County of San Diego
Stormwater Quality Management Plan (SWQMP)
Attachment 1: Storm Water Intake Form for All Permit Applications

This form establishes Stormwater Quality Management Plan (SWQMP) requirements for Development Projects per Sections 67.809 and 67.811 of the County of San Diego Watershed Protection Ordinance (WPO). See ***Storm Water Intake Form Instructions*** for additional guidance and explanation of terms.

Part 1. Project Information	
Project Name:	Vista II
Record ID (Permit) No(s):	
Assessor's Parcel No(s):	183-060-78-00, 183-060-84-00
Street Address (or Intersection):	143 Hannalei Drive
City, State, Zip:	Vista, CA 92083

Part 2. Applicant / Project Proponent Information	
Name:	Warmington Residential
Company:	Warmington Residential
Street Address:	3090 Pullman Street
City, State, Zip:	Costa Mesa, CA 92626
Phone Number	(714) 557-5511
Email:	

Part 3. Required Information for All Development Projects

A	1. Existing (pre-development) impervious surfaces (ft²)	2. Created or replaced impervious surfaces (ft²)	3. Total disturbed area (acres or ft²)
	36068	187308	235224

B		WDID # (if issued)
	☒ Check here and provide a WDID# if this project is subject to the California Construction General Permit (Order No. 2009-0009-DWQ)[1]	

For County Use Only	Reviewed By:	Review Date:
☐ Standard SWQMP	☐ PDP SWQMP	☐ Green Streets PDP Exemption SWQMP

[1] Available at: https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html

SDC PDS RCVD 03-01-24
TM5647

Part 4. Priority Classification & SWQMP Form Selection

(A) *If your project is the following ... (select one)*	(B) *You must complete ...*
☐ **Standard Project** ☐ a. Project is East of the Pacific/Salton Sea Divide ☐ b. None of the PDP criteria below applies	➔ **Standard *SWQMP Form***
☒ **Priority Development Project (PDP)** ☐ 1. Project is part of an existing PDP, OR ☒ 2. Project does any of the following: ☒ a. Creates or replaces a total of 10,000 ft^2 or more of impervious surface ☒ b. Creates or replaces a combined total of 5,000 ft^2 or more of impervious surface within one or more of the following uses: (1) parking lots; (2) streets, roads, highways, freeways, and/or driveways; (3) restaurants; and (4) hillsides ☐ c. Creates or replaces a combined total of 5,000 ft^2 or more of impervious surface within one or more of the following uses: (1) automotive repair shops; and (2) retail gasoline outlets ☐ d. Discharges directly to an Environmentally Sensitive Area (ESA) AND creates or replaces 2,500 ft^2 or more of impervious surface ☐ e. Disturbs one or more acres of land (43,560 ft^2) and is expected to generate pollutants post-construction ☒ f. Is a redevelopment project that creates or replaces 5,000 ft^2 or more of impervious surface on a site already having at least 10,000 ft^2 of impervious surface	➔ **PDP *SWQMP Form***
☐ **Green Streets PDP Exemption**[2]	➔ **Green *Streets PDP Exemption SWQMP Form***

Part 5. Applicant Signature

I have reviewed the information in this form, and it is true and correct to the best of my knowledge.

Applicant / Project Proponent Signature: Date: 9/30/22

- ***Upon completion*** *submit this form to the County.*
- ***If requested****, attach supporting documentation to justify selections made or exemptions claimed.*
- ***If this is a PDP that is part of a larger existing PDP****, you will be required to attach a copy of the existing SWQMP to the newer SWQMP submittal.*

[2] ***Green Streets PDP Exemption Projects*** are those claiming exemption from PDP classification per WPO Section 67.811(b)(2) because they consist exclusively of *either* 1) development of new sidewalks, bike lanes, and/or trails; *or* 2) improvements to existing roads, sidewalks, bike lanes, and/or trails.

PRIORITY DEVELOPMENT PROJECT STORM WATER QUALITY MANAGEMENT PLAN FOR VISTA II

Revision Page

February 14, 2024

This PDPSWQMP presents a revision to the October 16, 2023 report pursuant to the County of San Diego plan check comments received January 24, 2024. The following text identifies the plan check comments along with the responses in bold.

County of San Diego Comments

6-1. Provide a signature under Preparer's Certification.

Response: Signature will be provided once additional comments are cleared.

6-7. Attachment 1, Part 5: Provide a signature where indicated.

Response: Signature will be provided once additional comments are cleared.

6-8. Attachment 2.1 DMA Exhibit:
3rd Comment Review: Per Section 1.7 of the County BMP Design Manual, all impervious surfaces in the existing condition should be reviewed if they are a part of the project, because of the portion of the proposed improvements are located in Parcel 1 then the existing impervious surfaces of Parcel 1 must be included as part of the 50% rule. If a proposed parcel from this subdivision does not include any proposed improvement, then it be labeled as "existing and no plans for development." The resultant proposed parcels with improvements would be labeled as "new development." Please provide the project description and how it defines Parcel 1.

Response: All work will take place in Parcel 2. An updated 50% rule exhibit has been added to Attachment 2.1 to show updated lot lines and extent of work. Lots 1 and 3 have been labeled as "existing and no plans for development".

6-15. Attachment 2.2: Mapbooks Include mapbooks in a future submittal prior to Final Engineering submittal.

Response: Comment noted.

6-17. Attachment 7.1 Engineer of Work. Provide the Permit Application Number, PDS2022-TM-5647, and have the EOW sign and stamp the certification." Number, ***PDS2022-TM-5647***, and have the EOW sign and stamp the certification.

Response: Comment noted. The structural BMP certification will be signed and stamped once other comments have been cleared.

6-22b. 2nd Review Comment: Attachment 7.4:

3rd Review Comment: The unfactored DCV values differ between Pollutant Control Worksheet B.1, the DMA exhibit table, and Tabular summary of DMAs provided in Attachment 7.4 for DMA B1/B3, DMA B2, and DMA B4. Revise all to be consistent with the analysis.

Response: The DCV values have been updated to be consistent.

6-22d. 3rd Review Comment: Attachment 7.4:

Provide the total volume directed to and being treated by modular wetland as well as the capacity of selected modular wetland. Based on modular wetland drawing provided (MWS-L-8-8), the size is likely not enough to treat calculated values for 92% capture.

Response: The proposed MWS-L-8-8 was sized using the combined maximum water quality flow rates out of the stormwater vaults just below the HMP/Detention outlets. Water quality flow rates from DMA-B2 and DMA-B4 were also included in the treatment flow rate. The treatment flow rate for the MWS is shown to be greater than the combined water quality flow rate. Supporting calculations and annotated manufacturer specifications showing the treatment flow rate for the proposed BMP has been provided in Attachment 7.4 after the BMP outlet configuration/rating curve tables.

Though the attached manufacturer specifications state that the sizing is flow based, the flow rate out of each BMP correlates with the flow rate out of the vaults when the required treatment *volume* is stored (DCV * Storage Multiplier). Treating the maximum flow rate out of the vaults (flow out of low-flow orifices when vaults are ponded to just below HMP outlets) when the required treatment volume has been stored demonstrates 92% capture for water quality runoff.

6-22e. 3rd Review Comment: Attachment 7.4:

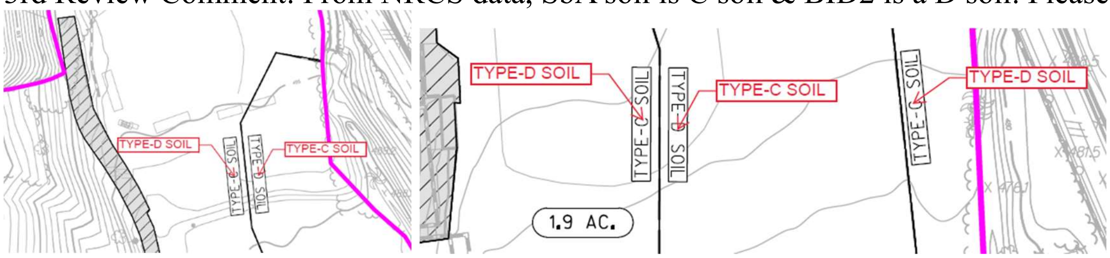
Clarify how Plan Note 31 (modified reverse curb outlet) in Sheet 6 of the PGP will convey stormwater flows from the proposed frontage improvements to the modular wetland system.

Response: Flows from the modified reverse curb outlet will tie in to a cleanout downstream of the internal orifice/weir plate and bypass storage structures. After entering the cleanout, flows will enter the MWS. Combined water quality flows from the reverse curb outlet and vaults will be treated by the MWS, and high flow will bypass the MWS via an internal bypass structure.

6-25a. 2nd Review Comment: SWMM Model:

The pre-project Hydromodification exhibit appears to indicate the underlying soil hydrological groups incorrectly toward the eastern side of the project. Correct to be consistent with the Soil Hydrologic groups from the NRCS data.

3rd Review Comment: From NRCS data, SbA soil is C soil & BID2 is a D soil. Please correct.



Response: Soil group labels have been updated in the pre-project hydromodification exhibit.

6-25e. 3rd Review Comment: SWMM Model:
For the Post-Project POC 1 model, revise the discharge rating curve from storage A to be consistent with routing the low flows to the modular wetland.

Response: The SWMM model has been updated to be consistent with the current storm drain layout. Low flows are now routed directly to POC-2 instead of POC-1.

6-25f. 3rd Review Comment: SWMM Model:
Provide the post processing calculations that demonstrate flow frequency and flow duration compliance.

Response: Post processing sheets have been included in Attachment 8.2.

6-26. Attachment 9.2:
3rd Review Comment: The justification provided uses City of Vista criteria. Please clarify whether the PCCSYA area is still present with the construction of the Vista I project and clarify how remaining PCCSYAs will be bypassed. The current plans show flows from a PCCYSA area going into a proposed brow ditch to the vault system.

Response: The PCCSYA report for Vista I has been removed from the PDPSWQMP for clarity. The majority of PCCSYAs existing before the Vista I project have since been developed. Any remaining PCCSYAs are to bypass the site and flow into the existing channel via a brow ditch. Offsite flows draining through PCCSYAs will enter the brow ditch and flow around the site rather than entering the vault system.

6-29. 3rd Review Comment:
Depending on how the Grading Violation against this property is resolved, the following revisions may be required:

- If the soil from the Vista I project site is allowed to remain on the Vista II site, then the pre-project conditions for this project will need to reflect the soil that was moved onto the site.
- If the soil from the Vista I project site will be removed and the Vista II project site will be restored to its condition prior to the Vista I soil being moved onto the site, then no revisions are needed.

Response: The pre-project HMP exhibit has been updated to include current site grading.

PRIORITY DEVELOPMENT PROJECT STORM WATER QUALITY MANAGEMENT PLAN FOR VISTA II

Revision Page

October 16, 2023

This PDPSWQMP presents a revision to the April 7, 2023 report pursuant to the County of San Diego plan check comments received August 31, 2023. The following text identifies the plan check comments along with the responses in bold.

<u>County of San Diego Comments</u>

6-1. Provide a signature under Preparer's Certification.

Comment noted. Report will be signed and stamped once other comments have been cleared.

6-8. Attachment 2.1 DMA Exhibit:
Per the County BMP Design Manual Chapter 1.3, CEQA requires that the project include "the whole of the action." As this proposed Tentative Map will be splitting the whole of APN 183-060-84-00 and as the percentage of impervious surfaces created/replaced exceeds 50%, the DMA Exhibit must encompass the entire bounds of
existing APN 183-060-84-00.

2nd Review Comment: Applicant response is insufficient. CEQA requires the "whole of the action" to be included. As the existing parcel will be split into three parcels in order to develop this project, the DMA Exhibit must encompass the entire bounds of the existing APN 183-060-84-00. If it was determined that the portion of work outside of Parcel 3 is less than the 50% increase, please show and include an annotation in the DMA Exhibit.

An exhibit showing the "whole of the action" for the proposed project has been included in Attachment 2 of the SWQMP below the DMA Exhibit. This exhibit includes the proposed subdivided parcels and the areas that will remain in their existing condition and untouched as part of the project.

6-13a. Correct the portion of the DMA Exhibit showing the connections for BMP-A2 to be consistent with profile detail provided.

DMA exhibit has been updated to show consistency with detail.

6-18. Attachment 7.2.1 Narrative Strategy. Clarify the flow path for DMA-B. The narrative states that the "high flows will bypass and be directed to the proposed biofiltration basin," but does not state what it is bypassing.

2nd Review Comment: Verify the DCV coefficient that was used to size the modular wetland. The calculations show a multiplier of 1.25 but the narrative in this section state the multiplier value is 1.5.

The narrative has been updated to clarify the updated design. Water Quality flows from DMA-A, B1, B2, B3, and B4 will be sent to a single modular wetland system (BMP-2B) instead of being treated by a biofiltration basin.

The DCV multiplier has been removed from the narrative, as this portion is only intended to describe the overall treatment strategy. Please refer to Attachment 7.4 for specific, updated calculations including DCV multiplier.

6-20. BMP-B2 Detail provided in Attachment 7.3 needs to be revised and provided in the DMA Exhibit. The detail must meet the design requirements in Appendix E.14 of the County BMP Design Manual including, but not limited to, surface ponding depth, mulch and media, filter course layers, etc.

BMP details have been updated to reflect current design.

2nd Review Comment: As the detail is now provided in the DMA, it can be removed from the Attachment 7 section of the PDP SWQMP.

Comment noted.

6-22a. Attachment 7.4 For DMA A, the provided drawdown for storage A1 does not drawdown within the allotted 24 hrs. Please revise either the percent capture nomograph to determine the appropriate DCV multiplier or provide updated drawdown times to show consistency with the percent capture nomograph used.

Drawdown times and DCV multiplier have been updated to be consistent with the percent capture nomograph.

6-22b. Attachment 7.4 For DMA B, the volume of 1.25*DCV is inconsistent between the automated worksheet B.1 value and what is noted on stage storage curve. The automated worksheet B.1 indicates that the DCV is 3642 ft 2 which would make 1.25*DCV = 4553 ft2. The flowrate used from the storage unit to the biofiltration basin corresponds to approximately 4180 ft2 (1.15*DCV). Clarify the discrepancy and revise as needed.

The volume to be treated by the modular wetland system (previously biofiltration basin) has been updated to match the required DCV multiplier. Backup calculations can be found in Attachment 7.4.

6-22c. Attachment 7.4 Automated Worksheet B.3, Clarify note provided at the bottom of the automated worksheet. Is this intended to show Step 2 of County BMP design Manual Appendix B.4.3 being met?

Worksheet B.3 was included in the SWQMP Attachment 7.4 as required. However, this worksheet is not adapted to storage units upstream of compact biofiltration. The note is included to indicate that Step 2 of County BMP design Manual Appendix B.4.3 being met through additional documentation on subsequent pages.

6-25a. SWMM Model The pre-project Hydromodification exhibit appears to indicate the underlying soil hydrological groups incorrectly toward the eastern side of the project. Correct to be consistent with the Soil Hydrologic groups from the NRCS data.

The labels on the Pre-Project Hydromodification exhibit have been updated to be consistent with the NRCS soil data.

6-25b. SWMM Model For both post-project models for POC 1 and POC 2 correct the Ksat values for DMA-A, as well as DMA-B1 and DMA-B2. The value must be reduced by 25% per Table G.1-4 of the County BMP Design Manual for compacted native soils.

The Ksat values for the post-project models have been reduced by 25% to reflect compacted native soils.

6-25c. Indicate the orifice/weir plate width in the face view provided in Vista II BMP-A1 Vault to Proprietary Biofiltration sheet.

The design of the outlet works has been changed to outlet structure inside the vault. This configuration makes it impractical to show an orifice/weir plate equivalent. However, elevations, diameters, and number of orifices have been called out in this detail.

6-25-d. Indicate the orifice/weir plate width in the face view provided in Vista II Biofiltration Basin B1 Vault to Biofiltration & HMP Configuration.

Details have been updated to indicate orifice/weir plate width.

6-26. Clarify the bypass of upstream offsite PCCSYAs. Based on the existing topography, the PCCSYAs upstream (to the east of the northernmost existing ballfield) would flow into the project area/proposed development.

A report discussing the bypass of upstream offsite PCCSYAs has been included in Attachment 9 of the PDPSWQMP.

PRIORITY DEVELOPMENT PROJECT STORM WATER QUALITY MANAGEMENT PLAN FOR VISTA II

Revision Page

April 7, 2023

This Priority Development Project Storm Water Quality Management Plan (PDP SWQMP) presents a revision to the September 30, 2022 report pursuant to the City of San Diego's plan check comments received March 3, 2023. The following text identifies the plan check comments along with the responses in bold.

County of San Diego Comments

6-1 Provide a signature under Preparer's Certification.

The report will be signed for the final submittal.

6-2 Table 1, Part A: Check the box indicating natural waterbodies are present. The site appears to include waters of the U.S. Select a corresponding BMP to be implemented for this feature. If no BMP is selected, provide a justification in Table 3.

The proposed grading limits of the project site does not contain natural water bodies. Rather, a natural drainage corridor to the east of the project site will be conserved. Table 1 has been updated to include the drainage corridor.

6-3 Table 1, Part B: Check the box indicating streets and roads, as well as driveways are proposed as part of this project. The plans indicate several internal roads and a connection to the public road that needs to be encompassed. Select a corresponding BMP to be implemented for each feature. If no BMP is selected, provide a justification in Table 3.

Comment noted. Table 1, Part B has been updated to reflect the streets, roads, and driveways.

6-4 Table 2, Part A: Typically, subdivisions for condominiums include at least one trash storage area for dumpsters serving the residents. Verify whether the box indicating trash & refuse storage should be checked. If so, select a corresponding BMP to be implemented for this feature and if no BMP is selected, provide a justification in Table 3.

Comment noted. Table 2, Part A has been updated to include trash storage areas.

6-5 Table 4, Part B, Section 2: Check the box indicating self-mitigating DMAs are proposed for this project. The DMA exhibit indicates one self-mitigating area. Also, check the boxes indicating that Attachment 6 and 9 have been provided.

Table 4, Part B, Section 2 has been updated to include self-mitigating DMAs.

6-6 Attachment 1, Part 3B: Check the box indicating that the project is subject to the California Construction General Permit. The project is disturbing more than an acre of land and is therefore subject to the California Construction General Permit (Order No. 2009-009-DWQ).

Comment noted. Attachment 1, Part 3B has been updated.

6-7 Attachment 1, Part 5: Provide a signature where indicated.

The storm water intake form will be signed for the final submittal.

6-8 Attachment 2.1 DMA Exhibit: Per the County BMP Design Manual Chapter 1.3, CEQA requires that the project include "the whole of the action." As this proposed Tentative Map will be splitting the whole of APN 183- 060-84-00 and as the percentage of impervious surfaces created/replaced exceeds 50%, the DMA Exhibit must encompass the entire bounds of existing APN 183-060-84-00.

Before construction begins, the existing parcel will be split into 3 smaller parcels which include a western parcel encompassing the existing church and house, an eastern parcel encompassing the project area, and a small parcel in the southeastern corner of the current parcel. The existing development only encompasses the eastern parcel and a small area of the western parcel (a parking lot which will receive water quality treatment and HMP storage). The project developer will only own the eastern parcel upon which the majority of the project will be constructed. The other parcels fall below a 50% increase to impervious areas.

6-9 Attachment 2.1 DMA Exhibit: The DMA exhibit is incomplete. Include the following information:

-Provide the underlying hydrologic soil group.

-Provide the approximate depth to groundwater.

-Clearly demarcate and provide an annotation for natural hydrologic features, including the existing channel along the east side of the proposed development.

Comment noted. These requests have been incorporated into the latest DMA exhibit.

6-10 Attachment 2.1 DMA Exhibit: Clarify DMA-B. The current limits appear to only include a portion of the BMP directly adjacent to the Hanalei Drive right of way and there appears to be a smaller DMA where the proposed private road connects to Hanalei Drive.

The portion of private road that connects to Hannalei drive (DMA-B2) drains directly to BMP-B2 to receive water quality treatment. BMP-B-1 will provide adequate storage to meet HMP requirements for both DMA-B1 and DMA-B2.

6-11 Attachment 2.1 DMA Exhibit: Provide a table indicating the area in square feet of impervious surfaces versus the area of pervious surfaces in each DMA.

Comment noted. DMA summary table have been included after the DMA exhibit.

6-12 Attachment 2.1 DMA Exhibit: Include detail views for all of the proposed BMPs, including how the proposed vaults are interconnected to share the volume of stormwater before going to the modular wetland and biofiltration basin.

Details of all proposed BMPs have been included with the DMA exhibit. Underground detention vaults are designed to pond concurrently are to be placed with the same bottom elevation and connected via 18" pipes.

6-13 Attachment 2.1 DMA Exhibit: Clarify how treated stormwater from BMP-A2 reaches the proposed POC on Hannalei Drive. According to the CEQA-Level Drainage Report Section 1, a storm drain is proposed along the existing channel (but does not appear to be shown) but Section 3 of the report states it will discharge to the channel. If BMP-A2 will discharge into the existing channel, a second POC is needed.

An outlet to the existing channel is now being shown on the DMA exhibit in Attachment 2.1. A second POC has been added to account for discharge flowing into the channel from DMA A.

6-14 Attachment 2.1 DMA Exhibit: Clarify what the red circled area indicates. If it was intended to show the proposed POC, it appears to have been misplaced.

Red circles indicate the proposed POCs and has been updated/labeled.

6-15 Attachment 2.2: Mapbooks. Include mapbooks in a future submittal prior to Final Engineering submittal.

Comment noted.

6-16 Attachment 2.3 Grading Plan: See PGP comments Attachment 7.1 Engineer of Work. Provide the Permit Application Number, PDS2022-TM-5647, and have the EOW sign and stamp the certification.

Comment noted. Permit Application Number will be provided. Grading plan will be signed and stamped in future submittal once comments have been addressed.

6-17 Attachment 7.1 Engineer of Work…Provide the Permit Application Number, PDS2022-TM-5647, and have the EOW sign and stamp the certification.

Certification will be signed and stamped in future submittal once comments have been addressed.

6-18 Attachment 7.2.1 Narrative Strategy: Clarify the flow path for DMA-B. The narrative states that the "high flows will bypass and be directed to the proposed biofiltration basin" but does not state what it is bypassing.

The narrative in Attachment 7.2.1 has been updated to discuss high flows in DMA-A and DMA-B.

6-19 Attachment 7.2.2 Structural BMP Summary Table: Check the box for "other" corresponding to BMP-A2 and note that it is a proprietary BMP.

Comment noted. Attachment 7.2.2 has been updated.

6-20 BMP-B2 Detail provided in Attachment 7.3 needs to be revised and provided in the DMA Exhibit. The detail must meet the design requirements in Appendix E.14 of the County BMP Design Manual including, but not limited to, surface ponding depth, mulch and media, filter course layers, etc. Also indicate that a barrier will be placed along the top of the retaining wall to prevent pedestrians within the property falling into the basin.

BMP-B2 Detail has been updated and design parameters have been called out.

6-21 Attachment 7.4: The information provided is insufficient to complete review. For sizing BMPs Downstream of a Storage Unit, please provide all applicable details that demonstrate how steps 1-4 of County BMP design Manual Appendix B.4.3 are met to size the BMP facility. Include any reference tables or materials where values used were taken from. Also, clarify how the interconnected vaults distribute the volume of stormwater to the modular wetland or biofiltration basin. Note: per Appendix B.4.3, use of upstream storage units like vaults, is not supported by County automated worksheets.

Calculations demonstrating appropriate BMP size have been included in Attachment 7.4. Details showing the function of the interconnected vault system have been added to attachment 7.4. Automated worksheets have been included to display DCV and retention requirements. However, additional documentation has been provided to demonstrate the functionality of the vaults (see HMP calculations), proprietary biofiltration system (see sizing chart Appendix 7.4), and biofiltration basin (see annotated County automated worksheets).

6-22 Attachment 7.4: Based on the County GIS system, the value for the 85th percentile rainfall depth is approximately 0.69 inches. Revise calculations accordingly.

Comment noted. The 85'th percentile rainfall depth has been revised throughout the calculations.

6-23 Attachment 7.5: This attachment is not applicable to the project proposed design. Please remove.

Attachment 7.5 has been removed.

6-24 Attachment 8.3: The HMP exhibit total DMA area is inconsistent with the DMA exhibit provided in Attachment 2.1 and pollutant control calculations. Verify DMA sizes.

Total area of HMP exhibit differs from area on DMA exhibit because offsite areas have been included to account for changes between pre- and post-project drainage conditions and ensure equivalent areas have been accounted for. Self-mitigating areas have been added to the exhibit to account for these changes (as seen on the DMA exhibit), and the post-project area is 0.1 ac greater than the pre-project area.

6-25 SWMM Model: The information provided is insufficient to complete review. Clarification is required to show how the interconnected vaults are designed and whether it is reasonable to be modeled as one BMP.

Exhibits showing BMP-A1 and BMP-B1 vault and outlet configurations have been added to Attachment 8.1 for clarity. The intent of the design is that the flow control structure for water quality and hydromodification is located at the downstream end of the linked underground vaults. In this way, the ponding/drawdown within the vaults will occur simultaneously.

6-26 Attachment 9.2: Revise the PCCSYA Exhibit to include the

(1) Project footprint.
(2) Areas of proposed development.
(3) Bypass of upstream offsite PCCSYAs along with what is already shown.

PCCSYA Exhibit has been updated.

6-27 Provide a Hydrologic Soil Group Map.

A hydrologic soil group map has been provided in Attachment 8.2.

2.0 General Requirements

- Attachment 2 consolidates exhibits and plans required for the entire project.
- Complete the table below to indicate which sub-attachments are included with the submittal. Sub-attachments that are not applicable can be excluded from the submittal.
- Unless otherwise stated, features and BMPs identified and described in each corresponding Attachment (6 through 9) must be shown on applicable DMA Exhibits and construction plans submitted for the project.

Sub-attachments	Requirement
☒ **2.1: DMA Exhibits**	All PDPs
☐ **2.2: Individual Structural BMP DMA Mapbook**	PDPs with structural BMPs
☒ **2.3: Construction Plan Sets**	All projects

NOTE: Mapbook to be included in future submittal.

2.1 DMA Exhibits

- DMA Exhibits must show all DMAs on the project site. Exhibits must include all applicable features identified in applicable SWQMP attachments.
- Exhibits may be prepared individually for the BMPs associated with each applicable SWQMP Attachment (6, 7, 8, and/or 9) or combined into one or more consolidated exhibits.
- Use this checklist to ensure required information is included on each exhibit (copy as needed).

DMA Exhibit ID #:		
A. Features required for all exhibits		
1. Existing Site Features		
☒ Underlying hydrologic soil group (A, B, C, D) ☒ Approximate depth to groundwater ☒ Natural hydrologic features	☒ Topography and impervious areas ☒ Existing drainage network, directions, and offsite connections	
2. Drainage Management Area (DMA) Information		
☒ Proposed drainage network, directions, and offsite connections	☒ DMA boundaries, ID numbers, areas, and type (structural BMP, de minimis, etc.)	
3. Proposed Site Changes, Features, and BMPs		
☒ Proposed demolition and grading ☒ Group 1, 2, and 3 Features[1] ☒ Group 4 Features	☐ Construction BMPs[2] ☒ Baseline source control BMPs ☐ Baseline source control BMPs	
B. Proposed Features and BMPs Specific to Individual SWQMP Attachments[3]		
☐ Attachment 6	☐ SSD-BMP impervious dispersion areas ☐ SSD-BMP tree wells	
☒ Attachment 7	☒ Structural pollutant control BMPs	
☒ Attachment 8	☒ Structural hydromodification management BMPs ☒ Point(s) of Compliance (POC) for hydromodification management ☒ Proposed drainage boundary and drainage area to each POC	
☒ Attachment 9	☐ Onsite CCSYAs	☐ Bypass of onsite CCSYAs ☒ Bypass of upstream offsite CCSYAs

[1] Group 1-4 features and baseline BMPs from PDP SWQMP Tables 2 and 3.

[2] Minimum Construction Stormwater BMPs from PDP SWQMP Table 7.

[3] Identify the location, ID numbers, type, and size/detail of BMPs.

2.2 Individual Structural BMP DMA Mapbook

- Use this page as a cover sheet for the Structural DMA Mapbook.
- An individual Structural DMA Mapbook must be submitted for any project site with one or more structural BMPs. One Mapbook is required for each unique subsequent owner with responsibility for maintenance of a Structural BMP. Mapbook exhibits will be incorporated as exhibits in Stormwater Maintenance Agreements (SWMAs) and Maintenance Notifications (MNs). See Attachment 11 for additional information on maintenance agreements. If the Mapbook has been provided for each subsequent owner in Attachment 11, they are not required here.
- Place each map on 8.5"x11" paper.
- Show at a minimum the DMA, Structural BMP, Assessor's parcel boundaries with parcel numbers, and any existing hydrologic features within the DMA.

☐	All Mapbooks are attached
☐	All Mapbooks are in Attachment 11

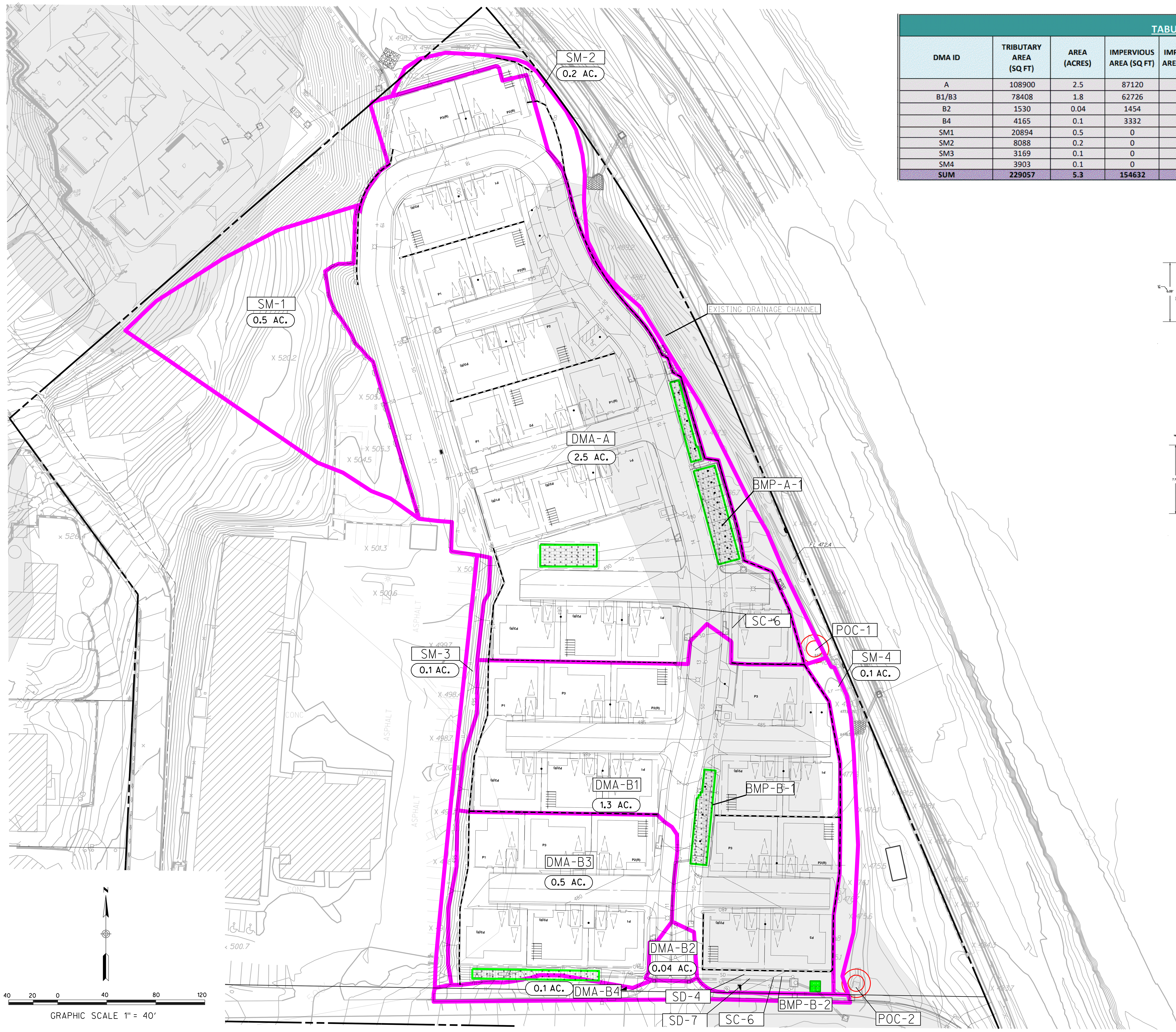
Note: Mapbooks to be provided in Final Engineering phase.

2.3 Construction Plan Sets

- DMAs, features, and BMPs identified and described in this attachment must also be shown on all applicable construction and landscape plans.
- As applicable, plan sheets must identify:
  - All features and BMPs identified in Sub-attachment 2.1 (DMA Exhibits).
  - The additional information listed below.
- Use this checklist to ensure required information is included on each plan (copy as needed).

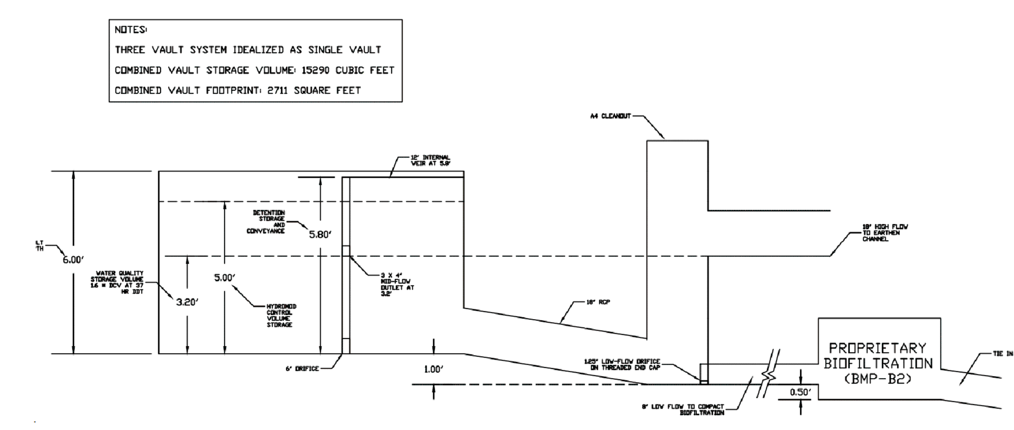
Plan Type	Grading Plan
Required Information[4]	
☒ Structural BMP(s) and Significant Site Design BMPs (if applicable) with ID numbers. ☒ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit. ☒ Details and specifications for construction of Structural BMP(s) and Significant Site Design BMPs (if applicable). ☒ Signage indicating the location and boundary of structural BMP(s) as required by County staff. ☒ How to access the structural BMP(s) to inspect and perform maintenance. ☒ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds). ☐ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP). ☐ Recommended equipment to perform maintenance. ☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management. ☐ Include landscaping plan sheets (if available) showing vegetation requirements for vegetated structural BMP(s). ☒ All BMPs must be fully dimensioned on the plans. ☒ When proprietary BMPs are used, site-specific cross-section with outflow, inflow, and manufacturer model number must be provided. Photocopies of general brochures are not acceptable. ☒ Include all source control and site design measures described in the SWQMP. ☒ Include all construction BMPs described in the SWQMP.	

[4] For Building Permit Applications, refer to Form PDS 272, https://www.sandiegocounty.gov/content/dam/sdc/pds/docs/pds272.pdf

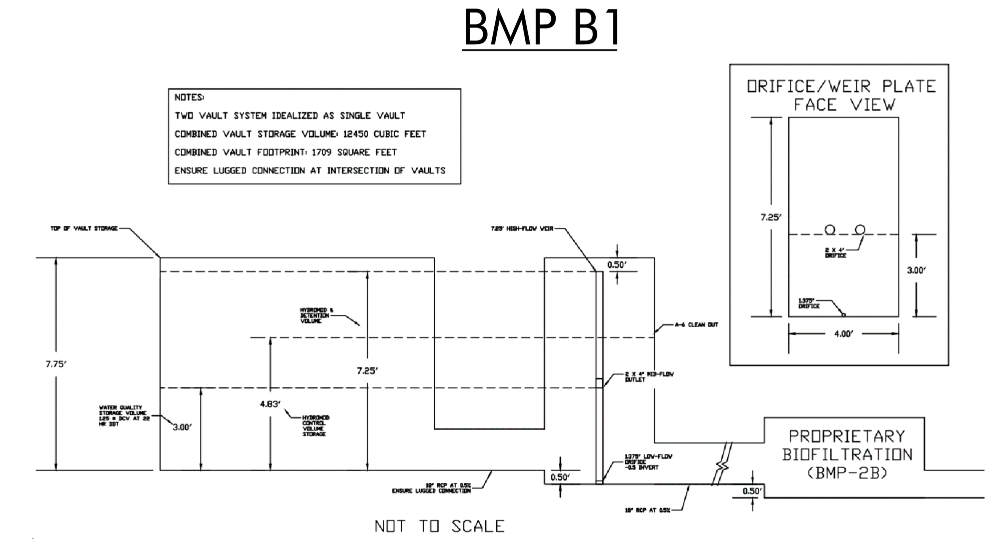


TABULAR SUMMARY OF DMAs, (VISTA II BALLFIELDS)											
DMA ID	TRIBUTARY AREA (SQ FT)	AREA (ACRES)	IMPERVIOUS AREA (SQ FT)	IMPERVIOUS AREA (ACRES)	%IMPERVIOUS	HSG	AREA WEIGHTED RUNOFF FACTOR	DCV (Cubic Feet)	TREATED BY	POLLUTANT CONTROL TYPE	WQ FLOW DRAINS TO (POC ID)
A	108900	2.5	87120	2.0	80%	D	0.78	4884	BMP-B2	Proprietary Biofil.	POC-2
B1/B3	78408	1.8	62726	1.4	80%	D	0.78	3517	BMP-B2	Proprietary Biofil.	POC-2
B2	1530	0.04	1454	0.03	95%	D	0.87	77	BMP-B2	Proprietary Biofil.	POC-2
B4	4165	0.1	3332	0.08	80%	D	0.78	187	BMP-B2	Proprietary Biofil.	POC-2
SM1	20894	0.5	0	0	0%	D	0.30	0	NA	NA	POC-1
SM2	8088	0.2	0	0	0%	D	0.30	0	NA	NA	POC-1
SM3	3169	0.1	0	0	0%	D	0.30	0	NA	NA	POC-2
SM4	3903	0.1	0	0	0%	D	0.30	0	NA	NA	POC-2
SUM	**229057**	**5.3**	**154632**	**3.5**	**68%**		**0.71**	**8664**			

BMP A



BMP B1



NOTES

-UNDERLYING HYDROLOGIC SOIL GROUP:
 TYPE "C" & TYPE "D"

-GROUNDWATER NOT DETECTED

-NO IMPACT FROM POTENTIAL CRITICAL COARSE SEDIMENT, PLEASE SEE THE APPROVED REPORT TITLED, "EVALUATION OF MAPPED POTENTIAL CRITICAL COURSE SEDIMENT YIELD AREAS FOR PHILLIPS SANTA FE VISTA PROJECT, CITY OF VISTA, CALIFORNIA", DATED DECEMBER 14, 2015 AND PREPARED BY RICK ENGINEERING COMPANY LOCATED IN ATTACHMENT 2B.

-REFER TO ATTACHMENT 1E FOR SIZING CALCULATIONS REGARDING THE MODULAR WETLANDS SYSTEM.

- JURISDICTIONAL BOUNDARIES ARE REFERENCED FROM SANGIS.

-BIOFILTRATION BASIN MUST BE FENCED TO PREVENT ACCESS.

SOURCE CONTROL BMP NOTES

SC-1: PREVENT ILLICIT DISCHARGES INTO THE MS4
SC-2: IDENTIFY THE STORM DRAIN SYSTEM USING STENCILING OR SIGNAGE
SC-6: ADDITIONAL BMPS BASED ON RUNOFF SOURCES
- ON-SITE STORM DRAIN INLETS
- LANDSCAPE/OUTDOOR PESTICIDE USE
- SIDEWALKS

SITE DESIGN BMP NOTES

SD-1: MAINTAIN NATURAL DRAINAGE PATHWAYS AND HYDROLOGIC FEATURES
SD-2: CONSERVE NATURAL AREAS, SOILS & VEGETATION
SD-3: MINIMIZE IMPERVIOUS AREA
SD-4: MINIMIZE SOIL COMPACTION
SD-7: LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES

LEGEND

DRAINAGE MANAGEMENT AREA (DMA) BOUNDARY
XX.X AC. — TRIBUTARY AREA TO DRAINAGE MANAGEMENT AREA
DMA-X — DRAINAGE MANAGEMENT AREA ID
BMP X — STRUCTURAL BMP ID
LOCATION OF COMPACT BIOFILTRATION BMP
LOCATION OF UNDERGROUND VAULT
SD-X — SOURCE CONTROL & SITE-DESIGN BMP
DRAINAGE FLOW PATH
POINT OF COMPLIANCE (POC)

DRAINAGE MANAGEMENT AREA EXHIBIT FOR VISTA II

Date: April 7, 2023
Revised: October 13, 2023
Revised: February 27, 2024

J-19253B

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5620 FRIARS ROAD
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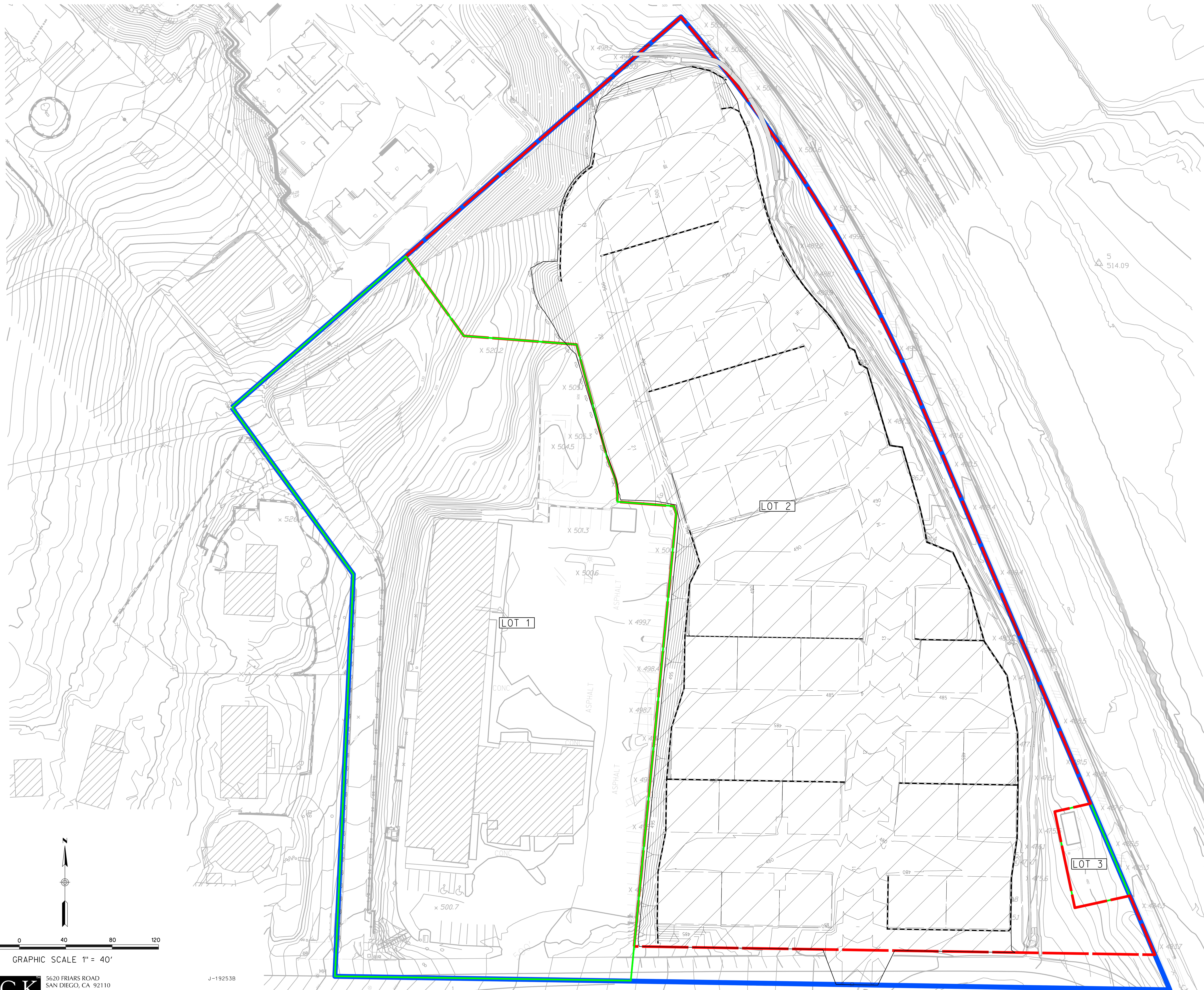
J-19253B

NOT FOR CONSTRUCTION - EXHIBIT FOR PDP SWQMP



50% RULE

LOT 1: - NO WORK DONE

LOT 2: > 50% IMPERVIOUS

LOT 3 - NO WORK DONE

PDP STORMWATER REQUIREMENTS APPLY ONLY TO THE NEWLY CREATED OR REPLACED IMPERVIOUS SURFACES PER SECTION 1.7 OF THE COUNTY OF SAN DIEGO BMP DESIGN MANUAL

LEGEND

EXISTING PARCEL BOUNDARY

PROJECT PARCEL BOUNDARY

PROPOSED PARCEL BOUNDARY

LIMITS OF WORK

50% RULE EXHIBIT FOR VISTA II

Date: October 13, 2023
Revised: February 27, 2024

J-19253B

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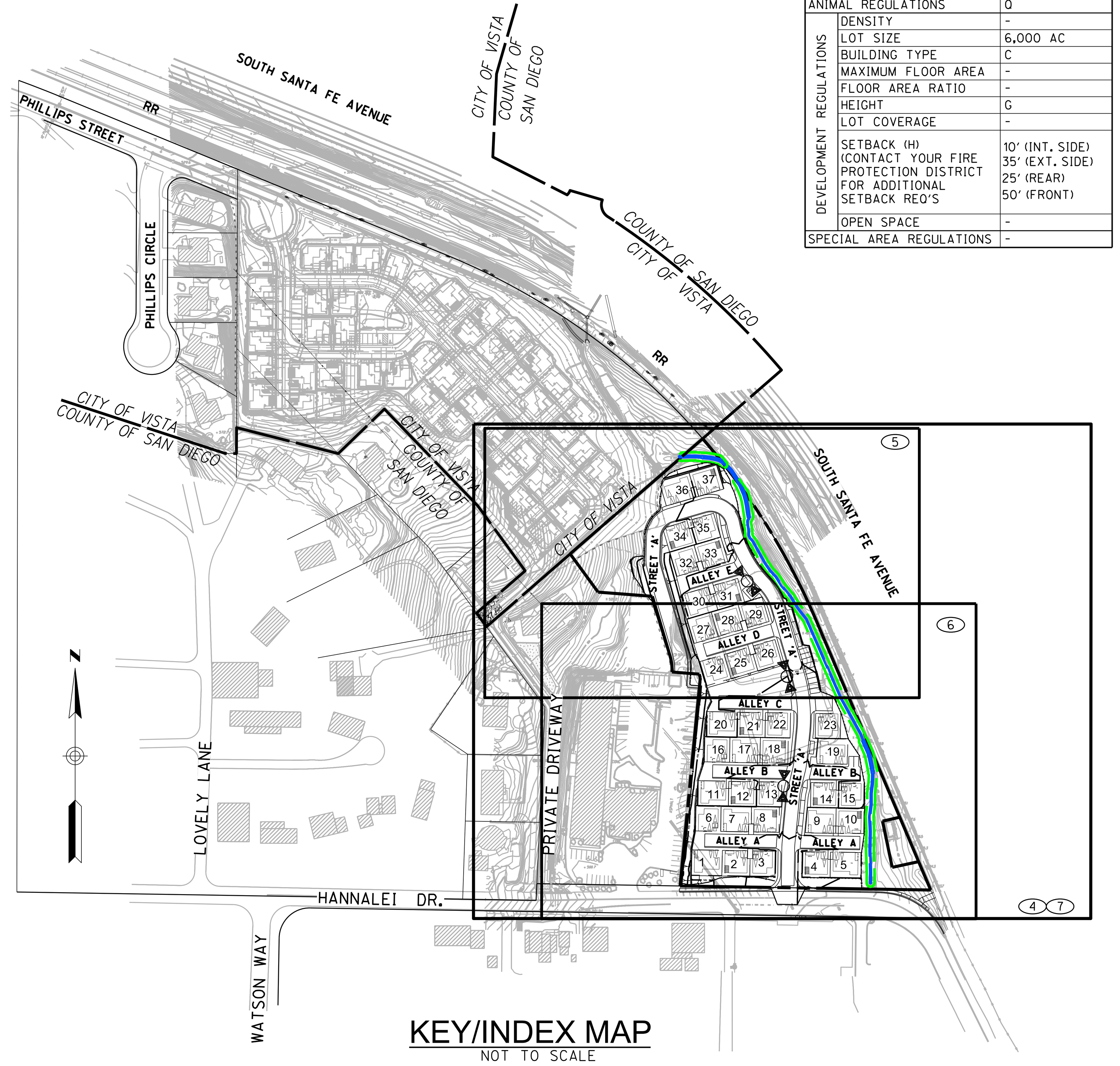
NOT FOR CONSTRUCTION - EXHIBIT FOR PDP SWQMP

PRELIMINARY GRADING PLAN
VISTA II MULTI-FAMILY

LEGEND	STANDARD DWGS.	SYMBOL
PROPERTY BOUNDARY		
EXISTING EDGE OF PAVEMENT		
EXISTING BUILDING		
EXISTING MAJOR CONTOUR		550
EXISTING MINOR CONTOUR		
EXISTING FENCE		
EXISTING SPOT ELEVATION		× 495.8
EXISTING SEWER MAIN		S
EXISTING SEWER MANHOLE		
EXISTING SEWER CLEANOUT		SC
EXISTING WATER MAIN		W
PROPOSED TOE OF SLOPE		
PROPOSED SLOPE		
PROPOSED RETAINING WALL		
PROPOSED WATER QUALITY BMP (SEE SHEET 8)		
PROPOSED STORM DRAIN (SIZE PER PLAN)		SD
PROPOSED RIPRAP		
PROPOSED HEADWALL		
PROPOSED PRIVATE BROW DITCH		
AQUATIC RESOURCES		



KEY/INDEX MAP
NOT TO SCALE

ZONE BOX (RS)

USE REGULATIONS		RS
ANIMAL REGULATIONS		Q
DEVELOPMENT REGULATIONS	DENSITY	-
	LOT SIZE	6,000 AC
	BUILDING TYPE	C
	MAXIMUM FLOOR AREA	-
	FLOOR AREA RATIO	-
	HEIGHT	G
	LOT COVERAGE	-
	SETBACK (H) (CONTACT YOUR FIRE PROTECTION DISTRICT FOR ADDITIONAL SETBACK REQ'S	10' (INT. SIDE) 35' (EXT. SIDE) 25' (REAR) 50' (FRONT)
	OPEN SPACE	-
SPECIAL AREA REGULATIONS		-

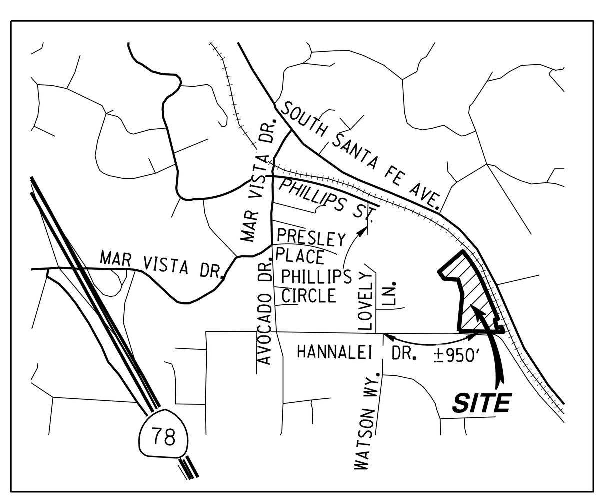
LIST OF ABBREVIATIONS

AC	ASPHALT CONCRETE	LF	LINEAR FEET
APN	ASSESSOR'S PARCEL NUMBER	LP	LOW POINT
AV	AIR & VACUUM ASSEMBLY	LT	LEFT
BO	BLOWOFF	MOD.	MODIFIED
BVC	BEGIN VERTICAL CURVE	P/L	PROPERTY LINE
C&G	CURB AND GUTTER	PCR	POINT OF CURB RETURN
C.B.	CATCH BASIN	PED	PEDESTRIAN
C.O.	CLEAN OUT	PI	POINT OF INTEREST
CL	CENTERLINE	PVC	POLYVINYL CHLORIDE
CL	CLASS	R	RADIUS
CML&C	CEMENT MORTAR LINED & COATING	R/W	RIGHT OF WAY
		RCB	REINFORCED CONCRETE BOX
D.G.	DECOMPOSED GRANITE	RCP	REINFORCED CONCRETE PIPE
DIP	DUCTILE IRON PIPE	RT	RIGHT
DWY	DRIVEWAY	RW	RECYCLED WATER
EC	END OF CURVE	SD	STORM DRAIN
EP	EDGE OF PAVEMENT	SDRSD	SAN DIEGO REGIONAL STANDARD DRAWINGS
EVC	END VERTICAL CURVE		
EX.	EXISTING	TEMP.	TEMPORARY
F.H.	FIRE HYDRANT	TP	TOP OF PIPE
FG	FINISHED GRADE	VC	VERTICAL CURVE
FL	FLOW LINE	W	WATER
G1	GRADE 1	W/	WITH
G2	GRADE 2	WSP	WATER STEEL PIPE
HP	HIGH POINT		

INDEX LEGEND

▭	SHEET
(3)	SHEET NUMBER
37	BUILDING NUMBER
	FIRE HYDRANT

SHEET INDEX



VICINITY MAP
NOT TO SCALE

ENVIRONMENTAL NOTE:
THE SUBJECT PROPERTY CONTAINS WETLANDS, A LAKE, A STREAM, AND/OR WATERS OF THE U.S. WHICH MAY BE SUBJECT TO REGULATION BY STATE AND/OR FEDERAL AGENCIES, INCLUDING, BUT NOT LIMITED TO, THE REGIONAL WATER QUALITY CONTROL BOARD, U.S. ARMY CORPS OF ENGINEERS AND THE CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE. IT IS THE APPLICANT5/32S RESPONSIBILITY TO CONSULT WITH EACH AGENCY TO DETERMINE IF A PERMIT, AGREEMENT OR OTHER APPROVAL IS REQUIRED AND TO OBTAIN ALL NECESSARY PERMITS, AGREEMENTS OR APPROVALS BEFORE COMMENCING ANY ACTIVITY WHICH COULD IMPACT THE WETLANDS, LAKE, STREAM, AND/OR WATERS OF THE U.S. ON THE SUBJECT PROPERTY. THE AGENCY CONTACT INFORMATION IS PROVIDED BELOW:

- U.S. ARMY CORPS OF ENGINEERS: 6010 HIDDEN VALLEY RD, SUITE 105, CARLSBAD, CA 92011-4219; (858) 674-5386; HTTP://WWW.USACE.ARMY.MIL/

- REGIONAL WATER QUALITY CONTROL BOARD: 9174 SKY PARK COURT, SUITE 100, SAN DIEGO, CA 92123-4340; (858) 467-2952; HTTP://WWW.WATERBOARDS.CA.GOV/SANDIEGO/

- UNITED STATES FISH AND WILDLIFE SERVICE: 2177 SALK AVE, SUITE 250, CARLSBAD, CA 92008;(760)431-9440; HTTPS://WWW.FWS.GOV/

- CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE: 3883 RUFFIN RD., SAN DIEGO, CA 92123; (858) 467-4201; HTTP://WWW.DFG.CA.GOV/"

WAIVER/DEVIATION REQUESTS:
1) PROJECT BOUNDARY SETBACK DEVIATION FOR UNIT 36 AND 37
25' REQUIRED
19.8' PROVIDED (UNIT 36)
23.3' PROVIDED (UNIT37)

2) PRIVATE USABLE OPEN SPACE DEVIATION
10'X10' MINIMUM REQUIRED
PROPOSE TO USE ENTIRE
REAR AND SIDE YARD
SPACE PROVIDED.

NOTE:
THIS PLAN IS PROVIDED TO ALLOW FOR FULL AND ADEQUATE DISCRETIONARY REVIEW OF THE PROPOSED DEVELOPMENT PROJECT. THE PROPERTY OWNER ACKNOWLEDGES THAT ACCEPTANCE OR APPROVAL OF THIS PLAN DOES NOT CONSTITUTE APPROVAL TO PERFORM AND GRADING SHOWN HERON, AND AGREES TO OBTAIN VALID GRADING PERMISSIONS BEFORE COMMENCING SUCH ACTIVITY

DENSITY:
MAXIMUM DENISTY ALLOWED: (7.3/AC) X 5.33 AC = 39 UNITS
DENSITY PROPOSED: (3.9/AC) X 5.33 AC = 37 UNITS

SOLAR ACCESS STATEMENT:
ALL LOTS WITHIN THIS SUBDIVISION HAVE A MINIMUM OF 100 SQUARE FEET OF SOLAR ACCESS FOR EACH FUTURE DWELLING UNIT ALLOWED BY THIS SUBDIVISION.

KAREN VAN ERT, RCE 56991

CONDOMINIUM STATEMENT:
THIS IS A MAP OF A CONDOMINIUM PROJECT AS DEFINED IN SECTION 1350 OF THE STATE OF CALIFORNIA CIVIL CODE. THE MAXIMUM NUMBER OF UNITS IS 37.

GENERAL SLOPE ANALYSIS TABLE:

LOT NO.	HIGH PT.	LOW PT.	LENGTH	SLOPE AVG.
LOT 1	543	491	608	8.5%
LOT 2	501	473	809	3.5%
LOT 3	482	479	39	7.7%

COUNTY OF SAN DIEGO OPEN SPACE REQUIREMENTS:

PRIVATE USABLE OPEN SPACE:
REQUIRED: 400 sf/UNIT
400 sf x 37 UNITS = 14,800 sf
PROVIDED: 14,800 sf

CONSERVATION/GROUP OPEN SPACE:
REQUIRED: 25% OF SITE
0.25 x 232,193 sf = 58,048 sf
CONSERVATION OPEN SPACE: 51,182 sf
GROUP OPEN SPACE: 10,280 sf
TOTAL OPEN SPACE PROVIDED: 61,462 sf

LOT INFORMATION:

EXISTING	GROSS AC.	NET AC.
LOT 1	8.93	8.93

PROPOSED	GROSS AC.	OPEN SPACE	NET AC.
LOT 1	3.52	0	3.52
LOT 2	5.33	1.33	4.00
LOT 3	0.078	0	0.078

OWNER
BUENA VISTA BAPTIST CHURCH
145 HANNALEI DRIVE
VISTA, CA 92083

OWNER'S CERTIFICATE
WE HEREBY CERTIFY THAT WE ARE THE RECORD OWNERS OF THE PROPERTY SHOWN ON THE TENTATIVE SUBDIVISION MAP AND THAT SAID MAP SHOWS ALL OUR CONTIGUOUS OWNERSHIP IN WHICH WE HAVE ANY DEED OR TRUST INTEREST. WE UNDERSTAND THAT OUR PROPERTY IS CONSIDERED CONTIGUOUS EVEN IF IT IS SEPARATED BY ROADS, STREETS, UTILITY EASEMENTS, OR RAILROAD RIGHT-OF-WAYS. WE WILL COMPLY WITH THE PARK AND LAND DEDICATION ORDINANCE.

BUENA VISTA BAPTIST CHURCH
145 HANNALEI DRIVE
VISTA, CA 92083

APPLICANT
WARMINGTON RESIDENTIAL
3090 PULLMAN STREET
COSTA MESA, CA. 92626
(714) 434-4416

LEGAL DESCRIPTION
A PORTION OF THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 32, TOWNSHIP 11 SOUTH, RANGE 3 WEST, SAN BERNARDINO MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO UNITED STATED GOVERNMENT SURVEY APPROVED DECEMBER 14, 1885.

BEGINNING AT A POINT IN THE SOUTH LINE OF THE SAID NORTEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 32, DISTANT THEREON SOUTH 89 DEGREES 37'16"EAST, 930.30 FEET FROM THE SOUTHEAST CORNER OF LOT 16 OF ORLEAVO HEIGHTS UNIT NO. 1, ACCORDING TO MAP THEREOF NO. 1944, FILED SEPTEMBER 17, 1926, IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY; THENCE CONTINUING ALONG SAID SOUTH LINE, SOUTH 89 DEGREES 37'16"EAST, 418.00 FEET TO THE SOUTHEAST CORNER OF SAID NORTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 32; THENCE SOUTH 89 DEGREES 37'16"EAST, ALONG THE SOUTH LINE OF SAID NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 32, 303.05 FEET TO A POUNT IN THE SOUTHWESTERLY RIGHT OF WAY LINE OF SAID ATCHISON, TOPEKA AND SANTA FE RAILWAY; THENCE NORTH 23 DEGREES 40'46"WEST ALONG SAID SOUTHWESTERLY RIGHT OF WAY LINE 560.51 FEET TO THE BEGINNING OF A TANGENT CURVE THEREIN, SAID CURVE BEING CONCAVE SOUTHWESTERLY AND HAVING A RADIUS OF 1223.57 FEET; THENCE NORTHWESTERLY ALONG THE ARC OF SAID CURVE IN SAID SOUTHWESTERLY RIGHT OF WAY LINE, 384.12 FEET TO A POINT, A RADIAL LINE THROUGH SAID POINT BEARING NORTH 48 DEGREES 20' EAST; THENCE LEAVING SAID SOUTHWESTERLY RIGHT OF WAY LINE, SOUTH 48 DEGREES 20' WEST, 513.00 FEET; THENCE SOUTH 36 DEGREES 50' EAST, 178.38 FEET; THENCE SOUTH 2 DEGREES 10' WEST, 347.00 FEET, MORE OR LESS TO THE POINT OF BEGINNING.

EXCEPTING THEREFROM THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 32 OF SAID LAND, ALL MINERALS, OILS, GAS AND HYDRO-CARBON SUBSTANES AS RESERVED BY CHARLES E. CARVER AND FLORA S CARVER, IN DEED RECORDED MARCH 3, 1923 IN BOOK 926, PAGE 306 OF DEEDS.

A.P.N.: 183-060-84

GENERAL NOTES
1. EXISTING LOTS: 1
2. PROPOSED LOTS: 3
3. TOTAL # OF MF UNITS PROPOSED : 37 UNITS
   TOTAL # OF MF UNITS (ALLOWED): 39 UNITS
4. TOTAL EXISTING AREA: 8.93 ACRES
5. A.P.N.: 183-060-84
6. EXISTING/PROPOSED GENERAL PLAN LAND USE
   DESIGNATION: VILLAGE RESIDENTIAL (VR-7.3)
7. EXISTING ZONING: RS
8. PROPOSED ZONING: RS
9. FIRE DISTRICT: VISTA FIRE PROTECTION DISTRICT
10. WATER DISTRICT: VISTA IRRIGATION DISTRICT
11. SCHOOL DISTRICT: VISTA UNIFIED SCHOOL DISTRICT
12. SEWER DISTRICT: CITY OF VISTA (BUENA SANITATION DISTRICT)
13. TAX RATE AREA: CITY OF VISTA
14. PLANNING AREA: NORTH COUNTY METRO

BENCHMARK
GPS STA. 2066 PER ROS 14023
VERTICAL DATUM: 1929 (NGVD 29)
ELEV.: 444.67

TOPOGRAPHY SOURCE
AERIAL SURVEY BY RICK ENGINEERING FLOWN: 12/16/2020

FIELD SURVEY VERIFICATION PERFORMED ON 4/08/2021
BY RICK ENGINEERING COMPANY

GEOTECHNICAL STUDY
"GEOTHECHNICAL INVESTIGATION, A 5.3 ACRE PHILLIPS SANTA FE RESIDENTIAL DEVELOPMENT PROJECT" DATED JUNE 11, 2021
PREPARED BY LEIGHTON & ASSOCIATES, INC.

GRADING QUANTITIES
ALL QUANTITIES ARE PRELIMINARY ONLY
PROPOSED CUT: 10,700 C.Y.
PROPOSED FILL: 22,500 C.Y.
PROPOSED IMPORT: 11,800 C.Y.

