.81
1	1636.71*	PF 1	37.30	1177.43	1177.767		1177.88	0.012558	2.642	14.12	42.86	0.81
1	1635.71*	PF 1	37.30	1177.42	1177.755		1177.86	0.012501	2.628	14.19	43.32	0.81
1	1634.71*	PF 1	37.30	1177.41	1177.744		1177.85	0.012465	2.614	14.27	43.78	0.81
1	1633.71*	PF 1	37.30	1177.40	1177.732		1177.84	0.012433	2.602	14.34	44.24	0.81
1	1632.71*	PF 1	37.30	1177.39	1177.720		1177.82	0.012391	2.588	14.41	44.70	0.80
1	1631.71*	PF 1	37.30	1177.38	1177.708		1177.81	0.012347	2.575	14.49	45.17	0.80
1	1630.71*	PF 1	37.30	1177.37	1177.696		1177.80	0.012297	2.561	14.56	45.63	0.80
1	1629.71*	PF 1	37.30	1177.36	1177.684		1177.79	0.012257	2.549	14.63	46.08	0.80
1	1628.71*	PF 1	37.30	1177.35	1177.673		1177.77	0.012231	2.537	14.70	46.53	0.80
1	1627.71*	PF 1	37.30	1177.34	1177.661		1177.76	0.012194	2.525	14.77	47.00	0.79
1	1626.71*	PF 1	37.30	1177.33	1177.649		1177.75	0.012145	2.512	14.85	47.45	0.79
1	1625.71*	PF 1	37.30	1177.32	1177.638		1177.74	0.012099	2.500	14.92	47.91	0.79
1	1624.71*	PF 1	37.30	1177.31	1177.626		1177.72	0.012073	2.488	14.99	48.38	0.79
1	1623.71*	PF 1	37.30	1177.30	1177.615		1177.71	0.012019	2.476	15.07	48.84	0.79
1	1622.71*	PF 1	37.30	1177.29	1177.603		1177.70	0.011985	2.464	15.14	49.30	0.78
1	1621.71*	PF 1	37.30	1177.28	1177.592		1177.69	0.011942	2.453	15.21	49.75	0.78
1	1620.71*	PF 1	37.30	1177.27	1177.580		1177.67	0.011878	2.440	15.29	50.22	0.78
1	1619.71*	PF 1	37.30	1177.26	1177.569		1177.66	0.011822	2.427	15.37	50.68	0.78
1	1618.71*	PF 1	37.30	1177.25	1177.558		1177.65	0.011754	2.414	15.45	51.15	0.77
1	1617.71*	PF 1	37.30	1177.24	1177.546		1177.64	0.011704	2.403	15.52	51.61	0.77
1	1616.71*	PF 1	37.30	1177.23	1177.535		1177.62	0.011626	2.389	15.61	52.07	0.77
1	1615.71*	PF 1	37.30	1177.22	1177.524		1177.61	0.011551	2.376	15.70	52.53	0.77
1	1614.71*	PF 1	37.30	1177.21	1177.513		1177.60	0.011453	2.362	15.79	52.99	0.76
1	1613.71*	PF 1	37.30	1177.20	1177.502		1177.59	0.011353	2.348	15.89	53.45	0.76
1	1612.71*	PF 1	37.30	1177.19	1177.492		1177.58	0.011240	2.333	15.99	53.92	0.76
1	1611.71*	PF 1	37.30	1177.18	1177.481		1177.56	0.011116	2.317	16.10	54.39	0.75
1	1610.71*	PF 1	37.30	1177.17	1177.471		1177.55	0.010951	2.299	16.23	54.85	0.75
1	1609.71*	PF 1	37.30	1177.16	1177.461		1177.54	0.010775	2.280	16.36	55.32	0.74
1	1608.71*	PF 1	37.30	1177.15	1177.451		1177.53	0.010571	2.259	16.51	55.80	0.73
1	1607.71*	PF 1	37.30	1177.14	1177.441		1177.52	0.010334	2.236	16.68	56.28	0.72
1	1606.71*	PF 1	37.30	1177.13	1177.432		1177.51	0.010080	2.212	16.86	56.74	0.72
1	1605.71*	PF 1	37.30	1177.12	1177.423		1177.50	0.009804	2.186	17.06	57.22	0.71
1	1604.71*	PF 1	37.30	1177.11	1177.414		1177.49	0.009499	2.159	17.28	57.70	0.70
1	1603.71*	PF 1	37.30	1177.10	1177.406		1177.48	0.009181	2.130	17.52	58.17	0.68
1	1602.71*	PF 1	37.30	1177.09	1177.398		1177.47	0.008852	2.099	17.77	58.66	0.67
1	1602.35	PF 1	37.30	1177.09	1177.393		1177.46	0.009245	2.125	17.55	58.80	0.69
1	1601.35*	PF 1	37.30	1177.08	1177.384		1177.45	0.009246	2.127	17.54	58.69	0.69
1	1600.35*	PF 1	37.30	1177.07	1177.374		1177.44	0.009236	2.127	17.53	58.58	0.69
1	1599.35*	PF 1	37.30	1177.06	1177.364		1177.44	0.009250	2.130	17.51	58.47	0.69
1	1598.35*	PF 1	37.30	1177.05	1177.355		1177.43	0.009235	2.130	17.51	58.38	0.69
1	1597.35*	PF 1	37.30	1177.04	1177.345		1177.42	0.009235	2.132	17.50	58.27	0.69
1	1596.35*	PF 1	37.30	1177.03	1177.336		1177.41	0.009240	2.134	17.48	58.15	0.69
1	1595.35*	PF 1	37.30	1177.02	1177.326		1177.40	0.009243	2.136	17.46	58.03	0.69
1	1594.35*	PF 1	37.30	1177.01	1177.316		1177.39	0.009244	2.138	17.45	57.90	0.69
1	1593.35*	PF 1	37.30	1177.00	1177.307		1177.38	0.009233	2.139	17.44	57.78	0.69
1	1592.35*	PF 1	37.30	1176.99	1177.297		1177.37	0.009234	2.141	17.42	57.65	0.69
1	1591.35*	PF 1	37.30	1176.98	1177.288		1177.36	0.009218	2.141	17.42	57.56	0.69
1	1590.35*	PF 1	37.30	1176.97	1177.278		1177.35	0.009209	2.142	17.41	57.44	0.69

HEC-RAS Plan: Plan 03 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	1589.35*	PF 1	37.30	1176.96	1177.268		1177.34	0.009216	2.145	17.39	57.31	0.69
1	1588.35*	PF 1	37.30	1176.95	1177.259		1177.33	0.009219	2.147	17.38	57.19	0.69
1	1587.35*	PF 1	37.30	1176.94	1177.249		1177.32	0.009207	2.148	17.37	57.08	0.69
1	1586.35*	PF 1	37.30	1176.93	1177.240		1177.31	0.009223	2.150	17.34	56.96	0.69
1	1585.35*	PF 1	37.30	1176.92	1177.230		1177.30	0.009226	2.153	17.33	56.84	0.69
1	1584.35*	PF 1	37.30	1176.91	1177.220		1177.29	0.009227	2.154	17.31	56.73	0.69
1	1583.35*	PF 1	37.30	1176.90	1177.211		1177.28	0.009230	2.156	17.30	56.62	0.69
1	1582.35*	PF 1	37.30	1176.89	1177.201		1177.27	0.009234	2.158	17.28	56.50	0.69
1	1581.35*	PF 1	37.30	1176.88	1177.192		1177.26	0.009223	2.159	17.28	56.39	0.69
1	1580.35*	PF 1	37.30	1176.87	1177.182		1177.26	0.009227	2.161	17.26	56.27	0.69
1	1579.35*	PF 1	37.30	1176.86	1177.172		1177.25	0.009232	2.163	17.24	56.15	0.69
1	1578.35*	PF 1	37.30	1176.85	1177.163		1177.24	0.009221	2.164	17.23	56.04	0.69
1	1577.35*	PF 1	37.30	1176.84	1177.153		1177.23	0.009226	2.166	17.22	55.92	0.69
1	1576.35*	PF 1	37.30	1176.83	1177.143		1177.22	0.009229	2.168	17.20	55.82	0.69
1	1575.35*	PF 1	37.30	1176.82	1177.134		1177.21	0.009219	2.169	17.19	55.71	0.69
1	1574.35*	PF 1	37.30	1176.81	1177.124		1177.20	0.009224	2.172	17.18	55.59	0.69
1	1573.35*	PF 1	37.30	1176.80	1177.115		1177.19	0.009230	2.174	17.16	55.47	0.69
1	1572.35*	PF 1	37.30	1176.79	1177.105		1177.18	0.009232	2.176	17.14	55.36	0.69
1	1571.35*	PF 1	37.30	1176.78	1177.096		1177.17	0.009225	2.177	17.13	55.24	0.69
1	1570.35*	PF 1	37.30	1176.77	1177.086		1177.16	0.009219	2.178	17.12	55.12	0.69
1	1569.35*	PF 1	37.30	1176.76	1177.077		1177.15	0.009197	2.178	17.12	55.03	0.69
1	1568.35*	PF 1	37.30	1176.75	1177.067		1177.14	0.009191	2.180	17.11	54.91	0.69
1	1567.35*	PF 1	37.30	1176.74	1177.058		1177.13	0.009173	2.181	17.11	54.79	0.69
1	1566.35*	PF 1	37.30	1176.73	1177.048		1177.12	0.009165	2.182	17.10	54.68	0.69
1	1565.35*	PF 1	37.30	1176.72	1177.039		1177.11	0.009162	2.183	17.08	54.56	0.69
1	1564.35*	PF 1	37.30	1176.71	1177.029		1177.10	0.009146	2.184	17.08	54.44	0.69
1	1563.35*	PF 1	37.30	1176.70	1177.020		1177.09	0.009140	2.186	17.07	54.32	0.69
1	1562.35*	PF 1	37.30	1176.69	1177.010		1177.09	0.009132	2.187	17.06	54.22	0.69
1	1561.35*	PF 1	37.30	1176.68	1177.001		1177.08	0.009138	2.189	17.04	54.10	0.69
1	1560.35*	PF 1	37.30	1176.67	1176.991		1177.07	0.009134	2.191	17.03	53.98	0.69
1	1559.35*	PF 1	37.30	1176.66	1176.982		1177.06	0.009115	2.191	17.02	53.87	0.69
1	1558.35*	PF 1	37.30	1176.65	1176.972		1177.05	0.009110	2.193	17.01	53.76	0.69
1	1557.35*	PF 1	37.30	1176.64	1176.963		1177.04	0.009095	2.193	17.01	53.64	0.69
1	1556.35*	PF 1	37.30	1176.63	1176.953		1177.03	0.009076	2.194	17.00	53.53	0.69
1	1555.35*	PF 1	37.30	1176.62	1176.944		1177.02	0.009060	2.194	17.00	53.42	0.69
1	1554.35*	PF 1	37.30	1176.61	1176.935		1177.01	0.009045	2.195	16.99	53.30	0.69
1	1553.35*	PF 1	37.30	1176.60	1176.925		1177.00	0.009016	2.195	16.99	53.20	0.68
1	1552.35*	PF 1	37.30	1176.59	1176.916		1176.99	0.008991	2.195	16.99	53.08	0.68
1	1551.35*	PF 1	37.30	1176.58	1176.907		1176.98	0.008976	2.196	16.99	52.96	0.68
1	1550.35*	PF 1	37.30	1176.57	1176.898		1176.97	0.008937	2.195	17.00	52.86	0.68
1	1549.35*	PF 1	37.30	1176.56	1176.888		1176.96	0.008923	2.196	16.99	52.74	0.68
1	1548.35*	PF 1	37.30	1176.55	1176.879		1176.95	0.008899	2.196	16.99	52.62	0.68
1	1547.35*	PF 1	37.30	1176.54	1176.870		1176.95	0.008871	2.195	16.99	52.52	0.68
1	1546.35*	PF 1	37.30	1176.53	1176.861		1176.94	0.008836	2.195	17.00	52.41	0.68
1	1545.35*	PF 1	37.30	1176.52	1176.852		1176.93	0.008791	2.193	17.01	52.29	0.68
1	1544.35*	PF 1	37.30	1176.51	1176.843		1176.92	0.008743	2.191	17.02	52.19	0.68
1	1543.35*	PF 1	37.30	1176.50	1176.833		1176.91	0.008699	2.190	17.03	52.07	0.68
1	1542.35*	PF 1	37.30	1176.49	1176.825		1176.90	0.008645	2.188	17.05	51.96	0.67
1	1541.35*	PF 1	37.30	1176.48	1176.816		1176.89	0.008592	2.186	17.07	51.84	0.67
1	1540.35*	PF 1	37.30	1176.47	1176.807		1176.88	0.008528	2.183	17.09	51.74	0.67
1	1539.35*	PF 1	37.30	1176.46	1176.798		1176.87	0.008466	2.180	17.11	51.62	0.67
1	1538.35*	PF 1	37.30	1176.45	1176.789		1176.86	0.008405	2.177	17.13	51.51	0.67
1	1537.35*	PF 1	37.30	1176.44	1176.781		1176.85	0.008332	2.173	17.17	51.41	0.66
1	1536.35*	PF 1	37.30	1176.43	1176.772		1176.85	0.008273	2.170	17.19	51.29	0.66
1	1535.35*	PF 1	37.30	1176.42	1176.763		1176.84	0.008195	2.166	17.22	51.18	0.66
1	1534.35*	PF 1	37.30	1176.41	1176.755		1176.83	0.008115	2.161	17.26	51.08	0.66
1	1533.35*	PF 1	37.30	1176.40	1176.746		1176.82	0.008030	2.156	17.30	50.98	0.65
1	1532.35*	PF 1	37.30	1176.39	1176.738		1176.81	0.007929	2.150	17.35	50.86	0.65
1	1531.35*	PF 1	37.30	1176.38	1176.730		1176.80	0.007826	2.143	17.40	50.77	0.65
1	1530.35*	PF 1	37.30	1176.37	1176.722		1176.79	0.007719	2.136	17.46	50.65	0.64
1	1529.35*	PF 1	37.30	1176.36	1176.714		1176.79	0.007598	2.128	17.53	50.55	0.64
1	1528.35*	PF 1	37.30	1176.35	1176.706		1176.78	0.007476	2.119	17.60	50.45	0.63
1	1527.35*	PF 1	37.30	1176.34	1176.695		1176.77	0.013589	2.136	17.47	50.32	0.64
1	1526.35*	PF 1	37.30	1176.33	1176.678		1176.75	0.014592	2.184	17.08	50.16	0.66
1	1525.35*	PF 1	37.30	1176.32	1176.658		1176.74	0.016105	2.253	16.55	49.99	0.69
1	1524.35*	PF 1	37.30	1176.31	1176.632		1176.72	0.019034	2.373	15.72	49.78	0.74
1	1523.35*	PF 1	37.30	1176.30	1176.583	1176.56400	1176.70	0.029479	2.714	13.74	49.42	0.91
1	1522.84	PF 1	37.30	1176.29	1176.556	1176.55600	1176.69	0.036174	2.890	12.91	49.26	1.00
1	1521.84*	PF 1	37.30	1175.54	1175.649	1175.81500	1176.52	0.779735	7.463	5.00	46.03	3.99
1	1520.84*	PF 1	37.30	1174.79	1174.906	1175.07400	1175.77	0.720997	7.436	5.02	43.78	3.87
1	1520.83	PF 1	37.30	1174.79	1174.906	1175.07300	1175.76	0.714076	7.416	5.03	43.76	3.86
1	1519.83*	PF 1	37.30	1174.78	1174.958	1175.06300	1175.31	0.169225	4.786	7.79	44.41	2.01
1	1518.83*	PF 1	37.30	1174.77	1175.139	1175.05000	1175.22	0.014470	2.259	16.51	45.83	0.66
1	1517.83*	PF 1	37.30	1174.76	1175.123		1175.20	0.015159	2.286	16.32	46.06	0.68
1	1516.83*	PF 1	37.30	1174.75	1175.104		1175.19	0.016175	2.326	16.03	46.30	0.70
1	1515.83*	PF 1	37.30	1174.74	1175.084		1175.17	0.017735	2.387	15.62	46.50	0.73
1	1514.83*	PF 1	37.30	1174.73	1175.063		1175.16	0.019511	2.452	15.21	46.71	0.76
1	1513.83*	PF 1	37.30	1174.72	1175.048		1175.14	0.011347	2.472	15.09	46.96	0.77
1	1512.83*	PF 1	37.30	1174.71	1175.037		1175.13	0.011339	2.466	15.13	47.22	0.77

HEC-RAS Plan: Plan 03 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	1511.83*	PF 1	37.30	1174.70	1175.026		1175.12	0.011328	2.459	15.17	47.49	0.77
1	1510.83*	PF 1	37.30	1174.69	1175.015		1175.11	0.011337	2.454	15.20	47.76	0.77
1	1509.83*	PF 1	37.30	1174.68	1175.004		1175.10	0.011347	2.450	15.23	48.02	0.77
1	1508.83*	PF 1	37.30	1174.67	1174.993		1175.09	0.011340	2.444	15.26	48.29	0.77
1	1507.83*	PF 1	37.30	1174.66	1174.982		1175.07	0.011319	2.437	15.31	48.57	0.77
1	1506.83*	PF 1	37.30	1174.65	1174.970		1175.06	0.011324	2.432	15.34	48.82	0.77
1	1505.83*	PF 1	37.30	1174.64	1174.959		1175.05	0.011320	2.426	15.37	49.10	0.76
1	1504.83*	PF 1	37.30	1174.63	1174.948		1175.04	0.011317	2.421	15.41	49.37	0.76
1	1503.83*	PF 1	37.30	1174.62	1174.937		1175.03	0.011320	2.416	15.44	49.63	0.76
1	1502.83*	PF 1	37.30	1174.61	1174.926		1175.02	0.011325	2.411	15.47	49.90	0.76
1	1501.83*	PF 1	37.30	1174.60	1174.915		1175.01	0.011325	2.406	15.50	50.17	0.76
1	1500.83*	PF 1	37.30	1174.59	1174.904		1174.99	0.011347	2.402	15.53	50.43	0.76
1	1499.83*	PF 1	37.30	1174.58	1174.892		1174.98	0.011365	2.398	15.55	50.71	0.76
1	1498.83*	PF 1	37.30	1174.57	1174.881		1174.97	0.011394	2.395	15.57	50.96	0.76
1	1497.83*	PF 1	37.30	1174.56	1174.870		1174.96	0.011445	2.394	15.58	51.23	0.77
1	1496.83*	PF 1	37.30	1174.55	1174.859		1174.95	0.011482	2.391	15.60	51.50	0.77
1	1495.83*	PF 1	37.30	1174.54	1174.847		1174.94	0.011546	2.390	15.61	51.75	0.77
1	1494.83*	PF 1	37.30	1174.53	1174.836		1174.92	0.011602	2.389	15.62	52.03	0.77
1	1493.83*	PF 1	37.30	1174.52	1174.824		1174.91	0.011692	2.389	15.61	52.29	0.77
1	1492.83*	PF 1	37.30	1174.51	1174.812		1174.90	0.011820	2.392	15.59	52.55	0.77
1	1491.83*	PF 1	37.30	1174.50	1174.800		1174.89	0.012002	2.399	15.55	52.81	0.78
1	1490.83*	PF 1	37.30	1174.49	1174.787		1174.88	0.012218	2.407	15.50	53.07	0.79
1	1489.83*	PF 1	37.30	1174.48	1174.774		1174.87	0.012446	2.416	15.44	53.33	0.79
1	1488.83*	PF 1	37.30	1174.46	1174.764		1174.85	0.011070	2.326	16.03	53.66	0.75
1	1487.83*	PF 1	37.30	1174.45	1174.753		1174.84	0.011060	2.321	16.07	53.93	0.75
1	1486.83*	PF 1	37.30	1174.44	1174.742		1174.83	0.011036	2.315	16.11	54.19	0.75
1	1485.83*	PF 1	37.30	1174.43	1174.731		1174.81	0.011038	2.311	16.14	54.47	0.75
1	1484.83*	PF 1	37.30	1174.42	1174.721		1174.80	0.011026	2.305	16.18	54.74	0.75
1	1483.83*	PF 1	37.30	1174.41	1174.710		1174.79	0.011024	2.301	16.21	55.00	0.75
1	1482.83*	PF 1	37.30	1174.40	1174.699		1174.78	0.011014	2.296	16.25	55.27	0.75
1	1481.83*	PF 1	37.30	1174.39	1174.688		1174.77	0.011005	2.290	16.29	55.55	0.75
1	1480.83*	PF 1	37.30	1174.38	1174.677		1174.76	0.011001	2.286	16.32	55.81	0.75
1	1479.83*	PF 1	37.30	1174.37	1174.666		1174.75	0.010997	2.281	16.35	56.08	0.74
1	1478.83*	PF 1	37.30	1174.36	1174.655		1174.74	0.010991	2.276	16.39	56.35	0.74
1	1477.83*	PF 1	37.30	1174.35	1174.645		1174.73	0.010989	2.272	16.42	56.62	0.74
1	1476.83*	PF 1	37.30	1174.34	1174.634		1174.71	0.010969	2.266	16.46	56.89	0.74
1	1475.83*	PF 1	37.30	1174.33	1174.623		1174.70	0.010954	2.261	16.49	57.16	0.74
1	1474.83*	PF 1	37.30	1174.32	1174.612		1174.69	0.010955	2.257	16.52	57.42	0.74
1	1473.83*	PF 1	37.30	1174.31	1174.601		1174.68	0.010968	2.254	16.55	57.70	0.74
1	1472.83*	PF 1	37.30	1174.30	1174.591		1174.67	0.010955	2.249	16.59	57.96	0.74
1	1471.83*	PF 1	37.30	1174.29	1174.580		1174.66	0.010959	2.245	16.62	58.23	0.74
1	1470.83*	PF 1	37.30	1174.28	1174.569		1174.65	0.010943	2.240	16.65	58.50	0.74
1	1469.83*	PF 1	37.30	1174.27	1174.558		1174.64	0.010929	2.235	16.69	58.78	0.74
1	1468.83*	PF 1	37.30	1174.26	1174.547		1174.63	0.010923	2.230	16.72	59.03	0.74
1	1467.83*	PF 1	37.30	1174.25	1174.537		1174.61	0.010910	2.226	16.76	59.31	0.74
1	1466.83*	PF 1	37.30	1174.24	1174.526		1174.60	0.010898	2.221	16.80	59.59	0.74
1	1465.83*	PF 1	37.30	1174.23	1174.515		1174.59	0.010890	2.216	16.83	59.85	0.74
1	1464.83*	PF 1	37.30	1174.22	1174.505		1174.58	0.010883	2.212	16.86	60.12	0.74
1	1463.83*	PF 1	37.30	1174.21	1174.494		1174.57	0.010873	2.207	16.90	60.39	0.74
1	1462.83*	PF 1	37.30	1174.20	1174.483		1174.56	0.010852	2.202	16.94	60.66	0.73
1	1461.83*	PF 1	37.30	1174.19	1174.473		1174.55	0.010828	2.197	16.98	60.94	0.73
1	1460.83*	PF 1	37.30	1174.18	1174.462		1174.54	0.010843	2.194	17.00	61.19	0.73
1	1459.83*	PF 1	37.30	1174.17	1174.451		1174.53	0.010820	2.189	17.04	61.47	0.73
1	1458.83*	PF 1	37.30	1174.16	1174.441		1174.52	0.010798	2.183	17.08	61.74	0.73
1	1457.83*	PF 1	37.30	1174.15	1174.430		1174.50	0.010780	2.178	17.12	62.01	0.73
1	1456.83*	PF 1	37.30	1174.14	1174.419		1174.49	0.010763	2.174	17.16	62.28	0.73
1	1455.83*	PF 1	37.30	1174.13	1174.409		1174.48	0.010743	2.169	17.20	62.55	0.73
1	1454.83*	PF 1	37.30	1174.12	1174.398		1174.47	0.010711	2.163	17.24	62.82	0.73
1	1453.83*	PF 1	37.30	1174.11	1174.388		1174.46	0.010661	2.156	17.30	63.10	0.73
1	1452.83*	PF 1	37.30	1174.10	1174.377		1174.45	0.010630	2.151	17.34	63.36	0.72
1	1451.83*	PF 1	37.30	1174.09	1174.367		1174.44	0.010600	2.145	17.39	63.63	0.72
1	1450.83*	PF 1	37.30	1174.08	1174.357		1174.43	0.010537	2.138	17.45	63.91	0.72
1	1449.83*	PF 1	37.30	1174.07	1174.346		1174.42	0.010474	2.130	17.51	64.19	0.72
1	1448.83*	PF 1	37.30	1174.06	1174.336		1174.41	0.010403	2.122	17.57	64.45	0.72
1	1447.98	PF 1	37.30	1174.05	1174.328	1174.27100	1174.40	0.010113	2.101	17.75	64.70	0.71