PARKING TABLE
REQUIRED (PER SEC. 6757 "OFFSTREET PARKING REGULATIONS")

+3 BDRM UNITS 2 SP/UNIT:	37 UNITS X 2 = 74 SPACES
GUEST (0.2 SP/UNIT):	37 UNITS X 0.2 = 8 SPACES
TOTAL REQUIRED:	82 SPACES

PROVIDED

GARAGES (2-CAR):	37 UNITS X 2-CAR GARAGE = 74 SPACES
ON-STREET (GUEST):	37 SPACES
TOTAL PROVIDED:	74+37 = 111 SPACES ✳

✳ INCLUDES 1 ADA STALL

Prepared By:
Name: Rick Engineering Company
Address: 5620 Friars Road
San Diego, California 92110
Phone #: (619) 291-0707

Project Address:
143 HANNALEI DRIVE
VISTA, CA. 92083

Project Name:
VISTA II MULTI-FAMILY

Sheet Title:
PRELIMINARY GRADING PLAN

Revision 14:	
Revision 13:	
Revision 12:	
Revision 11:	
Revision 10:	
Revision 9:	
Revision 8:	
Revision 7:	
Revision 6:	
Revision 5:	
Revision 4:	
Revision 3:	
Revision 2:	10/13/2023
Revision 1:	4/17/2023
Original Date:	9/30/2022

Sheet 1 of 7

COUNTY OF SAN DIEGO
TRACT NO. TM

PRELIMINARY
NOT FOR CONSTRUCTION

RICK ENGINEERING COMPANY
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619-291-0707
(FAX) 619-291-4165
rickengineering.com
San Diego
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J-19253B

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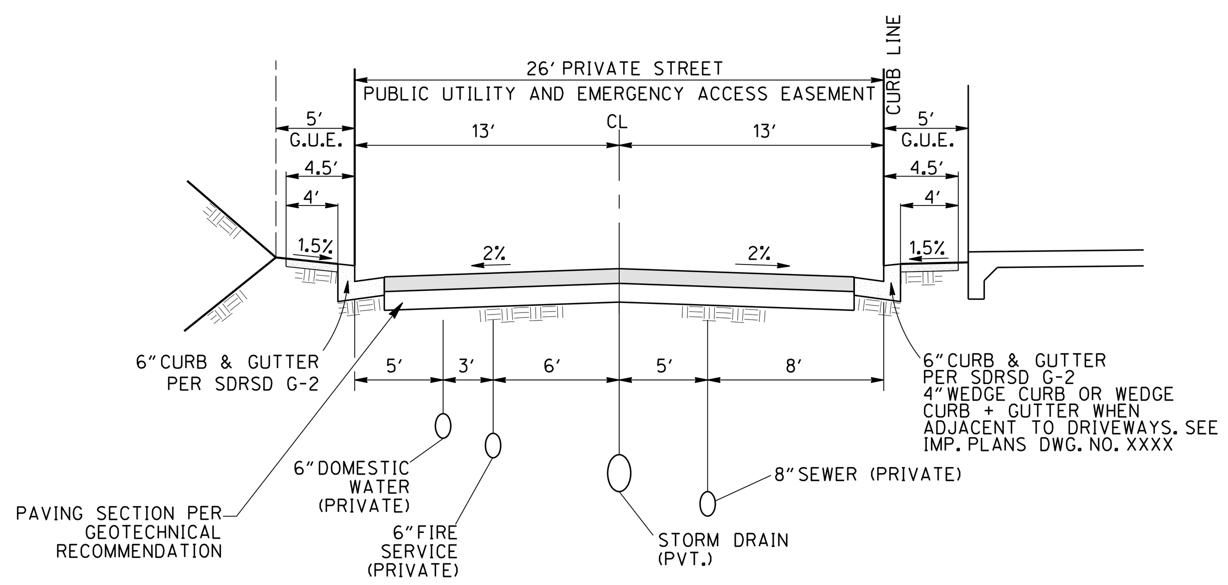
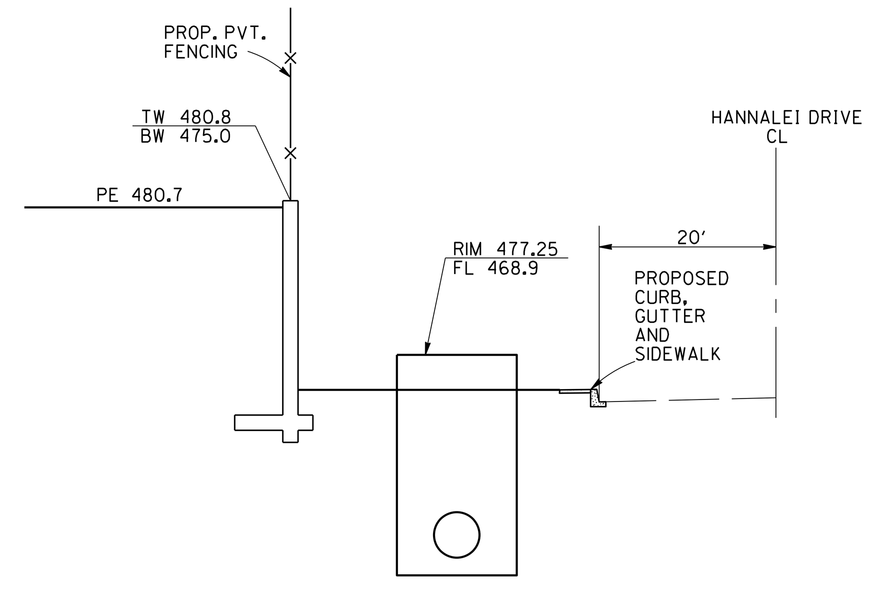
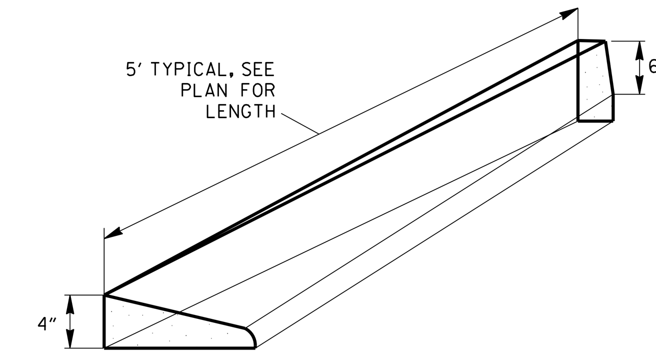
27-FEB-2024 15:19



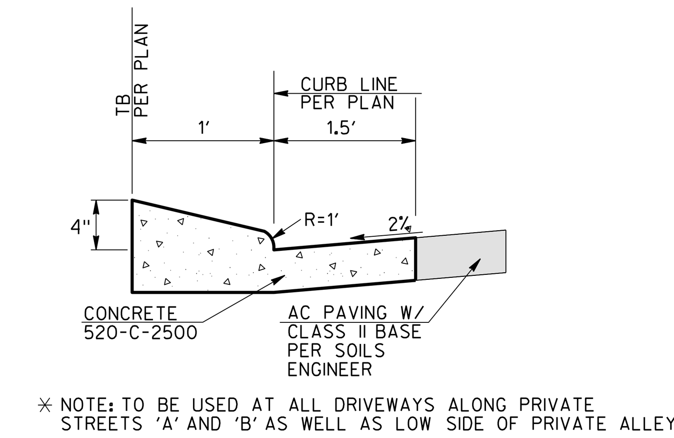
TYPICAL SECTION
PRIVATE STREET "A"
NO SCALE
10+00-17+75 & 18+60-20+00



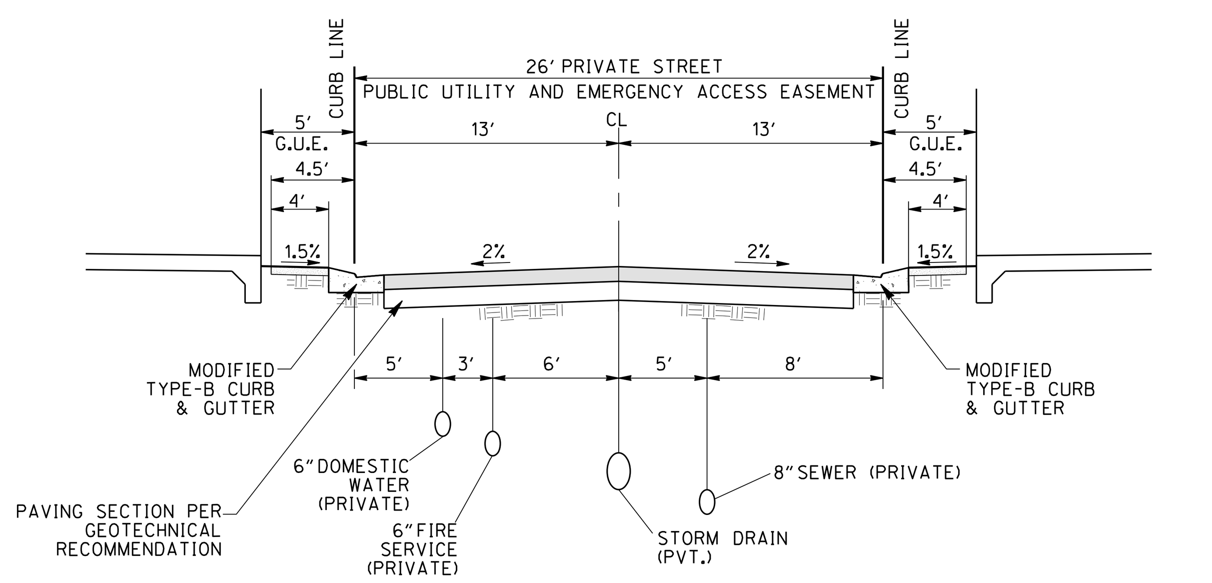
SECTION 1-1
N. T. S.



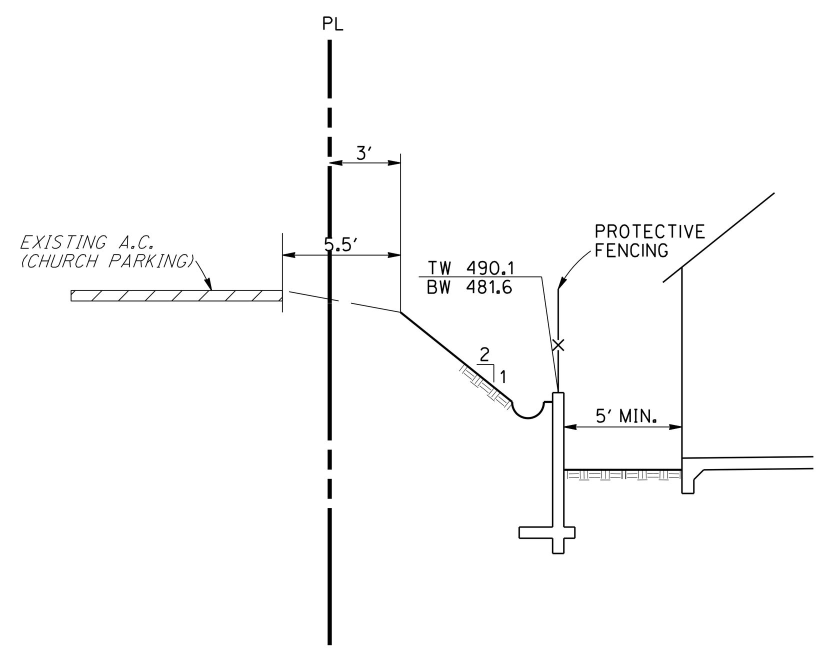
WEDGED CURB TO CURB TRANSITION PER RSD G-04B (PVT)
N. T. S.



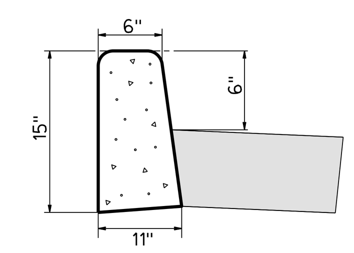
MODIFIED TYPE-B CURB & GUTTER (PVT.) PER RSD G-04A
N. T. S.



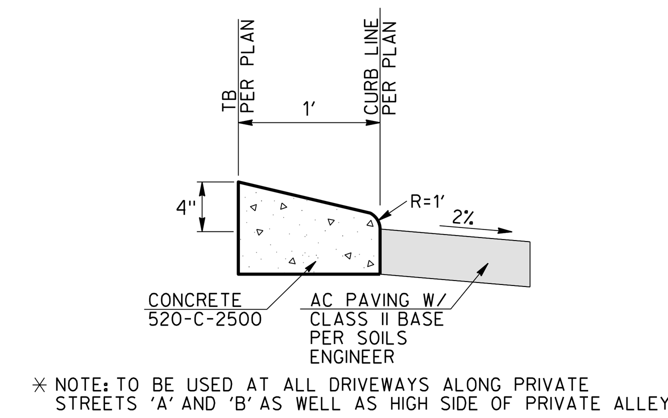
TYPICAL SECTION
PRIVATE STREET "A"
NO SCALE
17+75-18+60



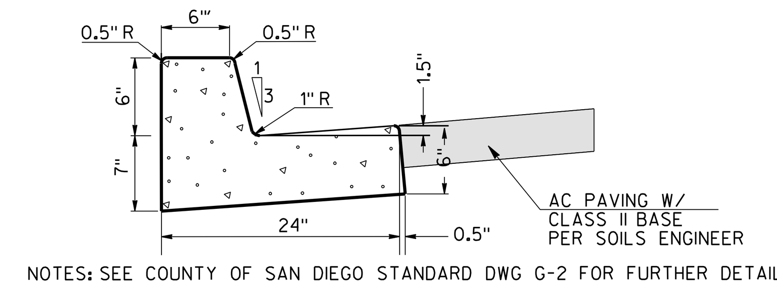
SECTION 2-2
N. T. S.



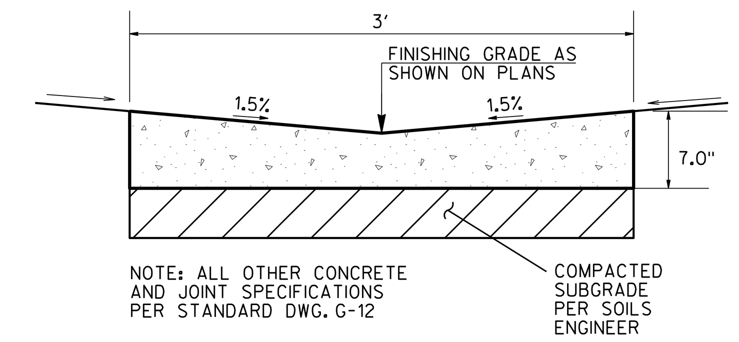
DETAIL: 6" CURB (PVT.) PER RSD G-1
N. T. S.



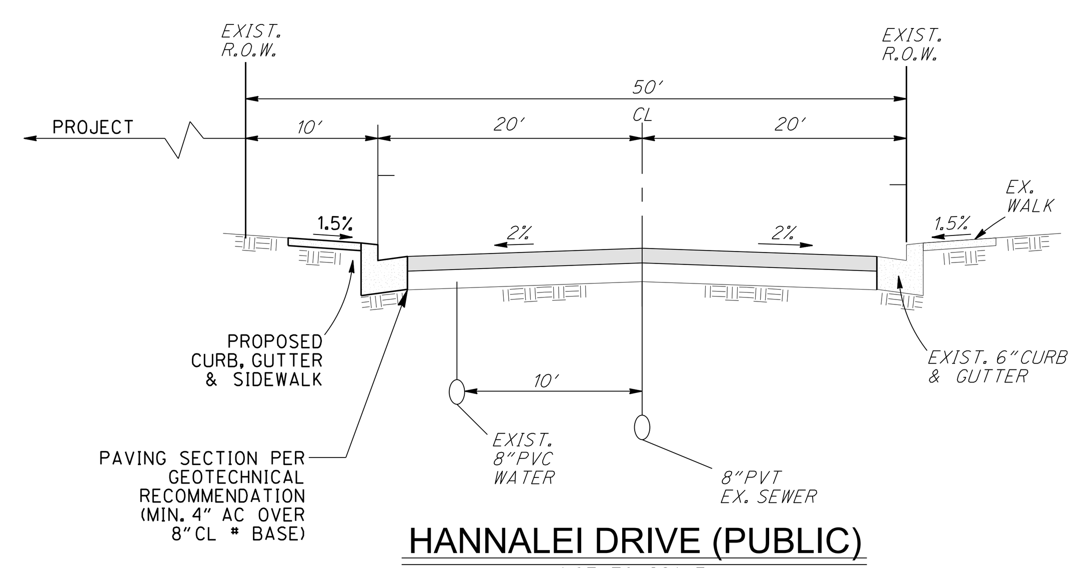
4" WEDGE CURB (PVT.)
N. T. S.



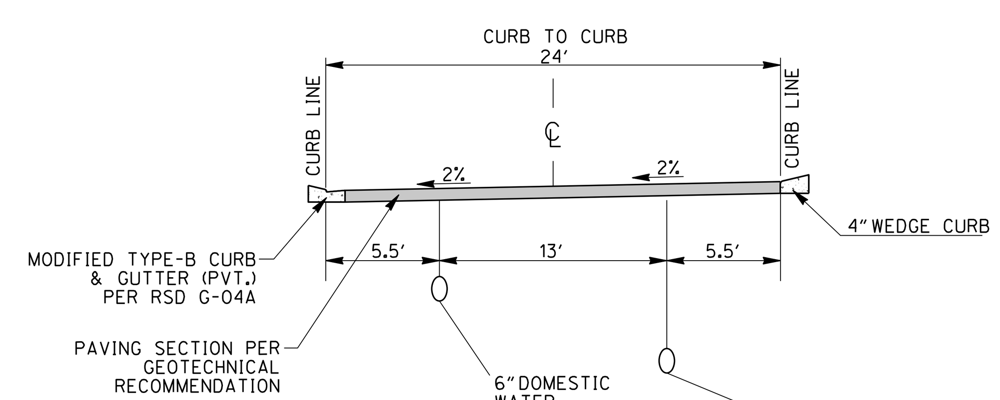
6" CURB & GUTTER (PVT) PER RSD G-2
N. T. S.



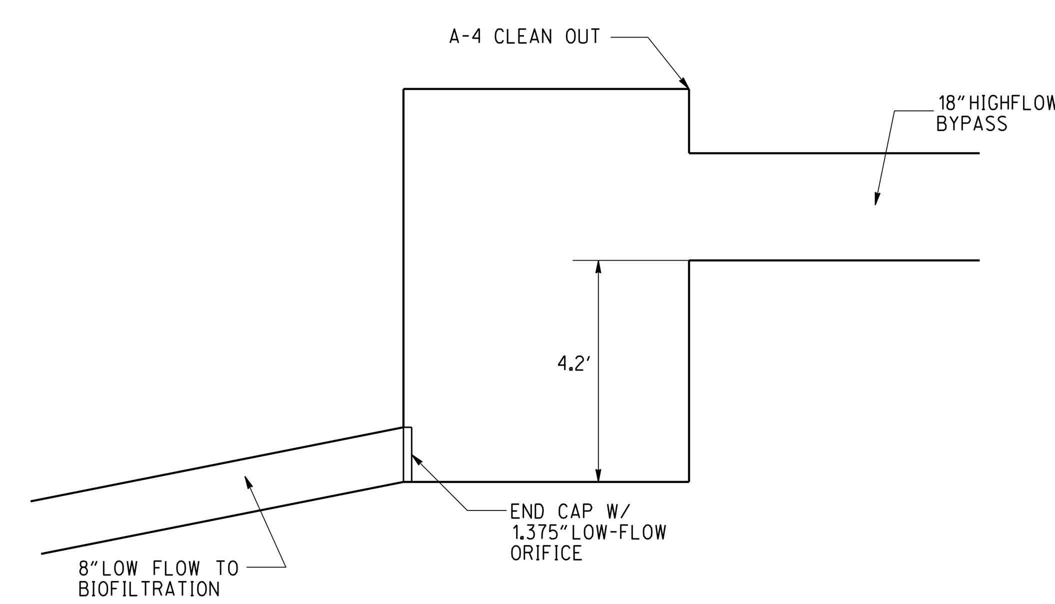
3' RIBBON GUTTER (PVT)
N. T. S.



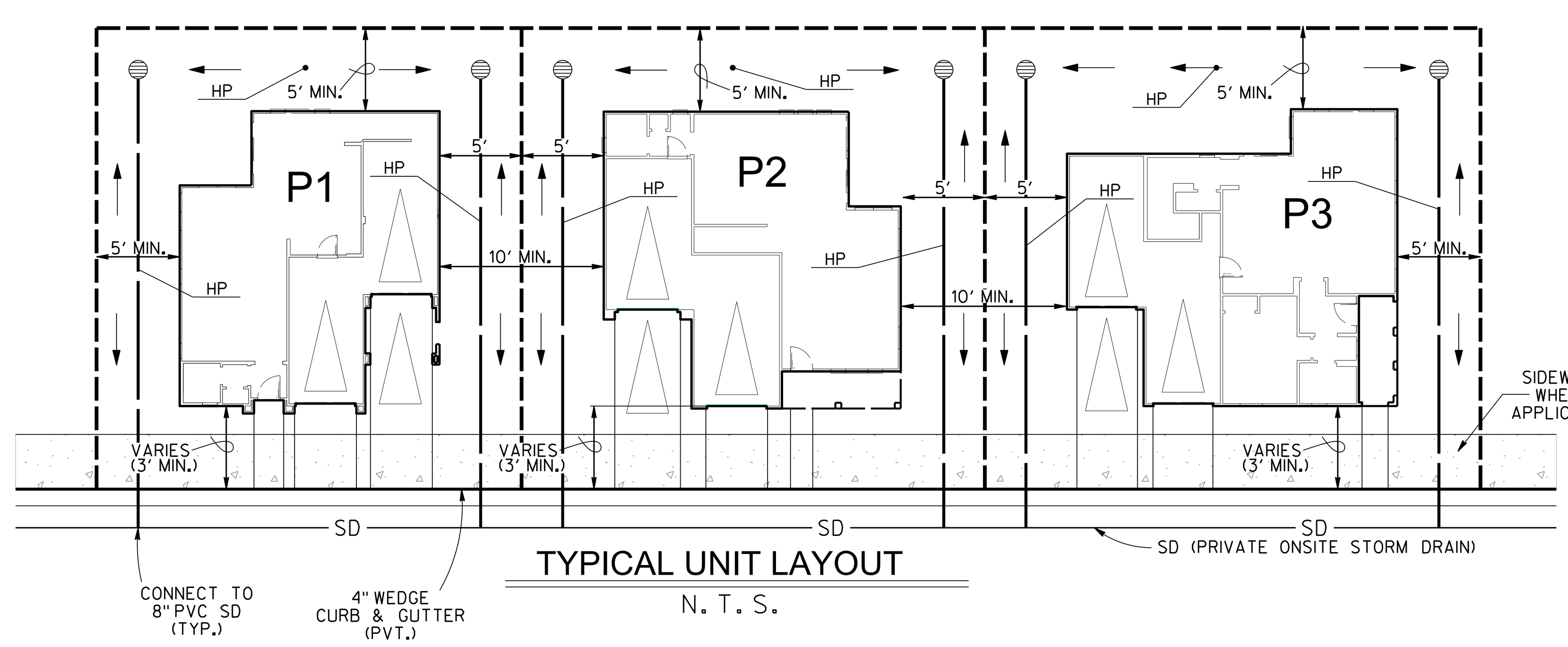
HANNALEI DRIVE (PUBLIC)
NOT TO SCALE



TYPICAL ALLEY SECTION (PVT)
NO SCALE

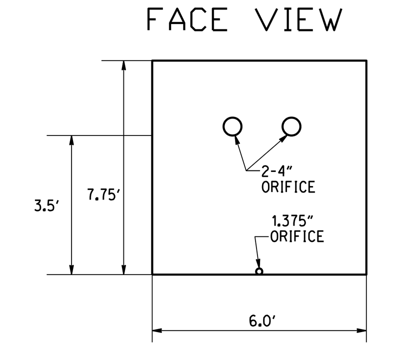


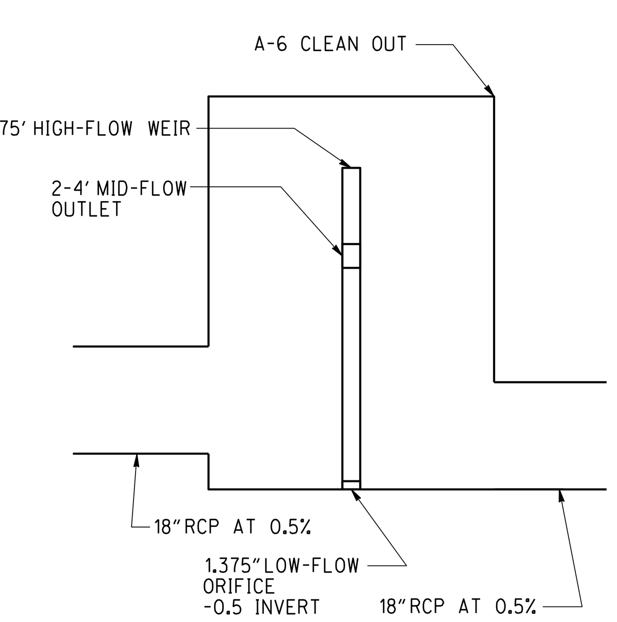
BMP A1 DETAIL



TYPICAL UNIT LAYOUT
N. T. S.

ORIFICE/WEIR PLATE FACE VIEW





BMP B1 DETAIL

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(FAX) 619-291-4165
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J-19253B

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Name: Rick Engineering Company
Address: 5620 Friars Road, San Diego, California 92110
Phone #: (619) 291-0707

Project Address:
143 HANNALEI DRIVE
VISTA, CA. 92083

Project Name:
VISTA II MULTI-FAMILY

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COUNTY OF SAN DIEGO
TRACT NO. TM

PRELIMINARY
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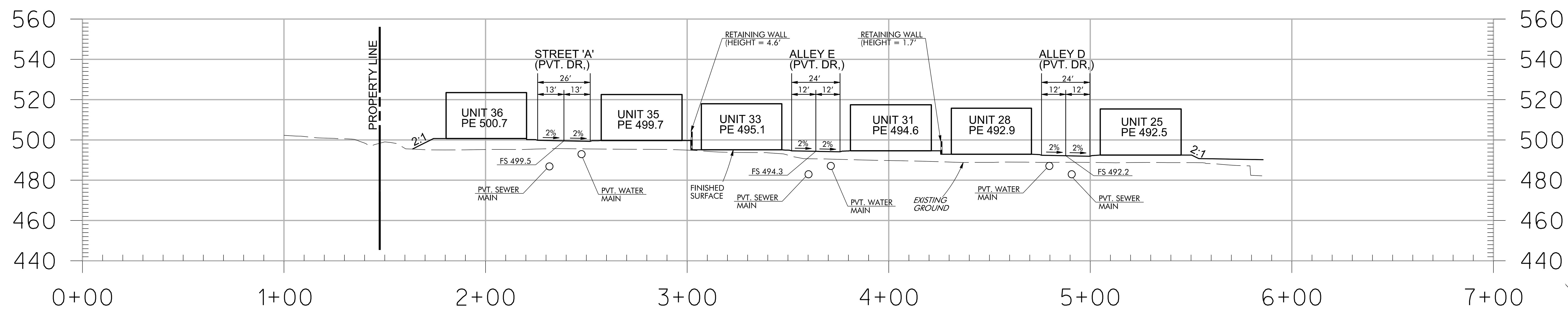
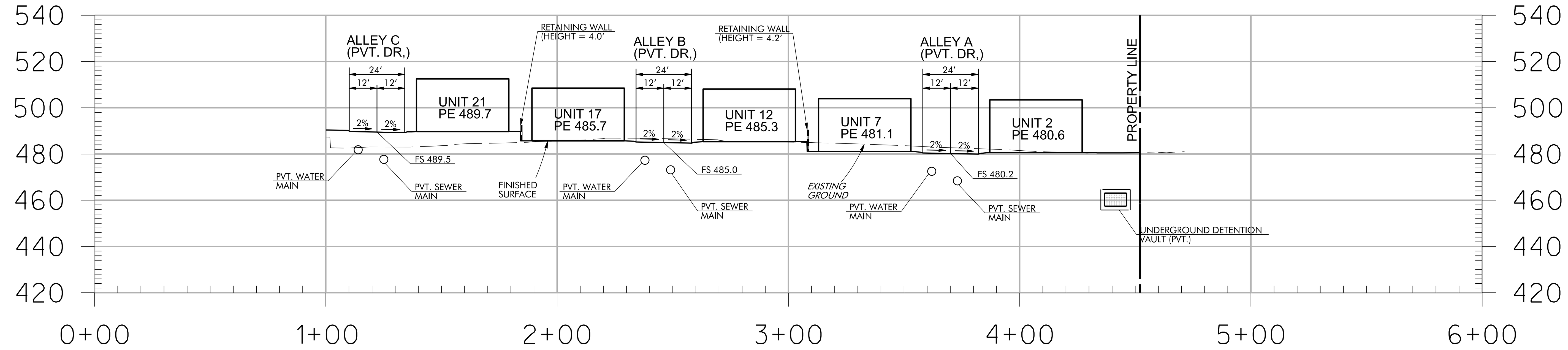


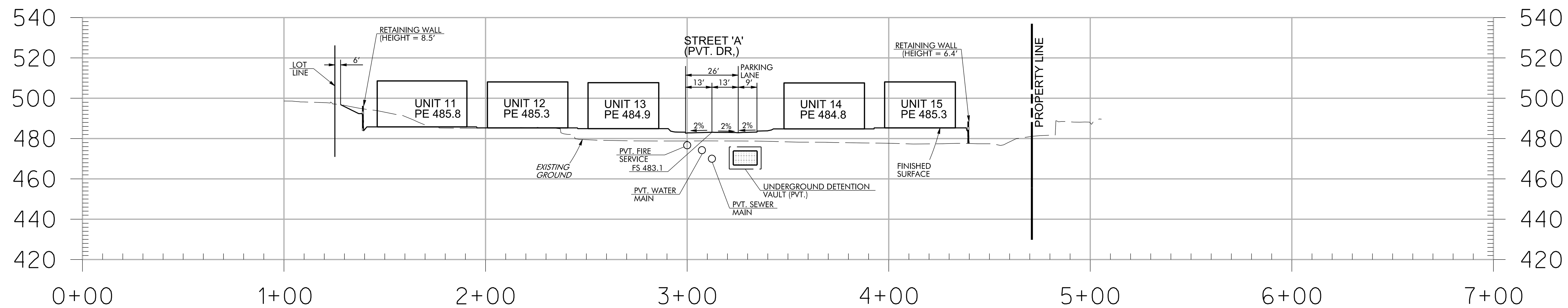
SECTION 3-3

N. T. S.



SECTION 4-4

N. T. S.



SECTION 5-5

N. T. S.

SECTION KEY MAP

GRAPHIC SCALE 1" = 60'

NOTE:
SEE SHEET 2 FOR CROSS SECTIONS 1-1 AND 2-2

Prepared By:
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143 HANNALEI DRIVE
VISTA, CA. 92083

Project Name:
VISTA II MULTI-FAMILY

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COUNTY OF SAN DIEGO
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PRELIMINARY
NOT FOR CONSTRUCTION

EASEMENT NOTES

A — EXISTING TEMPORARY CONSTRUCTION EASEMENT
PER DEED REC. 05-26-2015
DOC. NO. 2015-0264903 &REC. 03-04-2015
DOC. NO. 20015-0098147 TO REMAIN

B — EXISTING DRAINAGE EASEMENT
PER DEED REC. 05-26-2015
DOC. NO. 2015-0264903 &REC. 03-04-2015
DOC. NO. 20015-0098147 TO REMAIN

C — EXISTING DRAINAGE EASEMENT
PER DEED REC. 05-26-2015
DOC. NO. 2015-0264903 &REC. 03-04-2015
DOC. NO. 20015-0098147 TO REMAIN

D — EXISTING TEMPORARY CONSTRUCTION EASEMENT
PER DEED REC. 05-26-2015
DOC. NO. 2015-0264903 &REC. 03-04-2015
DOC. NO. 20015-0098147 TO REMAIN

E — EXISTING PATH EASEMENT
PER DEED REC. 05-26-2015
DOC. NO. 2015-0264903 &REC. 03-04-2015
DOC. NO. 20015-0098147 TO REMAIN

F — EXISTING DRAINAGE EASEMENT
PER DEED REC. 05-26-2015
DOC. NO. 2015-0264903 &REC. 03-04-2015
DOC. NO. 20015-0098147 TO REMAIN

G — EXISTING "EASEMENT FOR COUNTY HIGHWAY" DEDICATED TO THE COUNTY OF SAN DIEGO PER DOCUMENT RECORDED 8/20/1959 IN BOOK 7840, PAGE 175, O.R. TO REMAIN

H — EXISTING ESMT & RIGHT OF WAY FOR ROAD PURPOSES
PER DEED RECORDED 9-1-1927
IN BK 1367, PG 325
AND
EXISTING ESMT & RIGHT OF WAY FOR ROAD PURPOSES
PER DEED RECORDED 9-3-1930
IN BK 1817, PG 81 TO REMAIN

I — EXISTING 12' SDG&E ESMT FOR UTILITIES PURPOSES
PER DEED RECORDED 1-02-1962
IN FILE # 265 TO REMAIN

J — EXISTING SDG&E ESMT FOR UTILITIES PURPOSES
PER DEED RECORDED 8-5-1987
DOC. NO. 87-440960
AND
EXISTING ESMT & RIGHT OF WAY FOR ROAD PURPOSES
PER DEED RECORDED 9-3-1930
IN BK 1817, PG 81
AND
EXISTING ESMT & RIGHT OF WAY FOR ROAD PURPOSES
PER DEED RECORDED 12-29-1936
IN BK 605, PG 133
AND
EXISTING ESMT & RIGHT OF WAY FOR ROAD PURPOSES
PER DEED RECORDED NOV 30, 1959
IN BK 8017, PG 326 OF DEEDS (QUITCLAIMED)
(QUITCLAIM DEED REC. MAY 08, 1985
AS FILE NO. 85-162076 O.R.)

K — EXISTING 2' ESMT FOR UTILITIES PURPOSES
PER DEED RECORDED 4-4-1917
IN BK 735, PG 30 (LOCATION BASED ON POLE LINE)
TO BE QUITCLAIMED

L — EXISTING TEMPORARY ACCESS EASEMENT
PER DEED REC. 05-26-2015
DOC. NO. 2015-0264903 &REC. 03-04-2015
DOC. NO. 20015-0098147 TO BE QUITCLAIMED

M — EXISTING TEMPORARY CONSTRUCTION EASEMENT
PER DEED REC. 05-26-2015
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DOC. NO. 20015-0098147 TO REMAIN

N — EXISTING SDG&E ESMT
PER DEED REC. 04-23-2010
DOC. NO. 2010-0204091 O.R.
APPROX LOCATION TO REMAIN

O — EXISTING ESMT
PER DEED REC. 09-21-2021
DOC. NO. 2021-0666663 O.R.
SEWER EASEMENT GRANTED TO
BUENA SANITATION DISTRICT.
TO REMAIN

P — EXISTING ESMT
PER DEED REC. 09-21-2021
DOC. NO. 2021-0666661 O.R.
UTILITY EASEMENT AND
EMERGENCY ACCESS EASEMENT
GRANTED TO THE CITY OF VISTA.
TO REMAIN

Q — EXISTING ESMT
PER DEED REC. 09-16-2021
DOC. NO. 2021-0657923 O.R.
TEMPORARY CONSTRUCTION
EASEMENT GRANTED TO
CENTURY COMMUNITIES

R — EXISTING ESMT
PER DEED REC. 09-16-2021
DOC. NO. 2021-0657923 O.R.
UTILITY AND EMERGENCY
ACCESS EASEMENT GRANTED
TO CENTURY COMMUNITIES
TO REMAIN

NON-PLOTTABLE EASEMENTS NOTE

THE LOCATION OF THE FOLLOWING EASEMENTS HAVE NO PLOTTABLE LOCATION AND ARE THEREFORE NOT SHOWN HEREON:

- PIPELINE EASEMENT IN FAVOR OF VISTA IRRIGATION DISTRICT RECORDED 10/6/1925 IN BK. 1109, PG. 201, O.R. SAID EASEMENT IS SUBJECT TO A CONSENT TO EASEMENTS AND AGREEMENTS RECORDED 3/04/2015 AS INST. NO. 2015-0098147, O.R. TO BE VACATED

- AN EASEMENT IN FAVOR OF SDG&E RECORDED FEB. 09, 2022 AS INST. NO. 2022-0061964, O.R. TO BE QUITCLAIMED

- CONTRACT FOR BUENO COLORADO ENTITLEMENT (WAIVED LAND) REC'D APRIL 04, 1979 AS FILE NO. 79-138279, O.R. BY VISTA IRRIGATION DISTRICT, AND BETWEEN VISTA BAPTIST CHURCH OF VISTA, AN ASSIGNMENT WAIVER (WAIVER OF WATER RIGHTS) REC'D APRIL 04, 1979 AS FILE NO. 79-138280, O.R.

N

40 20 0 40 80 120
GRAPHIC SCALE 1" = 40'

Prepared By:
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Phone #: (619) 291-0707

Project Address:
143 HANNALEI DRIVE
VISTA, CA. 92083

Project Name:
VISTA II MULTI-FAMILY

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EXISTING CONDITIONS

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COUNTY OF SAN DIEGO
TRACT NO. TM

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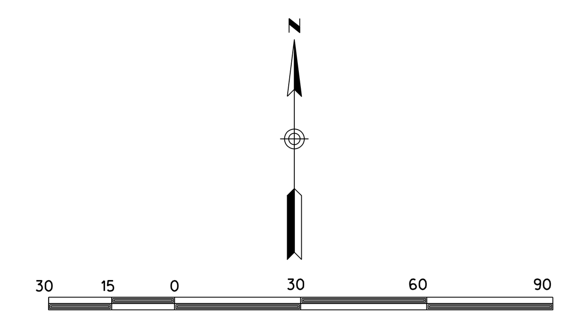
PHILLIPS BALLFIELD

PRELIMINARY
NOT FOR CONSTRUCTION



GRAPHIC SCALE 1" = 30'

EASEMENT NOTES

1. PROPOSED 5' GENERAL UTILITY AND PEDESTRIAN ACCESS EASEMENT
2. PROPOSED GENERAL UTILITY AND EMERGENCY ACCESS EASEMENT
4. *EXISTING 2' WIDE SDG&E EASEMENT REC. 4/9/1917 IN BOOK 735, PG. 30, O.R., TO BE QUITCLAIMED*
5. PROPOSED SEWER ACCESS EASEMENT TO BE DEDICATED FOR THE BENEFIT OF THE BUENA SANITATION DISTRICT
6. PROPOSED 24' EMERGENCY ACCESS EASEMENT

PLAN NOTES

16. STORM DRAIN (18" HDPE, UNLESS NOTED OTHERWISE) (PRIVATE)
17. TYPE-B INLET (PRIVATE)
18. TYPE-A4 C.O. (PRIVATE)
19. TYPE-B BROW DITCH PER RSD D-75
20. MOD. TYPE A-6 C.O. WITH WEIR STRUCTURE. SEE DETAIL SHT. 2.
21. RIP-RAP PAD
23. RETAINING WALL
24. PROPOSED IMPROVEMENT TO BE MAINTAINED BY HOA
25. MODULAR WETLAND SYSTEM (PRIVATE)
26. UNDERGROUND DETENTION VAULT (PVT.)
27. TYPE-F CATCH BASIN (PRIVATE)
28. *EXISTING OVERHEAD LINES TO BE UNDERGROUNDED BY SDG&E AT OWNERS EXPENSE*

NOISE NOTE

RESIDENTAIL UNITS WITH A BALCONY OR PATIO WITHIN 140 FT. OF THE RAILROAD CENTERLINE COULD POTENTIALLY BE EXPOSED TO EXTERIOR NOISE LEVELS ABOVE 65 dBA CNEL. AS REQUIRED BY POLICY N-2.2, AS A CONDITION OF APPROVAL, THESE UNITS WOULD BE DESIGNED TO INCLUDE A SOLID NOISE BARRIER THAT REDUCES NOISE EXPOSURE IN THE BALCONY OR PATIO TO BELOW 65 dBA CNEL BUT DOES NOT COMPLETELY ENCLOSE THE USABLE AREA.

NOTE

FOR EXISTING CONDITIONS AND EASEMENTS SEE SHEET 4

NOTE

ON-STREET VEHICULAR PARKING IS NOT ALLOWED ON STREET A OR ALLEYS A,B,C,D AND E, EXCEPT WHERE DESIGNATED

NOTE

PROPOSED STREET LIGHTS WILL COMPLY WITH STREET LIGHTING SPECIFICATIONS

NOTE

THIS PLAN IS PROVIDED TO ALLOW FOR A FULL AND ADEQUATE DISCRETIONARY REVIEW OF A PROPOSED DEVELOPMENT PROJECT. THE PROPERTY OWNER ACKNOWLEDGES THAT ACCEPTANCE OR APPROVAL OF THIS PLAN DOES NOT CONSTITUTE AN APPROVAL TO PERFORM ANY GRADINGSHOWN HEREON, AND AGREES TO OBTAIN VALID GRADING PERMISSIONS BEFORE COMMENCING SUCH ACTIVITY.

Prepared By:
Name: Rick Engineering Company
Address: 5620 Friars Road, San Diego, California 92110
Phone #: (619) 291-0707

Project Address:
143 HANNALEI DRIVE
VISTA, CA. 92083

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VISTA II MULTI-FAMILY

Sheet Title:
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COUNTY OF SAN DIEGO
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PRELIMINARY
NOT FOR CONSTRUCTION

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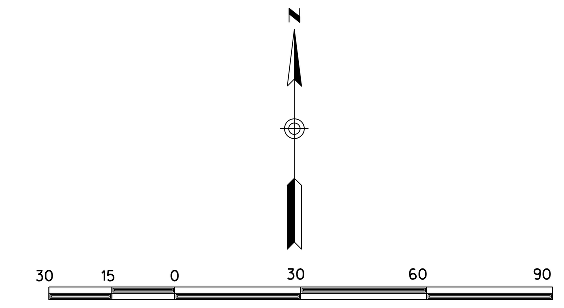

GRAPHIC SCALE 1" = 30'

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17. TYPE-B INLET (PRIVATE)
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21. RIP-RAP PAD
23. RETAINING WALL
24. PROPOSED IMPROVEMENT TO BE MAINTAINED BY HOA
25. MODULAR WETLAND SYSTEM (PRIVATE)
26. UNDERGROUND DETENTION VAULT (PVT.)
27. TYPE-F CATCH BASIN (PRIVATE)
28. *EXISTING OVERHEAD LINES TO BE UNDERGROUNDED*
30. 8" STORM DRAIN CLEANOUT PER RSD SC-01
31. MODIFIED REVERSE CURB OUTLET PER RSD D-25

NOISE NOTE

RESIDENTAIL UNITS WITH A BALCONY OR PATIO WITHIN 140 FT. OF THE RAILROAD CENTERLINE COULD POTENTIALLY BE EXPOSED TO EXTERIOR NOISE LEVELS ABOVE 65 dBA CNEL. AS REQUIRED BY POLICY N-2.2, AS A CONDITION OF APPROVAL, THESE UNITS WOULD BE DESIGNED TO INCLUDE A SOLID NOISE BARRIER THAT REDUCES NOISE EXPOSURE IN THE BALCONY OR PATIO TO BELOW 65 dBA CNEL BUT DOES NOT COMPLETELY ENCLOSE THE USABLE AREA.

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Prepared By:
Name: Rick Engineering Company
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143 HANNALEI DRIVE
VISTA, CA. 92083

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VISTA II MULTI-FAMILY

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COUNTY OF SAN DIEGO
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J-19253B

5.0 General Requirements

- Each Priority Development Project (PDP) must provide a description of existing site conditions and proposed changes to them, including changes to topography and drainage.
- Has a **Drainage Report** has been prepared for the PDP?

☒ **Yes**

- Review of the Drainage Report must be concurrent with the PDP SWQMP.
- Include the summary page of the Drainage Report with this cover page, and provide the following information:

Title:	Drainage Study for Vista II Ballfields
Prepared By:	RICK Engineering Company
Date:	**February 14, 2024**

- Do not complete the rest of this attachment (also exclude these additional pages from your submittal). Additional documentation of site and drainage conditions is not required unless requested by County staff.

☐ **No** -- Complete and submit the remainder of this attachment below.

DRAINAGE STUDY
FOR
VISTA II BALLFIELDS

(PRELIMINARY ENGINEERING)

Job Number 19253-B

September 30, 2022
Revised: April 7, 2023
Revised: October 16, 2023
Revised: February 27, 2024

RICK ENGINEERING COMPANY

DRAINAGE STUDY

FOR

VISTA II BALLFIELDS

(PRELIMINARY ENGINEERING)

Job Number 19253-B

Brendan Hastie
R.C.E #65809, Exp. 9/25

Prepared for:

Warmington Residential
3090 Pullman Street
Costa Mesa, California 92626

Prepared by:

Rick Engineering Company
Water Resources Division
5620 Friars Road
San Diego, California 92110-2596
(619) 291-0707

September 30, 2022
Revised: April 7, 2023
Revised: October 16, 2023
Revised: February 27, 2024

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<u>Appendices</u>

<u>Map Pockets</u>

DRAINAGE STUDY
FOR
VISTA II

Revision Page

February 27, 2024

This PDPSWQMP presents a revision to the October 16, 2023 report pursuant to the County of San Diego plan check comments received January 24, 2024. The following text identifies the plan check comments along with the responses in bold.

<u>County of San Diego Comments</u>

7-2. The CEQA Drainage Study will be required to be stamped and signed by the Engineer of Record.

Response: Comment noted. The Drainage Study will be stamped and signed for the final submittal.

7-33a. 3rd Review Comment: Revise the n- value used for the channel. Per Section 5.5.2 of the County Hydraulic Design Manual, a mature channel must be assumed and therefore the channel capacity n value must be 0.150.

Response: n- values have been updated for the offsite channel.

7-33b. 3rd Review Comment: The values for the water surface elevation appear to indicate an increase at certain stations. Due to increase in water surface elevation for the existing channel, document if the increase is contained on the project's private property or if the increase will impact existing neighboring property owners.

Response: The water surface elevations and HEC-RAS model has been revised. Any increase to WSEL is contained within the project's private property.

7-35. 3rd Review Comment: Update the Tc, A, and Q100 values for POC 2 in the Pre-Project Drainage Study Map to be consistent with the summary table and analysis in the report.

Response: The pre-project drainage study exhibit has been updated to be consistent with the summary table in the Drainage Study.

7-36. 3rd Review Comment: Both the Pre-Project and Post-Project Drainage exhibits do not indicate the 0.1 subbasin for the right of way public improvements, but the area appears to be included in the analysis.

Revise to show this area in both maps.

Response: The area representing the right of way public improvements has been added to the pre-project and post-project drainage exhibits.

7-37. 3rd Review Comment:
Depending on how the Grading Violation against this property is resolved, the following revisions may be required:
- If the soil from the Vista I project site is allowed to remain on the Vista II site, then the pre-project conditions for this project will need to reflect the soil that was moved onto the site.
- If the soil from the Vista I project site will be removed and the Vista II project site will be restored to its condition prior to the Vista I soil being moved onto the site, then no revisions are needed.

Response: The pre-project exhibit has been updated to show soil from the Vista I project.

DRAINAGE STUDY
FOR
VISTA II

Revision Page

October 16, 2023

This Drainage Study presents a revision to the April 7, 2023 report pursuant to the County of San Diego plan check comments received August 31, 2023 The following text identifies the plan check comments along with the responses in bold.

<u>County of San Diego Comments</u>

7-1. Offsite hydrologic and hydraulic analysis for the existing channel still needed.

Offsite hydraulic and hydraulic analysis has been provided in Appendix I of the report.

7-2. The CEQA Drainage Study will be required to be stamped and signed by the Engineer of Record.

Comment noted. CEQA Drainage Study will be signed and stamped on final submittal.

7-2a. Section 1 Introduction. Revise the narrative to clarify that a network of vaults designed to pond concurrently will drain to a biofiltration BMP. Currently the narrative says one underground vault, which may be how the system was idealized and modeled but is not what will physically be installed.

Section 1 introduction has been revised to clarify the proposed drainage design. The narrative specifies that there are two separate vault systems comprised of individual vaults intended to pond concurrently.

7-3. Specific values are needed in the post-project Q100 mitigated condition. It must be demonstrated through the analysis that the value for the Q100 mitigated condition is less than the pre-project condition, not just stated as such.
V100s needed.

Specific values have been provided for the post-project Q100 and V100 mitigated condition.

7-5. Specific values are needed in the post-project Q100 mitigated condition. It must be demonstrated through the analysis that the value for the Q100 mitigated condition is less than the pre-project condition, not just stated as such.

Specific values have been provided for the post-project Q100 and V100 mitigated condition
7-10. Section 5.0 Conclusion Demonstrate that the existing channel used can safely convey offsite and onsite flow such that the project and neighboring properties will not be flooded.

The conclusion has been updated to demonstrate that the existing channel can safely convey offsite and onsite flow.

7-17. The runoff coefficients used in the AES model.
- Pre-project node 120 to node 120, code 8 - runoff coefficient does not match backup calculations. Still applicable (0.33 in calcs, 0.35 in Appendix C).
- Pre-project node 199 to node 199, code 8 for the 1.3 acre subbasin – runoff coefficient does not match backup calculations. Still applicable (0.33 in calcs, 0.35 in Appendix C).
- Post-project node 199 to node 199, for a 0.1 acre subbasin for the driveway does not appear to be reflected in the AES model. The properties of the self-mitigating 0.1 acre subbasin appear to have been used instead. Still applicable. There are 3 0.1-ac self-mitigating (C=0.35) subbasins added to the mainflow to POC 2, but one of these basins includes added impervious surfaces for the proposed roadway and sidewalk connection to Hanalei Drive. The C value for this subbasin should be higher to reflect the impervious surface added.

The AES Pre- and Post-Project models have been updated to reflect comments.

7-33. Provide offsite hydrologic and hydraulic analysis for the existing channel. Response is only sufficient with regards to connecting to the existing storm drain system.

An offsite hydrologic and hydraulic analysis for the existing report has been included in Section 3 of the Drainage Study.

DRAINAGE STUDY
FOR
VISTA II

Revision Page

April 7, 2023

This Drainage Study presents a revision to the September 30, 2022 report pursuant to the City of San Diego's plan check comments received on March 3, 2023. The following text identifies the plan check comments along with the responses in bold.

County of San Diego Comments

7-1 The comments provided below for the CEQA Drainage Study review are incomplete, as the initial submittal did not include the following:
- Contribution of off-site flows
- Hydraulics for onsite/offsite storm drain and channel
- Inlet sizing
- Energy dissipator design
- discrepancies/missing information in design

Contribution of off-site flows, detailed storm drain hydraulics, inlet sizing, and energy dissipator design will be provided in final engineering. Missing design information has been provided in Drainage Study Appendix H.

7-2 The CEQA Drainage Study will be required to be stamped and signed by the Engineer of Record.

CEQA Drainage Study will be stamped and signed once other comments are addressed.

7-3 In Section 2.3 Results, please provide a summary table of: pre- and post- development C, Tc, I, A, V100, Q100 without mitigation and Q100 with mitigation for each area (or point) where drainage discharges from the project. Peak runoff rates (cfs), velocities (fps) and identification of all erosive velocities (at all points of discharge) calculations for pre-development and post-development must be provided. The comparisons should be made about the same discharge points for each drainage basin affecting the site and adjacent properties.

A summary table of pre- and post- development C, Tc, I, A, and Q100 has been added to section 2.3. V100s will be provided in a future submittal.

7-4 Clarify the discrepancy between the watershed area value in the pre- and post- development (Table 1 and Table 2). It appears that the project proposes to change the drainage pattern. Where is the stormwater from the 0.2 acre difference between the pre and post development project directed?

Offsite area not included in the project boundary had been included in the pre-project model but not the post-project model. This area has been added back into the post-project model to ensure that equivalent areas are compared.

7-5 The Detained 100-year peak flow rate shown in Table 2 in the Results section of the report does not match the value from the HEC-1 model. Revise accordingly to maintain consistency.

Comment noted. Table 2 has been updated for consistency.

7-6 The description of how the stormwater is discharged BMP-A2 to eventually reach the proposed POC on Hannalei Drive is inconsistent through the report. According to the CEQA-Level Drainage Report Section 1, a storm drain is proposed along the existing channel, but Section 3 of the report states it will discharge to the channel. If BMP-A2 will discharge into the existing channel, a second POC is needed.

BMP-A2 will now discharge to the channel due to environmental considerations. The exhibits and report narrative have been updated to reflect these changes, and second POC has been added.

7-7 Section 3 Hydraulics: Correct spelling and/or grammar mistakes.

Comment noted.

7-8 Section 3.2 Pipe Hydraulics: Clarify what pipe size will be used.

Pipe hydraulics will be provided in final engineering. Please refer to the civil plan sheet for specific storm drain pipe sizes.

7-9. Section 5.0 Conclusion: Show the limits of proposed grading within the existing channel in the PGP. Will any portion of the proposed grading fall outside of the property bounds or be within any existing easement?

No grading will be performed within the channel.

7-10. Section 5.0 Conclusion: Demonstrate that the existing channel used can safely convey offsite and onsite flow such that the project and neighboring properties will not be flooded.

Existing drainage patterns will be maintained, and detention will be provided onsite to ensure that post-project Q100s are equal to or less than pre-project flows. Please see detention analysis in Appendix H, the hydraulic section 3.4 of the report, and the hydraulic workmap in Appendix I for more detail.

7-11. Section 5.0 Conclusion: Please discuss explicitly whether or not the proposed project would substantially alter the existing drainage pattern of the site or area, including through alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site? If so, provide reasons and mitigations proposed.

Conclusion has been updated to discuss project impacts to existing drainage. There are no substantial changes to existing drainage patterns. The channel adjacent to the project will not be modified or impacted. Detention will be provided to ensure that post-project Q100 is equal to or less than pre-project Q100.

7-12. Section 5.0 Conclusion: Discuss whether or not the proposed project would substantially alter the existing drainage pattern of the site or area, including through alteration of the course of a stream or river or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off- site? If so, provide reasons and mitigations proposed.

Conclusion has been updated to discuss project impacts to existing drainage. There are no substantial changes to existing drainage patterns. The channel adjacent to the project will not be modified or impacted. Detention will be provided to ensure that post-project Q100s are equal to or less than pre-project flows.

7-13 Section 5.0 Conclusion: Discuss explicitly whether or not the proposed project would create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems? Provide reasons and mitigations proposed.

Report narrative has been updated. The project will include detention vaults to ensure that peak post-project flows are less than peak pre-project flows. Please see detention analysis for more detail.

7-14 Section 5.0 Conclusion: Discuss explicitly whether or not the proposed project would place structures within a 100-year flood hazard area which would impede or redirect flood flows?

A discussion regarding 100-year flood hazard area impediments has been included within section 5.0 of the drainage study.

7-15 Provide Rainfall Isopluvial for 100 Year Rainfall Event - 6 Hours and 24 Hours Maps with project site indicated.

Comment noted. Isopluvial maps have been provided in Appendix C of the drainage study.

7-16 It is not standard practice to use Code 8 subbasins after confluence analysis, as the actual Tc value would be significantly different between the mainline and the subarea being added.

The Code 8 subbasins added after the confluence analysis do not represent a significant portion of the overall basin area. Tc for a confluence is determined primarily based on the longest flow path and ratio between basin areas which would not be heavily impacted due to the addition of small additional areas.

7-17 Verify the runoff coefficients used in the AES model.
- Pre-project node 120 to node 120, code 8 - runoff coefficient does not match backup calculations.
- Pre-project node 199 to node 199, code 8 for the 1.3 acre subbasin - runoff coefficient does not match backup calculations.

- Post-project node 199 to node 199, code 8 for the 0.1 acre subbasin for the driveway does not appear to be reflected in the AES model. The properties of the self-mitigating 0.1 acre subbasin appear to have been used instead.

An AES Rational Method Coefficient chart has been provided in Appendix C of the Drainage Study. NRCS land uses and percent impervious were used to calculate runoff coefficients.

7-18 Include the Weighted Runoff Coefficient Calculations tables in the Drainage Study Maps

An AES Rational Method Coefficient Table (Table 3-1) has been provided in Appendix C of the Drainage Study. NRCS land uses and percent impervious were used to calculate runoff coefficients.

7-19 Post-Project Drainage Study Map: Label which pipes and their sizes are intended for use in the plan.

Please refer to the civil sheets that show the proposed size of the storm drain pipes.

7-20 Post- Project Drainage Study Map: Show the difference between impervious areas from the pervious areas (e.g., using a hatch/shading) on the plan.

Individually hatched pervious/impervious areas will be shown in final engineering. SDCHM Table 3-1 has been used to calculate runoff C values for the Drainage Study.

7-21 Post- Project Drainage Study Map: At the POC, please also indicate the Tc, A, and Q100 for the unmitigated condition.

Tc, A, and Q100 have been provided at POC-1 and POC-2 for the unmitigated condition.

7-22 For the HEC-1, provide all input information, including the input hydrograph and storage volume details.

HEC-1 input hydrograph, storage details, and outlet details have been provided in Appendix H of the drainage study.

7-23 Provide Intensity-Duration Design Chart Figure 3-1 indicating what value(s) were used.

Figure 3-1 has been added to Appendix C of the drainage study.

7-24 Provide Maximum Overland Flow Length and Initial Time of Concentration-Table 3-2.

Table 3-2 has been added to Appendix C of the drainage study.

7-25 Provide Rational Formula for Overland Time of Flow Nomograph Figure 3-3 indicating what value(s) were used.

Figure 3-3 has been added to Appendix C of the drainage study.

7-26 Provide Nomograph for Determination of Tc Figure 3-4 indicating what value(s) were used.

Figure 3-4 has been added to Appendix C of the drainage study.

7-27 Provide Computation of Effective Slope for Natural Watersheds Figure 3-5.

Figure 3-5 has been added to Appendix C of the drainage study.

7-28. Provide Detention storage routing calculations per Section 6.3.2 of the County of San Diego Hydraulic Design Manual (HDM), 2014.

Detention storage calculations have been added to Appendix H of the Drainage Study.

7-29. Provide Tables showing Vault Depth (ft) -Storage (ac-ft) -Outlet (Orifice Size (in)).

Tables showing vault parameters have been added to Appendix H the drainage study.

7-30. Provide Inflow Hydrograph per Section 6.3.1.1 of the HDM, Stage-Storage Curve (Section 6.3.1.2), Stage-Discharge Curve (Section 6.3.1.3).

Detailed inflow hydrograph, Stage-Storage, and Stage-Discharge curves will be provided in final engineering. Preliminary Stage-Storage and Stage-discharge curves representative of the proposed vaults and outlet works have been provided in Appendix H.

7-31. Provide Detention Facility Plans per Section 6.2.5 of the HDM. Show maximum design inflow and velocity, maximum total design outflow and velocity from the outlet, maximum design storage volume and water surface elevation,

Detention facility flow rates have been provided in Appendix H. Velocities out of the storage facilities will be provided in final engineering.

7-32. Provide appropriate details for facility inlet, outlet structures, energy dissipaters, maintenance measures and cross sections.

Storage facility outlet orifice diameters have been provided in Appendix H of the Drainage Study. Inlet structures, energy dissipaters, and maintenance measures will be provided in final design.

7-33. Provide Hydraulic Analysis report. Include a discussion on the existing systems (channel and storm drain) that are proposed to be used in the post-project condition. Discuss the existing connection points to these systems and a comparison of the proposed condition connection points. Discuss how the Hydraulic Grade Line (HGL) in the existing system be affected in the post-project condition. Include a hydraulic model of the existing system from the downstream end to as far upstream as necessary to show any impacts to the existing systems.

Comment noted. A detailed hydraulic analysis will be provided in final engineering. A discussion on pre- and post-project channel hydraulics has been added to Section 3 of the Drainage Study.

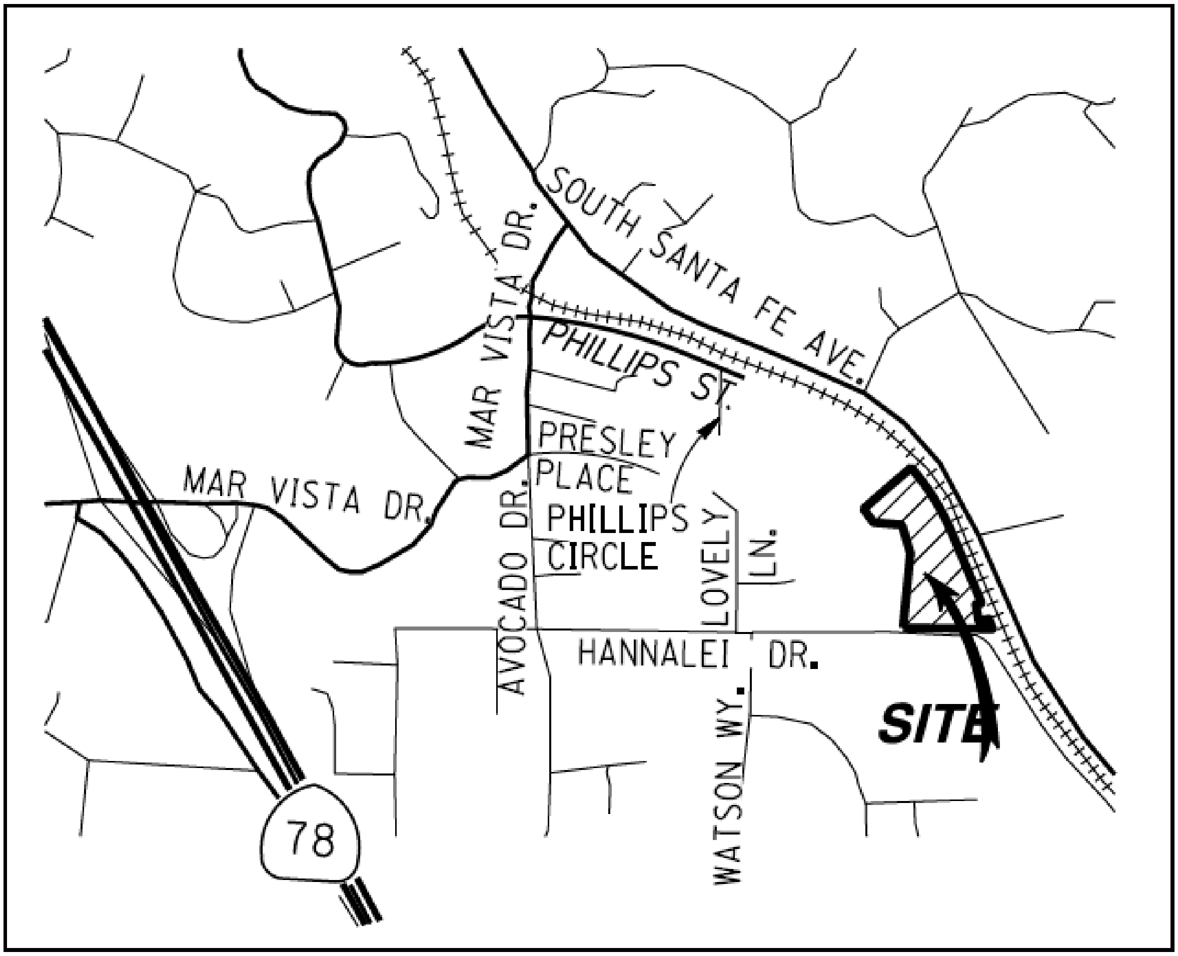
1.0 INTRODUCTION

Vista II Ballfields is a residential development to be located in the County of San Diego, northeast of the intersection of Hannalei Drive and South Santa Fe Road. The project proposes 37 dwelling units, a park, roadway features and associated utilities. There are two vault systems intended to provide flood control, hydromodification management control, and detention in the northern and southern portions of the site. The northern vault system (BMP-A1) consists of three vaults that are intended to pond concurrently. The vault floors will be placed at the same elevation and are the same height. The southern vault system (BMP-B1) consists of two vaults that will pond concurrently in a manner similar to BMP-A1. One compact biofiltration BMP will receive low flows from BMP-A1 and BMP-B1 to provide pollutant control. The purpose of this report is to evaluate the impacts to any existing drainage conveyance networks as a result of the proposed project development.

The existing project site is comprised of three (3) baseball fields and associated parking lot. The entire site drains to one (1) point of interest. The site is divided into northern portion and southern portion for the purpose of hydrology. Runoff from the northern portion of the site (3.2 acres) of the project site flows southerly and then easterly to an existing channel via overland flow. The existing channel then flows southerly until it is intercepted by an existing headwall and conveyed into the existing storm drain network. Runoff from the southern portion of the site (1.9 acres) also flows south overland and then east along Hannalei Drive before it is intercepted by the existing headwall. The study of hydrology with regards to the existing channel has not been done as part of this project.

The proposed drainage characteristics are similar to the existing drainage characteristics. The northern portion of the site still flows southeasterly via inlets and propose onsite storm drain and is treated by the underground vault and Modular Wetland System (MWS) combination. The mid-flows and high-flows are discharged to the existing channel via proposed onsite storm drain. The outlet to the channel will be protected with a riprap pad. The low flows in the northern portion of the site will be treated by the compact biofiltration system in the southern portion of the site. The southern portion of the site flows in the southerly direction and is treated by the underground vault and compact biofiltration system combination and ultimately ties into the proposed 36-inch RCP. The proposed 36-inch RCP ties into the existing 36-inch RCP across Hannalei Drive. The southern portion contains 0.1 ac. of no impervious area and is self-mitigating per the County of San Diego BMP Design Manual.

Figure 1-1: Vicinity Map



VICINITY MAP

NOT TO SCALE

2.0 ONSITE HYDROLOGY

2.1 CRITERIA

The hydrologic conditions were analyzed in accordance with the County of San Diego's design criteria.

Design Storm:	100-year, 6-hour
100-Year 6-Hour Precip (inches):	P = 3.2 inches

June 2003 San Diego County *Hydrology Manual* Criteria (unit-less) (See Appendix C)

Soil Type:	C and D (See Map Pocket 1)

Intensity-Duration-Frequency (I-D-F) Curves within the June 2003 County of San Diego *Hydrology Manual* (inches per hour)

2.2 MODIFIED RATIONAL METHOD

To calculate the flow rates for Basin 100 pre- and post-project, a Modified Rational Method analysis was performed in accordance with the methodology presented in the June 2003 County of San Diego *Hydrology Manual* to determine pre- and post-project 100-year peak discharge rates for watersheds less than 1 square-mile. The Advanced Engineering Software (AES) Rational Method computer program was used to perform these calculations. The hydrologic model is developed by creating independent node-link models of each interior drainage basin and linking these sub-models together at confluence points. The program has the capability to perform calculations for 15 hydrologic processes. These processes are assigned code numbers that appear in the results. The code numbers and their significance are as follows:

Code 1:	Confluence analysis at a node
Code 2:	Initial subarea analysis
Code 3:	Pipe flow travel time (computer-estimated pipe sizes)
Code 4:	Pipe flow travel time (user-specified pipe size)
Code 5:	Trapezoidal channel travel time
Code 6:	Street flow analysis through a subarea
Code 7:	User-specified information at a node
Code 8:	Addition of the subarea runoff to mainline
Code 9:	V-Gutter flow thru subarea
Code 10:	Copy main-stream data onto a memory bank
Code 11:	Confluence a memory bank with the main-stream memory
Code 12:	Clear a memory bank

Code 13: Clear the main-stream memory
Code 14: Copy a memory bank onto the main-stream memory
Code 15: Hydrologic data bank storage functions

In order for the program to perform the hydrologic analysis; base information for the study area is required. This information includes the land uses, drainage facility locations, flow patterns, drainage basin boundaries, and topographic elevations. The rainfall data, runoff coefficients, and soils information were obtained from the June 2003, County of San Diego *Hydrology Manual*.

2.3 RESULTS

The 100-year Modified Rational Method and Rational Method calculations for pre- and post-project conditions are provided in Appendix A and Appendix B, respectively, and the associated hydrologic drainage exhibits are located in Map Pockets 1 and 2. Preliminary detention analysis is provided in Appendix H. A summary of the results for contributing areas are listed in the following table:

Table 1 - Hydrologic Summary Table (Pre-project)

Basin	Watershed Area (acres)	Runoff "C"	Time of Concentration (min)	Intensity (in/hr)	Q100 (cfs)
100	3.2	0.46	11.1	5.0	7.4
200	5.2	0.5	12.1	4.8	11.2

Table 2 - Hydrologic Summary Table (Post-project)

Basin	Watershed Area (acres)	Runoff "C"	Time of Concentration (min)	Intensity (in/hr)	Q100 – Unmitigated (cfs)	Q100 – Mitigated (cfs)
100	3.2	0.69	6.1	5.1	16.1	5.7
200	5.3	0.71	6.8	6.9	25.9	10.8

Table 3 – Outfall Velocity Table

Basin	V100-Pre (ft/s)	V100-Post (ft/s)	V100-Post (Mitigated, ft/s)
100	n/a - channel	11.2	8.0
200	10.1	12.9	9.0

3.0 OFFSITE HYDROLOGY

3.1 OFFSITE DRAINAGE CHARACTERISTICS

An offsite drainage analysis has been included in this report to provide backup for the flowrates used in the existing earthen channel that boarders the eastern edge of the project site.. This analysis has been conducted to validate the flowrates used in the hydraulic analysis of the channel adjacent to the project.

Existing development in the surrounding area consists of a road, Hannalei Drive, and single-family homes to the south of the project, a graded lot to the north of the project, a church and single family homes to the west of a project, and a railroad, trail, and highway to the east of the project. Soils consist of type "D" and type "C" soil. To the east of the project is a manmade earthen channel that conveys flows from north of the project site to a storm drain on the north side of Hannalei Drive adjacent to the proposed development.

3.2 REFERENCED REPORTS & RESEARCH

Several resources were used to develop an understanding of offsite drainage conditions. The primary report is titled "Inland Rail Trail (IRT) Phase 2B Preliminary Drainage Study", dated December 2014, and prepared by PSOMAS. The purpose of this report is to analyze the hydrology for the IRT bike path project. The project consists of approximately 5,500 feet of new bike path running alongside the North County Transit District railroad tracks. Areas tributary to the offsite channel north of the project site bounded by Phillips Circuit are included in the IRT report. Additionally, the northern half of the project site is included in the report along with the area tributary to the rail trail between the railroad tracks and the project site. The criteria used to develop this project is per the County of San Diego Hydrology Manual, June 2023. The report analyzes the 100-year, 6-hour storm event and includes resources from the CSDHM, hydrology inputs and outputs, and maps of the project watershed. Refer to Appendix J for experts of this report.

Referenced in the IRT report are two additional reports, the first, titled "Drainage Report South Santa Fe Avenue Widening Project", dated September, 2009 (Santa Fe Ave.) and prepared by others, and the second, titled "Sprinter Rail Project (SRP) Drainage Calculations – Oceanside to Escondido", dated August, 2004 and prepared by others. The Santa Fe Ave. report was prepared for the design of the storm drain improvements associated with the Santa Fe Ave. project. The methodology used to develop this report was based on criteria from the 2003 County of San Diego Hydrology manual. The Santa Fe Ave. report includes supporting resources from the CSDHM, hydrology inputs, Advanced Engineering Software (AES) Rational Method outputs, maps denoting drainage delineations, and flow rates for the 100-year, 6-hour storm events. Additionally, the report includes flow rates for the three outfalls that drain to the earthen channel adjacent to the project site. These flow rates provide a basis for the flow rates used in the hydraulic analysis. Appendix J has experts of this report (note: the Sante Fe Ave. Drainage Report is referenced in the IRT report in Appendix D).

The SRP report is intended to summarize the drainage parameters associated with the cross culverts in the railroad right-of-way, the new cross culverts built as part of the SRP, and the side track ditches along the right-of-way. Due to the age of the report and the outdated criteria used for the analysis, this report was not used to develop flow rates for Vista II.

Additionally, Rick Engineering completed a drainage study for a project that boarders the project to the northwest. The report, titled “Drainage Study for Vista Hannalei”, revised April, 2023 details hydrologic conditions to the north and west of the project site and provides pre-project, post-project, and mitigated flows an outlet that discharges to the existing channel just upstream from our project site. The 2003 County of San Diego Hydrology Manual was used to develop flows for the 100-year, 6-hour storm. The Advanced Engineering Software (AES) program was used to perform a Modified Rational Method analysis of the drainage area. Please refer to Appendix K for references from this report.