HEC-RAS Plan: Plan 04 River: Entrada Reach: 1 Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3895.84	PF 1	25.10	1230.93	1233.074	1231.60900	1233.08	0.000185	0.817	30.71	22.35	0.12
1	3850.61	PF 1	25.10	1232.17	1232.923		1233.05	0.011721	2.819	8.90	23.14	0.80
1	3806.24	PF 1	25.10	1231.73	1232.489		1232.59	0.009020	2.535	9.90	24.71	0.71
1	3765.08	PF 1	25.10	1231.32	1231.907	1231.90700	1232.06	0.019417	3.181	7.89	24.91	1.00
1	3713.23	PF 1	25.10	1229.97	1230.769	1230.79400	1231.02	0.020785	3.978	6.31	15.05	1.08
1	3712.23*	PF 1	25.10	1229.97	1230.673	1230.75100	1230.99	0.028222	4.522	5.55	13.74	1.25
1	3711.23*	PF 1	25.10	1229.98	1230.708	1230.71100	1230.93	0.018258	3.791	6.62	15.41	1.02
1	3710.23*	PF 1	25.10	1229.98	1230.619	1230.67600	1230.91	0.025294	4.304	5.83	14.33	1.19
1	3709.23*	PF 1	25.10	1229.98	1230.626	1230.64100	1230.86	0.019331	3.861	6.50	15.38	1.05
1	3708.23*	PF 1	25.10	1229.98	1230.545	1230.60800	1230.84	0.026710	4.343	5.78	14.62	1.22
1	3707.23*	PF 1	25.10	1229.99	1230.555	1230.58300	1230.80	0.021347	3.959	6.34	15.58	1.09
1	3706.23*	PF 1	25.10	1229.99	1230.605	1230.56100	1230.77	0.013525	3.293	7.62	17.53	0.88
1	3705.23*	PF 1	25.10	1229.99	1230.602		1230.75	0.011739	3.100	8.10	18.34	0.82
1	3704.23*	PF 1	25.10	1229.99	1230.598		1230.73	0.010437	2.943	8.53	19.13	0.78
1	3703.23*	PF 1	25.10	1230.00	1230.593		1230.72	0.009791	2.842	8.83	19.90	0.75
1	3702.23*	PF 1	25.10	1230.00	1230.590		1230.70	0.008773	2.717	9.24	20.52	0.71
1	3701.23*	PF 1	25.10	1230.00	1230.586		1230.69	0.008059	2.608	9.62	21.32	0.68
1	3700.23*	PF 1	25.10	1230.01	1230.581		1230.68	0.007718	2.537	9.89	22.12	0.67
1	3699.23*	PF 1	25.10	1230.01	1230.578		1230.67	0.007148	2.445	10.27	22.93	0.64
1	3698.23*	PF 1	25.10	1230.01	1230.575		1230.66	0.006545	2.347	10.69	23.76	0.62
1	3697.23*	PF 1	25.10	1230.01	1230.572		1230.65	0.006122	2.269	11.06	24.60	0.60
1	3696.23*	PF 1	25.10	1230.02	1230.568		1230.65	0.005999	2.227	11.27	25.39	0.59
1	3695.23*	PF 1	25.10	1230.02	1230.565		1230.64	0.005620	2.157	11.64	26.19	0.57
1	3694.23*	PF 1	25.10	1230.02	1230.562		1230.63	0.005232	2.086	12.03	26.99	0.55
1	3693.23*	PF 1	25.10	1230.02	1230.559		1230.62	0.004928	2.022	12.41	27.89	0.53
1	3692.23*	PF 1	25.10	1230.03	1230.555		1230.62	0.004935	2.002	12.54	28.65	0.53
1	3691.23*	PF 1	25.10	1230.03	1230.552		1230.61	0.004687	1.950	12.87	29.45	0.52
1	3690.23*	PF 1	25.10	1230.03	1230.550		1230.61	0.004426	1.893	13.26	30.35	0.51
1	3689.23*	PF 1	25.10	1230.04	1230.546		1230.60	0.004481	1.882	13.34	31.11	0.51
1	3688.23*	PF 1	25.10	1230.04	1230.543		1230.60	0.004285	1.839	13.65	31.89	0.50
1	3687.23*	PF 1	25.10	1230.04	1230.540		1230.59	0.004098	1.794	13.99	32.81	0.48
1	3686.23*	PF 1	25.10	1230.04	1230.538		1230.59	0.003914	1.753	14.32	33.59	0.47
1	3685.23*	PF 1	25.10	1230.05	1230.534		1230.58	0.003986	1.748	14.36	34.28	0.48
1	3684.23*	PF 1	25.10	1230.05	1230.531		1230.58	0.003806	1.710	14.68	34.97	0.47
1	3683.23*	PF 1	25.10	1230.05	1230.529		1230.57	0.003666	1.677	14.97	35.70	0.46
1	3682.23*	PF 1	25.10	1230.05	1230.526		1230.57	0.003519	1.644	15.27	36.39	0.45
1	3681.23*	PF 1	25.10	1230.06	1230.523		1230.57	0.003624	1.647	15.24	37.05	0.45
1	3680.22*	PF 1	25.10	1230.06	1230.520		1230.56	0.003492	1.616	15.53	37.78	0.44
1	3679.22*	PF 1	25.10	1230.06	1230.517		1230.56	0.003361	1.586	15.83	38.49	0.44
1	3678.22*	PF 1	25.10	1230.06	1230.515		1230.55	0.003262	1.560	16.09	39.21	0.43
1	3677.22*	PF 1	25.10	1230.07	1230.511		1230.55	0.003408	1.571	15.98	39.83	0.44
1	3676.22*	PF 1	25.10	1230.07	1230.509		1230.55	0.003293	1.543	16.26	40.56	0.43
1	3675.22*	PF 1	25.10	1230.07	1230.506		1230.54	0.003213	1.521	16.50	41.29	0.42
1	3674.22*	PF 1	25.10	1230.08	1230.502		1230.54	0.003401	1.538	16.32	41.94	0.43
1	3673.22*	PF 1	25.10	1230.08	1230.499		1230.54	0.003329	1.517	16.55	42.73	0.43
1	3672.22*	PF 1	25.10	1230.08	1230.496		1230.53	0.003254	1.496	16.78	43.49	0.42
1	3671.22*	PF 1	25.10	1230.08	1230.494		1230.53	0.003198	1.477	17.00	44.31	0.42
1	3670.22*	PF 1	25.10	1230.09	1230.490		1230.52	0.003429	1.499	16.75	44.99	0.43
1	3669.22*	PF 1	25.10	1230.09	1230.487		1230.52	0.003386	1.482	16.94	45.86	0.43
1	3668.22*	PF 1	25.10	1230.09	1230.484		1230.52	0.003327	1.464	17.14	46.61	0.43
1	3667.22*	PF 1	25.10	1230.09	1230.481		1230.51	0.003292	1.449	17.32	47.46	0.42
1	3666.22*	PF 1	25.10	1230.10	1230.476		1230.51	0.003573	1.475	17.01	48.23	0.44
1	3665.22*	PF 1	25.10	1230.10	1230.473		1230.51	0.003526	1.463	17.15	48.76	0.43
1	3664.22*	PF 1	25.10	1230.10	1230.470		1230.50	0.003477	1.452	17.29	49.24	0.43
1	3663.22*	PF 1	25.10	1230.11	1230.465		1230.50	0.003834	1.489	16.86	49.71	0.45
1	3662.22*	PF 1	25.10	1230.11	1230.461		1230.50	0.003813	1.481	16.95	50.21	0.45
1	3661.22*	PF 1	25.10	1230.11	1230.458		1230.49	0.003809	1.474	17.02	50.72	0.45
1	3660.22*	PF 1	25.10	1230.11	1230.454		1230.49	0.003826	1.471	17.07	51.21	0.45
1	3659.22*	PF 1	25.10	1230.12	1230.445		1230.48	0.007893	1.532	16.38	51.68	0.48
1	3658.22*	PF 1	25.10	1230.12	1230.436		1230.47	0.008457	1.558	16.11	52.16	0.49
1	3657.22*	PF 1	25.10	1230.12	1230.425		1230.47	0.009227	1.594	15.74	52.61	0.51
1	3656.22*	PF 1	25.10	1230.12	1230.413		1230.46	0.010340	1.644	15.27	53.06	0.54
1	3655.22*	PF 1	25.10	1230.13	1230.389		1230.44	0.015228	1.841	13.63	53.47	0.64
1	3654.26	PF 1	25.10	1230.13	1230.321	1230.32100	1230.42	0.040775	2.472	10.15	53.60	1.00
1	3653.26*	PF 1	25.10	1229.47	1229.547	1229.67300	1230.25	0.998385	6.711	3.74	48.63	4.27
1	3652.26*	PF 1	25.10	1228.80	1228.896	1229.01100	1229.45	0.592154	5.948	4.22	44.43	3.40
1	3651.26*	PF 1	25.10	1228.14	1228.241	1228.36900	1228.84	0.601634	6.222	4.03	40.16	3.46
1	3650.27*	PF 1	25.10	1227.47	1227.579	1227.71800	1228.23	0.593076	6.480	3.87	35.90	3.48
1	3649.27*	PF 1	25.10	1226.81	1226.929	1227.08200	1227.64	0.575445	6.752	3.72	31.65	3.47
1	3648.64	PF 1	25.10	1226.39	1226.516	1226.67800	1227.27	0.565246	6.955	3.61	29.00	3.48
1	3647.64*	PF 1	25.10	1226.38	1226.564	1226.65700	1226.89	0.147542	4.548	5.52	30.61	1.89
1	3646.64*	PF 1	25.10	1226.37	1226.686	1226.64300	1226.78	0.022128	2.507	10.01	32.67	0.80
1	3645.64*	PF 1	25.10	1226.36	1226.662		1226.76	0.023592	2.519	9.96	33.86	0.82
1	3644.64*	PF 1	25.10	1226.34	1226.644		1226.73	0.021447	2.413	10.40	35.12	0.78
1	3643.64*	PF 1	25.10	1226.33	1226.617		1226.71	0.024064	2.465	10.18	36.29	0.82
1	3642.64*	PF 1	25.10	1226.32	1226.588		1226.69	0.028178	2.553	9.83	37.45	0.88
1	3641.64*	PF 1	25.10	1226.31	1226.567	1226.55000	1226.67	0.017156	2.582	9.72	38.64	0.91
1	3640.64*	PF 1	25.10	1226.30	1226.550	1226.53300	1226.65	0.017618	2.570	9.77	39.87	0.92
1	3639.64*	PF 1	25.10	1226.29	1226.532	1226.52100	1226.64	0.018353	2.571	9.76	41.07	0.93

HEC-RAS Plan: Plan 04 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3638.64*	PF 1	25.10	1226.27	1226.520	1226.49600	1226.61	0.015449	2.411	10.41	42.39	0.86
1	3637.64*	PF 1	25.10	1226.26	1226.506		1226.59	0.015399	2.381	10.54	43.63	0.85
1	3636.64*	PF 1	25.10	1226.25	1226.491		1226.58	0.015477	2.358	10.64	44.87	0.85
1	3635.64*	PF 1	25.10	1226.24	1226.476	1226.45300	1226.56	0.015703	2.343	10.71	46.11	0.86
1	3634.64*	PF 1	25.10	1226.23	1226.460		1226.55	0.016210	2.341	10.72	47.34	0.87
1	3633.64*	PF 1	25.10	1226.22	1226.443		1226.53	0.016928	2.347	10.69	48.56	0.88
1	3632.64*	PF 1	25.10	1226.20	1226.432		1226.51	0.014213	2.204	11.39	49.88	0.81
1	3631.64*	PF 1	25.10	1226.19	1226.418		1226.49	0.014167	2.180	11.51	51.12	0.81
1	3630.64*	PF 1	25.10	1226.18	1226.405		1226.48	0.014247	2.163	11.60	52.37	0.81
1	3629.64*	PF 1	25.10	1226.17	1226.391		1226.46	0.014385	2.149	11.68	53.61	0.81
1	3628.64*	PF 1	25.10	1226.16	1226.376		1226.45	0.014700	2.143	11.71	54.85	0.82
1	3627.64*	PF 1	25.10	1226.15	1226.360		1226.43	0.015318	2.151	11.67	56.08	0.83
1	3626.64*	PF 1	25.10	1226.14	1226.344		1226.42	0.016119	2.165	11.59	57.31	0.85
1	3625.64*	PF 1	25.10	1226.12	1226.333		1226.40	0.013497	2.034	12.34	58.63	0.78
1	3624.64*	PF 1	25.10	1226.11	1226.320		1226.38	0.013559	2.020	12.43	59.88	0.78
1	3623.64*	PF 1	25.10	1226.10	1226.306		1226.37	0.013702	2.010	12.49	61.12	0.78
1	3622.64*	PF 1	25.10	1226.09	1226.292		1226.36	0.014006	2.007	12.51	62.37	0.79
1	3621.64*	PF 1	25.10	1226.08	1226.277		1226.34	0.014654	2.019	12.43	63.59	0.80
1	3620.64*	PF 1	25.10	1226.07	1226.262		1226.33	0.015402	2.033	12.34	64.82	0.82
1	3619.64*	PF 1	25.10	1226.05	1226.251		1226.31	0.012831	1.909	13.15	66.14	0.76
1	3618.64*	PF 1	25.10	1226.04	1226.238		1226.29	0.012890	1.898	13.23	67.39	0.76
1	3617.64*	PF 1	25.10	1226.03	1226.225		1226.28	0.012990	1.888	13.29	68.64	0.76
1	3616.64*	PF 1	25.10	1226.02	1226.212		1226.27	0.013163	1.882	13.34	69.89	0.76
1	3615.64*	PF 1	25.10	1226.01	1226.199		1226.25	0.013506	1.884	13.33	71.13	0.77
1	3614.64*	PF 1	25.10	1226.00	1226.184		1226.24	0.014158	1.897	13.23	72.38	0.78
1	3613.64*	PF 1	25.10	1225.99	1226.169		1226.23	0.015056	1.920	13.08	73.60	0.80
1	3612.64*	PF 1	25.10	1225.97	1226.157		1226.21	0.012447	1.800	13.94	74.93	0.74
1	3611.63*	PF 1	25.10	1225.96	1226.145		1226.20	0.012513	1.791	14.01	76.18	0.74
1	3610.63*	PF 1	25.10	1225.95	1226.133		1226.18	0.012652	1.785	14.06	77.43	0.74
1	3609.63*	PF 1	25.10	1225.94	1226.120		1226.17	0.012920	1.785	14.06	78.68	0.74
1	3608.63*	PF 1	25.10	1225.93	1226.106		1226.16	0.013493	1.797	13.96	79.92	0.76
1	3607.63*	PF 1	25.10	1225.92	1226.092		1226.14	0.014053	1.808	13.88	81.16	0.77
1	3606.63*	PF 1	25.10	1225.90	1226.084		1226.13	0.010931	1.666	15.07	82.50	0.69
1	3605.63*	PF 1	25.10	1225.89	1226.074		1226.12	0.010625	1.642	15.29	83.76	0.68
1	3605.41	PF 1	25.10	1225.89	1226.070		1226.11	0.011261	1.669	15.04	84.02	0.70
1	3604.41*	PF 1	25.10	1225.88	1226.060		1226.10	0.010960	1.644	15.27	85.44	0.69
1	3603.41*	PF 1	25.10	1225.86	1226.046		1226.09	0.011393	1.652	15.19	86.86	0.70
1	3602.41*	PF 1	25.10	1225.85	1226.035		1226.08	0.011155	1.631	15.39	88.28	0.69
1	3601.41*	PF 1	25.10	1225.84	1226.025		1226.07	0.010899	1.610	15.59	89.71	0.68
1	3600.41*	PF 1	25.10	1225.82	1226.011		1226.05	0.011372	1.620	15.49	91.13	0.69
1	3599.41*	PF 1	25.10	1225.81	1226.000		1226.04	0.011182	1.602	15.67	92.55	0.69
1	3598.41*	PF 1	25.10	1225.80	1225.990		1226.03	0.010921	1.581	15.87	93.97	0.68
1	3597.41*	PF 1	25.10	1225.79	1225.979		1226.02	0.010672	1.561	16.08	95.38	0.67
1	3596.41*	PF 1	25.10	1225.77	1225.966		1226.00	0.011100	1.570	15.99	96.81	0.68
1	3595.41*	PF 1	25.10	1225.76	1225.955		1225.99	0.010885	1.552	16.17	98.23	0.67
1	3594.41*	PF 1	25.10	1225.75	1225.945		1225.98	0.010627	1.532	16.39	99.65	0.67
1	3593.41*	PF 1	25.10	1225.73	1225.931		1225.97	0.011057	1.541	16.28	101.09	0.68
1	3592.41*	PF 1	25.10	1225.72	1225.921		1225.96	0.010831	1.523	16.48	102.51	0.67
1	3591.41*	PF 1	25.10	1225.71	1225.911		1225.95	0.010589	1.505	16.68	103.92	0.66
1	3590.41*	PF 1	25.10	1225.69	1225.897		1225.93	0.011080	1.517	16.55	105.35	0.67
1	3589.41*	PF 1	25.10	1225.68	1225.886		1225.92	0.010898	1.501	16.72	106.77	0.67
1	3588.41*	PF 1	25.10	1225.67	1225.876		1225.91	0.010667	1.484	16.91	108.19	0.66
1	3587.41*	PF 1	25.10	1225.66	1225.866		1225.90	0.010390	1.465	17.14	109.61	0.65
1	3586.41*	PF 1	25.10	1225.64	1225.853		1225.89	0.010823	1.475	17.02	111.04	0.66
1	3585.41*	PF 1	25.10	1225.63	1225.843		1225.88	0.010575	1.457	17.22	112.47	0.66
1	3584.41*	PF 1	25.10	1225.62	1225.833		1225.87	0.010365	1.441	17.41	113.89	0.65
1	3583.41*	PF 1	25.10	1225.60	1225.819		1225.85	0.010824	1.453	17.27	115.32	0.66
1	3582.41*	PF 1	25.10	1225.59	1225.809		1225.84	0.010618	1.438	17.46	116.73	0.66
1	3581.41*	PF 1	25.10	1225.58	1225.799		1225.83	0.010391	1.421	17.66	118.15	0.65
1	3580.41*	PF 1	25.10	1225.56	1225.786		1225.82	0.010849	1.433	17.52	119.58	0.66
1	3579.41*	PF 1	25.10	1225.55	1225.776		1225.81	0.010654	1.419	17.69	121.00	0.65
1	3578.41*	PF 1	25.10	1225.54	1225.765		1225.80	0.010436	1.403	17.89	122.42	0.65
1	3577.41*	PF 1	25.10	1225.53	1225.755		1225.79	0.010194	1.387	18.10	123.85	0.64
1	3576.41*	PF 1	25.10	1225.51	1225.742		1225.77	0.010639	1.398	17.95	125.29	0.65
1	3575.41*	PF 1	25.10	1225.50	1225.732		1225.76	0.010401	1.383	18.15	126.71	0.64
1	3574.41*	PF 1	25.10	1225.49	1225.722		1225.75	0.010142	1.366	18.37	128.14	0.64
1	3573.41*	PF 1	25.10	1225.47	1225.709		1225.74	0.010578	1.377	18.22	129.57	0.65
1	3572.41*	PF 1	25.10	1225.46	1225.699		1225.73	0.010438	1.366	18.38	130.99	0.64
1	3571.41*	PF 1	25.10	1225.45	1225.689		1225.72	0.010184	1.350	18.59	132.41	0.64
1	3570.41*	PF 1	25.10	1225.43	1225.676		1225.71	0.010676	1.363	18.41	133.84	0.65
1	3569.41*	PF 1	25.10	1225.42	1225.666		1225.69	0.010512	1.351	18.58	135.27	0.64
1	3568.41*	PF 1	25.10	1225.41	1225.656		1225.68	0.010294	1.337	18.77	136.69	0.64
1	3567.41*	PF 1	25.10	1225.40	1225.646		1225.67	0.010053	1.322	18.98	138.11	0.63
1	3566.41*	PF 1	25.10	1225.38	1225.633		1225.66	0.010531	1.335	18.80	139.54	0.64
1	3565.41*	PF 1	25.10	1225.37	1225.623		1225.65	0.010319	1.322	18.99	140.96	0.63
1	3564.41*	PF 1	25.10	1225.36	1225.613		1225.64	0.010084	1.307	19.20	142.38	0.63
1	3563.41*	PF 1	25.10	1225.34	1225.600		1225.63	0.010584	1.321	19.00	143.81	0.64
1	3562.41*	PF 1	25.10	1225.33	1225.590		1225.62	0.010409	1.310	19.17	145.23	0.64
1	3561.41*	PF 1	25.10	1225.32	1225.580		1225.61	0.010206	1.297	19.36	146.66	0.63

HEC-RAS Plan: Plan 04 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3560.41*	PF 1	25.10	1225.30	1225.567		1225.59	0.010769	1.313	19.12	148.09	0.64
1	3559.41*	PF 1	25.10	1225.29	1225.557		1225.58	0.010766	1.308	19.20	149.51	0.64
1	3558.41*	PF 1	25.10	1225.28	1225.546		1225.57	0.010733	1.301	19.29	150.93	0.64
1	3557.41*	PF 1	25.10	1225.26	1225.532		1225.56	0.011734	1.332	18.85	152.35	0.67
1	3556.41*	PF 1	25.10	1225.25	1225.518		1225.55	0.012601	1.356	18.52	153.75	0.69
1	3555.41*	PF 1	25.10	1225.24	1225.504		1225.53	0.013805	1.388	18.08	155.15	0.72
1	3554.41*	PF 1	25.10	1225.23	1225.496		1225.52	0.009810	1.248	20.11	156.61	0.61
1	3553.41*	PF 1	25.10	1225.21	1225.484		1225.51	0.010217	1.259	19.94	158.05	0.62
1	3552.41*	PF 1	25.10	1225.20	1225.474		1225.50	0.010003	1.246	20.14	159.47	0.62
1	3551.41*	PF 1	25.10	1225.19	1225.465		1225.49	0.009702	1.231	20.39	160.90	0.61
1	3550.41*	PF 1	25.10	1225.17	1225.453		1225.48	0.010022	1.238	20.27	162.33	0.62
1	3549.41*	PF 1	25.10	1225.16	1225.443		1225.47	0.009753	1.224	20.51	163.76	0.61
1	3548.41*	PF 1	25.10	1225.15	1225.434		1225.46	0.009431	1.208	20.79	165.18	0.60
1	3547.42*	PF 1	25.10	1225.13	1225.422		1225.45	0.009654	1.212	20.71	166.62	0.61
1	3546.42*	PF 1	25.10	1225.12	1225.413		1225.44	0.009248	1.192	21.05	168.05	0.59
1	3545.42*	PF 1	25.10	1225.11	1225.404		1225.43	0.008747	1.168	21.48	169.50	0.58
1	3544.42*	PF 1	25.10	1225.10	1225.396		1225.42	0.008156	1.140	22.02	171.06	0.56
1	3543.42*	PF 1	25.10	1225.08	1225.389		1225.41	0.007548	1.109	22.62	172.65	0.54
1	3542.42*	PF 1	25.10	1225.07	1225.382		1225.40	0.006811	1.072	23.42	174.23	0.52
1	3541.42*	PF 1	25.10	1225.06	1225.373		1225.39	0.011479	1.051	23.88	175.77	0.50
1	3540.42*	PF 1	25.10	1225.04	1225.360		1225.38	0.012104	1.064	23.59	177.29	0.51
1	3539.42*	PF 1	25.10	1225.03	1225.347		1225.37	0.012831	1.079	23.26	178.82	0.53
1	3538.42*	PF 1	25.10	1225.02	1225.332		1225.35	0.014275	1.111	22.59	180.03	0.55
1	3537.42*	PF 1	25.10	1225.00	1225.312		1225.33	0.018819	1.205	20.83	180.97	0.63
1	3537.09	PF 1	25.10	1225.00	1225.276	1225.27600	1225.32	0.064871	1.747	14.37	181.12	1.09
1	3536.09*	PF 1	25.10	1224.19	1224.369	1224.43700	1225.05	5.312615	6.621	3.79	176.28	7.96
1	3535.09*	PF 1	25.10	1223.38	1223.553	1223.59500	1223.72	0.502339	3.296	7.62	171.95	2.76
1	3534.09*	PF 1	25.10	1222.56	1222.694	1222.74400	1222.98	1.158192	4.280	5.86	167.43	4.03
1	3533.09*	PF 1	25.10	1221.75	1221.861	1221.90700	1222.08	0.700259	3.720	6.75	163.00	3.22
1	3532.09*	PF 1	25.10	1220.94	1221.009	1221.07300	1221.27	0.932716	4.100	6.12	158.48	3.68
1	3531.18	PF 1	25.10	1220.20	1220.241	1220.29200	1220.48	0.790950	3.942	6.37	154.43	3.42
1	3530.18*	PF 1	25.10	1220.19	1220.340	1220.28300	1220.36	0.010728	1.083	23.17	155.00	0.49
1	3529.18*	PF 1	25.10	1220.18	1220.329		1220.35	0.011069	1.094	22.94	154.89	0.50
1	3528.18*	PF 1	25.10	1220.17	1220.317		1220.34	0.011580	1.109	22.63	154.80	0.51
1	3527.18*	PF 1	25.10	1220.16	1220.304		1220.32	0.012365	1.131	22.18	154.70	0.53
1	3526.18*	PF 1	25.10	1220.15	1220.289		1220.31	0.013850	1.171	21.44	154.58	0.55
1	3525.18*	PF 1	25.10	1220.14	1220.272		1220.30	0.016405	1.232	20.37	154.45	0.60
1	3524.18*	PF 1	25.10	1220.13	1220.259		1220.28	0.009954	1.261	19.90	154.36	0.62
1	3523.18*	PF 1	25.10	1220.12	1220.249		1220.27	0.009934	1.261	19.91	154.27	0.62
1	3522.18*	PF 1	25.10	1220.11	1220.239		1220.26	0.009946	1.261	19.90	154.18	0.62
1	3521.18*	PF 1	25.10	1220.10	1220.229		1220.25	0.009925	1.261	19.91	154.10	0.62
1	3520.18*	PF 1	25.10	1220.09	1220.219		1220.24	0.009937	1.262	19.90	154.01	0.62
1	3519.18*	PF 1	25.10	1220.08	1220.210		1220.23	0.009916	1.261	19.90	153.93	0.62
1	3518.18*	PF 1	25.10	1220.07	1220.200		1220.22	0.009928	1.262	19.89	153.84	0.62
1	3517.18*	PF 1	25.10	1220.06	1220.190		1220.21	0.009971	1.264	19.86	153.75	0.62
1	3516.18*	PF 1	25.10	1220.05	1220.180		1220.20	0.009950	1.263	19.87	153.67	0.62
1	3515.18*	PF 1	25.10	1220.04	1220.170		1220.19	0.009961	1.264	19.86	153.58	0.62
1	3514.18*	PF 1	25.10	1220.03	1220.160		1220.19	0.009942	1.263	19.87	153.49	0.62
1	3513.18*	PF 1	25.10	1220.02	1220.150		1220.18	0.009952	1.264	19.86	153.41	0.62
1	3512.18*	PF 1	25.10	1220.01	1220.140		1220.17	0.009933	1.264	19.86	153.32	0.62
1	3511.18*	PF 1	25.10	1220.00	1220.130		1220.16	0.009943	1.264	19.85	153.24	0.62
1	3510.18*	PF 1	25.10	1219.99	1220.120		1220.15	0.009924	1.264	19.86	153.15	0.62
1	3509.18*	PF 1	25.10	1219.98	1220.110		1220.14	0.009934	1.265	19.85	153.07	0.62
1	3508.18*	PF 1	25.10	1219.97	1220.100		1220.13	0.009915	1.264	19.86	152.98	0.62
1	3507.18*	PF 1	25.10	1219.96	1220.090		1220.12	0.009927	1.265	19.84	152.89	0.62
1	3506.18*	PF 1	25.10	1219.95	1220.080		1220.11	0.009906	1.264	19.85	152.81	0.62
1	3505.18*	PF 1	25.10	1219.94	1220.070		1220.10	0.009887	1.264	19.86	152.72	0.62
1	3504.18*	PF 1	25.10	1219.93	1220.060		1220.09	0.009930	1.266	19.83	152.63	0.62
1	3503.18*	PF 1	25.10	1219.92	1220.050		1220.08	0.009971	1.268	19.80	152.55	0.62
1	3502.18*	PF 1	25.10	1219.91	1220.040		1220.07	0.009951	1.267	19.81	152.47	0.62
1	3501.18*	PF 1	25.10	1219.90	1220.030		1220.06	0.009933	1.267	19.81	152.37	0.62
1	3500.18*	PF 1	25.10	1219.89	1220.020		1220.05	0.009943	1.267	19.80	152.29	0.62
1	3499.18*	PF 1	25.10	1219.88	1220.010		1220.04	0.009954	1.268	19.79	152.21	0.62
1	3498.18*	PF 1	25.10	1219.87	1220.000		1220.03	0.009967	1.269	19.78	152.11	0.62
1	3497.18*	PF 1	25.10	1219.86	1219.990		1220.02	0.009946	1.268	19.79	152.03	0.62
1	3496.18*	PF 1	25.10	1219.85	1219.980		1220.01	0.009957	1.269	19.78	151.95	0.62
1	3495.18*	PF 1	25.10	1219.84	1219.970		1220.00	0.009969	1.270	19.77	151.86	0.62
1	3494.18*	PF 1	25.10	1219.83	1219.961		1219.99	0.009949	1.269	19.77	151.77	0.62
1	3493.18*	PF 1	25.10	1219.82	1219.951		1219.98	0.009929	1.269	19.78	151.69	0.62
1	3492.18*	PF 1	25.10	1219.81	1219.941		1219.97	0.009941	1.270	19.77	151.61	0.62
1	3491.18*	PF 1	25.10	1219.80	1219.931		1219.96	0.009953	1.270	19.76	151.51	0.62
1	3490.18*	PF 1	25.10	1219.79	1219.921		1219.95	0.009932	1.270	19.77	151.44	0.62
1	3489.18*	PF 1	25.10	1219.78	1219.911		1219.94	0.009944	1.271	19.75	151.35	0.62
1	3488.18*	PF 1	25.10	1219.77	1219.901		1219.93	0.009955	1.271	19.74	151.27	0.62
1	3487.18*	PF 1	25.10	1219.76	1219.891		1219.92	0.009967	1.272	19.73	151.18	0.62
1	3486.18*	PF 1	25.10	1219.75	1219.881		1219.91	0.009948	1.272	19.74	151.09	0.62
1	3485.18*	PF 1	25.10	1219.74	1219.871		1219.90	0.009958	1.272	19.73	151.01	0.62
1	3484.18*	PF 1	25.10	1219.73	1219.861		1219.89	0.009970	1.273	19.72	150.92	0.62
1	3483.18*	PF 1	25.10	1219.72	1219.851		1219.88	0.009951	1.273	19.72	150.83	0.62