3.3 OFFSITE RESULTS

After review of the reports above and validating the methodology is consistent with the County of San Diego Hydrology manual (2003), the following table summarizes hydrologic flow data used to develop the offsite hydraulic model.

Table 4: Offsite Hydrologic Summary

HEC-RAS Flow Inputs			
Pre-Project		Post-Project	
River Station	Q100	River Station	Q100
1948	64.3	1948	64.3
1923	68.6	1923	68.6
1713	99.7	1713	94.4
-	-	1350	98.7
1271	131.4	1271	130.4
1200	131.4	1200	130.4

4.0 HYDRAULICS

The 100-year post-project peak flow rates determined using the methodology described in Section 2 were used to evaluate the hydraulic capacity of inlets leading into both the BMPs. Inlet sizes will be provided in subsequent submittals. Flows from BMP-A will discharge to the adjacent channel to the east of the project site at Node 125 and BMP-B will tie into the existing Storm Drain within Hannalei Drive. The existing Storm Drain also received offsite flows which were not analyzed as a part of this submittal. It is anticipated that offsite hydrology and hydraulic calculations will be performed as a part of subsequent submittals.

4.1 INLET SIZING

An inlet design calculation will be completed using a computer program based on Equation 1 for inlets on grade and Equation 2 inlets in sump and provided with a subsequent submittal:

Type A Inlets on a Grade

$$Q = 0.7 L (a + y)^{3/2} \qquad \text{(Equation 1)}$$

Where: y = depth of flow approaching the curb inlet, in feet (ft)
a = depth of depression of curb at inlet, in feet (ft)
L = length of clear opening of inlet for total interception, in feet (ft)
Q = interception capacity of the curb inlet, in cubic feet per second (cfs)

Type B Inlets in a Sump

$$Q/L = 1.5 \text{ cfs/ft} \qquad \text{(Equation 2)}$$

Where: Q = inlet capacity, in cubic feet per second (cfs)
L = length of clear opening of inlet for total interception, in feet (ft)

4.2 PIPE HYDRAULICS

Storm drain pipe sizes were determined based on a normal depth calculation to verify storm drain capacity based on Manning's equation.

$$Q= (1.486/n) A R^{2/3} S^{1/2}$$

Where:
Q = Discharge (cfs)
n = Manning's roughness coefficient
A = Cross-sectional Area of flow (sq. ft.)
R = Hydraulic radius (ft.) (where hydraulic radius is defined as the cross-section area of flow divide by the wetted perimeter, R= A/P)
S = Slope of pipe (ft./ft.)

A Manning's roughness coefficient "n" of 0.013 was used for the hydraulic calculations. This value is typically used for reinforced concrete pipe (RCP), polyvinyl chloride (PVC) and high-density polyethylene pipe (HDPE). The pipe sizes were evaluated based on the Rational Method flow rates with a 30% "bump up" sizing factor to account for hydraulic losses within the system.

Please refer to Appendix E for the storm drain sizes.

4.3 ENERGY DISSIPATOR DESIGN

An energy dissipater (i.e. riprap) at the single storm drain outfall into the existing channel, which lies to the east of the project site at Node 125, will be specified using the 2014 County of San Diego *Hydraulic Design Manual*, which provides rock classifications for design velocities entering riprap outfalls.

The design velocities were determined from both normal depth hydraulic analyses for flow in the final reach of storm drain leading to the outfall and HEC-RAS hydraulic analysis for flow across the riprap pad immediately downstream of the outfall.

HEC-RAS cross sections will be taken at 1-foot intervals across the riprap pad in order to determine the location of the hydraulic jump that is expected to occur on the riprap pad. The flow regime after the hydraulic jump is subcritical flow at normal depth, and the flow velocity after the hydraulic jump is expected to be less than 6 feet per second. The riprap pad length was then specified based on the location of the hydraulic jump, in order to provide 5 feet (or twice the pipe diameter, whichever is greater) of length beyond the hydraulic jump. The riprap pad width is based on the 2012 Edition of the San Diego Regional Standard Drawings Book Riprap Energy Dissipation, drawing number D-40.

The dimensions and size of riprap will be provided in Appendix G as a part of subsequent submittals.

4.4 CHANNEL HYDRAULICS

In the existing condition, the channel adjacent to the eastern boundary of the project is natural earth with a hardened concrete section leading into a storm drain. The project does not propose any grading of the channel. The only change to the stream itself will be a riprap protected outfall discharging from the vault system on the eastern side of the property. A retaining wall is also proposed along the eastern side of the property to allow for pad elevations to be raised above the 100-year water surface elevation (WSEL). A HEC-RAS analysis was performed to ensure that pad elevations would have a minimum freeboard of at least 1-foot above the 100-year water surface elevation, consistent with the County of San Diego Hydraulic Design Manual Section 5.3.7 for open channels conveying more than 10cfs.

HES-RAS cross sections were taken along the length of the channel starting just upstream of the project and ending at the storm drain inlet downstream of the project. Water surface elevations were determined at each cross section, and pads were placed at elevations at least one foot above the closest cross section. A figure showing HEC-RAS cross sections with their corresponding pad elevations and WSELs can be found in Appendix I.

5.0 DETENTION

For the detention system design, a rational method hydrologic analysis was performed to determine the 100-year peak discharge rates for the post-project condition. Detention will be provided within BMP-A-1 & BMP-B-1 to detain back flows for the 100-year storm event to pre-project conditions.

The sizing of a detention facility requires an inflow hydrograph to obtain the necessary storage volume. The modified rational method only yields a peak discharge and time of concentration and does not yield a hydrograph. In order to convert the peak discharge and time of concentration into a hydrograph, a modified rational method hydrograph synthesizing procedure was used. The modified rational method hydrograph synthesizing procedure methodology and criteria that were used are based on the Rational Method Hydrograph Procedure and Detention Basin Design, of the *San Diego County Hydrology Manual 2003*.

The 100-year hydrograph and elevation-storage-outflow rating curves were used in the HEC-1 hydrologic model to perform routing calculations for two detention systems in the project site to determine the 100-year detention volumes required for the systems to reduce the post-project peak discharge rate back to the pre-project peak discharge rate for the storm event.

The 100-year, 6-hour post-project peak discharge rates were routed using the HEC-1 hydrologic model to determine the detention volume required for the basins to reduce the post-project peak discharge rates back to the pre-project peak discharge rates. Preliminary HEC-1 detention analysis is provided in Appendix H. The detention analysis demonstrates that the post-project Q100 will be detained to pre-project Q100 as shown in Table 2.

6.0 CONCLUSION

Drainage conditions are expected to remain similar between pre- and post-project conditions. No major changes to drainage patterns are proposed, and existing drainage pathways will be preserved. The only proposed change to the existing channel adjacent to the eastern boundary is the addition of a riprap protected outlet for water quality, detention, and HMP flows out of the stormwater vault system. No grading is proposed in the channel. Peak post-project 100-year runoff rates will be detained to be equal to or below pre-project levels which reduces the risk of on- and off-site erosion and siltation. Since the post-project 100-year runoff rates will be equal to or less than existing 100-year runoff rates, the project is not anticipated to impact existing downstream facilities. Pad elevations have been raised to place structures out of the 100-year flood hazard areas in a manner that does not impede or redirect flood flows.

Post-project runoff will be treated for water quality by the underground vault and compact biofiltration BMP combination (i.e. BMP-A1, BMP-B2, BMP-B2). The two underground vault systems will also detain the 100-year 6-hour peak flows back to less than pre-project conditions while also satisfying the hydromodification management requirements per the County of San Diego BMP Design Manual. Grading is not proposed for the existing channel east of the project site. The channel receives flows from offsite areas. Offsite hydrologic and hydraulic analysis for the project has not been performed for this submittal. Flowrates used as part of the analysis have been taken from as-built information. Based on the results of this drainage analysis, it has been determined that the proposed residential development will not adversely impact the existing watershed or drainage patterns. Please refer to the report titled, "Priority Development Project Storm Water Quality Management Plan for Vista II," dated April 7, 2023, and prepared by Rick Engineering Company (Job No. 19253-B), for more information on water quality and hydromodification management.

APPENDIX A

HYDROLOGY ANALYSIS
100-YEAR, MODIFIED RATIONAL METHOD
(PRE-PROJECT)

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             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
             Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                          2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2014 Advanced Engineering Software (aes)
              Ver. 21.0 Release Date: 06/01/2014  License ID 1261

                             Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                          San Diego, California 92110
                        619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* J-19253B VISTA II BALLFIELDS                                             *
* 100YR, 6-HR PRE-PROJECT CONDITION                                        *
* J:\19253B\WR\HYDROLOGY\RATIONALMETHOD\...                                *
 **************************************************************************

  FILE NAME: V2B1E00.RAT
  TIME/DATE OF STUDY: 13:16 10/03/2023
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.200
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   18.0     13.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    66.00
  UPSTREAM ELEVATION(FEET) =    500.00
  DOWNSTREAM ELEVATION(FEET) =    496.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.016
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.483
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.26

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    120.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    496.00  DOWNSTREAM(FEET) =    487.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   365.00   CHANNEL SLOPE =  0.0247
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.461
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.73
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.61
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   3.79
  Tc(MIN.) =    9.80
  SUBAREA AREA(ACRES) =     1.40       SUBAREA RUNOFF(CFS) =    2.91
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.378
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       3.10

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   1.89
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =     431.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.461
  *USER SPECIFIED(SUBAREA):
```

```
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3668
  SUBAREA AREA(ACRES) =    1.00   SUBAREA RUNOFF(CFS) =    1.91
  TOTAL AREA(ACRES) =        2.5   TOTAL RUNOFF(CFS) =       5.01
  TC(MIN.) =    9.80

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    150.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    487.00  DOWNSTREAM(FEET) =    480.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   298.00   CHANNEL SLOPE =  0.0235
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.042
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.40
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.85
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   1.29
  Tc(MIN.) =   11.10
  SUBAREA AREA(ACRES) =     0.70       SUBAREA RUNOFF(CFS) =    2.79
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.459
  TOTAL AREA(ACRES) =        3.2         PEAK FLOW RATE(CFS) =       7.41

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   4.02
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    150.00 =     729.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    199.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    480.00  DOWNSTREAM(FEET) =    472.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   264.00   CHANNEL SLOPE =  0.0303
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.41
  FLOW VELOCITY(FEET/SEC.) =   4.23   FLOW DEPTH(FEET) =   0.50
  TRAVEL TIME(MIN.) =   1.04   Tc(MIN.) =   12.14
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    199.00 =     993.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    199.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.759
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4278
  SUBAREA AREA(ACRES) =    1.30   SUBAREA RUNOFF(CFS) =    2.17
  TOTAL AREA(ACRES) =        4.5   TOTAL RUNOFF(CFS) =       9.16
  TC(MIN.) =   12.14

****************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    199.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.759
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4516
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.80
  TOTAL AREA(ACRES) =        5.1   TOTAL RUNOFF(CFS) =      10.96
  TC(MIN.) =   12.14

****************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    199.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.759
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4538
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.27
  TOTAL AREA(ACRES) =        5.2   TOTAL RUNOFF(CFS) =      11.23
  TC(MIN.) =   12.14
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.2  TC(MIN.) =     12.14
  PEAK FLOW RATE(CFS)   =      11.23
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX B

HYDROLOGY ANALYSIS
100 YEAR, RATIONAL METHOD AND MODIFIED RATIONAL METHOD
(POST-PROJECT)

```
____________________________________________________________________________
****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2014 Advanced Engineering Software (aes)
             Ver. 21.0 Release Date: 06/01/2014  License ID 1261

                           Analysis prepared by:

                          RICK ENGINEERING COMPANY
                              5620 Friars Road
                        San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* J-19253B VISTA II BALLFIELDS                                              *
* 100YR, 6-HR POST-PROJECT CONDITION                                        *
* J:\19253B\WR\HYDROLOGY\RATIONALMETHOD\...                                 *
 **************************************************************************

  FILE NAME: V2B1P00.RAT
  TIME/DATE OF STUDY: 12:58 10/03/2023
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.200
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   18.0     13.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    504.00
  DOWNSTREAM ELEVATION(FEET) =    503.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.486
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    60.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.72
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.72

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    105.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  503.00  DOWNSTREAM ELEVATION(FEET) =  498.50
  STREET LENGTH(FEET) =   120.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 13.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   8.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.90
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    4.64
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.68
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.59
  STREET FLOW TRAVEL TIME(MIN.) =   0.75   Tc(MIN.) =    4.23
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
```

```
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
  SUBAREA AREA(ACRES) =    0.05      SUBAREA RUNOFF(CFS) =    0.36
  TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       1.07

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.22
  FLOW VELOCITY(FEET/SEC.) =  2.75   DEPTH*VELOCITY(FT*FT/SEC.) =   0.63
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =     220.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    115.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  498.50  DOWNSTREAM ELEVATION(FEET) =  488.50
  STREET LENGTH(FEET) =   411.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 13.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   8.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.89
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.58
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
  STREET FLOW TRAVEL TIME(MIN.) =   2.65   Tc(MIN.) =    6.89
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.859
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.810
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.63
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       2.50

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   8.91
  FLOW VELOCITY(FEET/SEC.) =  2.74   DEPTH*VELOCITY(FT*FT/SEC.) =   0.83
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =     631.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   489.00  DOWNSTREAM(FEET) =   487.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.03
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.50
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =    7.16
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =     731.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.16
  RAINFALL INTENSITY(INCH/HR) =   6.69
  TOTAL STREAM AREA(ACRES) =     0.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.50

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    504.00
  DOWNSTREAM ELEVATION(FEET) =    503.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.486
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    60.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.72
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.72
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    115.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  503.00  DOWNSTREAM ELEVATION(FEET) =  490.50
  STREET LENGTH(FEET) =   411.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 13.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   8.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.87
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    9.03
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.08
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.94
  STREET FLOW TRAVEL TIME(MIN.) =   2.23   Tc(MIN.) =    5.71
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.738
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.797
  SUBAREA AREA(ACRES) =    0.70      SUBAREA RUNOFF(CFS) =    4.28
  TOTAL AREA(ACRES) =        0.8        PEAK FLOW RATE(CFS) =       4.94

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.34
  FLOW VELOCITY(FEET/SEC.) =  3.51   DEPTH*VELOCITY(FT*FT/SEC.) =   1.24
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    115.00 =     511.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    117.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   487.00  DOWNSTREAM(FEET) =   486.00
  FLOW LENGTH(FEET) =   105.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.52
```

```
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.94
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =    6.03
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    117.00 =     616.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    117.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.473
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7943
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    3.54
  TOTAL AREA(ACRES) =        1.4   TOTAL RUNOFF(CFS) =       8.31
  TC(MIN.) =    6.03

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    120.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   486.00  DOWNSTREAM(FEET) =   485.50
  FLOW LENGTH(FEET) =    26.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.20
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.31
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    6.08
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    120.00 =     642.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.08
  RAINFALL INTENSITY(INCH/HR) =   7.43
  TOTAL STREAM AREA(ACRES) =     1.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.31

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
```

```
     1        2.50     7.16        6.687          0.45
     2        8.31     6.08        7.431          1.40

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       10.43     6.08       7.431
     2        9.98     7.16       6.687

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      10.43   Tc(MIN.) =    6.08
 TOTAL AREA(ACRES) =        1.9
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =     731.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.431
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .6800
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7771
 SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    2.02
 TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =      12.99
 TC(MIN.) =    6.08

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.431
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .7900
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7782
 SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    1.17
 TOTAL AREA(ACRES) =        2.5   TOTAL RUNOFF(CFS) =      14.17
 TC(MIN.) =    6.08

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.431
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7481
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.56
  TOTAL AREA(ACRES) =        2.7   TOTAL RUNOFF(CFS) =      14.73
  TC(MIN.) =    6.08

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.431
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6897
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.41
  TOTAL AREA(ACRES) =        3.2   TOTAL RUNOFF(CFS) =      16.14
  TC(MIN.) =    6.08

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    199.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   474.00  DOWNSTREAM(FEET) =   468.80
  FLOW LENGTH(FEET) =   380.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.50
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.14
  PIPE TRAVEL TIME(MIN.) =   0.75    Tc(MIN.) =    6.83
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    199.00 =    1111.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    199.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.83
  RAINFALL INTENSITY(INCH/HR) =   6.90
  TOTAL STREAM AREA(ACRES) =     3.15
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.14
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    132.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    484.00
  DOWNSTREAM ELEVATION(FEET) =    483.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.499
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    65.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.67
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.67

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    135.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  483.00  DOWNSTREAM ELEVATION(FEET) =  480.00
  STREET LENGTH(FEET) =   210.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 13.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   8.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.83
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.72
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.08
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
  STREET FLOW TRAVEL TIME(MIN.) =   1.68   Tc(MIN.) =    6.18
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.356
  *USER SPECIFIED(SUBAREA):
```

```
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    2.32
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       2.91

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.66
  FLOW VELOCITY(FEET/SEC.) =  2.32   DEPTH*VELOCITY(FT*FT/SEC.) =   0.79
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    135.00 =     310.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   477.00  DOWNSTREAM(FEET) =   476.50
  FLOW LENGTH(FEET) =    26.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.20
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.91
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    6.25
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    140.00 =     336.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.303
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.58
  TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       3.46
  TC(MIN.) =    6.25

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.303
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
```

```
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    2.88
  TOTAL AREA(ACRES) =        1.1   TOTAL RUNOFF(CFS) =       6.35
  TC(MIN.) =    6.25

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.303
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    3.46
  TOTAL AREA(ACRES) =        1.7   TOTAL RUNOFF(CFS) =       9.81
  TC(MIN.) =    6.25

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   471.50  DOWNSTREAM(FEET) =   471.00
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.72
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.81
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =    6.69
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    145.00 =     461.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    471.00  DOWNSTREAM(FEET) =    470.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   100.00   CHANNEL SLOPE =  0.0010
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.060   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.480
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.86
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.54
  AVERAGE FLOW DEPTH(FEET) =   0.88   TRAVEL TIME(MIN.) =   3.06
```

```
  Tc(MIN.) =    9.75
  SUBAREA AREA(ACRES) =     0.05       SUBAREA RUNOFF(CFS) =    0.10
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.777
  TOTAL AREA(ACRES) =        1.8         PEAK FLOW RATE(CFS) =       9.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.88   FLOW VELOCITY(FEET/SEC.) =   0.54
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    150.00 =     561.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    199.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.75
  RAINFALL INTENSITY(INCH/HR) =   5.48
  TOTAL STREAM AREA(ACRES) =     1.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.81

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       16.14     6.83        6.897          3.15
      2        9.81     9.75        5.480          1.75

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       23.01     6.83       6.897
      2       22.64     9.75       5.480

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      23.01   Tc(MIN.) =    6.83
  TOTAL AREA(ACRES) =        4.9
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    199.00 =    1111.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    199.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.897
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7136
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.24
  TOTAL AREA(ACRES) =        5.0   TOTAL RUNOFF(CFS) =      24.61
  TC(MIN.) =    6.83

****************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    199.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.897
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7065
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.24
  TOTAL AREA(ACRES) =        5.1   TOTAL RUNOFF(CFS) =      24.85
  TC(MIN.) =    6.83

****************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    199.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.897
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7060
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.47
  TOTAL AREA(ACRES) =        5.2   TOTAL RUNOFF(CFS) =      25.32
  TC(MIN.) =    6.83

****************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    199.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.897
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7075
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.54
  TOTAL AREA(ACRES) =        5.3   TOTAL RUNOFF(CFS) =      25.86
  TC(MIN.) =    6.83
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.3  TC(MIN.) =      6.83
```

```
  PEAK FLOW RATE(CFS)    =      25.86
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX C

RATIONAL METHOD BACK-UP

Weighted Runoff Coefficient Calculations

Pre-Project Condition

Basin 100

U/S Node #	D/S Node #	Sub Basin Area, A (sf)	Sub Basin Area, A (acres)	% Impervious (%)	Hydrologic Soil Group	Weighted Runoff Coefficient[1], C
100	102	3622	0.1	0%	D	0.35
102	120	60407	1.4	5%	C/D	0.38
120	120	45970	1	0%	C/D	0.35
120	150	29306	0.7	80%	C/D	0.79
199	199	55401	1.3	0%	C/D	0.35
199	199	27249	0.6	50%	C/D	0.63
199	199	4165	0.1	0.4	C/D	0.57
Total Area (acres) =			5.2			

Notes:

1. Based on County of San Diego Hydrology Manual (June 2003) Table 3-1 (Runoff Coefficients for Urban Areas), measured % impervious areas are matched up with the % impervious and soil type on the table to determine the appropriate runoff coefficient. If the measured % impervious is not provided in the table, runoff coefficients were interpolated accordingly.

2. The 100-year, 6-hour precipitation of 3.2 inches is referenced from the County of San Diego Hydrology Manual (June 2003) isopluvial map.

Weighted Runoff Coefficient Calculations

Post-Project Condition

Basin 100

U/S Node #	D/S Node #	Sub Basin Area, A (sf)	Sub Basin Area, A (acres)	% Impervious (%)	Hydrologic Soil Group	Weighted Runoff Coefficient[1], C
100	102	4550	0.1	90%	D	0.85
102	105	2047	0.05	90%	D	0.85
105	115	12104	0.3	80%	D	0.79
110	112	4081	0.1	90%	D	0.85
112	115	30017	0.7	80%	D	0.79
117	117	26417	0.6	80%	D	0.79
120	120	19184	0.4	60%	D	0.68
120	120	8425	0.2	80%	D	0.79
120	120	8712	0.2	5%	D	0.38
120	120	20905	0.5	5%	D	0.38
130	132	4460	0.1	80%	D	0.79
132	135	18821	0.4	80%	D	0.79
140	140	4095	0.1	80%	D	0.79
140	140	21260	0.5	80%	D	0.79
140	140	27432	0.6	80%	D	0.79
145	150	1961	0.05	0%	D	0.35
199	199	4048	0.1	0%	D	0.35
199	199	3779	0.1	0%	D	0.35
199	199	4356	0.1	60%	D	0.68
199	199	4165	0.1	80%	D	0.79
Total Area (acres) =		230819	5.3			

Notes:
1. Based on County of San Diego Hydrology Manual (June 2003) Table 3-1 (Runoff Coefficients for Urban Areas), measured % impervious areas are matched up with the % impervious and soil type on the table to determine the appropriate runoff coefficient. If the measured % impervious is not provided in the table, runoff coefficients were interpolated accordingly.

2. The 100-year, 6-hour precipitation of 3.2 inches is referenced from the County of San Diego Hydrology Manual (June 2003) isopluvial map.

=Used for Pre-Project AES Hydrology

=Used for Post-Project AES Hydrology

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

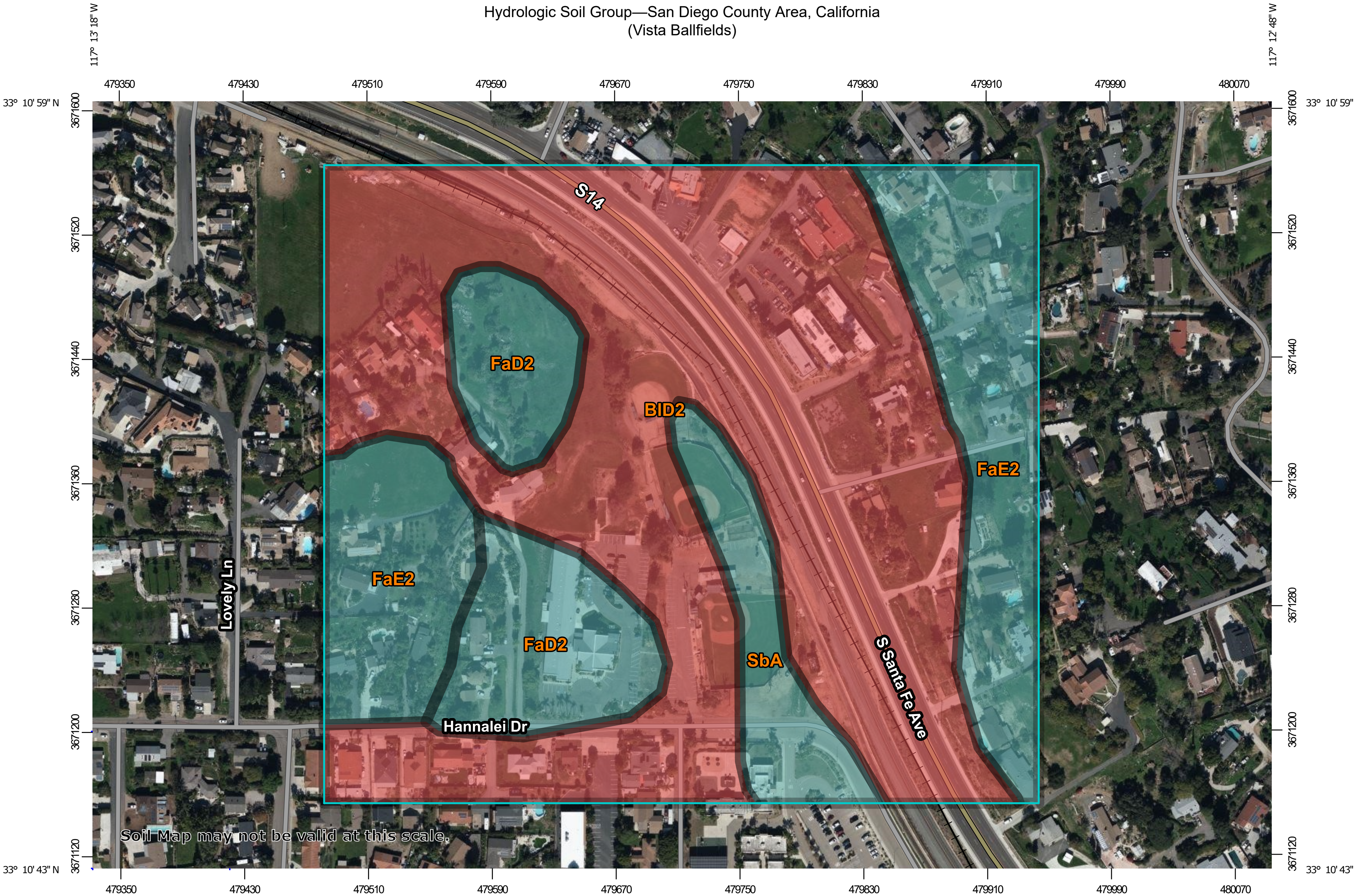
Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).

DU/A = dwelling units per acre

NRCS = National Resources Conservation Service

Hydrologic Soil Group—San Diego County Area, California
(Vista Ballfields)



Map Scale: 1:3,480 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 150, 300, 600, 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 15, May 27, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 24, 2020—Feb 12, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BlD2	Bonsall sandy loam, 9 to 15 percent slopes, eroded	D	28.3	60.1%
FaD2	Fallbrook sandy loam, 9 to 15 percent slopes, eroded	C	5.7	12.2%
FaE2	Fallbrook sandy loam, 15 to 30 percent slopes, eroded	C	10.2	21.7%
SbA	Salinas clay loam, 0 to 2 percent slopes, warm MAAT, MLRA 19	C	2.8	6.0%
Totals for Area of Interest			**47.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

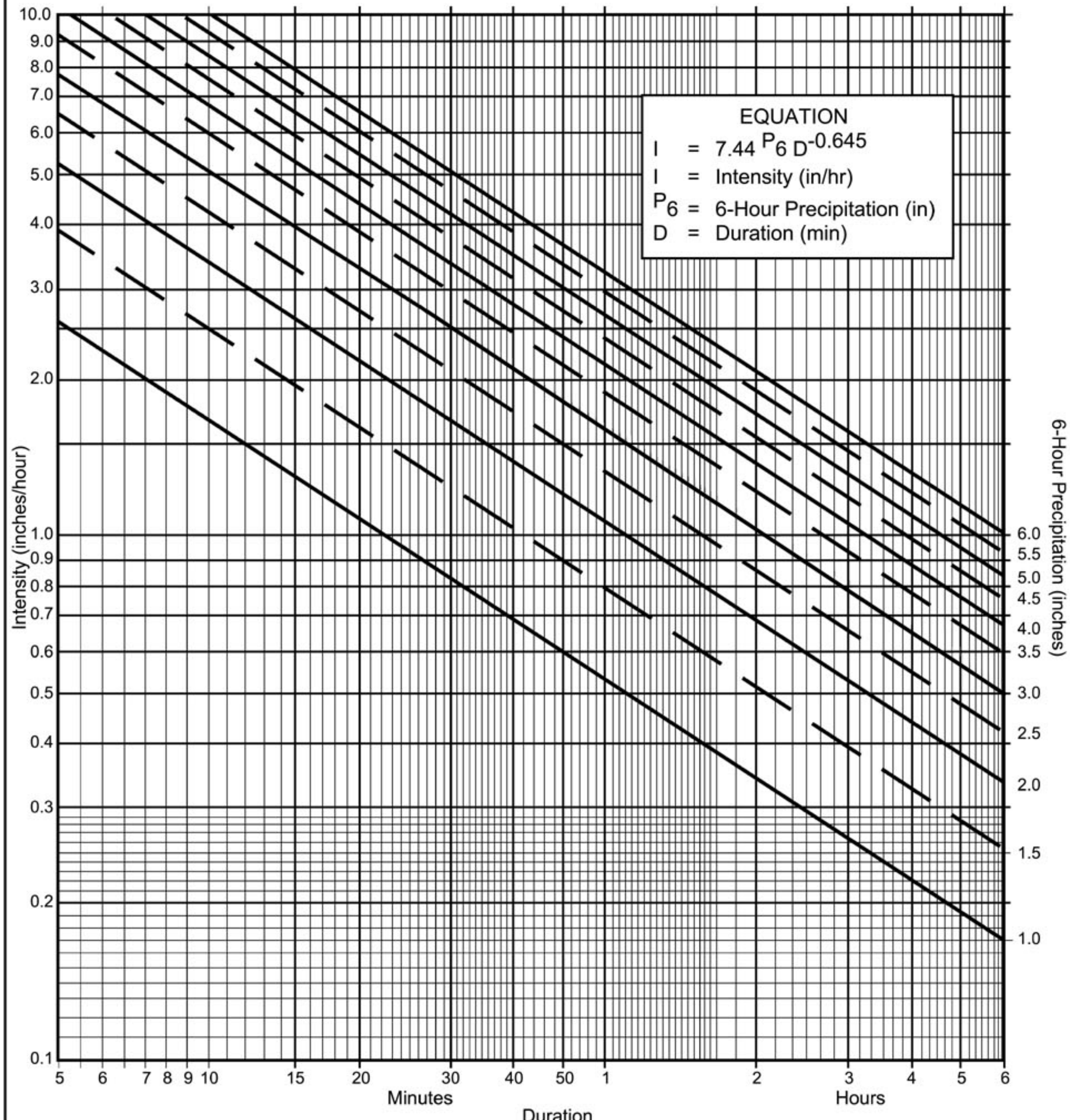
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicable to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency ______ year

(b) P_6 = ______ in., P_{24} = ______ , $\frac{P_6}{P_{24}}$ = ______ %$^{(2)}$

(c) Adjusted $P_6^{(2)}$ = ______ in.

(d) t_x = ______ min.

(e) I = ______ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE

3-1

Note that the Initial Time of Concentration should be reflective of the general land-use at the upstream end of a drainage basin. A single lot with an area of two or less acres does not have a significant effect where the drainage basin area is 20 to 600 acres.

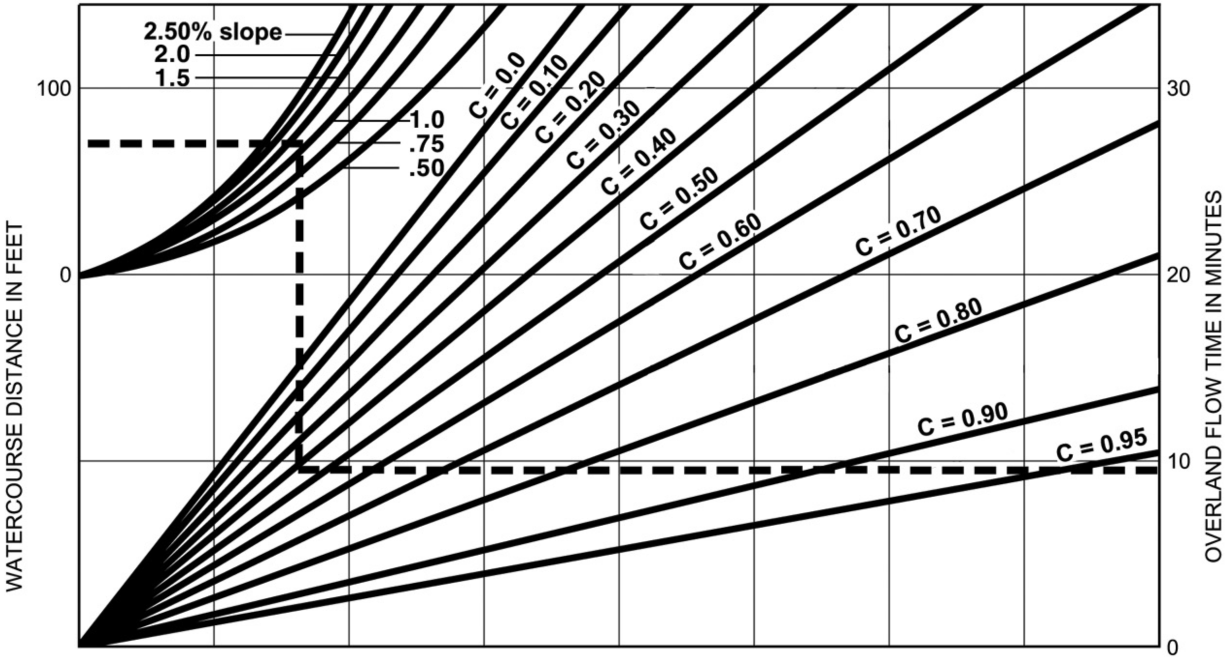
Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved by the "Regulating Agency" when submitted with a detailed study.

Table 3-2

MAXIMUM OVERLAND FLOW LENGTH (L_M) & INITIAL TIME OF CONCENTRATION (T_i)

Element*	DU/ Acre	.5%		1%		2%		3%		5%		10%	
		L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
N. Com		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
G. Com		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
O.P./Com		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

*See Table 3-1 for more detailed description



EXAMPLE:

Given: Watercourse Distance (D) = 70 Feet
Slope (s) = 1.3%
Runoff Coefficient (C) = 0.41
Overland Flow Time (T) = 9.5 Minutes

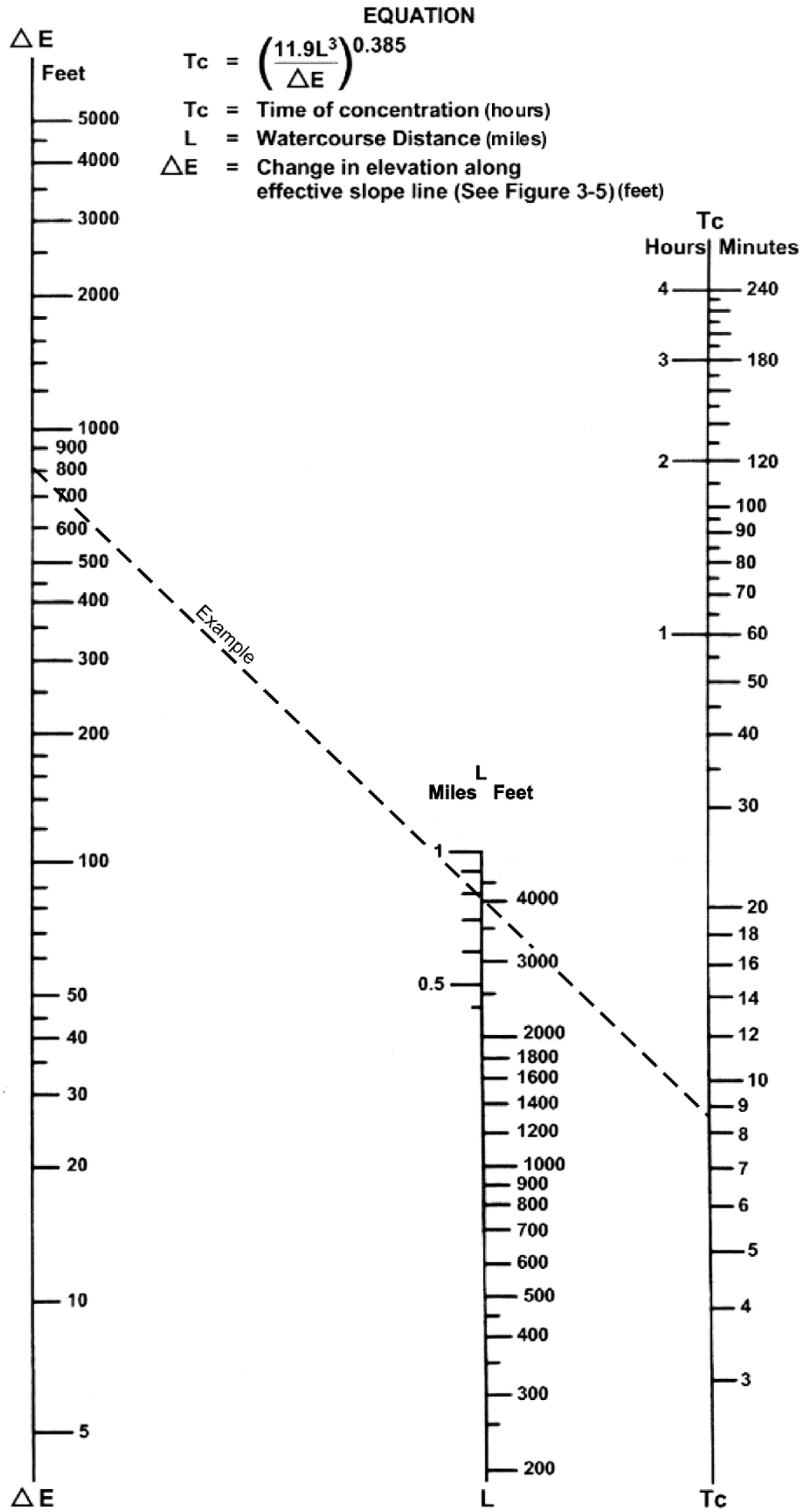
$$T = \frac{1.8\,(1.1\text{-}C)\sqrt{D}}{\sqrt[3]{s}}$$

SOURCE: Airport Drainage, Federal Aviation Administration, 1965

FIGURE

3-3

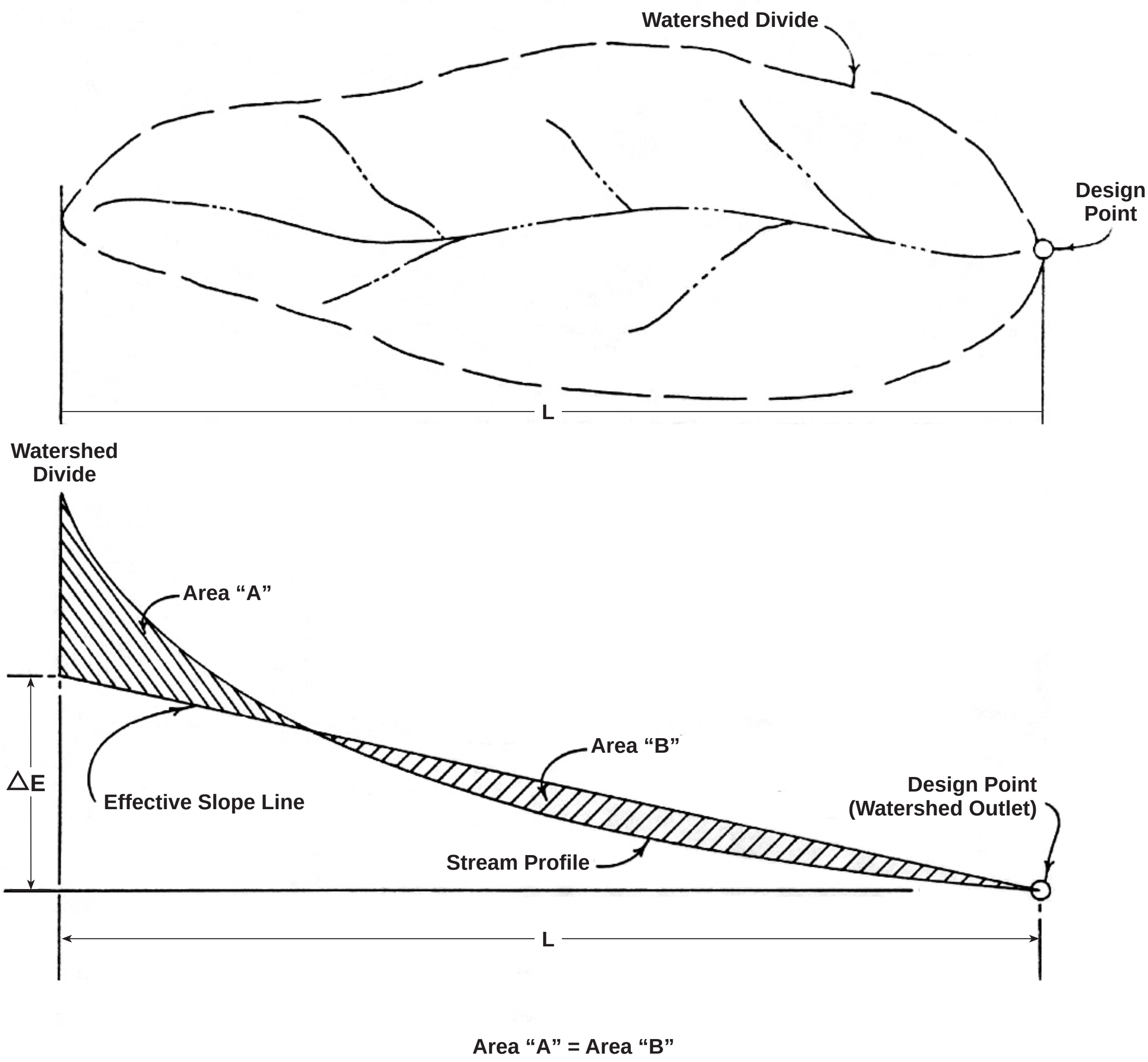
Rational Formula - Overland Time of Flow Nomograph



SOURCE: California Division of Highways (1941) and Kirpich (1940)

FIGURE **3-4**

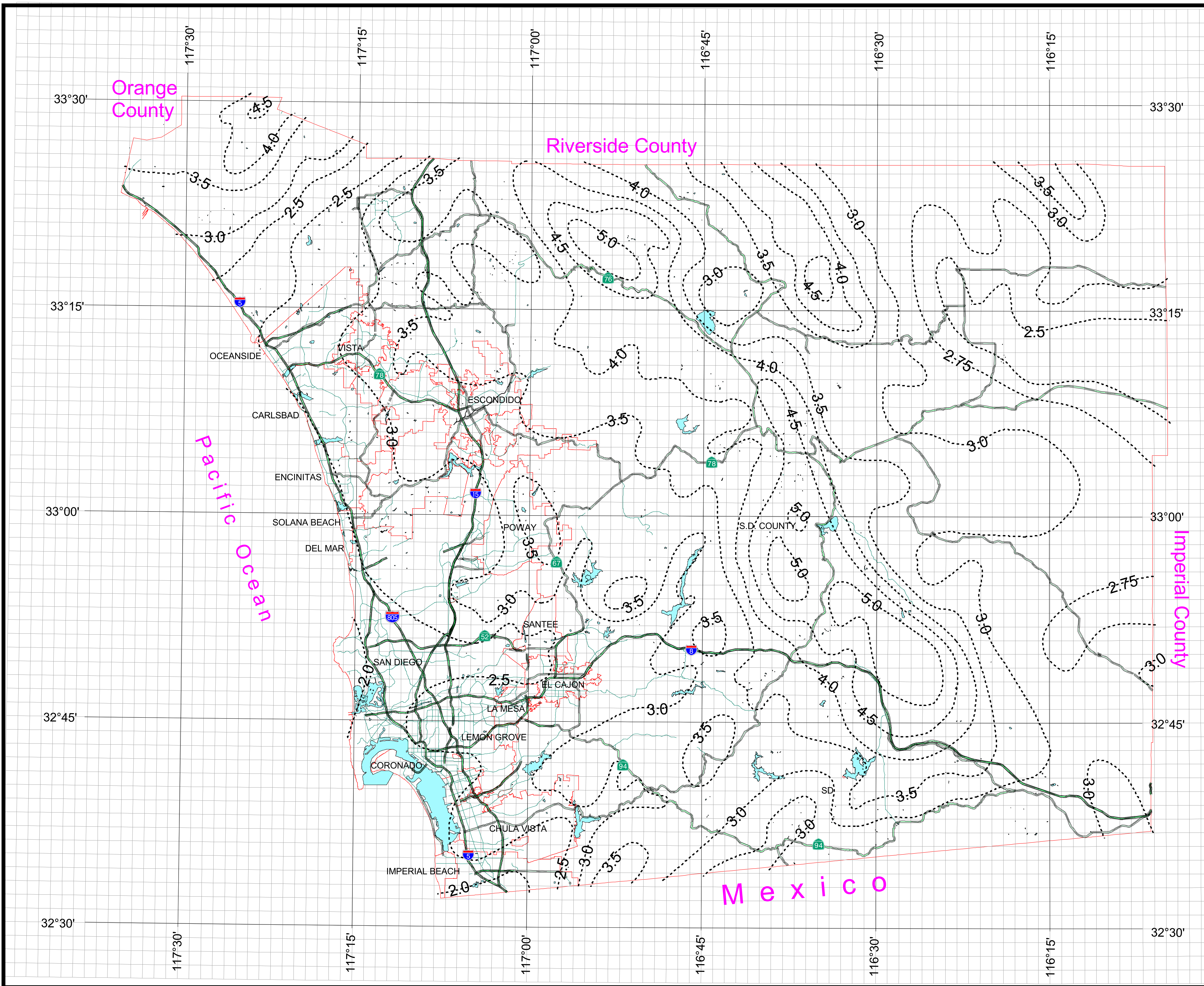
Nomograph for Determination of Time of Concentration (Tc) or Travel Time (Tt) for Natural Watersheds



SOURCE: California Division of Highways (1941) and Kirpich (1940)

FIGURE 3-5

Computation of Effective Slope for Natural Watersheds



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

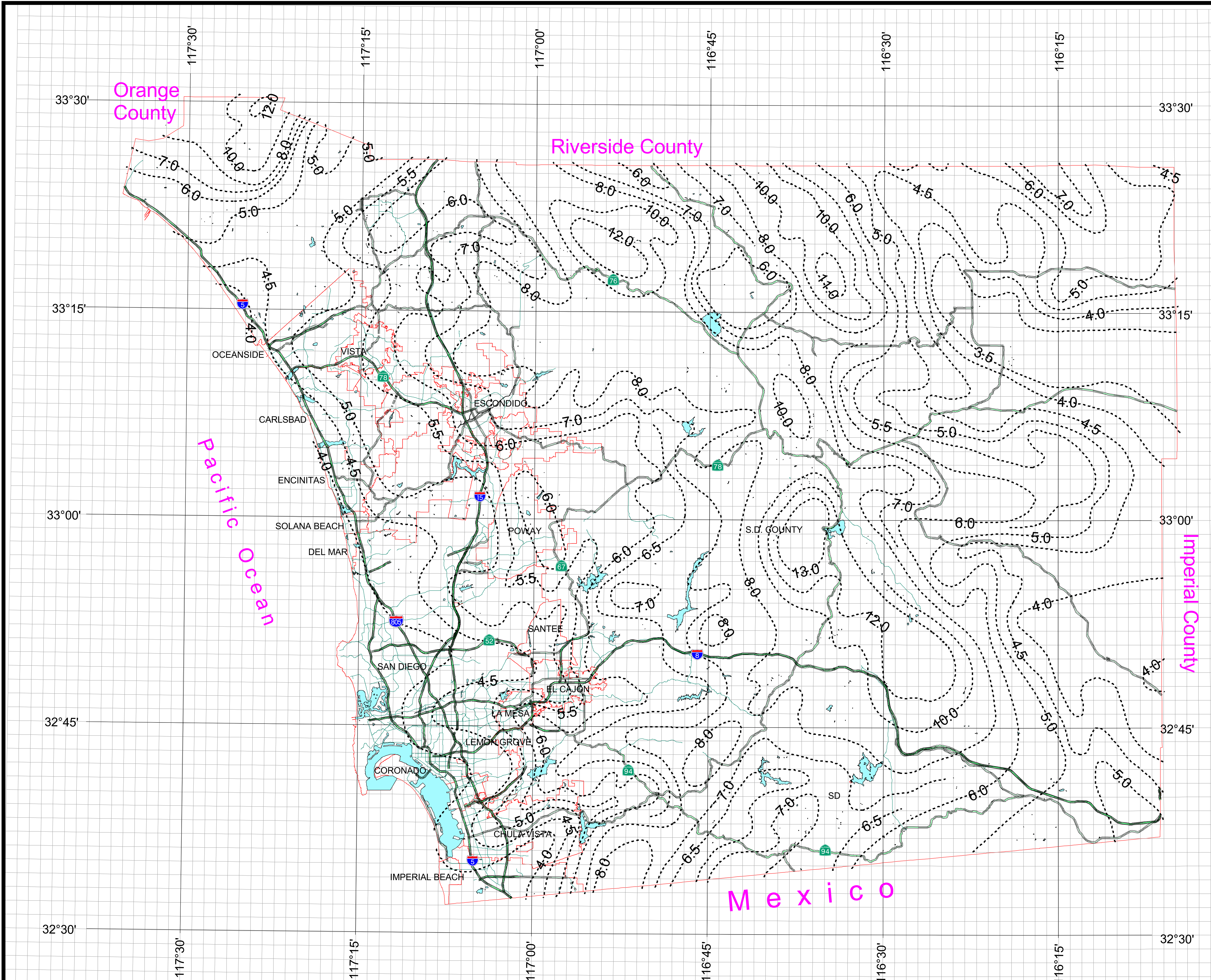
Isopluvial (inches)

Department of Public Works Geographic Information Services

We Have San Diego Covered!

N S E W

3 0 3 Miles



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N S W E

3 0 3 Miles

APPENDIX D

INLET SIZING CALCULATIONS

This will be included during final engineering.

APPENDIX E

PRELIMINARY STORM DRAIN SIZING

Normal Depth Storm Drain Sizing Table

The purpose of this table is to provide an estimated pipe size to convey the 100-year flow rates with a sizing factor.

Manning's n: 0.013

Sizing Factor (%): 30

	Slope at:	0.5%		1.0%		2.0%		3.0%	
Q_{100} (cfs[1])	Q_{100} with Sizing Factor (cfs[1])	Minimum Pipe Size[2] (feet)	Recommended Pipe Size (inches)	Minimum Pipe Size[2] (feet)	Recommended Pipe Size (inches)	Minimum Pipe Size [2] (feet)	Recommended Pipe Size (inches)	Minimum Pipe Size[2] (feet)	Recommended Pipe Size (inches)
0.8	1.0	0.70	10"	0.61	8"	0.54	8"	0.50	6"
1.3	1.7	0.86	12"	0.76	10"	0.66	8"	0.61	8"
3.0	3.9	1.18	18"	1.03	18"	0.91	12"	0.84	10"
6.0	7.8	1.53	24"	1.34	18"	1.18	18"	1.09	18"
10.5	13.7	1.88	24"	1.65	24"	1.45	18"	1.35	18"
16.1	20.9	2.21	30"	1.94	24"	1.70	24"	1.58	24"
25.0	32.5	2.61	36"	2.29	30"	2.01	24"	1.86	24"
30.0	39.0	2.79	36"	2.45	30"	2.15	30"	1.99	24"
35.0	45.5	2.96	36"	2.60	36"	2.28	30"	2.11	30"
40.0	52.0	3.11	42"	2.73	36"	2.40	30"	2.22	30"
50.0	65.0	3.38	42"	2.97	36"	2.61	36"	2.42	30"
60.0	78.0	3.62	48"	3.18	42"	2.79	36"	2.59	36"
70.0	91.0	3.83	48"	3.37	42"	2.96	36"	2.74	36"
80.0	104.0	4.03	54"	3.54	48"	3.11	42"	2.88	36"
90.0	117.0	4.21	54"	3.70	48"	3.25	42"	3.01	42"
100.0	130.0	4.38	54"	3.85	48"	3.38	42"	3.13	42"
150.0	195.0	5.10	72"	4.48	54"	3.94	48"	3.65	48"
200.0	260.0	5.68	72"	4.99	60"	4.38	54"	4.06	54"
250.0	325.0	6.18	84"	5.43	72"	4.77	60"	4.42	54"
300.0	390.0	6.62	84"	5.81	72"	5.10	72"	4.73	60"

Note:

1. "cfs" = cubic feet per second.
2. Minimum pipe sizes are calculated using the Manning's equation and are based on the flow rates with 30% factor.

APPENDIX F

EMERGENCY OVERFLOW CALCULATIONS

RICK™
ENGINEERING COMPANY

5620 Friars Road
San Diego, CA 92110-2596

Tel: (619) 291-0707
Fax: (619) 291-4165

Date	7/19/2021
Job No.	19253-B
Page	
Done By	BV
Checked By	

Vista-II Emergency Overflow Calcs

BMP-A-1

Post-project undetained Q_{100} = 15.6 cfs

$H = 0.5\ ft$

Solving for length $\Rightarrow Q = CLH^{3/2}$

$15.6\ cfs = 3 \times L \times 0.5^{3/2}$

$L = 15\text{-feet}$

BMP-B-1

Post-project undetained Q_{100} = 9.8 cfs

$H = 0.5\ ft$

Solving for length $\Rightarrow Q = CLH^{3/2}$

$9.8\ cfs = 3 \times L \times 0.5^{3/2}$

$L = 10\text{-feet}$

APPENDIX G

ENERGY DISSIPATER DESIGN

This will be included during final engineering.

APPENDIX H

PRELIMINARY HEC-1 DETENTION ANALYSIS

```
*FREE
*DIAGRAM
ID VISTA BALLFIELDS, J-19253-B PROJECT SITE
ID 100-YEAR DETENTION ANALYSIS
ID SEPTEMBER 19, 2023 - FILE NAME: VB100.HC1
IT 1 01JAN90 1200 1000
IO 5 0
KK VB100.hc1
KM RUN DATE   9/19/2023
KM RATIONAL METHOD HYDROGRAPH PROGRAM
KM COPYRIGHT 1992, 2014, RICK ENGINEERING COMPANY
KM 6HR RAINFALL IS 3.2 INCHES
KM RATIONAL METHOD RUNOFF COEFFICIENT IS 0.78
KM RATIONAL METHOD TIME OF CONCENTRATION IS 6 MIN.
KM FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
KM IT 2 01JAN90 1200 200
BA 0.0039
IN 6 01JAN90 1157
QI 0  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
QI 0.4  0.4  0.5  0.5  0.5  0.5  0.5  0.5  0.5  0.5
QI 0.6  0.6  0.6  0.6  0.6  0.7  0.7  0.7  0.8  0.8
QI 0.9  0.9  1  1.1  1.1  1.3  1.4  1.7  2  2.9
QI 4.5  14.2  2.3  1.6  1.2  1  0.9  0.8  0.7  0.7
QI 0.6  0.6  0.5  0.5  0.5  0.5  0.4  0.4  0.4  0.4
QI 0.4  0  0  0  0  0  0  0  0  0
QI 0  0
*
KK DET-A
KO 0 0 0 0 21
RS 1 ELEV 0
SV 0 0.185 0.21 0.229 0.249 0.322 0.351
SQ 0.04 0.083 0.674 1.025 1.278 1.945 5.373
SE 0 3.17 3.58 3.92 4.25 5.5 6
*
ZZ
```

```
1***************************************                                                        ***************************************
 *                                     *                                                        *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                      *   U.S. ARMY CORPS OF ENGINEERS      *
 *             JUN   1998              *                                                        *   HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.1               *                                                        *         609 SECOND STREET           *
 *                                     *                                                        *      DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   02OCT23  TIME  14:51:28  *                                                       *          (916) 756-1104             *
 *                                     *                                                        *                                     *
 ***************************************                                                        ***************************************


                              X     X  XXXXXXX   XXXXX           X
                              X     X  X        X     X         XX
                              X     X  X        X                X
                              XXXXXXX  XXXX     X       XXXXX    X
                              X     X  X        X                X
                              X     X  X        X     X          X
                              X     X  XXXXXXX   XXXXX          XXX


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

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


1                                            HEC-1 INPUT                                                    PAGE  1

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

 *** FREE ***
                        *DIAGRAM
            1           ID   VISTA BALLFIELDS, J-19253-B PROJECT SITE
            2           ID   100-YEAR DETENTION ANALYSIS
            3           ID   SEPTEMBER 19, 2023 - FILE NAME: VB100.HC1
            4           IT       1 01JAN90    1200    1000
            5           IO       5       0

            6           KKVB100.hc1
            7           KM   RUN DATE   9/19/2023
            8           KM   RATIONAL METHOD HYDROGRAPH PROGRAM
            9           KM   COPYRIGHT 1992, 2014, RICK ENGINEERING COMPANY
           10           KM   6HR RAINFALL IS 3.2 INCHES
           11           KM   RATIONAL METHOD RUNOFF COEFFICIENT IS 0.78
           12           KM   RATIONAL METHOD TIME OF CONCENTRATION IS 6 MIN.
           13           KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
           14           KM   IT 2 01JAN90 1200 200
           15           BA  0.0039
           16           IN       6 01JAN90    1157
           17           QI       0     0.4     0.4     0.4     0.4     0.4     0.4     0.4     0.4     0.4
           18           QI     0.4     0.4     0.5     0.5     0.5     0.5     0.5     0.5     0.5     0.5
           19           QI     0.6     0.6     0.6     0.6     0.6     0.7     0.7     0.7     0.8     0.8
           20           QI     0.9     0.9       1     1.1     1.1     1.3     1.4     1.7       2     2.9
           21           QI     4.5    14.2     2.3     1.6     1.2       1     0.9     0.8     0.7     0.7
           22           QI     0.6     0.6     0.5     0.5     0.5     0.5     0.4     0.4     0.4     0.4
           23           QI     0.4       0       0       0       0       0       0       0       0       0
           24           QI       0       0
                        *

           25           KK   DET-A
           26           KO       0       0       0       0      21
           27           RS       1    ELEV       0
           28           SV       0   0.185    0.21   0.229   0.249   0.322   0.351
           29           SQ    0.04   0.083   0.674   1.025   1.278   1.945   5.373
           30           SE       0    3.17    3.58    3.92    4.25     5.5       6
                        *
           31           ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

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

    6    VB100.hc
             V
             V
   25       DET-A

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

```
1***************************************                                                        ***************************************
 *                                     *                                                        *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                      *   U.S. ARMY CORPS OF ENGINEERS      *
 *             JUN   1998              *                                                        *   HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.1               *                                                        *         609 SECOND STREET           *
 *                                     *                                                        *      DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   02OCT23  TIME  14:51:28  *                                                       *          (916) 756-1104             *
 *                                     *                                                        *                                     *
 ***************************************                                                        ***************************************
```


```
                        VISTA BALLFIELDS, J-19253-B PROJECT SITE
```

```
                         100-YEAR DETENTION ANALYSIS
                         SEPTEMBER 19, 2023 - FILE NAME: VB100.HC1

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

      IT          HYDROGRAPH TIME DATA
                         NMIN           1  MINUTES IN COMPUTATION INTERVAL
                        IDATE      1JAN90  STARTING DATE
                        ITIME        1200  STARTING TIME
                           NQ        1000  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE      2JAN90  ENDING DATE
                       NDTIME        0439  ENDING TIME
                       ICENT           19  CENTURY MARK

                    COMPUTATION INTERVAL     .02 HOURS
                         TOTAL TIME BASE   16.65 HOURS

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


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

             **************
             *            *
   25 KK     *     DET-A  *
             *            *
             **************

   26 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2        1000  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .017  TIME INTERVAL IN HOURS

1
                                                      RUNOFF SUMMARY
                                              FLOW IN CUBIC FEET PER SECOND
                                           TIME IN HOURS,  AREA IN SQUARE MILES

                                           PEAK    TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM     TIME OF
          OPERATION       STATION          FLOW      PEAK                                            AREA      STAGE     MAX STAGE
+                                                                6-HOUR     24-HOUR     72-HOUR

          HYDROGRAPH AT
+                        VB100.hc           14.      4.05           1.          0.          0.        .00

          ROUTED TO
+                           DET-A            4.      4.13           1.          0.          0.        .00
+                                                                                                              5.84        4.13


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

LAG TIME FOR AES
DETENTION RUN

POC-1

PEAK FLOW FOR AES DETENTION RUN

DET-A   11200 1JAN90 0 1 11000   .004

.040	.040	.040	.040	.040	.040	.041	.041	.041	.041
.041	.041	.041	.041	.042	.042	.042	.042	.042	.042
.042	.042	.042	.043	.043	.043	.043	.043	.043	.043
.043	.043	.044	.044	.044	.044	.044	.044	.044	.044
.044	.045	.045	.045	.045	.045	.045	.045	.045	.046
.046	.046	.046	.046	.046	.046	.046	.046	.047	.047
.047	.047	.047	.047	.047	.047	.047	.048	.048	.048
.048	.048	.048	.048	.049	.049	.049	.049	.049	.049
.049	.050	.050	.050	.050	.050	.050	.050	.051	.051
.051	.051	.051	.051	.051	.052	.052	.052	.052	.052
.052	.052	.053	.053	.053	.053	.053	.053	.053	.054
.054	.054	.054	.054	.054	.055	.055	.055	.055	.055
.055	.056	.056	.056	.056	.056	.056	.057	.057	.057
.057	.057	.057	.058	.058	.058	.058	.058	.059	.059
.059	.059	.059	.059	.060	.060	.060	.060	.060	.061
.061	.061	.061	.061	.062	.062	.062	.062	.062	.063
.063	.063	.063	.063	.064	.064	.064	.064	.065	.065
.065	.065	.066	.066	.066	.066	.067	.067	.067	.067
.068	.068	.068	.068	.069	.069	.069	.070	.070	.070
.070	.071	.071	.071	.072	.072	.072	.073	.073	.073
.074	.074	.074	.075	.075	.075	.076	.076	.077	.077
.077	.078	.078	.079	.079	.079	.080	.080	.081	.081
.082	.082	.089	.146	.203	.260	.318	.379	.443	.510
.579	.651	.716	.781	.851	.926	1.005	1.070	1.143	1.243
1.344	1.454	1.583	1.731	1.874	2.501	3.516	4.080	4.260	4.114
3.832	3.575	3.339	3.121	2.918	2.729	2.554	2.395	2.250	2.117
1.994	1.940	1.930	1.920	1.910	1.900	1.889	1.878	1.867	1.856
1.845	1.834	1.822	1.811	1.799	1.788	1.776	1.764	1.753	1.741
1.729	1.717	1.705	1.693	1.681	1.669	1.657	1.645	1.633	1.621
1.610	1.598	1.587	1.576	1.564	1.553	1.541	1.529	1.518	1.506
1.495	1.484	1.473	1.462	1.451	1.440	1.429	1.418	1.407	1.395
1.384	1.373	1.362	1.351	1.341	1.330	1.320	1.310	1.299	1.289
1.280	1.267	1.254	1.240	1.228	1.215	1.203	1.191	1.179	1.166
1.154	1.142	1.129	1.117	1.105	1.092	1.081	1.069	1.057	1.046
1.035	1.023	1.008	.992	.977	.963	.949	.935	.921	.908
.896	.883	.871	.859	.848	.836	.825	.815	.803	.791
.777	.761	.745	.727	.709	.691	.673	.652	.631	.611
.591	.572	.554	.536	.519	.502	.486	.471	.456	.441
.427	.413	.400	.387	.375	.363	.351	.340	.329	.318
.308	.298	.289	.280	.271	.262	.254	.245	.238	.230
.223	.215	.209	.202	.195	.189	.183	.177	.172	.166
.161	.156	.151	.146	.141	.137	.132	.128	.124	.120
.116	.112	.109	.105	.102	.099	.095	.092	.089	.087
.084	.083	.083	.083	.083	.083	.083	.083	.083	.083
.083	.083	.083	.083	.083	.083	.083	.083	.083	.083
.082	.082	.082	.082	.082	.082	.082	.082	.082	.082
.082	.082	.082	.082	.082	.082	.082	.082	.082	.082
.082	.082	.082	.082	.082	.082	.082	.082	.082	.082
.082	.082	.082	.082	.082	.082	.082	.082	.081	.081
.081	.081	.081	.081	.081	.081	.081	.081	.081	.081
.081	.081	.081	.081	.081	.081	.081	.081	.081	.081
.081	.081	.081	.081	.081	.081	.081	.081	.081	.081
.081	.081	.081	.081	.081	.081	.080	.080	.080	.080
.080	.080	.080	.080	.080	.080	.080	.080	.080	.080
.080	.080	.080	.080	.080	.080	.080	.080	.080	.080
.080	.080	.080	.080	.080	.080	.080	.080	.080	.080
.080	.080	.080	.080	.080	.079	.079	.079	.079	.079
.079	.079	.079	.079	.079	.079	.079	.079	.079	.079
.079	.079	.079	.079	.079	.079	.079	.079	.079	.079
.079	.079	.079	.079	.079	.079	.079	.079	.079	.079
.079	.079	.079	.079	.079	.078	.078	.078	.078	.078
.078	.078	.078	.078	.078	.078	.078	.078	.078	.078
.078	.078	.078	.078	.078	.078	.078	.078	.078	.078
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.078	.078	.078	.078	.078	.077	.077	.077	.077	.077
.077	.077	.077	.077	.077	.077	.077	.077	.077	.077
.077	.077	.077	.077	.077	.077	.077	.077	.077	.077
.077	.077	.077	.077	.077	.077	.077	.077	.077	.077
.077	.077	.077	.077	.077	.077	.076	.076	.076	.076
.076	.076	.076	.076	.076	.076	.076	.076	.076	.076
.076	.076	.076	.076	.076	.076	.076	.076	.076	.076
.076	.076	.076	.076	.076	.076	.076	.076	.076	.076
.076	.076	.076	.076	.076	.076	.076	.075	.075	.075
.075	.075	.075	.075	.075	.075	.075	.075	.075	.075
.075	.075	.075	.075	.075	.075	.075	.075	.075	.075
.075	.075	.075	.075	.075	.075	.075	.075	.075	.075
.075	.075	.075	.075	.075	.075	.075	.075	.074	.074
.074	.074	.074	.074	.074	.074	.074	.074	.074	.074
.074	.074	.074	.074	.074	.074	.074	.074	.074	.074
.074	.074	.074	.074	.074	.074	.074	.074	.074	.074
.074	.074	.074	.074	.074	.074	.074	.074	.074	.074
.073	.073	.073	.073	.073	.073	.073	.073	.073	.073

.073	.073	.073	.073	.073	.073	.073	.073	.073	.073
.073	.073	.073	.073	.073	.073	.073	.073	.073	.073
.073	.073	.073	.073	.073	.073	.073	.073	.073	.073
.073	.073	.073	.072	.072	.072	.072	.072	.072	.072
.072	.072	.072	.072	.072	.072	.072	.072	.072	.072
.072	.072	.072	.072	.072	.072	.072	.072	.072	.072
.072	.072	.072	.072	.072	.072	.072	.072	.072	.072
.072	.072	.072	.072	.072	.072	.072	.071	.071	.071
.071	.071	.071	.071	.071	.071	.071	.071	.071	.071
.071	.071	.071	.071	.071	.071	.071	.071	.071	.071
.071	.071	.071	.071	.071	.071	.071	.071	.071	.071
.071	.071	.071	.071	.071	.071	.071	.071	.071	.071
.071	.070	.070	.070	.070	.070	.070	.070	.070	.070
.070	.070	.070	.070	.070	.070	.070	.070	.070	.070
.070	.070	.070	.070	.070	.070	.070	.070	.070	.070
.070	.070	.070	.070	.070	.070	.070	.070	.070	.070
.070	.070	.070	.070	.070	.069	.069	.069	.069	.069
.069	.069	.069	.069	.069	.069	.069	.069	.069	.069