HEC-RAS Plan: Plan 04 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3482.18*	PF 1	25.10	1219.71	1219.841		1219.87	0.009962	1.273	19.71	150.75	0.62
1	3481.18*	PF 1	25.10	1219.70	1219.831		1219.86	0.009943	1.273	19.72	150.66	0.62
1	3480.18*	PF 1	25.10	1219.69	1219.821		1219.85	0.009924	1.272	19.73	150.57	0.62
1	3479.18*	PF 1	25.10	1219.68	1219.811		1219.84	0.009935	1.273	19.71	150.49	0.62
1	3478.18*	PF 1	25.10	1219.67	1219.801		1219.83	0.009945	1.274	19.70	150.41	0.62
1	3477.18*	PF 1	25.10	1219.66	1219.791		1219.82	0.009957	1.275	19.69	150.32	0.62
1	3476.18*	PF 1	25.10	1219.65	1219.781		1219.81	0.009969	1.275	19.68	150.23	0.62
1	3475.18*	PF 1	25.10	1219.64	1219.771		1219.80	0.009949	1.275	19.69	150.15	0.62
1	3474.18*	PF 1	25.10	1219.63	1219.761		1219.79	0.009961	1.276	19.68	150.06	0.62
1	3473.18*	PF 1	25.10	1219.62	1219.752		1219.78	0.009942	1.275	19.68	149.97	0.62
1	3472.18*	PF 1	25.10	1219.61	1219.742		1219.77	0.009953	1.276	19.67	149.89	0.62
1	3471.18*	PF 1	25.10	1219.60	1219.732		1219.76	0.009963	1.277	19.66	149.81	0.62
1	3470.18*	PF 1	25.10	1219.59	1219.722		1219.75	0.009946	1.276	19.67	149.71	0.62
1	3469.18*	PF 1	25.10	1219.58	1219.712		1219.74	0.009926	1.276	19.67	149.63	0.62
1	3468.18*	PF 1	25.10	1219.57	1219.702		1219.73	0.009906	1.275	19.68	149.55	0.62
1	3467.18*	PF 1	25.10	1219.56	1219.692		1219.72	0.009919	1.276	19.67	149.45	0.62
1	3466.18*	PF 1	25.10	1219.55	1219.682		1219.71	0.009930	1.277	19.66	149.37	0.62
1	3465.18*	PF 1	25.10	1219.54	1219.672		1219.70	0.009910	1.276	19.67	149.29	0.62
1	3464.18*	PF 1	25.10	1219.53	1219.662		1219.69	0.009922	1.277	19.65	149.20	0.62
1	3463.18*	PF 1	25.10	1219.52	1219.652		1219.68	0.009904	1.277	19.66	149.11	0.62
1	3462.18*	PF 1	25.10	1219.51	1219.642		1219.67	0.009884	1.276	19.67	149.03	0.62
1	3461.18*	PF 1	25.10	1219.50	1219.632		1219.66	0.009896	1.277	19.66	148.94	0.62
1	3460.18*	PF 1	25.10	1219.49	1219.622		1219.65	0.009877	1.277	19.66	148.86	0.62
1	3459.18*	PF 1	25.10	1219.48	1219.613		1219.64	0.009858	1.276	19.67	148.78	0.62
1	3458.18*	PF 1	25.10	1219.47	1219.603		1219.63	0.009809	1.274	19.69	148.69	0.62
1	3457.18*	PF 1	25.10	1219.46	1219.593		1219.62	0.009761	1.273	19.72	148.60	0.62
1	3456.18*	PF 1	25.10	1219.45	1219.583		1219.61	0.009712	1.271	19.74	148.52	0.61
1	3455.18*	PF 1	25.10	1219.44	1219.574		1219.60	0.009636	1.269	19.79	148.43	0.61
1	3454.18*	PF 1	25.10	1219.43	1219.564		1219.59	0.009559	1.266	19.83	148.35	0.61
1	3453.18*	PF 1	25.10	1219.42	1219.555		1219.58	0.009455	1.262	19.89	148.27	0.61
1	3452.18*	PF 1	25.10	1219.41	1219.545		1219.57	0.009296	1.256	19.99	148.18	0.60
1	3451.18*	PF 1	25.10	1219.40	1219.536		1219.56	0.009086	1.247	20.12	148.11	0.60
1	3450.18*	PF 1	25.10	1219.39	1219.527		1219.55	0.008830	1.237	20.29	148.03	0.59
1	3449.18*	PF 1	25.10	1219.38	1219.519		1219.54	0.008534	1.225	20.49	147.94	0.58
1	3448.18*	PF 1	25.10	1219.37	1219.511		1219.53	0.008178	1.209	20.75	147.87	0.57
1	3447.18*	PF 1	25.10	1219.36	1219.503		1219.53	0.007753	1.190	21.09	147.81	0.56
1	3446.18*	PF 1	25.10	1219.35	1219.496		1219.52	0.007297	1.169	21.47	147.72	0.54
1	3445.18*	PF 1	25.10	1219.34	1219.489		1219.51	0.006798	1.145	21.92	147.66	0.52
1	3444.18*	PF 1	25.10	1219.33	1219.483		1219.50	0.006259	1.117	22.47	147.61	0.50
1	3443.18*	PF 1	25.10	1219.32	1219.477		1219.50	0.005716	1.087	23.09	147.54	0.48
1	3442.18*	PF 1	25.10	1219.31	1219.472		1219.49	0.005193	1.057	23.76	147.48	0.46
1	3441.18*	PF 1	25.10	1219.30	1219.468		1219.48	0.004617	1.020	24.61	147.43	0.44
1	3440.63	PF 1	33.60	1219.29	1219.445		1219.48	0.010712	1.476	22.77	147.31	0.66
1	3366.51	PF 1	33.60	1218.55	1218.715		1218.75	0.009062	1.412	23.79	145.08	0.61
1	3305.78	PF 1	33.60	1217.94	1218.156		1218.20	0.009037	1.684	19.95	93.19	0.64
1	3304.78*	PF 1	33.60	1217.93	1218.146		1218.19	0.009043	1.687	19.91	92.82	0.64
1	3303.78*	PF 1	33.60	1217.92	1218.137		1218.18	0.009031	1.689	19.89	92.45	0.64
1	3302.78*	PF 1	33.60	1217.91	1218.127		1218.17	0.009022	1.691	19.86	92.07	0.64
1	3301.78*	PF 1	33.60	1217.90	1218.118		1218.16	0.009011	1.694	19.84	91.71	0.64
1	3300.78*	PF 1	33.60	1217.89	1218.109		1218.15	0.009002	1.696	19.81	91.33	0.64
1	3299.78*	PF 1	33.60	1217.88	1218.099		1218.14	0.008993	1.698	19.79	90.96	0.64
1	3298.78*	PF 1	33.60	1217.87	1218.090		1218.14	0.008985	1.700	19.76	90.59	0.64
1	3297.78*	PF 1	33.60	1217.86	1218.080		1218.13	0.008977	1.703	19.73	90.22	0.64
1	3296.78*	PF 1	33.60	1217.85	1218.071		1218.12	0.008987	1.706	19.69	89.84	0.64
1	3295.78*	PF 1	33.60	1217.84	1218.061		1218.11	0.008979	1.708	19.67	89.48	0.64
1	3294.78*	PF 1	33.60	1217.83	1218.052		1218.10	0.008958	1.710	19.65	89.10	0.64
1	3293.78*	PF 1	33.60	1217.82	1218.043		1218.09	0.008935	1.712	19.63	88.74	0.64
1	3292.78*	PF 1	33.60	1217.81	1218.033		1218.08	0.008948	1.715	19.59	88.36	0.64
1	3291.78*	PF 1	33.60	1217.80	1218.024		1218.07	0.008942	1.718	19.56	87.99	0.64
1	3290.78*	PF 1	33.60	1217.79	1218.015		1218.06	0.008923	1.720	19.54	87.62	0.64
1	3289.78*	PF 1	33.60	1217.78	1218.005		1218.05	0.008919	1.722	19.51	87.25	0.64
1	3288.78*	PF 1	33.60	1217.77	1217.996		1218.04	0.008901	1.724	19.49	86.88	0.64
1	3287.78*	PF 1	33.60	1217.76	1217.987		1218.03	0.008882	1.726	19.47	86.51	0.64
1	3286.78*	PF 1	33.60	1217.75	1217.977		1218.02	0.008882	1.729	19.43	86.13	0.64
1	3285.78*	PF 1	33.60	1217.74	1217.968		1218.02	0.008864	1.731	19.41	85.77	0.64
1	3284.78*	PF 1	33.60	1217.73	1217.959		1218.01	0.008849	1.733	19.39	85.39	0.64
1	3283.78*	PF 1	33.60	1217.72	1217.949		1218.00	0.008848	1.736	19.36	85.03	0.64
1	3282.78*	PF 1	33.60	1217.71	1217.940		1217.99	0.008835	1.738	19.33	84.65	0.64
1	3281.78*	PF 1	33.60	1217.70	1217.931		1217.98	0.008822	1.741	19.30	84.28	0.64
1	3280.78*	PF 1	33.60	1217.69	1217.922		1217.97	0.008794	1.742	19.29	83.90	0.64
1	3279.78*	PF 1	33.60	1217.68	1217.912		1217.96	0.008796	1.745	19.25	83.54	0.64
1	3278.78*	PF 1	33.60	1217.67	1217.903		1217.95	0.008769	1.747	19.24	83.16	0.64
1	3277.78*	PF 1	33.60	1217.66	1217.894		1217.94	0.008742	1.748	19.22	82.79	0.64
1	3276.78*	PF 1	33.60	1217.65	1217.885		1217.93	0.008717	1.750	19.20	82.42	0.64
1	3275.78*	PF 1	33.60	1217.64	1217.876		1217.92	0.008676	1.750	19.20	82.06	0.64
1	3274.78*	PF 1	33.60	1217.63	1217.867		1217.92	0.008653	1.752	19.18	81.68	0.64
1	3273.78*	PF 1	33.60	1217.62	1217.858		1217.91	0.008614	1.753	19.17	81.32	0.64
1	3272.78*	PF 1	33.60	1217.61	1217.849		1217.90	0.008564	1.753	19.17	80.94	0.64
1	3271.78*	PF 1	33.60	1217.60	1217.840		1217.89	0.008527	1.754	19.16	80.58	0.63

HEC-RAS Plan: Plan 04 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3270.78*	PF 1	33.60	1217.59	1217.831		1217.88	0.008464	1.753	19.16	80.21	0.63
1	3269.78*	PF 1	33.60	1217.58	1217.822		1217.87	0.008418	1.754	19.16	79.83	0.63
1	3268.78*	PF 1	33.60	1217.57	1217.813		1217.86	0.008370	1.754	19.16	79.47	0.63
1	3267.78*	PF 1	33.60	1217.56	1217.804		1217.85	0.008326	1.754	19.15	79.10	0.63
1	3266.78*	PF 1	33.60	1217.55	1217.796		1217.84	0.008267	1.754	19.16	78.74	0.63
1	3265.78*	PF 1	33.60	1217.54	1217.787		1217.84	0.008198	1.753	19.17	78.36	0.62
1	3264.78*	PF 1	33.60	1217.53	1217.778		1217.83	0.008129	1.752	19.18	78.00	0.62
1	3263.78*	PF 1	33.60	1217.52	1217.770		1217.82	0.008050	1.750	19.20	77.63	0.62
1	3262.78*	PF 1	33.60	1217.51	1217.761		1217.81	0.007946	1.746	19.24	77.27	0.62
1	3261.78*	PF 1	33.60	1217.50	1217.753		1217.80	0.007847	1.743	19.28	76.90	0.61
1	3260.78*	PF 1	33.60	1217.49	1217.745		1217.79	0.007735	1.739	19.32	76.54	0.61
1	3259.78*	PF 1	33.60	1217.48	1217.737		1217.78	0.007606	1.733	19.38	76.17	0.61
1	3258.78*	PF 1	33.60	1217.47	1217.729		1217.78	0.007478	1.728	19.45	75.82	0.60
1	3257.78*	PF 1	33.60	1217.46	1217.718		1217.77	0.013687	1.747	19.24	75.43	0.61
1	3256.78*	PF 1	33.60	1217.44	1217.705		1217.75	0.012629	1.708	19.67	75.10	0.59
1	3255.78*	PF 1	33.60	1217.43	1217.689		1217.74	0.013750	1.756	19.14	74.68	0.61
1	3254.78*	PF 1	33.60	1217.42	1217.671		1217.72	0.015512	1.825	18.41	74.26	0.65
1	3253.78*	PF 1	33.60	1217.41	1217.644		1217.70	0.019777	1.968	17.07	73.78	0.72
1	3253.32	PF 1	33.60	1217.41	1217.599	1217.59900	1217.69	0.040702	2.450	13.72	73.34	1.00
1	3252.32*	PF 1	33.60	1216.12	1216.175	1216.31800	1217.45	2.839276	9.042	3.72	67.66	6.80
1	3251.32*	PF 1	33.60	1214.83	1214.907	1215.03600	1215.66	1.065060	6.936	4.84	62.92	4.41
1	3250.32*	PF 1	33.60	1213.54	1213.618	1213.75800	1214.49	1.239915	7.498	4.48	58.05	4.76
1	3250.17	PF 1	33.60	1213.35	1213.429	1213.57000	1214.30	1.212747	7.484	4.49	57.34	4.72
1	3249.17*	PF 1	33.60	1213.34	1213.480	1213.56100	1213.76	0.177616	4.203	7.99	57.41	1.99
1	3248.17*	PF 1	33.60	1213.33	1213.651	1213.55200	1213.70	0.011308	1.829	18.37	58.21	0.57
1	3247.17*	PF 1	33.60	1213.32	1213.638		1213.69	0.011785	1.856	18.10	57.89	0.59
1	3246.17*	PF 1	33.60	1213.31	1213.624		1213.68	0.012426	1.890	17.78	57.58	0.60
1	3245.17*	PF 1	33.60	1213.30	1213.609		1213.67	0.013266	1.931	17.40	57.25	0.62
1	3244.17*	PF 1	33.60	1213.29	1213.594		1213.65	0.014163	1.974	17.02	56.92	0.64
1	3243.17*	PF 1	33.60	1213.28	1213.583		1213.64	0.008174	1.994	16.85	56.62	0.64
1	3242.17*	PF 1	33.60	1213.27	1213.574		1213.64	0.008161	1.997	16.83	56.33	0.64
1	3241.17*	PF 1	33.60	1213.26	1213.565		1213.63	0.008141	2.000	16.80	56.04	0.64
1	3240.17*	PF 1	33.60	1213.25	1213.556		1213.62	0.008117	2.002	16.79	55.77	0.64
1	3239.17*	PF 1	33.60	1213.24	1213.547		1213.61	0.008109	2.005	16.75	55.47	0.64
1	3238.17*	PF 1	33.60	1213.23	1213.538		1213.60	0.008092	2.008	16.73	55.18	0.64
1	3237.17*	PF 1	33.60	1213.22	1213.530		1213.59	0.008073	2.011	16.71	54.90	0.64
1	3236.17*	PF 1	33.60	1213.21	1213.521		1213.58	0.008058	2.014	16.68	54.61	0.64
1	3235.17*	PF 1	33.60	1213.20	1213.512		1213.58	0.008044	2.018	16.65	54.31	0.64
1	3234.17*	PF 1	33.60	1213.19	1213.503		1213.57	0.008028	2.021	16.63	54.03	0.64
1	3233.17*	PF 1	33.60	1213.18	1213.495		1213.56	0.008013	2.024	16.60	53.75	0.64
1	3232.17*	PF 1	33.60	1213.17	1213.486		1213.55	0.008001	2.027	16.58	53.46	0.64
1	3231.17*	PF 1	33.60	1213.16	1213.477		1213.54	0.007988	2.030	16.55	53.17	0.64
1	3230.17*	PF 1	33.60	1213.15	1213.468		1213.53	0.007968	2.033	16.52	52.88	0.64
1	3229.17*	PF 1	33.60	1213.14	1213.460		1213.52	0.007946	2.036	16.50	52.60	0.64
1	3228.17*	PF 1	33.60	1213.13	1213.451		1213.52	0.007929	2.039	16.48	52.31	0.64
1	3227.17*	PF 1	33.60	1213.12	1213.442		1213.51	0.007909	2.042	16.45	52.02	0.64
1	3226.17*	PF 1	33.60	1213.11	1213.434		1213.50	0.007891	2.045	16.43	51.74	0.64
1	3225.17*	PF 1	33.60	1213.10	1213.425		1213.49	0.007876	2.049	16.40	51.45	0.64
1	3224.17*	PF 1	33.60	1213.09	1213.416		1213.48	0.007873	2.053	16.37	51.16	0.64
1	3223.17*	PF 1	33.60	1213.08	1213.407		1213.47	0.007857	2.056	16.34	50.88	0.64
1	3222.17*	PF 1	33.60	1213.07	1213.399		1213.47	0.007855	2.061	16.30	50.58	0.64
1	3221.17*	PF 1	33.60	1213.06	1213.390		1213.46	0.007864	2.066	16.26	50.29	0.64
1	3220.17*	PF 1	33.60	1213.05	1213.381		1213.45	0.007858	2.070	16.23	50.02	0.64
1	3219.17*	PF 1	33.60	1213.04	1213.373		1213.44	0.007840	2.074	16.20	49.73	0.64
1	3218.17*	PF 1	33.60	1213.03	1213.364		1213.43	0.007842	2.079	16.16	49.43	0.64
1	3217.17*	PF 1	33.60	1213.02	1213.355		1213.42	0.007842	2.083	16.13	49.15	0.64
1	3216.17*	PF 1	33.60	1213.01	1213.346		1213.41	0.007836	2.088	16.09	48.86	0.64
1	3215.17*	PF 1	33.60	1213.00	1213.338		1213.41	0.007842	2.093	16.05	48.57	0.64
1	3214.17*	PF 1	33.60	1212.99	1213.329		1213.40	0.007831	2.097	16.02	48.29	0.64
1	3213.17*	PF 1	33.60	1212.98	1213.320		1213.39	0.007838	2.103	15.98	48.00	0.64
1	3212.17*	PF 1	33.60	1212.97	1213.311		1213.38	0.007843	2.108	15.94	47.72	0.64
1	3211.17*	PF 1	33.60	1212.96	1213.302		1213.37	0.007852	2.114	15.89	47.43	0.64
1	3210.17*	PF 1	33.60	1212.95	1213.294		1213.36	0.007862	2.120	15.85	47.13	0.64
1	3209.17*	PF 1	33.60	1212.94	1213.285		1213.36	0.007870	2.126	15.80	46.85	0.65
1	3208.17*	PF 1	33.60	1212.93	1213.276		1213.35	0.007888	2.133	15.76	46.57	0.65
1	3207.17*	PF 1	33.60	1212.92	1213.267		1213.34	0.007910	2.140	15.70	46.27	0.65
1	3206.17*	PF 1	33.60	1212.91	1213.258		1213.33	0.007930	2.147	15.65	45.99	0.65
1	3205.17*	PF 1	33.60	1212.90	1213.249		1213.32	0.007964	2.155	15.59	45.70	0.65
1	3204.17*	PF 1	33.60	1212.89	1213.240		1213.31	0.007998	2.163	15.53	45.40	0.65
1	3203.17*	PF 1	33.60	1212.88	1213.231		1213.30	0.008031	2.171	15.48	45.12	0.65
1	3202.17*	PF 1	33.60	1212.87	1213.222		1213.30	0.008068	2.180	15.41	44.82	0.66
1	3201.17*	PF 1	33.60	1212.86	1213.213		1213.29	0.008111	2.189	15.35	44.54	0.66
1	3200.17*	PF 1	33.60	1212.85	1213.204		1213.28	0.008156	2.198	15.28	44.25	0.66
1	3199.17*	PF 1	33.60	1212.84	1213.194		1213.27	0.008225	2.210	15.21	43.96	0.66
1	3198.17*	PF 1	33.60	1212.83	1213.185		1213.26	0.008282	2.220	15.13	43.67	0.66
1	3197.17*	PF 1	33.60	1212.82	1213.176		1213.25	0.008364	2.233	15.05	43.37	0.67
1	3196.17*	PF 1	33.60	1212.81	1213.166		1213.25	0.008466	2.247	14.95	43.08	0.67
1	3195.17*	PF 1	33.60	1212.80	1213.156		1213.24	0.008553	2.260	14.87	42.80	0.68
1	3194.17*	PF 1	33.60	1212.79	1213.146		1213.23	0.008680	2.276	14.76	42.50	0.68

HEC-RAS Plan: Plan 04 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3193.17*	PF 1	33.60	1212.78	1213.136		1213.22	0.008809	2.293	14.66	42.20	0.69
1	3192.17*	PF 1	33.60	1212.77	1213.126		1213.21	0.008957	2.311	14.54	41.91	0.69
1	3191.17*	PF 1	33.60	1212.76	1213.116		1213.20	0.009125	2.330	14.42	41.60	0.70
1	3190.17*	PF 1	33.60	1212.75	1213.105		1213.19	0.009328	2.352	14.28	41.30	0.71
1	3189.17*	PF 1	33.60	1212.74	1213.094		1213.18	0.009543	2.375	14.14	41.01	0.71
1	3188.17*	PF 1	33.60	1212.73	1213.083		1213.17	0.009799	2.401	13.99	40.71	0.72
1	3187.17*	PF 1	33.60	1212.72	1213.071		1213.16	0.010115	2.432	13.82	40.40	0.73
1	3186.18	PF 1	33.60	1212.71	1213.059		1213.15	0.010499	2.467	13.62	40.09	0.75
1	3091.83	PF 1	33.60	1211.75	1212.049		1212.13	0.011217	2.315	14.51	49.41	0.75
1	3030.37	PF 1	33.60	1211.13	1211.384		1211.45	0.010925	2.052	16.37	65.54	0.72
1	3029.37*	PF 1	33.60	1211.12	1211.373		1211.44	0.010920	2.048	16.40	65.83	0.72
1	3028.37*	PF 1	33.60	1211.11	1211.362		1211.43	0.010913	2.044	16.44	66.13	0.72
1	3027.37*	PF 1	33.60	1211.10	1211.351		1211.42	0.010927	2.041	16.46	66.42	0.72
1	3026.37*	PF 1	33.60	1211.09	1211.340		1211.41	0.010960	2.040	16.47	66.72	0.72
1	3025.37*	PF 1	33.60	1211.08	1211.330		1211.39	0.010955	2.036	16.51	67.02	0.72
1	3024.37*	PF 1	33.60	1211.07	1211.319		1211.38	0.010972	2.033	16.53	67.32	0.72
1	3023.37*	PF 1	33.60	1211.06	1211.308		1211.37	0.011026	2.032	16.53	67.62	0.72
1	3022.37*	PF 1	33.60	1211.05	1211.297		1211.36	0.011045	2.030	16.55	67.92	0.72
1	3021.37*	PF 1	33.60	1211.04	1211.286		1211.35	0.011098	2.029	16.56	68.23	0.73
1	3020.37*	PF 1	33.60	1211.03	1211.275		1211.34	0.011156	2.029	16.56	68.53	0.73
1	3019.37*	PF 1	33.60	1211.02	1211.263		1211.33	0.011254	2.030	16.55	68.83	0.73
1	3018.37*	PF 1	33.60	1211.01	1211.252		1211.32	0.011369	2.033	16.53	69.14	0.73
1	3017.37*	PF 1	33.60	1211.00	1211.241		1211.31	0.011452	2.034	16.52	69.44	0.74
1	3016.37*	PF 1	33.60	1210.98	1211.234		1211.29	0.009538	1.921	17.49	69.84	0.68
1	3015.37*	PF 1	33.60	1210.97	1211.224		1211.28	0.009325	1.904	17.65	70.17	0.67
1	3014.37*	PF 1	33.60	1210.96	1211.216		1211.27	0.009090	1.886	17.81	70.49	0.66
1	3013.37*	PF 1	33.60	1210.95	1211.207		1211.26	0.008835	1.867	18.00	70.81	0.65
1	3012.37*	PF 1	33.60	1210.94	1211.199		1211.25	0.008558	1.845	18.21	71.15	0.64
1	3011.37*	PF 1	33.60	1210.93	1211.191		1211.24	0.008281	1.824	18.42	71.48	0.63
1	3010.37*	PF 1	33.60	1210.92	1211.183		1211.23	0.007965	1.800	18.67	71.81	0.62
1	3009.37*	PF 1	33.60	1210.91	1211.176		1211.23	0.007640	1.774	18.94	72.14	0.61
1	3008.37*	PF 1	33.60	1210.90	1211.165		1211.21	0.013620	1.772	18.96	72.46	0.61
1	3007.37*	PF 1	33.60	1210.89	1211.149		1211.20	0.014544	1.805	18.62	72.74	0.63
1	3006.37*	PF 1	33.60	1210.88	1211.131		1211.18	0.016042	1.856	18.11	73.01	0.66
1	3005.37*	PF 1	33.60	1210.87	1211.107		1211.17	0.019266	1.958	17.16	73.25	0.71
1	3004.37*	PF 1	33.60	1210.86	1211.067		1211.14	0.029918	2.233	15.05	73.39	0.87
1	3004.33	PF 1	33.60	1210.86	1211.064	1211.06400	1211.14	0.031119	2.259	14.87	73.39	0.88
1	3003.33*	PF 1	33.60	1210.01	1210.076	1210.20700	1210.96	1.574335	7.562	4.44	67.98	5.21
1	3002.33*	PF 1	33.60	1209.17	1209.256	1209.37600	1209.84	0.723334	6.151	5.46	63.55	3.70
1	3001.33*	PF 1	33.60	1208.32	1208.408	1208.53600	1209.07	0.798501	6.528	5.15	58.99	3.90
1	3000.32*	PF 1	33.60	1207.47	1207.562	1207.69900	1208.27	0.794196	6.729	4.99	54.45	3.92
1	2999.32*	PF 1	33.60	1206.62	1206.718	1206.86300	1207.47	0.784689	6.942	4.84	49.92	3.93
1	2998.41	PF 1	33.60	1205.85	1205.953	1206.10600	1206.75	0.773138	7.154	4.70	45.79	3.94
1	2997.41*	PF 1	33.60	1205.84	1206.005	1206.09400	1206.31	0.157463	4.407	7.62	46.59	1.92
1	2996.41*	PF 1	33.60	1205.83	1206.165	1206.08100	1206.24	0.014671	2.135	15.74	48.04	0.66
1	2995.41*	PF 1	33.60	1205.82	1206.148		1206.22	0.015349	2.157	15.58	48.44	0.67
1	2994.41*	PF 1	33.60	1205.81	1206.130		1206.21	0.016398	2.193	15.32	48.82	0.69
1	2993.41*	PF 1	33.60	1205.80	1206.109		1206.19	0.018074	2.252	14.92	49.19	0.72
1	2992.41*	PF 1	33.60	1205.79	1206.088		1206.17	0.020063	2.317	14.50	49.55	0.75
1	2991.41*	PF 1	33.60	1205.78	1206.073		1206.16	0.011727	2.336	14.38	49.96	0.77
1	2990.41*	PF 1	33.60	1205.77	1206.062		1206.15	0.011716	2.327	14.44	50.38	0.77
1	2989.41*	PF 1	33.60	1205.76	1206.050		1206.13	0.011696	2.319	14.49	50.79	0.77
1	2988.41*	PF 1	33.60	1205.75	1206.039		1206.12	0.011691	2.311	14.54	51.21	0.76
1	2987.41*	PF 1	33.60	1205.74	1206.027		1206.11	0.011667	2.302	14.60	51.64	0.76
1	2986.41*	PF 1	33.60	1205.73	1206.016		1206.10	0.011651	2.293	14.65	52.07	0.76
1	2985.41*	PF 1	33.60	1205.72	1206.005		1206.09	0.011637	2.285	14.70	52.49	0.76
1	2984.41*	PF 1	33.60	1205.71	1205.994		1206.07	0.011608	2.276	14.76	52.91	0.76
1	2983.41*	PF 1	33.60	1205.70	1205.982		1206.06	0.011583	2.267	14.82	53.33	0.76
1	2982.41*	PF 1	33.60	1205.69	1205.971		1206.05	0.011555	2.258	14.88	53.77	0.76
1	2981.41*	PF 1	33.60	1205.68	1205.960		1206.04	0.011567	2.252	14.92	54.19	0.76
1	2980.41*	PF 1	33.60	1205.67	1205.949		1206.03	0.011532	2.243	14.98	54.61	0.76
1	2979.41*	PF 1	33.60	1205.66	1205.938		1206.02	0.011498	2.234	15.04	55.03	0.75
1	2978.41*	PF 1	33.60	1205.65	1205.926		1206.00	0.011463	2.225	15.10	55.47	0.75
1	2977.41*	PF 1	33.60	1205.64	1205.915		1205.99	0.011451	2.218	15.15	55.89	0.75
1	2976.41*	PF 1	33.60	1205.63	1205.904		1205.98	0.011441	2.210	15.20	56.31	0.75
1	2975.41*	PF 1	33.60	1205.62	1205.893		1205.97	0.011450	2.204	15.24	56.74	0.75
1	2974.41*	PF 1	33.60	1205.61	1205.882		1205.96	0.011406	2.195	15.31	57.17	0.75
1	2973.41*	PF 1	33.60	1205.60	1205.870		1205.95	0.011385	2.188	15.36	57.59	0.75
1	2972.41*	PF 1	33.60	1205.59	1205.859		1205.93	0.011371	2.180	15.41	58.01	0.75
1	2971.41*	PF 1	33.60	1205.58	1205.848		1205.92	0.011354	2.173	15.46	58.43	0.74
1	2970.41*	PF 1	33.60	1205.57	1205.837		1205.91	0.011339	2.166	15.51	58.85	0.74
1	2969.41*	PF 1	33.60	1205.56	1205.826		1205.90	0.011322	2.159	15.56	59.29	0.74
1	2968.41*	PF 1	33.60	1205.55	1205.815		1205.89	0.011276	2.150	15.63	59.71	0.74
1	2967.41*	PF 1	33.60	1205.54	1205.804		1205.88	0.011250	2.142	15.68	60.14	0.74
1	2966.41*	PF 1	33.60	1205.53	1205.793		1205.86	0.011225	2.135	15.74	60.56	0.74
1	2965.41*	PF 1	33.60	1205.52	1205.782		1205.85	0.011198	2.127	15.79	60.99	0.74
1	2964.41*	PF 1	33.60	1205.51	1205.772		1205.84	0.011142	2.118	15.86	61.42	0.73
1	2963.41*	PF 1	33.60	1205.50	1205.761		1205.83	0.011105	2.110	15.92	61.85	0.73
1	2962.41*	PF 1	33.60	1205.49	1205.750		1205.82	0.011069	2.103	15.98	62.27	0.73