```
*FREE
*DIAGRAM
ID VISTA BALLFIELDS, J-19253-B PROJECT SITE
ID 100-YEAR DETENTION ANALYSIS
ID SEPTEMBER 19, 2023 - FILE NAME: VB200.HC1
IT 1 01JAN90 1200 1000
IO 5 0
KK VB200.hc1
KM RUN DATE   9/19/2023
KM RATIONAL METHOD HYDROGRAPH PROGRAM
KM COPYRIGHT 1992, 2014, RICK ENGINEERING COMPANY
KM 6HR RAINFALL IS 3.2 INCHES
KM RATIONAL METHOD RUNOFF COEFFICIENT IS 0.78
KM RATIONAL METHOD TIME OF CONCENTRATION IS 10 MIN.
KM FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
KM IT 2 01JAN90 1200 200
BA 0.0028
IN 10 01JAN90 1155
QI 0  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.4
QI 0.4  0.4  0.4  0.4  0.4  0.5  0.5  0.6  0.6  0.7
QI 0.7  0.9  1  1.5  3.1  9.8  1.2  0.8  0.6  0.5
QI 0.5  0.4  0.4  0.3  0.3  0.3  0.3  0  0  0
QI 0  0  0  0  0  0  0  0
*
KK DET-B1/B3
KO 0 0 0 0 21
RS 1 ELEV 0
SV 0 0.111 0.123 0.144 0.191 0.267 0.277 0.286
SQ 0.033 0.092 0.44 0.831 1.306 1.836 6.389 14.669
SE 0 3 3.33 3.92 5.17 7.25 7.5 7.75
*
ZZ
```

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1****************************************                                                    ***************************************
 *                                       *                                                    *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                    *   U.S. ARMY CORPS OF ENGINEERS      *
 *             JUN   1998                *                                                    *   HYDROLOGIC ENGINEERING CENTER     *
 *          VERSION 4.1                  *                                                    *         609 SECOND STREET           *
 *                                       *                                                    *      DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   02OCT23  TIME  14:24:26   *                                                    *          (916) 756-1104             *
 *                                       *                                                    *                                     *
 ****************************************                                                    ***************************************


                                   X     X  XXXXXXX   XXXXX          X
                                   X     X  X        X     X        XX
                                   X     X  X        X               X
                                   XXXXXXX  XXXX     X       XXXXX   X
                                   X     X  X        X               X
                                   X     X  X        X     X         X
                                   X     X  XXXXXXX   XXXXX         XXX
```

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

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

```
1                                          HEC-1 INPUT                                          PAGE  1

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

 *** FREE ***
                        *DIAGRAM
            1           ID   VISTA BALLFIELDS, J-19253-B PROJECT SITE
            2           ID   100-YEAR DETENTION ANALYSIS
            3           ID   SEPTEMBER 19, 2023 - FILE NAME: VB200.HC1
            4           IT       1 01JAN90    1200    1000
            5           IO       5       0

            6           KKVB200.hc1
            7           KM   RUN DATE   9/19/2023
            8           KM   RATIONAL METHOD HYDROGRAPH PROGRAM
            9           KM   COPYRIGHT 1992, 2014, RICK ENGINEERING COMPANY
           10           KM   6HR RAINFALL IS 3.2 INCHES
           11           KM   RATIONAL METHOD RUNOFF COEFFICIENT IS 0.78
           12           KM   RATIONAL METHOD TIME OF CONCENTRATION IS 10 MIN.
           13           KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
           14           KM   IT 2 01JAN90 1200 200
           15           BA  0.0028
           16           IN      10 01JAN90    1155
           17           QI       0     0.3     0.3     0.3     0.3     0.3     0.3     0.3     0.3     0.4
           18           QI     0.4     0.4     0.4     0.4     0.4     0.5     0.5     0.6     0.6     0.7
           19           QI     0.7     0.9       1     1.5     3.1     9.8     1.2     0.8     0.6     0.5
           20           QI     0.5     0.4     0.4     0.3     0.3     0.3     0.3       0       0       0
           21           QI       0       0       0       0       0       0       0       0
                        *

           22           KKDET-B1/B3
           23           KO       0       0       0       0      21
           24           RS       1    ELEV       0
           25           SV       0   0.111   0.123   0.144   0.191   0.267   0.277   0.286
           26           SQ   0.033   0.092    0.44   0.831   1.306   1.836   6.389  14.669
           27           SE       0       3    3.33    3.92    5.17    7.25     7.5    7.75
                        *
           28           ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

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

     6    VB200.hc
                V
                V
    22    DET-B1/B

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


```
1****************************************                                                    ***************************************
 *                                       *                                                    *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                    *   U.S. ARMY CORPS OF ENGINEERS      *
 *             JUN   1998                *                                                    *   HYDROLOGIC ENGINEERING CENTER     *
 *          VERSION 4.1                  *                                                    *         609 SECOND STREET           *
 *                                       *                                                    *      DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   02OCT23  TIME  14:24:26   *                                                    *          (916) 756-1104             *
 *                                       *                                                    *                                     *
 ****************************************                                                    ***************************************
```


```
                          VISTA BALLFIELDS, J-19253-B PROJECT SITE
                          100-YEAR DETENTION ANALYSIS
                          SEPTEMBER 19, 2023 - FILE NAME: VB200.HC1
```

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

      IT         HYDROGRAPH TIME DATA
                        NMIN           1  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1JAN90  STARTING DATE
                       ITIME        1200  STARTING TIME
                          NQ        1000  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      2JAN90  ENDING DATE
                      NDTIME        0439  ENDING TIME
                      ICENT           19  CENTURY MARK

                 COMPUTATION INTERVAL     .02 HOURS
                      TOTAL TIME BASE   16.65 HOURS

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


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
   22 KK    *  DET-B1/B  *     3
            *            *
            **************

   23 KO         OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2        1000  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .017  TIME INTERVAL IN HOURS

1
                                                    RUNOFF SUMMARY
                                            FLOW IN CUBIC FEET PER SECOND
                                         TIME IN HOURS,  AREA IN SQUARE MILES

                                         PEAK    TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM     TIME OF
          OPERATION       STATION        FLOW     PEAK                                             AREA      STAGE     MAX STAGE
+                                                            6-HOUR     24-HOUR     72-HOUR

          HYDROGRAPH AT
+                        VB200.hc         10.     4.08           1.          0.          0.         .00

          ROUTED TO
+                        DET-B1/B          3.     4.22           1.          0.          0.         .00
+                                                                                                              7.33        4.22


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

LAG TIME FOR AES
DETENTION RUN

POC-2

PEAK FLOW FOR AES DETENTION RUN

DET-B1/B 11200 1JAN90 0 1 11000 .003

.033	.033	.033	.033	.034	.034	.034	.034	.034	.034
.035	.035	.035	.035	.035	.036	.036	.036	.036	.036
.037	.037	.037	.037	.037	.038	.038	.038	.038	.038
.039	.039	.039	.039	.039	.039	.040	.040	.040	.040
.040	.041	.041	.041	.041	.041	.042	.042	.042	.042
.042	.043	.043	.043	.043	.043	.043	.044	.044	.044
.044	.044	.045	.045	.045	.045	.045	.046	.046	.046
.046	.046	.046	.047	.047	.047	.047	.047	.048	.048
.048	.048	.048	.049	.049	.049	.049	.050	.050	.050
.050	.051	.051	.051	.052	.052	.052	.052	.053	.053
.053	.053	.054	.054	.054	.054	.055	.055	.055	.055
.056	.056	.056	.056	.057	.057	.057	.057	.058	.058
.058	.058	.059	.059	.059	.059	.060	.060	.060	.060
.061	.061	.061	.061	.062	.062	.062	.062	.063	.063
.063	.063	.064	.064	.064	.065	.065	.065	.066	.066
.066	.067	.067	.067	.068	.068	.068	.068	.069	.069
.070	.070	.070	.071	.071	.071	.072	.072	.073	.073
.073	.074	.074	.074	.075	.075	.076	.076	.076	.077
.077	.078	.078	.079	.079	.079	.080	.080	.081	.081
.082	.082	.083	.083	.083	.084	.084	.085	.085	.086
.086	.087	.087	.088	.089	.089	.090	.090	.091	.092
.103	.136	.169	.200	.231	.261	.291	.322	.353	.385
.418	.448	.470	.493	.516	.541	.567	.597	.630	.666
.705	.748	.793	.837	.865	.894	.930	.973	1.026	1.087
1.157	1.234	1.316	1.381	1.452	1.529	1.603	1.669	1.727	1.775
1.815	2.331	3.228	3.286	2.906	2.297	1.835	1.828	1.821	1.814
1.806	1.798	1.790	1.781	1.773	1.764	1.754	1.745	1.735	1.726
1.716	1.706	1.696	1.686	1.676	1.666	1.656	1.646	1.635	1.625
1.615	1.605	1.594	1.584	1.574	1.564	1.554	1.543	1.534	1.524
1.514	1.504	1.495	1.485	1.476	1.466	1.457	1.448	1.438	1.429
1.420	1.410	1.401	1.392	1.382	1.373	1.364	1.355	1.346	1.336
1.328	1.319	1.310	1.299	1.287	1.274	1.262	1.250	1.238	1.226
1.214	1.202	1.190	1.178	1.166	1.154	1.142	1.131	1.119	1.108
1.097	1.086	1.075	1.064	1.053	1.043	1.033	1.023	1.013	1.003
.993	.984	.974	.965	.956	.947	.938	.929	.920	.911
.903	.895	.886	.878	.870	.862	.855	.846	.838	.827
.810	.793	.776	.758	.740	.721	.703	.685	.668	.651
.635	.619	.603	.588	.573	.558	.544	.530	.517	.504
.491	.479	.467	.455	.443	.428	.411	.395	.379	.364
.350	.336	.323	.311	.298	.287	.276	.265	.254	.244
.235	.226	.217	.208	.200	.192	.185	.178	.171	.164
.157	.151	.145	.140	.134	.129	.124	.119	.114	.110
.106	.101	.098	.094	.092	.092	.092	.092	.092	.092
.092	.091	.091	.091	.091	.091	.091	.091	.091	.091
.091	.091	.091	.091	.091	.091	.090	.090	.090	.090
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.079	.079	.079	.079	.079	.079	.079	.079	.079	.079
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.076	.076	.076	.076	.076	.076	.076	.076	.076	.076
.076	.076	.076	.076	.075	.075	.075	.075	.075	.075
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.071	.071	.071	.071	.071	.071	.071	.071	.071	.071
.071	.071	.071	.071	.071	.071	.071	.071	.070	.070
.070	.070	.070	.070	.070	.070	.070	.070	.070	.070
.070	.070	.070	.070	.070	.070	.070	.069	.069	.069
.069	.069	.069	.069	.069	.069	.069	.069	.069	.069

.069	.069	.069	.069	.069	.069	.069	.068	.068	.068
.068	.068	.068	.068	.068	.068	.068	.068	.068	.068
.068	.068	.068	.068	.068	.068	.068	.067	.067	.067
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.066	.066	.066	.066	.066	.066	.066	.066	.066	.066
.066	.066	.066	.066	.066	.066	.066	.066	.065	.065
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.065	.065	.065	.065	.065	.065	.065	.065	.065	.064
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.062	.062	.062	.062	.061	.061	.061	.061	.061	.061
.061	.061	.061	.061	.061	.061	.061	.061	.061	.061
.061	.061	.061	.061	.061	.061	.060	.060	.060	.060

VISTA II AES,
DETAINED
100-YR, 6-HR STORM

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            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2014 Advanced Engineering Software (aes)
             Ver. 21.0 Release Date: 06/01/2014  License ID 1261

                           Analysis prepared by:

                          RICK ENGINEERING COMPANY
                              5620 Friars Road
                        San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* J-19253B VISTA II BALLFIELDS                                             *
* 100YR, 6-HR POST-PROJECT - DETAINED                                      *
* J:\19253B\WR\HYDROLOGY\RATIONALMETHOD\...                                *
 **************************************************************************

  FILE NAME: V2B1D00.RAT
  TIME/DATE OF STUDY: 14:02 10/03/2023
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.200
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   18.0     13.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
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****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    504.00
  DOWNSTREAM ELEVATION(FEET) =    503.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.486
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    60.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.72
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.72

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    105.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  503.00  DOWNSTREAM ELEVATION(FEET) =  498.50
  STREET LENGTH(FEET) =   120.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 13.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   8.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.90
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    4.64
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.68
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.59
  STREET FLOW TRAVEL TIME(MIN.) =   0.75   Tc(MIN.) =    4.23
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
```

```
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
  SUBAREA AREA(ACRES) =    0.05      SUBAREA RUNOFF(CFS) =    0.36
  TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       1.07

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.22
  FLOW VELOCITY(FEET/SEC.) =  2.75   DEPTH*VELOCITY(FT*FT/SEC.) =   0.63
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =     220.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    115.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  498.50  DOWNSTREAM ELEVATION(FEET) =  488.50
  STREET LENGTH(FEET) =   411.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 13.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   8.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.89
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.58
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
  STREET FLOW TRAVEL TIME(MIN.) =   2.65   Tc(MIN.) =    6.89
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.859
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.810
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.63
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       2.50

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   8.91
  FLOW VELOCITY(FEET/SEC.) =  2.74   DEPTH*VELOCITY(FT*FT/SEC.) =   0.83
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =     631.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   489.00  DOWNSTREAM(FEET) =   487.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.03
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.50
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =    7.16
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =     731.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.16
  RAINFALL INTENSITY(INCH/HR) =   6.69
  TOTAL STREAM AREA(ACRES) =     0.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.50

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    504.00
  DOWNSTREAM ELEVATION(FEET) =    503.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.486
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    60.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.72
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.72
```

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****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    115.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  503.00  DOWNSTREAM ELEVATION(FEET) =  490.50
  STREET LENGTH(FEET) =   411.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 13.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   8.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.87
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    9.03
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.08
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.94
  STREET FLOW TRAVEL TIME(MIN.) =   2.23   Tc(MIN.) =    5.71
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.738
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.797
  SUBAREA AREA(ACRES) =    0.70      SUBAREA RUNOFF(CFS) =    4.28
  TOTAL AREA(ACRES) =        0.8        PEAK FLOW RATE(CFS) =       4.94

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.34
  FLOW VELOCITY(FEET/SEC.) =  3.51   DEPTH*VELOCITY(FT*FT/SEC.) =   1.24
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    115.00 =     511.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    117.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   487.00  DOWNSTREAM(FEET) =   486.00
  FLOW LENGTH(FEET) =   105.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.52
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  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.94
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =    6.03
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    117.00 =     616.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    117.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.473
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7943
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    3.54
  TOTAL AREA(ACRES) =        1.4   TOTAL RUNOFF(CFS) =       8.31
  TC(MIN.) =    6.03

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    120.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   486.00  DOWNSTREAM(FEET) =   485.50
  FLOW LENGTH(FEET) =    26.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.20
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.31
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    6.08
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    120.00 =     642.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.08
  RAINFALL INTENSITY(INCH/HR) =   7.43
  TOTAL STREAM AREA(ACRES) =     1.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.31

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
```

```
    1        2.50     7.16        6.687          0.45
    2        8.31     6.08        7.431          1.40

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc      INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1       10.43     6.08       7.431
    2        9.98     7.16       6.687

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      10.43   Tc(MIN.) =    6.08
TOTAL AREA(ACRES) =        1.9
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =     731.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.431
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .6800
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7771
SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    2.02
TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =      12.99
TC(MIN.) =    6.08

****************************************************************************
FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.431
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .7900
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7782
SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    1.17
TOTAL AREA(ACRES) =        2.5   TOTAL RUNOFF(CFS) =      14.17
TC(MIN.) =    6.08

****************************************************************************
FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   7
----------------------------------------------------------------------------
>>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
```

AES ROUNDS TO 2.5 AC - ACTUAL AREA 2.45 ACRES AS INPUT IN CODE 7. SEE RUNOFF COEFFICIENT/AREA TABLE FOR BACKUP

```
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  10.88   RAIN INTENSITY(INCH/HOUR) =  5.11
 TOTAL AREA(ACRES) =     2.45   TOTAL RUNOFF(CFS) =      4.30

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.106
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3465
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.39
  TOTAL AREA(ACRES) =        2.7   TOTAL RUNOFF(CFS) =       4.69
  TC(MIN.) =   10.88

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.106
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3518
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    0.97
  TOTAL AREA(ACRES) =        3.2   TOTAL RUNOFF(CFS) =       5.66
  TC(MIN.) =   10.88

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    199.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   474.00  DOWNSTREAM(FEET) =   468.80
  FLOW LENGTH(FEET) =   380.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.47
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.66
  PIPE TRAVEL TIME(MIN.) =   0.98    Tc(MIN.) =   11.86
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    199.00 =    1111.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    199.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.86
  RAINFALL INTENSITY(INCH/HR) =   4.83
  TOTAL STREAM AREA(ACRES) =     3.15
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.66

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    132.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    484.00
  DOWNSTREAM ELEVATION(FEET) =    483.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.499
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    65.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.67
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.67

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    135.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  483.00  DOWNSTREAM ELEVATION(FEET) =  480.00
  STREET LENGTH(FEET) =   210.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 13.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   8.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.83
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.72
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.08
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
  STREET FLOW TRAVEL TIME(MIN.) =   1.68   Tc(MIN.) =    6.18
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.356
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    2.32
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       2.91

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.66
  FLOW VELOCITY(FEET/SEC.) =  2.32   DEPTH*VELOCITY(FT*FT/SEC.) =   0.79
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    135.00 =     310.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   477.00  DOWNSTREAM(FEET) =   476.50
  FLOW LENGTH(FEET) =    26.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.20
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.91
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    6.25
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    140.00 =     336.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.303
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.58
  TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       3.46
  TC(MIN.) =    6.25

****************************************************************************
```

```
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.303
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    2.88
  TOTAL AREA(ACRES) =        1.1   TOTAL RUNOFF(CFS) =       6.35
  TC(MIN.) =    6.25

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.303
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    3.46
  TOTAL AREA(ACRES) =        1.7   TOTAL RUNOFF(CFS) =       9.81
  TC(MIN.) =    6.25

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   471.50  DOWNSTREAM(FEET) =   471.00
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.72
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.81
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =    6.69
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    145.00 =     461.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    471.00  DOWNSTREAM(FEET) =    470.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   100.00   CHANNEL SLOPE =  0.0010
```

AES ROUNDS TO 1.8 AC - ACTUAL AREA 1.75 ACRES AS INPUT IN CODE 7. SEE RUNOFF COEFFICIENT/AREA TABLE FOR BACKUP

```
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  12.000
 MANNING'S FACTOR = 0.060   MAXIMUM DEPTH(FEET) =   3.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.480
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.86
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.54
 AVERAGE FLOW DEPTH(FEET) =   0.88   TRAVEL TIME(MIN.) =   3.06
 Tc(MIN.) =    9.75
 SUBAREA AREA(ACRES) =     0.05       SUBAREA RUNOFF(CFS) =    0.10
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.777
 TOTAL AREA(ACRES) =         1.8          PEAK FLOW RATE(CFS) =       9.81

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.88   FLOW VELOCITY(FEET/SEC.) =   0.54
 LONGEST FLOWPATH FROM NODE    130.00 TO NODE    150.00 =     561.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  18.20   RAIN INTENSITY(INCH/HOUR) =  3.66
 TOTAL AREA(ACRES) =     1.75   TOTAL RUNOFF(CFS) =      3.30

****************************************************************************
 FLOW PROCESS FROM NODE    199.00 TO NODE    199.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   18.20
 RAINFALL INTENSITY(INCH/HR) =   3.66
 TOTAL STREAM AREA(ACRES) =     1.75
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.30

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        5.66    11.86        4.830          3.15
     2        3.30    18.20        3.664          1.75

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
```

```
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        7.81    11.86       4.830
      2        7.59    18.20       3.664

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.81   Tc(MIN.) =   11.86
  TOTAL AREA(ACRES) =        4.9
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    199.00 =    1111.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    199.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.830
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4087
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.17
  TOTAL AREA(ACRES) =        5.0   TOTAL RUNOFF(CFS) =      9.87
  TC(MIN.) =   11.86

****************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    199.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.830
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4076
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.17
  TOTAL AREA(ACRES) =        5.1   TOTAL RUNOFF(CFS) =     10.04
  TC(MIN.) =   11.86

****************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    199.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.830
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4128
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.33
  TOTAL AREA(ACRES) =        5.2   TOTAL RUNOFF(CFS) =     10.37
```

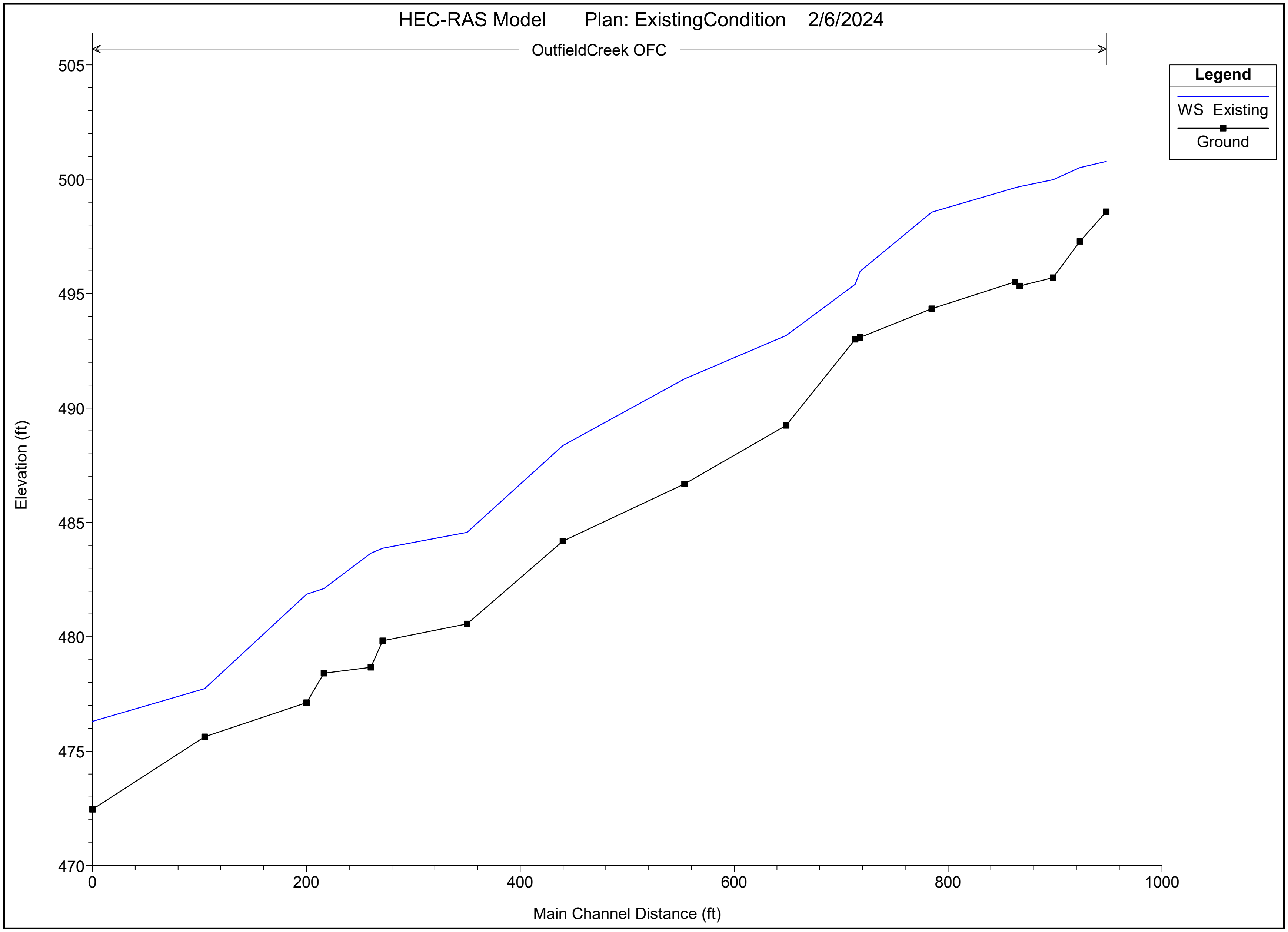
```
  TC(MIN.) =   11.86

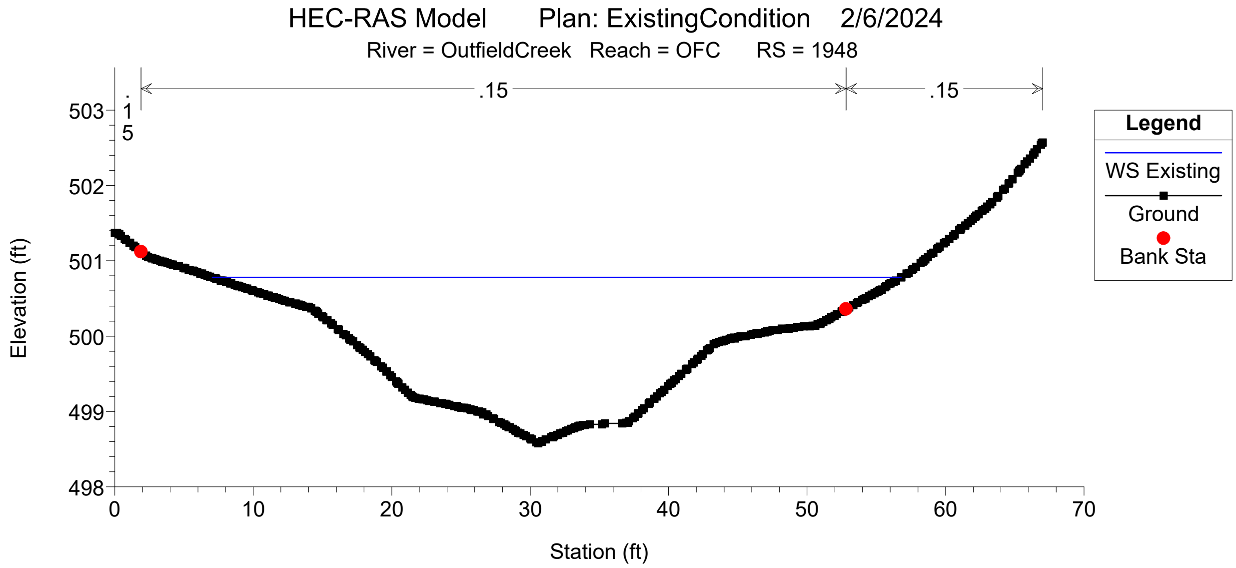
****************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    199.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.830
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4199
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.38
  TOTAL AREA(ACRES) =        5.3   TOTAL RUNOFF(CFS) =      10.75
  TC(MIN.) =   11.86
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.3  TC(MIN.) =     11.86
  PEAK FLOW RATE(CFS)   =      10.75
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Q100-DETAINED
(Q100-PRE = 11.2 CFS)

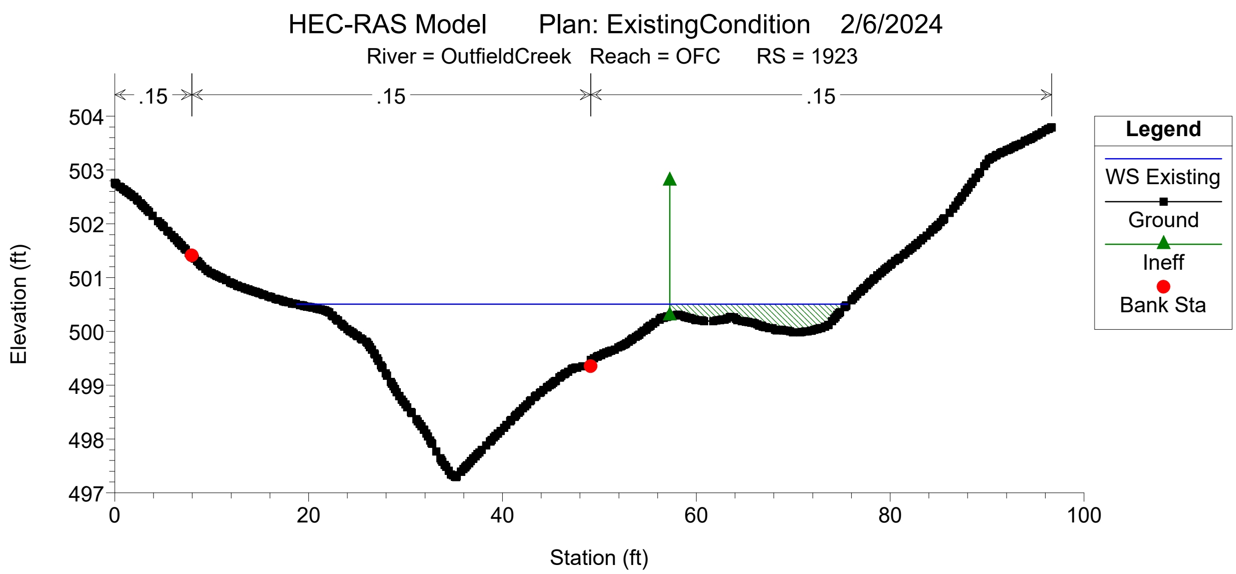
APPENDIX I

HEC-RAS CROSS SECTIONS AND WATER SURFACE ELEVATIONS

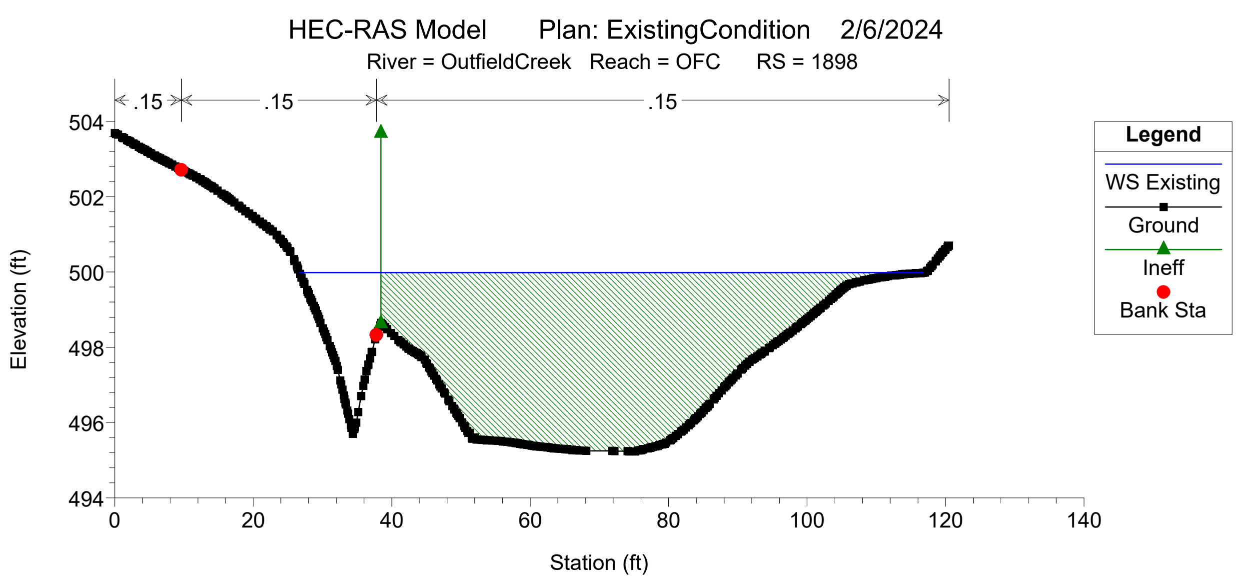

HEC-RAS Model Plan: ExistingCondition 2/6/2024
OutfieldCreek OFC
Legend
WS Existing
Ground
Elevation (ft)
505
500
495
490
485
480
475
470
0
200
400
600
800
1000
Main Channel Distance (ft)



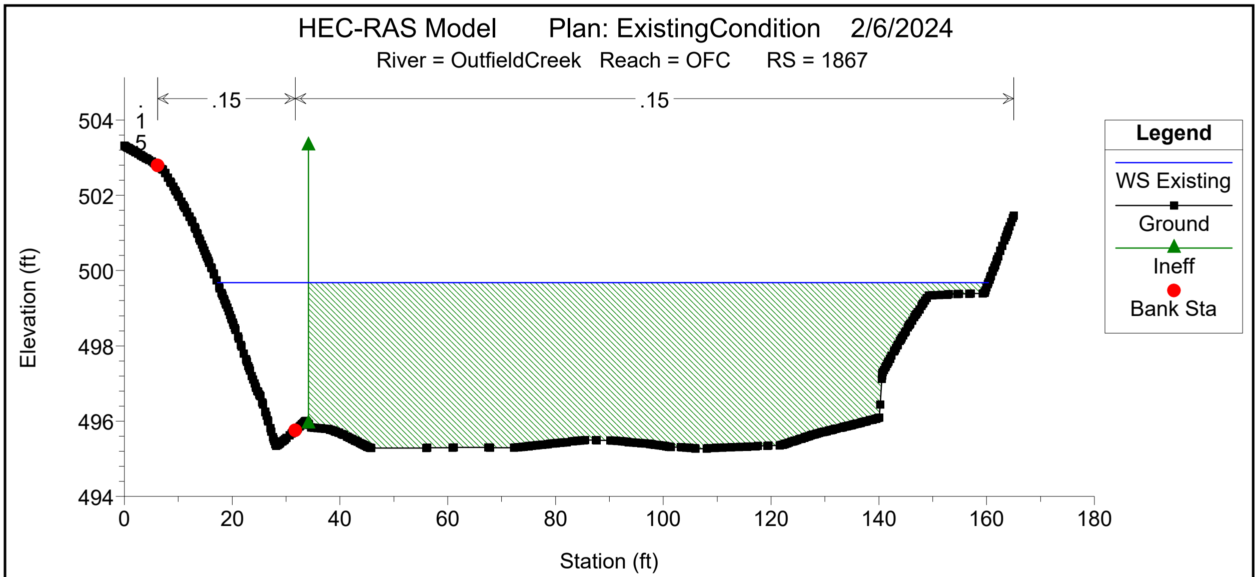
HEC-RAS Model Plan: ExistingCondition 2/6/2024
River = OutfieldCreek Reach = OFC RS = 1948
.15
.15
.15
Legend
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)

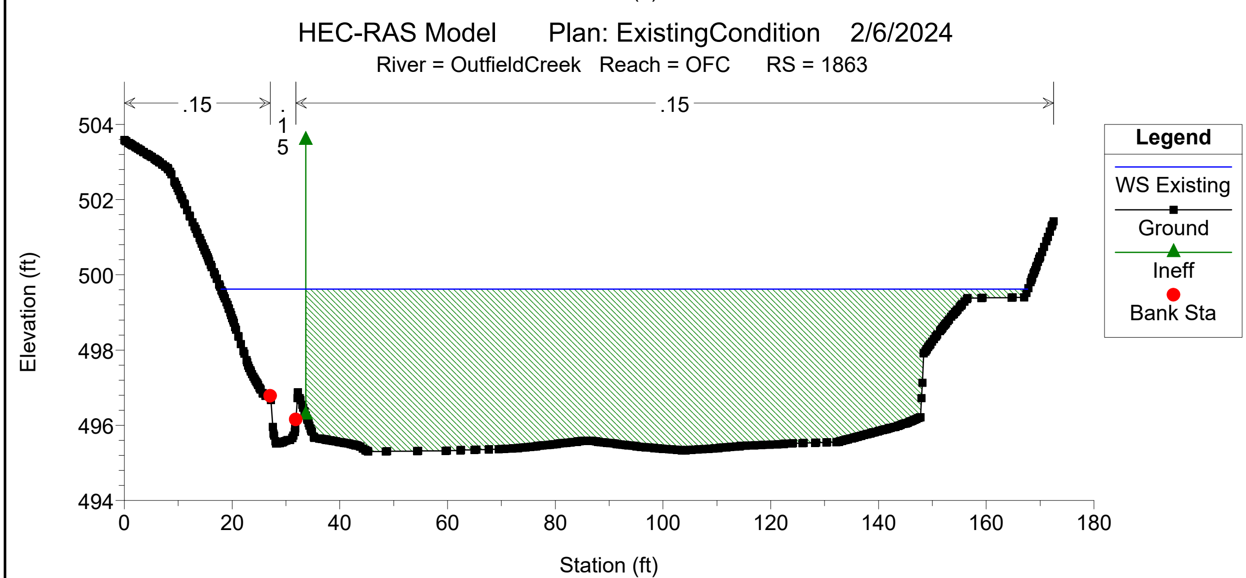


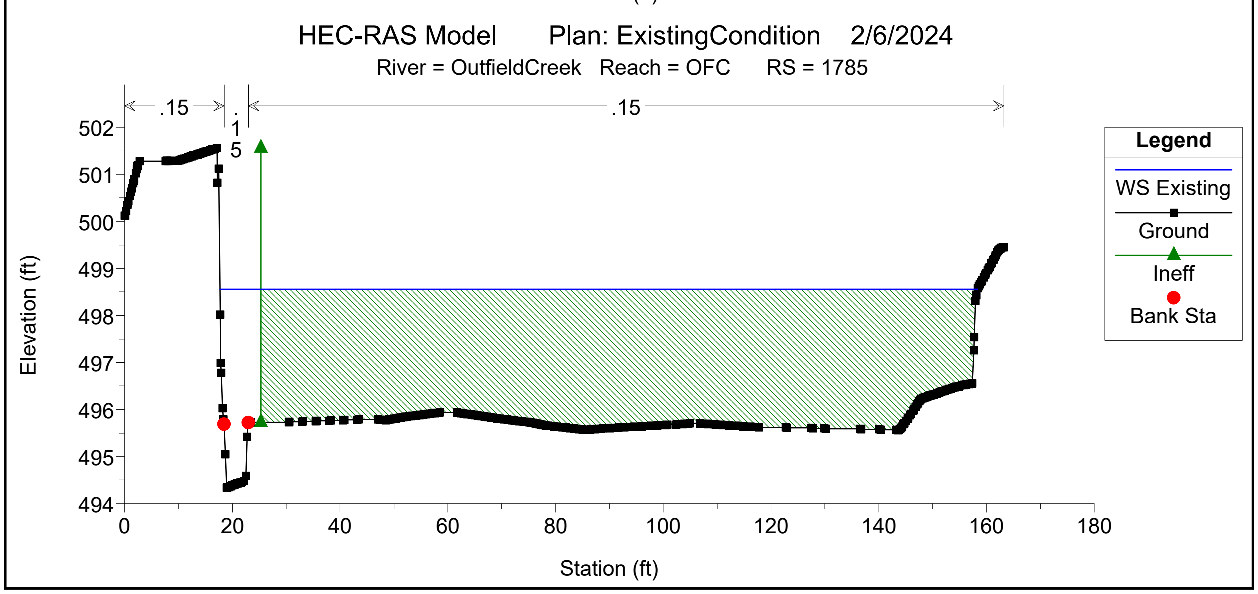
HEC-RAS Model Plan: ExistingCondition 2/6/2024
River = OutfieldCreek Reach = OFC RS = 1923
.15
.15
.15
Legend
WS Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

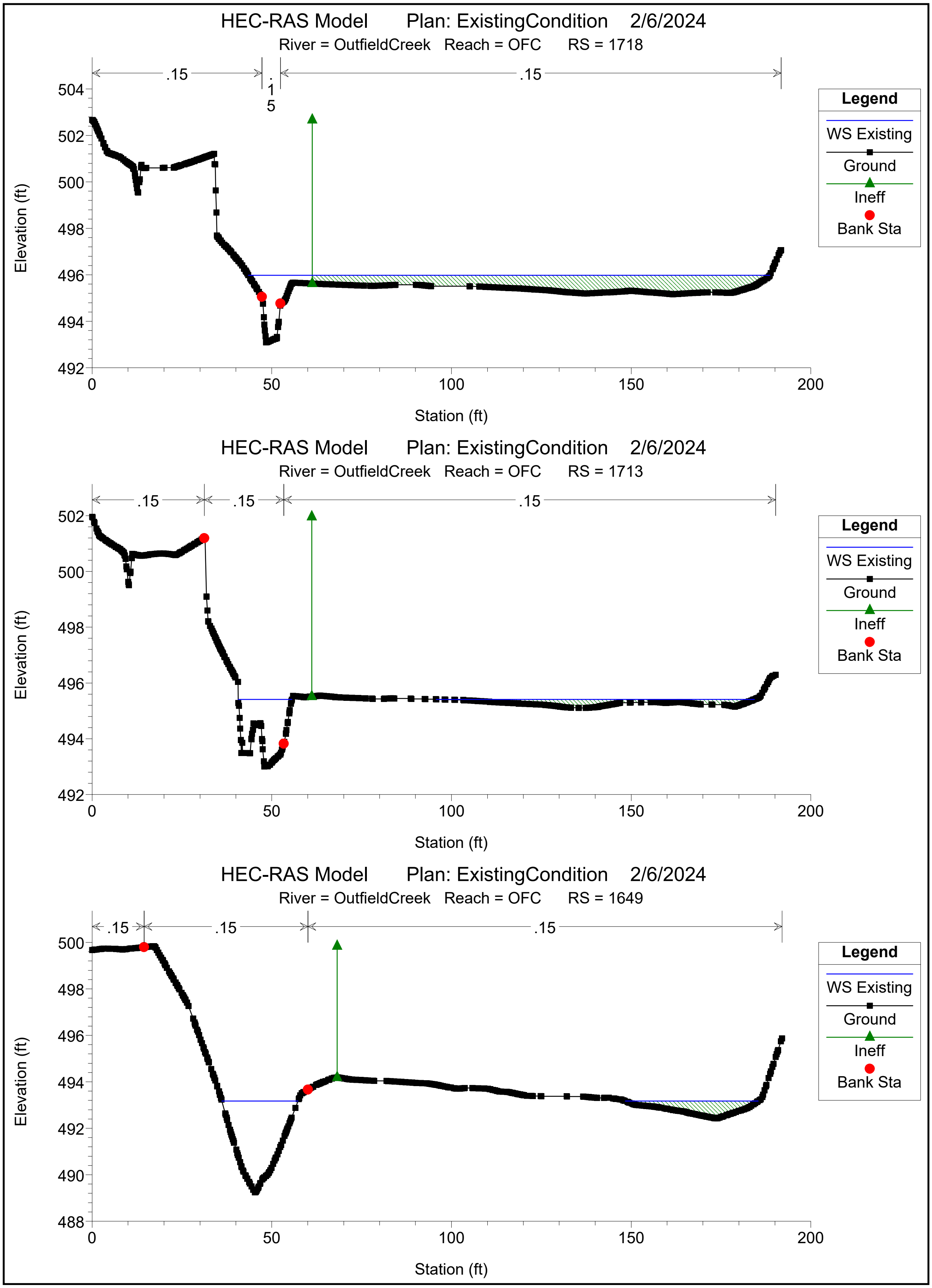


HEC-RAS Model Plan: ExistingCondition 2/6/2024
River = OutfieldCreek Reach = OFC RS = 1898
.15
.15
.15
Legend
WS Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


HEC-RAS Model Plan: ExistingCondition 2/6/2024
River = OutfieldCreek Reach = OFC RS = 1867
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
WS Existing
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: ExistingCondition 2/6/2024
River = OutfieldCreek Reach = OFC RS = 1863
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
WS Existing
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: ExistingCondition 2/6/2024
River = OutfieldCreek Reach = OFC RS = 1785
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
WS Existing
Ground
Ineff
Bank Sta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River = OutfieldCreek Reach = OFC RS = 1718
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.15
.15
Elevation (ft)
Station (ft)
Legend
WS Existing
Ground
Ineff
Bank Sta
HEC-RAS Model Plan: ExistingCondition 2/6/2024
River = OutfieldCreek Reach = OFC RS = 1713
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
WS Existing
Ground
Ineff
Bank Sta
HEC-RAS Model Plan: ExistingCondition 2/6/2024
River = OutfieldCreek Reach = OFC RS = 1649
.15
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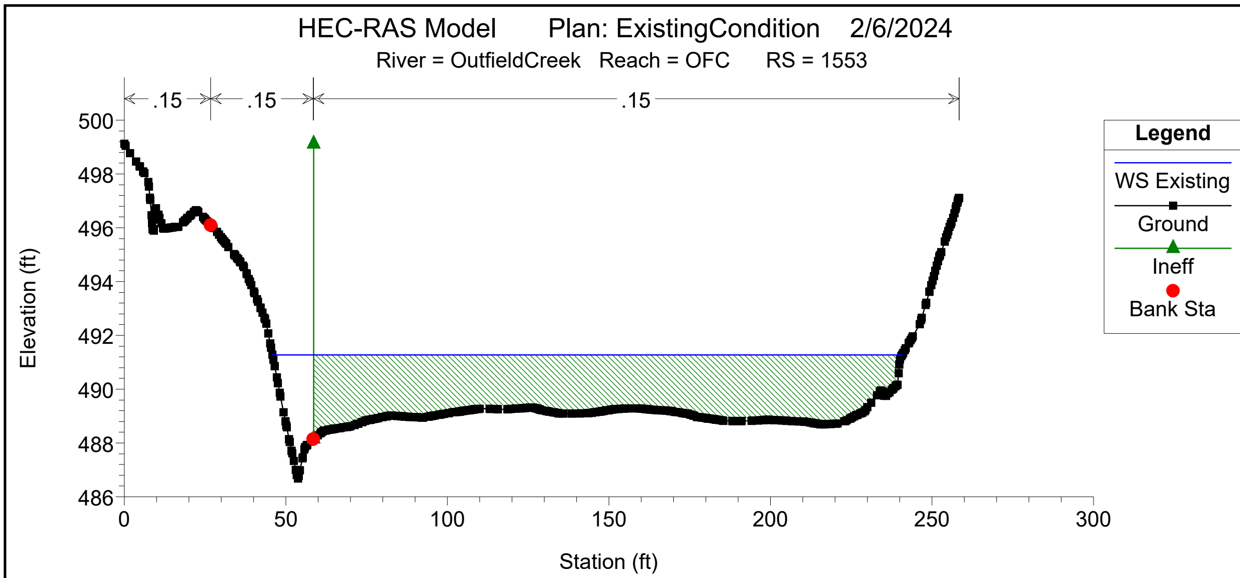
.15
Elevation (ft)
Station (ft)
Legend
WS Existing
Ground
Ineff
Bank Sta



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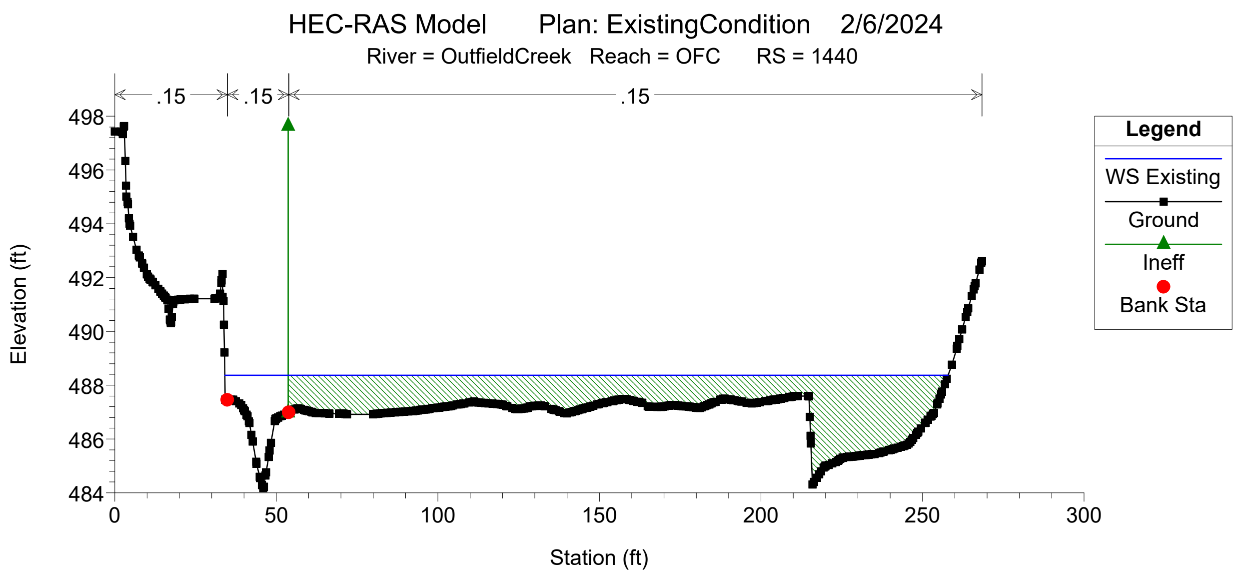
.15
Elevation (ft)
Station (ft)
Legend
WS Existing
Ground
Ineff
Bank Sta



HEC-RAS Model Plan: ExistingCondition 2/6/2024
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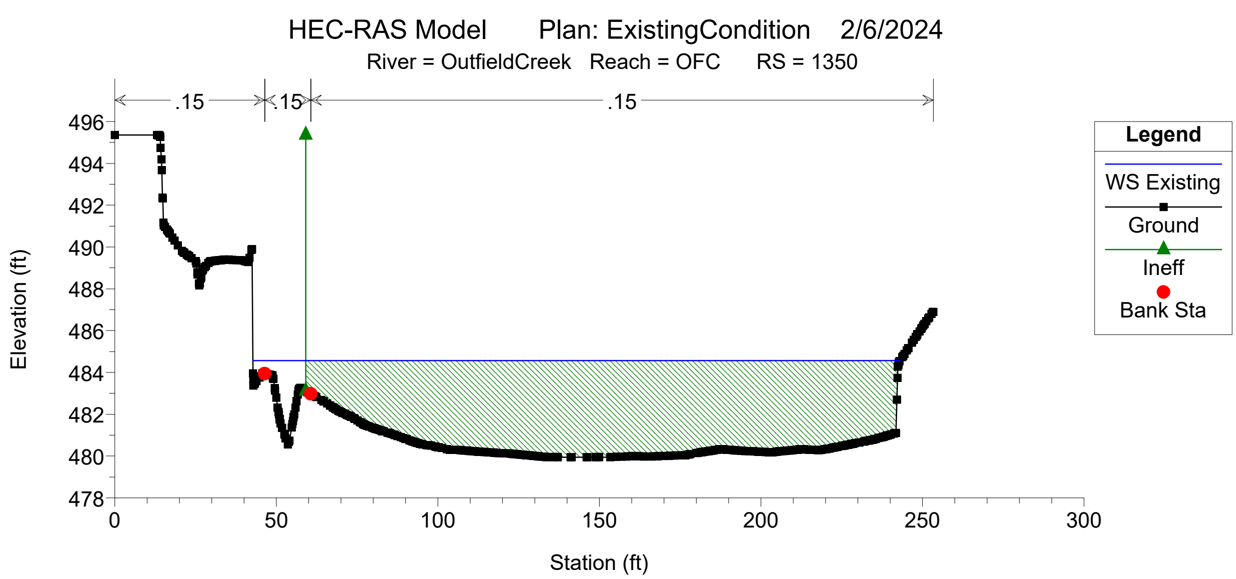
Elevation (ft)
Station (ft)
Legend
WS Existing
Ground
Ineff
Bank Sta



HEC-RAS Model Plan: ExistingCondition 2/6/2024
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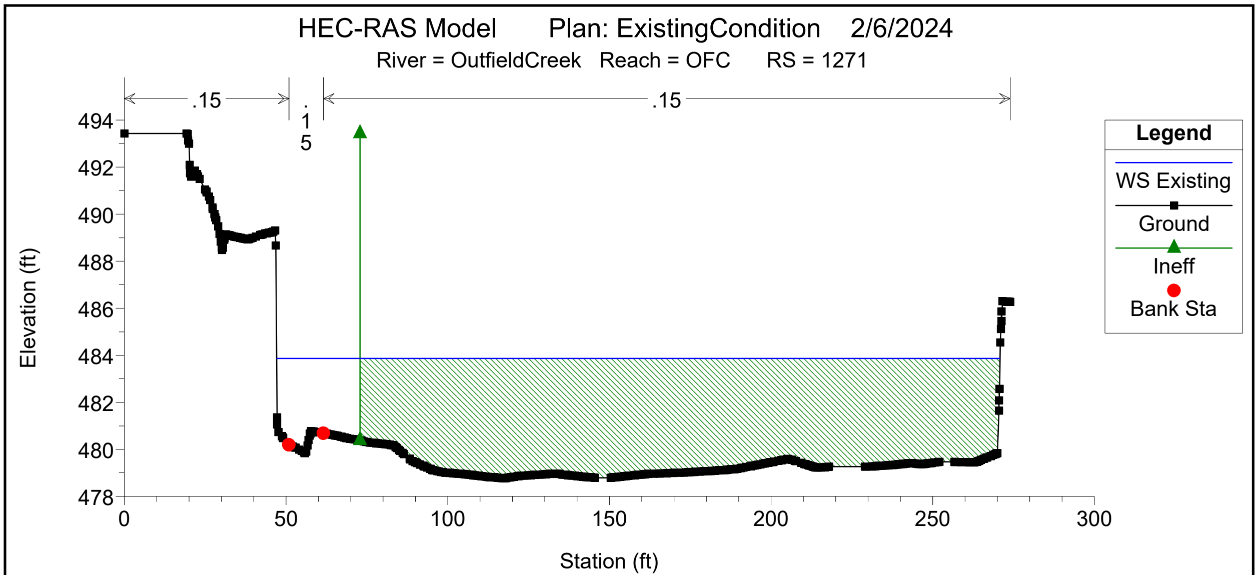
.15
.15
Elevation (ft)
Station (ft)
Legend
WS Existing
Ground
Ineff
Bank Sta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Station (ft)
Legend
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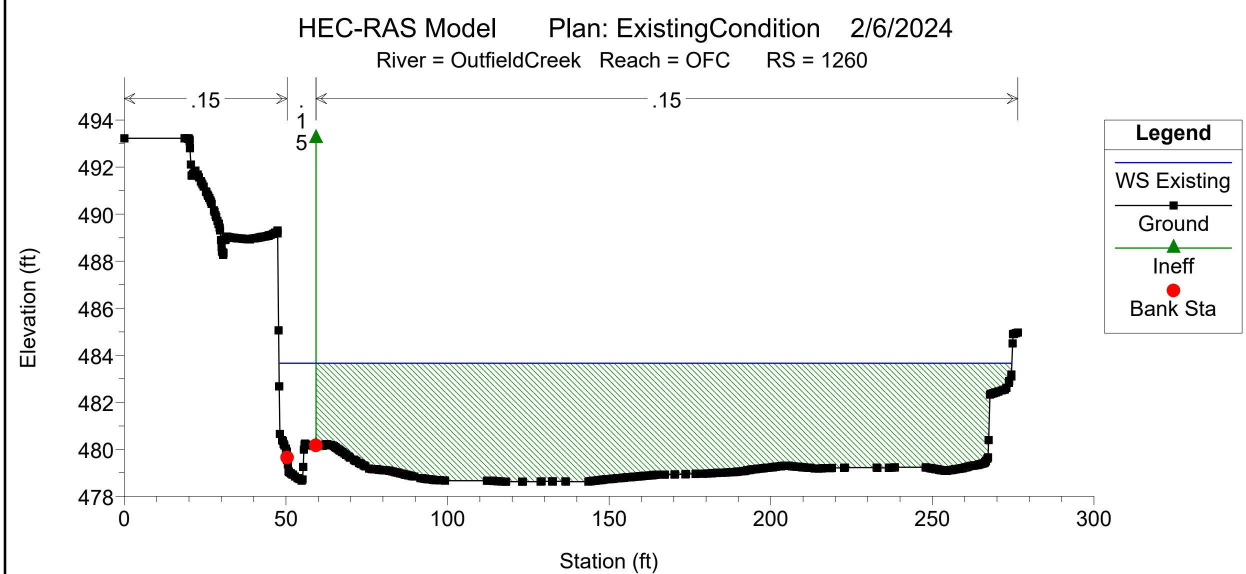
Ground
Ineff
Bank Sta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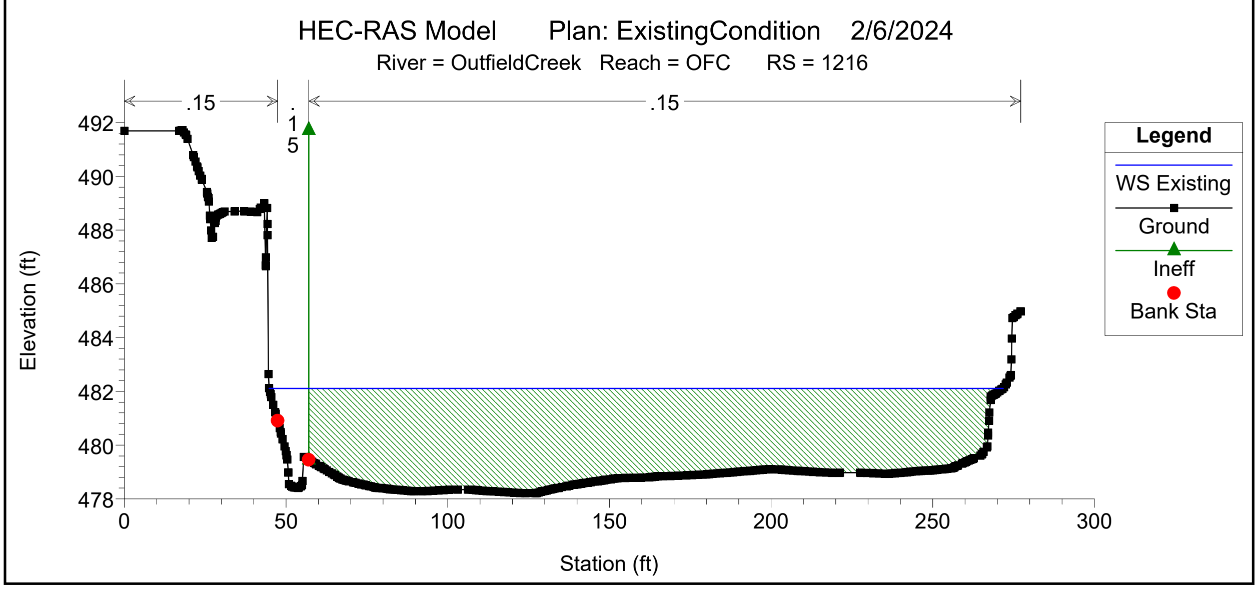
Elevation (ft)
Station (ft)
Legend
WS Existing
Ground
Ineff
Bank Sta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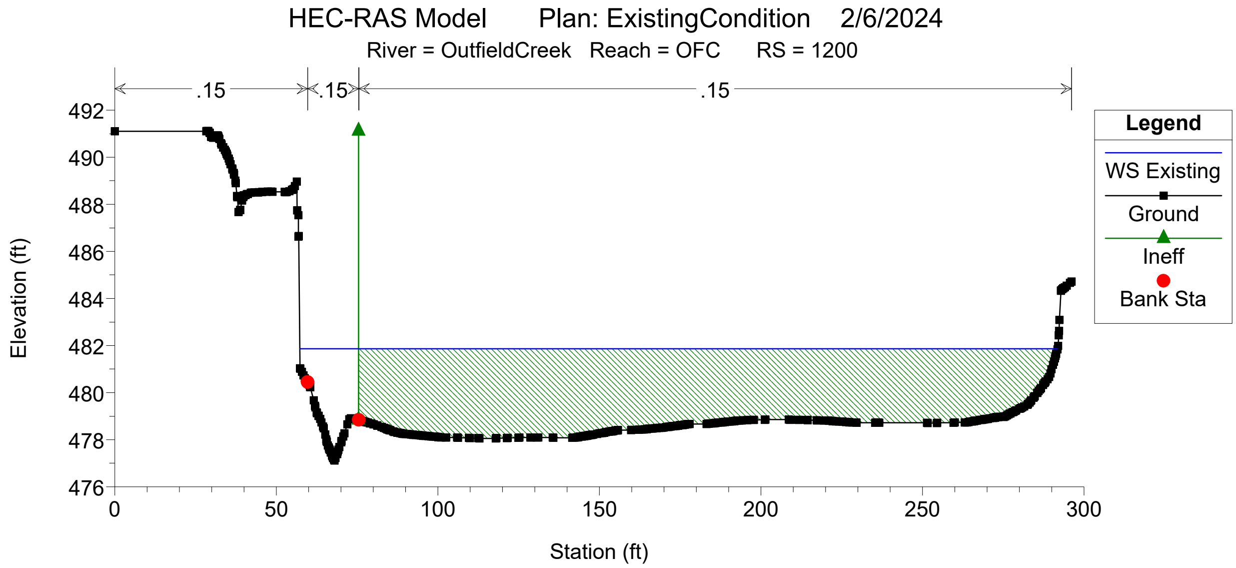
Elevation (ft)
Station (ft)
Legend
WS Existing
Ground
Ineff
Bank Sta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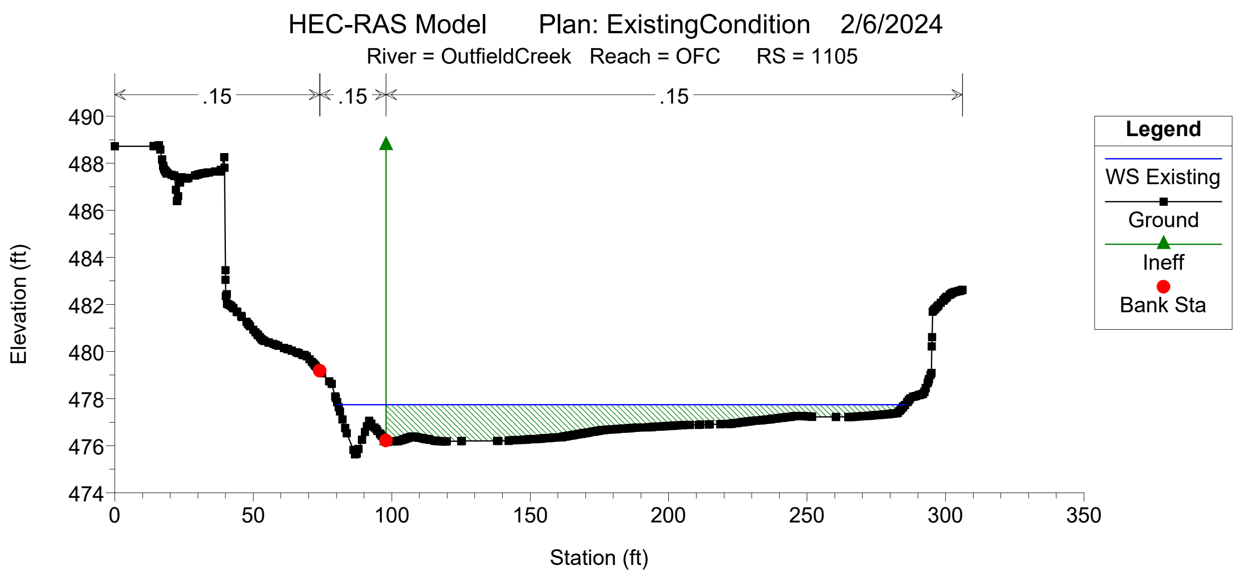
.15
.15
Elevation (ft)
Station (ft)
Legend
WS Existing
Ground
Ineff
Bank Sta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River = OutfieldCreek Reach = OFC RS = 1105
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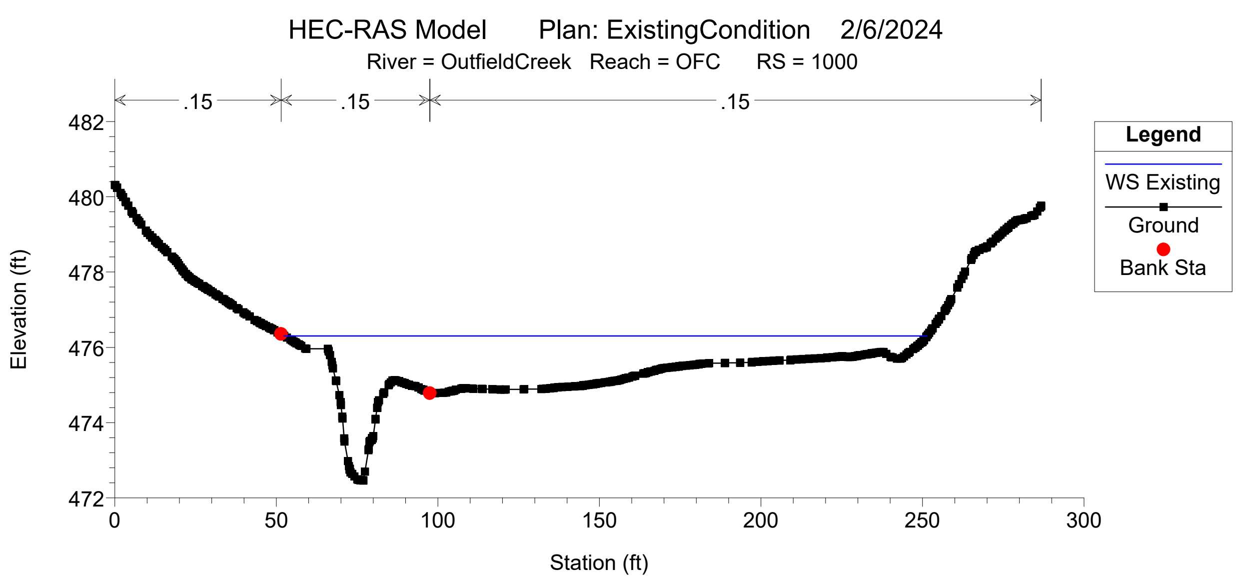
.15
Elevation (ft)
Station (ft)
Legend
WS Existing
Ground
Ineff
Bank Sta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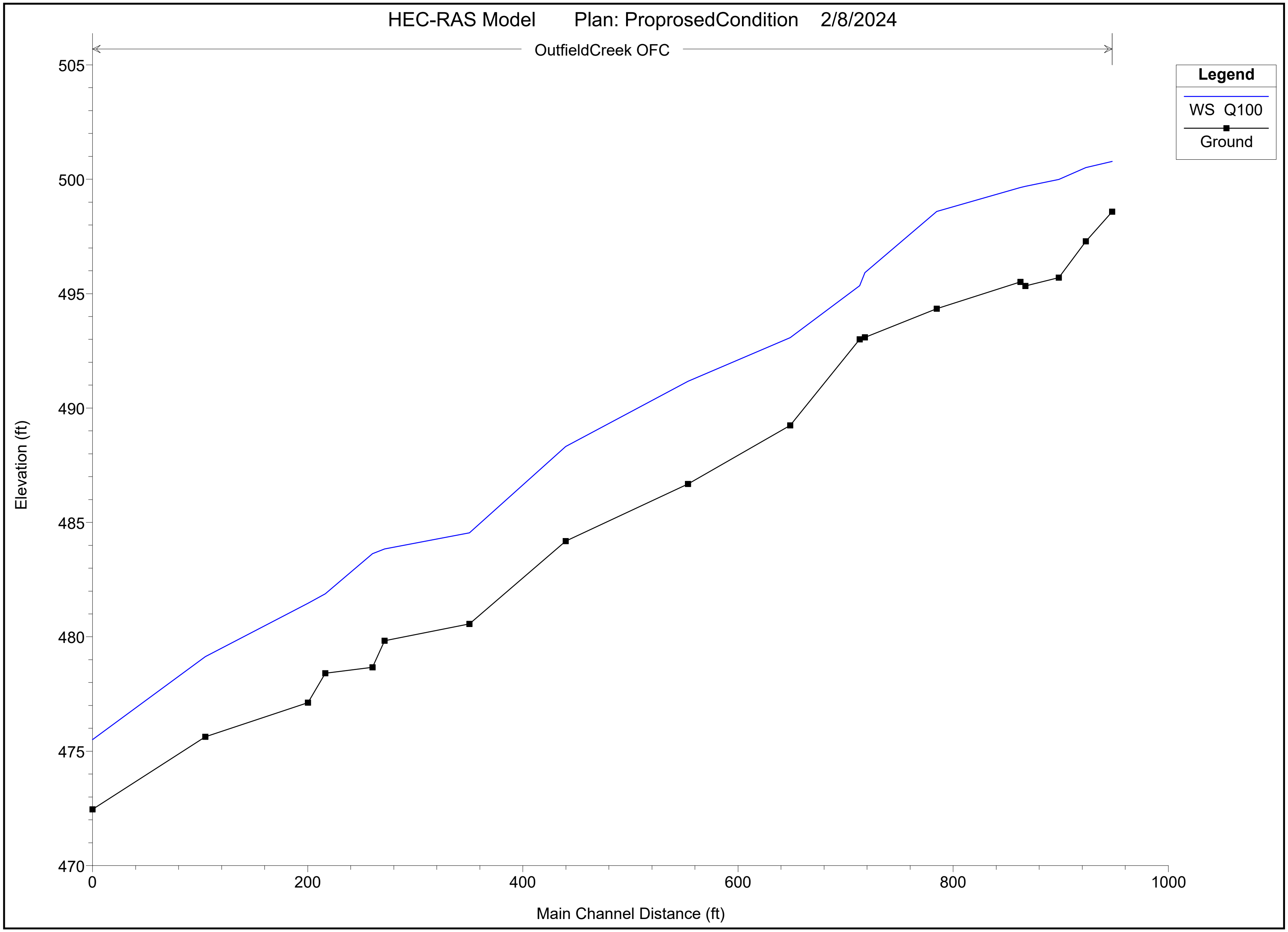
.15
Elevation (ft)
Station (ft)
Legend
WS Existing
Ground
Bank Sta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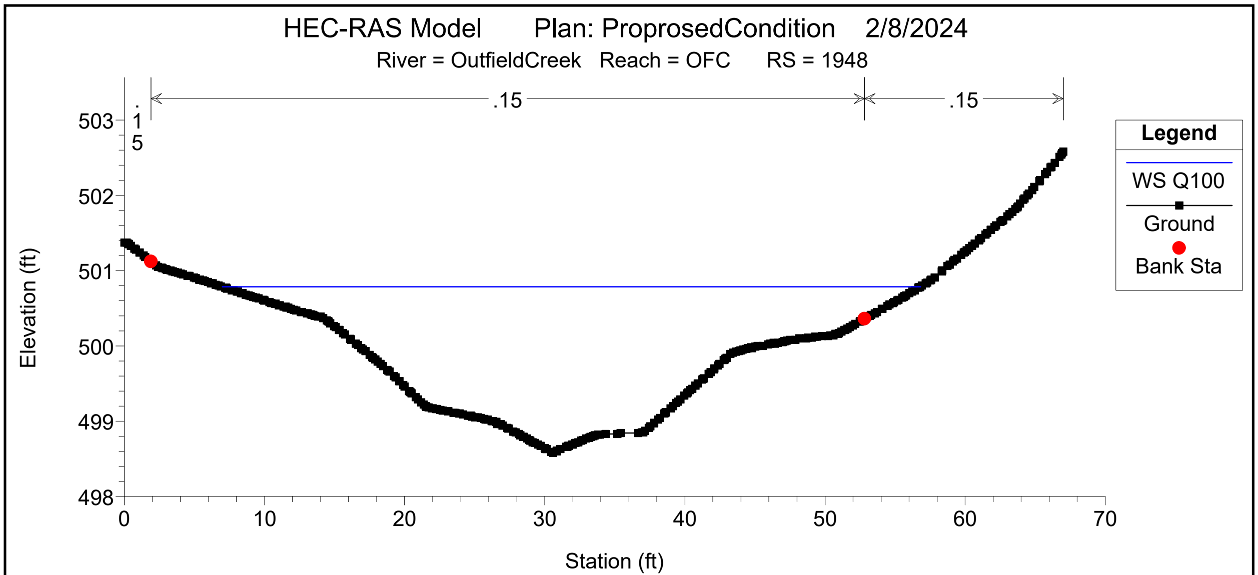
OutfieldCreek OFC
Legend
WS Q100
Ground
505
500
495
490
485
480
475
470
Elevation (ft)
0
200
400
600
800
1000
Main Channel Distance (ft)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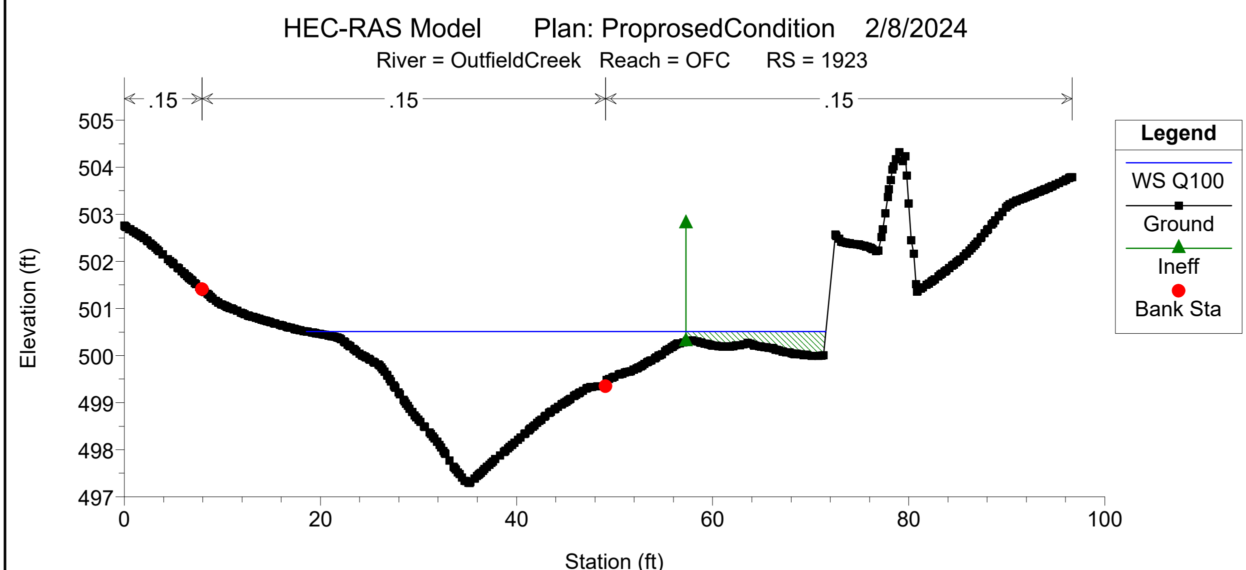
.15
Legend
WS Q100
Ground
Bank Sta
Elevation (ft)
Station (ft)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.15
Legend
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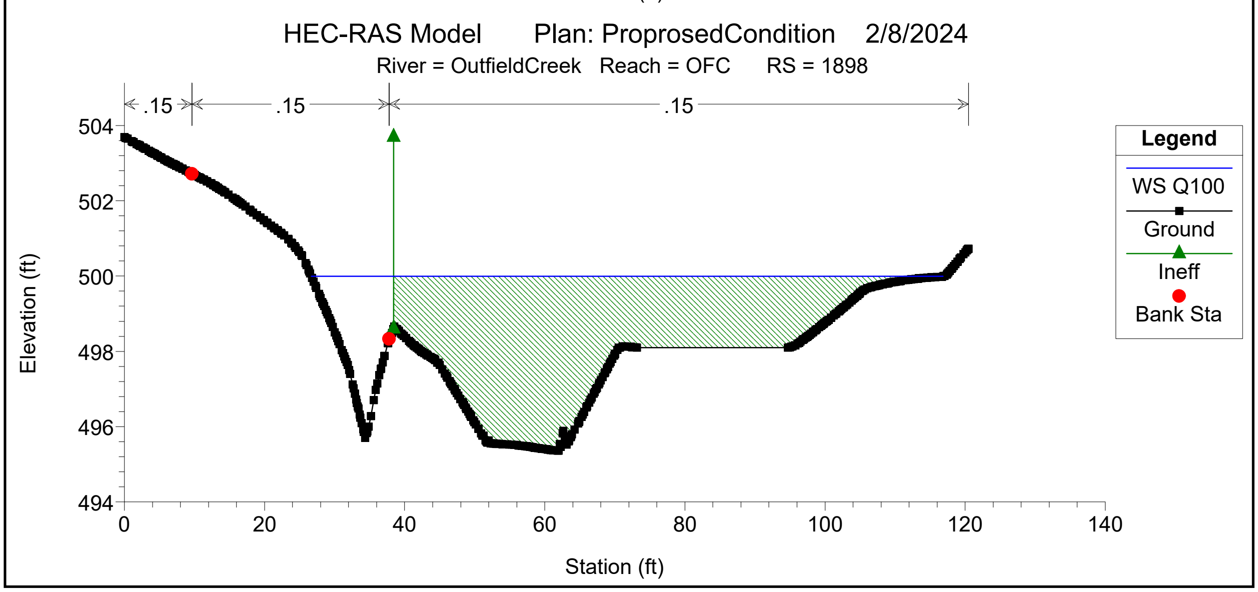
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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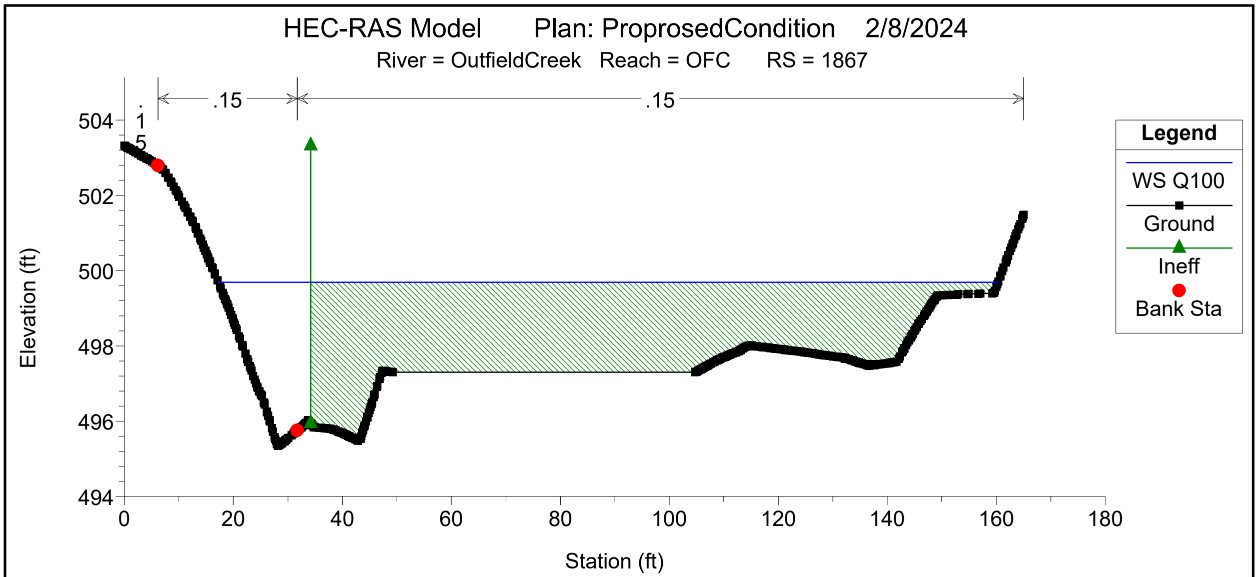
.15
Legend
WS Q100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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.15
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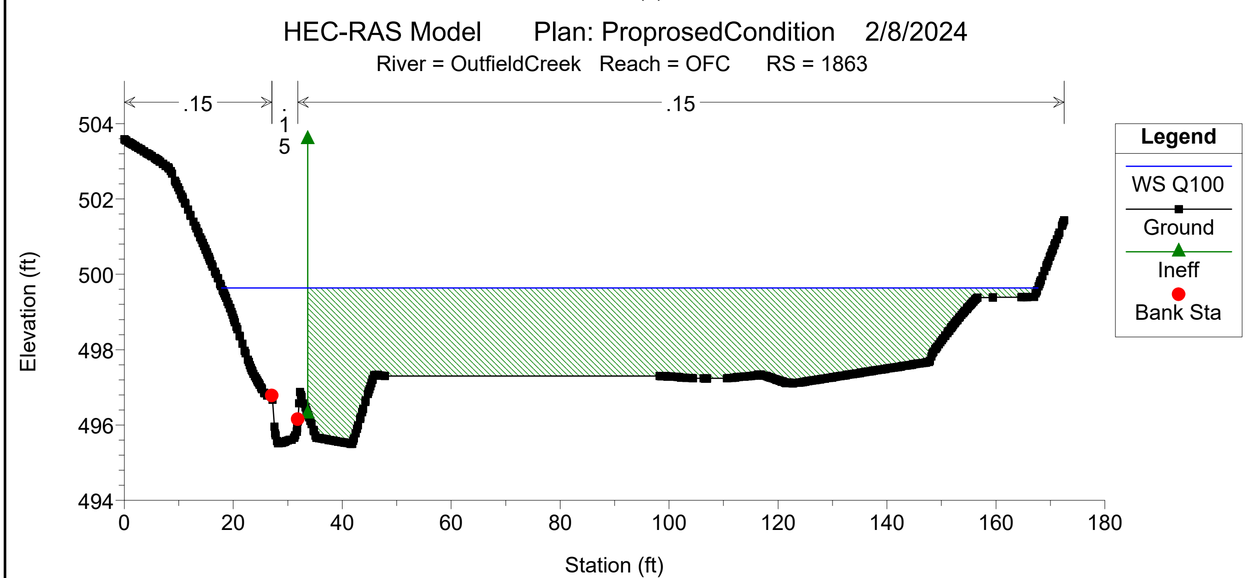
.15
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta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.15
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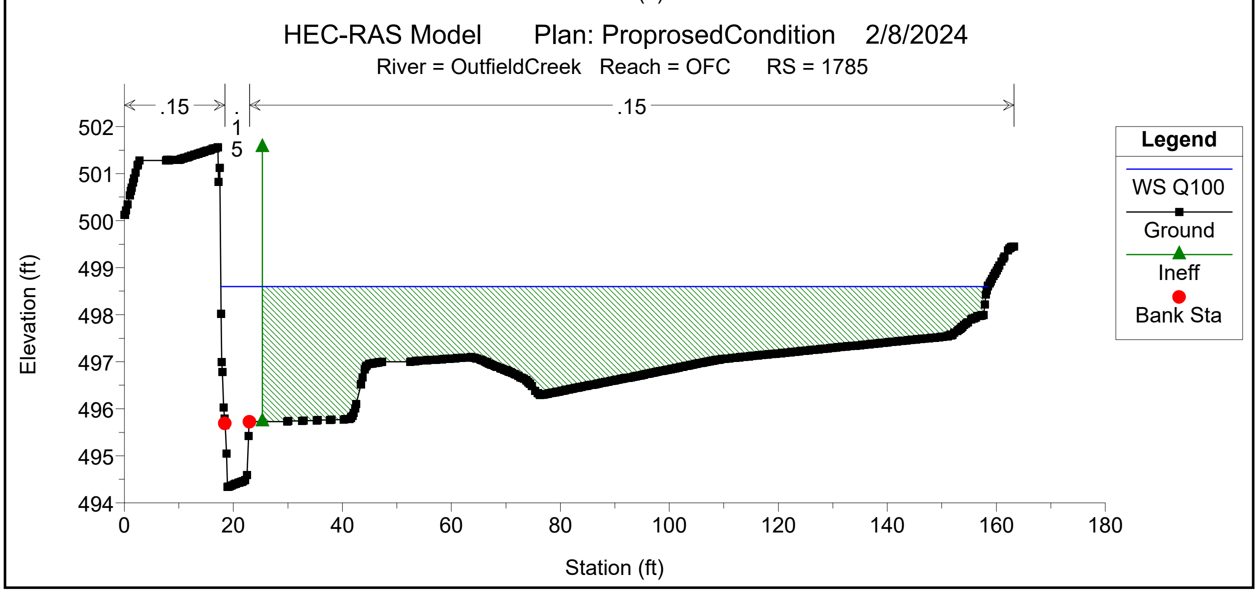
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta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River = OutfieldCreek Reach = OFC RS = 1785
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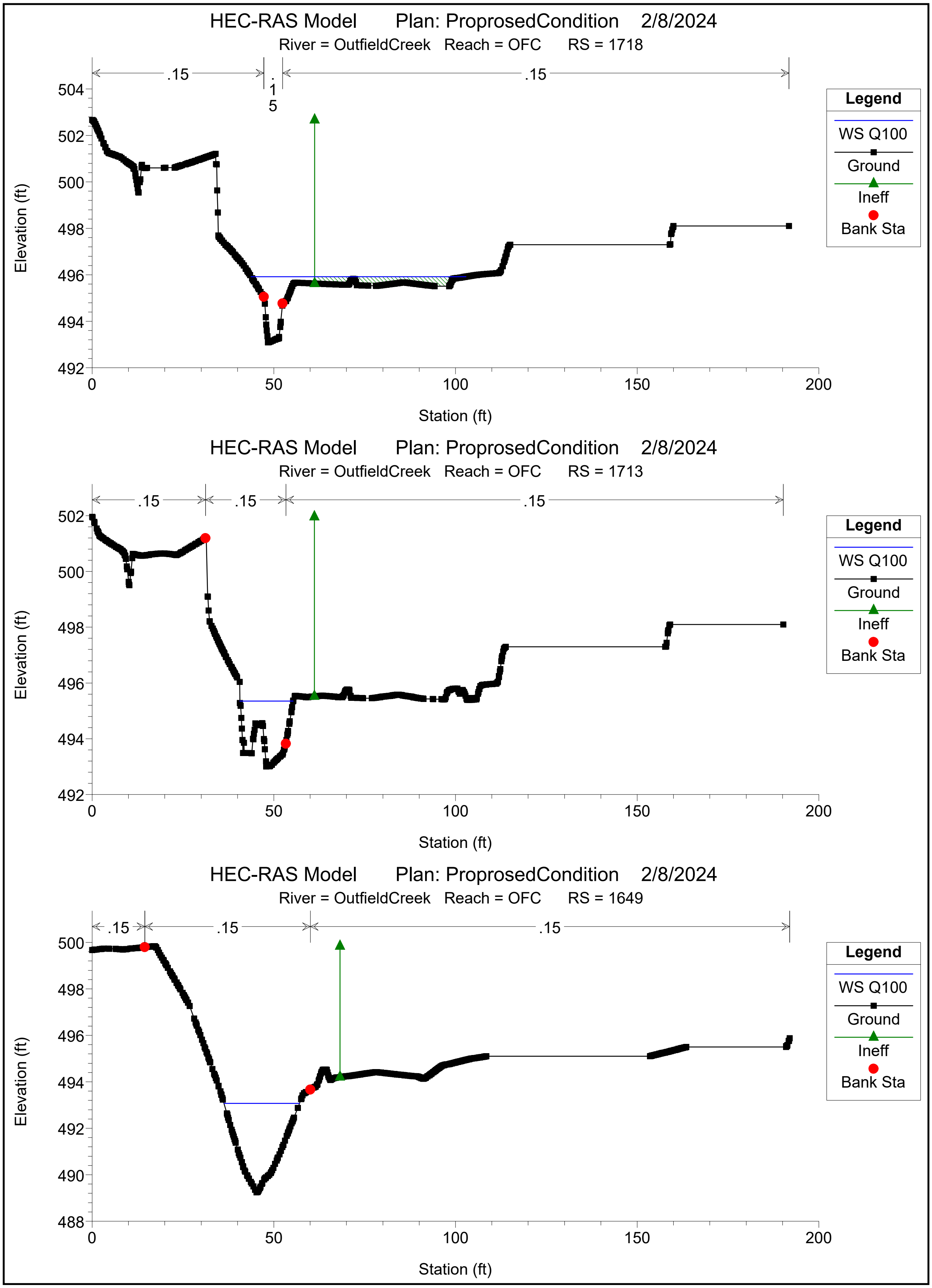
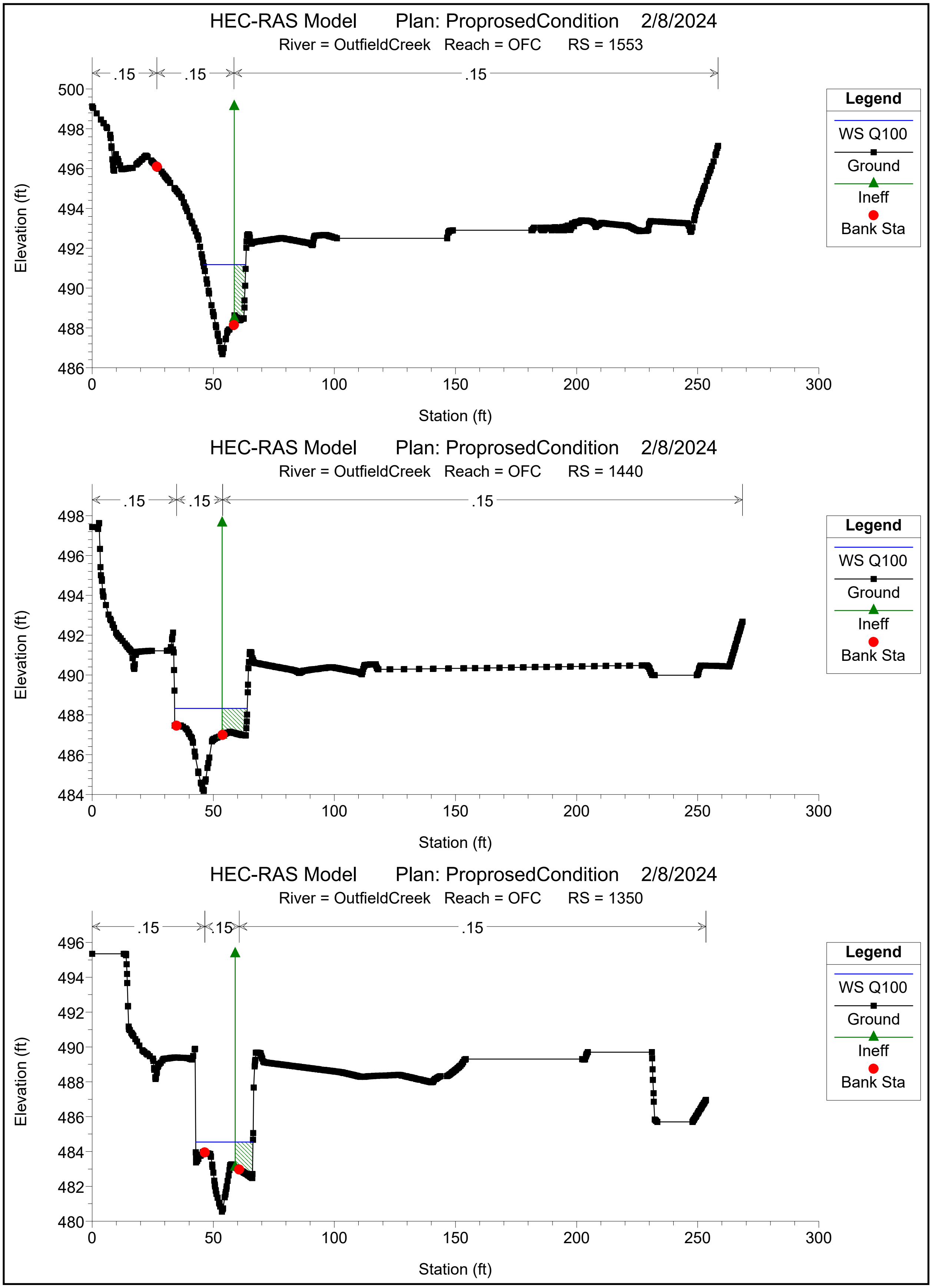
.15
.15
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta



HEC-RAS Model Plan: ProprosedCondition 2/8/2024
River = OutfieldCreek Reach = OFC RS = 1718
.15
.15
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
HEC-RAS Model Plan: ProprosedCondition 2/8/2024
River = OutfieldCreek Reach = OFC RS = 1713
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
HEC-RAS Model Plan: ProprosedCondition 2/8/2024
River = OutfieldCreek Reach = OFC RS = 1649
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta



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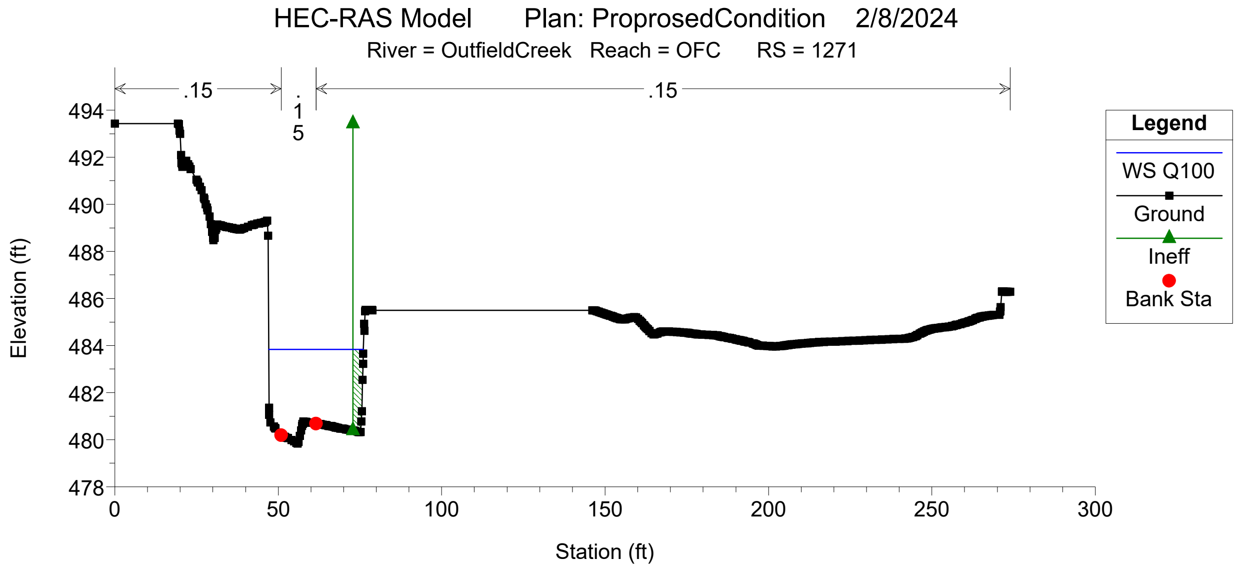
River = OutfieldCreek Reach = OFC RS = 1553
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
HEC-RAS Model Plan: ProprosedCondition 2/8/2024
River = OutfieldCreek Reach = OFC RS = 1440
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
HEC-RAS Model Plan: ProprosedCondition 2/8/2024
River = OutfieldCreek Reach = OFC RS = 1350
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta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.15
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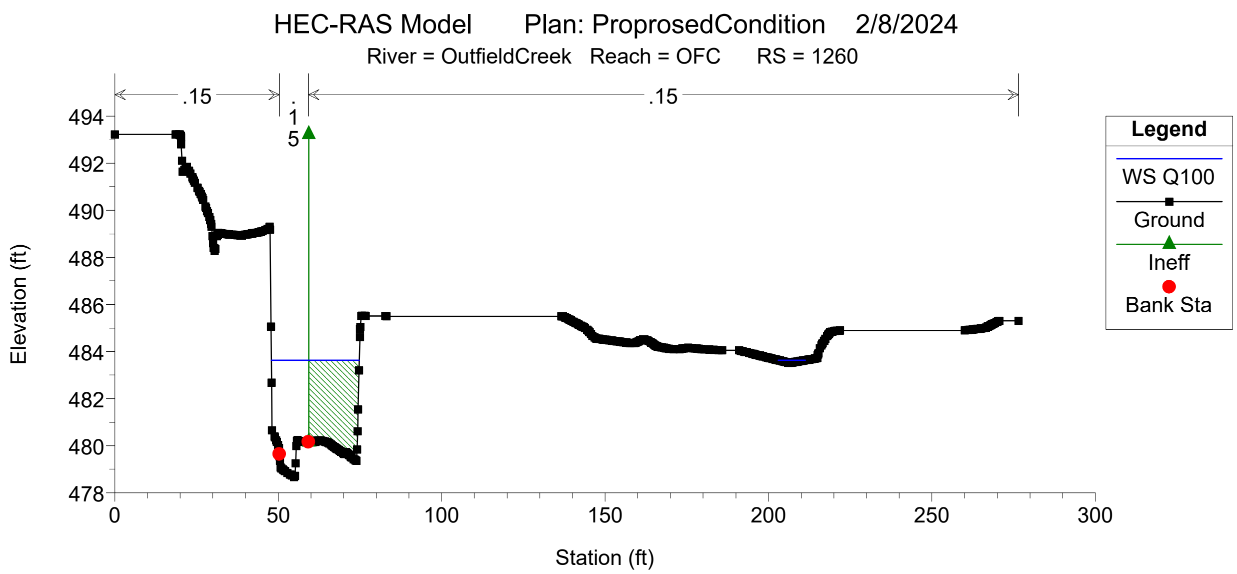
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: ProprosedCondition 2/8/2024
River = OutfieldCreek Reach = OFC RS = 1260
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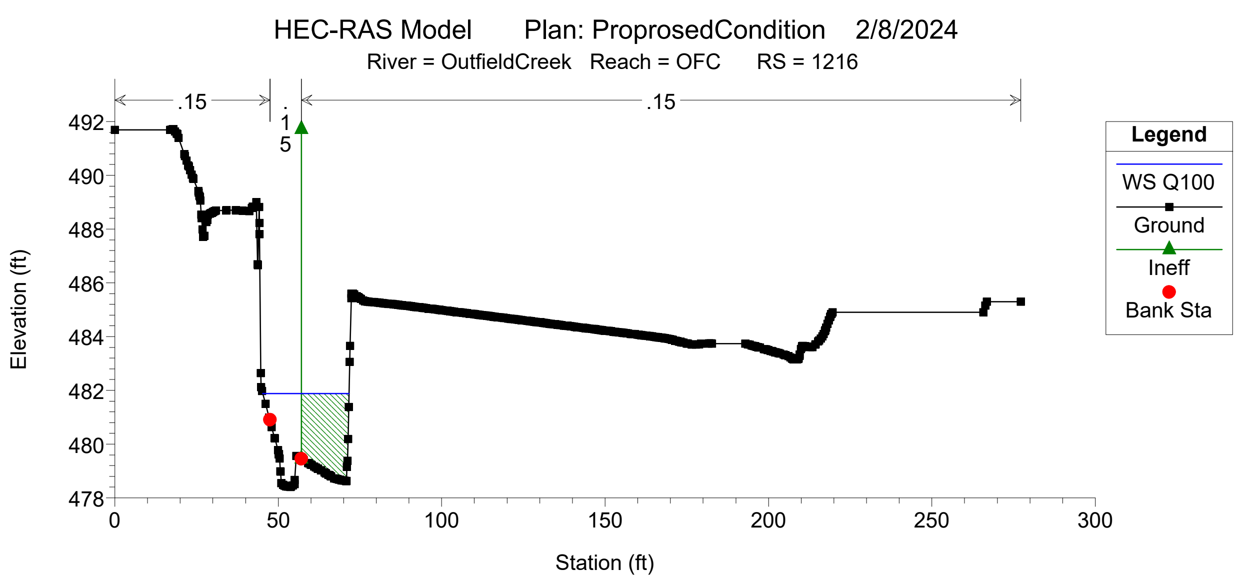
.15
.15
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta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River = OutfieldCreek Reach = OFC RS = 1216
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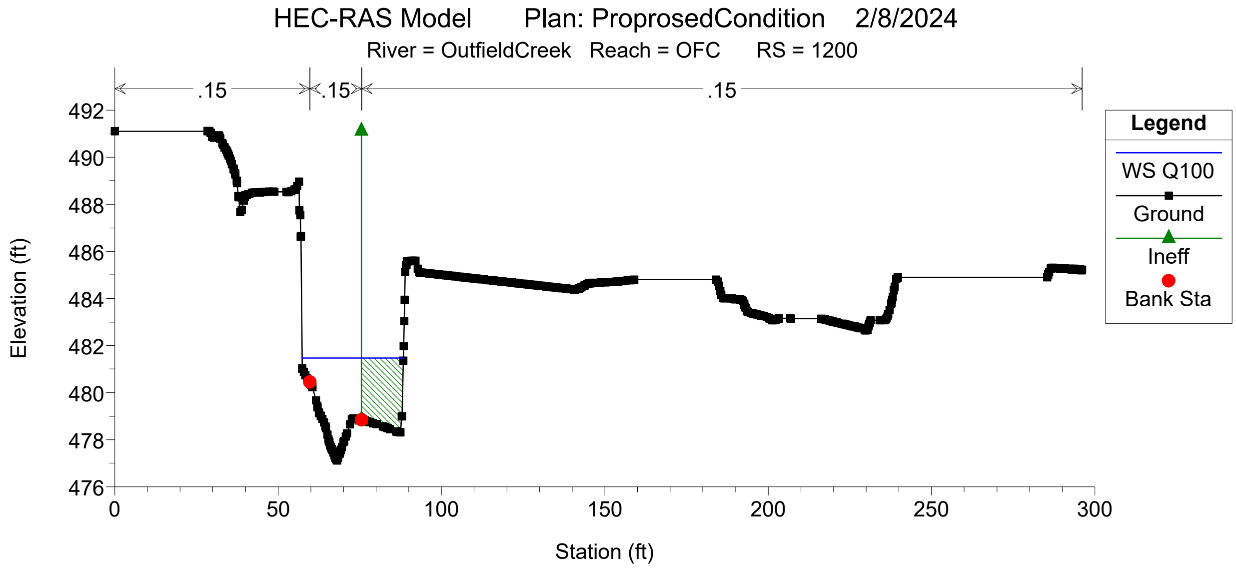
.15
.15
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: ProprosedCondition 2/8/2024
River = OutfieldCreek Reach = OFC RS = 1200
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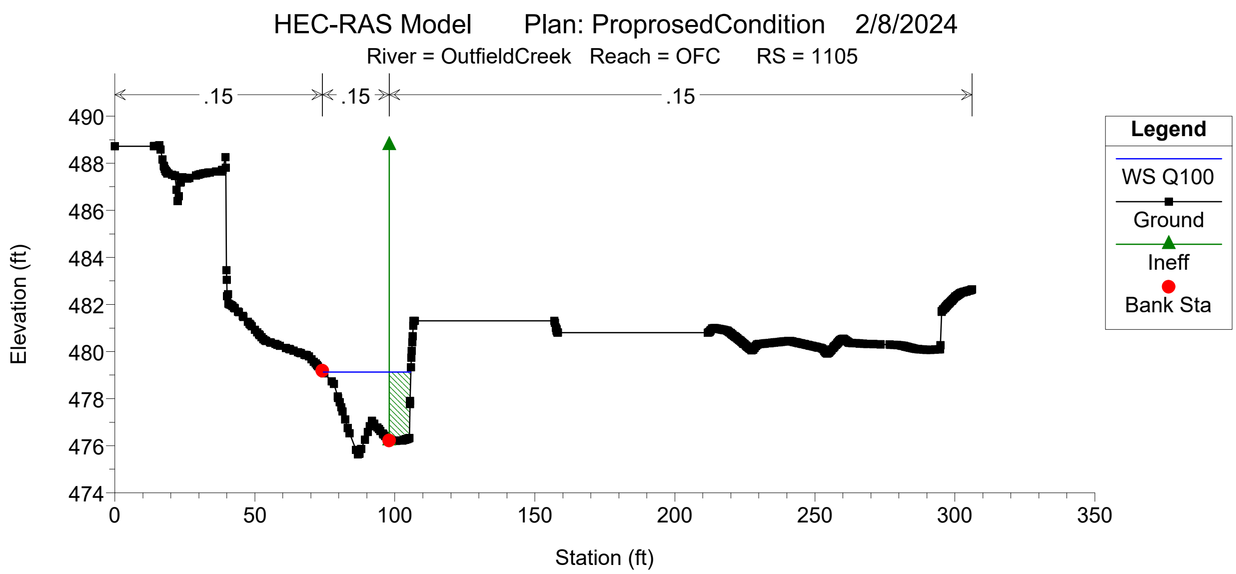
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta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River = OutfieldCreek Reach = OFC RS = 1105
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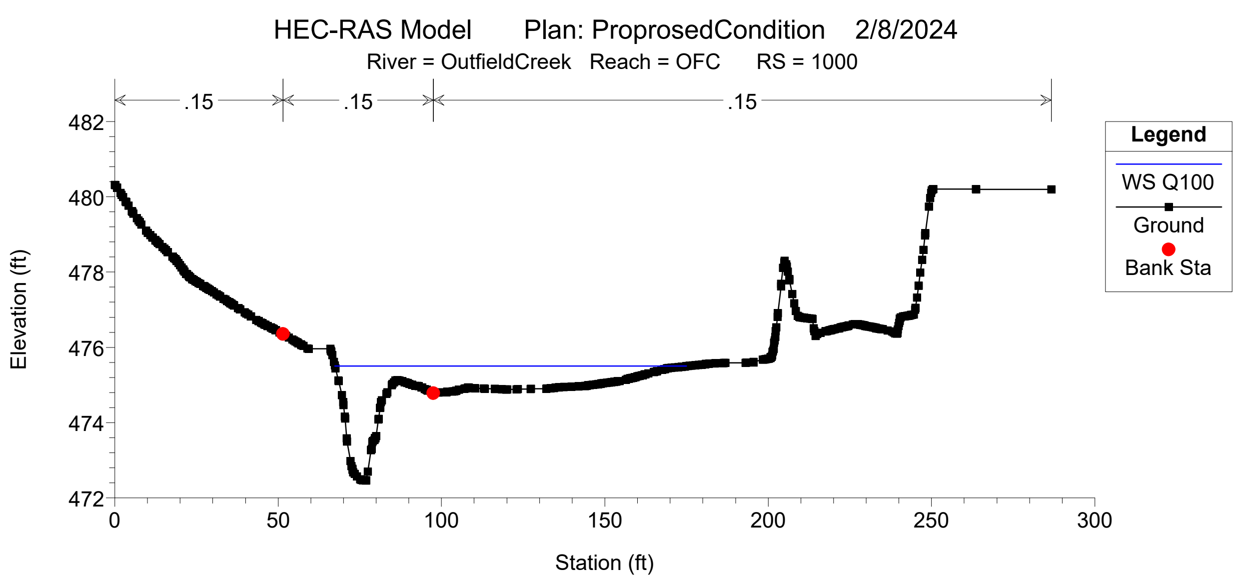
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: ProprosedCondition 2/8/2024
River = OutfieldCreek Reach = OFC RS = 1000
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Bank Sta

VISTA BALL FIELDS, HEC RAS MODELING RESULTS

		EXISTING			PROPOSED					
Reach	River Sta	Q Total	W.S. Elev	Velocity	Q Total	W.S. Elev	Velocity	Nearest Pad Elevation	Pad Elevation - Pr. WSEL	Proposed WSEL - Existing WSEL
		(cfs)	(ft)	(ft/s)	(cfs)	(ft)	(ft/s)	(ft)	(ft)	(ft)
OFC	1949	64.3	500.78	1.2	64.3	500.78	1.19	NA	NA	0
OFC	1924	68.6	500.51	1.34	68.6	500.51	1.33	501.6	1.09	0
OFC	1899	68.6	499.98	2.75	68.6	499.99	2.73	501	1.01	0.01
OFC	1868	68.6	499.68	1.38	68.6	499.69	1.37	501	1.31	0.01
OFC	1863	68.6	499.62	2.1	68.6	499.64	2.1	501	1.36	0.02
OFC	1785	68.6	498.56	2.74	68.6	498.6	2.71	501	2.4	0.04
OFC	1718	68.6	495.98	4.44	68.6	495.92	4.7	499.7	3.78	-0.06
OFC	1713	99.7	495.41	4.38	94.4	495.35	4.33	499.7	4.35	-0.06
OFC	1649	99.7	493.17	2.12	94.4	493.07	2.09	495.1	2.03	-0.1
OFC	1554	99.7	491.27	2.72	94.4	491.17	2.68	492.5	1.33	-0.1
OFC	1440	99.7	488.36	2.61	94.4	488.32	2.53	492	3.68	-0.04
OFC	1350	99.7	484.57	3.56	98.7	484.55	3.56	489.3	4.75	-0.02
OFC	1271	131.4	483.87	1.58	130.4	483.84	1.59	485.5	1.66	-0.03
OFC	1260	131.4	483.66	3.14	130.4	483.63	3.13	485.5	1.87	-0.03
OFC	1216	131.4	482.11	4.64	130.4	481.88	5.04	485.5	3.62	-0.23
OFC	1200	131.4	481.86	2.46	130.4	481.46	2.79	485.5	4.04	-0.4
OFC	1105	131.4	477.74	6.23	130.4	479.13	2.69	481.3	2.17	1.39
OFC	1000	131.4	476.3	0.75	130.4	475.5	2.29	480.7	5.2	-0.8

Notes.
1. Existing condition and proposed capacity runs use Manning's N valus of 0.15.
2. Areas that are behind fences or obstructed by buildings are modeled as ineffective flow areas.

HYDRAULIC WORK MAP FOR VISTA 2 (PROPOSED CONDITION)

Date: April 7, 2023

J-19253-B Revised: February 27, 2024

RICK ENGINEERING COMPANY
San Diego
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619-291-0707
(FAX) 619-291-4165
rickengineering.com
Riverside - Orange - Sacramento - San Luis Obispo - Phoenix - Tucson - Denver

J-19278B

NOT FOR CONSTRUCTION

APPENDIX J

INLAND RAIL TRAIL PHASE 2B DRAINAGE REPORT

INLAND RAIL TRAIL PHASE 2B
PRELIMINARY DRAINAGE STUDY

100% SUBMITTAL

DECEMBER, 2014

Prepared For:

COUNTY OF SAN DIEGO - DPW
COUNTY OPERATIONS CENTER
5510 OVERLAND AVENUE, SUITE 410
SAN DIEGO, CA 92123

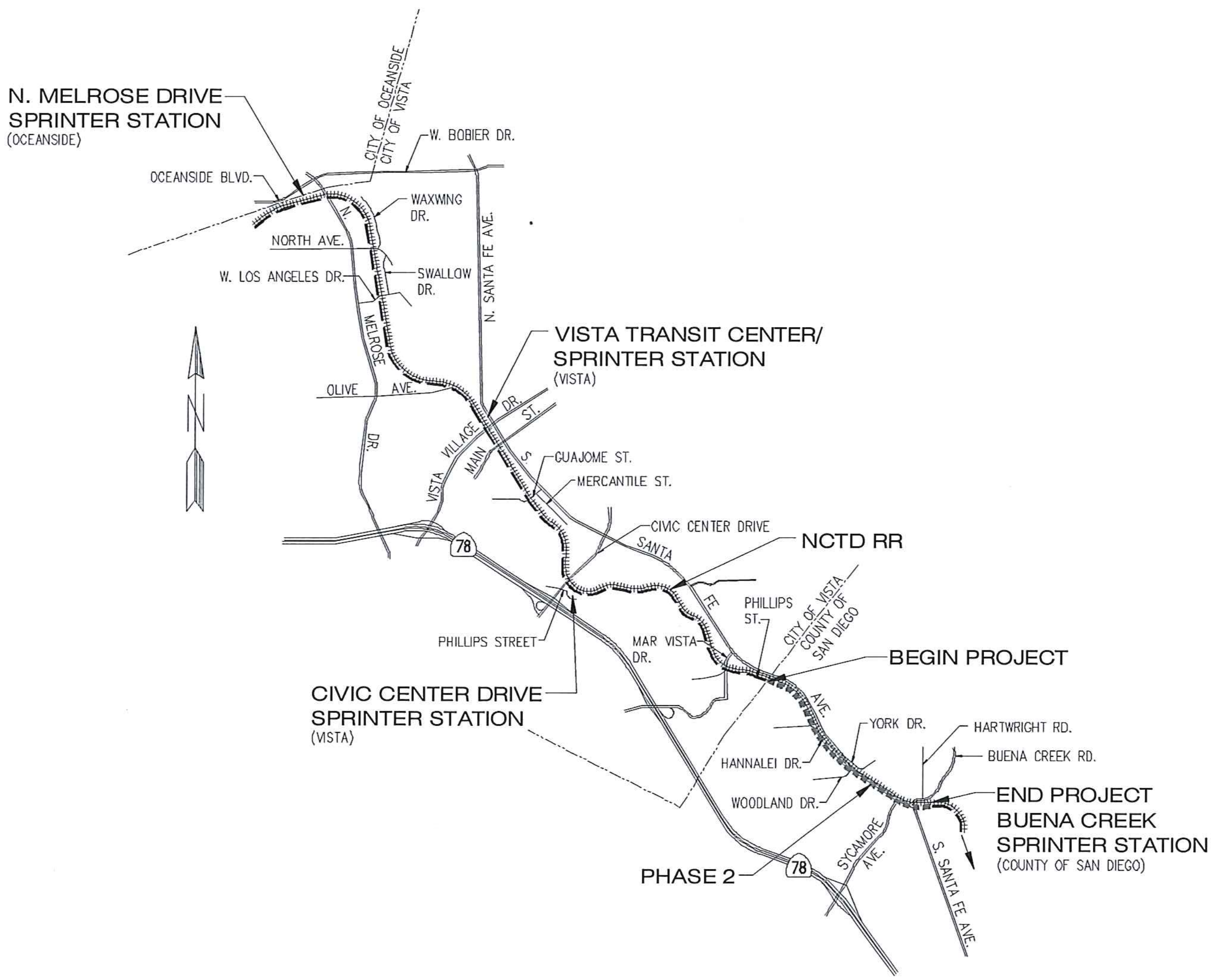
Prepared By:
PSOMAS
3111 Camino Del Rio North, Suite 702
San Diego, CA 92108

TABLE OF CONTENTS

APPENDICES / EXHIBITS

BACKGROUND

The purpose of this study is to analyze the hydrology for the Inland Rail Trail Phase 2B Bike Path project. The project includes approximately 5500 feet of new Bike Path running adjacent to the NCTD railroad tracks within the railroad right of way. The project is located in the County of San Diego, extending from the City of Vista/County of San Diego border on the west end to the Buena Creek Sprinter Station on the east end.



VICINITY MAP

NTS

DESIGN CRITERIA

The drainage design criteria used for this project is per the County of San Diego Hydrology Manual, dated June 2003.

A. DESIGN RUNOFF METHOD

The contributing watersheds are less than one square mile, and therefore, flow rates shall be calculated using the rational method, given as:

$$Q = C \times I \times A$$

Where:
Q = Flow rate in cubic feet per second (cfs)
C = Coefficient of Runoff
I = Rainfall Intensity in inches per hour (in/hr)
A = Area in acres (ac)

Hydrologic characteristics for the project are as follows:

- Soil Group is determined to be Soil Group C & D from the U.S.G.S Hydrologic Soil Group Maps for San Diego County. Soil type D is used for the analysis purposes. See Appendix A.
- The 100-year 6-hour precipitation (P6) is determined to be 3.5 inches using County Isopluvial Maps. See Appendix B.
- The 100-year 24-hour precipitation (P24) is determined to be 6.0 inches using County Isopluvial Maps. See Appendix B.
- The Runoff Coefficient is based on land use which is determined from Table 3-1 from the County of San Diego Hydrology Manual. See Appendix C.

Rainfall intensity shall be determined by the equation given in Figure 3-1 of the Manual, where:

I = 7.44 x P6 x (Tc^-.645)

Where:

I = Rainfall Intensity in inches per hour (in/hr)
P6 = 6-hour Precipitation in inches (in)
Tc = Time of concentration in minutes (min)

Time of concentration is governed by surface characteristics of the watershed. The time of concentration for natural watersheds is based on the Kirpitch formula, given in Figure 3-4 of the Manual, where:

$$Tc = \{60 * (11.9 * L^3/H)^{0.385}\}$$

Where:
Tc = Time of Concentration in minutes (min.)
L = Length of Watershed in miles (mi.)
H = Difference in Elevation in feet (ft.)

For urban watersheds the time of concentration is per the FAA formula given in Figure 3-3 of the manual, where:

$$Tc = [1.8*(1.1-C)*D^{0.5}]/(S^{0.33})$$

Where:
Tc = Time of Concentration in minutes (min.)
C = Runoff coefficient
D = Distance of watercourse
S = Slope in %

See Appendix C for Tables and Nomographs taken from the Sn Diego County Hydrology Manual.

B. HYDRAULIC DESIGN

- Flow in proposed storm drain pipes and open channels shall be analyzed using Bentley FlowMaster software.

HYDROLOGY/HYDRAULICS

A. EXISTING HYRDOLOGY

The existing project site, located in the County of San Diego, runs along the south edge of the NCTD Right-of-Way from Phillips Street to Woodland Drive (Segments A and B) and along the north edge of the NCTD Right-of-Way from York Drive to Buena Creek Road (Segment C).

Segment A:
This section of the project has narrow, linear drainage sub-basins inside the NCTD R/W that collect runoff generated near the railroad tracks and larger overland drainage sub-basins to the south that are comprised of natural undisturbed hillsides and grassy baseball-fields. The railroad runoff is routed through a series of culverts which feed into the existing earthen channel that runs along the south side of the NCDT R/W from west to east. These sub-basins ultimately feed into a catch basin at Hannalei Drive and become part of the public drainage system.

Segment B:
This small drainage basin collects runoff from the NCTD Right-of-Way and feeds into the detention basin that was constructed with the South Santa Fe Widening Project in 2009. Storm runoff is routed in a short series of concrete ditches and collected by catch basins which outlet to the detention basin near the intersection or Hannalei Drive and Woodland Drive. See Appendix D for the "Drainage Report – South Santa Fe Widening Project".

Segment C:
This section of the project also consists of narrow drainage sub-basins created by the NCTD railroad, and some residential sub-basins to the north, located between York Drive and Buena Creek Road just inside the northern NCTD R/W line. The sub-basins in this segment confluence to a 96" culvert that runs under the NCTD R/W (north to south) which outlets into the South Santa Fe Ave. drainage facility, and ultimately to Buena Creek.

B. PROPOSED HYDROLOGY

Hydrology calculations have been tabulated in Appendix C for the 100-year storm event. See also Exhibit 1 for the Drainage Basin Map. Note that time of concentration calculations are based on the formula given in Figure 3-3 and values given in Table 3-2 of the County of San Diego Hydrology Hydrology Manual-2003. To be conservative, values for time of concentration given in Table 3-2 were used as a maximum for an entire sub-basin. This assumption will give Q100 values that are conservative in nature, adding to the factor of safety in the design of downstream rectangular concrete channels.

Segment A:
The construction of the bike path intercepts overland flow form basins A1 and A3 (See Exhibit 1 – Drainage Basin Map) conveying it back to the natural earthen channel just past CD-4. Concrete brow ditch CD-1 captures flow at the top of the 2:1cut slope to the south. Drainage Swale CD-2, a LID Bioretention Trench (See Exhibit 4 for Bioretention Trench Detail), catches runoff from the bike path and confluences with CD-2 to CD-4. The Bioretention Trench runs adjacent to the bike path and treats the runoff that the bike path generates. The Bioretention Trench also serves to slow down the runoff created
by the bike paths impervious material. CD-4 converges with runoff conveyed through an extended existing 36" RCP storm drain culvert (see Exhibit 3 – Hydraulic Calculations for culvert hydraulic data) that delivers runoff from the NCTD R/W from the County / City of Vista line. The impact to the outlet at CD-4 is minimal due to the nature of the Bioretention Trench and the very small change (only 1.0 cfs) in 100-year flow generated by the bike path itself and the rip-rap energy dissipater at the outlet point to the natural channel.

Overland flows from Basin A-5 are conveyed to a rectangular channel (CD-5) just north of the little League baseball field. This rectangular channel (b=4.25', h=1.5') realigns the natural channel around the "pinch point" between the NCTD R/W and the ball field. The channel converges with an extension of an existing 24" RCP conveying runoff from the NCTD R/W (Basin A7) and the two outlet to a riprap energy dissipater to the natural channel to the east. Runoff generated by the bike path in basin A7 is also treated by a Bioretention Trench and the runoff coefficient is conservatively weighted as if no Bioretention Trench were use. With no Bioretention Trench in use, the runoff generated by the bike path adds only 0.7 cfs to the total Q of basin A7. This additional water is easily handled by the 24" RCP culvert as shown in Exhibit 3.

A similar situation occurs with Basin A6 – outletting to a rectangular channel (CD-7, b=4', d=1.5') around the major league field "pinch point" with the NCTD R/W. This channel converges with another 24" RCP culvert extension conveying flows from Basin A8. The additional flows generated by the bike path, not taking into account the Bioretention Trench treatment and percolation, is merely 0.6 cfs and is again dissipated by rip-rap at the entrance to the natural earthen channel. The final flows for this segment continue past the last little League baseball fields and are delivered to a catch basin at Hannalei Drive.

Segment B:
The construction of the bike path to the north of Hannalei Drive intercepts flows from the NCTD R/W (Basin B1) that would have been collected by the Hannalei drainage system. A concrete brow ditch (CD-8), located at the top of a short retaining wall, captures runoff from the Rail R/W and directs it eastward toward an existing concrete ditch where the two ditches converge. This existing concrete ditch then conveys water from an existing culvert and the flows from Basin B1 to a closed-pipe system and eventually outlets into a detention basin. See Appendix D for data regarding the South Santa Fe Widening Project. The runoff placed into the existing system by Basins B1, B2 and B3 is the same water that currently flows to the catch basin at the end of the existing concrete ditch, so no additional calculations for the existing facility were generated. 100-year Q values generated by Basins B1, B2 and B3 are available in Exhibit 2.

Segment C:
Basin C1 functions very similarly to the existing condition with the exception of the impervious area generated by the construction of the bike path. Again, this new bike path runoff is treated by a Bioretention Trench that runs the length of the path. The flow path of this Basin is only slightly modified in ditch alignment (CD-9) and connection via drop inlet to the existing 96" CMP culvert pipe running under the NCTD tracks. The additional flow generated by the path, not including losses from the Bioretention Trench, is only 0.7cfs.

Basin C2 delivers overland flow from a hillside to the north of the bike path to the existing 96" culvert opening. This flow is only impacted by the addition of a concrete ditch at the base of a concrete fill retaining wall. Flow to the 96" culvert is a marginal percentage of the total pipe's capacity at 2.0 cfs and is not different from the existing condition.

Basin C3 conveys flows from an existing mobile home park. The Runoff Coefficient used for this basin is medium density residential based on data taken from Appendix C. Flow in this area is routed to a proposed catch basin and into a 12" PVC pipe which outlets to the south side of the bike path into an existing concrete ditch inside the NCTD R/W at Buena Creek Road. Hydraulic data for the 12" PVC can be found in Exhibit 3.

Drainage Basin C4 is similar to that of C1, collecting runoff from the tracks and the bike path, but flows east to west to the same drop inlet into the existing 96" CMP culvert. The bike path Bioretention Trench treats the new runoff and the additional 100-year Q is only 1.2 cfs. The existing concrete ditch is only slightly realigned to accommodate the new bike path and slopes.

CONCLUSION

The construction of the Inland Rail Trail bike path has very little impact to the existing natural or man-made drainage facilities. The generation of a calculated Q100 2.3 cfs in Segment A and 1.9 cfs in Segment C is less than 2% of the entire flow and capacity. This increase generated by the bike path is mitigated by the use of Bioretention Trenchs and rip-rap energy dissipaters, and, therefore, has negligible impact to the existing facilities.

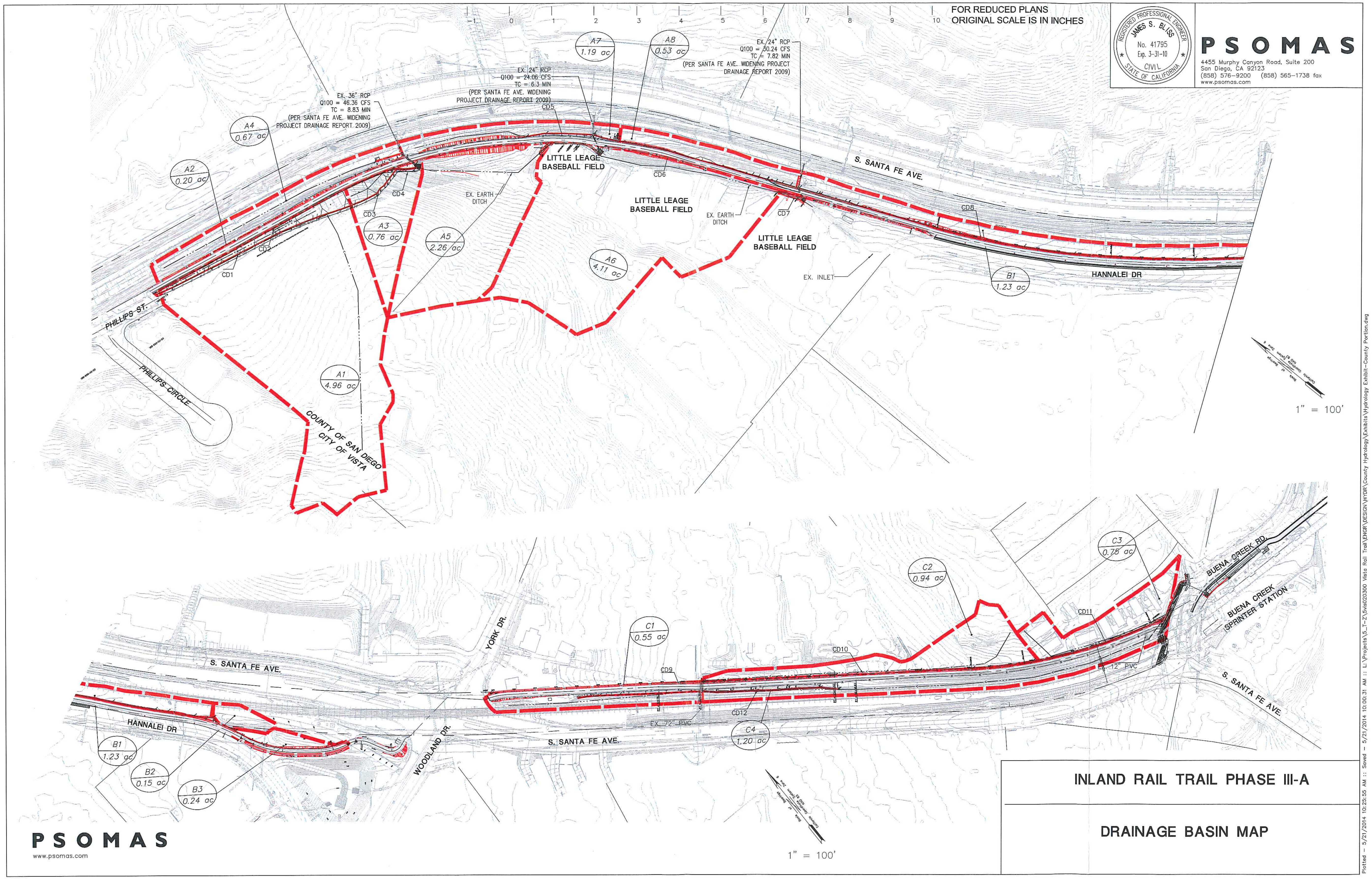

FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES
-1 0 1 2 3 4 5 6 7 8 9 10
REGISTERED PROFESSIONAL ENGINEER
JAMES S. BLISS
No. 41795
Exp. 3-31-10
CIVIL
STATE OF CALIFORNIA
PSOMAS
4455 Murphy Canyon Road, Suite 200
San Diego, CA 92123
(858) 576-9200 (858) 565-1738 fax
www.psomas.com
A7 1.19 ac
A8 0.53 ac
EX. 24" RCP
Q100 = 30.24 CFS
TC = 7.82 MIN
(PER SANTA FE AVE. WIDENING PROJECT DRAINAGE REPORT 2009)
EX. 24" RCP
Q100 = 24.06 CFS
TC = 6.3 MIN
(PER SANTA FE AVE. WIDENING PROJECT DRAINAGE REPORT 2009)
EX. 36" RCP
Q100 = 46.36 CFS
TC = 8.83 MIN
(PER SANTA FE AVE. WIDENING PROJECT DRAINAGE REPORT 2009)
A4 0.67 ac
A2 0.20 ac
CD1
CD2
CD3
CD4
CD5
CD6
CD7
CD8
LITTLE LEAGE BASEBALL FIELD
LITTLE LEAGE BASEBALL FIELD
LITTLE LEAGE BASEBALL FIELD
EX. EARTH DITCH
EX. EARTH DITCH
EX. INLET
S. SANTA FE AVE.
HANNALEI DR
A3 0.76 ac
A5 2.26 ac
A6 4.11 ac
A1 4.96 ac
B1 1.23 ac
PHILLIPS ST.
PHILLIPS CIRCLE
COUNTY OF SAN DIEGO
CITY OF VISTA
1" = 100'
C1 0.55 ac
C2 0.94 ac
C3 0.75 ac
C4 1.20 ac
CD9
CD10
CD11
CD12
EX. 72" PVC
12" PVC
YORK DR.
WOODLAND DR.
S. SANTA FE AVE.
S. SANTA FE AVE.
S. SANTA FE AVE.
HANNALEI DR
BUENA CREEK RD
BUENA CREEK SPRINTER STATION
B1 1.23 ac
B2 0.15 ac
B3 0.24 ac
1" = 100'
PSOMAS
www.psomas.com
INLAND RAIL TRAIL PHASE III-A
DRAINAGE BASIN MAP
Plotted – 5/21/2014 10:25:55 AM :: Saved – 5/21/2014 10:00:31 AM :: L:\Projects\5_T–Z\5vis020300 Vista Rail Trail\ENGR\DESIGN\HYDR\County Hydrology\Exhibits\Hydrology Exhibit-County Portion.dwg

EXHIBIT 2

HYDROLOGY CALCULATION DATA TABLE

P S O M A S
3111 Camino Del Rio North, Suite 702
San Diego, CA 92108

INLAND RAIL TRAIL - PHASE 2
5DOK010100
CALCULATED BY: SCO
CHECKED BY: JSB

HYDROLOGY CALCULATIONS-100 YEAR STORM EVENT

SEE APPENDIX D OF THIS REFERENCED REPORT FOR "SANTA FE AVE. ROAD WIDENING PROJECT DRAINAGE REPORT" SEPTEMBER 2009, PREPARED BY PROJECT DESIGN CONSULTANTS

EXISTING CHANNEL HYDROLOGY

DRAINAGE AREA	Land Type	A (ACRES)	Tc (MIN)	C	*I100 (IN/HR) 100 YR P6 = 3.35	ΔQ100 (CFS)	ΣQ100 (CFS)	SLOPE (%)	SECTION	REMARKS
HYDROLOGY CALCULATIONS PER METHODS DESCRIBED IN THE 2003 COUNTY OF SAN DIEGO HYDROLOGY MANUAL										
A1	UNT	5.11	6.9	0.35	7.17	12.8	12.8	10.0%	ND	(Max Ti Used per Table 3-2) Lm=100 Ti=6.9
A2	BP	0.25	7.2	0.90	6.96	1.6	14.4	2.2%	Bio V-Swale	dH=15', s=2.2%(effective) Tc=7.2 min.
A3	UNT	0.76	9.8	0.35	5.72	1.5	**15.9**	2.0%	CD	Flow to CD4 (Exist Natural Channel)
A4	RW	0.72	12.5	0.57	4.89	2.0	17.9	1.0%	CD	Additional Flow generated by Bike Path Initial Run (track side) - Lm=70 Ti=12.5 min.
KNOWN OFFSITE FLOW (EX. 36"RCP)			8.8		6.12	**46.4**			36" RCP	Exist. 36" RCP data from Santa Fe Ave Widening Proj. - Drainage Report 2009
A5	UNT	2.26	10.5	0.35	5.48	4.3	68.6	3.0%	ND	(overland) dH=68', s=17.1%, Tc=10.47min.
							68.6		Rect. Channel b=4.25', h=1.5'	Flow to CD5: Bypass around Little League Field
A6	UNT	4.11	19.1	0.35	3.72	5.3	74.0	2.6%	NC	dH=11.2', s=2.6% Tc=19.1 min.
A7	RW	0.6	12.5	0.57	4.89	1.7	75.6	1.3%	CD	Additional Flow Generated by Bike Path Initial Basin - Lm=70 Ti=12.5 MIN
KNOWN OFFSITE FLOW (EX. 24"RCP)			6.3		7.60	**24.1**			24" RCP	Exist. 24" RCP data from Santa Fe Ave Widening Proj. - Drainage Report 2009 + FLOW from A7
							99.7		Rect. Channel b=4', h<1.5'	Flow to CD7: Bypass around Major League Field
KNOWN OFFSITE FLOW (EX. 24"RCP)			7.8		6.91	**30.2**			24" RCP	Exist. 24" RCP data from Santa Fe Ave Widening Proj. - Drainage Report 2009
A8	RW	0.53	12.5	0.57	4.89	1.5	31.7			Additional Flow to Exist. 24" RCP (Ex 24" + A8)
							131.4			Combined Flow to Exist. Natural Channel
B1	RW	1.23	10.3	0.45	5.54	3.1		3.0%	CD	Additional Flow added to Exist. Conc. Ditch Initial Basin - Lm=100 &3% Ti=10.3 MIN
KNOWN OFFSITE FLOW from "NCTD Culvert 4" to Exist. CD						**35.0**			24" RCP	Exist. 24" RCP data from Santa Fe Ave Widening Proj. - Drainage Report 2009 Flow into Exist. Conc. Ditch
							38.1			Combined Flow in Exist Conc. Ditch
B2	UNT	0.15	10.3	0.35	5.54	0.3	**38.4**	2.0%	CD	Initial Basin - Lm=85 &3% Ti=10.9 MIN
B3	UNT	0.24	9.5	0.57	5.83	0.8	**39.2**	2.6%	CD	Additional Flow droped into Exist. SD System. dH=5', s=2.6% Tc=9.5 min.
C1	RW	0.55	10.6	0.57	5.44	1.7	**1.7**	2.5%	CD	Initial Basin - Natural: Lm=93's=2.5%, Ti = 10.6min.
										Flow Dropped into 96" Culvert
C2	UND	0.94	8.3	0.35	6.37	2.1	**2.1**	6.0%	CD	Initial Basin - Natural: Lm=100', s=6.0%, Ti=8.3min.
										Flow into North end of Culvert
C3	MOBILE H.	0.75	5.4	0.63	8.40	4.0	4.0	4.5%	CD	Initial Basin - MDR 12DU/Ac s=4.5% Lm=100', Tc=5.4mir
										C3 Flow into 12" PVC Line 'G' to C4
C4	RW	1.20	13.2	0.57	4.72	3.2	**7.2**	0.6%	CD	Max based on Table 3-2 Lm=50' s=0.5% Tc=13.2min Dropped into 96" Culvert
							15.0			Total Flow Placed into 96" Culvert from IRT Project - Impacted by the Bike Path

* Intensities are based on the Regression equation from the San Diego County - Hydrology Manual, Figure 3-1 where:

I(t) = 7.44 * P6 * D^-0.645

**Q based on the rational method equation from the County of San Diego Hydrology Manual expressed as:

Q = C * I *A

***Q1,T1,I1 is defined by the tributary with the shortest Tc. Select largest Qt, and the Tc associated with it.

LEGEND:
- C.P. Concentration Point
- LDR Low Density Residential
- UNT Undisturbed Natural Terrain
- ND Natural Ditch
- CD Concrete Brow Ditch Type B
- BP Bike Path
- RW Rail Way = BP + UNT (Weighted C Coeff)

APPENDIX D

DRAINAGE REPORT REFERENCE:
SOUTH SANTA FE AVENUE WIDENING PROJECT

DRAINAGE REPORT
SOUTH SANTA FE AVENUE
WIDENING PROJECT

County of San Diego, CA
SEPTEMBER 2009

Prepared For:
COUNTY OF SAN DIEGO
5555 Overland Avenue (MS 0340)
San Diego, CA 92123-1295

Prepared By:
PROJECT DESIGN CONSULTANTS
701 B Street, Suite 800
San Diego, CA 92101

Project No. 1217.00

REGISTERED PROFESSIONAL ENGINEER
DEBBY SUE REECE
No. C56148
EXP. 12-31-10
CIVIL
STATE OF CALIFORNIA

Prepared By: Matt Moore
Modified By: Richard Isaac
Modified By: C. Pack, P.E.
Under the supervision of

Debby Reece RCE C56148
Registration Expires 12/31/10

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FIGURES

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APPENDICES

EXHIBITS

1. INTRODUCTION

This drainage report has been prepared for the County of San Diego (County) for the design of the storm drain improvements associated with the South Santa Fe Avenue, (SSFA) Widening Project (Project). In addition to the SSFA widening, roadway segments associated with Hannalei, York, and Woodland Drives, will also be improved to accommodate the new SSFA alignment. The aforementioned roadways are located near the southerly terminus of the Project.

The Project is located in the County of San Diego, approximately 0.6 miles northeast of State Highway 78, and consists of widening SSFA from a 2-lane to a 4-lane major arterial. In general, the Project is approximately 4,000 feet long, and is bound by: 1) Robelini Drive and Montgomery Drive to the south and north, respectively, and 2) the North County Transit District (NCTD) railroad tracks to the west between Montgomery Drive and Woodland Drive, and to the east between Woodland Drive and Robelini Drive. See Figure 1 for the Project Vicinity Map.

From a hydrologic land-use perspective, "The North County Metropolitan Planning Area Map, Sheet 1, of the Land Use Element Section II, Part XXV, of the County of San Diego General Plan" was used to determine the projected build-out zoning, or land- uses, for the drainage basins tributary to the Project (See Exhibit A-1). The latter information was used to determine the Rational Method runoff coefficients used for the Project hydrology analyses. In general, the land-uses for the Project consist of residential, office professional commercial, general commercial, and service commercial.