HEC-RAS Plan: Plan 04 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	2961.41*	PF 1	33.60	1205.48	1205.739		1205.81	0.011032	2.095	16.04	62.70	0.73
1	2960.41*	PF 1	33.60	1205.47	1205.728		1205.80	0.010982	2.086	16.11	63.13	0.73
1	2959.41*	PF 1	33.60	1205.46	1205.718		1205.79	0.010917	2.077	16.18	63.56	0.73
1	2958.41*	PF 1	33.60	1205.45	1205.707		1205.77	0.010836	2.067	16.26	63.98	0.72
1	2957.41*	PF 1	33.60	1205.44	1205.697		1205.76	0.010723	2.055	16.35	64.41	0.72
1	2956.41*	PF 1	33.60	1205.43	1205.687		1205.75	0.010642	2.044	16.43	64.85	0.72
1	2955.41*	PF 1	33.60	1205.42	1205.676		1205.74	0.010519	2.032	16.53	65.27	0.71
1	2955.4	PF 1	33.60	1205.42	1205.676		1205.74	0.010550	2.034	16.52	65.28	0.71
1	2914.65	PF 1	33.60	1205.01	1205.243		1205.30	0.010524	1.910	17.59	76.28	0.70
1	2815.59	PF 1	33.60	1204.02	1204.205		1204.25	0.010556	1.648	20.39	110.59	0.68
1	2782.59	PF 1	33.60	1203.69	1203.868		1203.91	0.010073	1.569	21.41	120.68	0.66
1	2743.58	PF 1	33.60	1203.30	1203.473		1203.51	0.010188	1.548	21.70	125.91	0.66
1	2742.58*	PF 1	33.60	1203.29	1203.463		1203.50	0.010166	1.546	21.73	126.05	0.66
1	2741.58*	PF 1	33.60	1203.28	1203.453		1203.49	0.010191	1.547	21.72	126.19	0.66
1	2740.58*	PF 1	33.60	1203.27	1203.443		1203.48	0.010190	1.546	21.73	126.34	0.66
1	2739.58*	PF 1	33.60	1203.26	1203.433		1203.47	0.010192	1.545	21.74	126.48	0.66
1	2738.58*	PF 1	33.60	1203.25	1203.422		1203.46	0.010243	1.547	21.72	126.60	0.66
1	2737.58*	PF 1	33.60	1203.24	1203.412		1203.45	0.010269	1.548	21.71	126.74	0.66
1	2736.58*	PF 1	33.60	1203.23	1203.402		1203.44	0.010319	1.549	21.69	126.88	0.66
1	2735.58*	PF 1	33.60	1203.22	1203.391		1203.43	0.010394	1.552	21.65	127.02	0.66
1	2734.58*	PF 1	33.60	1203.21	1203.380		1203.42	0.010494	1.556	21.60	127.16	0.67
1	2733.58*	PF 1	33.60	1203.20	1203.370		1203.41	0.010648	1.562	21.51	127.30	0.67
1	2732.58*	PF 1	33.60	1203.19	1203.359		1203.40	0.010857	1.570	21.40	127.43	0.68
1	2731.58*	PF 1	33.60	1203.18	1203.347		1203.39	0.011290	1.588	21.16	127.56	0.69
1	2730.58*	PF 1	33.60	1203.17	1203.334		1203.37	0.011952	1.615	20.81	127.68	0.71
1	2729.58*	PF 1	33.60	1203.16	1203.321		1203.36	0.012701	1.644	20.44	127.79	0.72
1	2728.58*	PF 1	33.60	1203.14	1203.312		1203.35	0.010041	1.531	21.94	128.01	0.65
1	2727.58*	PF 1	33.60	1203.13	1203.302		1203.34	0.009995	1.528	21.98	128.15	0.65
1	2726.58*	PF 1	33.60	1203.12	1203.292		1203.33	0.009949	1.526	22.02	128.29	0.65
1	2725.58*	PF 1	33.60	1203.11	1203.282		1203.32	0.009928	1.524	22.05	128.43	0.65
1	2724.58*	PF 1	33.60	1203.10	1203.272		1203.31	0.009883	1.521	22.09	128.57	0.65
1	2723.58*	PF 1	33.60	1203.09	1203.263		1203.30	0.009814	1.517	22.14	128.72	0.64
1	2722.58*	PF 1	33.60	1203.08	1203.253		1203.29	0.009745	1.513	22.20	128.87	0.64
1	2721.58*	PF 1	33.60	1203.07	1203.243		1203.28	0.009656	1.509	22.27	129.01	0.64
1	2720.58*	PF 1	33.60	1203.06	1203.234		1203.27	0.009569	1.504	22.34	129.14	0.64
1	2719.58*	PF 1	33.60	1203.05	1203.224		1203.26	0.009415	1.496	22.46	129.29	0.63
1	2718.57*	PF 1	33.60	1203.04	1203.215		1203.25	0.009264	1.488	22.58	129.43	0.63
1	2717.57*	PF 1	33.60	1203.03	1203.206		1203.24	0.009095	1.479	22.72	129.58	0.62
1	2716.57*	PF 1	33.60	1203.02	1203.197		1203.23	0.008867	1.467	22.90	129.73	0.62
1	2715.57*	PF 1	33.60	1203.01	1203.189		1203.22	0.008608	1.454	23.12	129.88	0.61
1	2714.57*	PF 1	33.60	1203.00	1203.181		1203.21	0.008302	1.437	23.38	130.03	0.60
1	2713.57*	PF 1	33.60	1202.99	1203.173		1203.20	0.007957	1.418	23.69	130.19	0.59
1	2712.57*	PF 1	33.60	1202.98	1203.165		1203.20	0.007596	1.398	24.03	130.34	0.57
1	2711.57*	PF 1	33.60	1202.97	1203.158		1203.19	0.007209	1.376	24.42	130.49	0.56
1	2710.57*	PF 1	33.60	1202.96	1203.151		1203.18	0.006788	1.350	24.88	130.66	0.55
1	2709.57*	PF 1	33.60	1202.95	1203.142		1203.17	0.011863	1.343	25.02	130.80	0.54
1	2708.57*	PF 1	33.60	1202.94	1203.129		1203.16	0.012487	1.363	24.65	130.92	0.55
1	2707.57*	PF 1	33.60	1202.93	1203.115		1203.15	0.013536	1.396	24.07	131.04	0.57
1	2706.57*	PF 1	33.60	1202.92	1203.097		1203.13	0.015497	1.453	23.12	131.13	0.61
1	2705.57*	PF 1	33.60	1202.91	1203.070		1203.11	0.021587	1.605	20.93	131.17	0.71
1	2704.94	PF 1	33.60	1202.90	1203.027	1203.02700	1203.09	0.046785	2.025	16.59	131.06	1.00
1	2703.94*	PF 1	33.60	1202.01	1202.047	1202.14000	1202.87	3.155764	7.289	4.61	125.57	6.71
1	2702.94*	PF 1	33.60	1201.13	1201.191	1201.26400	1201.51	0.625722	4.556	7.37	120.77	3.25
1	2701.94*	PF 1	33.60	1200.24	1200.295	1200.37700	1200.73	0.973389	5.291	6.35	115.78	3.98
1	2700.94*	PF 1	33.60	1199.35	1199.409	1199.49200	1199.82	0.833575	5.139	6.54	110.84	3.73
1	2700.54	PF 1	33.60	1199.00	1199.059	1199.14400	1199.49	0.869761	5.242	6.41	108.89	3.81
1	2699.54*	PF 1	33.60	1198.99	1199.205	1199.13300	1199.24	0.011575	1.429	23.52	110.00	0.54
1	2698.54*	PF 1	33.60	1198.98	1199.193		1199.23	0.011987	1.443	23.29	110.16	0.55
1	2697.54*	PF 1	33.60	1198.97	1199.179		1199.21	0.012562	1.462	22.98	110.32	0.56
1	2696.54*	PF 1	33.60	1198.96	1199.165		1199.20	0.013468	1.492	22.51	110.46	0.58
1	2695.54*	PF 1	33.60	1198.95	1199.148		1199.19	0.014976	1.540	21.82	110.58	0.61
1	2694.54*	PF 1	33.60	1198.94	1199.130		1199.17	0.017108	1.602	20.97	110.70	0.65
1	2693.54*	PF 1	33.60	1198.93	1199.117		1199.16	0.010191	1.629	20.63	110.85	0.67
1	2692.54*	PF 1	33.60	1198.92	1199.107		1199.15	0.010202	1.629	20.63	111.03	0.67
1	2691.54*	PF 1	33.60	1198.91	1199.097		1199.14	0.010193	1.627	20.65	111.20	0.67
1	2690.54*	PF 1	33.60	1198.90	1199.086		1199.13	0.010206	1.627	20.65	111.37	0.67
1	2689.54*	PF 1	33.60	1198.89	1199.076		1199.12	0.010197	1.625	20.67	111.54	0.67
1	2688.54*	PF 1	33.60	1198.88	1199.066		1199.11	0.010188	1.624	20.69	111.71	0.67
1	2687.54*	PF 1	33.60	1198.87	1199.056		1199.10	0.010199	1.623	20.70	111.89	0.67
1	2686.54*	PF 1	33.60	1198.86	1199.046		1199.09	0.010192	1.622	20.71	112.04	0.67
1	2685.54*	PF 1	33.60	1198.85	1199.036		1199.08	0.010161	1.620	20.74	112.21	0.66
1	2684.54*	PF 1	33.60	1198.84	1199.026		1199.07	0.010130	1.617	20.78	112.38	0.66
1	2683.54*	PF 1	33.60	1198.83	1199.016		1199.06	0.010099	1.615	20.81	112.56	0.66
1	2682.54*	PF 1	33.60	1198.82	1199.006		1199.05	0.010067	1.612	20.84	112.73	0.66
1	2681.54*	PF 1	33.60	1198.81	1198.996		1199.04	0.010080	1.612	20.85	112.90	0.66
1	2680.54*	PF 1	33.60	1198.80	1198.986		1199.03	0.010050	1.609	20.88	113.07	0.66
1	2679.54*	PF 1	33.60	1198.79	1198.976		1199.02	0.010019	1.607	20.91	113.24	0.66
1	2678.54*	PF 1	33.60	1198.78	1198.966		1199.01	0.009969	1.604	20.95	113.40	0.66
1	2677.54*	PF 1	33.60	1198.77	1198.956		1199.00	0.009915	1.600	21.00	113.58	0.66

HEC-RAS Plan: Plan 04 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	2676.54*	PF 1	33.60	1198.76	1198.946		1198.99	0.009842	1.596	21.06	113.76	0.65
1	2675.54*	PF 1	33.60	1198.75	1198.936		1198.98	0.009748	1.590	21.13	113.93	0.65
1	2674.54*	PF 1	33.60	1198.74	1198.927		1198.97	0.009656	1.584	21.21	114.10	0.65
1	2673.54*	PF 1	33.60	1198.73	1198.917		1198.96	0.009543	1.578	21.29	114.27	0.64
1	2672.54*	PF 1	33.60	1198.72	1198.908		1198.95	0.009410	1.570	21.40	114.46	0.64
1	2671.54*	PF 1	33.60	1198.71	1198.899		1198.94	0.009241	1.561	21.53	114.63	0.64
1	2670.54*	PF 1	33.60	1198.70	1198.890		1198.93	0.009056	1.550	21.67	114.81	0.63
1	2669.54*	PF 1	33.60	1198.69	1198.881		1198.92	0.008840	1.538	21.84	114.98	0.62
1	2668.54*	PF 1	33.60	1198.68	1198.872		1198.91	0.008610	1.525	22.03	115.15	0.61
1	2667.54*	PF 1	33.60	1198.67	1198.864		1198.90	0.008333	1.509	22.26	115.34	0.61
1	2666.54*	PF 1	33.60	1198.66	1198.856		1198.89	0.008018	1.491	22.53	115.53	0.60
1	2665.54*	PF 1	33.60	1198.65	1198.849		1198.88	0.007671	1.471	22.85	115.71	0.58
1	2664.54*	PF 1	33.60	1198.64	1198.841		1198.87	0.007298	1.448	23.21	115.90	0.57
1	2663.54*	PF 1	33.60	1198.63	1198.834		1198.87	0.006906	1.423	23.61	116.10	0.56
1	2662.54*	PF 1	33.60	1198.62	1198.828		1198.86	0.006515	1.397	24.04	116.29	0.54
1	2661.54*	PF 1	33.60	1198.61	1198.822		1198.85	0.006093	1.369	24.55	116.48	0.53
1	2661.04	PF 1	33.60	1198.60	1198.820	1198.75100	1198.85	0.005362	1.317	25.52	116.61	0.50
1	2616.7	PF 1	33.60	1198.16	1198.294	1198.29400	1198.37	0.029799	2.232	15.05	112.81	1.08
1	2540.68	PF 1	33.60	1197.39	1197.695	1197.53400	1197.71	0.002058	1.012	33.19	109.62	0.32
1	2481.7	PF 1	33.60	1196.79	1197.698		1197.70	0.000040	0.287	117.10	133.07	0.05
1	2409.33	PF 1	33.60	1196.06	1197.698		1197.70	0.000005	0.144	232.68	146.96	0.02
1	2320.35	PF 1	37.30	1195.17	1197.698	1195.34400	1197.70	0.000003	0.151	246.60	105.15	0.02
1	2300		Culvert									
1	2119.93	PF 1	37.30	1185.98	1186.238	1186.22100	1186.34	0.016961	2.587	14.42	56.71	0.90
1	2068.55	PF 1	37.30	1185.47	1185.740		1185.79	0.007149	1.734	21.51	80.60	0.59
1	2000.07	PF 1	37.30	1184.78	1185.088		1185.18	0.011433	2.382	15.66	51.83	0.76
1	1943.65	PF 1	37.30	1184.21	1184.538		1184.61	0.008877	2.188	17.05	52.99	0.68
1	1862.48	PF 1	37.30	1183.39	1183.726		1183.82	0.010728	2.440	15.29	46.50	0.75
1	1861.48*	PF 1	37.30	1183.38	1183.715		1183.81	0.010782	2.442	15.27	46.57	0.75
1	1860.48*	PF 1	37.30	1183.37	1183.704		1183.80	0.010862	2.446	15.25	46.64	0.75
1	1859.48*	PF 1	37.30	1183.36	1183.693		1183.79	0.010966	2.452	15.21	46.70	0.76
1	1858.48*	PF 1	37.30	1183.35	1183.681		1183.78	0.011090	2.459	15.17	46.77	0.76
1	1857.48*	PF 1	37.30	1183.34	1183.670		1183.76	0.011229	2.466	15.12	46.84	0.77
1	1856.48*	PF 1	37.30	1183.33	1183.658		1183.75	0.011429	2.478	15.05	46.91	0.77
1	1855.48*	PF 1	37.30	1183.32	1183.646		1183.74	0.011629	2.490	14.98	46.96	0.78
1	1854.48*	PF 1	37.30	1183.30	1183.635		1183.73	0.010510	2.413	15.46	47.09	0.74
1	1853.48*	PF 1	37.30	1183.29	1183.625		1183.72	0.010525	2.412	15.46	47.17	0.74
1	1852.48*	PF 1	37.30	1183.28	1183.615		1183.71	0.010539	2.412	15.47	47.25	0.74
1	1851.48*	PF 1	37.30	1183.27	1183.604		1183.69	0.010588	2.414	15.45	47.30	0.74
1	1850.48*	PF 1	37.30	1183.26	1183.593		1183.68	0.010616	2.414	15.45	47.38	0.75
1	1849.48*	PF 1	37.30	1183.25	1183.583		1183.67	0.010644	2.415	15.45	47.46	0.75
1	1848.48*	PF 1	37.30	1183.24	1183.572		1183.66	0.010699	2.417	15.43	47.53	0.75
1	1847.48*	PF 1	37.30	1183.23	1183.561		1183.65	0.010759	2.419	15.42	47.60	0.75
1	1846.48*	PF 1	37.30	1183.22	1183.550		1183.64	0.010832	2.423	15.39	47.66	0.75
1	1845.48*	PF 1	37.30	1183.21	1183.539		1183.63	0.010916	2.427	15.37	47.73	0.75
1	1844.48*	PF 1	37.30	1183.20	1183.527		1183.62	0.011015	2.432	15.34	47.81	0.76
1	1843.48*	PF 1	37.30	1183.19	1183.516		1183.61	0.011189	2.443	15.27	47.87	0.76
1	1842.48*	PF 1	37.30	1183.18	1183.504		1183.60	0.011411	2.456	15.19	47.92	0.77
1	1841.48*	PF 1	37.30	1183.17	1183.492		1183.59	0.011589	2.466	15.13	47.99	0.77
1	1840.48*	PF 1	37.30	1183.15	1183.482		1183.57	0.010437	2.387	15.63	48.13	0.74
1	1839.48*	PF 1	37.30	1183.14	1183.471		1183.56	0.010457	2.387	15.63	48.20	0.74
1	1838.48*	PF 1	37.30	1183.13	1183.461		1183.55	0.010473	2.387	15.63	48.27	0.74
1	1837.48*	PF 1	37.30	1183.12	1183.450		1183.54	0.010493	2.387	15.63	48.34	0.74
1	1836.48*	PF 1	37.30	1183.11	1183.440		1183.53	0.010496	2.385	15.64	48.42	0.74
1	1835.48*	PF 1	37.30	1183.10	1183.429		1183.52	0.010517	2.385	15.64	48.49	0.74
1	1834.48*	PF 1	37.30	1183.09	1183.419		1183.51	0.010533	2.385	15.64	48.56	0.74
1	1833.48*	PF 1	37.30	1183.08	1183.408		1183.50	0.010554	2.385	15.64	48.63	0.74
1	1832.48*	PF 1	37.30	1183.07	1183.398		1183.49	0.010584	2.386	15.64	48.71	0.74
1	1831.48*	PF 1	37.30	1183.06	1183.387		1183.48	0.010645	2.388	15.62	48.77	0.74
1	1830.48*	PF 1	37.30	1183.05	1183.376		1183.47	0.010689	2.390	15.61	48.85	0.75
1	1829.48*	PF 1	37.30	1183.04	1183.365		1183.45	0.010751	2.393	15.59	48.91	0.75
1	1828.48*	PF 1	37.30	1183.03	1183.354		1183.44	0.010809	2.395	15.57	48.99	0.75
1	1827.48*	PF 1	37.30	1183.02	1183.344		1183.43	0.010845	2.396	15.57	49.06	0.75
1	1826.48*	PF 1	37.30	1183.00	1183.337		1183.42	0.009470	2.298	16.23	49.21	0.71
1	1825.48*	PF 1	37.30	1182.99	1183.328		1183.41	0.009369	2.289	16.30	49.29	0.70
1	1824.48*	PF 1	37.30	1182.98	1183.318		1183.40	0.009252	2.279	16.37	49.37	0.70
1	1823.48*	PF 1	37.30	1182.97	1183.310		1183.39	0.009125	2.268	16.45	49.45	0.69
1	1822.48*	PF 1	37.30	1182.96	1183.301		1183.38	0.008986	2.256	16.53	49.54	0.69
1	1821.48*	PF 1	37.30	1182.95	1183.292		1183.37	0.008839	2.243	16.63	49.62	0.68
1	1820.48*	PF 1	37.30	1182.94	1183.284		1183.36	0.008688	2.230	16.72	49.70	0.68
1	1819.48*	PF 1	37.30	1182.93	1183.275		1183.35	0.008541	2.217	16.82	49.78	0.67
1	1818.48*	PF 1	37.30	1182.92	1183.267		1183.34	0.008363	2.202	16.94	49.87	0.67
1	1817.48*	PF 1	37.30	1182.91	1183.259		1183.33	0.008180	2.186	17.07	49.97	0.66
1	1816.48*	PF 1	37.30	1182.90	1183.251		1183.32	0.007983	2.168	17.20	50.06	0.65
1	1815.48*	PF 1	37.30	1182.89	1183.239		1183.31	0.014508	2.182	17.10	50.11	0.66
1	1814.48*	PF 1	37.30	1182.88	1183.220		1183.30	0.015656	2.232	16.71	50.14	0.68
1	1813.48*	PF 1	37.30	1182.87	1183.199		1183.28	0.017502	2.307	16.17	50.15	0.72
1	1812.48*	PF 1	37.30	1182.86	1183.172		1183.26	0.020690	2.427	15.37	50.13	0.77
1	1811.48*	PF 1	37.30	1182.84	1183.146		1183.24	0.022135	2.476	15.07	50.15	0.80

HEC-RAS Plan: Plan 04 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	1811.06	PF 1	37.30	1182.84	1183.102	1183.10200	1183.23	0.037106	2.896	12.88	49.92	1.01
1	1810.06*	PF 1	37.30	1182.35	1182.480	1182.62200	1183.09	0.438397	6.273	5.95	46.13	3.08
1	1809.06*	PF 1	37.30	1181.87	1182.006	1182.15800	1182.65	0.435066	6.427	5.80	43.17	3.09
1	1808.06*	PF 1	37.30	1181.38	1181.521	1181.68200	1182.21	0.439747	6.633	5.62	40.21	3.13
1	1807.36	PF 1	37.30	1181.04	1181.187	1181.35000	1181.90	0.435751	6.756	5.52	38.13	3.13
1	1806.36*	PF 1	37.30	1181.03	1181.241	1181.34100	1181.57	0.126484	4.630	8.06	38.76	1.79
1	1805.36*	PF 1	37.30	1181.02	1181.421	1181.32800	1181.51	0.014623	2.389	15.62	40.15	0.68
1	1804.36*	PF 1	37.30	1181.01	1181.404		1181.50	0.015281	2.416	15.44	40.34	0.69
1	1803.36*	PF 1	37.30	1181.00	1181.386		1181.48	0.016190	2.453	15.20	40.54	0.71
1	1802.36*	PF 1	37.30	1180.99	1181.366		1181.46	0.017510	2.507	14.88	40.72	0.73
1	1801.36*	PF 1	37.30	1180.98	1181.346		1181.45	0.018902	2.561	14.57	40.91	0.76
1	1800.36*	PF 1	37.30	1180.97	1181.332		1181.44	0.010851	2.571	14.51	41.13	0.76
1	1799.36*	PF 1	37.30	1180.96	1181.322		1181.42	0.010726	2.556	14.59	41.38	0.76
1	1798.36*	PF 1	37.30	1180.95	1181.312		1181.41	0.010585	2.540	14.69	41.62	0.75
1	1797.36*	PF 1	37.30	1180.94	1181.303		1181.40	0.010418	2.522	14.79	41.88	0.75
1	1796.36*	PF 1	37.30	1180.93	1181.293		1181.39	0.010271	2.505	14.89	42.12	0.74
1	1795.36*	PF 1	37.30	1180.92	1181.284		1181.38	0.010092	2.486	15.00	42.36	0.74
1	1794.36*	PF 1	37.30	1180.91	1181.275		1181.37	0.009880	2.464	15.14	42.62	0.73
1	1793.36*	PF 1	37.30	1180.90	1181.265		1181.36	0.009688	2.444	15.26	42.86	0.72
1	1792.36*	PF 1	37.30	1180.90	1181.249		1181.35	0.011176	2.548	14.64	43.00	0.77
1	1791.36*	PF 1	37.30	1180.89	1181.238		1181.34	0.011101	2.537	14.70	43.26	0.77
1	1790.36*	PF 1	37.30	1180.88	1181.228		1181.33	0.011038	2.527	14.76	43.50	0.76
1	1789.36*	PF 1	37.30	1180.87	1181.217		1181.32	0.010977	2.518	14.82	43.73	0.76
1	1788.36*	PF 1	37.30	1180.86	1181.207		1181.30	0.010898	2.506	14.88	43.98	0.76
1	1787.36*	PF 1	37.30	1180.85	1181.196		1181.29	0.010814	2.495	14.95	44.22	0.76
1	1786.36*	PF 1	37.30	1180.84	1181.186		1181.28	0.010718	2.483	15.02	44.46	0.75
1	1785.36*	PF 1	37.30	1180.83	1181.176		1181.27	0.010593	2.469	15.11	44.71	0.75
1	1784.36*	PF 1	37.30	1180.82	1181.166		1181.26	0.010476	2.456	15.19	44.95	0.74
1	1783.36*	PF 1	37.30	1180.81	1181.156		1181.25	0.010343	2.441	15.28	45.20	0.74
1	1782.36*	PF 1	37.30	1180.80	1181.147		1181.24	0.010182	2.424	15.39	45.44	0.73
1	1781.36*	PF 1	37.30	1180.79	1181.137		1181.23	0.010007	2.406	15.50	45.70	0.73
1	1780.36*	PF 1	37.30	1180.78	1181.128		1181.22	0.009813	2.387	15.63	45.95	0.72
1	1779.36*	PF 1	37.30	1180.77	1181.119		1181.21	0.009605	2.366	15.76	46.20	0.71
1	1778.36*	PF 1	37.30	1180.76	1181.110		1181.20	0.009403	2.346	15.90	46.44	0.71
1	1777.36*	PF 1	37.30	1180.75	1181.102		1181.19	0.009169	2.324	16.05	46.70	0.70
1	1777.34	PF 1	37.30	1180.75	1181.101		1181.19	0.009201	2.326	16.04	46.70	0.70
1	1709.86	PF 1	37.30	1180.06	1180.422		1180.52	0.010674	2.551	14.62	41.44	0.76
1	1708.86*	PF 1	37.30	1180.05	1180.412		1180.51	0.010693	2.550	14.63	41.53	0.76
1	1707.86*	PF 1	37.30	1180.04	1180.401		1180.50	0.010699	2.548	14.64	41.63	0.76
1	1706.86*	PF 1	37.30	1180.03	1180.391		1180.49	0.010706	2.546	14.65	41.72	0.76
1	1705.86*	PF 1	37.30	1180.02	1180.380		1180.48	0.010719	2.545	14.66	41.81	0.76
1	1704.86*	PF 1	37.30	1180.01	1180.369		1180.47	0.010726	2.543	14.67	41.91	0.76
1	1703.86*	PF 1	37.30	1180.00	1180.359		1180.46	0.010734	2.541	14.68	42.00	0.76
1	1702.86*	PF 1	37.30	1179.99	1180.348		1180.45	0.010754	2.540	14.68	42.10	0.76
1	1701.86*	PF 1	37.30	1179.98	1180.337		1180.44	0.010762	2.539	14.69	42.20	0.76
1	1700.86*	PF 1	37.30	1179.97	1180.327		1180.43	0.010771	2.537	14.70	42.29	0.76
1	1699.86*	PF 1	37.30	1179.96	1180.316		1180.42	0.010809	2.538	14.70	42.38	0.76
1	1698.86*	PF 1	37.30	1179.95	1180.305		1180.41	0.010843	2.538	14.70	42.47	0.76
1	1697.86*	PF 1	37.30	1179.94	1180.294		1180.39	0.010877	2.538	14.70	42.57	0.76
1	1696.86*	PF 1	37.30	1179.93	1180.283		1180.38	0.010950	2.541	14.68	42.66	0.76
1	1695.86*	PF 1	37.30	1179.92	1180.272		1180.37	0.011011	2.543	14.67	42.75	0.77
1	1694.86*	PF 1	37.30	1179.91	1180.261		1180.36	0.011086	2.546	14.65	42.85	0.77
1	1693.86*	PF 1	37.30	1179.90	1180.249		1180.35	0.011187	2.551	14.62	42.94	0.77
1	1692.86*	PF 1	37.30	1179.89	1180.237		1180.34	0.011323	2.558	14.58	43.02	0.77
1	1691.86*	PF 1	37.30	1179.88	1180.225		1180.33	0.011483	2.567	14.53	43.11	0.78
1	1690.86*	PF 1	37.30	1179.87	1180.214		1180.32	0.011619	2.574	14.49	43.19	0.78
1	1689.86*	PF 1	37.30	1179.85	1180.203		1180.30	0.010528	2.495	14.95	43.35	0.75
1	1688.86*	PF 1	37.30	1179.84	1180.193		1180.29	0.010519	2.492	14.97	43.44	0.75
1	1687.86*	PF 1	37.30	1179.83	1180.183		1180.28	0.010493	2.488	14.99	43.54	0.75
1	1686.86*	PF 1	37.30	1179.82	1180.172		1180.27	0.010485	2.486	15.01	43.63	0.75
1	1685.86*	PF 1	37.30	1179.81	1180.162		1180.26	0.010483	2.483	15.02	43.72	0.75
1	1684.86*	PF 1	37.30	1179.80	1180.152		1180.25	0.010470	2.480	15.04	43.82	0.75
1	1683.86*	PF 1	37.30	1179.79	1180.141		1180.24	0.010444	2.476	15.06	43.92	0.75
1	1682.86*	PF 1	37.30	1179.78	1180.131		1180.23	0.010419	2.472	15.09	44.02	0.74
1	1681.86*	PF 1	37.30	1179.77	1180.121		1180.22	0.010394	2.468	15.11	44.12	0.74
1	1680.86*	PF 1	37.30	1179.76	1180.111		1180.21	0.010369	2.464	15.14	44.21	0.74
1	1679.86*	PF 1	37.30	1179.75	1180.100		1180.20	0.010349	2.461	15.16	44.30	0.74
1	1678.86*	PF 1	37.30	1179.74	1180.090		1180.18	0.010313	2.456	15.19	44.40	0.74
1	1677.86*	PF 1	37.30	1179.73	1180.080		1180.17	0.010277	2.451	15.22	44.50	0.74
1	1676.86*	PF 1	37.30	1179.72	1180.070		1180.16	0.010241	2.446	15.25	44.60	0.74
1	1675.86*	PF 1	37.30	1179.71	1180.060		1180.15	0.010181	2.440	15.29	44.70	0.74
1	1674.86*	PF 1	37.30	1179.70	1180.050		1180.14	0.010122	2.434	15.33	44.80	0.73
1	1673.86*	PF 1	37.30	1179.69	1180.040		1180.13	0.010068	2.428	15.36	44.89	0.73
1	1672.86*	PF 1	37.30	1179.68	1180.031		1180.12	0.010010	2.421	15.41	44.99	0.73
1	1671.86*	PF 1	37.30	1179.67	1180.021		1180.11	0.009941	2.414	15.45	45.09	0.73
1	1670.86*	PF 1	37.30	1179.66	1180.011		1180.10	0.009849	2.405	15.51	45.20	0.72
1	1669.86*	PF 1	37.30	1179.65	1180.002		1180.09	0.009758	2.396	15.57	45.30	0.72
1	1668.86*	PF 1	37.30	1179.64	1179.992		1180.08	0.009657	2.387	15.63	45.41	0.72
1	1667.86*	PF 1	37.30	1179.63	1179.983		1180.07	0.009535	2.375	15.70	45.51	0.71