During the previous design phase for the project, it was determined that further drainage analysis and improvements were required south of the proposed project surface improvements near Anna Lane and Woodland Drive to mitigate for the drainage impacts associated with the project. The County contracted with Rick Engineering to evaluate different drainage alternatives. Rick Engineering's preliminary analysis is presented in the *South Santa Fe Avenue (North) Widening Anna Lane Drainage Improvements Preliminary Alternatives Analysis* (dated April 11, 2008), (herein referred to as the "Anna Lane report"). After reviewing the Anna Lane report, the County chose Alternative 5B, which consists of constructing a detention/water quality basin near the proposed Woodland Drive/Hannalei Drive intersection. Therefore, the main purpose of this drainage report revision is to update the drainage calculations to incorporate the new basin, including detention routing and water quality calculations. Note that the original and revisions to the Storm Water Management Plan (SWMP) for the project are being completed by Rick Engineering, but the water quality basin drawdown calculations are contained herein.

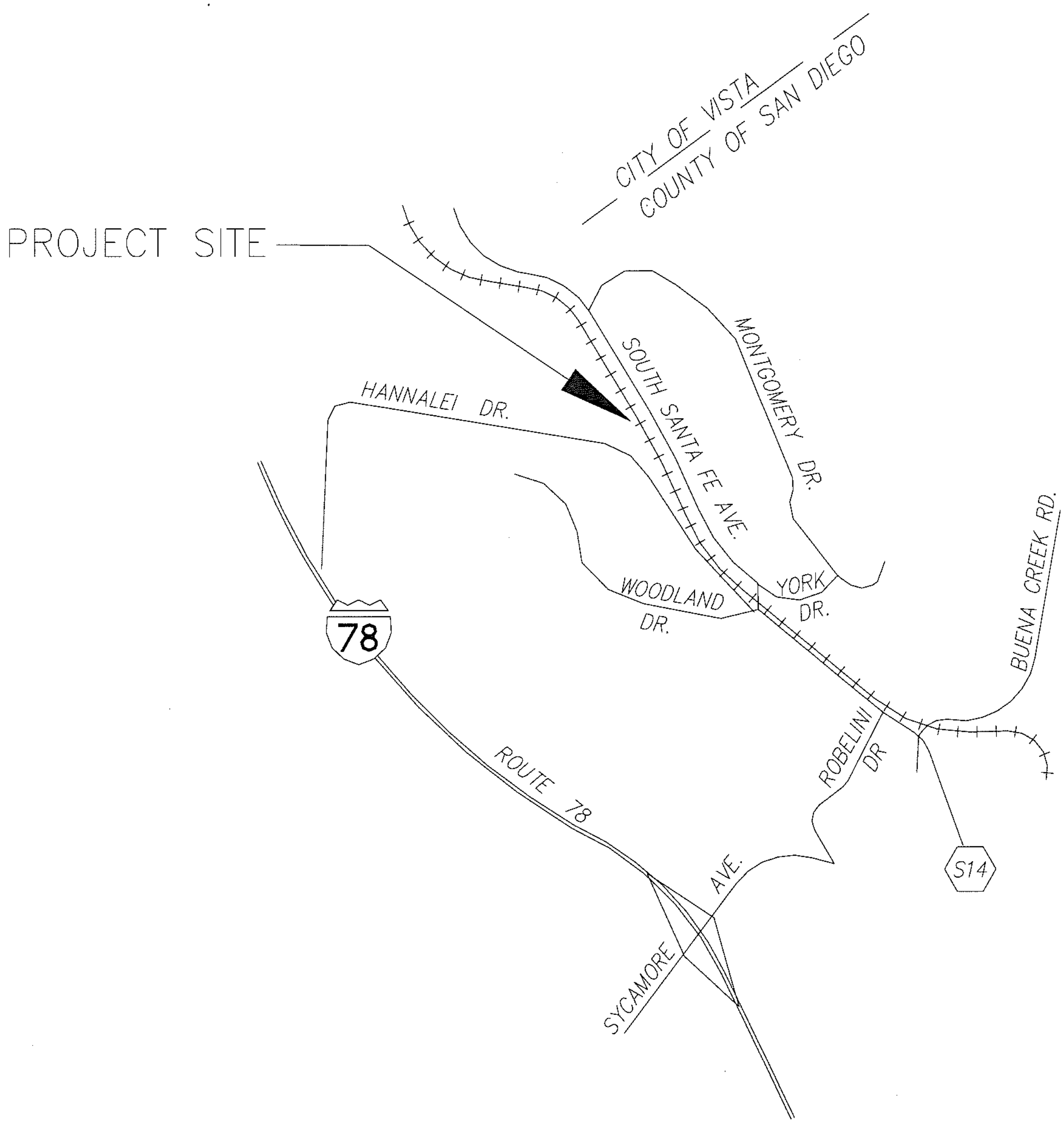

Figure 1: Vicinity Map

2. EXISTING DRAINAGE IMPROVEMENTS

SSFA, within the project limits, is a two-lane crowned paved roadway with no curb, gutter or sidewalk. The section below describes the five existing drainage basins and improvements, relative to the improvement plan roadway stationing and the Rational Method node numbers. The existing condition hydrology node numbers are identified on Exhibit B.

- Systems 100A, 100B, and 200 (Nodes 100-295): Storm flows from the northern most three basins are collected and conveyed from the east side of the roadway to the west side via inlet and pipe systems. The first is located just north of Montgomery Drive (Station 8+75, Node 110); the second is just north of the first driveway immediately south of Montgomery Drive (Station 13+00, Node 155); and the final is located at approximate Station 19+25 SSFA (Node 270). These three systems consist of inlets, pipes, and headwalls. Storm flows are conveyed to an existing ditch located between SSFA and the NCTD railroad (RR) tracks. Existing flows are then conveyed under the RR tracks by three culverts (NCTD Culverts 1, 2 and 3), just downstream of each outlet from SSFA. These three NCTD culverts do not have capacity to convey the existing flows, therefore some bypass occurs. This bypass continues south to a fourth culvert (NCTD Culvert 4).

- System 300A (Nodes 300-395): Storm flows from this basin, which consist of the southern half of the project, are collected and conveyed via roadside swales to the existing York Drive/SSFA intersection. At this location flows from the east side of SSFA cross the road, are combined with the flows from the west side of SSFA and the bypass flows from the other Systems, then subsequently are conveyed under the RR tracks via NCTD Culvert 4. This culvert does not have capacity for the total combined flow to this location. Bypass continues as sheet flow in a southwesterly direction, through the property west of Hannalei Drive.

- System 300D (Nodes 425-435): Storm flows from this final basin drain via sheet flow from the west side of the NCTD RR, combine with the outflow and bypass flows from NCTD Culvert 4, to the intersection of Woodland Drive and Anna Lane. Note that there is a 0.82 acre subarea at the northwest corner of the intersection of Woodland Drive and Anna Lane (Nodes 430-435) that appears to not match the topography. This is because the area represents a portion of the Buena Vista 9 subdivision, which was constructed after the date of topography. The runoff coefficient and flow rate from this 0.82 acre area was copied into System 300D from the results presented in *Rough Grading Drainage Study for Buena Vista 9* (prepared by Hunsaker and Associates, dated September 29, 2006). Pertinent excerpts from the report are included in Appendix 17. At the downstream end of System 300D, there is one small pipe crossing under Woodland Drive which is substantially undersized. This pipe conveys low flows to a small roadside swale/ditch on the west side of Anna Lane. When the capacity of this small swale is reached, this area floods, saturating the front yards of the properties along Anna Lane. Project flows combine with flows from other adjacent tributary areas and continue south to an existing 60-inch RCP culvert located on the north side of the existing commercial center, south of the southerly terminus of Anna Lane. The Anna Lane report contains calculations that show how the total combined existing condition 100-year peak flow to the existing 60-inch headwall is too large to drain into the pipe without causing significant ponding at the surface over the headwall. Therefore, the area surrounding the headwall acts as a detention basin for the 100-year storm.

3. PROPOSED DRAINAGE IMPROVEMENTS

This section describes the proposed drainage improvements for the Project relative to the improvement plan roadway stationing and the Rational Method node numbers. The proposed condition hydrology node numbers are identified on Exhibit C.

Additionally, this section also provides a general description of the drainage improvements that will be used at a number of the steep driveways that tie into SSFA. The driveway drainage and grading improvements are a key component of the overall SSFA roadway design, due to the superelevated section of SSFA for portions of the proposed improvements. In effect, the driveway improvements were designed to minimize driveway runoff from potentially sheeting across the superelevated section of SSFA.

- Systems 1000, 2000, 3000, and 4000: These systems are approximately located between Stations 9+00 and 22+00 of SSFA. Storm runoff from tributary basins that are located on the east side of SSFA is conveyed by overland flow then collected and conveyed by underground piping to the west side of SSFA. Subsequently, the runoff is discharged to a concrete brow ditch located between SSFA and the NCTD RR tracks. Similar to the existing condition, some of the NCTD culverts will have bypass for the peak 100-year flow. Therefore, for each of the culverts with bypass flows, the bypass flows were added to the next downstream system.

- System 1000: This system discharge location is at approximate Station 9+00 of SSFA. The system consists of 18-inch to 36-inch RCP's. Runoff is collected by inlets on SSFA and Montgomery Avenue and a catch basin north of the intersection of SSFA and Montgomery Avenue. Runoff is discharged south of SSFA at approximate station 9+00 onto a D-40 riprap pad and thence into the NCTD swale. Runoff then flows southeasterly via the swale to NCTD Culvert 1 under the RR tracks at approximate Station 10+60 SSFA.

- System 2000: This system discharge location is at approximate Station 13+00 of SSFA. The system consists of 24-inch to 30-inch RCP's. Runoff is collected by grate inlets within a commercial center. Runoff is discharged south of SSFA at approximate Station 13+00 onto D-40 riprap pad and thence into a concrete brow ditch. Runoff then flows southeasterly via the concrete brow ditch to NCTD Culvert 2 under the RR tracks at approximate Station 15+60 SSFA. Bypass from this culvert continues southeasterly in a concrete brow ditch to NCTD Culvert 3 crossing under the RR tracks at approximate Station 20+85 SSFA.

- System 3000: This system discharge location is at approximate Station 18+90 SSFA. The system consists of 18-inch to 36-inch RCP's. Runoff is collected by inlets on SSFA, private driveways, and catch basins. Runoff is discharged south of SSFA at approximate Station 18+90 onto a D-40 riprap pad and thence into a concrete brow ditch. Runoff then flows southeasterly to NCTD Culvert 3 under the RR tracks at approximately Station 20+85 SSFA. Bypass from this culvert continues southeasterly in a concrete brow ditch to NCTD Culvert 4 crossing under the RR tracks at approximate Station 34+25 SSFA.

- System 4000: This system discharge location is at approximate Station 21+75 SSFA. The system consists of 18-inch RCP's. Runoff is collected by an inlet on SSFA and catch basins north of SSFA, and is discharged south of SSFA at approximate Station 21+75 onto a D-40 riprap pad and thence into a concrete brow ditch. Runoff then flows southeasterly via the concrete brow ditch to NCTD Culvert 4 under the RR tracks at approximate Station 34+25 SSFA. NCTD Culvert 4 conveys all proposed condition flows southerly to Woodland Drive and Anna Lane with no bypass.

- System 5000: System 5000 consists of all of the drainage area that drains into the east side of the proposed detention/water quality basin at the Hannalei/Woodland Drive intersection. The system consists of 18-inch to 48-inch RCP's. Runoff is collected by inlets on SSFA, York Drive, Frontage Road, Woodland Drive, and a series of catch basins north of SSFA. Runoff from this system will be combined with System 9000 and detained and treated prior to draining south in Anna Lane via a proposed 42/48-inch pipe to the existing 60-inch storm drain headwall located on the north side of the existing commercial center, at the southerly terminus of Anna Lane.

- System 9000: System 9000 consists of all of the drainage area that drains into the west side of the proposed detention/water quality basin at the Hannalei/Woodland Drive intersection. The system consists of 18-inch to 36-inch RCP's. Runoff is collected by inlets on Hannalei Drive and an F-type catch basin that collects the discharge from NCTD Culvert 4 (which includes upstream bypass from NCTD Culvert 3 and the peak flow from System 4000).

- System 7000: System 7000 consists of the small drainage area on Hannalei Drive and Woodland Drive that drains into the pipe that outlets from the basin. The system consists of 18- and 24-inch pipes.

- Driveway Improvements: A key element in the design of the driveway drainage improvements is to prevent the sheeting of flow across segments of superelevated roadway and to maintain 12-foot dry lanes during the peak 100-year storm.

- Type "F" Catch Basins/Ditches: Ditches will convey runoff to Type 'F' catch basins to: 1) protect the newly manufactured slopes along the easterly side of SSFA, 2) prevent the sheeting of runoff across superelevated segments of the roadway, and 3) direct runoff to the driveway drainage improvements. PDC and the County agreed to use Type F catch basins, in lieu of CMP risers (STD DWG D-16), to minimize maintenance.

4. HYDROLOGIC CRITERIA, METHODOLOGY, AND RESULTS

4.1 Hydrology Analysis Criteria

Table 1 below summarizes the drainage criteria for the project. Appendix 1 includes the 100-year, 6-hour and 24-hour Isopluvials, Intensity-Duration Chart and the Soil Group Map.

Table 1: Hydrology Analysis Criteria

Design Storm:	100-year
Land Use:	Mostly Residential, Commercial, and Streets
Runoff Coefficients:	Based on criteria presented in the 2003 County of San Diego Hydrology Manual. (See Section 4.3)
Hydrologic Soil Group:	C and D per the County of San Diego Soil Group Maps. Soil type D was used for the analysis.
Intensity:	Based on criteria presented in the 2003 County of San Diego Hydrology Manual.

4.2 Hydrology Analysis Methodology

The Modified Rational Method was used to determine the 100-year storm runoff for the design of the Project storm drainpipes, curb inlets, concrete brow ditches and erosion protection.

This section of the report addresses the Project hydrology methodology relative to: 1) the selection of the runoff coefficients, 2) the hydrology methodology used, and 3) the AES Rational Method software model used for the hydrologic analysis.

4.3 Project Runoff Coefficients

From a hydrologic land-use perspective, "The North County Metropolitan Planning Area Map, Sheet 1, of the Land Use Element Section II, Part XXV, of the County of San Diego General Plan" (Land Use Map) was used to determine the build-out zoning, i.e. land-uses, for the drainage basins tributary to SSFA. For the north-western project drainage areas within City of Vista jurisdiction, the City of Vista Zoning Map was used as a reference to determine C values. (See Exhibit A-2). The zoning maps were used to determine the runoff coefficients (C values) used in the Rational Method. See Appendix 2 for the calculation of the weighted C values for each System, and Exhibits A-1 and A-2 for the Land Use Maps. For drainage subareas with multiple land uses, a composite runoff coefficient was calculated. See calculations in Appendix 2.

4.4 Explanation of AES Rational Method Software

Advanced Engineering Software (AES) Rational Method Program was used to perform the hydrologic calculations. The following section provides a brief explanation of the computational procedure used in the computer model.

The AES Modified Rational Method Hydrology Program is a computer-aided design program where the user develops a node link model of the watershed. Developing independent node link models for each interior watershed and linking these sub-models together at confluence points creates the node link model. The intensity-duration-frequency relationships are applied to each of the drainage areas in the model to get the peak flow rates at each point of interest.

4.5 100-year Hydrology Analysis Results

The results of the existing and proposed conditions Rational Method computer output are located in Appendices 3 and 4. A summary of the 100-year peak flows are shown in Table 2 on the following page.

As Table 2 indicates, if detention was not provided, the proposed condition peak flow would be greater than the existing conditions flow at the Anna Lane - Woodland Drive intersection. In addition, there is a small area (approximately 3 acres) at the intersection of York and SSFA that in the existing condition drains south along SSFA to the localized low point near the existing RV Storage Center. In the proposed condition, flows from this area are collected via inlets and conveyed to the Anna Lane – Woodland Drive intersection. The increase of flow will be detained with the proposed basin so that the ponding depth at the existing 60-inch pipe at the southern end of Anna Lane under proposed conditions will be less than or equal to the existing condition ponding depth, per Rick Engineering's detention analysis in the Anna Lane report.

Table 2. Summary of Hydrology Results for 100-year Storm

	EXISTING CONDITIONS						PROPOSED CONDITIONS					
Point of Interest (Description)	***System***	***Node(s)***	***Q 100 IN (cfs)***	***Q 100 OUT (cfs)***	***Contrib. Area (acres)***	***Adjust. Contrib. Area (acres)****	***System***	***Node(s)***	***Q 100 IN (cfs)***	***Q 100 OUT (cfs)***	***Contrib. Area (acres)***	***Adjust. Contrib. Area (acres)****
NCTD Culvert 1	System 100A	120	49.5	49.5	13.8	N/A	System 1000	1090	46.4	46.4	13.76	N/A
NCTD Culvert 2	System 100B	170	32.4	25.9	6.64	N/A	System 2000	2040	25.7	24.1	5.55	N/A
NCTD Culvert 3	System 200	290	55.3	29.9	13.9	15.22	System 3000	3090	57.5	30.2	12.69	13.04
Total outfalls towards school=			**137.2**	**105.3**	**34.34**	**35.66**			**129.6**	**100.7**	**32.0**	**32.35**
NCTD Culvert 4	System 300A	370	66.0	53.3	15.64	22.63	Portion of System 9000	9082	35.0	35.0	3.61	9.78
Anna Lane - Woodland Drive Intersection	System 300D	435	97.8	97.8	25.39	32.38	System 5000	5098	74.8	-	17.98	N/A
							System 9000	9090	51.2	-	9.11	15.29
							Basin Subtotal:	N/A	117.5	75.5	27.09	33.27
							System 7000		20.6	20.6	3.24	N/A
Total at outfall=			**97.8**	**97.8**	**25.39**	**32.38**			**138.1**	**77.9**	**30.33**	**36.51**

Note: Adjusted contributing areas include adjusted area to account for upstream bypass during 100-year peak event, if applicable. See split flow calculations in Appendix 5.

4.6 2 and 10-year Hydrology Analysis Results

As shown in Table 2, there is a minor increase in flow between existing and proposed conditions for Culvert 3. The minor increase in flow and the split flow situation at the culverts prompted the County to request additional hydrology calculations for the 2 and 10 year storms in order to evaluate whether or not a hydrologic condition of concern exists for the unlined channel near the ball fields. This channel conveys the runoff from Culverts 1, 2, and 3 in a southerly direction. The following tables summarize the results of the 2 and 10 year analysis. Refer to Appendix 18 for the calculations.

Table 3. Summary of Hydrology Results for 2-year Storm

	EXISTING CONDITIONS							PROPOSED CONDITIONS						
Point of Interest (Description)	*System*	*Node(s)*	*Q_2 IN (cfs)*	*Q_2 OUT (cfs)*	*Tc (min)*	*Contrib. Area (acres)*	*Adjust. Contrib. Area (acres)**	*System*	*Node(s)*	*Q_2 IN (cfs)*	*Q_2 OUT (cfs)*	*Tc (min)*	*Contrib. Area (acres)*	*Adjust. Contrib. Area (acres)**
NCTD Culvert 1	System 100A	125	19.9	19.9	8.58	13.8	N/A	System 1000	1096	18.1	18.1	10.11	13.76	N/A
NCTD Culvert 2	System 100B	170	13.2	13.2	6.83	6.64	N/A	System 2000	2040	10.5	10.5	6.83	5.55	N/A
NCTD Culvert 3	System 200	290	19.8	19.8	10.01	13.9	N/A	System 3000	3090	17.6	17.6	12.76	12.69	N/A
Total outfalls towards school=			**52.9**	**52.9**		**34.34**	**N/A**			**46.2**	**46.2**		**32.00**	**N/A**

****Note: Adjusted contributing areas include adjusted area to account for upstream bypass during peak event, if applicable.***

Table 4. Summary of Hydrology Results for 10-year Storm

	EXISTING CONDITIONS							PROPOSED CONDITIONS						
Point of Interest (Description)	*System*	*Node(s)*	*Q_{10} IN (cfs)*	*Q_{10} OUT (cfs)*	*Tc (min)*	*Contrib. Area (acres)*	*Adjust. Contrib. Area (acres)**	*System*	*Node(s)*	*Q_{10} IN (cfs)*	*Q_{10} OUT (cfs)*	*Tc (min)*	*Contrib. Area (acres)*	*Adjust. Contrib. Area (acres)**
NCTD Culvert 1	System 100A	125	30.2	30.2	8.16	13.8	N/A	System 1000	1096	27.7	27.7	9.5	13.76	N/A
NCTD Culvert 2	System 100B	170	19.9	19.9	6.53	6.64	N/A	System 2000	2040	15.7	15.7	6.56	5.55	N/A
NCTD Culvert 3	System 200	290	30.1	25.2	9.61	13.9	N/A	System 3000	3090	33.9	26.2	8.32	12.69	N/A
Total outfalls towards school=			**80.2**	**75.3**		**34.34**	**N/A**			**77.3**	**69.6**		**32.00**	**N/A**

****Note: Adjusted contributing areas include adjusted area to account for upstream bypass during peak event, if applicable.***

As indicated in the tables, for the 2-year storm, there are no bypass flows for any of the culverts and the proposed flows are less than the existing flows for each of the culverts. For the 10-year storm, Culvert 3 is the only culvert with bypass at the headwall. Culvert 3 is also the only culvert with an increase in flow between existing and proposed conditions. However, the increase is only 1 cfs, and the combined flow between Culverts 1, 2, and 3 shows that there is a reduction in flow to the channel between existing and proposed conditions. Therefore, there is no hydrologic condition of concern for the unlined channel near the ball fields on the southwest side of the railroad tracks due to the proposed project.

4.7 Generating Hydrographs for Systems with Upstream Bypass

As Table 2 indicates, due to the split flow situation at some of the NCTD culverts for the 100-year storm, the tributary area at any point downstream of the culverts with bypass is not a straight-forward calculation. This makes calculating a hydrograph for the basin routing somewhat difficult. Due to the split flow at NCTD Culvert 3 in the proposed condition during the 100-year peak flow, the peak bypass flow drains to System 9000 and becomes tributary to the proposed detention basin. The flow rate and time of concentration for this bypass flow is added to System 9000 in the hydrology model as user-specified hydrology information at a point. Because of the split flow situation (which creates a non-linear relationship between the bypass flow rate and total upstream area), the flow was added with a proportional bypass area in System 9000 in the AES model so that any downstream confluences or flows calculated from sub-area additions would not be skewed by an incorrect upstream area. In order to generate a hydrograph for System 9000, the area flowing downstream of NCTD Culvert 3 was added as a "representative" area of the upstream bypass. The "representative" area was calculated based on the proportion of the area tributary to the culvert and the ratio of the bypass and total peak flow at the culvert headwall. For example, if 10% of the peak flow bypassed the culvert, then 10% of the total area draining to the culvert was added to the next downstream system for the adjusted area calculation. This was needed for System 9000 so that the hydrograph generator would not under-estimate the total hydrograph volume. For these calculations, refer to Appendix 5.

5. HYDRAULIC ANALYSIS CRITERIA AND METHODOLOGY

The following sections describe the criteria and methodology used in the hydraulic analysis of the proposed drainage improvements.

5.1 Hydraulic Analysis Criteria

Table 3 below presents the hydraulic criteria used in the design of the storm drain improvements.

Table 3: Hydraulic Analysis Criteria

FACILITY	CRITERIA
Underground storm drain systems	100-year storm HGL 1-ft below the inlet opening and 1-ft below cleanout top-of-rim elevations.
Inlets	Minimum 85% capture for continuous grade inlets
Brow Ditches	100-year storm capacity.
Riprap Protection	Per Regional Std. Dwg. D-40
Dry Roadway Width	12-foot wide dry lane within the roadway traveled way
Detention Basin Routing	Detain the peak 100-year flow rate in the proposed basin such that the combination of the detained basin flow and the flow from the rest of the drainage area to the existing 60-inch pipe produces a maximum ponded water surface elevation at the southerly end of Anna Lane no worse than the existing condition, per Rick Engineering's offsite analysis.
Water Quality Basin Routing	Drain time for Water Quality volume between 24 and 72 hours, per County BMP worksheet guidance.
Emergency Spillway	Design spillway for undetained peak 100-year flow with 1 foot of freeboard. (Worst case situation assuming basin outlet structure is clogged.)

5.2 Hydraulic Analysis Methodology

Several computer models were employed to analyze the capacity of the proposed storm drain system. The AES Pipeflow and WSPG software hydraulic models were used to determine the hydraulic grade lines for the storm drain system improvements. FLOWMASTER, a proprietary software program by Haestad Methods, was used for the brow ditches, and to determine the roadway gutter depth and flood width necessary to determine the roadway dry-lane width required for emergency vehicle access. Additionally, CULVERTMASTER, proprietary software by Haestad Methods, was used in calculating the capacity and bypass of the NCTD culverts (see Appendix 5 for calculations). PondPack, another proprietary software by Haestad Methods, was used to do the detention and water quality routing for the proposed detention/water quality basin. The following sections provide a brief description of the analytical procedures used in each model.

5.3 Explanation of the AES Pipeflow Software

The AES Pipeflow model was used to determine the hydraulic grade line for the storm drain pipe improvements for this project. The AES computational procedure is based on solving Bernoulli's equation for the total energy at each section; and Manning's formula for the friction loss between the sections in each computational reach. Confluences are analyzed using pressure and momentum theory. In addition, the program uses basic mathematical and hydraulic principals to calculate data such as cross sectional area, velocity, wetted perimeter, normal depth, critical depth, and pressure and momentum. Model input basically includes storm drain facility geometry, inverts, lengths, confluence angles, and downstream/upstream boundary conditions, i.e., initial water surface elevations.

5.4 Explanation of FLOWMASTER Software

The FLOWMASTER model computes flows, water velocities, depths and pressures based on several well-known formulas such as Darcy-Weisbach, Manning's, Kutter's, and Hazen-Williams. For this project, Manning's equation was used in the design of the brow ditches, gutter depths and in the dry lane width calculations.

5.5 Explanation of CULVERTMASTER Software

The CULVERTMASTER model analyzes culvert hydraulics based on methodologies set forth in Hydraulic Design Series No. 5 (HDS 5), Hydraulic Design of Highway Culverts (1985) as prepared by the Federal Highway Administration. CULVERTMASTER was used to model split flow at the NCTD culverts. Based on the spot elevations provided by the County's survey crew, the configuration at each culvert headwall was approximated by the culvert and a generic weir set equal to the elevation of the surrounding ground where bypass starts to occur. The model solved for the ponded water surface elevation that passes the design discharge, and reported the flow rate in the culvert and the bypass flow over the weir. The bypass flow was added to the downstream hydrology model as user-specified information so that the bypass flows could be added downstream.

5.6 Explanation of PondPack Software

The PondPack model was used in the detention and water quality routing for the proposed detention basin. The program inputs include the elevation-area relationship, the hydrographs, and the design for the outlet structures. The level-pool routing routine is used to generate the detained outflow hydrograph. The hydrograph for System 7000 was added to the outflow hydrograph from the basin for the final project hydrograph at Node 7100 (the pipe junction underneath the intersection of Woodland Drive and Anna Lane).

6. HYDRAULIC ANALYSIS RESULTS

In general, the storm drain improvements for this project consist of:

- A system of underground drainpipes.
- Inlets and brow ditches.
- One water quality/detention basin.
- Riprap outlet protection.

The following sections present the results of the SSFA storm drain system hydraulic analyses.

6.1 Storm Drainpipe Analysis

In general, the drainpipe system was designed to flow open channel for the 100-year storm event. However, some segments of the drainpipe are under pressure. As a result, watertight joints will be used at locations where deemed appropriate. See Appendices 6-12 for hydraulic analysis output and Exhibit D for the AES Pipeflow node number locations. Note that the AES Rational Method node numbers are used in the AES Pipeflow computer outputs wherever possible to facilitate the plan check. The storm drain analysis results for the Anna Lane storm drain show that the HGL is above the rim elevations for the two most downstream cleanouts. The recommended limit on the HGL elevation could not be met due to the ponding at the 60-inch pipe and so pressure manholes will be used at those locations. The starting water surface elevation used for the analysis was taken from the calculations from the revised Anna Lane report. Rick Engineering refined their preliminary model with the revised final engineering data presented herein, and the starting water surface elevation at the 60-inch pipe was revised per their results so that the HGL could be finalized for the proposed Anna Lane storm drain.

6.2 Curb Inlet, Type F Catch Basin and Ditch Analyses

The Project storm drain inlets, Type F catch basins, and ditches were designed for the 100-year storm event. The inlets were designed to minimize or prohibit bypass, especially at the driveways where SSFA is superelevated. The County of San Diego inlet design formulas, and gutter depths per the FLOWMASTER computer output, were used to design the required curb opening lengths of the inlets on a continuous grade. See Appendices 13-14 for the inlet, catch basin, and ditch analyses. The continuous grade inlets were sized to capture the vast majority of the 100-year peak flow. For any inlets with bypass flow, the bypass amount was added to the next downstream inlet for inlet sizing purposes. For the pipe hydraulic analysis, the bypass amount was ignored and 100% capture of the full flow to the upstream inlet was assumed. The only inlet that did not meet the 85% capture criteria was Node 3095 (0+50 Driveway 15+15 SSF). A maximum 20-foot opening was used, with an efficiency of only 82% due to the steepness of the driveway.

6.3 Detention Basin Routing

The peak-flow attenuation of the proposed detention basin was modeled with Pondpack, a Haestad Methods detention basin routing software package. The 100-year hydrographs for System 5000 and 9000 were input into the model and the elevation-discharge and elevation-area relationships were used to produce a routed hydrograph. The hydrograph for System 7000 was added to the routed hydrograph, and the peak flow out was used to model the flows in Storm Drain Line G down Anna Lane. Rick Engineering updated the offsite analysis in the Anna Lane report to show that the project peak flow rate at the end of Line G is small enough so that the combined peak flow rate (from the project site plus offsite area) is such that it does not raise the ponded water surface elevation at that location, above existing 100-year conditions. The emergency spillway was designed to pass the peak undetained flow rate with a minimum 1 foot of freeboard.

6.4 Water Quality Volume Routing

The permanent basin will be a combined detention/water quality basin, and therefore the lower part of the basin will empty at a much slower rate to allow the water quality volume sufficient time to empty out of the basin, thereby enhancing pollutant removal. The water quality volume routing was performed in PondPack by starting the model with the full water quality volume in the basin at the initial starting time, per standard convention. The draw-down curve and the results are included in Appendix 16.

6.5 D-40 Energy Dissipater Protection

For the energy dissipation at the pipe outfalls, three different approaches were utilized:

1) For Storm Drain Lines A, B, C, and D discharging into NCTD right-of-way, a riprap pad per Standard Drawing D-40 was specified. For Lines A, B, and C, the soffit tailwater condition was eliminated and the hydraulics were re-run to find the outlet velocity with no tailwater. The pipe discharge velocity from the hydraulic model output was used to determine the riprap class and thickness per the design velocity chart on Standard Drawing D-40. The riprap rock class for Line D was downgraded, based on the criteria on page 7-2 of the County Drainage Design Manual (d_{50} shall not exceed outlet diameter of pipe). At the request of the County, the first five feet of riprap will be grouted to protect against high velocities at the outlet.

2) For Storm Drain Lines E and F discharging into the proposed detention/water quality basin, the pipe hydraulic models were copied and then revised to eliminate the tailwater condition. The velocity at the outlet with no tailwater condition was used to size the riprap energy dissipation per Standard Drawing D-40. This method produced higher velocities and represents the worst

case scenario for the outlets. Note that the first few pages of the revised pipe models are included in Appendix 14 for riprap sizing only and are not the hydraulic models used to plot the HGLs on the plans.

3) For Storm Drain Line G, the outfall apron will tie into an existing concrete pad near the existing 60" headwall location. Because of this, a D-40 dissipater is not needed. However, a splashwall will protect the slope directly across from the new outlet.

7. CONCLUSION

The goal of this project is to widen South Santa Fe Avenue to a 4-lane arterial from the current 2-lane collector. This project consists of approximately 4,000 feet of roadway located 0.6 miles Northeast of State Highway 78. This document analyses the drainage issues that are intrinsic due to the construction of this project. From the analysis the following conclusions can be made:

- According the hydrology and hydraulic models, storm flows can be safely conveyed from the eastern side of SSFA to the western side during the 100-year storm without any detrimental flooding.
- A key element in the design of the driveway drainage improvements is to prevent sheet flow from the driveways to continue onto SSFA and to maintain 12-foot dry lanes.
- The detention/water quality basin will mitigate the small diversion of flow and an increase in peak 100-year flow rate with development of the project and will also provide treatment for approximately 27.1 acres (SSFA between Stations 22+00 and 42+00 and corresponding upstream tributaries).
- The project will maintain existing drainage patterns. The drainage areas and peak flow rates to the NCTD Culverts 1, 2, and 3 are closely matched to the existing conditions. Therefore, the project should not cause significant downstream impacts downstream of those culverts.
- The offsite analysis performed by Rick Engineering shows how the post-project flow affects the existing flooding situation at the existing 60-inch headwall located at the southerly terminus of Anna Lane. This analysis confirmed that the proposed project detention basin at the Hannalei/Woodland intersection does not exacerbate the existing

100-year flooding situation at the downstream 60-inch headwall. Refer to Rick Engineering's final report dated August 19, 2009 entitled *South Santa Fe Avenue Road Widening Project (Northern Segment) Anna Lane Detention Modeling Final Design.*

LEGEND

AES RATIONAL METHOD NODE NUMBER	5150
APPROX. ZONING BOUNDARY	
DRAINAGE SUBAREA	
FLOW DIRECTION	
DRAINAGE SUBBASIN AREA (NOTE: * MEANS COMPOSITE C VALUE WAS USED)	1.00ac
EX. NCTD CULVERT #	

0 20 40 60 120 180
GRAPHICAL SCALE

SCALE: 1"=60'

JOB #: 1217.00

CREATED: 3/1/07

PREPARED BY:

PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Environmental | Engineering | Survey
701 B Street, Suite 800 San Diego, CA 92101
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COUNTY OF SAN DIEGO
SOUTH SANTA FE AVENUE

HYDROLOGY MAP
PROPOSED CONDITIONS
EXHIBIT C – 1 OF 3

APPENDIX K

DRAINAGE STUDY FOR VISTA HANNALEI

DRAINAGE STUDY
FOR
VISTA HANNALEI
(FINAL ENGINEERING)

Job Number 19253-A

October 14, 2020
Revised: January 18, 2021
Revised: August 23, 2021
Revised: October 19, 2021
Revised: December 16, 2021
Revised: February 22, 2023
Revised: April 14, 2023

RICK ENGINEERING COMPANY

RICK ENGINEERING COMPANY

RICK ENGINEERING CO

RICK
ENGINEERING COMPANY

DRAINAGE STUDY

FOR

VISTA HANNALEI

(FINAL ENGINEERING)

Job Number 19253-A

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October 14, 2020
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Revised: February 22, 2023
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Table of Contents

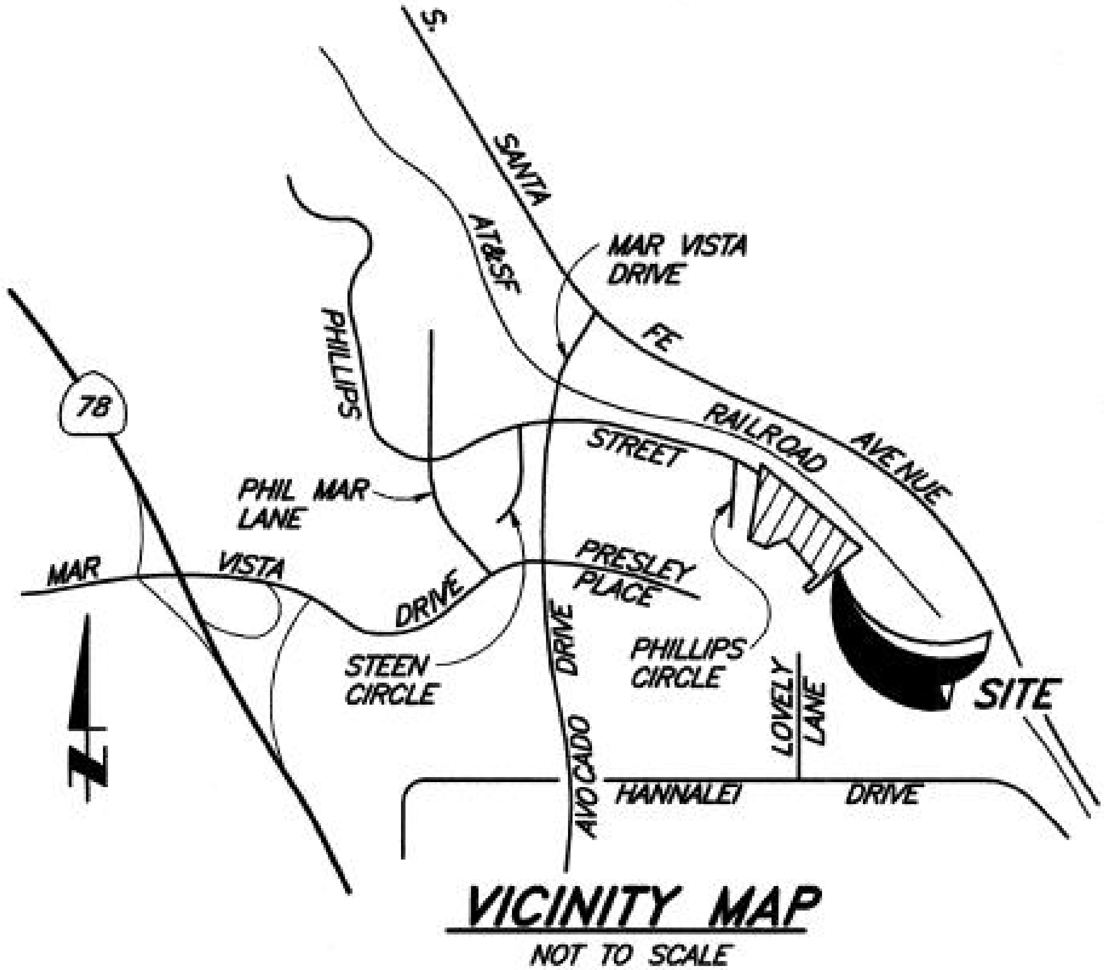
1.0 INTRODUCTION

Vista Hannalei is a residential development located in the City of Vista, approximately 800 linear feet north of Hannalei Drive and approximately 0.6 miles east of State Route 78. The project proposes 44 dwelling units, roadway features, and an emergency access road. This emergency access road connects to an existing private driveway that extends south to intersect Hannalei Drive. This private driveway will also be widened and refinished. This residential development will be constructed on varying slopes and therefore, soil will need to be imported and compacted to stabilize the foundation. Two biofiltration with partial retention BMPs (i.e. BMP-B & BMP-C) and one underground vault and Modular Wetland System (MWS) combination (i.e. BMP-A) will be used for storm water pollutant control, hydromodification management control, and flood control detention for drainage from the project site. The purpose of this report is to evaluate the impacts to any existing drainage conveyance networks as a result of the proposed project development.

The existing project site is comprised of a short grass field with a single residential property located within the site at the top of the slope. Approximately 2.5 acres of land off-site drains westerly onto a 0.8 acre private driveway that extends south and intersects Hannalei Drive. Runoff from Basin B (2.2 acres) of the project site flows north overland and over a cut fill slope into an earthen swale adjacent to the railroad. It then flows easterly until it is intercepted by a catch basin and conveyed into the existing storm drain network. Runoff from Basin A (4.2 acres) also flows north overland and down the cut fill slope where it is then conveyed westerly via earthen swale adjacent to the railroad and into an earthen ditch. An existing 36-inch Reinforced Concrete Pipe (RCP) conveys run-on from an off-site area across the railroad tracks and also discharges into the earthen ditch. This ditch flows approximately 900 linear feet easterly around the existing baseball field and into the existing storm drain system via catch basin. Drainage from the private driveway flows southerly by concrete ditch and continues easterly once it is intercepted by Hannalei Drive until it flows into the existing storm drain network via curb inlet. This is the same storm drain network that receives flow from the earthen ditch to the north.

The proposed drainage characteristics are similar to the existing drainage characteristics in that a majority of the runoff still flows northeasterly and into the earthen ditch, while a similar amount of runoff still flows north and into the earthen swale flowing west. Post-project Basin's A & E reflect the area of pre-project Basin A, while post-project Basin's B, C, & D reflect the area of pre-project Basin B. Runoff from Basin A (2.8 acres) is first treated within BMP-A, an underground vault and MWS combination. Basin E (0.9 acres) consists of pervious slope draining in a north easterly direction and ultimately drains to the earthen ditch. At the western end of the site, runoff from Basin B (1.3 acres) and Basin C (1.1 acres) is first treated through BMP-B and BMP-C, respectively, before being discharged onto Phillips Street. Both BMPs are biofiltration with partial retention and flood control detention basins. The remaining runoff from Basin D (0.2 acres) will not be treated for pollutant control requirements and is offset by BMP-F, a Modular Wetlands System. This Modular Wetlands System is sized to treat an existing upstream, off-site impervious area that is greater than the impervious area located in Basin D. Basin E contains no impervious area and is self-mitigating per section 5.2.1 of the City of Vista BMP Design Manual.

Figure 1-1: Vicinity Map



DECLARATION OF RESPONSIBLE CHARGE

I hereby declare that I am the engineer of work for this project. That I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with current standards.

I understand that the check of the project drawings and specifications by the County of San Diego is confined to a review only and does not relieve me, as engineer of work, of my responsibilities for project design.

Brendan Hastie

Brendan Hastie R.C.E #65809, Exp. 9/23

2.0 HYDROLOGY

2.1 CRITERIA

The hydrologic conditions were analyzed in accordance with the County of San Diego's design criteria.

Design Storm:	100-year, 6-hour
100-Year 6-Hour Precip (inches):	P = 3.25 inches

June 2003 San Diego County *Hydrology Manual* Criteria (unit-less) (See Appendix C)

Soil Type:	C and D (See Map Pocket 1)

Intensity-Duration-Frequency (I-D-F) Curves within the June 2003 County of San Diego *Hydrology Manual* (inches per hour)

2.2 RATIONAL METHOD

To calculate the flow rates for post-project Basins D and E, the Rational Method equation was used. It should be noted that The Modified Rational Method was used to calculate an accurate Time of Concentration for Basin A through the street and into BMP-A, Basin B through the street and into BMP-B and Basin C through the street and into BMP-C. For each of the other basins, a 5 minute time of concentration was assumed because the areas are significantly smaller compared to Basin A, B and C (post-project). The Rational Method equation is defined by the following equation.

$$Q_{\text{peak, x-year event}} = C * I_{\text{x-year event}} * A$$

Where:

$Q_{\text{peak, x-year event}}$ = peak flow rate for a design storm event (i.e. 10-year, 50-year, etc.) (cfs)
C = the area-weighted runoff coefficient (see runoff coefficient criteria in section 2.1)
$I_{\text{x-year event}}$ = rainfall intensity (see intensity criteria in section 2.1)
A = tributary area to a point of interest (acres)

Weighted runoff coefficients are calculated, where appropriate, based on a percentage of the runoff coefficients for 100% Impervious Area (0.90) and 0% Impervious area (0.35) for Type D Soils, which is calculated based on the following equation:

$$C_{\text{weighted}} = 0.90 * (\text{\% Impervious Area}) + 0.35 * (1 - \text{\% Impervious Area})$$

2.3 MODIFIED RATIONAL METHOD

To calculate the flow rates for Basins A & B (pre-project) and Basin A, B and C (post-project), a Modified Rational Method analysis was performed in accordance with the methodology presented in the June 2003 County of San Diego *Hydrology Manual* to determine pre- and post-project 100-year peak discharge rates for watersheds less than 1 square-mile. The Advanced Engineering Software (AES) Rational Method computer program was used to perform these calculations. The hydrologic model is developed by creating independent node-link models of each interior drainage basin and linking these sub-models together at confluence points. The program has the capability to perform calculations for 15 hydrologic processes. These processes are assigned code numbers that appear in the results. The code numbers and their significance are as follows:

Code 1: Confluence analysis at a node
Code 2: Initial subarea analysis
Code 3: Pipe flow travel time (computer-estimated pipe sizes)
Code 4: Pipe flow travel time (user-specified pipe size)
Code 5: Trapezoidal channel travel time
Code 6: Street flow analysis through a subarea
Code 7: User-specified information at a node
Code 8: Addition of the subarea runoff to mainline
Code 9: V-Gutter flow thru subarea
Code 10: Copy main-stream data onto a memory bank
Code 11: Confluence a memory bank with the main-stream memory
Code 12: Clear a memory bank
Code 13: Clear the main-stream memory
Code 14: Copy a memory bank onto the main-stream memory
Code 15: Hydrologic data bank storage functions

In order for the program to perform the hydrologic analysis; base information for the study area is required. This information includes the land uses, drainage facility locations, flow patterns, drainage basin boundaries, and topographic elevations. The rainfall data, runoff coefficients, and soils information were obtained from the June 2003, County of San Diego *Hydrology Manual*.

2.4 RESULTS

The 100-year Modified Rational Method and Rational Method calculations for pre- and post-project conditions are provided in Appendix A and Appendix B, respectively, and the associated hydrologic drainage exhibits are located in Map Pockets 1 and 2. A summary of the results for contributing areas are listed in the following tables:

Table 1- Hydrologic Summary Table (Pre-project)

Basin	Watershed Area (acres)	Time of Concentration (min)	100-Year Peak Flow Rate (cfs)
A	4.2	11.0	7.4
B	2.2	8.0	4.9
F[1]	2.1	12.8	4.9
TOTAL:	**8.5**		**17.2**

Table 2- Hydrologic Summary Table (Post-project)

Basin	Watershed Area (acres)	Time of Concentration (min)	Undetained 100-Year Peak Flow Rate (cfs)	Detained 100-Year Peak Flow Rate (cfs)
A	2.8	10.0	11.3	6.7
E	0.9	5.0	2.7	
B	1.3	7.8	4.9	2.7
C	1.1	8.0	4.4	
D	0.2	5.0	1.7	
F[1]	2.3	12.7	5.7	5.7
TOTAL:	**8.6**			**15.1**

100-YEAR DETAINED PEAK FLOW TO EXISTING CHANNEL

Table 3 – Peak Flowrate for Confluence of Outfall A and Outfall D at POC-1

	Pre-Project	Post-Project
Area (ac)	16.1	15.6
Time of Concentration (min)	14.6	14.6
100-Year Peak Flow Rate	37.8	36.9[2]

([1]): Flow Rate calculated using the Modified Rational Method to Outfall C

([2]): Flow Rate from Outlet A uses mitigated peak flows when conferencing with Outlet D. See Appendix A & B for confluence calculations.

3.0 HYDRAULICS

The 100-year post-project peak flow rates determined using the methodology described in Section 2 were used to evaluate the hydraulic capacity for the six inlets leading into each of the three BMPs. Hydraulic analysis of the proposed outfall pipe from BMP-A, size of the proposed energy dissipater (ie. Rip-rap) for that outfall pipe discharging into the earthen ditch has been provided in Appendix G.

3.1 INLET SIZING

An inlet design calculation was completed using a computer program based on Equation 1 for inlets on grade and Equation 2 inlets in sump:

Type A Inlets on a Grade

$$Q = 0.7\ L\ (a + y)^{3/2} \qquad \text{(Equation 1)}$$

Where:
y = depth of flow approaching the curb inlet, in feet (ft)
a = depth of depression of curb at inlet, in feet (ft)
L = length of clear opening of inlet for total interception, in feet (ft)
Q = interception capacity of the curb inlet, in cubic feet per second (cfs)

Type B Inlets in a Sump

$$Q/L = 1.5\ \text{cfs/ft} \qquad \text{(Equation 2)}$$

Where:
Q = inlet capacity, in cubic feet per second (cfs)
L = length of clear opening of inlet for total interception, in feet (ft)

3.2 PIPE HYDRAULICS

Proposed storm drain improvements for Vista Hannalei will be analyzed using the AES Pipe Flow Hydraulics Computer Program as a part of next submittal. The program performs gradually varied flow and pressure flow profile computations and is used to calculate the hydraulic and energy grade lines. The results will be provided in an incremental and summarized form and indicate reaches of open channel and pressure flow within a given reach of pipe. The program also accounts for losses that may occur due to friction, junction structures, pipe bends, etc. The codes and an explanation of their function are as follows:

Code 1: Friction Losses
Code 2: Manhole Losses
Code 3: Pipe-Bend Losses
Code 4: Sudden Pipe-Enlargement
Code 5: Junction Losses
Code 6: Angle-Point Losses
Code 7: Sudden Pipe-Reduction
Code 8: Catch Basin Entrance Losses

The results for this AES Pipe Flow hydraulic analysis have been provided in Appendix E.

3.3 ENERGY DISSIPATER DESIGN

Energy dissipaters (i.e. riprap) at the single storm drain outfall and inflow into BMP-A will be specified using the 2014 County of San Diego *Hydraulic Design Manual*, which provides rock classifications for design velocities entering riprap outfalls.

The design velocities were determined from both the AES Pipe Flow hydraulic analyses for flow in the final reach of storm drain leading to the outfall and HEC-RAS hydraulic analysis for flow across the riprap pad immediately downstream of the outfall.

HEC-RAS cross sections will be taken at 1-foot intervals across the riprap pad in order to determine the location of the hydraulic jump that is expected to occur on the riprap pad. The flow regime after the hydraulic jump is subcritical flow at normal depth, and the flow velocity after the hydraulic jump is expected to be less than 6 feet per second. The riprap pad length was then specified based on the location of the hydraulic jump, in order to provide 5 feet (or twice the pipe diameter, whichever is greater) of length beyond the hydraulic jump. The riprap pad width is based on the 2012 Edition of the San Diego Regional Standard Drawings Book Riprap Energy Dissipation, drawing number D-40.

The dimensions and size of riprap have been provided in Appendix G.

3.4 SCOUR ANALYSIS

Normal depth analysis has been performed using Hydraulic Toolbox at sections A, B and C. The results showed that depth of flow is contained within the natural channel and would not scour the walls along the easterly edge of the property. Hence, mitigation is not required.

Refer to Appendix G for cross-section locations and detailed calculations.

4.0 DETENTION

For the detention system design, a rational method hydrologic analysis was performed to determine the 100-year peak discharge rates for the post-project condition. Detention will be provided within BMP-A, B & C to detain back flows for the 100-year storm event to pre-project conditions.

The sizing of a detention facility requires an inflow hydrograph to obtain the necessary storage volume. The modified rational method only yields a peak discharge and time of concentration and does not yield a hydrograph. In order to convert the peak discharge and time of concentration into a hydrograph, a modified rational method hydrograph synthesizing procedure was used. The modified rational method hydrograph synthesizing procedure methodology and criteria that were used are based on the Rational Method Hydrograph Procedure and Detention Basin Design, of the *San Diego County Hydrology Manual 2003*.

The 100-year hydrograph and elevation-storage-outflow rating curves were used in the HEC-1 hydrologic model to perform routing calculations for three detention systems in the project site to determine the 100-year detention volumes required for the systems to reduce the post-project peak discharge rate back to the pre-project peak discharge rate for the storm event.

The 100-year, 6-hour post-project peak discharge rates were routed using the HEC-1 hydrologic model to determine the detention volume required for the basins to reduce the post-project peak discharge rates back to the pre-project peak discharge rates. The HEC-1 detention analyses is provided in Appendix H.

5.0 CONCLUSION

Post-project runoff will be treated for water quality by the two biofiltration with partial retention BMPs, underground vault and Modular Wetland System combination and single Modular Wetland System. The two biofiltration basins and underground will also detain the 100-year 6-hour peak flows back to less than pre-project conditions while also satisfying the hydromodification management requirements per the City of Vista BMP Design Manual. Based on the results of this drainage analysis, it has been determined that the proposed residential development and driveway widening will not adversely impact the existing watershed or drainage patterns. Please refer to the report titled, "Priority Development Project Storm Water Quality Management Plan for Vista Hannalei," dated October 14, 2020 prepared by Rick Engineering Company (Job No. 19253-A), for more information on water quality and hydromodification management.

APPENDIX B

HYDROLOGY ANALYSIS
100 YEAR, RATIONAL METHOD AND MODIFIED RATIONAL METHOD
(POST-PROJECT)

```
************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2014 Advanced Engineering Software (aes)
             Ver. 21.0 Release Date: 06/01/2014  License ID 1261

                           Analysis prepared by:

                          RICK ENGINEERING COMPANY
                              5620 Friars Road
                        San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* J-19253A VISTA HANNALEI                                              *
* 100-YR, 6-HR POST-PROJECT CONDITION FOR BASIN A                         *
*                                                                         *
 **************************************************************************

  FILE NAME: VHAPST.RAT
  TIME/DATE OF STUDY: 14:10 01/12/2021
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.250
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======   ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   13.0      8.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    105.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .7100
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    86.00
  UPSTREAM ELEVATION(FEET) =    546.00
  DOWNSTREAM ELEVATION(FEET) =    545.50
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.091
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    52.44
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.539
  SUBAREA RUNOFF(CFS) =      0.54
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.54

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  545.50  DOWNSTREAM ELEVATION(FEET) =  541.00
  STREET LENGTH(FEET) =   468.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 13.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   8.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0180

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.19
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   12.22
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.02
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.70
  STREET FLOW TRAVEL TIME(MIN.) =   3.87   Tc(MIN.) =    9.96
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.491
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7350
  S.C.S. CURVE NUMBER (AMC II) =  92
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.733
  SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    5.25
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       5.64

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  13.00
  FLOW VELOCITY(FEET/SEC.) =  2.11   DEPTH*VELOCITY(FT*FT/SEC.) =   0.77
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =     554.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.491
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7350
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7341
  SUBAREA AREA(ACRES) =    1.40   SUBAREA RUNOFF(CFS) =    5.65
  TOTAL AREA(ACRES) =        2.8   TOTAL RUNOFF(CFS) =      11.29
  TC(MIN.) =    9.96
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.8  TC(MIN.) =      9.96
  PEAK FLOW RATE(CFS)   =      11.29
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX H

HEC-1 DETENTION ANALYSIS

```
1***************************************
**************************************
 *                                     *                                                   *
 *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                   *    U.S. ARMY CORPS OF ENGINEERS
 *
 *              JUN   1998             *                                                   *    HYDROLOGIC ENGINEERING CENTER
 *
 *           VERSION 4.1               *                                                   *          609 SECOND STREET
 *
 *                                     *                                                   *       DAVIS, CALIFORNIA 95616
 *
 *  RUN DATE   14JAN21  TIME  07:43:45   *                                                   *           (916) 756-1104
 *
 *                                     *                                                   *
 *
 ***************************************
**************************************


                                   X     X  XXXXXXX   XXXXX          X
                                   X     X  X        X     X        XX
                                   X     X  X        X               X
                                   XXXXXXX  XXXX     X       XXXXX   X
                                   X     X  X        X               X
                                   X     X  X        X     X         X
                                   X     X  XXXXXXX   XXXXX         XXX


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

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

1                                                          HEC-1 INPUT                                                PAGE  1

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

 *** FREE ***
                         *DIAGRAM
             1           ID   VISTA HANNALEI, J-19253-A BIOFILTRATION BASIN A
             2           ID   100-YEAR DETENTION ANALYSES - PRELIMINARY ENGINEERING
             3           ID   JANUARY 12, 2020 - FILE NAME: VHA00.HC1
             4           IT       1 01JAN90    1200    1000
             5           IO       5       0

             6           KKBasinA.hc1
             7           KM   RUN DATE   1/12/2021
             8           KM   RATIONAL METHOD HYDROGRAPH PROGRAM
             9           KM   COPYRIGHT 1992, 2014, RICK ENGINEERING COMPANY
            10           KM   6HR RAINFALL IS 3.25 INCHES
            11           KM   RATIONAL METHOD RUNOFF COEFFICIENT IS 0.735
            12           KM   RATIONAL METHOD TIME OF CONCENTRATION IS 10 MIN.
            13           KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
            14           KM   IT 2 01JAN90 1200 200
            15           BA  0.0044
            16           IN      10 01JAN90    1155
            17           QI       0     0.4     0.4     0.4     0.4     0.5     0.5     0.5     0.5     0.5
            18           QI     0.5     0.6     0.6     0.6     0.7     0.7     0.7     0.8     0.9       1
            19           QI     1.1     1.3     1.5     2.2     3.1    11.3     1.8     1.2     0.9     0.8
            20           QI     0.7     0.6     0.6     0.5     0.5     0.4     0.4       0       0       0
            21           QI       0       0       0       0       0       0       0       0
                         *

            22           KK   DET-A
            23           KO       0       0       0       0      21
            24           RS       1    STOR      -1
            25           SV       0   0.044   0.087   0.131   0.175   0.218   0.262   0.306   0.349   0.393
```

```
          26          SV   0.437   0.480   0.524     0.5
          27          SQ       0   0.015   0.021   0.025   0.029   0.033   0.036   0.065   0.078   0.089
          28          SQ   0.894   2.980   4.063     32.
          29          SE       0     1.0     2.0     3.0     4.0     5.0     6.0     7.0     8.0     9.0
          30          SE    10.0    11.0    12.0    13.0
                      *
          31          ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

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

     6    BasinA.h
                 V
                 V
    22       DET-A

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
***************************************
 *                                       *                                                    *
 *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                    *    U.S. ARMY CORPS OF ENGINEERS
 *
 *             JUN   1998                *                                                    *    HYDROLOGIC ENGINEERING CENTER
 *
 *          VERSION 4.1                  *                                                    *          609 SECOND STREET
 *
 *                                       *                                                    *       DAVIS, CALIFORNIA 95616
 *
 *  RUN DATE   14JAN21  TIME  07:43:45   *                                                    *           (916) 756-1104
 *
 *                                       *                                                    *
 *
 *****************************************
***************************************




                           VISTA HANNALEI, J-19253-A BIOFILTRATION BASIN A
                           100-YEAR DETENTION ANALYSES - PRELIMINARY ENGINEERING
                           JANUARY 12, 2020 - FILE NAME: VHA00.HC1

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

      IT         HYDROGRAPH TIME DATA
                        NMIN          1  MINUTES IN COMPUTATION INTERVAL
                       IDATE     1JAN90  STARTING DATE
                       ITIME       1200  STARTING TIME
                          NQ       1000  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE     2JAN90  ENDING DATE
                      NDTIME       0439  ENDING TIME
                       ICENT         19  CENTURY MARK

                   COMPUTATION INTERVAL     .02 HOURS
                        TOTAL TIME BASE   16.65 HOURS

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


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
***
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              **************
              *            *
   22 KK      *     DET-A  *
              *            *
              **************

   23 KO         OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
                       IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                        IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2       1000  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT       .017  TIME INTERVAL IN HOURS

1
                                             RUNOFF SUMMARY
                                         FLOW IN CUBIC FEET PER SECOND
                                      TIME IN HOURS,  AREA IN SQUARE MILES

                                            PEAK   TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM     TIME OF
           OPERATION       STATION          FLOW     PEAK                                            AREA      STAGE     MAX STAGE
+                                                               6-HOUR      24-HOUR      72-HOUR

           HYDROGRAPH AT
+                         BasinA.h           11.     4.08          1.           0.           0.       .00

           ROUTED TO
+                            DET-A            4.     4.08          0.           0.           0.       .00
+                                                                                                                 12.00        4.10


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

```
    DET-A    11200  1JAN90 0 1 11000      .004
          .200         .200         .202         .204         .208         .212         .217         .221         .226
.230
          .234         .238         .242         .246         .250         .254         .258         .261         .265
.268
          .271         .274         .278         .281         .284         .286         .289         .292         .295
.297
          .300         .302         .305         .307         .310         .312         .314         .317         .319
.322
          .325         .328         .332         .335         .339         .343         .347         .351         .354
.358
          .362         .365         .368         .372         .375         .378         .381         .384         .387
.390
          .392         .395         .398         .400         .403         .405         .408         .410         .412
.414
          .416         .418         .421         .422         .424         .426         .428         .430         .432
.433
          .435         .437         .438         .440         .441         .443         .444         .446         .447
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          .449         .451         .452         .453         .454         .455         .457         .458         .460
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          .464         .466         .469         .471         .474         .477         .480         .483         .486
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          .492         .494         .497         .499         .502         .504         .507         .509         .511
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          .516         .518         .520         .522         .524         .526         .528         .530         .532
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          .538         .540         .544         .547         .550         .554         .557         .561         .564
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          .571         .574         .577         .581         .584         .586         .589         .592         .595
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          .600         .602         .605         .607         .609         .612         .614         .617         .619
.622
          .625         .628         .632         .635         .639         .643         .647         .651         .656
.660
          .665         .669         .674         .679         .684         .690         .695         .700         .706
.712
          .717         .723         .729         .736         .742         .748         .754         .761         .767
.774
          .781         .788         .795         .802         .809         .816         .823         .831         .839
.847
          .855         .864         .873         .883         .892         .916         .941         .966         .991
1.016
         1.040        1.064        1.087        1.111        1.134        1.157        1.181        1.209        1.239
1.272
         1.307        1.344        1.384        1.425        1.469        1.514        1.561        1.611        1.664
1.719
         1.776        1.835        1.897        1.960        2.025        2.092        2.183        2.322        2.505
2.729
         2.986        3.140        3.316        3.514        3.733        3.971         .000         .000         .000
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.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
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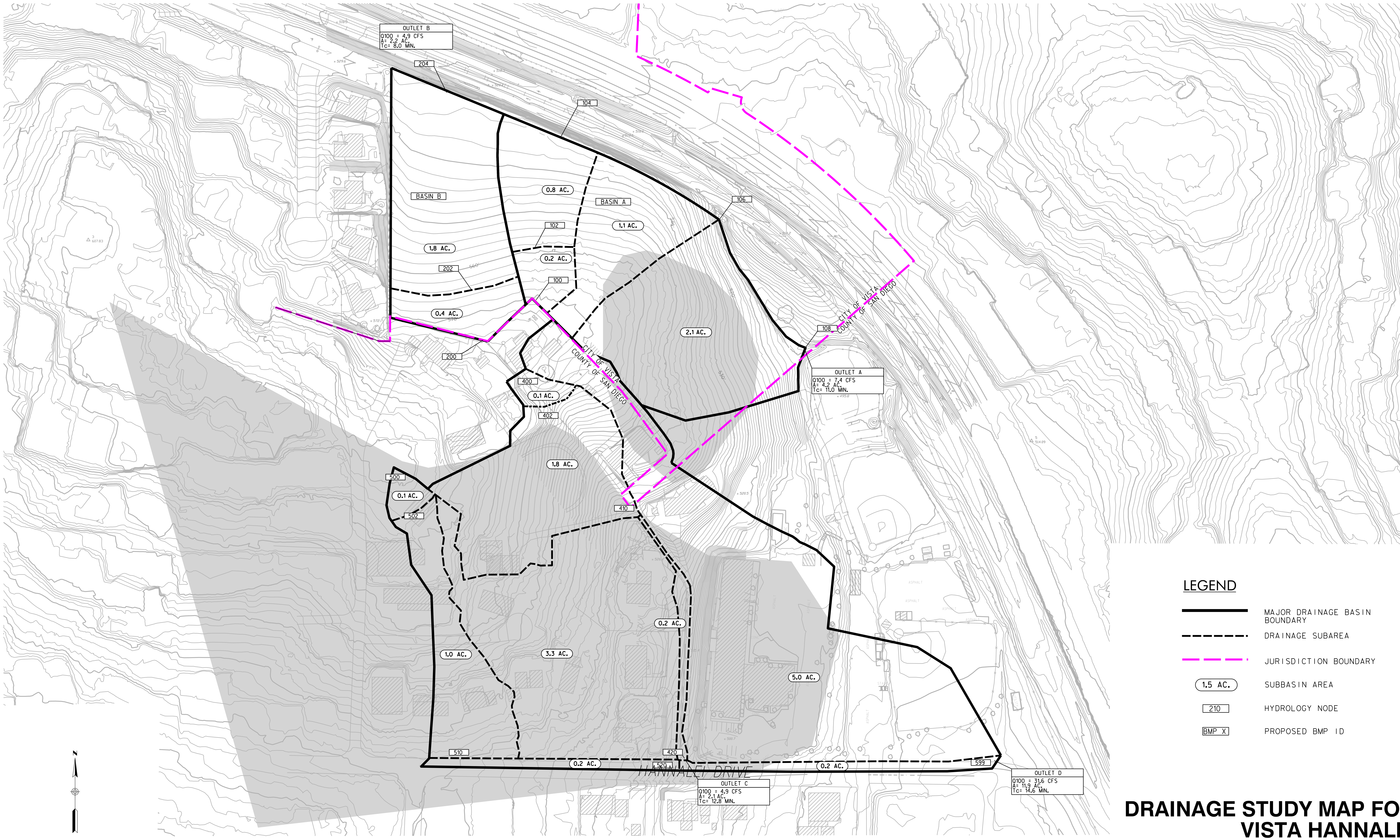
MAP POCKET 1

DRAINAGE STUDY MAP FOR VISTA HANNALEI
PRE-PROJECT



80 40 0 80 160 240

GRAPHIC SCALE 1" = 80'

DRAINAGE STUDY MAP FOR VISTA HANNALEI (PRE-PROJECT)

Date: October 14, 2020
Revised: April 14, 2023

J-19253-A

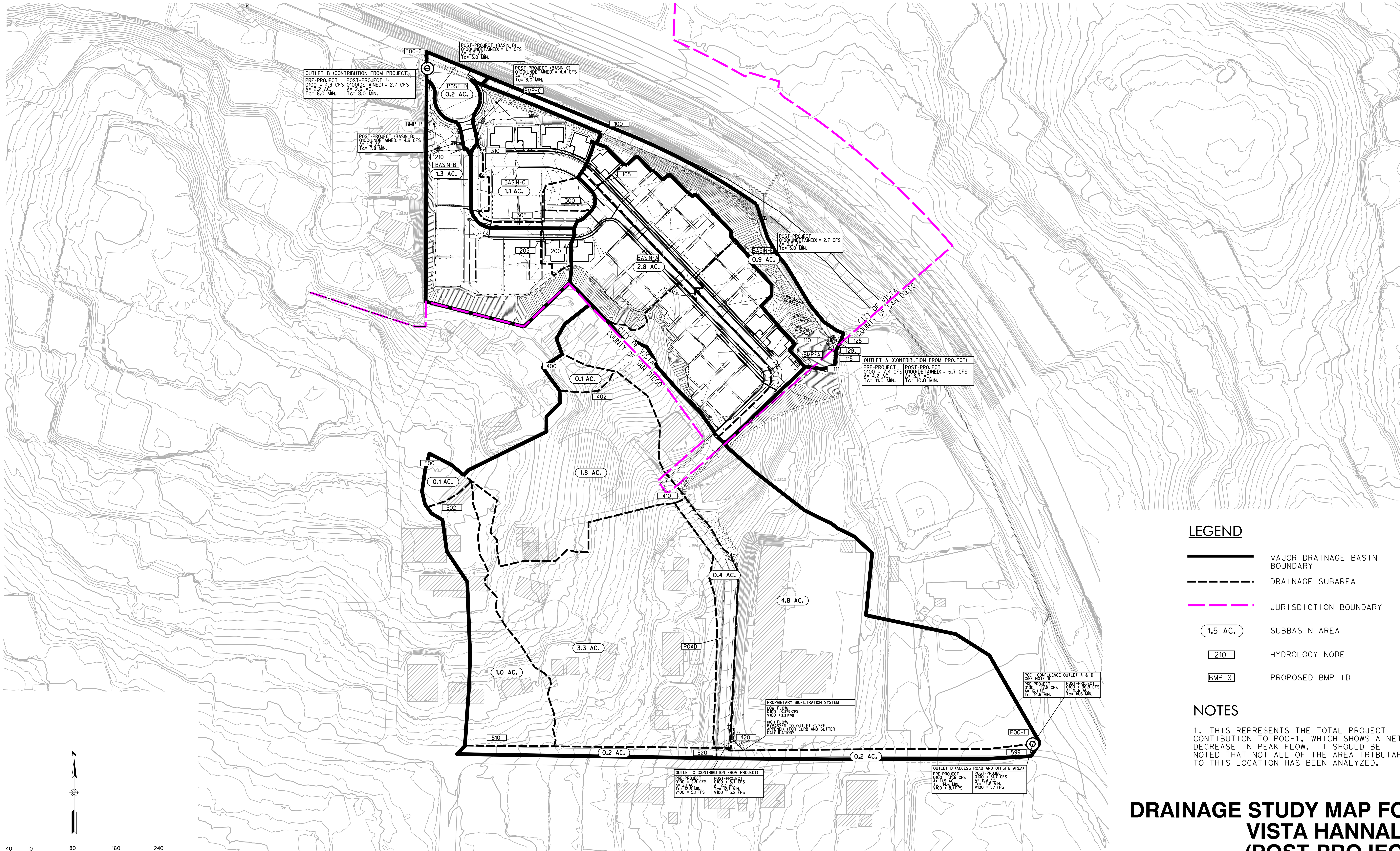
RICK ENGINEERING COMPANY
San Diego
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619-291-0707
(FAX) 619-291-4165
rickengineering.com
Riverside - Orange - Sacramento - San Luis Obispo - Phoenix - Tucson - Denver

J-19253-A

NOT FOR CONSTRUCTION - EXHIBIT FOR DRAINAGE STUDY ONLY

MAP POCKET 2

DRAINAGE STUDY MAP FOR VISTA HANNALEI
POST-PROJECT



NOTES

1. THIS REPRESENTS THE TOTAL PROJECT CONTIBUTION TO POC-1, WHICH SHOWS A NET DECREASE IN PEAK FLOW. IT SHOULD BE NOTED THAT NOT ALL OF THE AREA TRIBUTARY TO THIS LOCATION HAS BEEN ANALYZED.

80 40 0 80 160 240

GRAPHIC SCALE 1" = 80'

DRAINAGE STUDY MAP FOR VISTA HANNALEI (POST-PROJECT)

Date: October 14, 2020
Revised: April 14, 2023

J-19253-A

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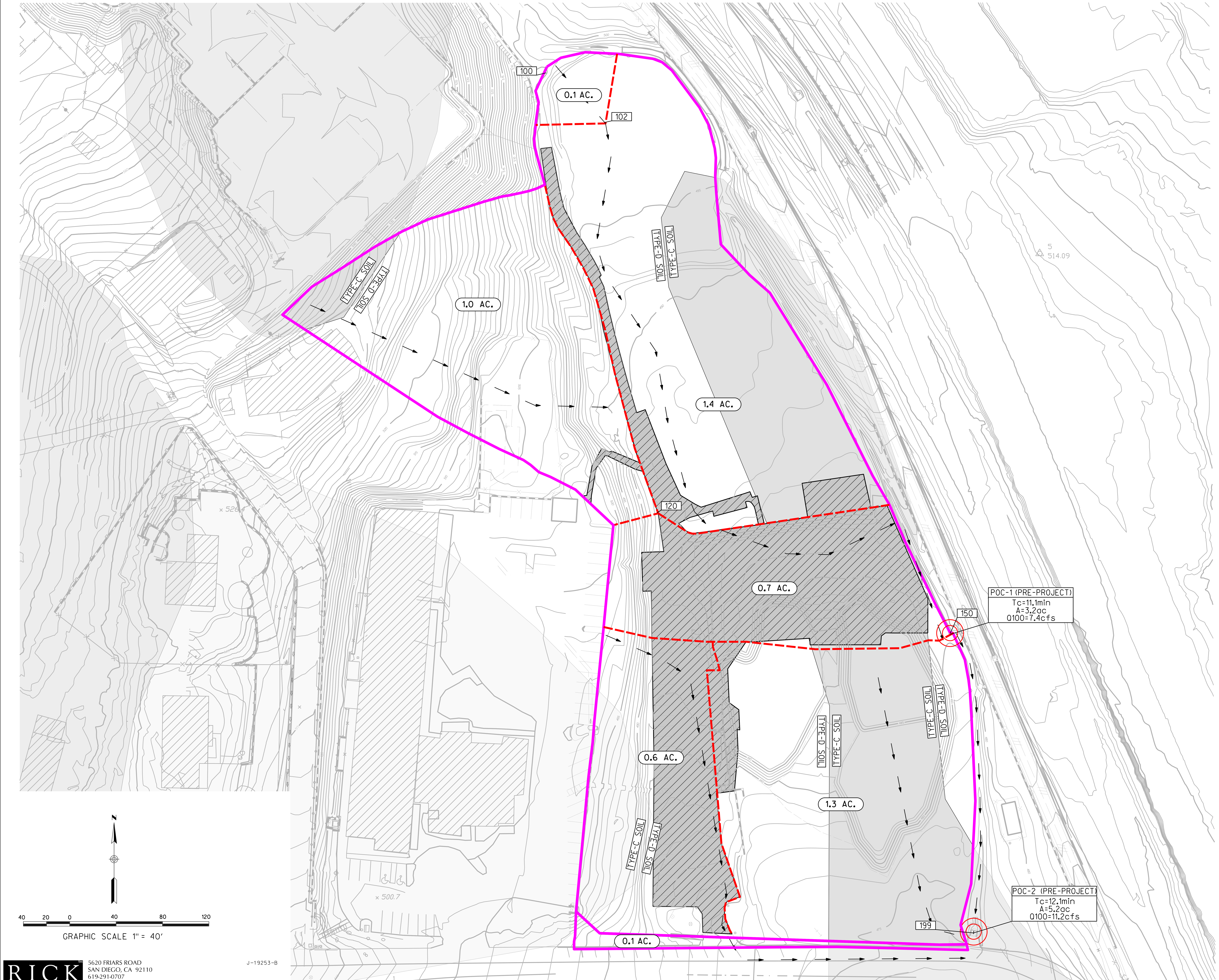
MAP POCKET 1

DRAINAGE STUDY MAP FOR VISTA II BALLFIELDS
PRE-PROJECT



40 20 0 40 80 120

GRAPHIC SCALE 1" = 40'

LEGEND

	MAJOR DRAINAGE BASIN BOUNDARY
	DRAINAGE SUBAREA
X.X AC.	SUBBASIN AREA
XXX	HYDROLOGY NODE
	EXISTING IMPERVIOUS AREA
	POINT OF COMPLIANCE (POC)
	TYPE 'C' HYDROLOGIC SOIL GROUP

DRAINAGE STUDY MAP FOR VISTA II BALLFIELDS (PRE-PROJECT)

Date: April 7, 2023
Revised: October 13, 2023
Revised: February 14, 2024

J-19253-B

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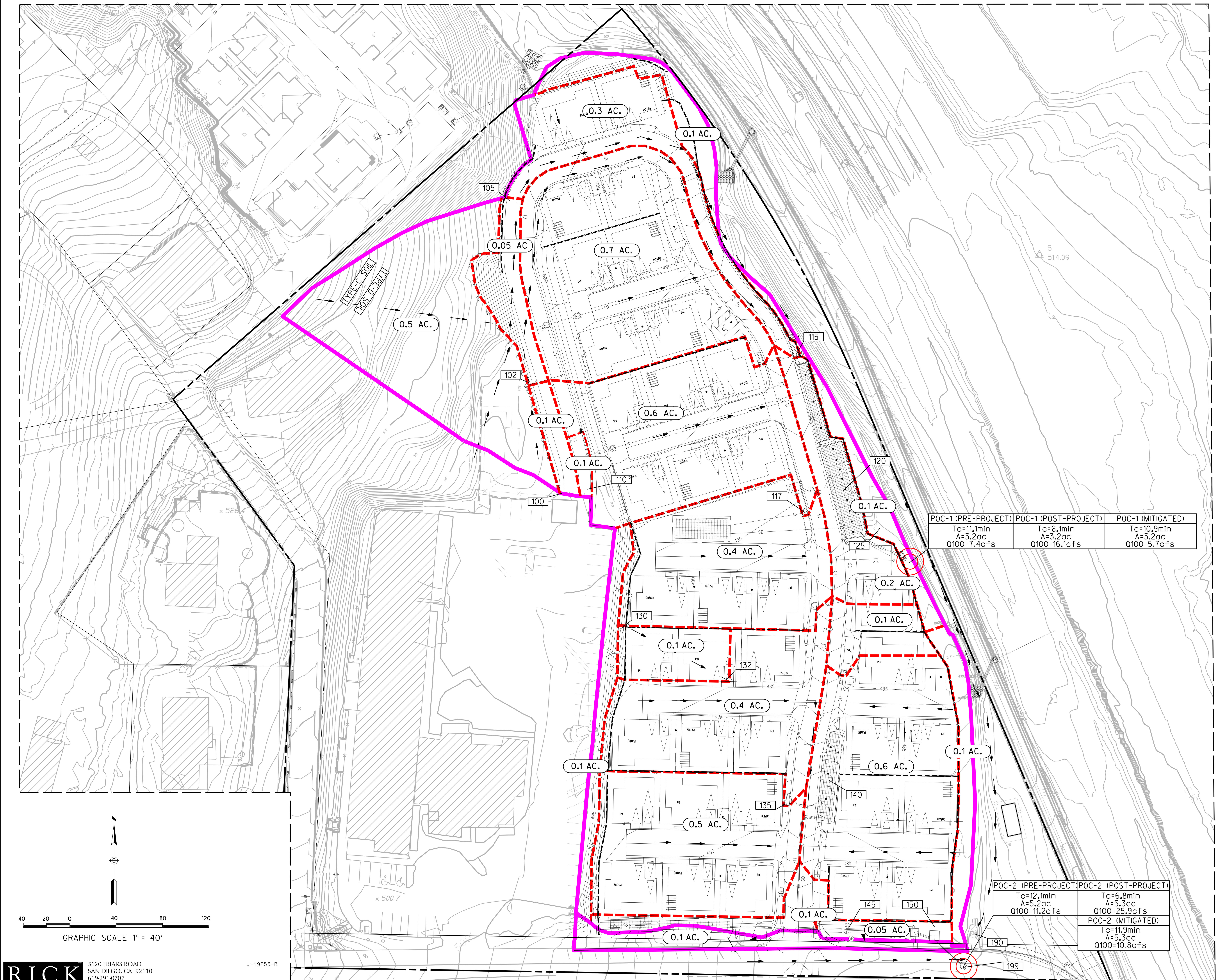
J-19253-B

NOT FOR CONSTRUCTION - EXHIBIT FOR DRAINAGE STUDY ONLY

MAP POCKET 2

DRAINAGE STUDY MAP FOR VISTA II BALLFIELDS

POST-PROJECT



POC-1 (PRE-PROJECT)	POC-1 (POST-PROJECT)	POC-1 (MITIGATED)
Tc=11.1min A=3.2ac Q100=7.4cfs	Tc=6.1min A=3.2ac Q100=16.1cfs	Tc=10.9min A=3.2ac Q100=5.7cfs

POC-2 (PRE-PROJECT)	POC-2 (POST-PROJECT)
Tc=12.1min A=5.2ac Q100=11.2cfs	Tc=6.8min A=5.3ac Q100=25.9cfs
	POC-2 (MITIGATED)
	Tc=11.9min A=5.3ac Q100=10.8cfs

LEGEND

- MAJOR DRAINAGE BASIN BOUNDARY
- DRAINAGE SUBAREA
- X.X AC. — SUBBASIN AREA
- XXX — HYDROLOGY NODE
- POINT OF COMPLIANCE (POC)

DRAINAGE STUDY MAP FOR VISTA II BALLFIELDS (POST-PROJECT)

Date: April 7, 2023
Revised: October 13, 2023
Revised: February 27, 2024

J-19253-B

RICK ENGINEERING COMPANY
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J-19253-B

NOT FOR CONSTRUCTION - EXHIBIT FOR DRAINAGE STUDY ONLY

6.0 General Requirements

- Use this attachment to document all proposed (1) self-mitigating, (2) de minimis, and (3) self-retaining DMAs. Indicate under "DMA Compliance Option" below which design options will be used to satisfy structural performance requirements for one or more DMA.

DMA Compliance Option	Required Sub-attachments or Printouts	BMPDM Design Resources
☒ **Self-mitigating**	• Sub-attachment 6.1	• BMPDM Section 5.2.1
☐ **De minimis**	• Sub-attachment 6.2	• BMPDM Section 5.2.2
☐ **Self-retaining**[1]	• Sub-attachment 6.3	• BMPDM Section 5.2.3 (all options)
<u>**SSD-BMP Type(s)**</u>		
☐ **Impervious Area Dispersion**	• DCV calculations from SSD-BMP tool • Dispersion Areas calculations from SSD-BMP tool	• Fact Sheet SD-B (Appendix E.8) • Appendix I
☐ **Tree Wells**	• DCV calculations from SSD-BMP tool • Tree Well calculations from SSD-BMP tool	• Fact Sheet SD-A (Appendix E.7) • Appendix I

- Submit this cover page and all "Required Sub-attachments or Printouts" listed for each selected DMA compliance option.
- See the BMPDM sections and appendices listed under "BMPDM Design Resources" for additional explanation of design requirements. Each constructed feature must <u>fully</u> satisfy the requirements described in these resources, and any other guidance identified by the County.
- <u>DMA Exhibits and Construction Plans</u>: DMAs, features, and BMPs identified and described in this attachment must be shown on DMA Exhibits and all applicable construction plans submitted for the project. See Attachment 2 for additional instruction on exhibits and plans.

[1] If "Self-retaining" is selected, also choose the types of Significant Site Design BMPs (SSD-BMPs) to be used. SSD-BMPs are Site Design BMPs that are sized and constructed to fully satisfy all applicable Structural Performance Standards for a DMA.

6.1 Self-mitigating DMAs (complete this page once for ALL self-mitigating DMAs)

Self-mitigating DMAs consist of natural or landscaped areas that drain directly offsite or to the public storm drain system. These DMAs are excluded from DCV calculations.

- Provide the information requested below for each proposed self-mitigating DMA. Add rows or copy the table if additional entries are needed.

DMA #	*a. DMA Area (ft²)*	*Incidental Impervious Area*		*Permit # and Sheet #*
		b. Size(ft²)	*c. % (b/a*100)*	
SM-1	20894	0	0%	
SM-2	8088	0	0%	
SM-3	3169	0	0%	
SM-4	3903	0	0%	

- "DMA #", "DMA Area", and "Permit # and Sheet #" are required for all DMAs listed.
- "Incidental Impervious Area" calculations are required only where applicable (see below).
- Each self-mitigating DMA must <u>fully</u> satisfy all design requirements and restrictions described in BMPDM Section 5.2.1 and any other guidance or instruction identified by the County. Check the boxes below to confirm that all required conditions are satisfied <u>for every DMA listed</u>.

☒ Each DMA is hydraulically separate from other DMAs that contain permanent storm water pollutant control BMPs.

<u>Natural and Landscaped Areas</u>

☒ Each DMA consists solely of natural or landscaped areas, except for incidental impervious areas (see below).

☒ Each area drains directly offsite or to the public storm drain system.

☒ Soils are undisturbed native topsoil, or disturbed soils that have been amended and aerated to promote water retention characteristics equivalent to undisturbed native topsoil.

☒ Vegetation is native and/or non-native/non-invasive drought tolerant species that do not require regular application of fertilizers and pesticides.

<u>Incidental Impervious Areas (if applicable; see above)</u>

Minor impervious areas may be permitted within the DMA if they satisfy the following criteria:

☒ They are not hydraulically connected to other impervious areas (unless it is a storm water conveyance system such as a brow ditch).

☒ They comprise less than 5% of the total DMA. Calculate the % incidental impervious area in the table above (c= b/a). DMAs are <u>not</u> self-mitigating if this area is 5% or greater.

7.0 General Requirements

- Submit this cover page and all required Sub-attachments for all structural BMPs proposed for the project.
- See the BMPDM sections and appendices listed under "BMPDM Design Resources" in the table below for additional explanation of design requirements. Constructed features must fully satisfy the requirements described in these resources, and any other guidance identified by the County.
- PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management. Completion of SWQMP Attachment 8 is also required for these BMPs.
- DMA Exhibits and Construction Plans: DMAs, features, and BMPs identified and described in this attachment must be shown on DMA Exhibits and all applicable construction plans submitted for the project. See Attachment 2 for additional instruction on exhibits and plans.
- Structural BMP Certification. All structural BMPs documented this attachment and in Attachment 8 must be certified by a registered engineer in Sub-attachment 7.1.
- Structural BMP Verification. Structural BMP installation must be verified by the County at the completion of construction. Applicants must complete an Installation Verification Form (Attachment 10).

Sub-attachments (check all that are completed)	**Requirement**	**BMPDM Design Resources**
☒ **7.1: Preparer's Certification**	Required	• N/A
☒ **7.2: Structural BMP Strategy**	Required	• BMPDM Sections 5.1., 5.3, 5.4, and Chapter 6 • BMPDM Appendix E (pages E-78 through E-210)
☒ **7.3: Structural BMP Checklist(s)**	Required	
☒ **7.4: Stormwater Pollutant Control Worksheet Calculations**	Required	• BMPDM Appendix B
☒ **7.5: Identification and Narrative of Receiving Water and Pollutants of Concern**	Required if flow-thru BMPs are proposed	• N/A

7.1 Engineer of Work Certification for Structural BMPs

Project Name Vista II

Permit Application Number PDS2022-TM-5647/PDS2022- MUP-22-011

CERTIFICATION

I hereby declare that I am the Engineer in Responsible Charge of design of structural storm water best management practices (BMPs) for this project, and that I have exercised responsible charge over the design of the BMPs as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the PDP requirements of the County of San Diego BMP Design Manual, which is a design manual for compliance with local County of San Diego Watershed Protection Ordinance (Sections 67.801 et seq.) and regional MS4 Permit (California Regional Water Quality Control Board San Diego Region Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100) requirements for storm water management. I have read and understand that the County of San Diego has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the BMP Design Manual.

I certify that this PDP SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this PDP SWQMP by County staff is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of structural storm water BMPs for this project, of my responsibilities for their design.

☒ In addition to the structural pollutant control BMPs described in this attachment, this certification applies to the Structural Hydromodification Management BMPs described in Attachment 8 (check if applicable).

Brendan Hastie, RCE #65809, 9/23

Engineer of Work's Signature, PE Number & Expiration Date

Brendan Hastie

Print Name

RICK Engineering Company

Company

9/30/2022

Date

Engineer's Seal:

7.2 Structural BMP Strategy

7.2.1 Narrative Strategy (Continue description on subsequent pages as necessary)

Describe the general strategy for structural BMP implementation at the project site. For pollutant control BMPs, your description must address the key points outlined in Section 5.1 of the BMP Design Manual, and the type of BMPs selected. For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate.

Two structural BMPs (BMP-A & B), are proposed for storm water pollutant control, hydromodification management flow control, and flood control detention for drainage from the project site. Flow control and pollutant control are implemented separately as vault to proprietary biofiltration.

One Modular Wetland System, BMP-B2, is proposed to treat DMA-A and DMA-B, which will be located downstream of vaults that will be sized to provide water quality, HMP, and detention volume. The modular wetland will be sized based on volume requirements to meet 92% annual capture, and water quality low flows from the vaults (BMP-A, BMP-B1) will be directed to this unit in addition to flows from DMA-B2 and B4. High flows will bypass the modular wetland via an overflow in the vault and be directed to the channel to the east of the project through a riprap protected outlet.

The compact biofiltration system (MWS) BMP-B2 is proposed to treat DMA-B1/B2 (in addition to DMA-A), and will be located downstream of the combined vault system, BMP-B1, that will be sized to provide water quality, HMP, and detention volume. Compact biofiltration system, BMP-B2, is sized to treat low flows from the vaults (DMA-A, DMA-B1/B3) in addition to DMA-2 and DMA-4. High flows will enter the MWS and be directed to an overflow structure located in the MWS which leads to a public storm drain on the southeastern corner of the project site along Hannalei Drive via private storm drain. The high flows will not be treated by the modular wetland system, and will bypass via the overflow instead.

The proposed MWS-L-8-8 was sized using the combined maximum water quality flow rates out of the stormwater vaults just below the HMP/Detention outlets. Water quality flow rates from DMA-B2 and DMA-B4 were also included in the treatment flow rate. The treatment flow rate for the MWS is shown to be greater than the combined water quality flow rate. Supporting calculations and annotated manufacturer specifications showing the treatment flow rate for the proposed BMP has been provided in Attachment 7.4 after the BMP outlet configuration/rating curve tables.

Though the attached manufacturer specifications state that the sizing is flow based, the flow rate out of each BMP correlates with the flow rate out of the vaults when the required treatment volume is stored (DCV * Storage Multiplier). Treating the maximum flow rate out of the vaults (flow out of low-flow orifices when vaults are ponded to just below HMP outlets) when the required treatment volume has been stored demonstrates 92% capture for water quality runoff.

Annotated depictions of the vault/MWS and supporting calculations for water quality flow rates and volumes can be found in Attachment 7.4.

HMP strategy and depictions showing the vaults and outlet works in conjunction with SWMM inputs can be found in Attachment 8. The vaults will pond concurrently via an intersection of 18" pipes and will sit at an equal elevation to ensure a linear stage/storage curve. The combined vault systems will each respectively drain to a single outlet structure designed to meet HMP requirements.

7.2.2 Structural BMP Summary Table (Complete for all proposed structural BMPs)

- List and provide the information requested below for all pollutant control and hydromodification management BMPs proposed for the project.
- For each BMP listed, complete the Structural BMP Checklist on the next page. Copy the Checklist as many times as needed.

BMP ID #	DMA #	DMA Area (ft²)	Structural BMP Type: Harvest and Use	Infiltration	Unlined Biofiltration	Lined Biofiltration	Flow-thru treatment	Hydromodification Management [1]	Other	Permit # and Sheet #
BMP-A1	DMA-A	108900	☐	☐	☐	☐	☐	☒	☐	
BMP-B1	DMA-B1	78408	☐	☐	☐	☐	☐	☒	☐	
BMP-B2	DMA-A/B1/B2	78408	☐	☐	☐	☐	☐	☐	☒	**Proprietary biofiltration**
			☐	☐	☐	☐	☐	☐	☐	
			☐	☐	☐	☐	☐	☐	☐	
			☐	☐	☐	☐	☐	☐	☐	
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Copy and Paste table here for additional BMPs

[1] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

7.3 Structural BMP Checklist (Complete once for each proposed structural BMP)

<table>
<tr><td>Structural BMP ID # BMP-A1</td><td colspan="4">Permit # and Sheet #</td></tr>
<tr><td colspan="5">BMP Type</td></tr>
<tr><td>Infiltration
☐ Infiltration basin (INF-1)
☐ Bioretention (INF-2)
☐ Permeable pavement (INF-3)
Unlined Biofiltration
☐ Biofiltration with partial retention (PR-1)
Lined Biofiltration
☐ Biofiltration (BF-1)
☐ Nutrient Sensitive Media Design (BF-2)
☐ Proprietary Biofiltration (BF-3)</td><td colspan="4">Harvest and Use
☐ Cistern (HU-1)
Flow-thru Treatment (describe below)
☐ With prior lawful approval to meet earlier PDP requirements
☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2]
☐ With alternative compliance
Hydromodification Management[3]
☒ Detention pond or vault
☐ Other (describe below)</td></tr>
<tr><td colspan="5">BMP Purpose</td></tr>
<tr><td>☐ Pollutant control only
☒ Hydromodification control only
☐ Combined pollutant control and hydromodification</td><td colspan="4">☐ Pre-treatment/forebay for another BMP
☐ Other (describe below)</td></tr>
<tr><td colspan="5">BMP Verification (See BMPDM Section 8.3)</td></tr>
<tr><td>Provide name and contact information for the party responsible to sign BMP verification forms</td><td colspan="4">RICK Engineering Company
5620 Friars Road, San Diego, California 92110
(619) 291 4165, bhastie@rickengineering.com</td></tr>
<tr><td colspan="5">BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)</td></tr>
<tr><td>BMP Maintenance Category</td><td>Cat. 1
☐</td><td>Cat. 2
☒</td><td>Cat. 3
☐</td><td>Cat. 4
☐</td></tr>
<tr><td>Final owner of BMP</td><td colspan="4">☒ HOA ☐ Property Owner ☐ County
☐ Other (describe):</td></tr>
<tr><td>Maintenance of BMP into perpetuity</td><td colspan="4">☒ HOA ☐ Property Owner ☐ County
☐ Other (describe):</td></tr>
<tr><td colspan="5">Discussion (As needed; Continue on subsequent pages as necessary)</td></tr>
<tr><td colspan="5"></td></tr>
</table>

Copy and Paste table here for additional BMPs

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

7.3 Structural BMP Checklist (Complete once for each proposed structural BMP)

Structural BMP ID # BMP-B1	**Permit # and Sheet #**
BMP Type	
Infiltration ☐ Infiltration basin (INF-1) ☐ Bioretention (INF-2) ☐ Permeable pavement (INF-3) **Unlined Biofiltration** ☐ Biofiltration with partial retention (PR-1) **Lined Biofiltration** ☐ Biofiltration (BF-1) ☐ Nutrient Sensitive Media Design (BF-2) ☐ Proprietary Biofiltration (BF-3)	**Harvest and Use** ☐ Cistern (HU-1) **Flow-thru Treatment** (describe below) ☐ With prior lawful approval to meet earlier PDP requirements ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2] ☐ With alternative compliance **Hydromodification Management[3]** ☒ Detention pond or vault ☐ **Other** (describe below)
BMP Purpose	
☐ Pollutant control only ☒ Hydromodification control only ☐ Combined pollutant control and hydromodification	☐ Pre-treatment/forebay for another BMP ☐ Other (describe below)
BMP Verification (See BMPDM Section 8.3)	
Provide name and contact information for the party responsible to sign BMP verification forms	RICK Engineering Company 5620 Friars Road, San Diego, California 92110 (619) 291 4165, bhastie@rickengineering.com
BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)	
BMP Maintenance Category	Cat. 1 ☐ Cat. 2 ☒ Cat. 3 ☐ Cat. 4 ☐
Final owner of BMP	☒ HOA ☐ Property Owner ☐ County ☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA ☐ Property Owner ☐ County ☐ Other (describe):
Discussion (As needed; Continue on subsequent pages as necessary)	

Copy and Paste table here for additional BMPs

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

7.3 Structural BMP Checklist (Complete once for each proposed structural BMP)

Structural BMP ID # BMP-B2	Permit # and Sheet #
BMP Type	
Infiltration ☐ Infiltration basin (INF-1) ☐ Bioretention (INF-2) ☐ Permeable pavement (INF-3) **Unlined Biofiltration** ☐ Biofiltration with partial retention (PR-1) **Lined Biofiltration** ☐ Biofiltration (BF-1) ☐ Nutrient Sensitive Media Design (BF-2) ☒ Proprietary Biofiltration (BF-3)	**Harvest and Use** ☐ Cistern (HU-1) **Flow-thru Treatment** (describe below) ☐ With prior lawful approval to meet earlier PDP requirements ☐ Pre-treatment/forebay for an onsite retention or biofiltration BMP[2] ☐ With alternative compliance **Hydromodification Management**[3] ☐ Detention pond or vault ☐ **Other** (describe below)
BMP Purpose	
☒ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification	☐ Pre-treatment/forebay for another BMP ☐ Other (describe below)
BMP Verification (See BMPDM Section 8.3)	
Provide name and contact information for the party responsible to sign BMP verification forms	RICK Engineering Company 5620 Friars Road, San Diego, California 92110 (619) 291 4165, bhastie@rickengineering.com
BMP Ownership and Maintenance (See BMPDM Section 7.3 and Attachment 11)	
BMP Maintenance Category	Cat. 1 ☐ Cat. 2 ☒ Cat. 3 ☐ Cat. 4 ☐
Final owner of BMP	☒ HOA ☐ Property Owner ☐ County ☐ Other (describe):
Maintenance of BMP into perpetuity	☒ HOA ☐ Property Owner ☐ County ☐ Other (describe):
Discussion (As needed; Continue on subsequent pages as necessary)	

Copy and Paste table here for additional BMPs

[2] Indicate which onsite retention or biofiltration BMP the pre-treatment/forebay serves.
[3] Hydromodification Management BMPs must be accompanied by BMPs that provide pollutant control.

7.4 Storm Water Pollutant Control Worksheet Calculations

- Use this page as a cover sheet for the submittal of any required worksheets below.
- Complete the checklist to identify which BMPDM Appendix B (Storm Water Pollutant Control Hydrologic Calculations and Sizing Methods) worksheets are included with this attachment.
- See BMPDM Appendix B for an explanation of the applicability of individual worksheets and detailed guidance on their completion.

Worksheet	Requirement
☒ Worksheet B.1 Calculation of Design Capture Volume (DCV)	Required
☒ Worksheet B.2 Retention Requirements	Required
☒ Worksheet B.3 BMP Performance	Required
☐ Worksheet B.4 Major Maintenance Intervals for Reduced-sized BMPs	If applicable
☐ Other worksheets	As required

County of San Diego Automated Stormwater Pollutant Control Worksheets
(Version 2.0)

WELCOME:

Welcome to the County of San Diego Automated Stormwater Pollutant Control Worksheets. These worksheets may be used to demonstrate compliance with stormwater pollutant control standards set forth in the 2013 MS4 Permit for Priority Development Projects and Green Street Projects.

INSTRUCTIONS:

General: To use this workbook, navigate to each of the worksheet tabs below and populate all yellow cells with project specific information. Yellow cells require user input, white cells are locked for editing and are automatically calculated, blue cells are also locked for editing and are automatically populated based on results from previous worksheet tabs, grey cells are items that do not require user input because of previous user inputs, orange cells represent warnings where supplemental information and/or revisions may be required for compliance. The worksheets are formatted to accommodate calculations for up to 10 drainage areas and associated BMPs. Each drainage area and BMP is represented as a discrete column with corresponding user inputs and calculations appearing in the rows below. Please note that projects with more than 10 drainage areas may need to use more than one workbook to accommodate the entire project.

Step 1. DCV: Provide the required inputs to determine the design capture volume for each PDP drainage area. The calculations in this worksheet determine the initial design capture volume and also apply any applicable reductions associated with site design techniques including dispersion to pervious surfaces, incorporation of tree wells, and incorporation of rain barrels.

Step 2. Retention Requirements: Provide required inputs to determine the minimum retention requirements for each drainage area.

Step 3. BMP Performance: Provide required inputs to determine the portion of the pollutant control performance standards that are satisfied by the proposed BMPs.

Reduced Size BMP Maintenance (optional): If BMPs with a footprint of less than 3% of the effective impervious tributary are proposed, provide required inputs to determine the anticipated frequency for major BMP maintenance activities.

DISCLAIMER:

The County of San Diego has developed this tool in an effort to streamline traditionally complex efforts associated with planning, design, submittal, and review of PDPs that are subject to stormwater pollutant control requirements set forth in the 2013 MS4 Permit. While the calculations performed herein are deemed to be in compliance with Permit requirements, applicants may elect to provide their own calculations. Use of this tool is optional and the County will not be held liable for any errors or other negative impacts associated with its use. In the event that the County performs updates to these worksheets, applicants that have not established reliance on previous versions of the worksheet via discretionary approval may be required to utilize the latest version of the worksheets. A summary of version releases is included below.

QUESTIONS:

-Questions relating to specific projects, submittal requirements, approval process, and/or policy-related issues should be directed your PDS Land Development Project Manager (link below).

PDS Land Development Project Manager

-General questions/comments on this worksheet may be directed to Charles Mohrlock in the County of San Diego Watershed Protection Program (link below).

charles.mohrlock@sdcounty.ca.gov

Automated Worksheet B.1: Calculation of Design Capture Volume (V2.0)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DMA-A	DMA-B1/B3	DMA-B2	DMA-B4							unitless
	2	85th Percentile 24-hr Storm Depth	0.69	0.69	0.69	0.69							inches
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	87,120	62,726	1,454	3,332							sq-ft
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)											sq-ft
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)	21,780	15,682	77	833							sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	Yes	No	No	No	No	No	No	No	No	No	yes/no
	11	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)											sq-ft
	12	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	13	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	14	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	15	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)											sq-ft
	16	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)											sq-ft
	17	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	18	Number of Tree Wells Proposed per SD-A											#
	19	Average Mature Tree Canopy Diameter											ft
	20	Number of Rain Barrels Proposed per SD-E											#
	21	Average Rain Barrel Size											gal
Initial Runoff Factor Calculation	22	Total Tributary Area	108,900	78,408	1,530	4,165	0	0	0	0	0	0	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.78	0.78	0.87	0.78	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.78	0.78	0.87	0.78	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	26	Initial Design Capture Volume	4,884	3,517	77	187	0	0	0	0	0	0	cubic-feet
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.78	0.78	0.87	0.78	n/a	n/a	n/a	n/a	n/a	n/a	unitless
	32	Design Capture Volume After Dispersion Techniques	4,884	3,517	77	187	0	0	0	0	0	0	cubic-feet
Tree & Barrel Adjustments	33	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.78	0.78	0.87	0.78	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	36	Final Effective Tributary Area	84,942	61,158	1,331	3,249	0	0	0	0	0	0	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	0	0	0	0	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	4,884	3,517	77	187	0	0	0	0	0	0	cubic-feet

No Warning Messages

NOTE: THE WATER QUALITY APPROACH FOR VISTA II IS NOT COMPATIBLE WITH THE COUNTY OF SAN DIEGO AUTOMATED STORMWATER POLLUTANT CONTROL WORKSHEETS. PLEASE SEE ADDITIONAL PAGES FOR WATER QUALITY TREATMENT APPROACH AND BACKUP PER COUNTY COMMENT 6-21 WITH REFERENCE TO APPENDIX B.4.3.

Automated Worksheet B.2: Retention Requirements (V2.0)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Basic Analysis	1	Drainage Basin ID or Name	DMA-A	DMA-B1/B3	DMA-B2	DMA-B4	-	-	-	-	-	-	unitless
	2	85th Percentile Rainfall Depth	0.69	0.69	0.69	0.69	-	-	-	-	-	-	inches
	3	Predominant NRCS Soil Type Within BMP Location	D	D	D	D							unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Restricted	Restricted	Restricted	Restricted							unitless
	5	Nature of Restriction	Soil Type	Soil Type	Soil Type	Soil Type							unitless
	6	Do Minimum Retention Requirements Apply to this Project?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No	No	No	No							yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	Yes	Yes	Yes	Yes							yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer	0.000	0.000	0.000	0.000							in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.000	0.000	0.000	0.000	-	-	-	-	-	-	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	1.5%	1.5%	1.5%	1.5%	-	-	-	-	-	-	percentage
	12	Fraction of DCV Requiring Retention	0.01	0.01	0.01	0.01	-	-	-	-	-	-	ratio
	13	Required Retention Volume	49	35	1	2	-	-	-	-	-	-	cubic-feet

No Warning Messages

Automated Worksheet B.3: BMP Performance (V2.0)

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units
BMP Inputs	1	Drainage Basin ID or Name	DMA-A	DMA-B1/B3	DMA-B2	DMA-B4	-	-	-	-	-	-	sq-ft
	2	Design Infiltration Rate Recommended	0.000	0.000	0.000	0.000	-	-	-	-	-	-	in/hr
	3	Design Capture Volume Tributary to BMP	4,884	3,517	77	187	-	-	-	-	-	-	cubic-feet
	4	Is BMP Vegetated or Unvegetated?	Vegetated	Vegetated	Vegetated	Vegetated							unitless
	5	Is BMP Impermeably Lined or Unlined?	Lined	Lined	Lined	Lined							unitless
	6	Does BMP Have an Underdrain?	No Underdrain	No Underdrain	No Underdrain	No Underdrain							unitless
	7	Does BMP Utilize Standard or Specialized Media?											unitless
	8	Provided Surface Area	N/A	N/A	N/A	N/A							sq-ft
	9	Provided Surface Ponding Depth	N/A	N/A	N/A	N/A							inches
	10	Provided Soil Media Thickness	N/A	N/A	N/A	N/A							inches
	11	Provided Gravel Thickness (Total Thickness)	N/A	N/A	N/A	N/A							inches
	12	Underdrain Offset											inches
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	~~1.25~~	~~1.38~~									inches
	14	Specialized Soil Media Filtration Rate											in/hr
	15	Specialized Soil Media Pore Space for Retention											unitless
	16	Specialized Soil Media Pore Space for Biofiltration											unitless
	17	Specialized Gravel Media Pore Space											unitless
Retention Calculations	18	Volume Infiltrated Over 6 Hour Storm	0	0	0	0	0	0	0	0	0	0	cubic-feet
	19	Ponding Pore Space Available for Retention	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	unitless
	20	Soil Media Pore Space Available for Retention	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	unitless
	21	Gravel Pore Space Available for Retention (Above Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	22	Gravel Pore Space Available for Retention (Below Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	23	Effective Retention Depth	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.00	0.00	0.00	0.00	0.00	0.00	inches
	24	Fraction of DCV Retained (Independent of Drawdown Time)	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	25	Calculated Retention Storage Drawdown Time	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0	0	0	0	0	0	hours
	26	Efficacy of Retention Processes	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	27	Volume Retained by BMP (Considering Drawdown Time)	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0	0	0	0	0	0	cubic-feet
	28	Design Capture Volume Remaining for Biofiltration	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0	0	0	0	0	0	cubic-feet
Biofiltration Calculations	29	Max Hydromod Flow Rate through Underdrain	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	cfs
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	in/hr
	31	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr
	32	Soil Media Filtration Rate to be used for Sizing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	in/hr
	33	Depth Biofiltered Over 6 Hour Storm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	34	Ponding Pore Space Available for Biofiltration	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	35	Soil Media Pore Space Available for Biofiltration	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	unitless
	36	Gravel Pore Space Available for Biofiltration (Above Underdrain)	0.00	0.00	0.00	0.00	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	37	Effective Depth of Biofiltration Storage	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.00	0.00	0.00	0.00	0.00	0.00	inches
	38	Drawdown Time for Surface Ponding	>120	>120	>120	>120	0	0	0	0	0	0	hours
	39	Drawdown Time for Effective Biofiltration Depth	n/a	n/a	n/a	n/a	0	0	0	0	0	0	hours
	40	Total Depth Biofiltered	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.00	0.00	0.00	0.00	0.00	0.00	inches
	41	Option 1 - Biofilter 1.50 DCV: Target Volume	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0	0	0	0	0	0	cubic-feet
	42	Option 1 - Provided Biofiltration Volume	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0	0	0	0	0	0	cubic-feet
	43	Option 2 - Store 0.75 DCV: Target Volume	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0	0	0	0	0	0	cubic-feet
	44	Option 2 - Provided Storage Volume	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0	0	0	0	0	0	cubic-feet
	45	Portion of Biofiltration Performance Standard Satisfied	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.00	0.00	0.00	0.00	0.00	0.00	ratio
Result	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	-	-	-	-	-	-	yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	48	**Deficit of Effectively Treated Stormwater**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	cubic-feet

Attention!

-Vegetated BMPs with surface ponding drawdown times over 24 hours must be certified by a landscape architect or agronomist. All BMPs must have a surface ponding drawdown time of 96 hours or less.

MAX WQ TREATMENT FLOW RATE OUT OF BMP-A1 = 0.083 CFS AT 3.2' PONDING DEPTH.

MAX WQ TREATMENT FLOW RATE OUT OF BMP-B1 = 0.092 CFS AT 3.0' PONDING DEPTH.

TABULAR SUMMARY OF DMAs, (VISTA II BALLFIELDS)

DMA ID	TRIBUTARY AREA (SQ FT)	AREA (ACRES)	IMPERVIOUS AREA (SQ FT)	IMPERVIOUS AREA (ACRES)	%IMPERVIOUS	HSG	AREA WEIGHTED RUNOFF FACTOR	DCV (Cubic Feet)	TREATED BY	POLLUTANT CONTROL TYPE	WQ FLOW DRAINS TO (POC ID)
A	108900	2.5	87120	2.0	80%	D	0.78	4884	BMP-B2	Proprietary Biofil.	POC-2
B1/B3	78408	1.8	62726	1.4	80%	D	0.78	3517	BMP-B2	Proprietary Biofil.	POC-2
B2	1530	0.04	1454	0.03	95%	D	0.87	77	BMP-B2	Proprietary Biofil.	POC-2
B4	4165	0.1	3332	0.08	80%	D	0.78	187	BMP-B2	Proprietary Biofil.	POC-2
SM1	20894	0.5	0	0	0%	D	0.30	0	NA	NA	POC-1
SM2	8088	0.2	0	0	0%	D	0.30	0	NA	NA	POC-1
SM3	3169	0.1	0	0	0%	D	0.30	0	NA	NA	POC-2
SM4	3903	0.1	0	0	0%	D	0.30	0	NA	NA	POC-2
SUM	**229057**	**5.3**	**154632**	**3.5**	**68%**		**0.71**	**8664**			

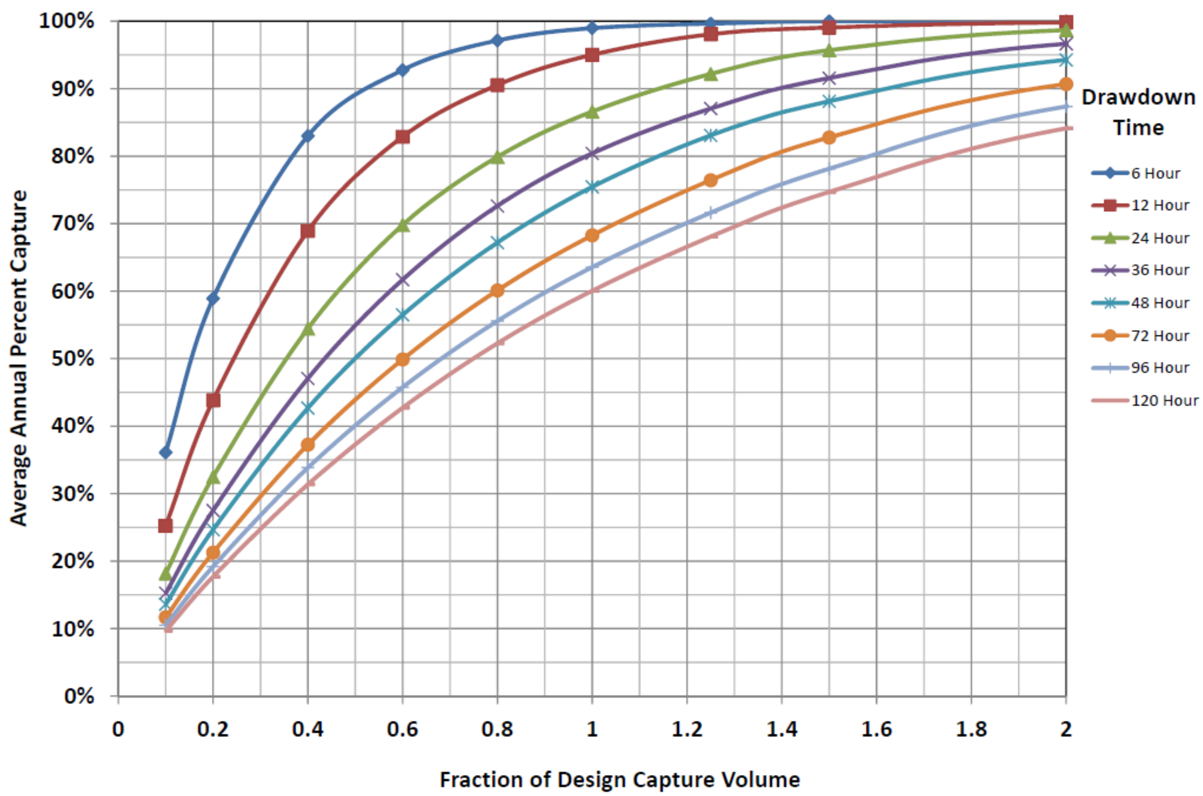


Figure B.3-1: Percent Capture Nomograph

Part 6) Determine the efficacy of the retention processes provided by the BMP. This value represents the portion of the pollutant control performance standard that is satisfied through retention processes of the BMP and is calculated as follows.

$$E_R = \frac{P_C}{80\%}$$

Where:
E_R: Efficacy of retention processes (decimal)
P_C: Average Annual Percent Capture (%)

Part 7) Determine the total volume retained by the proposed BMP.

$$V_{RBMP} = \text{DCV x } E_R$$

Where:
V_{RBMP}: Total volume retained by BMP (ft^3)
DCV: Design capture volume (ft^3)
E_R: Efficacy of retention processes (decimal)

BMP A1 (Stage-Storage-Discharge Rating Curve)

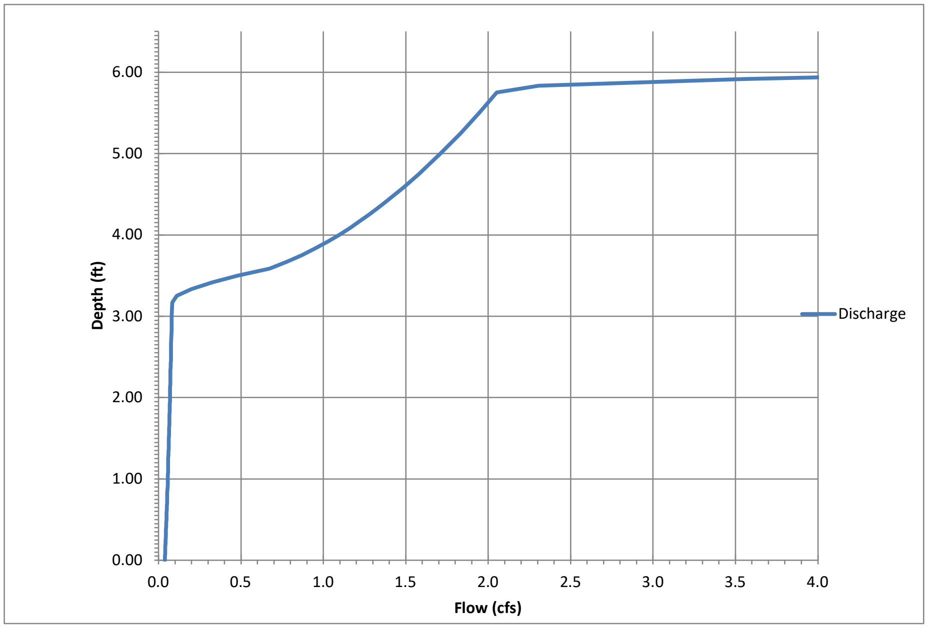
Vault Characteristics	
Vault Depth (ft) =	6

Low-Flow Orifice	
Num. of Orifices =	1
Orifice Invert (ft) =	-1
Orifice Diameter (in) =	1.25
Cg =	0.6

Mid-flow Orifice (Lower)	
Num. of Orifices =	3
Orifice Invert (ft) =	3.2
Orifice Diameter (in) =	4
Cg =	0.6

Mid-flow Orifice (Upper)(Rectangular)	
Num. of Orifices =	0
Orifice Invert (ft) =	0
Orifice Width (ft) =	0
Orifice Height (ft) =	0
Cg (orifice) =	0.6
Cg (weir) =	3

Top of Inlet	
Upper Weir Inv (ft) =	5.8
B (ft) =	12
Cs =	3



Outlet Link Rating Curve (Input to SWMM)

h (in)	h (ft)	Low-Flow Orifice	Mid-Flow Orifice (Lower)	Mid-Flow Orifice (Upper, Weir Calc)	Mid-flow Orifice Upper	Overflow Weir	Total Flow (cfs)	Surface Area (ft2)	Porosity	Incremental Volume (ft3)	Cumulative Volume (ft3)
0.0	0.00	0.040	0.000	0.000	0.000	0.000	0.040	2711	0.94	0	0
0.5	0.04	0.040	0.000	0.000	0.000	0.000	0.040	2711	0.94	106	106
1.0	0.08	0.041	0.000	0.000	0.000	0.000	0.041	2711	0.94	106	212
1.5	0.13	0.041	0.000	0.000	0.000	0.000	0.041	2711	0.94	106	319
2.0	0.17	0.042	0.000	0.000	0.000	0.000	0.042	2711	0.94	106	425
2.5	0.21	0.043	0.000	0.000	0.000	0.000	0.043	2711	0.94	106	531
3.0	0.25	0.044	0.000	0.000	0.000	0.000	0.044	2711	0.94	106	637
3.5	0.29	0.045	0.000	0.000	0.000	0.000	0.045	2711	0.94	106	743
4.0	0.33	0.045	0.000	0.000	0.000	0.000	0.045	2711	0.94	106	849
4.5	0.38	0.046	0.000	0.000	0.000	0.000	0.046	2711	0.94	106	956
5.0	0.42	0.047	0.000	0.000	0.000	0.000	0.047	2711	0.94	106	1062
5.5	0.46	0.048	0.000	0.000	0.000	0.000	0.048	2711	0.94	106	1168
6.0	0.50	0.048	0.000	0.000	0.000	0.000	0.048	2711	0.94	106	1274
6.5	0.54	0.049	0.000	0.000	0.000	0.000	0.049	2711	0.94	106	1380
7.0	0.58	0.050	0.000	0.000	0.000	0.000	0.050	2711	0.94	106	1487
7.5	0.63	0.051	0.000	0.000	0.000	0.000	0.051	2711	0.94	106	1593
8.0	0.67	0.051	0.000	0.000	0.000	0.000	0.051	2711	0.94	106	1699
8.5	0.71	0.052	0.000	0.000	0.000	0.000	0.052	2711	0.94	106	1805
9.0	0.75	0.053	0.000	0.000	0.000	0.000	0.053	2711	0.94	106	1911
9.5	0.79	0.053	0.000	0.000	0.000	0.000	0.053	2711	0.94	106	2017
10.0	0.83	0.054	0.000	0.000	0.000	0.000	0.054	2711	0.94	106	2124
10.5	0.88	0.055	0.000	0.000	0.000	0.000	0.055	2711	0.94	106	2230
11.0	0.92	0.055	0.000	0.000	0.000	0.000	0.055	2711	0.94	106	2336
11.5	0.96	0.056	0.000	0.000	0.000	0.000	0.056	2711	0.94	106	2442
12.0	1.00	0.056	0.000	0.000	0.000	0.000	0.056	2711	0.94	106	2548
12.5	1.04	0.057	0.000	0.000	0.000	0.000	0.057	2711	0.94	106	2655
13.0	1.08	0.058	0.000	0.000	0.000	0.000	0.058	2711	0.94	106	2761
13.5	1.13	0.058	0.000	0.000	0.000	0.000	0.058	2711	0.94	106	2867
14.0	1.17	0.059	0.000	0.000	0.000	0.000	0.059	2711	0.94	106	2973
14.5	1.21	0.060	0.000	0.000	0.000	0.000	0.060	2711	0.94	106	3079
15.0	1.25	0.060	0.000	0.000	0.000	0.000	0.060	2711	0.94	106	3185
15.5	1.29	0.061	0.000	0.000	0.000	0.000	0.061	2711	0.94	106	3292
16.0	1.33	0.061	0.000	0.000	0.000	0.000	0.061	2711	0.94	106	3398
16.5	1.38	0.062	0.000	0.000	0.000	0.000	0.062	2711	0.94	106	3504
17.0	1.42	0.062	0.000	0.000	0.000	0.000	0.062	2711	0.94	106	3610
17.5	1.46	0.063	0.000	0.000	0.000	0.000	0.063	2711	0.94	106	3716
18.0	1.50	0.064	0.000	0.000	0.000	0.000	0.064	2711	0.94	106	3823

18.5	1.54	0.064	0.000	0.000	0.000	0.000	0.064	2711	0.94	106	3929
19.0	1.58	0.065	0.000	0.000	0.000	0.000	0.065	2711	0.94	106	4035
19.5	1.63	0.065	0.000	0.000	0.000	0.000	0.065	2711	0.94	106	4141
20.0	1.67	0.066	0.000	0.000	0.000	0.000	0.066	2711	0.94	106	4247
20.5	1.71	0.066	0.000	0.000	0.000	0.000	0.066	2711	0.94	106	4353
21.0	1.75	0.067	0.000	0.000	0.000	0.000	0.067	2711	0.94	106	4460
21.5	1.79	0.067	0.000	0.000	0.000	0.000	0.067	2711	0.94	106	4566
22.0	1.83	0.068	0.000	0.000	0.000	0.000	0.068	2711	0.94	106	4672
22.5	1.88	0.068	0.000	0.000	0.000	0.000	0.068	2711	0.94	106	4778
23.0	1.92	0.069	0.000	0.000	0.000	0.000	0.069	2711	0.94	106	4884
23.5	1.96	0.069	0.000	0.000	0.000	0.000	0.069	2711	0.94	106	4990
24.0	2.00	0.070	0.000	0.000	0.000	0.000	0.070	2711	0.94	106	5097
24.5	2.04	0.070	0.000	0.000	0.000	0.000	0.070	2711	0.94	106	5203
25.0	2.08	0.071	0.000	0.000	0.000	0.000	0.071	2711	0.94	106	5309
25.5	2.13	0.071	0.000	0.000	0.000	0.000	0.071	2711	0.94	106	5415
26.0	2.17	0.072	0.000	0.000	0.000	0.000	0.072	2711	0.94	106	5521