HEC-RAS Plan: Plan 04 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	1666.86*	PF 1	37.30	1179.62	1179.974		1180.06	0.009420	2.365	15.77	45.60	0.71
1	1665.86*	PF 1	37.30	1179.61	1179.965		1180.05	0.009291	2.353	15.85	45.71	0.70
1	1664.86*	PF 1	37.30	1179.60	1179.956		1180.04	0.009153	2.340	15.94	45.82	0.70
1	1663.86*	PF 1	37.30	1179.59	1179.947		1180.03	0.009008	2.327	16.03	45.93	0.69
1	1662.86*	PF 1	37.30	1179.58	1179.939		1180.02	0.008856	2.313	16.13	46.03	0.69
1	1661.86*	PF 1	37.30	1179.57	1179.930		1180.01	0.008686	2.297	16.24	46.14	0.68
1	1660.86*	PF 1	37.30	1179.56	1179.922		1180.00	0.008534	2.283	16.34	46.24	0.68
1	1659.86*	PF 1	37.30	1179.55	1179.914		1179.99	0.008344	2.265	16.46	46.35	0.67
1	1658.86*	PF 1	37.30	1179.54	1179.906		1179.98	0.008150	2.247	16.60	46.47	0.66
1	1657.86*	PF 1	37.30	1179.53	1179.898		1179.98	0.007953	2.229	16.74	46.58	0.66
1	1656.86*	PF 1	37.30	1179.52	1179.886		1179.96	0.014376	2.238	16.67	46.67	0.66
1	1655.86*	PF 1	37.30	1179.51	1179.868		1179.95	0.015333	2.281	16.35	46.72	0.68
1	1654.86*	PF 1	37.30	1179.50	1179.848		1179.93	0.016830	2.345	15.91	46.75	0.71
1	1653.86*	PF 1	37.30	1179.49	1179.822		1179.92	0.019636	2.456	15.19	46.75	0.76
1	1652.86*	PF 1	37.30	1179.48	1179.774	1179.75700	1179.89	0.029472	2.778	13.43	46.62	0.91
1	1652.33	PF 1	37.30	1179.47	1179.746	1179.74600	1179.88	0.035992	2.951	12.64	46.57	1.00
1	1651.33*	PF 1	37.30	1178.74	1178.862	1179.03200	1179.71	0.664984	7.396	5.04	41.76	3.75
1	1650.33*	PF 1	37.30	1178.01	1178.140	1178.32000	1179.05	0.648885	7.630	4.89	37.92	3.75
1	1649.71	PF 1	37.30	1177.56	1177.696	1177.88200	1178.64	0.638112	7.790	4.79	35.56	3.74
1	1648.71*	PF 1	37.30	1177.55	1177.747	1177.87400	1178.18	0.182593	5.302	7.04	36.39	2.13
1	1647.71*	PF 1	37.30	1177.54	1177.941	1177.86100	1178.04	0.016325	2.521	14.79	38.09	0.71
1	1646.71*	PF 1	37.30	1177.53	1177.923		1178.02	0.017045	2.543	14.67	38.51	0.73
1	1645.71*	PF 1	37.30	1177.52	1177.903		1178.01	0.018165	2.581	14.45	38.90	0.75
1	1644.71*	PF 1	37.30	1177.51	1177.879		1177.99	0.019941	2.644	14.11	39.30	0.78
1	1643.71*	PF 1	37.30	1177.50	1177.856		1177.97	0.021957	2.711	13.76	39.70	0.81
1	1642.71*	PF 1	37.30	1177.49	1177.840		1177.96	0.012753	2.725	13.69	40.13	0.82
1	1641.71*	PF 1	37.30	1177.48	1177.828		1177.94	0.012667	2.707	13.78	40.59	0.82
1	1640.71*	PF 1	37.30	1177.47	1177.816		1177.93	0.012600	2.691	13.86	41.05	0.82
1	1639.71*	PF 1	37.30	1177.46	1177.805		1177.92	0.012524	2.674	13.95	41.51	0.81
1	1638.71*	PF 1	37.30	1177.45	1177.793		1177.90	0.012439	2.657	14.04	41.97	0.81
1	1637.71*	PF 1	37.30	1177.44	1177.781		1177.89	0.012364	2.641	14.12	42.42	0.81
1	1636.71*	PF 1	37.30	1177.43	1177.769		1177.88	0.012303	2.626	14.20	42.88	0.80
1	1635.71*	PF 1	37.30	1177.42	1177.758		1177.86	0.012202	2.608	14.30	43.34	0.80
1	1634.71*	PF 1	37.30	1177.41	1177.746		1177.85	0.012105	2.591	14.40	43.80	0.80
1	1633.71*	PF 1	37.30	1177.40	1177.735		1177.84	0.011984	2.573	14.50	44.26	0.79
1	1632.71*	PF 1	37.30	1177.39	1177.724		1177.83	0.011853	2.553	14.61	44.72	0.79
1	1631.71*	PF 1	37.30	1177.38	1177.713		1177.81	0.011693	2.532	14.73	45.20	0.78
1	1630.71*	PF 1	37.30	1177.37	1177.703		1177.80	0.011529	2.511	14.85	45.66	0.78
1	1629.71*	PF 1	37.30	1177.36	1177.692		1177.79	0.011347	2.489	14.98	46.12	0.77
1	1628.71*	PF 1	37.30	1177.35	1177.682		1177.78	0.011138	2.466	15.13	46.59	0.76
1	1627.71*	PF 1	37.30	1177.34	1177.672		1177.76	0.010908	2.440	15.28	47.06	0.75
1	1626.71*	PF 1	37.30	1177.33	1177.662		1177.75	0.010647	2.413	15.46	47.53	0.75
1	1625.71*	PF 1	37.30	1177.32	1177.653		1177.74	0.010368	2.385	15.64	48.00	0.74
1	1624.71*	PF 1	37.30	1177.31	1177.644		1177.73	0.010061	2.354	15.85	48.48	0.73
1	1623.71*	PF 1	37.30	1177.30	1177.635		1177.72	0.009730	2.321	16.07	48.96	0.71
1	1622.71*	PF 1	37.30	1177.29	1177.627		1177.71	0.009390	2.288	16.30	49.44	0.70
1	1621.71*	PF 1	37.30	1177.28	1177.619		1177.70	0.009035	2.253	16.56	49.91	0.69
1	1620.71*	PF 1	37.30	1177.27	1177.611		1177.69	0.008658	2.215	16.84	50.40	0.68
1	1619.71*	PF 1	37.30	1177.26	1177.604		1177.68	0.008282	2.178	17.13	50.89	0.66
1	1618.71*	PF 1	37.30	1177.25	1177.596		1177.67	0.007899	2.139	17.44	51.38	0.65
1	1617.71*	PF 1	37.30	1177.24	1177.590		1177.66	0.007501	2.098	17.78	51.87	0.63
1	1616.71*	PF 1	37.30	1177.23	1177.583		1177.65	0.007110	2.057	18.14	52.36	0.62
1	1615.71*	PF 1	37.30	1177.22	1177.578		1177.64	0.006720	2.015	18.51	52.85	0.60
1	1614.71*	PF 1	37.30	1177.21	1177.572		1177.63	0.006336	1.972	18.91	53.34	0.58
1	1613.71*	PF 1	37.30	1177.20	1177.567		1177.62	0.005962	1.929	19.33	53.84	0.57
1	1612.71*	PF 1	37.30	1177.19	1177.562		1177.62	0.005596	1.886	19.78	54.34	0.55
1	1611.71*	PF 1	37.30	1177.18	1177.557		1177.61	0.005245	1.843	20.24	54.84	0.53
1	1610.71*	PF 1	37.30	1177.17	1177.553		1177.60	0.004868	1.795	20.77	55.35	0.52
1	1609.71*	PF 1	37.30	1177.16	1177.550		1177.60	0.004513	1.749	21.33	55.86	0.50
1	1608.71*	PF 1	37.30	1177.15	1177.547		1177.59	0.004179	1.703	21.91	56.38	0.48
1	1607.71*	PF 1	37.30	1177.14	1177.544		1177.59	0.003868	1.657	22.51	56.90	0.46
1	1606.71*	PF 1	37.30	1177.13	1177.542		1177.58	0.003575	1.613	23.13	57.40	0.45
1	1605.71*	PF 1	37.30	1177.12	1177.540		1177.58	0.003301	1.569	23.77	57.92	0.43
1	1604.71*	PF 1	37.30	1177.11	1177.537		1177.57	0.003048	1.527	24.43	58.43	0.42
1	1603.71*	PF 1	37.30	1177.10	1177.536		1177.57	0.002814	1.485	25.11	58.95	0.40
1	1602.71*	PF 1	37.30	1177.09	1177.534		1177.57	0.002598	1.445	25.81	59.47	0.39
1	1602.35	PF 1	37.30	1177.09	1177.533		1177.57	0.002600	1.444	25.84	59.64	0.39
1	1601.35*	PF 1	37.30	1177.08	1177.531		1177.56	0.002460	1.420	26.26	59.58	0.38
1	1600.35*	PF 1	37.30	1177.07	1177.529		1177.56	0.002324	1.397	26.70	59.53	0.37
1	1599.35*	PF 1	37.30	1177.06	1177.528		1177.56	0.002200	1.375	27.14	59.47	0.36
1	1598.35*	PF 1	37.30	1177.05	1177.526		1177.55	0.002080	1.352	27.59	59.43	0.35
1	1597.35*	PF 1	37.30	1177.04	1177.525		1177.55	0.001966	1.330	28.05	59.39	0.34
1	1596.35*	PF 1	37.30	1177.03	1177.523		1177.55	0.001861	1.309	28.50	59.32	0.33
1	1595.35*	PF 1	37.30	1177.02	1177.522		1177.55	0.001763	1.288	28.96	59.26	0.32
1	1594.35*	PF 1	37.30	1177.01	1177.521		1177.55	0.001672	1.268	29.41	59.20	0.32
1	1593.35*	PF 1	37.30	1177.00	1177.520		1177.54	0.001585	1.248	29.88	59.14	0.31
1	1592.35*	PF 1	37.30	1176.99	1177.519		1177.54	0.001503	1.229	30.35	59.07	0.30
1	1591.35*	PF 1	37.30	1176.98	1177.518		1177.54	0.001425	1.210	30.83	59.04	0.30
1	1590.35*	PF 1	37.30	1176.97	1177.517		1177.54	0.001353	1.192	31.29	58.98	0.29

HEC-RAS Plan: Plan 04 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	1589.35*	PF 1	37.30	1176.96	1177.516		1177.54	0.001287	1.175	31.75	58.90	0.28
1	1588.35*	PF 1	37.30	1176.95	1177.515		1177.54	0.001225	1.158	32.21	58.83	0.28
1	1587.35*	PF 1	37.30	1176.94	1177.514		1177.53	0.001166	1.141	32.68	58.76	0.27
1	1586.35*	PF 1	37.30	1176.93	1177.513		1177.53	0.001111	1.125	33.14	58.69	0.26
1	1585.35*	PF 1	37.30	1176.92	1177.512		1177.53	0.001058	1.110	33.61	58.62	0.26
1	1584.35*	PF 1	37.30	1176.91	1177.511		1177.53	0.001008	1.094	34.09	58.54	0.25
1	1583.35*	PF 1	37.30	1176.90	1177.511		1177.53	0.000961	1.079	34.57	58.50	0.25
1	1582.35*	PF 1	37.30	1176.89	1177.510		1177.53	0.000917	1.064	35.04	58.41	0.24
1	1581.35*	PF 1	37.30	1176.88	1177.510		1177.53	0.000874	1.050	35.53	58.34	0.24
1	1580.35*	PF 1	37.30	1176.87	1177.509		1177.53	0.000835	1.036	36.00	58.24	0.23
1	1579.35*	PF 1	37.30	1176.86	1177.509		1177.53	0.000799	1.023	36.47	58.17	0.23
1	1578.35*	PF 1	37.30	1176.85	1177.508		1177.52	0.000764	1.010	36.94	58.11	0.22
1	1577.35*	PF 1	37.30	1176.84	1177.508		1177.52	0.000731	0.997	37.43	58.05	0.22
1	1576.35*	PF 1	37.30	1176.83	1177.507		1177.52	0.000700	0.984	37.91	58.01	0.21
1	1575.35*	PF 1	37.30	1176.82	1177.507		1177.52	0.000670	0.972	38.39	57.95	0.21
1	1574.35*	PF 1	37.30	1176.81	1177.506		1177.52	0.000642	0.960	38.85	57.89	0.21
1	1573.35*	PF 1	37.30	1176.80	1177.506		1177.52	0.000617	0.949	39.32	57.82	0.20
1	1572.35*	PF 1	37.30	1176.79	1177.505		1177.52	0.000592	0.937	39.79	57.76	0.20
1	1571.35*	PF 1	37.30	1176.78	1177.505		1177.52	0.000568	0.927	40.26	57.69	0.20
1	1570.35*	PF 1	37.30	1176.77	1177.505		1177.52	0.000546	0.916	40.73	57.63	0.19
1	1569.35*	PF 1	37.30	1176.76	1177.505		1177.52	0.000525	0.905	41.22	57.60	0.19
1	1568.35*	PF 1	37.30	1176.75	1177.504		1177.52	0.000505	0.895	41.68	57.53	0.19
1	1567.35*	PF 1	37.30	1176.74	1177.504		1177.52	0.000486	0.885	42.14	57.47	0.18
1	1566.35*	PF 1	37.30	1176.73	1177.503		1177.52	0.000468	0.875	42.61	57.41	0.18
1	1565.35*	PF 1	37.30	1176.72	1177.503		1177.52	0.000450	0.866	43.07	57.35	0.18
1	1564.35*	PF 1	37.30	1176.71	1177.503		1177.51	0.000434	0.857	43.53	57.28	0.17
1	1563.35*	PF 1	37.30	1176.70	1177.503		1177.51	0.000419	0.848	43.99	57.22	0.17
1	1562.35*	PF 1	37.30	1176.69	1177.502		1177.51	0.000404	0.839	44.46	57.18	0.17
1	1561.35*	PF 1	37.30	1176.68	1177.502		1177.51	0.000390	0.831	44.91	57.12	0.17
1	1560.35*	PF 1	37.30	1176.67	1177.502		1177.51	0.000376	0.822	45.37	57.05	0.16
1	1559.35*	PF 1	37.30	1176.66	1177.501		1177.51	0.000363	0.814	45.83	56.99	0.16
1	1558.35*	PF 1	37.30	1176.65	1177.501		1177.51	0.000351	0.806	46.29	56.93	0.16
1	1557.35*	PF 1	37.30	1176.64	1177.501		1177.51	0.000339	0.798	46.74	56.87	0.16
1	1556.35*	PF 1	37.30	1176.63	1177.501		1177.51	0.000328	0.790	47.21	56.82	0.15
1	1555.35*	PF 1	37.30	1176.62	1177.501		1177.51	0.000317	0.783	47.67	56.77	0.15
1	1554.35*	PF 1	37.30	1176.61	1177.500		1177.51	0.000307	0.775	48.11	56.71	0.15
1	1553.35*	PF 1	37.30	1176.60	1177.500		1177.51	0.000297	0.768	48.57	56.65	0.15
1	1552.35*	PF 1	37.30	1176.59	1177.500		1177.51	0.000288	0.761	49.01	56.58	0.14
1	1551.35*	PF 1	37.30	1176.58	1177.500		1177.51	0.000279	0.754	49.46	56.53	0.14
1	1550.35*	PF 1	37.30	1176.57	1177.500		1177.51	0.000270	0.747	49.90	56.47	0.14
1	1549.35*	PF 1	37.30	1176.56	1177.499		1177.51	0.000262	0.741	50.34	56.41	0.14
1	1548.35*	PF 1	37.30	1176.55	1177.499		1177.51	0.000254	0.735	50.78	56.34	0.14
1	1547.35*	PF 1	37.30	1176.54	1177.499		1177.51	0.000247	0.728	51.25	56.31	0.13
1	1546.35*	PF 1	37.30	1176.53	1177.499		1177.51	0.000239	0.722	51.69	56.24	0.13
1	1545.35*	PF 1	37.30	1176.52	1177.499		1177.51	0.000232	0.716	52.12	56.18	0.13
1	1544.35*	PF 1	37.30	1176.51	1177.499		1177.51	0.000226	0.710	52.57	56.13	0.13
1	1543.35*	PF 1	37.30	1176.50	1177.499		1177.51	0.000219	0.704	53.00	56.06	0.13
1	1542.35*	PF 1	37.30	1176.49	1177.499		1177.51	0.000213	0.698	53.44	56.00	0.13
1	1541.35*	PF 1	37.30	1176.48	1177.499		1177.51	0.000207	0.692	53.87	55.94	0.12
1	1540.35*	PF 1	37.30	1176.47	1177.498		1177.51	0.000201	0.687	54.31	55.90	0.12
1	1539.35*	PF 1	37.30	1176.46	1177.498		1177.51	0.000196	0.681	54.73	55.84	0.12
1	1538.35*	PF 1	37.30	1176.45	1177.498		1177.51	0.000191	0.676	55.16	55.78	0.12
1	1537.35*	PF 1	37.30	1176.44	1177.498		1177.51	0.000186	0.671	55.59	55.71	0.12
1	1536.35*	PF 1	37.30	1176.43	1177.498		1177.51	0.000181	0.666	56.01	55.65	0.12
1	1535.35*	PF 1	37.30	1176.42	1177.498		1177.51	0.000176	0.661	56.42	55.59	0.12
1	1534.35*	PF 1	37.30	1176.41	1177.498		1177.50	0.000172	0.656	56.85	55.54	0.11
1	1533.35*	PF 1	37.30	1176.40	1177.497		1177.50	0.000167	0.651	57.28	55.50	0.11
1	1532.35*	PF 1	37.30	1176.39	1177.497		1177.50	0.000163	0.647	57.69	55.43	0.11
1	1531.35*	PF 1	37.30	1176.38	1177.497		1177.50	0.000159	0.642	58.12	55.38	0.11
1	1530.35*	PF 1	37.30	1176.37	1177.497		1177.50	0.000155	0.637	58.52	55.31	0.11
1	1529.35*	PF 1	37.30	1176.36	1177.497		1177.50	0.000151	0.633	58.94	55.25	0.11
1	1528.35*	PF 1	37.30	1176.35	1177.497		1177.50	0.000147	0.628	59.37	55.20	0.11
1	1527.35*	PF 1	37.30	1176.34	1177.497		1177.50	0.000256	0.624	59.77	55.13	0.11
1	1526.35*	PF 1	37.30	1176.33	1177.497		1177.50	0.000250	0.620	60.18	55.09	0.10
1	1525.35*	PF 1	37.30	1176.32	1177.497		1177.50	0.000244	0.616	60.59	55.04	0.10
1	1524.35*	PF 1	37.30	1176.31	1177.496		1177.50	0.000238	0.612	60.98	54.97	0.10
1	1523.35*	PF 1	37.30	1176.30	1177.496		1177.50	0.000233	0.608	61.38	54.91	0.10
1	1522.84	PF 1	37.30	1176.29	1177.496		1177.50	0.000227	0.603	61.85	54.90	0.10
1	1521.84*	PF 1	37.30	1175.54	1177.499		1177.50	0.000048	0.372	100.36	57.12	0.05
1	1520.84*	PF 1	37.30	1174.79	1177.499		1177.50	0.000021	0.260	143.24	74.90	0.03
1	1520.83	PF 1	37.30	1174.79	1177.499		1177.50	0.000021	0.260	143.20	74.89	0.03
1	1519.83*	PF 1	37.30	1174.78	1177.499		1177.50	0.000021	0.259	143.75	75.27	0.03
1	1518.83*	PF 1	37.30	1174.77	1177.499		1177.50	0.000021	0.258	144.51	75.69	0.03
1	1517.83*	PF 1	37.30	1174.76	1177.499		1177.50	0.000021	0.257	145.07	76.08	0.03
1	1516.83*	PF 1	37.30	1174.75	1177.499		1177.50	0.000020	0.256	145.85	76.51	0.03
1	1515.83*	PF 1	37.30	1174.74	1177.499		1177.50	0.000020	0.255	146.40	76.90	0.03
1	1514.83*	PF 1	37.30	1174.73	1177.499		1177.50	0.000020	0.254	147.14	77.31	0.03
1	1513.83*	PF 1	37.30	1174.72	1177.499		1177.50	0.000008	0.252	148.21	61.66	0.03
1	1512.83*	PF 1	37.30	1174.71	1177.499		1177.50	0.000008	0.249	149.61	62.01	0.03

HEC-RAS Plan: Plan 04 River: Entrada Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	1511.83*	PF 1	37.30	1174.70	1177.499		1177.50	0.000008	0.247	150.98	62.32	0.03
1	1510.83*	PF 1	37.30	1174.69	1177.499		1177.50	0.000008	0.245	152.39	62.68	0.03
1	1509.83*	PF 1	37.30	1174.68	1177.500		1177.50	0.000007	0.243	153.77	63.00	0.03
1	1508.83*	PF 1	37.30	1174.67	1177.500		1177.50	0.000007	0.240	155.16	63.31	0.03
1	1507.83*	PF 1	37.30	1174.66	1177.500		1177.50	0.000007	0.238	156.61	63.67	0.03
1	1506.83*	PF 1	37.30	1174.65	1177.500		1177.50	0.000007	0.236	157.99	63.99	0.03
1	1505.83*	PF 1	37.30	1174.64	1177.500		1177.50	0.000007	0.234	159.45	64.35	0.03
1	1504.83*	PF 1	37.30	1174.63	1177.500		1177.50	0.000007	0.232	160.87	64.66	0.03
1	1503.83*	PF 1	37.30	1174.62	1177.500		1177.50	0.000006	0.230	162.33	65.02	0.03
1	1502.83*	PF 1	37.30	1174.61	1177.500		1177.50	0.000006	0.228	163.75	65.34	0.03
1	1501.83*	PF 1	37.30	1174.60	1177.500		1177.50	0.000006	0.226	165.23	65.68	0.03
1	1500.83*	PF 1	37.30	1174.59	1177.500		1177.50	0.000006	0.224	166.68	66.02	0.02
1	1499.83*	PF 1	37.30	1174.58	1177.500		1177.50	0.000006	0.222	168.16	66.36	0.02
1	1498.83*	PF 1	37.30	1174.57	1177.500		1177.50	0.000006	0.220	169.57	66.67	0.02
1	1497.83*	PF 1	37.30	1174.56	1177.500		1177.50	0.000006	0.218	171.06	67.01	0.02
1	1496.83*	PF 1	37.30	1174.55	1177.500		1177.50	0.000006	0.216	172.55	67.35	0.02
1	1495.83*	PF 1	37.30	1174.54	1177.500		1177.50	0.000005	0.214	173.99	67.66	0.02
1	1494.83*	PF 1	37.30	1174.53	1177.500		1177.50	0.000005	0.212	175.53	68.03	0.02
1	1493.83*	PF 1	37.30	1174.52	1177.500		1177.50	0.000005	0.211	177.01	68.35	0.02
1	1492.83*	PF 1	37.30	1174.51	1177.500		1177.50	0.000005	0.209	178.52	68.69	0.02
1	1491.83*	PF 1	37.30	1174.50	1177.500		1177.50	0.000005	0.207	180.04	69.02	0.02
1	1490.83*	PF 1	37.30	1174.49	1177.500		1177.50	0.000005	0.205	181.57	69.36	0.02
1	1489.83*	PF 1	37.30	1174.48	1177.500		1177.50	0.000005	0.204	183.08	69.69	0.02
1	1488.83*	PF 1	37.30	1174.46	1177.500		1177.50	0.000005	0.201	185.29	70.07	0.02
1	1487.83*	PF 1	37.30	1174.45	1177.500		1177.50	0.000005	0.200	186.78	70.38	0.02
1	1486.83*	PF 1	37.30	1174.44	1177.500		1177.50	0.000004	0.198	188.35	70.73	0.02
1	1485.83*	PF 1	37.30	1174.43	1177.500		1177.50	0.000004	0.196	189.89	71.06	0.02
1	1484.83*	PF 1	37.30	1174.42	1177.500		1177.50	0.000004	0.195	191.43	71.38	0.02
1	1483.83*	PF 1	37.30	1174.41	1177.500		1177.50	0.000004	0.193	192.99	71.72	0.02
1	1482.83*	PF 1	37.30	1174.40	1177.500		1177.50	0.000004	0.192	194.56	72.05	0.02
1	1481.83*	PF 1	37.30	1174.39	1177.500		1177.50	0.000004	0.190	196.17	72.40	0.02
1	1480.83*	PF 1	37.30	1174.38	1177.500		1177.50	0.000004	0.189	197.72	72.72	0.02
1	1479.83*	PF 1	37.30	1174.37	1177.500		1177.50	0.000004	0.187	199.32	73.07	0.02
1	1478.83*	PF 1	37.30	1174.36	1177.500		1177.50	0.000004	0.186	200.92	73.40	0.02
1	1477.83*	PF 1	37.30	1174.35	1177.500		1177.50	0.000004	0.184	202.52	73.74	0.02
1	1476.83*	PF 1	37.30	1174.34	1177.500		1177.50	0.000004	0.183	204.12	74.07	0.02
1	1475.83*	PF 1	37.30	1174.33	1177.500		1177.50	0.000004	0.181	205.75	74.41	0.02
1	1474.83*	PF 1	37.30	1174.32	1177.500		1177.50	0.000003	0.180	207.33	74.73	0.02
1	1473.83*	PF 1	37.30	1174.31	1177.500		1177.50	0.000003	0.178	208.97	75.08	0.02
1	1472.83*	PF 1	37.30	1174.30	1177.500		1177.50	0.000003	0.177	210.59	75.41	0.02
1	1471.83*	PF 1	37.30	1174.29	1177.500		1177.50	0.000003	0.176	212.19	75.72	0.02
1	1470.83*	PF 1	37.30	1174.28	1177.500		1177.50	0.000003	0.174	213.89	76.09	0.02
1	1469.83*	PF 1	37.30	1174.27	1177.500		1177.50	0.000003	0.173	215.53	76.41	0.02
1	1468.83*	PF 1	37.30	1174.26	1177.500		1177.50	0.000003	0.172	217.15	76.74	0.02
1	1467.83*	PF 1	37.30	1174.25	1177.500		1177.50	0.000003	0.170	218.84	77.08	0.02
1	1466.83*	PF 1	37.30	1174.24	1177.500		1177.50	0.000003	0.169	220.52	77.42	0.02
1	1465.83*	PF 1	37.30	1174.23	1177.500		1177.50	0.000003	0.168	222.18	77.75	0.02
1	1464.83*	PF 1	37.30	1174.22	1177.500		1177.50	0.000003	0.167	223.86	78.10	0.02
1	1463.83*	PF 1	37.30	1174.21	1177.500		1177.50	0.000003	0.165	225.55	78.42	0.02
1	1462.83*	PF 1	37.30	1174.20	1177.500		1177.50	0.000003	0.164	227.22	78.75	0.02
1	1461.83*	PF 1	37.30	1174.19	1177.500		1177.50	0.000003	0.163	228.95	79.09	0.02
1	1460.83*	PF 1	37.30	1174.18	1177.500		1177.50	0.000003	0.162	230.58	79.41	0.02
1	1459.83*	PF 1	37.30	1174.17	1177.500		1177.50	0.000003	0.161	232.33	79.76	0.02
1	1458.83*	PF 1	37.30	1174.16	1177.500		1177.50	0.000003	0.159	234.05	80.09	0.02
1	1457.83*	PF 1	37.30	1174.15	1177.500		1177.50	0.000002	0.158	235.79	80.44	0.02
1	1456.83*	PF 1	37.30	1174.14	1177.500		1177.50	0.000002	0.157	237.48	80.75	0.02
1	1455.83*	PF 1	37.30	1174.13	1177.500		1177.50	0.000002	0.156	239.24	81.10	0.02
1	1454.83*	PF 1	37.30	1174.12	1177.500		1177.50	0.000002	0.155	240.97	81.44	0.02
1	1453.83*	PF 1	37.30	1174.11	1177.500		1177.50	0.000002	0.154	242.73	81.77	0.02
1	1452.83*	PF 1	37.30	1174.10	1177.500		1177.50	0.000002	0.153	244.45	82.09	0.02
1	1451.83*	PF 1	37.30	1174.09	1177.500		1177.50	0.000002	0.151	246.24	82.45	0.02
1	1450.83*	PF 1	37.30	1174.08	1177.500		1177.50	0.000002	0.150	247.98	82.76	0.02
1	1449.83*	PF 1	37.30	1174.07	1177.500		1177.50	0.000002	0.149	249.78	83.11	0.02
1	1448.83*	PF 1	37.30	1174.06	1177.500		1177.50	0.000002	0.148	251.52	83.44	0.02
1	1447.98	PF 1	37.30	1174.05	1177.500	1174.27100	1177.50	0.000002	0.147	253.16	83.73	0.01

2 – Equilibrium Slope Calculations

EX No Self-Form

Reach	AMAFCA					
	Fr = 0.7	Fr = 0.75	Fr = 0.8	Fr = 0.85	Fr = 0.9	Fr = 1.0
1	0.009	0.010	0.012	0.014	0.015	0.019
2	0.010	0.011	0.013	0.015	0.017	0.021
3	0.009	0.010	0.012	0.013	0.015	0.019

Reach	HEC-20 Eq. 6.17	Reach	HEC-20 Eq. 6.18
1	0.023	1	0.005
2	0.052	2	0.011
3	0.032	3	0.007

EX Self-Form

Reach	AMAFCA					
	Fr = 0.7	Fr = 0.75	Fr = 0.8	Fr = 0.85	Fr = 0.9	Fr = 1.0
1	0.009	0.011	0.012	0.014	0.016	0.020
2	0.009	0.011	0.012	0.014	0.016	0.020
3	0.010	0.011	0.013	0.015	0.016	0.021

Reach	HEC-20 Eq. 6.17	Reach	HEC-20 Eq. 6.18
1	0.036	1	0.007
2	0.037	2	0.008
3	0.042	3	0.009

Proposed - DS ND

Reach	AMAFCA					
	Fr = 0.7	Fr = 0.75	Fr = 0.8	Fr = 0.85	Fr = 0.9	Fr = 1.0
1	0.009	0.011	0.013	0.014	0.016	0.020
2	0.011	0.013	0.014	0.016	0.019	0.023
3	0.009	0.011	0.012	0.014	0.016	0.020

Reach	HEC-20 Eq. 6.17	Reach	HEC-20 Eq. 6.18
1	0.046	1	0.010
2	0.075	2	0.016
3	0.032	3	0.007

Avg AMAFCA	Avg 6.17	Avg 6.18
0.011	0.051	0.011

Proposed - DS WSE

Reach	AMAFCA					
	Fr = 0.7	Fr = 0.75	Fr = 0.8	Fr = 0.85	Fr = 0.9	Fr = 1.0
1	0.009	0.011	0.012	0.014	0.016	0.020
2	0.011	0.013	0.014	0.016	0.019	0.023
3	0.009	0.011	0.012	0.014	0.016	0.020

Reach	HEC-20 Eq. 6.17	Reach	HEC-20 Eq. 6.18
1	0.047	1	0.010
2	0.075	2	0.016
3	0.032	3	0.007

Avg AMAFCA	Avg 6.17	Avg 6.18
0.011	0.051	0.011

Existing Conditions																		
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Max Chl Dpth	Wetted Perim	Hydraulic Radius	q	W/D Ratio	Length Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)	(ft^2/ft)	cfs/ft		(ft)
1	3895.84	PF 1	25.1	1230.93	1233.074	1231.609	1233.08	0.000185	0.817	30.71	22.35	0.12	2.14	23.02	1.33	1.12	10.44	45.23
1	3850.61	PF 1	25.1	1232.17	1232.923		1233.05	0.011721	2.819	8.9	23.14	0.8	0.75	23.36	0.38	1.08	30.85	44.36
1	3806.24	PF 1	25.1	1231.73	1232.489		1232.59	0.00902	2.535	9.9	24.71	0.71	0.76	25.04	0.40	1.02	32.51	41.16
1	3765.08	PF 1	25.1	1231.32	1231.907	1231.907	1232.06	0.019417	3.181	7.89	24.91	1	0.59	25.22	0.31	1.01	42.22	51.85
1	3713.23	PF 1	25.1	1229.97	1230.769	1230.794	1231.02	0.020785	3.978	6.31	15.05	1.08	0.8	15.18	0.42	1.67	18.81	58.96
1	3654.26	PF 1	25.1	1226.59	1226.743	1226.933	1227.69	0.364465	7.905	3.22	24.12	3.78	0.15	24.17	0.13	1.04	160.80	5.63
1	3648.64	PF 1	25.1	1226.5	1226.911	1226.852	1227.02	0.010961	2.578	9.67	27.16	0.77	0.41	27.31	0.35	0.92	66.24	43.22
1	3605.41	PF 1	25.1	1225.91	1226.227	1226.219	1226.31	0.016013	2.345	10.7	46.71	0.86	0.32	46.75	0.23	0.54	145.97	68.33
1	3537.09	PF 1	25.1	1224.36	1224.937	1224.937	1225.07	0.020576	2.953	8.5	31.24	1	0.58	31.73	0.27	0.80	53.86	5.91
1	3531.18	PF 1	25.1	1224.13	1224.63	1224.707	1224.89	0.042858	4.056	6.19	24.46	1.42	0.5	24.88	0.25	1.03	48.92	90.55
1	3440.63	PF 1	33.6	1221.99	1222.398	1222.398	1222.51	0.02152	2.674	12.57	55.94	0.99	0.41	56.28	0.22	0.60	136.44	74.11
1	3366.51	PF 1	33.6	1219.32	1219.821	1219.917	1220.14	0.051341	4.512	7.45	28.95	1.57	0.5	29.22	0.25	1.16	57.90	60.74
1	3305.78	PF 1	33.6	1216.49	1217.065	1217.16	1217.38	0.040282	4.519	7.44	24.19	1.44	0.58	24.27	0.31	1.39	41.71	52.46
1	3253.32	PF 1	33.6	1214.98	1215.313	1215.339	1215.45	0.032128	2.947	11.4	59.58	1.19	0.33	59.6	0.19	0.56	180.55	3.15
1	3250.17	PF 1	33.6	1214.88	1215.172	1215.213	1215.33	0.042625	3.142	10.69	62.75	1.34	0.29	62.76	0.17	0.54	216.38	63.99
1	3186.18	PF 1	33.6	1213.19	1213.534	1213.534	1213.65	0.021774	2.674	12.56	56.74	1	0.34	56.76	0.22	0.59	166.88	94.35
1	3091.83	PF 1	33.6	1210.75	1211.032	1211.069	1211.23	0.030174	3.547	9.47	35.53	1.21	0.28	35.8	0.26	0.95	126.89	61.46
1	3030.37	PF 1	33.6	1209	1209.445	1209.451	1209.56	0.02409	2.67	12.59	61.16	1.04	0.44	61.5	0.20	0.55	139.00	26.04
1	3004.33	PF 1	33.6	1208.51	1208.849	1208.881	1209.01	0.033896	3.173	10.59	51.28	1.23	0.34	51.58	0.21	0.66	150.82	5.91
1	2998.41	PF 1	33.6	1208.37	1208.722	1208.739	1208.86	0.027749	2.948	11.4	53.04	1.12	0.35	53.37	0.21	0.63	151.54	43.01
1	2955.4	PF 1	33.6	1207.24	1207.636	1207.683	1207.82	0.057739	3.395	9.9	64.6	1.53	0.4	64.94	0.15	0.52	161.50	40.75
1	2914.65	PF 1	33.6	1206.45	1206.777	1206.777	1206.87	0.022726	2.434	13.81	73.89	0.99	0.33	74.19	0.19	0.45	223.91	99.06
1	2815.59	PF 1	33.6	1204.13	1204.478	1204.478	1204.56	0.024097	2.232	15.05	96.03	0.99	0.35	96.23	0.16	0.35	274.37	33.00
1	2782.59	PF 1	33.6	1203	1203.324	1203.384	1203.58	0.034498	4.092	8.21	27.6	1.32	0.32	27.68	0.30	1.22	86.25	39.02
1	2743.58	PF 1	33.6	1202.49	1202.818	1202.815	1202.88	0.023382	2.053	16.37	115.73	0.96	0.33	115.95	0.14	0.29	350.70	38.63
1	2704.94	PF 1	33.6	1201.05	1201.809	1201.809	1201.91	0.027543	2.499	13.44	79.73	1.07	0.76	80.18	0.17	0.42	104.91	4.40
1	2700.54	PF 1	33.6	1201.55	1201.649	1201.691	1201.81	0.017389	0.825	11.21	58.29	0.69	0.65	58.57	0.19	0.58	89.68	39.50
1	2661.04	PF 1	33.6	1200.7	1200.957	1200.956	1201.03	0.02409	2.139	15.81	109.73	0.98	0.26	109.9	0.14	0.31	422.04	44.34
1	2616.7	PF 1	33.6	1199.67	1200.039	1200.025	1200.08	0.018657	1.71	20.09	172.25	0.85	0.37	172.48	0.12	0.20	465.54	76.03
1	2540.68	PF 1	33.6	1198.01	1198.387	1198.387	1198.45	0.025221	1.963	17.11	136.97	0.98	0.38	137.27	0.12	0.25	360.45	58.97
1	2481.7	PF 1	33.6	1196.68	1197.06	1197.084	1197.16	0.016337	1.762	15.44	88.89	0.81	0.5	89.27	0.17	0.38	177.78	72.38
1	2409.33	PF 1	33.6	1195.25	1195.443	1195.482	1195.61	0.040072	1.596	14.03	164.52	1.11	0.34	164.82	0.09	0.20	483.88	88.97
1	2320.35	PF 1	37.3	1193	1193.141	1193.141	1193.21	0.02541	2.077	17.96	133.12	1	0.14	133.12	0.13	0.28	950.86	200.44
1	2119.93	PF 1	37.3	1187	1187.403	1187.467	1187.68	0.029776	4.247	8.78	25	1.26	0.4	25.08	0.35	1.49	62.50	51.36
1	2068.55	PF 1	37.3	1186	1186.278	1186.376	1186.62	0.052099	4.682	7.97	29.82	1.6	0.28	29.9	0.27	1.25	106.50	68.48
1	2000.07	PF 1	37.3	1184	1185.26	1185.094	1185.49	0.008253	3.874	9.63	11.54	0.75	1.26	12.05	0.80	3.23	9.16	56.42
1	1943.65	PF 1	37.3	1183.66	1184.639	1184.639	1184.91	0.012866	4.265	9.41	18.94	0.91	0.98	19.28	0.49	1.97	19.33	81.17
1	1862.48	PF 1	37.3	1181.99	1182.464	1182.636	1183.03	0.050218	6.044	6.17	15.23	1.67	0.47	15.36	0.40	2.45	32.40	51.42
1	1811.06	PF 1	37.3	1180.69	1181.455	1181.455	1181.77	0.015897	4.535	8.22	12.98	1	0.76	13.29	0.62	2.87	17.08	3.7
1	1807.36	PF 1	37.3	1180.46	1181.059	1181.231	1181.65	0.044025	6.153	6.06	13.06	1.59	0.6	13.31	0.46	2.86	21.77	30.02
1	1777.34	PF 1	37.3	1180	1180.467	1180.554	1180.8	0.038557	4.631	8.05	24.23	1.42	0.47	24.51	0.33	1.54	51.55	67.48
1	1709.86	PF 1	37.3	1178.12	1178.755	1178.755	1178.88	0.018323	4.016	13.56	53.46	1	0.64	53.69	0.25	0.70	83.53	57.53
1	1652.33	PF 1	37.3	1177	1177.479	1177.439	1177.62	0.012776	3.077	12.53	33.39	0.85	0.48	33.68	0.37	1.12	69.56	2.62
1	1649.71	PF 1	37.3	1177	1177.464		1177.58	0.010257	2.714	13.81	35.09	0.76	0.46	35.51	0.39	1.06	76.28	47.36
1	1602.35	PF 1	37.3	1176.22	1176.709	1176.706	1176.88	0.01852	3.294	11.14	31.01	0.99	0.73	31.82	0.35	1.20	42.48	79.51
1	1522.84	PF 1	37.3	1174.86	1175.215	1175.215	1175.36	0.018923	3.091	12.59	45.94	0.98	0.36	46.25	0.27	0.81	127.61	2.01
1	1520.83	PF 1	37.3	1174.81	1175.128	1175.164	1175.31	0.027028	3.464	11.15	45	1.16	0.32	45.19	0.25	0.83	140.63	72.85
1	1447.98	PF 1	37.3	1172.71	1173.182	1173.195	1173.31	0.027504	2.837	13.32	67.98	1.11	0.47	68.24	0.20	0.55	144.64	

Parameter	Reach 1 STA 1447.98 to STA 2320.35	Reach 2 STA 2409.33 to STA 3440.63	Reach 3 STA 3531.18 to STA 3895.84
Discharge (cfs)	37.3	33.6	25.1
Average Hydr Radius (ft)	0.37	0.19	0.41
Average Width (ft)	37.24	76.25	26.39
Average Discharge Per Unit Width, q (cfs/ft)	1.51	0.58	1.02
Average Energy Slope, S (dimensionless)	0.0257	0.0299	0.0516
Average Froude Number, Fr (dimensionless)	1.128	1.110	1.154
Average Manning n-value	0.030	0.030	0.030
Average Velocity (fps)	3.938	2.705	3.317
Average Depth (ft)	0.551	0.402	0.700
D50 (ft) Average 1	0.0235	0.0235	0.0235
D90 (ft) Average 1	0.1126	0.1126	0.1126
Temperature (˚F)	60	60	60
Kinematic viscosity of water, v (ft^2/s)	0.00001217	0.00001217	0.00001217
Unit Weight of Water, γ_w (lb/ft^3)	62.4	62.4	62.4
Specific Weight of Sediment, γ_s (lb/ft^3)	165.4	165.4	165.4

Albuquerque Metroploitan Arroyo Flood Control Authority Sediment and Erosion Design Guide Equation 3.59

$$S_{eq} = CQ^{-0.133}$$

$$C = 18.28 n^2 F^{0.133} F_r^{2.133}$$

F = width/depth ratio typicall about 40 (Leopold and Miller, 1956; Harvey, 1985)

	Fr = 0.7	Fr = 0.75	Fr = 0.8	Fr = 0.85	Fr = 0.9	Fr = 1.0
Reach 1						
Flowrate, Q (cfs)	37.3	37.3	37.3	37.3	37.3	37.3
Manning roughness coefficient, n	0.030	0.030	0.030	0.030	0.030	0.030
Width/Depth Ratio, F (ft/ft)	122.24	122.24	122.24	122.24	122.24	122.24
Froude Number, Fr	0.700	0.750	0.800	0.850	0.900	1.000
C	0.0146	0.0169	0.0194	0.0220	0.0249	0.0312
Equilibrium Slope, S_{eq} (ft/ft)	**0.0090**	**0.0104**	**0.0120**	**0.0136**	**0.0154**	**0.0193**
Reach 2						
	Fr = 0.7	**Fr = 0.75**	**Fr = 0.8**	**Fr = 0.85**	**Fr = 0.9**	**Fr = 1.0**
Flowrate, Q (cfs)	33.6	33.6	33.6	33.6	33.6	33.6
Manning roughness coefficient, n	0.030	0.030	0.030	0.030	0.030	0.030
Width/Depth Ratio, F (ft/ft)	207.69	207.69	207.69	207.69	207.69	207.69
Froude Number, Fr	0.700	0.750	0.800	0.850	0.900	1.000
C	0.0156	0.0181	0.0208	0.0237	0.0267	0.0335
Equilibrium Slope, S_{eq} (ft/ft)	**0.0098**	**0.0113**	**0.0130**	**0.0148**	**0.0167**	**0.0210**
Reach 3						
	Fr = 0.7	**Fr = 0.75**	**Fr = 0.8**	**Fr = 0.85**	**Fr = 0.9**	**Fr = 1.0**
Flowrate, Q (cfs)	25.1	25.1	25.1	25.1	25.1	25.1
Manning roughness coefficient, n	0.030	0.030	0.030	0.030	0.030	0.030
Width/Depth Ratio, F (ft/ft)	61.06	61.06	61.06	61.06	61.06	61.06
Froude Number, Fr	0.700	0.750	0.800	0.850	0.900	1.000
C	0.0133	0.0154	0.0177	0.0201	0.0227	0.0284
Equilibrium Slope, S_{eq} (ft/ft)	**0.0087**	**0.0100**	**0.0115**	**0.0131**	**0.0148**	**0.0185**
Avg. Across All Reaches =	**0.0092**	**0.0106**	**0.0122**	**0.0138**	**0.0156**	**0.0196**

HEC-20 Equation 6.17

$$S_{eq} = \left[K_s D_c \left(\frac{\gamma_s - \gamma}{\gamma} \right) \right]^{\frac{10}{7}} \left(\frac{1.486}{qn} \right)^{\frac{6}{7}}$$

$D_C = D_{90}$

	Reach 1 STA 1447.98 to STA 2320.35	**Reach 2 STA 2409.33 to STA 3440.63**	**Reach 3 STA 3531.18 to STA 3895.84**
Original stream energy slope, S (ft/ft)	0.0257	0.0299	0.0516
Mean bed sediment diameter, D (ft)	0.0235	0.0235	0.0235
Specific weight of sediment, γ_s (lb/ft^3)	165.4	165.4	165.4
Specific weight of water, γ (lb/ft^3)	62.4	62.4	62.4
Kinematic viscosity of water, v (ft/sec^2)	0.00001217	0.00001217	0.00001217
Hydraulic radius or mean depth, d in wide channels (ft)	0.55	0.40	0.70
Shear velocity, U* (ft/s)	0.67	0.62	1.08
Boundary Reynold's number, R*	1302	1200	2080
Shields parameter, Ks (see HEC-20)	0.047	0.047	0.047
Shear Stress, τ_0 (lb/ft^2)	0.88	0.75	2.25
Critical bed material size, Dc (ft) = D90 Average 1	0.11	0.11	0.11
Manning roughness coefficient, n	0.030	0.030	0.030
Channel discharge per unit width, q (ft^2/s)	1.51	0.58	1.02
Equilibrium Slope, S_{eq} (ft/ft)	**0.023**	**0.052**	**0.032**

HEC-20 Equation 6.18

Another approach to determining an equilibrium slope under conditions of no upstream sediment supply is presented by the USBR using the Meyer-Peter Muller equation for beginning of transport (USBR 1984). If adjustment of the hydraulic depth due to the reduction in channel slope is included in the equation, the USBR equation is:

$$S_{eq} = K_u \frac{(D_{50})^{10/7} n^{9/7}}{(D_{90})^{5/14} q^{6/7}} \qquad (6.18)$$

where:

K_u = 60.1 English
K_u = 28.0 SI

	Reach 1 STA 1447.98 to STA 2320.35	Reach 2 STA 2409.33 to STA 3440.63	Reach 3 STA 3531.18 to STA 3895.84
Original stream energy slope, S (ft/ft)	0.0257	0.0299	0.0516
D50 (ft) Average 1	0.0235	0.0235	0.0235
D90 (ft) Average 1	0.1126	0.1126	0.1126
Manning roughness coefficient, n	0.030	0.030	0.030
Channel discharge per unit width, q (ft^2/s)	1.51	0.58	1.02
Equilibrium Slope, S_{eq} (ft/ft)	**0.0048**	**0.0108**	**0.0067**

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Max Chl Dpth	Wetted Perim	Hydraulic Radius	q	W/D Ratio
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)	(ft^2/ft)	cfs/ft	
1	3895.84	PF 1	25.1	1230.66	1232.306	1230.916	1232.31	0.000047	0.447	56.14	34.1	0.06	1.65	37.39	1.50	0.74	20.67
1	3850.61	PF 1	25.1	1231.9	1232.197		1232.29	0.013	2.482	10.11	34.1	0.8	0.3	34.69	0.29	0.74	113.67
1	3806.24	PF 1	25.1	1231.46	1231.826		1231.89	0.006487	2.012	12.48	34.1	0.59	0.37	34.83	0.36	0.74	92.16
1	3765.08	PF 1	25.1	1231.05	1231.306	1231.306	1231.44	0.021152	2.875	8.73	34.1	1	0.26	34.61	0.25	0.74	131.15
1	3713.23	PF 1	25.1	1229.7	1229.926	1229.957	1230.09	0.031988	3.258	7.7	34.1	1.21	0.23	34.55	0.22	0.74	148.26
1	3654.26	PF 1	25.1	1226.32	1226.474	1226.576	1226.83	0.115252	4.793	5.24	34.1	2.16	0.15	34.41	0.15	0.74	227.33
1	3648.64	PF 1	25.1	1226.23	1226.399	1226.486	1226.69	0.083741	4.354	5.77	34.1	1.87	0.17	34.44	0.17	0.74	200.59
1	3605.41	PF 1	25.1	1225.64	1225.896	1225.896	1226.03	0.021019	2.87	8.75	34.1	1	0.26	34.61	0.25	0.74	131.15
1	3537.09	PF 1	25.1	1224.09	1224.334	1224.347	1224.48	0.024665	3.012	8.33	34.1	1.07	0.24	34.59	0.24	0.74	142.08
1	3531.18	PF 1	25.1	1223.86	1224.064	1224.116	1224.27	0.04518	3.615	6.94	34.1	1.41	0.2	34.51	0.20	0.74	170.50
1	3440.63	PF 1	33.6	1221.72	1222.008	1222.008	1222.15	0.020256	3.041	11.05	38.43	1	0.29	39.01	0.28	0.87	132.52
1	3366.51	PF 1	33.6	1219.05	1219.246	1219.336	1219.56	0.073104	4.483	7.49	38.3	1.79	0.2	38.69	0.19	0.88	191.50
1	3305.78	PF 1	33.6	1216.22	1216.469	1216.508	1216.66	0.032851	3.523	9.54	38.3	1.24	0.25	38.8	0.25	0.88	153.20
1	3253.32	PF 1	33.6	1214.73	1215.001	1215.017	1215.16	0.024795	3.236	10.38	38.32	1.1	0.27	38.86	0.27	0.88	141.93
1	3250.17	PF 1	33.6	1214.61	1214.847	1214.897	1215.06	0.038546	3.697	9.09	38.3	1.34	0.24	38.77	0.23	0.88	159.58
1	3186.18	PF 1	33.6	1212.92	1213.148	1213.209	1213.38	0.044154	3.851	8.72	38.3	1.42	0.23	38.76	0.22	0.88	166.52
1	3091.83	PF 1	33.6	1210.48	1210.768	1210.768	1210.91	0.020323	3.048	11.02	38.3	1	0.29	38.88	0.28	0.88	132.07
1	3030.37	PF 1	33.6	1208.73	1208.963	1209.012	1209.18	0.041011	3.767	8.92	38.3	1.38	0.23	38.77	0.23	0.88	166.52
1	3004.33	PF 1	33.6	1208.24	1208.529	1208.529	1208.67	0.020125	3.039	11.06	38.3	1	0.29	38.88	0.28	0.88	132.07
1	2998.41	PF 1	33.6	1208.1	1208.359	1208.388	1208.54	0.028872	3.388	9.92	38.3	1.17	0.26	38.82	0.26	0.88	147.31
1	2955.4	PF 1	33.6	1206.97	1207.244	1207.258	1207.4	0.024057	3.207	10.48	38.3	1.08	0.27	38.85	0.27	0.88	141.85
1	2914.65	PF 1	33.6	1206.18	1206.485	1206.485	1206.61	0.021751	2.819	11.92	49.09	1.01	0.3	49.73	0.24	0.68	163.63
1	2815.59	PF 1	33.6	1203.86	1204.13	1204.145	1204.29	0.025006	3.245	10.36	38.3	1.1	0.27	38.84	0.27	0.88	141.85
1	2782.59	PF 1	33.6	1202.73	1203.093	1203.018	1203.18	0.009456	2.419	13.89	38.3	0.71	0.36	39.03	0.36	0.88	106.39
1	2743.58	PF 1	33.6	1202.22	1202.507	1202.507	1202.65	0.020496	3.056	11	38.31	1.01	0.29	38.88	0.28	0.88	132.10
1	2704.94	PF 1	33.6	1200.78	1201.187	1201.069	1201.26	0.00648	2.154	15.6	38.55	0.6	0.41	39.29	0.40	0.87	94.02
1	2700.54	PF 1	33.6	1200.73	1201.168		1201.23	0.005124	1.995	16.84	39.16	0.54	0.44	39.9	0.42	0.86	89.00
1	2661.04	PF 1	33.6	1200.43	1200.717	1200.717	1200.86	0.021021	3.056	10.99	39.02	1.02	0.29	39.6	0.28	0.86	134.55
1	2616.7	PF 1	33.6	1199.4	1199.669	1199.688	1199.83	0.025537	3.265	10.29	38.3	1.11	0.27	38.84	0.26	0.88	141.85
1	2540.68	PF 1	33.6	1197.74	1197.964	1198.028	1198.2	0.046678	3.916	8.58	38.3	1.46	0.22	38.75	0.22	0.88	174.09
1	2481.7	PF 1	33.6	1196.29	1196.578	1196.578	1196.72	0.020181	3.041	11.05	38.31	1	0.29	38.88	0.28	0.88	132.10
1	2409.33	PF 1	33.6	1194.83	1195.12	1195.118	1195.26	0.019845	3.026	11.1	38.31	0.99	0.29	38.88	0.29	0.88	132.10
1	2320.35	PF 1	37.3	1192.71	1193.043	1193.043	1193.12	0.028909	2.206	16.91	125.56	1.06	0.33	126.14	0.13	0.30	380.48
1	2119.93	PF 1	37.3	1186.71	1186.974	1187.01	1187.17	0.030404	3.527	10.58	40	1.21	0.26	40.53	0.26	0.93	153.85
1	2068.55	PF 1	37.3	1185.71	1186.01	1186.01	1186.16	0.019855	3.1	12.03	40.03	1	0.3	40.63	0.30	0.93	133.43
1	2000.07	PF 1	37.3	1183.71	1184.2	1184.011	1184.26	0.003957	1.905	19.58	40	0.48	0.49	40.98	0.48	0.93	81.63
1	1943.65	PF 1	37.3	1183.37	1183.67	1183.67	1183.82	0.019966	3.107	12.01	40	1	0.3	40.6	0.30	0.93	133.33
1	1862.48	PF 1	37.3	1181.7	1181.995	1181.999	1182.15	0.021197	3.163	11.79	40	1.03	0.29	40.59	0.29	0.93	137.93
1	1811.06	PF 1	37.3	1180.4	1180.666	1180.701	1180.86	0.029943	3.511	10.63	40	1.2	0.27	40.53	0.26	0.93	148.15
1	1807.36	PF 1	37.3	1180.17	1180.381	1180.469	1180.68	0.063843	4.411	8.46	40	1.69	0.21	40.42	0.21	0.93	190.48
1	1777.34	PF 1	37.3	1179.71	1180.01	1180.01	1180.16	0.020101	3.113	11.98	40	1	0.3	40.6	0.30	0.93	133.33
1	1709.86	PF 1	37.3	1177.83	1178.074	1178.13	1178.3	0.039607	3.82	9.77	40	1.36	0.24	40.49	0.24	0.93	166.67
1	1652.33	PF 1	37.3	1176.71	1177.113	1177.007	1177.2	0.007517	2.313	16.13	40	0.64	0.4	40.81	0.40	0.93	100.00
1	1649.71	PF 1	37.3	1176.71	1177.02	1177.009	1177.16	0.017909	3.006	12.41	40	0.95	0.31	40.62	0.31	0.93	129.03
1	1602.35	PF 1	37.3	1175.93	1176.26	1176.228	1176.38	0.014576	2.825	13.2	40	0.87	0.33	40.66	0.32	0.93	121.21
1	1522.84	PF 1	37.3	1174.57	1174.869	1174.869	1175.02	0.020264	3.121	11.95	40	1.01	0.3	40.6	0.29	0.93	133.33
1	1520.83	PF 1	37.3	1174.52	1174.819	1174.82	1174.97	0.020357	3.128	11.93	39.91	1.01	0.3	40.51	0.29	0.93	133.03
1	1447.98	PF 1	37.3	1172.42	1172.66	1172.719	1172.9	0.04221	3.893	9.58	40	1.4	0.24	40.48	0.24	0.93	166.67

Results From EX (No Self-Form) Model								
River Sta	Q (cfs)	Min Ch El (ft)	Length Chnl (ft)	Flow Area (ft^2)	Top Width (ft)	Avg Slope	Self-Forming Channel Width (ft)	Approx. Depth (Hydraulic Toolbox)
3895.84	25.1	1230.93	45.23	30.71	22.35	0.0186	34.1	0.27
3850.61	25.1	1232.17	44.36	8.9	23.14	0.0186	34.1	0.27
3806.24	25.1	1231.73	41.16	9.9	24.71	0.0186	34.1	0.27
3765.08	25.1	1231.32	51.85	7.89	24.91	0.0186	34.1	0.27
3713.23	25.1	1229.97	58.96	6.31	15.05	0.0186	34.1	0.27
3654.26	25.1	1226.59	5.63	3.22	24.12	0.0186	34.1	0.27
3648.64	25.1	1226.5	43.22	9.67	27.16	0.0186	34.1	0.27
3605.41	25.1	1225.91	68.33	10.7	46.71	0.0186	34.1	0.27
3537.09	25.1	1224.36	5.91	8.5	31.24	0.0186	34.1	0.27
3531.18	25.1	1224.13	90.55	6.19	24.46	0.0186	34.1	0.27
3440.63	33.6	1221.99	74.11	12.57	55.94	0.0259	38.3	0.27
3366.51	33.6	1219.32	60.74	7.45	28.95	0.0259	38.3	0.27
3305.78	33.6	1216.49	52.46	7.44	24.19	0.0259	38.3	0.27
3253.32	33.6	1214.98	3.15	11.4	59.58	0.0259	38.3	0.27
3250.17	33.6	1214.88	63.99	10.69	62.75	0.0259	38.3	0.27
3186.18	33.6	1213.19	94.35	12.56	56.74	0.0259	38.3	0.27
3091.83	33.6	1210.75	61.46	9.47	35.53	0.0259	38.3	0.27
3030.37	33.6	1209	26.04	12.59	61.16	0.0259	38.3	0.27
3004.33	33.6	1208.51	5.91	10.59	51.28	0.0259	38.3	0.27
2998.41	33.6	1208.37	43.01	11.4	53.04	0.0259	38.3	0.27
2955.4	33.6	1207.24	40.75	9.9	64.6	0.0259	38.3	0.27
2914.65	33.6	1206.45	99.06	13.81	73.89	0.0259	38.3	0.27
2815.59	33.6	1204.13	33.00	15.05	96.03	0.0259	38.3	0.27
2782.59	33.6	1203	39.02	8.21	27.6	0.0259	38.3	0.27
2743.58	33.6	1202.49	38.63	16.37	115.73	0.0259	38.3	0.27
2704.94	33.6	1201.05	4.40	13.44	79.73	0.0259	38.3	0.27
2700.54	33.6	1201.55	39.50	11.21	58.29	0.0259	38.3	0.27
2661.04	33.6	1200.7	44.34	15.81	109.73	0.0259	38.3	0.27
2616.7	33.6	1199.67	76.03	20.09	172.25	0.0259	38.3	0.27
2540.68	33.6	1198.01	58.97	17.11	136.97	0.0259	38.3	0.27
2481.7	33.6	1196.68	72.38	15.44	88.89	0.0259	38.3	0.27
2409.33	33.6	1195.25	88.97	14.03	164.52	0.0259	38.3	0.27
2320.35	37.3	1193	200.44	17.96	133.12	0.0233	40.0	0.29
2119.93	37.3	1187	51.36	8.78	25	0.0233	40.0	0.29
2068.55	37.3	1186	68.48	7.97	29.82	0.0233	40.0	0.29
2000.07	37.3	1184	56.42	9.63	11.54	0.0233	40.0	0.29
1943.65	37.3	1183.66	81.17	9.41	18.94	0.0233	40.0	0.29
1862.48	37.3	1181.99	51.42	6.17	15.23	0.0233	40.0	0.29
1811.06	37.3	1180.69	3.70	8.22	12.98	0.0233	40.0	0.29
1807.36	37.3	1180.46	30.02	6.06	13.06	0.0233	40.0	0.29
1777.34	37.3	1180	67.48	8.05	24.23	0.0233	40.0	0.29
1709.86	37.3	1178.12	57.53	13.56	53.46	0.0233	40.0	0.29
1652.33	37.3	1177	2.62	12.53	33.39	0.0233	40.0	0.29
1649.71	37.3	1177	47.36	13.81	35.09	0.0233	40.0	0.29
1602.35	37.3	1176.22	79.51	11.14	31.01	0.0233	40.0	0.29
1522.84	37.3	1174.86	2.01	12.59	45.94	0.0233	40.0	0.29
1520.83	37.3	1174.81	72.85	11.15	45	0.0233	40.0	0.29
1447.98	37.3	1172.71		13.32	67.98	0.0233	40.0	0.29

n = 0.03

Parameter	Reach 1 STA 1447.98 to STA 2320.35	Reach 2 STA 2409.33 to STA 3440.63	Reach 3 STA 3531.18 to STA 3895.84
Discharge (cfs)	37.3	33.6	25.1
Average Hydr Radius (ft)	0.29	0.28	0.36
Average Width (ft)	45.34	38.88	34.10
Average Discharge Per Unit Width, q (cfs/ft)	0.89	0.87	0.74
Average Energy Slope, S (dimensionless)	0.0250	0.0268	0.0363
Average Froude Number, Fr (dimensionless)	1.057	1.094	1.117
Average Manning n-value	0.030	0.030	0.030
Average Velocity (fps)	3.134	3.194	2.972
Average Depth (ft)	0.304	0.284	0.383
D50 (ft) Average 1	0.0235	0.0235	0.0235
D90 (ft) Average 1	0.1126	0.1126	0.1126
Temperature (˚F)	60	60	60
Kinematic viscosity of water, v (ft^2/s)	0.00001217	0.00001217	0.00001217
Unit Weight of Water, γ_w (lb/ft^3)	62.4	62.4	62.4
Specific Weight of Sediment, γ_s (lb/ft^3)	165.4	165.4	165.4

Albuquerque Metroploitan Arroyo Flood Control Authority Sediment and Erosion Design Guide Equation 3.59

$$S_{eq} = CQ^{-0.133}$$

$$C = 18.28 n^2 F^{0.133} F_r^{2.133}$$

F = width/depth ratio typicall about 40 (Leopold and Miller, 1956; Harvey, 1985)

	Fr = 0.7	Fr = 0.75	Fr = 0.8	Fr = 0.85	Fr = 0.9	Fr = 1.0
Reach 1						
Flowrate, Q (cfs)	37.3	37.3	37.3	37.3	37.3	37.3
Manning roughness coefficient, n	0.030	0.030	0.030	0.030	0.030	0.030
Width/Depth Ratio, F (ft/ft)	152.66	152.66	152.66	152.66	152.66	152.66
Froude Number, Fr	0.700	0.750	0.800	0.850	0.900	1.000
C	0.0150	0.0174	0.0200	0.0227	0.0256	0.0321
Equilibrium Slope, S_{eq} (ft/ft)	**0.0093**	**0.0107**	**0.0123**	**0.0140**	**0.0158**	**0.0198**
Reach 2						
	Fr = 0.7	**Fr = 0.75**	**Fr = 0.8**	**Fr = 0.85**	**Fr = 0.9**	**Fr = 1.0**
Flowrate, Q (cfs)	33.6	33.6	33.6	33.6	33.6	33.6
Manning roughness coefficient, n	0.030	0.030	0.030	0.030	0.030	0.030
Width/Depth Ratio, F (ft/ft)	141.22	141.22	141.22	141.22	141.22	141.22
Froude Number, Fr	0.700	0.750	0.800	0.850	0.900	1.000
C	0.0149	0.0172	0.0197	0.0225	0.0254	0.0318
Equilibrium Slope, S_{eq} (ft/ft)	**0.0093**	**0.0108**	**0.0124**	**0.0141**	**0.0159**	**0.0199**
Reach 3						
	Fr = 0.7	**Fr = 0.75**	**Fr = 0.8**	**Fr = 0.85**	**Fr = 0.9**	**Fr = 1.0**
Flowrate, Q (cfs)	25.1	25.1	25.1	25.1	25.1	25.1
Manning roughness coefficient, n	0.030	0.030	0.030	0.030	0.030	0.030
Width/Depth Ratio, F (ft/ft)	137.76	137.76	137.76	137.76	137.76	137.76
Froude Number, Fr	0.700	0.750	0.800	0.850	0.900	1.000
C	0.0148	0.0171	0.0197	0.0224	0.0253	0.0317
Equilibrium Slope, S_{eq} (ft/ft)	**0.0096**	**0.0112**	**0.0128**	**0.0146**	**0.0165**	**0.0206**
Avg. Across All Reaches =	**0.0094**	**0.0109**	**0.0125**	**0.0142**	**0.0161**	**0.0201**

HEC-20 Equation 6.17

$$S_{eq} = \left[K_s D_c \left(\frac{\gamma_s - \gamma}{\gamma} \right) \right]^{\frac{10}{7}} \left(\frac{1.486}{qn} \right)^{\frac{6}{7}}$$

Dc = D90

	Reach 1 STA 1447.98 to STA 2320.35	Reach 2 STA 2409.33 to STA 3440.63	Reach 3 STA 3531.18 to STA 3895.84
Original stream energy slope, S (ft/ft)	0.0257	0.0299	0.0516
Mean bed sediment diameter, D (ft)	0.1126	0.1126	0.1126
Specific weight of sediment, γ_s (lb/ft^3)	165.4	165.4	165.4
Specific weight of water, γ (lb/ft^3)	62.4	62.4	62.4
Kinematic viscosity of water, v (ft/sec^2)	0.00001217	0.00001217	0.00001217
Hydraulic radius or mean depth, d in wide channels (ft)	0.30	0.28	0.38
Shear velocity, U* (ft/s)	0.50	0.52	0.80
Boundary Reynold's number, R*	4640	4838	7382
Shields parameter, Ks (see HEC-20)	0.047	0.047	0.047
Shear Stress, τo (lb/ft^2)	0.49	0.53	1.23
Critical bed material size, Dc (ft) = D90 Average 1	0.11	0.11	0.11
Manning roughness coefficient, n	0.030	0.030	0.030
Channel discharge per unit width, q (ft^2/s)	0.89	0.87	0.74
Equilibrium Slope, S_{eq} (ft/ft)	**0.036**	**0.037**	**0.042**

HEC-20 Equation 6.18

Another approach to determining an equilibrium slope under conditions of no upstream sediment supply is presented by the USBR using the Meyer-Peter Muller equation for beginning of transport (USBR 1984). If adjustment of the hydraulic depth due to the reduction in channel slope is included in the equation, the USBR equation is:

$$S_{eq} = K_u \frac{(D_{50})^{10/7} n^{9/7}}{(D_{90})^{5/14} q^{6/7}} \qquad (6.18)$$

where:

K_u = 60.1 English
K_u = 28.0 SI

	Reach 1 STA 1447.98 to STA 2320.35	Reach 2 STA 2409.33 to STA 3440.63	Reach 3 STA 3531.18 to STA 3895.84
Original stream energy slope, S (ft/ft)	0.0257	0.0299	0.0516
D50 (ft) Average 1	0.0235	0.0235	0.0235
D90 (ft) Average 1	0.112614013	0.112614013	0.112614013
Manning roughness coefficient, n	0.030	0.030	0.030
Channel discharge per unit width, q (ft^2/s)	0.89	0.87	0.74
Equilibrium Slope, S_{eq} (ft/ft)	**0.0075**	**0.0077**	**0.0088**

River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Max Chl Dpth	Wetted Perim	Hydraulic Radius	q	W/D Ratio	Length Chnl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)	(ft^2/ft)	cfs/ft		(ft)
1	3895.84	25.1	1230.93	1233.074	1231.609	1233.08	0.000185	0.817	30.71	22.35	0.12	2.14	23.02	1.33	1.123043	10.443925	45.23
1	3850.61	25.1	1232.17	1232.923		1233.05	0.011721	2.819	8.9	23.14	0.8	0.75	23.36	0.38	1.084702	30.853333	44.36
1	3806.24	25.1	1231.73	1232.489		1232.59	0.00902	2.535	9.9	24.71	0.71	0.76	25.04	0.40	1.015783	32.513158	41.16
1	3765.08	25.1	1231.32	1231.907	1231.907	1232.06	0.019417	3.181	7.89	24.91	1	0.59	25.22	0.31	1.007627	42.220339	51.85
1	3713.23	25.1	1229.97	1230.769	1230.794	1231.02	0.020785	3.978	6.31	15.05	1.08	0.8	15.18	0.42	1.667774	18.8125	58.96
1	3654.26	25.1	1230.13	1230.321	1230.321	1230.42	0.040775	2.472	10.15	53.6	1	0.19	53.66	0.19	0.468284	282.10526	5.63
1	3648.64	25.1	1226.39	1226.516	1226.678	1227.27	0.565246	6.955	3.61	29	3.48	0.13	29.04	0.12	0.865517	223.07692	43.22
1	3605.41	25.1	1225.89	1226.07		1226.11	0.011261	1.669	15.04	84.02	0.7	0.18	84.08	0.18	0.298738	466.77778	68.33
1	3537.09	25.1	1225	1225.276	1225.276	1225.32	0.064871	1.747	14.37	181.12	1.09	0.28	181.18	0.08	0.138582	646.85714	5.91
1	3531.18	25.1	1220.2	1220.241	1220.292	1220.48	0.79095	3.942	6.37	154.43	3.42	0.04	154.44	0.04	0.162533	3860.75	90.55
1	3440.63	33.6	1219.29	1219.445		1219.48	0.010712	1.476	22.77	147.31	0.66	0.16	147.36	0.15	0.22809	920.6875	74.11
1	3366.51	33.6	1218.55	1218.715		1218.75	0.009062	1.412	23.79	145.08	0.61	0.16	145.13	0.16	0.231596	906.75	60.74
1	3305.78	33.6	1217.94	1218.156		1218.2	0.009037	1.684	19.95	93.19	0.64	0.22	93.26	0.21	0.360554	423.59091	52.46
1	3253.32	33.6	1217.41	1217.599	1217.599	1217.69	0.040702	2.45	13.72	73.34	1	0.19	73.4	0.19	0.45814	386	3.15
1	3250.17	33.6	1213.35	1213.429	1213.57	1214.3	1.212747	7.484	4.49	57.34	4.72	0.08	57.37	0.08	0.585978	716.75	63.99
1	3186.18	33.6	1212.71	1213.059		1213.15	0.010499	2.467	13.62	40.09	0.75	0.35	40.21	0.34	0.838114	114.54286	94.35
1	3091.83	33.6	1211.75	1212.049		1212.13	0.011217	2.315	14.51	49.41	0.75	0.3	49.5	0.29	0.680024	164.7	61.46
1	3030.37	33.6	1211.13	1211.384		1211.45	0.010925	2.052	16.37	65.54	0.72	0.25	65.61	0.25	0.512664	262.16	26.04
1	3004.33	33.6	1210.86	1211.064	1211.064	1211.14	0.031119	2.259	14.87	73.39	0.88	0.2	73.45	0.20	0.457828	366.95	5.91
1	2998.41	33.6	1205.85	1205.953	1206.106	1206.75	0.773138	7.154	4.7	45.79	3.94	0.1	45.82	0.10	0.733785	457.9	43.01
1	2955.4	33.6	1205.42	1205.676		1205.74	0.01055	2.034	16.52	65.28	0.71	0.26	65.36	0.25	0.514706	251.07692	40.75
1	2914.65	33.6	1205.01	1205.243		1205.3	0.010524	1.91	17.59	76.28	0.7	0.23	76.35	0.23	0.440482	331.65217	99.06
1	2815.59	33.6	1204.02	1204.205		1204.25	0.010556	1.648	20.39	110.59	0.68	0.19	110.65	0.18	0.303825	582.05263	33.00
1	2782.59	33.6	1203.69	1203.868		1203.91	0.010073	1.569	21.41	120.68	0.66	0.18	120.74	0.18	0.278422	670.44444	39.02
1	2743.58	33.6	1203.3	1203.473		1203.51	0.010188	1.548	21.7	125.91	0.66	0.17	125.96	0.17	0.266857	740.64706	38.63
1	2704.94	33.6	1202.9	1203.027	1203.027	1203.09	0.046785	2.025	16.59	131.06	1	0.13	131.1	0.13	0.256371	1008.1538	4.40
1	2700.54	33.6	1199	1199.059	1199.144	1199.49	0.869761	5.242	6.41	108.89	3.81	0.06	108.91	0.06	0.308568	1814.8333	39.50
1	2661.04	33.6	1198.6	1198.82	1198.751	1198.85	0.005362	1.317	25.52	116.61	0.5	0.22	116.68	0.22	0.28814	530.04545	44.34
1	2616.7	33.6	1198.16	1198.294	1198.294	1198.37	0.029799	2.232	15.05	112.81	1.08	0.13	112.86	0.13	0.297846	867.76923	76.03
1	2540.68	33.6	1197.39	1197.695	1197.534	1197.71	0.002058	1.012	33.19	109.62	0.32	0.31	109.72	0.30	0.306513	353.6129	58.97
1	2481.7	33.6	1196.79	1197.698		1197.7	0.00004	0.287	117.1	133.07	0.05	0.91	133.29	0.88	0.252499	146.23077	72.38
1	2409.33	33.6	1196.06	1197.698		1197.7	0.000005	0.144	232.68	146.96	0.02	1.64	147.49	1.58	0.228634	89.609756	88.97
1	2320.35	37.3	1195.17	1197.698	1195.344	1197.7	0.000003	0.151	246.6	105.15	0.02	2.53	105.97	2.33	0.354731	41.561265	200.44
1	2119.93	37.3	1185.98	1186.238	1186.221	1186.34	0.016961	2.587	14.42	56.71	0.9	0.26	56.79	0.25	0.657732	218.11538	51.36
1	2068.55	37.3	1185.47	1185.74		1185.79	0.007149	1.734	21.51	80.6	0.59	0.27	80.69	0.27	0.462779	298.51852	68.48
1	2000.07	37.3	1184.78	1185.088		1185.18	0.011433	2.382	15.66	51.83	0.76	0.31	51.93	0.30	0.71966	167.19355	56.42
1	1943.65	37.3	1184.21	1184.538		1184.61	0.008877	2.188	17.05	52.99	0.68	0.33	53.1	0.32	0.703906	160.57576	81.17
1	1862.48	37.3	1183.39	1183.726		1183.82	0.010728	2.44	15.29	46.5	0.75	0.34	46.61	0.33	0.802151	136.76471	51.42
1	1811.06	37.3	1182.84	1183.102	1183.102	1183.23	0.037106	2.896	12.88	49.92	1.01	0.26	50.01	0.26	0.747196	192	3.7
1	1807.36	37.3	1181.04	1181.187	1181.35	1181.9	0.435751	6.756	5.52	38.13	3.13	0.15	38.18	0.14	0.978232	254.2	30.02
1	1777.34	37.3	1180.75	1181.101		1181.19	0.009201	2.326	16.04	46.7	0.7	0.35	46.81	0.34	0.798715	133.42857	67.48
1	1709.86	37.3	1180.06	1180.422		1180.52	0.010674	2.551	14.62	41.44	0.76	0.36	41.55	0.35	0.900097	115.11111	57.53
1	1652.33	37.3	1179.47	1179.746	1179.746	1179.88	0.035992	2.951	12.64	46.57	1	0.28	46.66	0.27	0.800945	166.32143	2.62
1	1649.71	37.3	1177.56	1177.696	1177.882	1178.64	0.638112	7.79	4.79	35.56	3.74	0.14	35.6	0.13	1.048931	254	47.36
1	1602.35	37.3	1177.09	1177.393		1177.46	0.009245	2.125	17.55	58.8	0.69	0.3	58.9	0.30	0.634354	196	79.51
1	1522.84	37.3	1176.29	1176.556	1176.556	1176.69	0.036174	2.89	12.91	49.26	1	0.27	49.34	0.26	0.757207	182.44444	2.01
1	1520.83	37.3	1174.79	1174.906	1175.073	1175.76	0.714076	7.416	5.03	43.76	3.86	0.12	43.8	0.11	0.852377	364.66667	72.85
1	1447.98	37.3	1174.05	1174.328	1174.271	1174.4	0.010113	2.101	17.75	64.7	0.71	0.28	64.79	0.27	0.576507	231.07143	

Parameter	Reach 1 STA 1447.98 to STA 2320.35	Reach 2 STA 2409.33 to STA 3440.63	Reach 3 STA 3531.18 to STA 3895.84
Discharge (cfs)	37.3	33.6	25.1
Average Hydr Radius (ft)	0.51	0.35	0.50
Average Width (ft)	60.54	103.65	32.36
Average Discharge Per Unit Width, q (cfs/ft)	0.66	0.38	1.03
Average Energy Slope, S (dimensionless)	0.0094	0.0094	0.0121
Average Froude Number, Fr (dimensionless)	0.656	0.594	0.735
Average Manning n-value	0.030	0.030	0.030
Average Velocity (fps)	2.059	1.569	2.500
Average Depth (ft)	0.533	0.355	0.870
D50 (ft) Average 1	0.0235	0.0235	0.0235
D90 (ft) Average 1	0.1126	0.1126	0.1126
Temperature (˚F)	60	60	60
Kinematic viscosity of water, v (ft^2/s)	0.00001217	0.00001217	0.00001217
Unit Weight of Water, γ_w (lb/ft^3)	62.4	62.4	62.4
Specific Weight of Sediment, γ_s (lb/ft^3)	165.4	165.4	165.4

**Note: Average values exclude cross-sections at drop structure tops and toes*

Albuquerque Metroploitan Arroyo Flood Control Authority Sediment and Erosion Design Guide Equation 3.59

$$S_{eq} = CQ^{-0.133} \qquad C = 18.28 n^2 F^{0.133} F_r^{2.133}$$

F = width/depth ratio typicall about 40 (Leopold and Miller, 1956; Harvey, 1985)

	Fr = 0.7	Fr = 0.75	Fr = 0.8	Fr = 0.85	Fr = 0.9	Fr = 1.0
Reach 1						
Flowrate, Q (cfs)	37.3	37.3	37.3	37.3	37.3	37.3
Manning roughness coefficient, n	0.030	0.030	0.030	0.030	0.030	0.030
Width/Depth Ratio, F (ft/ft)	169.83	169.83	169.83	169.83	169.83	169.83
Froude Number, Fr	0.700	0.750	0.800	0.850	0.900	1.000
C	0.0152	0.0176	0.0202	0.0230	0.0260	0.0326
Equilibrium Slope, S_{eq} (ft/ft)	**0.0094**	**0.0109**	**0.0125**	**0.0142**	**0.0161**	**0.0201**
Reach 2						
	Fr = 0.7	**Fr = 0.75**	**Fr = 0.8**	**Fr = 0.85**	**Fr = 0.9**	**Fr = 1.0**
Flowrate, Q (cfs)	33.6	33.6	33.6	33.6	33.6	33.6
Manning roughness coefficient, n	0.030	0.030	0.030	0.030	0.030	0.030
Width/Depth Ratio, F (ft/ft)	459.72	459.72	459.72	459.72	459.72	459.72
Froude Number, Fr	0.700	0.750	0.800	0.850	0.900	1.000
C	0.0174	0.0201	0.0231	0.0263	0.0297	0.0372
Equilibrium Slope, S_{eq} (ft/ft)	**0.0109**	**0.0126**	**0.0145**	**0.0165**	**0.0186**	**0.0233**
Reach 3						
	Fr = 0.7	**Fr = 0.75**	**Fr = 0.8**	**Fr = 0.85**	**Fr = 0.9**	**Fr = 1.0**
Flowrate, Q (cfs)	25.1	25.1	25.1	25.1	25.1	25.1
Manning roughness coefficient, n	0.030	0.030	0.030	0.030	0.030	0.030
Width/Depth Ratio, F (ft/ft)	100.27	100.27	100.27	100.27	100.27	100.27
Froude Number, Fr	0.700	0.750	0.800	0.850	0.900	1.000
C	0.0142	0.0164	0.0189	0.0215	0.0243	0.0304
Equilibrium Slope, S_{eq} (ft/ft)	**0.0092**	**0.0107**	**0.0123**	**0.0140**	**0.0158**	**0.0198**

HEC-20 Equation 6.17

$$S_{eq} = \left[K_s D_c \left(\frac{\gamma_s - \gamma}{\gamma} \right) \right]^{\frac{10}{7}} \left(\frac{1.486}{qn} \right)^{\frac{6}{7}}$$

$D_C = D_{90}$

	Reach 1 STA 1447.98 to STA 2320.35	Reach 2 STA 2409.33 to STA 3440.63	Reach 3 STA 3531.18 to STA 3895.84
Original stream energy slope, S (ft/ft)	0.0257	0.0299	0.0516
Mean bed sediment diameter, D (ft)	0.0004	0.0004	0.0004
Specific weight of sediment, γ_s (lb/ft^3)	165.4	165.4	165.4
Specific weight of water, γ (lb/ft^3)	62.4	62.4	62.4
Kinematic viscosity of water, v (ft/sec^2)	0.00001217	0.00001217	0.00001217
Hydraulic radius or mean depth, d in wide channels (ft)	0.53	0.36	0.87
Shear velocity, U* (ft/s)	0.66	0.58	1.20
Boundary Reynold's number, R*	20	18	37
Shields parameter, Ks (see HEC-20)	0.047	0.047	0.047
Shear Stress, τ_0 (lb/ft^2)	0.85	0.66	2.80
Critical bed material size, D_c (ft) = D_{90} Average 1	0.11	0.11	0.11
Manning roughness coefficient, n	0.030	0.030	0.030
Channel discharge per unit width, q (ft^2/s)	0.66	0.38	1.03
Equilibrium Slope, S_{eq} (ft/ft)	**0.046**	**0.075**	**0.032**

HEC-20 Equation 6.18

Another approach to determining an equilibrium slope under conditions of no upstream sediment supply is presented by the USBR using the Meyer-Peter Muller equation for beginning of transport (USBR 1984). If adjustment of the hydraulic depth due to the reduction in channel slope is included in the equation, the USBR equation is:

$$S_{eq} = K_u \frac{(D_{50})^{10/7} n^{9/7}}{(D_{90})^{5/14} q^{6/7}} \qquad (6.18)$$

where:

K_u = 60.1 English
K_u = 28.0 SI

	Reach 1 STA 1447.98 to STA 2320.35	Reach 2 STA 2409.33 to STA 3440.63	Reach 3 STA 3531.18 to STA 3895.84
Original stream energy slope, S (ft/ft)	0.0257	0.0299	0.0516
D_{50} (ft) Average 1	0.0235	0.0235	0.0235
D_{90} (ft) Average 1	0.1126	0.1126	0.1126
Manning roughness coefficient, n	0.030	0.030	0.030
Channel discharge per unit width, q (ft^2/s)	0.66	0.38	1.03
Equilibrium Slope, S_{eq} (ft/ft)	**0.0097**	**0.0157**	**0.0066**

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Max Chl Dpth	Wetted Perim	Hydraulic Radius	q	W/D Ratio	Length Chnl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)	(ft^2/ft)	cfs/ft		(ft)
1	3895.84	25.1	1230.93	1233.074	1231.609	1233.08	0.000185	0.817	30.71	22.35	0.12	2.14	23.02	1.40	1.123043	10.443925	45.23
1	3850.61	25.1	1232.17	1232.923		1233.05	0.011721	2.819	8.9	23.14	0.8	0.75	23.36	0.36	1.084702	30.853333	44.36
1	3806.24	25.1	1231.73	1232.489		1232.59	0.00902	2.535	9.9	24.71	0.71	0.76	25.04	0.38	1.015783	32.513158	41.16
1	3765.08	25.1	1231.32	1231.907	1231.907	1232.06	0.019417	3.181	7.89	24.91	1	0.59	25.22	0.29	1.007627	42.220339	51.85
1	3713.23	25.1	1229.97	1230.769	1230.794	1231.02	0.020785	3.978	6.31	15.05	1.08	0.8	15.18	0.40	1.667774	18.8125	58.96
1	3654.26	25.1	1230.13	1230.321	1230.321	1230.42	0.040775	2.472	10.15	53.6	1	0.19	53.66	0.17	0.468284	282.10526	5.63
1	3648.64	25.1	1226.39	1226.516	1226.678	1227.27	0.565246	6.955	3.61	29	3.48	0.13	29.04	0.11	0.865517	223.07692	43.22
1	3605.41	25.1	1225.89	1226.07		1226.11	0.011261	1.669	15.04	84.02	0.7	0.18	84.08	0.16	0.298738	466.77778	68.33
1	3537.09	25.1	1225	1225.276	1225.276	1225.32	0.064871	1.747	14.37	181.12	1.09	0.28	181.18	0.08	0.138582	646.85714	5.91
1	3531.18	25.1	1220.2	1220.241	1220.292	1220.48	0.79095	3.942	6.37	154.43	3.42	0.04	154.44	0.04	0.162533	3860.75	90.55
1	3440.63	33.6	1219.29	1219.445		1219.48	0.010712	1.476	22.77	147.31	0.66	0.16	147.36	0.16	0.22809	920.6875	74.11
1	3366.51	33.6	1218.55	1218.715		1218.75	0.009062	1.412	23.79	145.08	0.61	0.16	145.13	0.16	0.231596	906.75	60.74
1	3305.78	33.6	1217.94	1218.156		1218.2	0.009037	1.684	19.95	93.19	0.64	0.22	93.26	0.21	0.360554	423.59091	52.46
1	3253.32	33.6	1217.41	1217.599	1217.599	1217.69	0.040702	2.45	13.72	73.34	1	0.19	73.4	0.19	0.45814	386	3.15
1	3250.17	33.6	1213.35	1213.429	1213.57	1214.3	1.212747	7.484	4.49	57.34	4.72	0.08	57.37	0.08	0.585978	716.75	63.99
1	3186.18	33.6	1212.71	1213.059		1213.15	0.010499	2.467	13.62	40.09	0.75	0.35	40.21	0.34	0.838114	114.54286	94.35
1	3091.83	33.6	1211.75	1212.049		1212.13	0.011217	2.315	14.51	49.41	0.75	0.3	49.5	0.29	0.680024	164.7	61.46
1	3030.37	33.6	1211.13	1211.384		1211.45	0.010925	2.052	16.37	65.54	0.72	0.25	65.61	0.25	0.512664	262.16	26.04
1	3004.33	33.6	1210.86	1211.064	1211.064	1211.14	0.031119	2.259	14.87	73.39	0.88	0.2	73.45	0.20	0.457828	366.95	5.91
1	2998.41	33.6	1205.85	1205.953	1206.106	1206.75	0.773138	7.154	4.7	45.79	3.94	0.1	45.82	0.10	0.733785	457.9	43.01
1	2955.4	33.6	1205.42	1205.676		1205.74	0.01055	2.034	16.52	65.28	0.71	0.26	65.36	0.25	0.514706	251.07692	40.75
1	2914.65	33.6	1205.01	1205.243		1205.3	0.010524	1.91	17.59	76.28	0.7	0.23	76.35	0.23	0.440482	331.65217	99.06
1	2815.59	33.6	1204.02	1204.205		1204.25	0.010556	1.648	20.39	110.59	0.68	0.19	110.65	0.18	0.303825	582.05263	33.00
1	2782.59	33.6	1203.69	1203.868		1203.91	0.010073	1.569	21.41	120.68	0.66	0.18	120.74	0.18	0.278422	670.44444	39.02
1	2743.58	33.6	1203.3	1203.473		1203.51	0.010188	1.548	21.7	125.91	0.66	0.17	125.96	0.17	0.266857	740.64706	38.63
1	2704.94	33.6	1202.9	1203.027	1203.027	1203.09	0.046785	2.025	16.59	131.06	1	0.13	131.1	0.13	0.256371	1008.1538	4.40
1	2700.54	33.6	1199	1199.059	1199.144	1199.49	0.869761	5.242	6.41	108.89	3.81	0.06	108.91	0.06	0.308568	1814.8333	39.50
1	2661.04	33.6	1198.6	1198.82	1198.751	1198.85	0.005362	1.317	25.52	116.61	0.5	0.22	116.68	0.22	0.28814	530.04545	44.34
1	2616.7	33.6	1198.16	1198.294	1198.294	1198.37	0.029799	2.232	15.05	112.81	1.08	0.13	112.86	0.14	0.297846	867.76923	76.03
1	2540.68	33.6	1197.39	1197.695	1197.534	1197.71	0.002058	1.012	33.19	109.62	0.32	0.31	109.72	0.31	0.306513	353.6129	58.97
1	2481.7	33.6	1196.79	1197.698		1197.7	0.00004	0.287	117.1	133.07	0.05	0.91	133.29	0.89	0.252499	146.23077	72.38
1	2409.33	33.6	1196.06	1197.698		1197.7	0.000005	0.144	232.68	146.96	0.02	1.64	147.49	1.58	0.228634	89.609756	88.97
1	2320.35	37.3	1195.17	1197.698	1195.344	1197.7	0.000003	0.151	246.6	105.15	0.02	2.53	105.97	2.33	0.354731	41.561265	200.44
1	2119.93	37.3	1185.98	1186.238	1186.221	1186.34	0.016961	2.587	14.42	56.71	0.9	0.26	56.79	0.25	0.657732	218.11538	51.36
1	2068.55	37.3	1185.47	1185.74		1185.79	0.007149	1.734	21.51	80.6	0.59	0.27	80.69	0.27	0.462779	298.51852	68.48
1	2000.07	37.3	1184.78	1185.088		1185.18	0.011433	2.382	15.66	51.83	0.76	0.31	51.93	0.30	0.71966	167.19355	56.42
1	1943.65	37.3	1184.21	1184.538		1184.61	0.008877	2.188	17.05	52.99	0.68	0.33	53.1	0.32	0.703906	160.57576	81.17
1	1862.48	37.3	1183.39	1183.726		1183.82	0.010728	2.44	15.29	46.5	0.75	0.34	46.61	0.33	0.802151	136.76471	51.42
1	1811.06	37.3	1182.84	1183.102	1183.102	1183.23	0.037106	2.896	12.88	49.92	1.01	0.26	50.01	0.26	0.747196	192	3.7
1	1807.36	37.3	1181.04	1181.187	1181.35	1181.9	0.435751	6.756	5.52	38.13	3.13	0.15	38.18	0.15	0.978232	254.2	30.02
1	1777.34	37.3	1180.75	1181.101		1181.19	0.009201	2.326	16.04	46.7	0.7	0.35	46.81	0.34	0.798715	133.42857	67.48
1	1709.86	37.3	1180.06	1180.422		1180.52	0.010674	2.551	14.62	41.44	0.76	0.36	41.55	0.35	0.900097	115.11111	57.53
1	1652.33	37.3	1179.47	1179.746	1179.746	1179.88	0.035992	2.951	12.64	46.57	1	0.28	46.66	0.27	0.800945	166.32143	2.62
1	1649.71	37.3	1177.56	1177.696	1177.882	1178.64	0.638112	7.79	4.79	35.56	3.74	0.14	35.6	0.13	1.048931	254	47.36
1	1602.35	37.3	1177.09	1177.533		1177.57	0.0026	1.444	25.84	59.64	0.39	0.44	59.78	0.43	0.625419	135.54545	79.51
1	1522.84	37.3	1176.29	1177.496		1177.5	0.000227	0.603	61.85	54.9	0.1	1.21	55.29	1.12	0.679417	45.371901	2.01
1	1520.83	37.3	1174.79	1177.499		1177.5	0.000021	0.26	143.2	74.89	0.03	2.71	75.77	1.89	0.498064	27.634686	72.85
1	1447.98	37.3	1174.05	1177.5	1174.271	1177.5	0.000002	0.147	253.16	83.73	0.01	3.45	84.85	2.98	0.44548	24.269565	

Parameter	Reach 1 STA 1447.98 to STA 2320.35	Reach 2 STA 2409.33 to STA 3440.63	Reach 3 STA 3531.18 to STA 3895.84
Discharge (cfs)	37.3	33.6	25.1
Average Hydr Radius (ft)	0.79	0.35	0.50
Average Width (ft)	62.53	103.65	32.36
Average Discharge Per Unit Width, q (cfs/ft)	0.65	0.38	1.03
Average Energy Slope, S (dimensionless)	0.0078	0.0094	0.0121
Average Froude Number, Fr (dimensionless)	0.556	0.594	0.735
Average Manning n-value	0.030	0.030	0.030
Average Velocity (fps)	1.795	1.569	2.500
Average Depth (ft)	0.864	0.355	0.870
D50 (ft) Average 1	0.0235	0.0235	0.0235
D90 (ft) Average 1	0.1126	0.1126	0.1126
Temperature (˚F)	60	60	60
Kinematic viscosity of water, v (ft^2/s)	0.00001217	0.00001217	0.00001217
Unit Weight of Water, γ_w (lb/ft^3)	62.4	62.4	62.4
Specific Weight of Sediment, γ_s (lb/ft^3)	165.4	165.4	165.4

**Note: Average values exclude cross-sections at drop structure tops and toes*

Albuquerque Metroploitan Arroyo Flood Control Authority
Sediment and Erosion Design Guide
Equation 3.59

$$S_{eq} = CQ^{-0.133}$$

$$C = 18.28 n^2 F^{0.133} F_r^{2.133}$$

F = width/depth ratio typicall about 40 (Leopold and Miller, 1956; Harvey, 1985)

	Fr = 0.7	Fr = 0.75	Fr = 0.8	Fr = 0.85	Fr = 0.9	Fr = 1.0
Reach 1						
Flowrate, Q (cfs)	37.3	37.3	37.3	37.3	37.3	37.3
Manning roughness coefficient, n	0.030	0.030	0.030	0.030	0.030	0.030
Width/Depth Ratio, F (ft/ft)	143.11	143.11	143.11	143.11	143.11	143.11
Froude Number, Fr	0.700	0.750	0.800	0.850	0.900	1.000
C	0.0149	0.0172	0.0198	0.0225	0.0254	0.0318
Equilibrium Slope, S_{eq} (ft/ft)	**0.0092**	**0.0107**	**0.0122**	**0.0139**	**0.0157**	**0.0197**
Reach 2						
	Fr = 0.7	**Fr = 0.75**	**Fr = 0.8**	**Fr = 0.85**	**Fr = 0.9**	**Fr = 1.0**
Flowrate, Q (cfs)	33.6	33.6	33.6	33.6	33.6	33.6
Manning roughness coefficient, n	0.030	0.030	0.030	0.030	0.030	0.030
Width/Depth Ratio, F (ft/ft)	459.72	459.72	459.72	459.72	459.72	459.72
Froude Number, Fr	0.700	0.750	0.800	0.850	0.900	1.000
C	0.0174	0.0201	0.0231	0.0263	0.0297	0.0372
Equilibrium Slope, S_{eq} (ft/ft)	**0.0109**	**0.0126**	**0.0145**	**0.0165**	**0.0186**	**0.0233**
Reach 3						
	Fr = 0.7	**Fr = 0.75**	**Fr = 0.8**	**Fr = 0.85**	**Fr = 0.9**	**Fr = 1.0**
Flowrate, Q (cfs)	25.1	25.1	25.1	25.1	25.1	25.1
Manning roughness coefficient, n	0.030	0.030	0.030	0.030	0.030	0.030
Width/Depth Ratio, F (ft/ft)	100.27	100.27	100.27	100.27	100.27	100.27
Froude Number, Fr	0.700	0.750	0.800	0.850	0.900	1.000
C	0.0142	0.0164	0.0189	0.0215	0.0243	0.0304
Equilibrium Slope, S_{eq} (ft/ft)	**0.0092**	**0.0107**	**0.0123**	**0.0140**	**0.0158**	**0.0198**

HEC-20 Equation 6.17

$$S_{eq} = \left[K_s D_c \left(\frac{\gamma_s - \gamma}{\gamma} \right) \right]^{\frac{10}{7}} \left(\frac{1.486}{qn} \right)^{\frac{6}{7}}$$

$D_C = D_{90}$

	Reach 1 STA 1447.98 to STA 2320.35	Reach 2 STA 2409.33 to STA 3440.63	Reach 3 STA 3531.18 to STA 3895.84
Original stream energy slope, S (ft/ft)	0.0257	0.0299	0.0516
Mean bed sediment diameter, D (ft)	0.0004	0.0004	0.0004
Specific weight of sediment, γ_s (lb/ft^3)	165.4	165.4	165.4
Specific weight of water, γ (lb/ft^3)	62.4	62.4	62.4
Kinematic viscosity of water, v (ft/sec^2)	0.00001217	0.00001217	0.00001217
Hydraulic radius or mean depth, d in wide channels (ft)	0.86	0.36	0.87
Shear velocity, U* (ft/s)	0.84	0.58	1.20
Boundary Reynold's number, R*	26	18	37
Shields parameter, Ks (see HEC-20)	0.047	0.047	0.047
Shear Stress, τ_0 (lb/ft^2)	1.38	0.66	2.80
Critical bed material size, D_c (ft) = D_{90} Average 1	0.11	0.11	0.11
Manning roughness coefficient, n	0.030	0.030	0.030
Channel discharge per unit width, q (ft^2/s)	0.65	0.38	1.03
Equilibrium Slope, S_{eq} (ft/ft)	**0.047**	**0.075**	**0.032**

HEC-20 Equation 6.18

Another approach to determining an equilibrium slope under conditions of no upstream sediment supply is presented by the USBR using the Meyer-Peter Muller equation for beginning of transport (USBR 1984). If adjustment of the hydraulic depth due to the reduction in channel slope is included in the equation, the USBR equation is:

$$S_{eq} = K_u \frac{(D_{50})^{10/7} n^{9/7}}{(D_{90})^{5/14} q^{6/7}} \qquad (6.18)$$

where:

K_u = 60.1 English
K_u = 28.0 SI

	Reach 1 STA 1447.98 to STA 2320.35	Reach 2 STA 2409.33 to STA 3440.63	Reach 3 STA 3531.18 to STA 3895.84
Original stream energy slope, S (ft/ft)	0.0257	0.0299	0.0516
D_{50} (ft) Average 1	0.0235	0.0235	0.0235
D_{90} (ft) Average 1	0.1126	0.1126	0.1126
Manning roughness coefficient, n	0.030	0.030	0.030
Channel discharge per unit width, q (ft^2/s)	0.65	0.38	1.03
Equilibrium Slope, S_{eq} (ft/ft)	**0.0099**	**0.0157**	**0.0066**

3 – Drainage Map

42" SD RCP
LINE "A" PER PD 2637
MAINTAINED BY LACFCD

WATER QUALITY
BASIN "C"
(TO BE MAINTAINED BY LACFCD)

24" SD RCP
LINE "C" PER PD 2637
MAINTAINED BY LACFCD

DOUBLE 6"W X 3..5"H
LINE "D" PER PD 2637
MAINTAINED BY LACFCD

54" SD RCP
LINE "B" PER
PD 2637
MAINTAINED BY
LACFCD

MAGIC MOUNTAIN PARKWAY

"A" STREET

"C" STREET

DEBRIS BASIN #5
(TO BE MAINTAINED BY LACFCD)

WATER QUALITY
BASIN "B"
(TO BE MAINTAINED BY LACFCD)

EXISTING OAK
TREE TO BE
PROTECTED IN
PLACE

DIVERSION
STRUCTURE

DEBRIS BASIN #7
(TO BE MAINTAINED BY LACFCD)

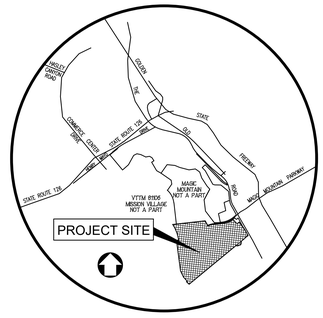
DEBRIS BASIN #4
(TO BE MAINTAINED BY LACFCD)

A

B

C

D



VICINITY MAP
NOT TO SCALE

LEGEND:

- PHASING LIMITS
- PROPOSED WATERSHED 100 BOUNDARY PER PROPOSED ENTRADA SOUTH HYDROLOGY MAP
- PROPOSED SUBAREA BOUNDARY FOR WATERSHED 100 PER PROPOSED ENTRADA SOUTH HYDROLOGY MAP
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- WQ — WATER QUALITY
- ACCESS ROAD
- NATURAL CHANNEL
- DIVERSION STRUCTURE

SUMMARY TABLE:

Node	Area	Q	QB	QBB	ΣQ	ΣQB	ΣQBB	DV	ΣDV	Note
A	N/A	13.0			13.0			N/A	N/A	Diversion Flow
B	6.2	12.1	12.3	14.0	25.1	25.3	27.0	213	213	Subarea 107B
C	4.4	8.5	8.8	9.9	33.6	34.1	36.9		213	
D	1.5	3.7	3.8		37.3	37.9	40.7		213	Subarea 109B

HYDROLOGY STUDY APPROVED
REVIEWED BY: _____ DATE 03/12/2025
APPROVED BY: _____ DATE 03/12/2025
COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

FEET
100' 50' 0 100' 200'
1" 1/2 0 1" 2"
INCHES

TRACT 53295
UNNAMED CANYON 2 EXHIBIT
ENTRADA SOUTH

REGISTERED PROFESSIONAL ENGINEER
JAMES T. HUNSAKER III
No. 40695
CIVIL
STATE OF CALIFORNIA
02/14/25

HUNSAKER & ASSOCIATES
LOS ANGELES, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
26074 Avenue Hall, Suite #23 ▪ Valencia, CA 91355
FX: (661) 294-9890 ▪ PH: (661) 294-2211

DATE: 02/04/2025 *REV. DATE:*
PROJECT NO: 0015-035-019 *SHEET 1 OF 1*

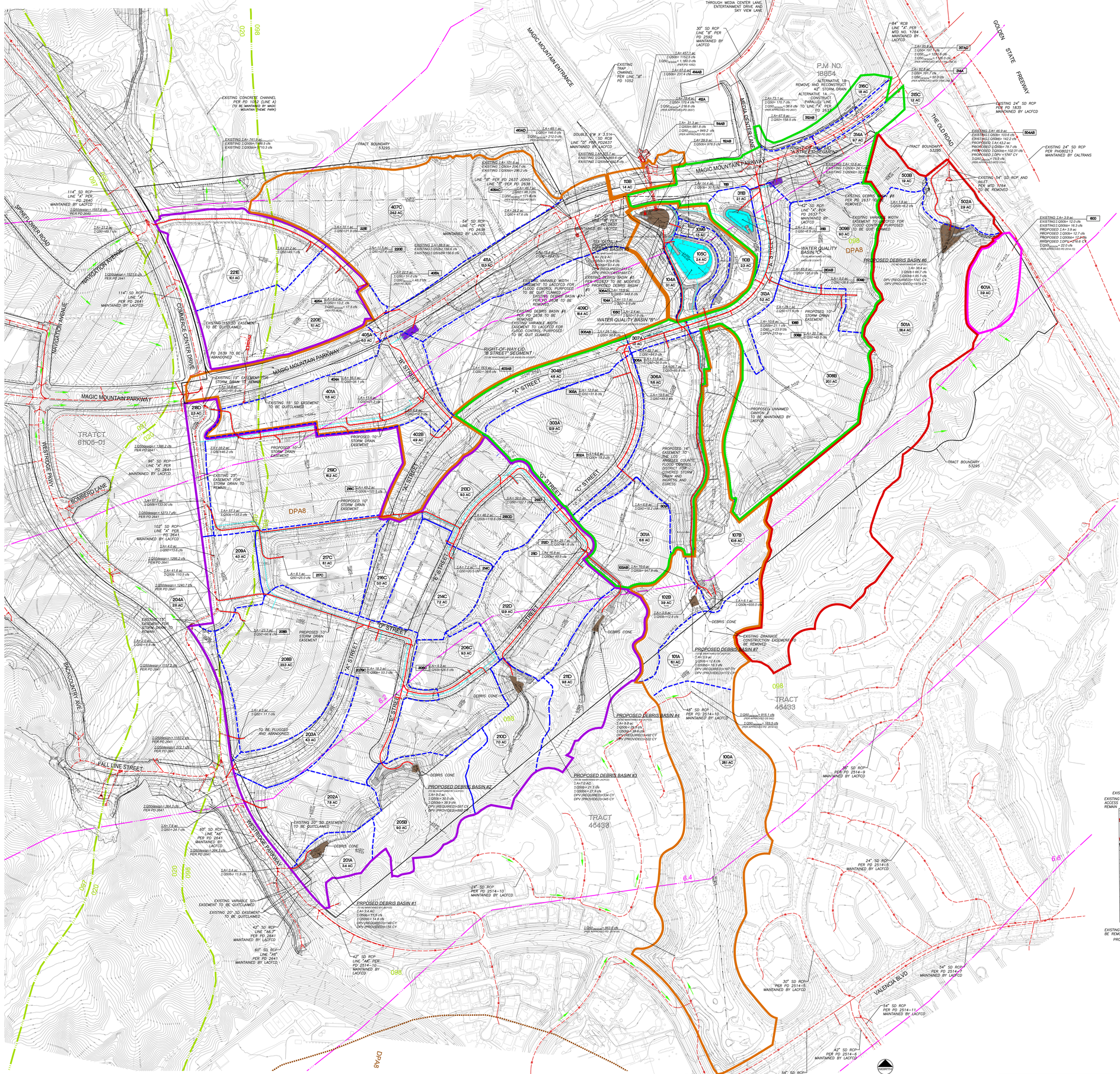
H&S057-01_ENTRADA SOUTH UNNAMED CANYON 2 EXHIBIT.DWG

FIVEPOINT

G:\Newhall Ranch\53295 Entrada South\Hydrology\H&S057-01_Entrada South Unnamed Canyon 2 Exhibit.dwg Plotted on Feb 04, 2025 by smoore

4 – Digital HEC-RAS Model

5 – Drainage Concept Map (Whole Site Hydrology)



VICINITY MAP
NOT TO SCALE

LEGEND:

- PHASING LIMITS
- PROPOSED 100 & 400 WATERSHED AREA
- PROPOSED 200 WATERSHED AREA
- PROPOSED 300 WATERSHED AREA
- PROPOSED 500 WATERSHED AREA
- PROPOSED 600 WATERSHED AREA
- PROPOSED SUBAREA BOUNDARY
- TIME OF CONCENTRATION PATH
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- WATER QUALITY
- ALTERNATIVE 1A AND 1B 96" SD RCP CONNECTION TO LINE "A" PER PD 2637
- ALTERNATIVE 1B 96" SD RCP CONNECTION TO LINE "A" PER PD 2637
- SUBAREA NODE
- AREA
- TIME OF CONCENTRATION
- DPA8 DEBRIS PRODUCTION AREA
- SOIL CLASSIFICATION AREA
- ARMY CORPS OF ENGINEERS JURISDICTION
- EXISTING FLOODPLAIN SANTA CLARA RIVER WATER SURFACE ELEVATION
- EXISTING FLOODWAY
- FEMA ZONE
- OFFSITE FLOW PATH
- NATURAL CHANNEL
- WATER QUALITY BASIN
- RIGHT-OF-WAY-LID
- DEBRIS BASIN

DRAINAGE DESIGN CRITERIA:

1. 50-YR, 24-HR ISOHYETS: 5.9-6.3
2. SOIL TYPES 99 AND 20
3. DESIGN STORM: 50-YR, 24-HR
4. PERCENT IMPERVIOUS VALUES: 28, 10B, 74B, 80B, 90B, 91E
5. DPA = 6, 35,500 CY PER SQ MI
6. BULK FACTOR= 1.28

NOTE:
1. NOT WITHIN COUNTY ADOPTED FLOODWAY
2. NOT WITHIN FEMA FLOOD ZONE "A"
3. ALL DEBRIS BASINS AND ALL CATCH BASINS SERVING CATCH BASINS ARE PUBLICLY MAINTAINED.
4. ALL LATERALS SERVING A BUILDER SITE WILL BE PRIVATELY MAINTAINED.
5. ALL MAINLINES ARE PUBLICLY MAINTAINED UNLESS NOTED OTHERWISE.

Subarea	Node	Soil Type	DPA Zone	Burn Factor	Backing Factor	% Imp	Area (Ac)	EXHIBIT A (Ac)	Mb Hr Isohyet (in)	Mb Hr Tc (mins)	Mb Hr Flow (cfs)	Q(50) (cfs)	Qb (cfs)	Q(5b) (cfs)	Q(Mb) (cfs)	Q(Qb) (cfs)	Future Q(Qb) (cfs)	Note	Land Use
100A		99	B	0.34	1.36	0.03	28.1	28.1	6.2	13							915.1	Subarea 100 & upstream lots are tributary to approved 36 Ac. 915.1 cfs added from approved 36 Inc.	Golf Course
101A		99	B	0.34	1.36	0.03	6.1	6.1	6.2	5	19.5	19.5	19.5	19.5			400.0		Golf Course
102A	102AB	99	B	0.34	1.36	0.03	12.7	12.7	6.2	5	12.5	12.5	12.5	12.5	16.3		427.4	Debris Basin #7	Natural/Debris Basin
103A		99	B		1.36	0.10	3.1	3.1	6.2	6	8.6	8.6	8.6	8.6			444.4	Debris Basin #6	Open Space/Debris Basin
104A		99	B		1.36	0.10	3.1	3.1	6.2	6	8.6	8.6	8.6	8.6			444.4	Debris Basin #6	Water Quality Basin
105C	105AC	99	B				10.6	10.6									444.4		
107B	108B	99	B	0.34	1.36	0.10	10.6	10.6	6.1	13	20.6	20.6	21.1	21.1	23.5		213		Natural/Canyon
108B		99	B	0.34	1.36	0.10	1.5	1.5	6.1	5	2.9	2.9	2.9	2.9					Natural/Canyon
110B		99	B		1.36	0.10	2.3	14.4	6.0	10	5.2	29.3	5.2	30.0					Recreation
111B								29.3				29.3		30.0					
113B	112AB	99	B		1.36	0.80	1.4	30.8	5.9	5	4.7	42.2	4.7	42.9			370.5		Public Road
114A		99	B					11.6				11.6		11.6			401.4		Public Road
201A		99	B	0.34	1.36	0.10	3.4	3.4	6.3	5	11.5	11.5	11.5	11.5	14.5		149	Debris Basin #1	Natural/Debris Basin
202A		99	B	0.34	1.36	0.10	7.8	7.8	6.3	5	26.1	26.1	26.1	26.1					Multi-Family Condo
203A		99	B		1.36	0.10	4.3	12.0	6.3	5	11.1	44.8	11.1	44.8					Public Road
204A		99	B		1.36	0.10	1.0	13.0	6.3	5	3.4	48.2	3.4	48.2					Public Road
205B		99	B	0.34	1.36	0.10	8.3	8.3	6.3	5	20.5	20.5	20.5	20.5	38.8		357	Debris Basin #2	Natural/Debris Basin
206C	207BC	99	B		1.36	0.74	8.3	8.3	6.3	7	26.5	26.5	26.5	26.5					Multi-Family Condo
207B		99	B		1.36	0.74	8.3	16.6	6.3	7	53.1	53.1	53.1	53.1					
208B		99	B		1.36	0.74	4.5	21.1	6.3	6	58.7	111.8	58.7	111.8					Multi-Family Condo
209A		99	B		1.36	0.74	4.5	25.6	6.3	6	71.2	183.0	71.2	183.0					Multi-Family Condo
210B		99	B		1.36	0.74	7.2	32.8	6.3	6	91.3	274.3	91.3	274.3					Multi-Family Condo
210C		99	B		1.36	0.74	7.2	7.2	6.3	7	20.5	20.5	20.5	20.5					Multi-Family Condo
210D	210AD	99	B					40.0				294.3		294.3					
211C		99	B		1.36	0.86	3.5	43.5	6.3	6	9.3	120.5	9.3	120.5					Public Road
211D		99	B		1.36	0.74	2.1	45.6	6.3	6	5.9	126.4	5.9	126.4					Multi-Family Condo
212C		99	B		1.36	0.74	11.1	56.7	6.3	6	31.1	157.5	31.1	157.5					Open Space/Debris Basin
212D		99	B		1.36	0.74	10.2	10.2	6.3	7	48.2	31.9	48.2	31.9					Multi-Family Condo/Mixed Residential
213C		99	B		1.36	0.74	10.2	66.9	6.3	7	48.2	205.7	48.2	205.7					Commercial/Business Park
213D		99	B		1.36	0.74	10.2	77.1	6.3	7	48.2	253.9	48.2	253.9					Commercial/Business Park
301A	302A	99	B		1.36	0.74	8.8	8.8	6.2	7	10.2	10.2	10.2	10.2					Multi-Family Condo
302B		99	B		1.36	0.74	4.8	4.8	6.1	7	10.2	10.2	10.2	10.2					Multi-Family Condo
303A	304AB	99	B		1.36	0.31	4.8	9.6	6.1	13	10.0	10.0	10.0	10.0					Public Road
304A	304B	99	B		1.36	0.10	11.5	32.1	6.2	10	20.0	64.2	20.0	64.2					Public Park/Recreation
305A		99	B		1.36	0.10	11.5	43.6	6.2	10	27.1	87.3	27.1	87.3					Public Road
306A		99	B		1.36	0.10	11.5	55.1	6.1	11	33.5	120.8	33.5	120.8					Public Road
306B		99	B		1.36	0.74	9.0	29.1	6.1	6	26.8	71.9	26.8	71.9					Multi-Family Condo
307A	310AB	99	B					40.2				112.6		112.6					
308B		99	B		1.36	0.10	9.0	49.2	6.1	11	30.0	142.6	30.0	142.6					Public Road
309B	310AB	99	B					89.4				255.2		255.2					
310A		99	B		1.36	0.80	5.2	10.7	6.0	5	8.6	19.3	8.6	19.3					Water Quality Basin/Open Space
311A		99	B		1.36	0.80	5.2	15.9	6.0	5	12.5	176.7	12.5	176.7					Public Road
312A		99	B		1.36	0.80	5.2	21.1	6.0	5	16.5	193.1	16.5	193.1					Public Road
315C		99	B		1.36	0.10	1.2	1.2	6.3	5	3.2	3.2	3.2	3.2					Open Space
315C	317AC	99	B					89.8				197.9					1261.8		Public Road
401A		99	B		1.36	0.74	11.6	11.6	6.0	11	25.2	25.2	25.2	25.2					Multi-Family Condo
402B	402AB	99	B		1.36	0.74	6.5	6.5	6.0	11	14.1	14.1	14.1	14.1					Multi-Family Condo
402A	404A	99	B					18.2				39.4		39.4					
403A	406A	99	B		1.36	0.91	6.5	24.7	5.9	11	13.2	51.6	13.2	51.6					Public Road
405C		99	B		1.36	0.91	24.2	24.2	5.9	14	47.6	47.6	47.6	47.6					Commercial/Business Park
406C	406AC	99	B					42.9				89.1		89.1					
407A	410AB	99	B		1.36	0.74	18.4	18.4	6.0	7	49.2	49.2	49.2	49.2					Multi-Family Condo
411A	410C	99	B		1.36	0.91	13.3	13.3	5.9	14	26.1	170.5	26.1	170.5					Commercial/Business Park
	412C							70.2				170.5		170.5					
	413B							31.3				66.6		67.4				Addition of Watershed 100 Hydrograph	
	414AB							109.7				235.4		237.4			1,152.3	Combined Flow of Watershed 100 and 400	
501A		99	B	0.34	1.36	0.10	38.4	38.4	6.1	17	64.5	64.5	66.7	66.7	1940.1			Debris Basin #8	Natural/Debris Basin
502A		99	B	0.34	1.36	0.10	8.9	47.3	6.1	11	51.1	51.1	51.1	51.1					Commercial/Business Park
503B		99	B	0.34	1.36	0.31	1.9	4.8	6.1	5	6.1	6.1	6.2	6.2	6.5		194.56		Natural
	504AB							52.1				56.3		56.7			19.76		
601A		99	B	0.34	1.36	0.31	3.9	3.9	6.2	5	10.4	10.4	10.4	10.7	17.3		218.6	218.6 Valves per Hydraulic	Natural

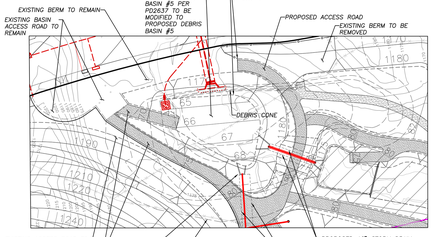
200- Watershed Summary Table *

Subarea	FF/ LAT Node	Qbkup LAT per Hydrology (cfs)	Qpeak LAT per ES Hydrology	Q DELTA PEAK LAT (50% QPE)	D/S node Cumulative SQ	LATERALS Approved FD Q SOUTH 5/S of LAT	Approved FD Q SOUTH 5/S of LAT	MAINLINE Approved FD Q	Revised Q design (Approved Qbkup+ cumulative + LS)*	Delta Q (revised- design)
							364.1		364.1	0.0
201A	LAT "4A-B"	12.0	11.5	-0.5			364.1		364.1	0.0
202A	LAT "4A-C"	11.0	24.1	13.1			378.2	364.1	369.7	-8.5
	LAT "4A-D"			11.6			373.1	364.1	375.9	11.6
203A		0.8	11.1	10.3						
Lagoon *	Line A	934	774	-159.9			372.1	364.1	394.8	31.9
1A-C-SD3	LAT "1A-A"	81.0	0.0	-81.0			1,137.2	1,137.2	1,129.1	-138.1
204A	LAT "1A-B"	82.0	6.8	-75.2			1,137.2	1,137.2	1,137.2	-138.1
205B	LAT "1A-C"	82.0	110.5	28.5			1,346.7	1,346.7	1,343.7	-123.5
206F	LAT "1A-D"	82.0	193.5	81.5			1,346.7	1,346.7	1,437.4	-123.5
206A	LAT "1A-D"	8.0	13.5	5.5			1,346.2	1,346.2	1,346.2	1,138.8
207A	LAT "1A-D"	30.0	123.0	93.0			1,270.7	1,270.7	1,315.1	-122.2
208A	LAT "1A-D"	46.0	51.9	-94.1			1,396.2	1,396.2	1,396.2	-32.2
209F	LAT "1A-D"	46.0	51.9	-94.1				1,396.2	1,396.2	1,266.9
North of Magic Mountain Parkway							1,153.6		1,482.3	-39.3
210F	LAT "1A-D"	36.0	49.1	13.1			1,153.6	1,482.3	1,511.6	-39.3
Total (cfs)		1,317.0	1,370.4	-39.2			1,157.6		1,511.6	-39.3

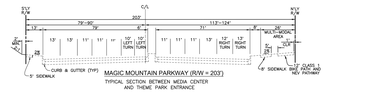
Notes

1. HG Values are per the latest approved revisions of PD2640 and PD2643 plans
2. Legacy Undeveloped Q(50)=564.2 cfs
   Legacy Ultimate Q(5) to be limited to Q(50)=762 cfs
3. Revised Q is the approved Mainline Q + cumulative SQ for each Lateral
4. Subarea 201A includes total subarea: 201A, 201B, 201C, 201D
5. Subarea 207C includes total subarea: 206B, 206C,207B,207BC,206F, 206C and 207C
6. Subarea 208D includes total subarea: 208D and 209D
7. Subarea 210D includes total subarea: 210B and 210D
8. Values are in CFS

HYDROLOGY STUDY APPROVED
APPROVED AS NOTED — DATE 05/23/2005
APPROVED AS NOTED — DATE 05/23/2005
COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
FOR DIRECTOR OF PLANNING



DETAIL A
DEBRIS BASIN #5
SCALE: 1"=40'



TYPICAL SECTION BETWEEN MEDIA CENTER AND THEME PARK ENTRANCE

DESIGNED						OWNER/DEVELOPER: FIVEPOINT 20 LIN SPRINGFIELD COURT, SUITE 300 VALENCIA, CA 91355 TELEPHONE: (661) 255-4500 REPRESENTATIVE: MR. MILES HELPRICH		PLANS PREPARED BY: HUNSAKER & ASSOCIATES IRVINE, INC. 3 HUGHES • IRVINE, CA 92618-2027 (949) 583-1010 FAX (949) 583-0759		COUNTY OF LOS ANGELES	SCALE: AS SHOWN
DRAFTED										PROPOSED HYDROLOGY MAP FOR ENTRADA TRACT MAP 53295	DATE: 02/21/2007
CHECKED											JOB No.: 2010-047-02
NO.	REVISIONS	DATE	BY							IN THE UNINCORPORATED AREA OF THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA	SHEET
											1 OF 1 SHEETS

FIVEPOINT
20 LIN SPRINGFIELD COURT, SUITE 300
VALENCIA, CA 91355