26.5	2.21	0.072	0.000	0.000	0.000	0.000	0.072	2711	0.94	106	5628
27.0	2.25	0.073	0.000	0.000	0.000	0.000	0.073	2711	0.94	106	5734
27.5	2.29	0.073	0.000	0.000	0.000	0.000	0.073	2711	0.94	106	5840
28.0	2.33	0.074	0.000	0.000	0.000	0.000	0.074	2711	0.94	106	5946
28.5	2.38	0.074	0.000	0.000	0.000	0.000	0.074	2711	0.94	106	6052
29.0	2.42	0.075	0.000	0.000	0.000	0.000	0.075	2711	0.94	106	6158
29.5	2.46	0.075	0.000	0.000	0.000	0.000	0.075	2711	0.94	106	6265
30.0	2.50	0.076	0.000	0.000	0.000	0.000	0.076	2711	0.94	106	6371
31.0	2.58	0.077	0.000	0.000	0.000	0.000	0.077	2711	0.94	212	6583
32.0	2.67	0.077	0.000	0.000	0.000	0.000	0.077	2711	0.94	212	6796
33.0	2.75	0.078	0.000	0.000	0.000	0.000	0.078	2711	0.94	212	7008
34.0	2.83	0.079	0.000	0.000	0.000	0.000	0.079	2711	0.94	212	7220
35.0	2.92	0.080	0.000	0.000	0.000	0.000	0.080	2711	0.94	212	7433
36.0	3.00	0.081	0.000	0.000	0.000	0.000	0.081	2711	0.94	212	7645
37.0	3.08	0.082	0.000	0.000	0.000	0.000	0.082	2711	0.94	212	7857
38.0	3.17	0.083	0.000	0.000	0.000	0.000	0.083	2711	0.94	212	8070
39.0	3.25	0.084	0.009	0.000	0.000	0.000	0.110	2711	0.94	212	8282
40.0	3.33	0.084	0.039	0.000	0.000	0.000	0.201	2711	0.94	212	8494
41.0	3.42	0.085	0.081	0.000	0.000	0.000	0.327	2711	0.94	212	8707
42.0	3.50	0.086	0.131	0.000	0.000	0.000	0.480	2711	0.94	212	8919
43.0	3.58	0.087	0.196	0.000	0.000	0.000	0.674	2711	0.94	212	9132
44.0	3.67	0.088	0.230	0.000	0.000	0.000	0.778	2711	0.94	212	9344
45.0	3.75	0.088	0.260	0.000	0.000	0.000	0.869	2711	0.94	212	9556
46.0	3.83	0.089	0.287	0.000	0.000	0.000	0.950	2711	0.94	212	9769
47.0	3.92	0.090	0.312	0.000	0.000	0.000	1.025	2711	0.94	212	9981
48.0	4.00	0.091	0.334	0.000	0.000	0.000	1.094	2711	0.94	212	10193
49.0	4.08	0.092	0.356	0.000	0.000	0.000	1.159	2711	0.94	212	10406
50.0	4.17	0.092	0.376	0.000	0.000	0.000	1.220	2711	0.94	212	10618
51.0	4.25	0.093	0.395	0.000	0.000	0.000	1.278	2711	0.94	212	10830
52.0	4.33	0.094	0.413	0.000	0.000	0.000	1.333	2711	0.94	212	11043
53.0	4.42	0.095	0.431	0.000	0.000	0.000	1.386	2711	0.94	212	11255
54.0	4.50	0.095	0.447	0.000	0.000	0.000	1.437	2711	0.94	212	11468
55.0	4.58	0.096	0.463	0.000	0.000	0.000	1.486	2711	0.94	212	11680
56.0	4.67	0.097	0.479	0.000	0.000	0.000	1.534	2711	0.94	212	11892
57.0	4.75	0.098	0.494	0.000	0.000	0.000	1.580	2711	0.94	212	12105
58.0	4.83	0.098	0.509	0.000	0.000	0.000	1.625	2711	0.94	212	12317
59.0	4.92	0.099	0.523	0.000	0.000	0.000	1.668	2711	0.94	212	12529
60.0	5.00	0.100	0.537	0.000	0.000	0.000	1.711	2711	0.94	212	12742
61.0	5.08	0.100	0.551	0.000	0.000	0.000	1.752	2711	0.94	212	12954
62.0	5.17	0.101	0.564	0.000	0.000	0.000	1.792	2711	0.94	212	13166
63.0	5.25	0.102	0.577	0.000	0.000	0.000	1.832	2711	0.94	212	13379
64.0	5.33	0.102	0.589	0.000	0.000	0.000	1.870	2711	0.94	212	13591
65.0	5.42	0.103	0.602	0.000	0.000	0.000	1.908	2711	0.94	212	13804
66.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.945	2711	0.94	212	14016
67.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.981	2711	0.94	212	14228
68.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.017	2711	0.94	212	14441
69.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.052	2711	0.94	212	14653
70.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.305	2711	0.94	212	14865
71.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.555	2711	0.94	212	15078
72.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5.373	2711	0.94	212	15290

DMA-A DCV: 4884 CF

BMP-A1 WQ DDT: 37 HOURS

BMP-A1 STORAGE MULTIPLIER: 1.6 (CONSERVATIVE)

BMP-A1 REQ. TREATMENT VOLUME: 7815 CF

VOLUME TREATED BY BMP-A1 TO PROVIDE 92% ANNUAL CAPTURE: 8070 CF

BMP B1 (Stage-Storage-Discharge Rating Curve)

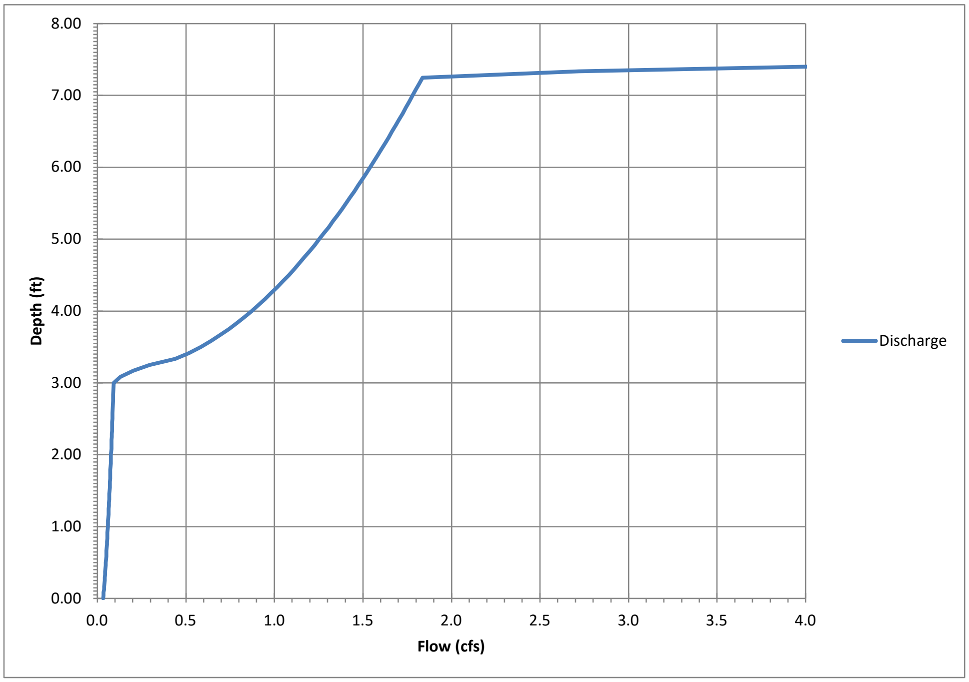
Vault Characteristics	
Vault Depth (ft) =	7.75

Low-Flow Orifice	
Num. of Orifices =	1
Orifice Invert (ft) =	-0.5
Orifice Diameter (in) =	1.375
Cg =	0.6

Mid-flow Orifice (Lower)	
Num. of Orifices =	2
Orifice Invert (ft) =	3
Orifice Diameter (in) =	4
Cg =	0.6

Mid-flow Orifice (Upper)(Rectangular)	
Num. of Orifices =	0
Orifice Invert (ft) =	0
Orifice Width (ft) =	0
Orifice Height (ft) =	0
Cg (orifice) =	0.6
Cg (weir) =	3

Top of Inlet	
Upper Weir Inv (ft) =	7.25
B (ft) =	12
Cs =	3



Outlet Link Rating Curve (Input to SWMM)

h (in)	h (ft)	Low-Flow Orifice	Mid-Flow Orifice (Lower)	Mid-Flow Orifice (Upper, Weir Calc)	Mid-flow Orifice Upper	Overflow Weir	Total Flow (cfs)	Surface Area (ft2)	Porosity	Incremental Volume (ft3)	Cumulative Volume (ft3)
0.0	0.00	0.033	0.000	0.000	0.000	0.000	0.033	1709	0.94	0	0
0.5	0.04	0.035	0.000	0.000	0.000	0.000	0.035	1709	0.94	67	67
1.0	0.08	0.036	0.000	0.000	0.000	0.000	0.036	1709	0.94	67	134
1.5	0.13	0.037	0.000	0.000	0.000	0.000	0.037	1709	0.94	67	201
2.0	0.17	0.039	0.000	0.000	0.000	0.000	0.039	1709	0.94	67	268
2.5	0.21	0.040	0.000	0.000	0.000	0.000	0.040	1709	0.94	67	335
3.0	0.25	0.041	0.000	0.000	0.000	0.000	0.041	1709	0.94	67	402
3.5	0.29	0.043	0.000	0.000	0.000	0.000	0.043	1709	0.94	67	469
4.0	0.33	0.044	0.000	0.000	0.000	0.000	0.044	1709	0.94	67	535
4.5	0.38	0.045	0.000	0.000	0.000	0.000	0.045	1709	0.94	67	602
5.0	0.42	0.046	0.000	0.000	0.000	0.000	0.046	1709	0.94	67	669
5.5	0.46	0.047	0.000	0.000	0.000	0.000	0.047	1709	0.94	67	736
6.0	0.50	0.048	0.000	0.000	0.000	0.000	0.048	1709	0.94	67	803
6.5	0.54	0.049	0.000	0.000	0.000	0.000	0.049	1709	0.94	67	870
7.0	0.58	0.050	0.000	0.000	0.000	0.000	0.050	1709	0.94	67	937
7.5	0.63	0.051	0.000	0.000	0.000	0.000	0.051	1709	0.94	67	1004
8.0	0.67	0.052	0.000	0.000	0.000	0.000	0.052	1709	0.94	67	1071
8.5	0.71	0.053	0.000	0.000	0.000	0.000	0.053	1709	0.94	67	1138
9.0	0.75	0.054	0.000	0.000	0.000	0.000	0.054	1709	0.94	67	1205
9.5	0.79	0.055	0.000	0.000	0.000	0.000	0.055	1709	0.94	67	1272
10.0	0.83	0.056	0.000	0.000	0.000	0.000	0.056	1709	0.94	67	1339
10.5	0.88	0.057	0.000	0.000	0.000	0.000	0.057	1709	0.94	67	1406
11.0	0.92	0.058	0.000	0.000	0.000	0.000	0.058	1709	0.94	67	1473
11.5	0.96	0.059	0.000	0.000	0.000	0.000	0.059	1709	0.94	67	1540
12.0	1.00	0.060	0.000	0.000	0.000	0.000	0.060	1709	0.94	67	1606
12.5	1.04	0.060	0.000	0.000	0.000	0.000	0.060	1709	0.94	67	1673
13.0	1.08	0.061	0.000	0.000	0.000	0.000	0.061	1709	0.94	67	1740
13.5	1.13	0.062	0.000	0.000	0.000	0.000	0.062	1709	0.94	67	1807
14.0	1.17	0.063	0.000	0.000	0.000	0.000	0.063	1709	0.94	67	1874
14.5	1.21	0.064	0.000	0.000	0.000	0.000	0.064	1709	0.94	67	1941
15.0	1.25	0.065	0.000	0.000	0.000	0.000	0.065	1709	0.94	67	2008
15.5	1.29	0.065	0.000	0.000	0.000	0.000	0.065	1709	0.94	67	2075
16.0	1.33	0.066	0.000	0.000	0.000	0.000	0.066	1709	0.94	67	2142
16.5	1.38	0.067	0.000	0.000	0.000	0.000	0.067	1709	0.94	67	2209
17.0	1.42	0.068	0.000	0.000	0.000	0.000	0.068	1709	0.94	67	2276
17.5	1.46	0.068	0.000	0.000	0.000	0.000	0.068	1709	0.94	67	2343

18.0	1.50	0.069	0.000	0.000	0.000	0.000	0.069	1709	0.94	67	2410
18.5	1.54	0.070	0.000	0.000	0.000	0.000	0.070	1709	0.94	67	2477
19.0	1.58	0.071	0.000	0.000	0.000	0.000	0.071	1709	0.94	67	2544
19.5	1.63	0.071	0.000	0.000	0.000	0.000	0.071	1709	0.94	67	2610
20.0	1.67	0.072	0.000	0.000	0.000	0.000	0.072	1709	0.94	67	2677
20.5	1.71	0.073	0.000	0.000	0.000	0.000	0.073	1709	0.94	67	2744
21.0	1.75	0.074	0.000	0.000	0.000	0.000	0.074	1709	0.94	67	2811
21.5	1.79	0.074	0.000	0.000	0.000	0.000	0.074	1709	0.94	67	2878
22.0	1.83	0.075	0.000	0.000	0.000	0.000	0.075	1709	0.94	67	2945
22.5	1.88	0.076	0.000	0.000	0.000	0.000	0.076	1709	0.94	67	3012
23.0	1.92	0.076	0.000	0.000	0.000	0.000	0.076	1709	0.94	67	3079
23.5	1.96	0.077	0.000	0.000	0.000	0.000	0.077	1709	0.94	67	3146
24.0	2.00	0.078	0.000	0.000	0.000	0.000	0.078	1709	0.94	67	3213
24.5	2.04	0.078	0.000	0.000	0.000	0.000	0.078	1709	0.94	67	3280
25.0	2.08	0.079	0.000	0.000	0.000	0.000	0.079	1709	0.94	67	3347
25.5	2.13	0.080	0.000	0.000	0.000	0.000	0.080	1709	0.94	67	3414
26.0	2.17	0.080	0.000	0.000	0.000	0.000	0.080	1709	0.94	67	3481
26.5	2.21	0.081	0.000	0.000	0.000	0.000	0.081	1709	0.94	67	3548
27.0	2.25	0.081	0.000	0.000	0.000	0.000	0.081	1709	0.94	67	3615
27.5	2.29	0.082	0.000	0.000	0.000	0.000	0.082	1709	0.94	67	3681
28.0	2.33	0.083	0.000	0.000	0.000	0.000	0.083	1709	0.94	67	3748
28.5	2.38	0.083	0.000	0.000	0.000	0.000	0.083	1709	0.94	67	3815
29.0	2.42	0.084	0.000	0.000	0.000	0.000	0.084	1709	0.94	67	3882
29.5	2.46	0.085	0.000	0.000	0.000	0.000	0.085	1709	0.94	67	3949
30.0	2.50	0.085	0.000	0.000	0.000	0.000	0.085	1709	0.94	67	4016
31.0	2.58	0.086	0.000	0.000	0.000	0.000	0.086	1709	0.94	134	4150
32.0	2.67	0.088	0.000	0.000	0.000	0.000	0.088	1709	0.94	134	4284
33.0	2.75	0.089	0.000	0.000	0.000	0.000	0.089	1709	0.94	134	4418
34.0	2.83	0.090	0.000	0.000	0.000	0.000	0.090	1709	0.94	134	4552
35.0	2.92	0.091	0.000	0.000	0.000	0.000	0.091	1709	0.94	134	4686
36.0	3.00	0.092	0.000	0.000	0.000	0.000	0.092	1709	0.94	134	4819
37.0	3.08	0.093	0.019	0.000	0.000	0.000	0.132	1709	0.94	134	4953
38.0	3.17	0.094	0.054	0.000	0.000	0.000	0.203	1709	0.94	134	5087
39.0	3.25	0.095	0.100	0.000	0.000	0.000	0.295	1709	0.94	134	5221
40.0	3.33	0.096	0.172	0.000	0.000	0.000	0.440	1709	0.94	134	5355
41.0	3.42	0.098	0.210	0.000	0.000	0.000	0.518	1709	0.94	134	5489
42.0	3.50	0.099	0.243	0.000	0.000	0.000	0.584	1709	0.94	134	5623
43.0	3.58	0.100	0.271	0.000	0.000	0.000	0.642	1709	0.94	134	5756
44.0	3.67	0.101	0.297	0.000	0.000	0.000	0.695	1709	0.94	134	5890
45.0	3.75	0.102	0.321	0.000	0.000	0.000	0.744	1709	0.94	134	6024
46.0	3.83	0.103	0.343	0.000	0.000	0.000	0.789	1709	0.94	134	6158
47.0	3.92	0.104	0.364	0.000	0.000	0.000	0.831	1709	0.94	134	6292
48.0	4.00	0.105	0.384	0.000	0.000	0.000	0.872	1709	0.94	134	6426
49.0	4.08	0.106	0.402	0.000	0.000	0.000	0.910	1709	0.94	134	6560
50.0	4.17	0.107	0.420	0.000	0.000	0.000	0.947	1709	0.94	134	6694
51.0	4.25	0.108	0.437	0.000	0.000	0.000	0.982	1709	0.94	134	6827
52.0	4.33	0.109	0.454	0.000	0.000	0.000	1.016	1709	0.94	134	6961
53.0	4.42	0.109	0.470	0.000	0.000	0.000	1.049	1709	0.94	134	7095
54.0	4.50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1709	0.94	134	7229
55.0	4.58	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1709	0.94	134	7363
56.0	4.67	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1709	0.94	134	7497
57.0	4.75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1709	0.94	134	7631
58.0	4.83	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1709	0.94	134	7765
59.0	4.92	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1709	0.94	134	7898
60.0	5.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1709	0.94	134	8032
61.0	5.08	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1709	0.94	134	8166
62.0	5.17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1709	0.94	134	8300
63.0	5.25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1709	0.94	134	8434
64.0	5.33	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1709	0.94	134	8568
65.0	5.42	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1709	0.94	134	8702
66.0	5.50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1709	0.94	134	8836
67.0	5.58	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1709	0.94	134	8969
68.0	5.67	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1709	0.94	134	9103
69.0	5.75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1709	0.94	134	9237
70.0	5.83	0.124	0.686	0.000	0.000	0.000	1.497	1709	0.94	134	9371
71.0	5.92	0.125	0.697	0.000	0.000	0.000	1.519	1709	0.94	134	9505
72.0	6.00	0.126	0.707	0.000	0.000	0.000	1.541	1709	0.94	134	9639
73.0	6.08	0.127	0.718	0.000	0.000	0.000	1.562	1709	0.94	134	9773
74.0	6.17	0.128	0.728	0.000	0.000	0.000	1.583	1709	0.94	134	9907
75.0	6.25	0.128	0.738	0.000	0.000	0.000	1.604	1709	0.94	134	10040
76.0	6.33	0.129	0.748	0.000	0.000	0.000	1.625	1709	0.94	134	10174

DMA-B DCV: 3517 CF

BMP-B1 WQ DDT: 21.4 HOURS

BMP-B1/BF1 STORAGE MULTIPLIER: 1.25 (CONSERVATIVE)

BMP-B1/BF1 REQ. TREATMENT VOLUME: 4396 CF

VOLUME TREATED BY BMP-B1/BF1 TO PROVIDE 92% ANNUAL CAPTURE: 4819 CF

J-19253B

77.0	6.42	0.130	0.758	0.000	0.000	0.000	1.645	1709	0.94	134	10308
78.0	6.50	0.131	0.767	0.000	0.000	0.000	1.665	1709	0.94	134	10442
79.0	6.58	0.132	0.777	0.000	0.000	0.000	1.685	1709	0.94	134	10576
80.0	6.67	0.132	0.786	0.000	0.000	0.000	1.705	1709	0.94	134	10710
81.0	6.75	0.133	0.795	0.000	0.000	0.000	1.724	1709	0.94	134	10844
82.0	6.83	0.134	0.805	0.000	0.000	0.000	1.743	1709	0.94	134	10977
83.0	6.92	0.135	0.814	0.000	0.000	0.000	1.762	1709	0.94	134	11111

BMP A1 - VAULT				CALCULATED	
	STORAGE		DISCHARGE	DRAWDOWN TIME	
h (ft)	Incremental storage volume (ft3)	Cumulative storage volume (ft3)	Total Flow (cfs)	Incremental Drawdown Time (hr)	Cumulative Drawdown Time (hr)
0.00	0	0	0.040	0.00	0.00
0.04	106	106	0.040	0.74	0.74
0.08	106	212	0.041	0.73	1.47
0.13	106	319	0.041	0.72	2.19
0.17	106	425	0.042	0.70	2.90
0.21	106	531	0.043	0.69	3.59
0.25	106	637	0.044	0.68	4.27
0.29	106	743	0.045	0.67	4.93
0.33	106	849	0.045	0.65	5.59
0.38	106	956	0.046	0.64	6.23
0.42	106	1,062	0.047	0.63	6.86
0.46	106	1,168	0.048	0.62	7.48
0.50	106	1,274	0.048	0.61	8.10
0.54	106	1,380	0.049	0.60	8.70
0.58	106	1,487	0.050	0.60	9.30
0.63	106	1,593	0.051	0.59	9.88
0.67	106	1,699	0.051	0.58	10.46
0.71	106	1,805	0.052	0.57	11.03
0.75	106	1,911	0.053	0.56	11.60
0.79	106	2,017	0.053	0.56	12.15
0.83	106	2,124	0.054	0.55	12.70
0.88	106	2,230	0.055	0.54	13.25
0.92	106	2,336	0.055	0.54	13.78
0.96	106	2,442	0.056	0.53	14.31
1.00	106	2,548	0.056	0.52	14.84
1.04	106	2,655	0.057	0.52	15.36
1.08	106	2,761	0.058	0.51	15.87
1.13	106	2,867	0.058	0.51	16.38
1.17	106	2,973	0.059	0.50	16.88
1.21	106	3,079	0.060	0.50	17.38
1.25	106	3,185	0.060	0.49	17.87
1.29	106	3,292	0.061	0.49	18.36
1.33	106	3,398	0.061	0.48	18.85
1.38	106	3,504	0.062	0.48	19.33
1.42	106	3,610	0.062	0.47	19.80
1.46	106	3,716	0.063	0.47	20.27
1.50	106	3,823	0.064	0.47	20.74
1.54	106	3,929	0.064	0.46	21.20
1.58	106	4,035	0.065	0.46	21.66
1.63	106	4,141	0.065	0.45	22.11
1.67	106	4,247	0.066	0.45	22.56
1.71	106	4,353	0.066	0.45	23.01
1.75	106	4,460	0.067	0.44	23.45
1.79	106	4,566	0.067	0.44	23.90
1.83	106	4,672	0.068	0.44	24.33
1.88	106	4,778	0.068	0.43	24.77
1.92	106	4,884	0.069	0.43	25.20
1.96	106	4,990	0.069	0.43	25.62
2.00	106	5,097	0.070	0.42	26.05
2.04	106	5,203	0.070	0.42	26.47
2.08	106	5,309	0.071	0.42	26.89
2.13	106	5,415	0.071	0.42	27.30
2.17	106	5,521	0.072	0.41	27.71
2.21	106	5,628	0.072	0.41	28.12
2.25	106	5,734	0.073	0.41	28.53
2.29	106	5,840	0.073	0.40	28.93
2.33	106	5,946	0.074	0.40	29.33
2.38	106	6,052	0.074	0.40	29.73
2.42	106	6,158	0.075	0.40	30.13
2.46	106	6,265	0.075	0.39	30.52
2.50	106	6,371	0.076	0.39	30.91
2.58	212	6,583	0.077	0.78	31.69
2.67	212	6,796	0.077	0.77	32.45
2.75	212	7,008	0.078	0.76	33.21
2.83	212	7,220	0.079	0.75	33.96
2.92	212	7,433	0.080	0.74	34.70
3.00	212	7,645	0.081	0.73	35.43
3.08	212	7,857	0.082	0.72	36.16
3.17	212	8,070	0.083	0.72	36.87
3.25	212	8,282	0.110	0.61	37.49
3.33	212	8,494	0.201	0.38	37.86
3.42	212	8,707	0.327	0.22	38.09
3.50	212	8,919	0.480	0.15	38.23
3.58	212	9,132	0.674	0.10	38.34
3.67	212	9,344	0.778	0.08	38.42
3.75	212	9,556	0.869	0.07	38.49
3.83	212	9,769	0.950	0.06	38.55
3.92	212	9,981	1.025	0.06	38.61
4.00	212	10,193	1.094	0.06	38.67
4.08	212	10,406	1.159	0.05	38.72
4.17	212	10,618	1.220	0.05	38.77
4.25	212	10,830	1.278	0.05	38.82
4.33	212	11,043	1.333	0.05	38.86
4.42	212	11,255	1.386	0.04	38.91
4.50	212	11,468	1.437	0.04	38.95
4.58	212	11,680	1.486	0.04	38.99
4.67	212	11,892	1.534	0.04	39.03
4.75	212	12,105	1.580	0.04	39.07
4.83	212	12,317	1.625	0.04	39.10
4.92	212	12,529	1.668	0.04	39.14
5.00	212	12,742	1.711	0.03	39.17
5.08	212	12,954	1.752	0.03	39.21
5.17	212	13,166	1.792	0.03	39.24
5.25	212	13,379	1.832	0.03	39.27
5.33	212	13,591	1.870	0.03	39.31
5.42	212	13,804	1.908	0.03	39.34
5.50	212	14,016	1.945	0.03	39.37
5.58	212	14,228	1.981	0.03	39.40
5.67	212	14,441	2.017	0.03	39.43
5.75	212	14,653	2.052	0.03	39.46
5.83	212	14,865	2.305	0.03	39.48
5.92	212	15,078	3.555	0.02	39.50
6.00	212	15,290	5.373	0.01	39.52

BMP B1 - VAULT				CALCULATED	
	STORAGE		DISCHARGE	DRAWDOWN TIME	
h (ft)	Incremental storage volume (ft3)	Cumulative storage volume (ft3)	Total Flow (cfs)	Incremental Drawdown Time (hr)	Cumulative Drawdown Time (hr)
0.000	0	0	0.033	0.00	0.00
0.042	67	67	0.035	0.55	0.55
0.083	67	134	0.036	0.53	1.08
0.125	67	201	0.037	0.51	1.58
0.167	67	268	0.039	0.49	2.07
0.208	67	335	0.040	0.47	2.54
0.250	67	402	0.041	0.46	3.00
0.292	67	469	0.043	0.44	3.44
0.333	67	535	0.044	0.43	3.87
0.375	67	602	0.045	0.42	4.29
0.417	67	669	0.046	0.41	4.70
0.458	67	736	0.047	0.40	5.10
0.500	67	803	0.048	0.39	5.49
0.542	67	870	0.049	0.38	5.87
0.583	67	937	0.050	0.37	6.25
0.625	67	1,004	0.051	0.37	6.61
0.667	67	1,071	0.052	0.36	6.97
0.708	67	1,138	0.053	0.35	7.32
0.750	67	1,205	0.054	0.35	7.67
0.792	67	1,272	0.055	0.34	8.01
0.833	67	1,339	0.056	0.33	8.35
0.875	67	1,406	0.057	0.33	8.67
0.917	67	1,473	0.058	0.32	9.00
0.958	67	1,540	0.059	0.32	9.32
1.000	67	1,606	0.060	0.31	9.63
1.042	67	1,673	0.060	0.31	9.94
1.083	67	1,740	0.061	0.31	10.25
1.125	67	1,807	0.062	0.30	10.55
1.167	67	1,874	0.063	0.30	10.84
1.208	67	1,941	0.064	0.29	11.14
1.250	67	2,008	0.065	0.29	11.43
1.292	67	2,075	0.065	0.29	11.71
1.333	67	2,142	0.066	0.28	12.00
1.375	67	2,209	0.067	0.28	12.27
1.417	67	2,276	0.068	0.28	12.55
1.458	67	2,343	0.068	0.27	12.82
1.500	67	2,410	0.069	0.27	13.09
1.542	67	2,477	0.070	0.27	13.36
1.583	67	2,544	0.071	0.26	13.63
1.625	67	2,610	0.071	0.26	13.89
1.667	67	2,677	0.072	0.26	14.15
1.708	67	2,744	0.073	0.26	14.40
1.750	67	2,811	0.074	0.25	14.66
1.792	67	2,878	0.074	0.25	14.91
1.833	67	2,945	0.075	0.25	15.16
1.875	67	3,012	0.076	0.25	15.41
1.917	67	3,079	0.076	0.24	15.65
1.958	67	3,146	0.077	0.24	15.89
2.000	67	3,213	0.078	0.24	16.13
2.042	67	3,280	0.078	0.24	16.37
2.083	67	3,347	0.079	0.24	16.61
2.125	67	3,414	0.080	0.23	16.84
2.167	67	3,481	0.080	0.23	17.08
2.208	67	3,548	0.081	0.23	17.31
2.250	67	3,615	0.081	0.23	17.54
2.292	67	3,681	0.082	0.23	17.76
2.333	67	3,748	0.083	0.23	17.99
2.375	67	3,815	0.083	0.22	18.21
2.417	67	3,882	0.084	0.22	18.44
2.458	67	3,949	0.085	0.22	18.66
2.500	67	4,016	0.085	0.22	18.88
2.583	134	4,150	0.086	0.43	19.31
2.667	134	4,284	0.088	0.43	19.74
2.750	134	4,418	0.089	0.42	20.16
2.833	134	4,552	0.090	0.42	20.57
2.917	134	4,686	0.091	0.41	20.99
3.000	134	4,819	0.092	0.41	21.39
3.083	134	4,953	0.132	0.33	21.72
3.167	134	5,087	0.203	0.22	21.95
3.250	134	5,221	0.295	0.15	22.10
3.333	134	5,355	0.440	0.10	22.20
3.417	134	5,489	0.518	0.08	22.27
3.500	134	5,623	0.584	0.07	22.34
3.583	134	5,756	0.642	0.06	22.40
3.667	134	5,890	0.695	0.06	22.46
3.750	134	6,024	0.744	0.05	22.51
3.833	134	6,158	0.789	0.05	22.56
3.917	134	6,292	0.831	0.05	22.60
4.000	134	6,426	0.872	0.04	22.65
4.083	134	6,560	0.910	0.04	22.69
4.167	134	6,694	0.947	0.04	22.73
4.250	134	6,827	0.982	0.04	22.77
4.333	134	6,961	1.016	0.04	22.81
4.417	134	7,095	1.049	0.04	22.84
4.500	134	7,229	1.081	0.03	22.88
4.583	134	7,363	1.112	0.03	22.91
4.667	134	7,497	1.141	0.03	22.94
4.750	134	7,631	1.171	0.03	22.98
4.833	134	7,765	1.199	0.03	23.01
4.917	134	7,898	1.227	0.03	23.04
5.000	134	8,032	1.254	0.03	23.07
5.083	134	8,166	1.280	0.03	23.10
5.167	134	8,300	1.306	0.03	23.13
5.250	134	8,434	1.331	0.03	23.15
5.333	134	8,568	1.356	0.03	23.18
5.417	134	8,702	1.381	0.03	23.21
5.500	134	8,836	1.405	0.03	23.24
5.583	134	8,969	1.428	0.03	23.26
5.667	134	9,103	1.451	0.03	23.29
5.750	134	9,237	1.474	0.03	23.31
5.833	134	9,371	1.497	0.03	23.34
5.917	134	9,505	1.519	0.02	23.36
6.000	134	9,639	1.541	0.02	23.39
6.083	134	9,773	1.562	0.02	23.41
6.167	134	9,907	1.583	0.02	23.43
6.250	134	10,040	1.604	0.02	23.46
6.333	134	10,174	1.625	0.02	23.48
6.417	134	10,308	1.645	0.02	23.50
6.500	134	10,442	1.665	0.02	23.53
6.583	134	10,576	1.685	0.02	23.55
6.667	134	10,710	1.705	0.02	23.57
6.750	134	10,844	1.724	0.02	23.59
6.833	134	10,977	1.743	0.02	23.61
6.917	134	11,111	1.762	0.02	23.63
7.000	134	11,245	1.781	0.02	23.66
7.083	134	11,379	1.799	0.02	23.68
7.167	134	11,513	1.818	0.02	23.70
7.250	134	11,647	1.836	0.02	23.72
7.333	134	11,781	2.720	0.02	23.73
7.417	134	11,915	4.321	0.01	23.74
7.500	134	12,048	6.389	0.01	23.75
7.583	134	12,182	8.835	0.00	23.76
7.667	134	12,316	11.607	0.00	23.76
7.750	134	12,450	14.669	0.00	23.76

WATER QUALITY FLOW RATE TO BMP-B2

WQ FLOW RATE, BMP-A1 = 0.083 CFS

WQ FLOW RATE, BMP-B1 = 0.092 CFS

WQ FLOW RATE, DMA-B2 = 0.04 AC * 0.3 IN/HR * 0.87 = .010 CFS

WQ FLOW RATE, DMA-B4 = 0.1 AC * 0.3 IN/HR * 0.78 = 0.023 cfs

TOTAL WQ FLOW RATE TO BMP-B2 = 0.21 CFS

SIZING FOR MODULAR WETLAND SYSTEM

SPECIFICATIONS

FLOW-BASED

The MWS Linear can be used in stand-alone applications to meet treatment flow requirements. Since the MWS Linear is the only biofiltration system that can accept inflow pipes several feet below the surface, it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.

MODEL #	DIMENSIONS	WETLANDMEDIA SURFACE AREA (sq.ft.)	TREATMENT FLOW RATE (cfs)
MWS-L-4-4	4' x 4'	23	0.052
MWS-L-4-6	4' x 6'	32	0.073
MWS-L-4-8	4' x 8'	50	0.115
MWS-L-4-13	4' x 13'	63	0.144
MWS-L-4-15	4' x 15'	76	0.175
MWS-L-4-17	4' x 17'	90	0.206
MWS-L-4-19	4' x 19'	103	0.237
MWS-L-4-21	4' x 21'	117	0.268
MWS-L-6-8	7' x 9'	64	0.147
MWS-L-8-8	8' x 8'	100	0.230
MWS-L-8-12	8' x 12'	151	0.346
MWS-L-8-16	8' x 16'	201	0.462
MWS-L-8-20	9' x 21'	[illegible]	0.577
MWS-L-8-24	9' x 25'	[illegible]	0.693

COMBINED WATER QUALITY FLOW RATE TO BMP-B2 = 0.21 CFS

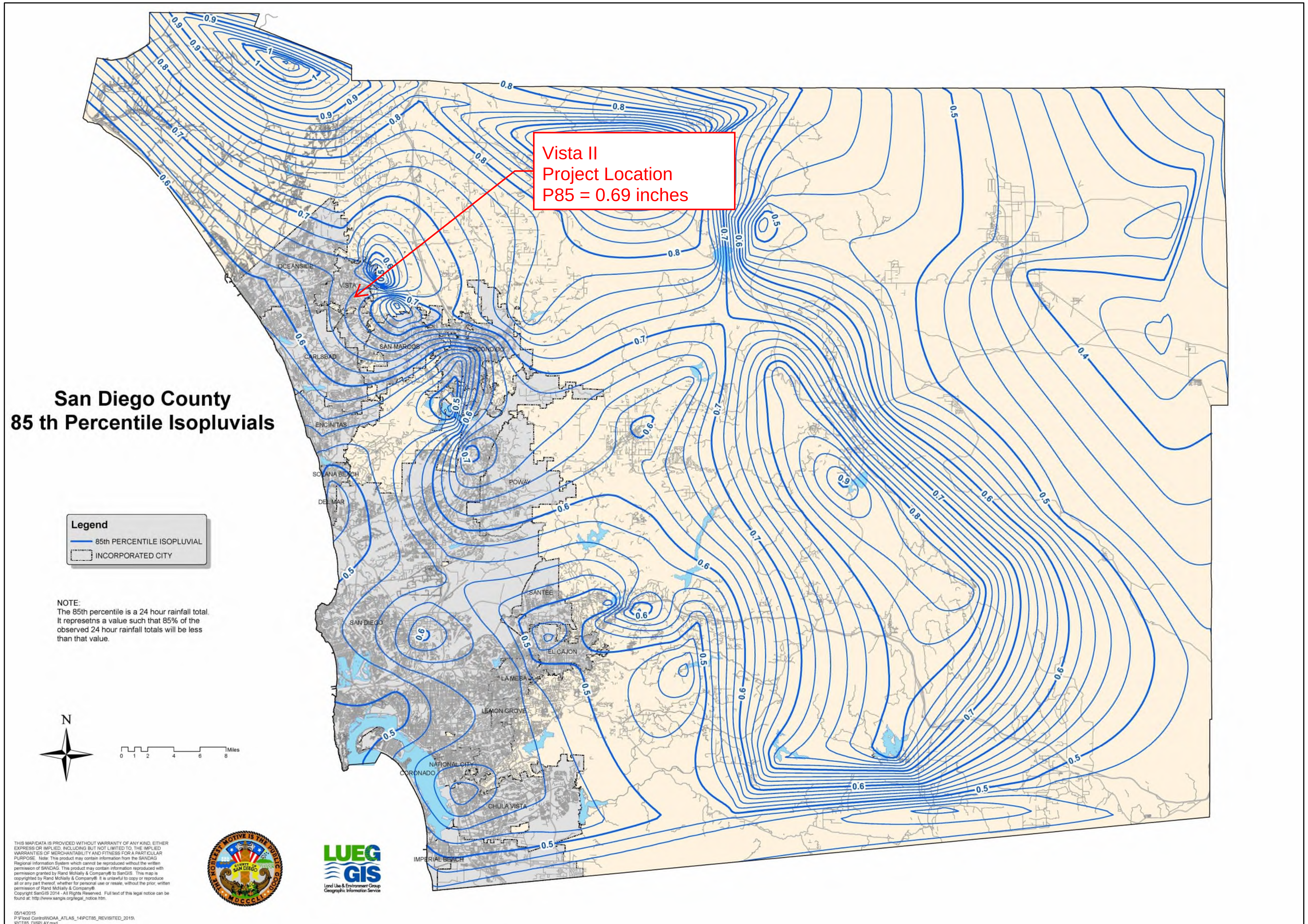
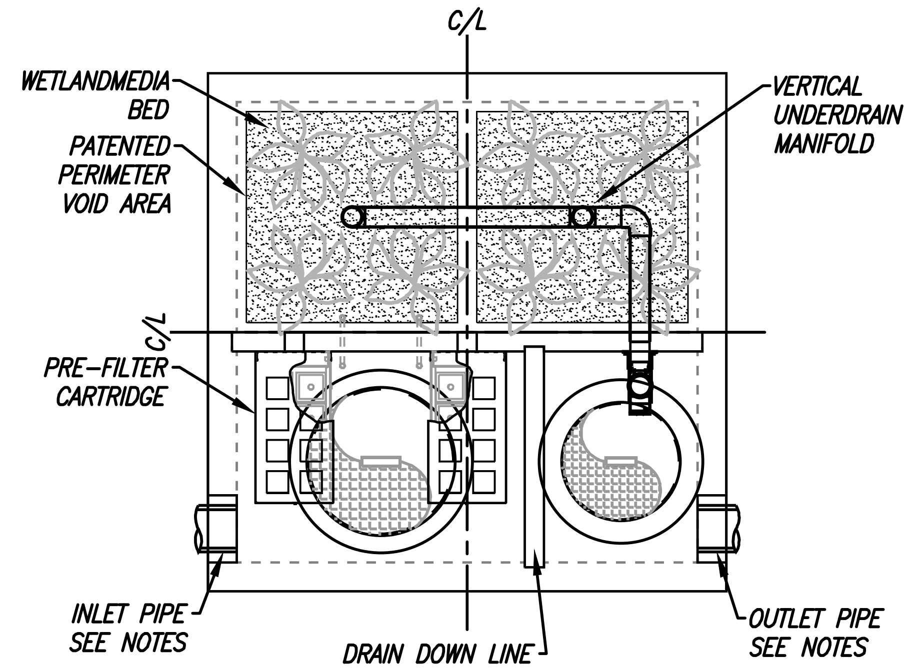


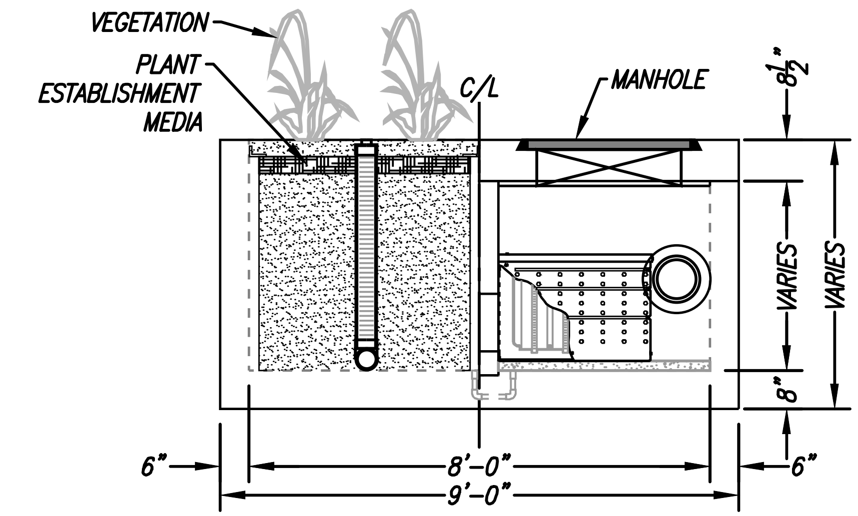
Figure B.1-1: 85th Percentile 24-hour Isopluvial Map

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
FLOW BASED (CFS)			
0.231			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



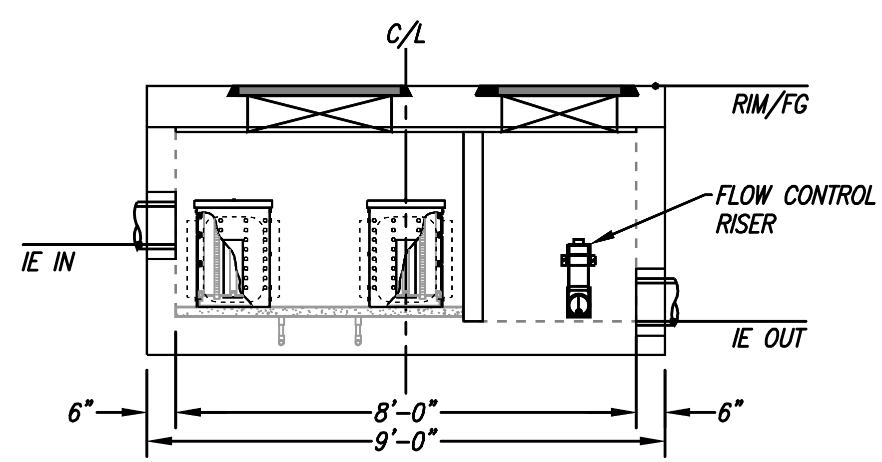
LEFT END VIEW

INSTALLATION NOTES

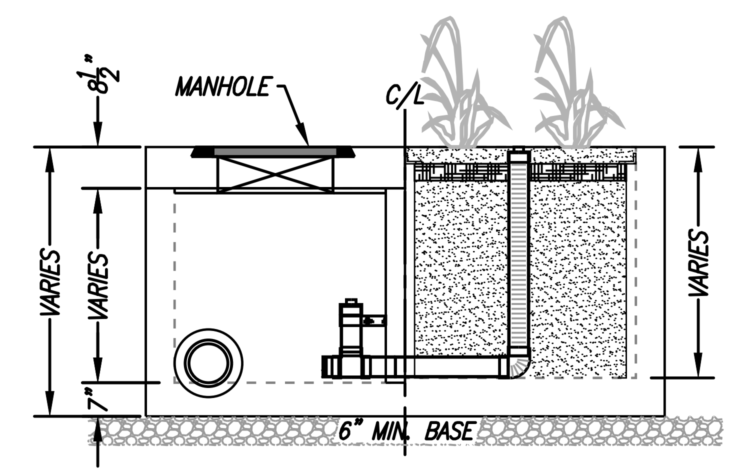
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT CONTECH.



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.231
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS
FOR PATENT INFORMATION, GO TO www.ContechES.com/IP

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com

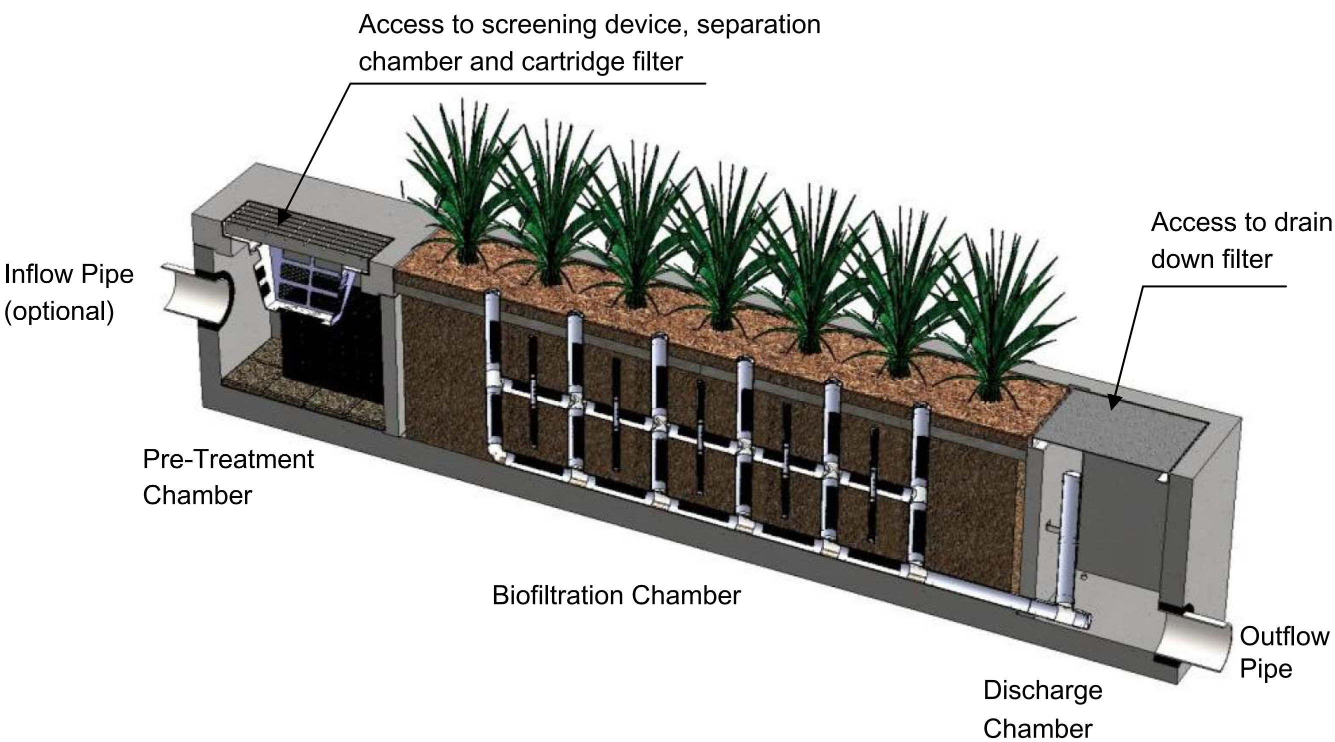
MWS-L-8-8-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

Maintenance Guidelines for
Modular Wetland System - Linear

Maintenance Summary

- Remove Trash from Screening Device – average maintenance interval is 6 to 12 months.
    - (*5 minute average service time*).
- Remove Sediment from Separation Chamber – average maintenance interval is 12 to 24 months.
    - (*10 minute average service time*).
- Replace Cartridge Filter Media – average maintenance interval 12 to 24 months.
    - (*10-15 minute per cartridge average service time*).
- Replace Drain Down Filter Media – average maintenance interval is 12 to 24 months.
    - (*5 minute average service time*).
- Trim Vegetation – average maintenance interval is 6 to 12 months.
    - (*Service time varies*).

System Diagram



Maintenance Procedures

Screening Device

1. Remove grate or manhole cover to gain access to the screening device in the Pre-Treatment Chamber. Vault type units do not have screening device. Maintenance can be performed without entry.
2. Remove all pollutants collected by the screening device. Removal can be done manually or with the use of a vacuum truck. The hose of the vacuum truck will not damage the screening device.
3. Screening device can easily be removed from the Pre-Treatment Chamber to gain access to separation chamber and media filters below. Replace grate or manhole cover when completed.

Separation Chamber

1. Perform maintenance procedures of screening device listed above before maintaining the separation chamber.
2. With a pressure washer spray down pollutants accumulated on walls and cartridge filters.
3. Vacuum out Separation Chamber and remove all accumulated pollutants. Replace screening device, grate or manhole cover when completed.

Cartridge Filters

1. Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.
2. Enter separation chamber.
3. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.
4. Remove each of 4 to 8 media cages holding the media in place.
5. Spray down the cartridge filter to remove any accumulated pollutants.
6. Vacuum out old media and accumulated pollutants.
7. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase.
8. Replace the lid and tighten down bolts. Replace screening device, grate or manhole cover when completed.

Drain Down Filter

1. Remove hatch or manhole cover over discharge chamber and enter chamber.
2. Unlock and lift drain down filter housing and remove old media block. Replace with new media block. Lower drain down filter housing and lock into place.
3. Exit chamber and replace hatch or manhole cover.

Maintenance Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.

2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.

3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

4. Entry into chambers may require confined space training based on state and local regulations.

5. No fertilizer shall be used in the Biofiltration Chamber.

6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may require irrigation.

July 2017

GENERAL USE LEVEL DESIGNATION FOR BASIC, ENHANCED, AND PHOSPHORUS TREATMENT

For the

MWS-Linear Modular Wetland

Ecology's Decision:

Based on Modular Wetland Systems, Inc. application submissions, including the Technical Evaluation Report, dated April 1, 2014, Ecology hereby issues the following use level designation:

1. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Basic treatment

   - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.

2. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Phosphorus treatment

   - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.

3. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Enhanced treatment

   - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.

4. Ecology approves the MWS - Linear Modular Wetland Stormwater Treatment System units for Basic, Phosphorus, and Enhanced treatment at the hydraulic loading rate listed above. Designers shall calculate the water quality design flow rates using the following procedures:

   - Western Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.
   - Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.
   - Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.

5. These use level designations have no expiration date but may be revoked or amended by Ecology, and are subject to the conditions specified below.

Ecology's Conditions of Use:

Applicants shall comply with the following conditions:

1. Design, assemble, install, operate, and maintain the MWS – Linear Modular Wetland Stormwater Treatment System units, in accordance with Modular Wetland Systems, Inc. applicable manuals and documents and the Ecology Decision.
2. Each site plan must undergo Modular Wetland Systems, Inc. review and approval before site installation. This ensures that site grading and slope are appropriate for use of a MWS – Linear Modular Wetland Stormwater Treatment System unit.
3. MWS – Linear Modular Wetland Stormwater Treatment System media shall conform to the specifications submitted to, and approved by, Ecology.
4. The applicant tested the MWS – Linear Modular Wetland Stormwater Treatment System with an external bypass weir. This weir limited the depth of water flowing through the media, and therefore the active treatment area, to below the root zone of the plants. This GULD applies to MWS – Linear Modular Wetland Stormwater Treatment Systems whether plants are included in the final product or not.
5. Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured filter treatment device.

   - Typically, Modular Wetland Systems, Inc. designs MWS - Linear Modular Wetland systems for a target prefilter media life of 6 to 12 months.
   - Indications of the need for maintenance include effluent flow decreasing to below the design flow rate or decrease in treatment below required levels.
   - Owners/operators must inspect MWS - Linear Modular Wetland systems for a minimum of twelve months from the start of post-construction operation to determine site-specific

maintenance schedules and requirements. You must conduct inspections monthly during the wet season, and every other month during the dry season. (According to the SWMMWW, the wet season in western Washington is October 1 to April 30. According to SWMMEW, the wet season in eastern Washington is October 1 to June 30). After the first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections.

- Conduct inspections by qualified personnel, follow manufacturer's guidelines, and use methods capable of determining either a decrease in treated effluent flowrate and/or a decrease in pollutant removal ability.
- When inspections are performed, the following findings typically serve as maintenance triggers:
  - Standing water remains in the vault between rain events, or
  - Bypass occurs during storms smaller than the design storm.
  - If excessive floatables (trash and debris) are present (but no standing water or excessive sedimentation), perform a minor maintenance consisting of gross solids removal, not prefilter media replacement.
  - Additional data collection will be used to create a correlation between pretreatment chamber sediment depth and pre-filter clogging (see *Issues to be Addressed by the Company* section below)

6. Discharges from the MWS - Linear Modular Wetland Stormwater Treatment System units shall not cause or contribute to water quality standards violations in receiving waters.

Applicant: Modular Wetland Systems, Inc.
Applicant's Address: *PO. Box 869*
Oceanside, CA 92054

Application Documents:

- *Original Application for Conditional Use Level Designation*, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., January 2011
- *Quality Assurance Project Plan*: Modular Wetland system – Linear Treatment System performance Monitoring Project, draft, January 2011.
- *Revised Application for Conditional Use Level Designation*, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., May 2011
- *Memorandum: Modular Wetland System-Linear GULD Application Supplementary Data, April 2014*
- *Technical Evaluation Report: Modular Wetland System Stormwater Treatment System Performance Monitoring, April 2014.*

Applicant's Use Level Request:

General use level designation as a Basic, Enhanced, and Phosphorus treatment device in accordance with Ecology's Guidance for Evaluating Emerging Stormwater Treatment Technologies Technology Assessment Protocol – Ecology (TAPE) January 2011 Revision.

Applicant's Performance Claims:

- The MWS – Linear Modular wetland is capable of removing a minimum of 80-percent of TSS from stormwater with influent concentrations between 100 and 200 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 50-percent of Total Phosphorus from stormwater with influent concentrations between 0.1 and 0.5 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 30-percent of dissolved Copper from stormwater with influent concentrations between 0.005 and 0.020 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 60-percent of dissolved Zinc from stormwater with influent concentrations between 0.02 and 0.30 mg/l.

Ecology Recommendations:

- Modular Wetland Systems, Inc. has shown Ecology, through laboratory and field-testing, that the MWS - Linear Modular Wetland Stormwater Treatment System filter system is capable of attaining Ecology's Basic, Total phosphorus, and Enhanced treatment goals.

Findings of Fact:

<u>Laboratory Testing</u>

The MWS-Linear Modular wetland has the:

- Capability to remove 99 percent of total suspended solids (using Sil-Co-Sil 106) in a quarter-scale model with influent concentrations of 270 mg/L.
- Capability to remove 91 percent of total suspended solids (using Sil-Co-Sil 106) in laboratory conditions with influent concentrations of 84.6 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 93 percent of dissolved Copper in a quarter-scale model with influent concentrations of 0.757 mg/L.
- Capability to remove 79 percent of dissolved Copper in laboratory conditions with influent concentrations of 0.567 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 80.5-percent of dissolved Zinc in a quarter-scale model with influent concentrations of 0.95 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 78-percent of dissolved Zinc in laboratory conditions with influent concentrations of 0.75 mg/L at a flow rate of 3.0 gpm per square foot of media.

Field Testing

- Modular Wetland Systems, Inc. conducted monitoring of an MWS-Linear (Model # MWS-L-4-13) from April 2012 through May 2013, at a transportation maintenance facility in Portland, Oregon. The manufacturer collected flow-weighted composite samples of the system's influent and effluent during 28 separate storm events. The system treated approximately 75 percent of the runoff from 53.5 inches of rainfall during the monitoring period. The applicant sized the system at 1 gpm/sq ft. (wetland media) and 3gpm/sq ft. (prefilter).
- Influent TSS concentrations for qualifying sampled storm events ranged from 20 to 339 mg/L. Average TSS removal for influent concentrations greater than 100 mg/L (n=7) averaged 85 percent. For influent concentrations in the range of 20-100 mg/L (n=18), the upper 95 percent confidence interval about the mean effluent concentration was 12.8 mg/L.
- Total phosphorus removal for 17 events with influent TP concentrations in the range of 0.1 to 0.5 mg/L averaged 65 percent. A bootstrap estimate of the lower 95 percent confidence limit (LCL95) of the mean total phosphorus reduction was 58 percent.
- The lower 95 percent confidence limit of the mean percent removal was 60.5 percent for dissolved zinc for influent concentrations in the range of 0.02 to 0.3 mg/L (n=11). The lower 95 percent confidence limit of the mean percent removal was 32.5 percent for dissolved copper for influent concentrations in the range of 0.005 to 0.02 mg/L (n=14) at flow rates up to 28 gpm (design flow rate 41 gpm). Laboratory test data augmented the data set, showing dissolved copper removal at the design flow rate of 41 gpm (93 percent reduction in influent dissolved copper of 0.757 mg/L).

Issues to be addressed by the Company:

1. Modular Wetland Systems, Inc. should collect maintenance and inspection data for the first year on all installations in the Northwest in order to assess standard maintenance requirements for various land uses in the region. Modular Wetland Systems, Inc. should use these data to establish required maintenance cycles.
2. Modular Wetland Systems, Inc. should collect pre-treatment chamber sediment depth data for the first year of operation for all installations in the Northwest. Modular Wetland Systems, Inc. will use these data to create a correlation between sediment depth and pre-filter clogging.

Technology Description:
Download at http://www.modularwetlands.com/

Contact Information:

Applicant: Zach Kent
BioClean A Forterra Company.
398 Vi9a El Centro
Oceanside, CA 92058
zach.kent@forterrabp.com

Applicant website: http://www.modularwetlands.com/

Ecology web link: http://www.ecy.wa.gov/programs/wg/stormwater/newtech/index.html

Ecology: Douglas C. Howie, P.E.
Department of Ecology
Water Quality Program
(360) 407-6444
douglas.howie@ecy.wa.gov

Revision History

Date	**Revision**
June 2011	Original use-level-designation document
September 2012	Revised dates for TER and expiration
January 2013	Modified Design Storm Description, added Revision Table, added maintenance discussion, modified format in accordance with Ecology standard
December 2013	Updated name of Applicant
April 2014	Approved GULD designation for Basic, Phosphorus, and Enhanced treatment
December 2015	Updated GULD to document the acceptance of MWS-Linear Modular Wetland installations with or without the inclusion of plants
July 2017	Revised Manufacturer Contact Information (name, address, and email)

8.0 General Requirements

- Completion of this attachment is required for all PDPs subject to hydromodification management requirements (see PDP SWQMP Form Table 5). Do not submit this attachment if exempt from Hydromodification Management requirements. Document the PDP exemption in Attachment 9.
- Submit this cover page and all required Sub-attachments for all structural hydromodification management BMPs proposed for the project.
- Constructed features must fully satisfy the requirements described in applicable BMPDM sections and appendices, and any other guidance identified by the County.
- DMA Exhibits and Construction Plans: DMAs, features, and BMPs identified and described in this attachment must be shown on DMA Exhibits and all applicable construction plans submitted for the project. See Attachment 2 for additional instruction on exhibits and plans.
- Structural BMP Certification. All structural hydromodification management BMPs documented this attachment must be certified by a registered engineer in Attachment 7, Sub-attachment 7.1.
- Structural BMP Verification. BMP installation must be verified by the County at the completion of construction. Applicants must complete an Installation Verification Form (Attachment 10).

Sub-attachments (check all that are completed)
☒ **8.1: Flow Control Facility Design** (required)[1] Submit using ☐ the Sub-attachment 8.1 cover sheet provided, or ☐ as a separate stand-alone document labeled Sub-attachment 8.1.
☒ **8.2: Hydromodification Management Points of Compliance** (required) Complete the table provided in Sub-attachment 8.2.
8.3: Geomorphic Assessment of Receiving Channels 1. Has a geomorphic assessment been performed for the receiving channel(s)? ☒ No, the low flow threshold is 0.1Q2 (default low flow threshold)
☐ Yes (provide the information below): Low flow threshold: ☐ 0.1Q2 ☐ 0.3Q2 ☐ 0.5Q2
Title: Date: Preparer:
Submit using ☐ the Sub-attachment 8.3 cover sheet provided, or ☐ as a separate stand-alone document labeled Sub-attachment 8.3.
8.4: Vector Control Plan (required if BMPs will not drain in less than 96 hours) ☐ Included with this attachment ☒ Not required

[1] Including Structural BMP Drawdown Calculations and Overflow Design Summary. See BMPDM Chapter 6 and Appendix G for additional design guidance.

8.1 Flow Control Facility Design

Insert Flow Control Facility Design behind this cover page or submit as a separate stand-alone document labeled Sub-attachment 8.1.

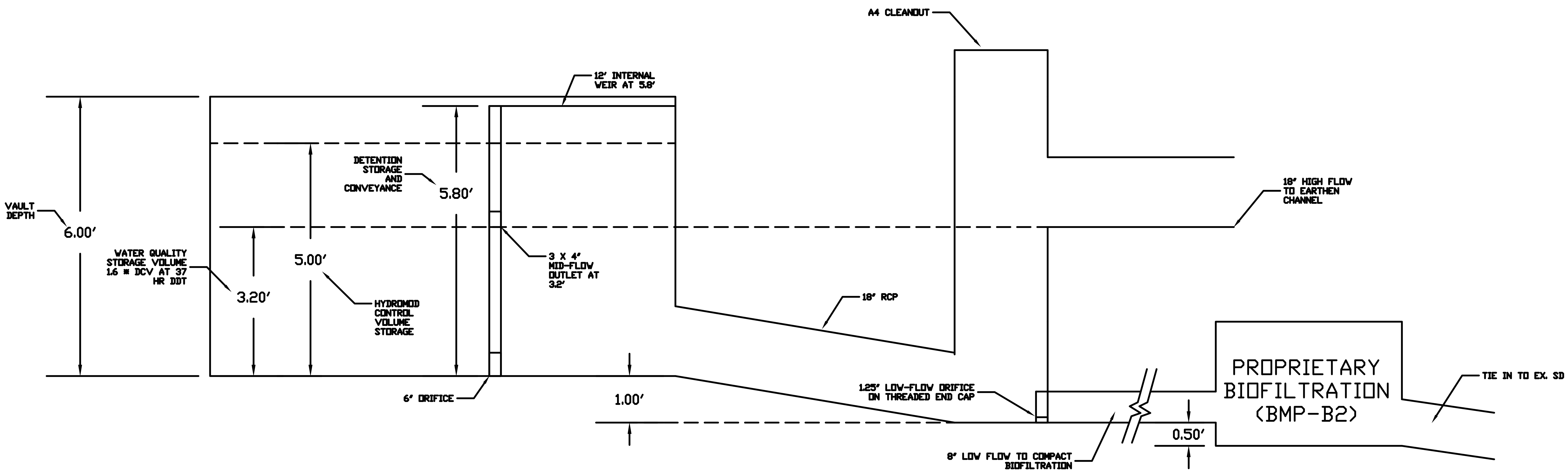
See following pages for BMP flow control outlet works.

NOTES:

THREE VAULT SYSTEM IDEALIZED AS SINGLE VAULT

COMBINED VAULT STORAGE VOLUME: 15290 CUBIC FEET

COMBINED VAULT FOOTPRINT: 2711 SQUARE FEET



NOT TO SCALE

NOTES:

1. VAULTS JOINED AS SINGLE SYSTEM AND INTENDED TO POND/DRAIN CONCURRENTLY.
2. 8" PIPE TO CONVEY WQ TREATMENT FLOWS TO PROPRIETARY BIOFILTRATION. 18" PIPE TO BYPASS BIOFILTRATION AND CONVEY Q100.

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VISTA II
BMP-A1/A2 CONFIGURATION
VAULT TO PROPRIETARY BIOFILTRATION

10/4/2023
JN-19253B

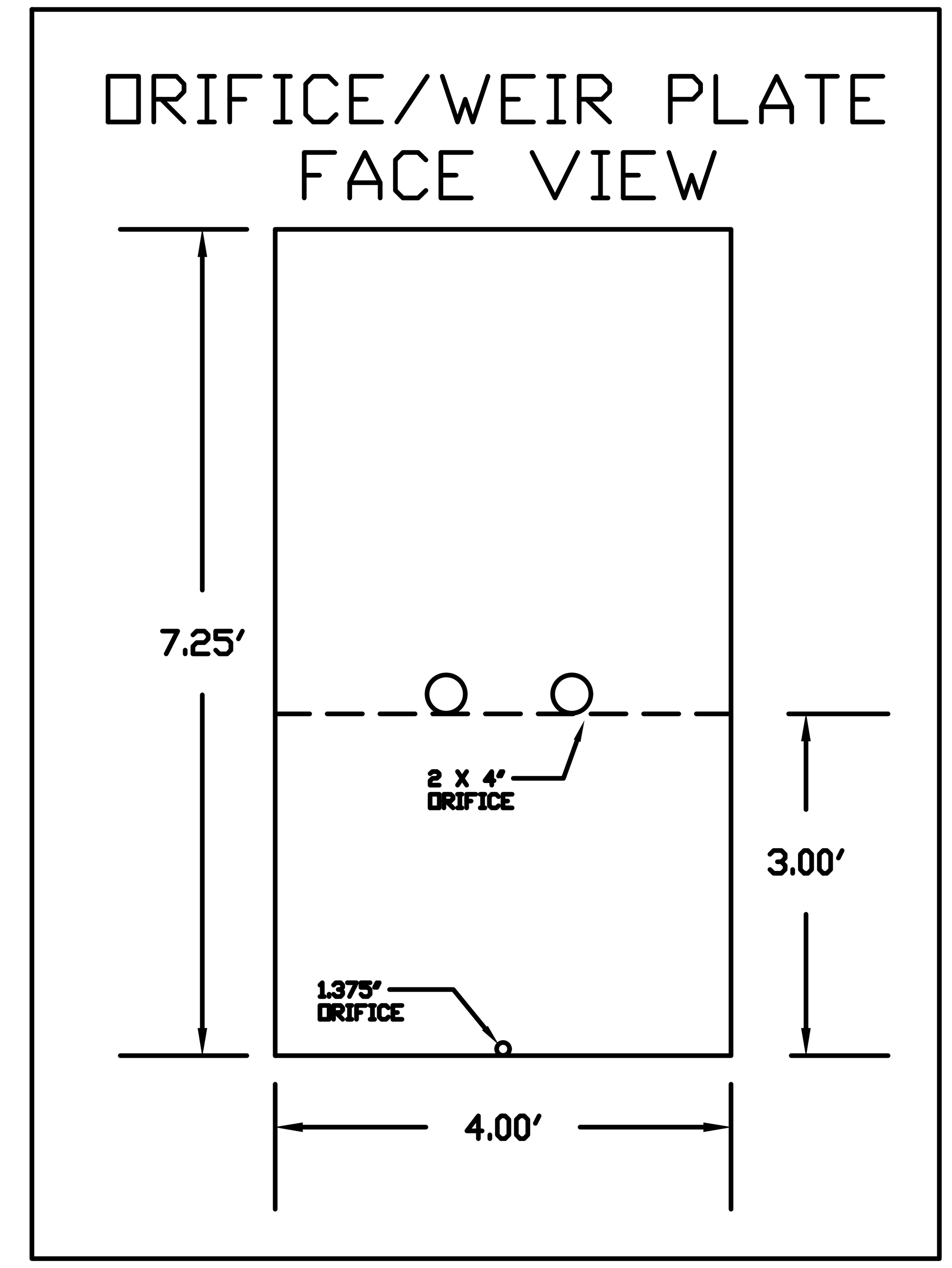
NOTES:

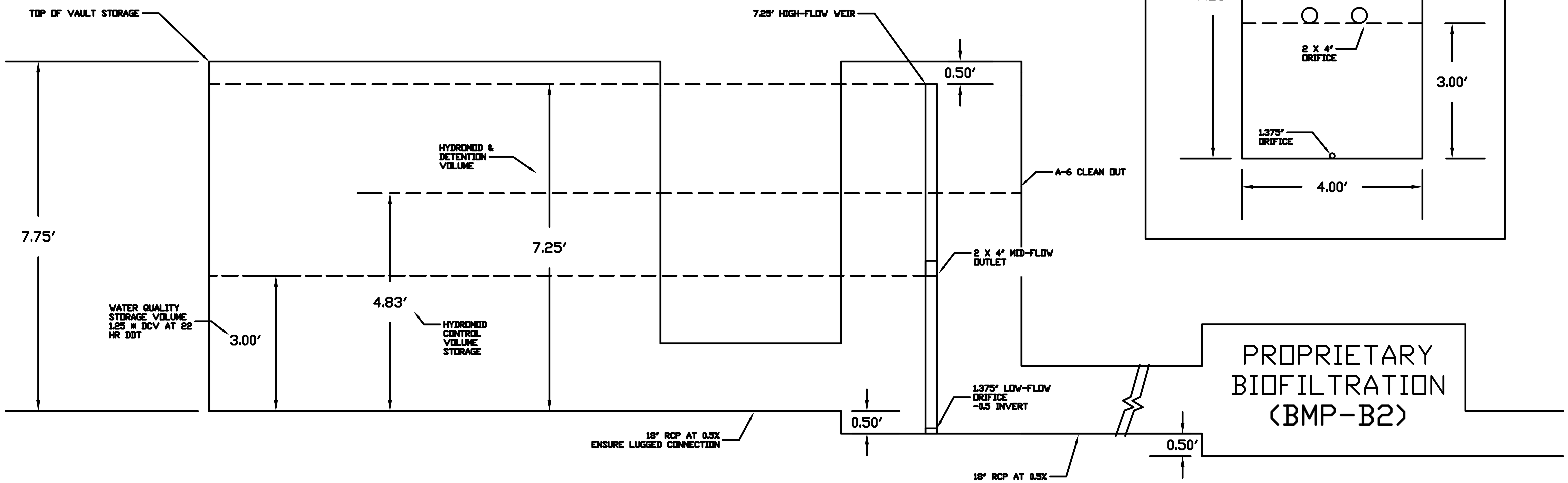
TWO VAULT SYSTEM IDEALIZED AS SINGLE VAULT

COMBINED VAULT STORAGE VOLUME: 12450 CUBIC FEET

COMBINED VAULT FOOTPRINT: 1709 SQUARE FEET

ENSURE LUGGED CONNECTION AT INTERSECTION OF VAULTS





NOT TO SCALE

NOTES:

1. VAULTS JOINED AS SINGLE SYSTEM AND INTENDED TO POND/DRAIN CONCURRENTLY.

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VISTA II
BMP-B1/B2 CONFIGURATION
VAULT TO BIOFILTRATION

10/4/2023
JN-19253B

NOT FOR CONSTRUCTION

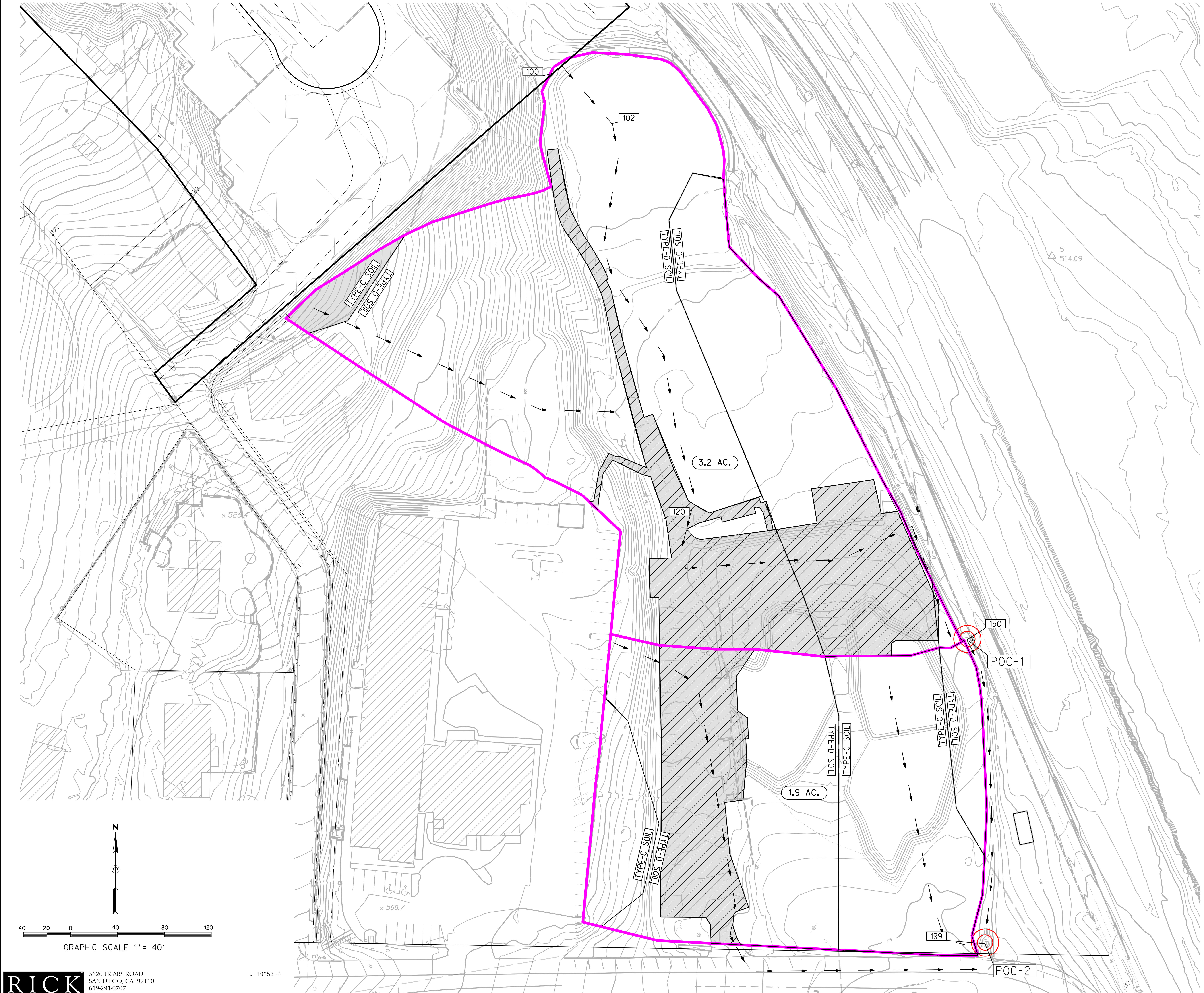
8.2 Hydromodification Management Points of Compliance

- List and describe all points of compliance (POCs) for flow control for hydromodification management.
- For each POC, provide a POC identification name or number, and a receiving channel identification name or number correlating to the project's HMP Exhibit (see Attachment 2).

POC name or #	Channel name or #	POC Description
POC-1		Channel adjacent to eastern side of project site.
POC-2		Hannalei Drive Public Storm Drain

POC-1 consists of flow from DMA-A that discharges from BMP-A1/A2 to the channel on the eastern side of the project and flow from self-mitigating areas SM-1 and SM-2 on the northern half of the project. The HMP at POC-1 ensures that the stretch of drainage channel between the BMP outlet and POC-2 meets hydromodification criteria.

POC-2 consists of flow from POC-1 combined with flow from DMA-B1/B2 that discharges out of BMP-B1/B2 and flows from SM-3 and SM-4 on the southern side of the project. This combined flow meets HMP requirements for the entirety of the project site.



LEGEND

	MAJOR DRAINAGE BASIN BOUNDARY
X.X AC.	SUBBASIN AREA
DMA-X	DMA ID
BMP X	STRUCTURAL BMP ID
	IMPERVIOUS SURFACE
	POINT OF COMPLIANCE

HYDROMODIFICATION EXHIBIT FOR VISTA II (PRE-DEVELOPMENT)

Date: April 4, 2023
Revised: October 13, 2023
Revised: February 14, 2024
J-19253-B

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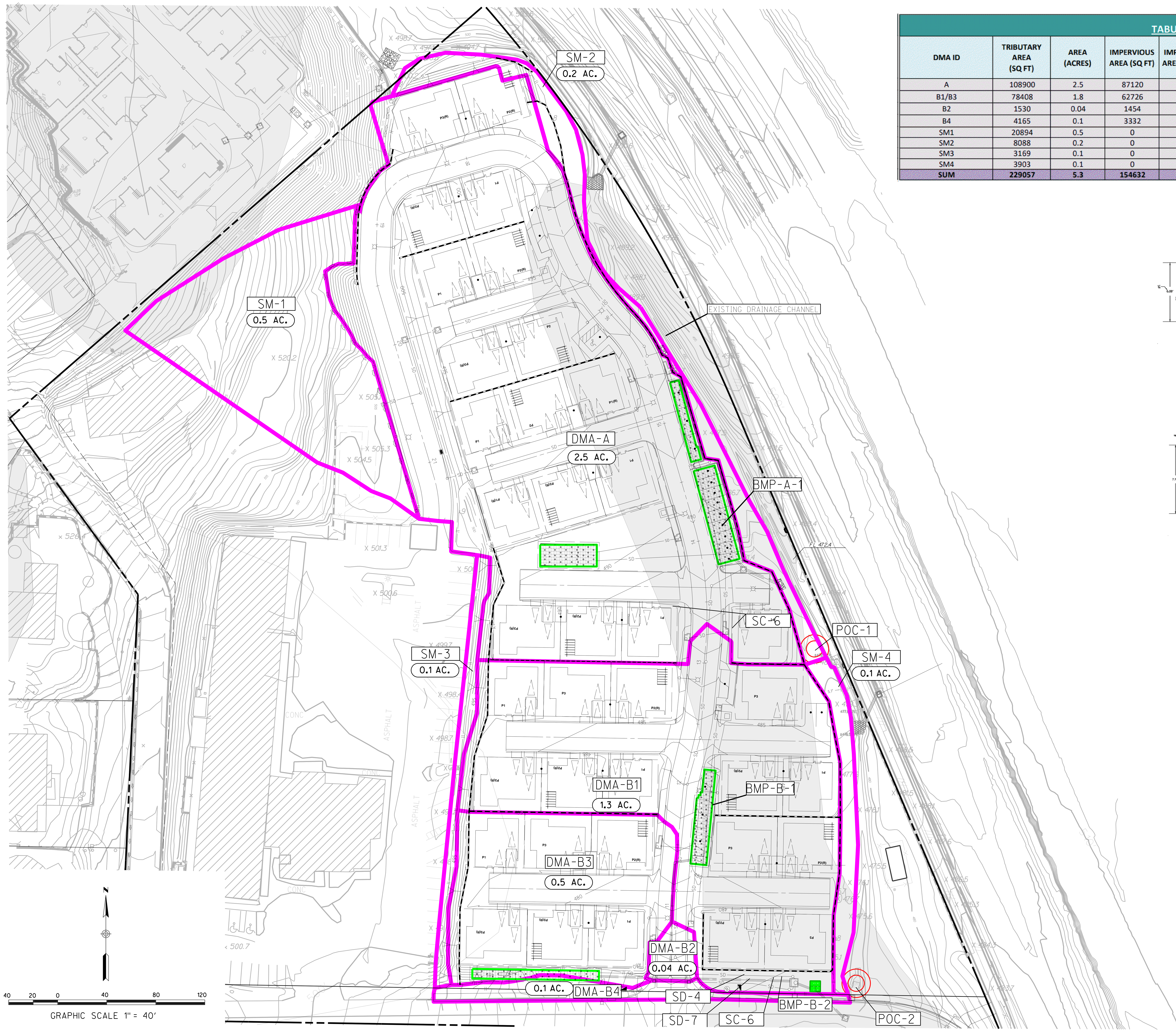
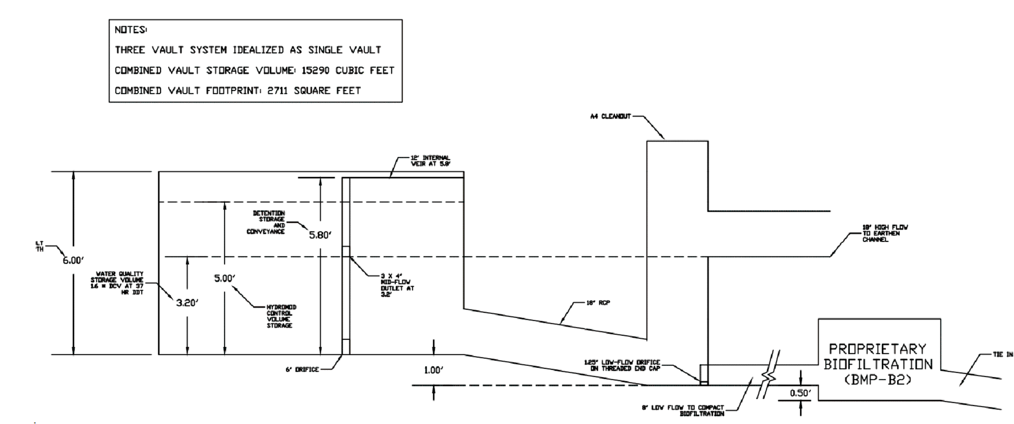
J-19253-B

NOT FOR CONSTRUCTION - EXHIBIT FOR PDPSWQMP ONLY

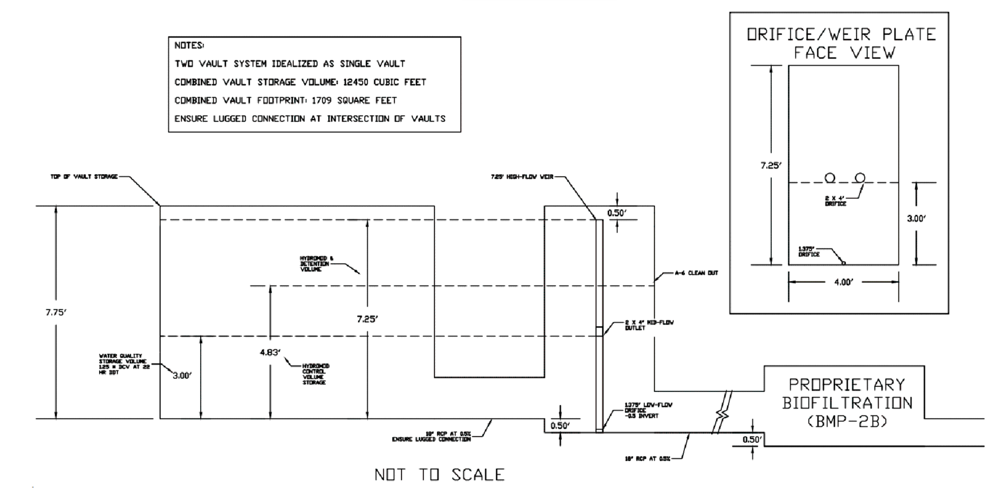


TABULAR SUMMARY OF DMAs, (VISTA II BALLFIELDS)											
DMA ID	TRIBUTARY AREA (SQ FT)	AREA (ACRES)	IMPERVIOUS AREA (SQ FT)	IMPERVIOUS AREA (ACRES)	%IMPERVIOUS	HSG	AREA WEIGHTED RUNOFF FACTOR	DCV (Cubic Feet)	TREATED BY	POLLUTANT CONTROL TYPE	WQ FLOW DRAINS TO (POC ID)
A	108900	2.5	87120	2.0	80%	D	0.78	4884	BMP-B2	Proprietary Biofil.	POC-2
B1/B3	78408	1.8	62726	1.4	80%	D	0.78	3517	BMP-B2	Proprietary Biofil.	POC-2
B2	1530	0.04	1454	0.03	95%	D	0.87	77	BMP-B2	Proprietary Biofil.	POC-2
B4	4165	0.1	3332	0.08	80%	D	0.78	187	BMP-B2	Proprietary Biofil.	POC-2
SM1	20894	0.5	0	0	0%	D	0.30	0	NA	NA	POC-1
SM2	8088	0.2	0	0	0%	D	0.30	0	NA	NA	POC-1
SM3	3169	0.1	0	0	0%	D	0.30	0	NA	NA	POC-2
SM4	3903	0.1	0	0	0%	D	0.30	0	NA	NA	POC-2
SUM	**229057**	**5.3**	**154632**	**3.5**	**68%**		**0.71**	**8664**			

BMP A



BMP B1



NOTES

- UNDERLYING HYDROLOGIC SOIL GROUP: TYPE "C" & TYPE "D"
- GROUNDWATER NOT DETECTED
- NO IMPACT FROM POTENTIAL CRITICAL COARSE SEDIMENT, PLEASE SEE THE APPROVED REPORT TITLED, "EVALUATION OF MAPPED POTENTIAL CRITICAL COURSE SEDIMENT YIELD AREAS FOR PHILLIPS SANTA FE VISTA PROJECT, CITY OF VISTA, CALIFORNIA", DATED DECEMBER 14, 2015 AND PREPARED BY RICK ENGINEERING COMPANY LOCATED IN ATTACHMENT 2B.
- REFER TO ATTACHMENT 1E FOR SIZING CALCULATIONS REGARDING THE MODULAR WETLANDS SYSTEM.
- JURISDICTIONAL BOUNDARIES ARE REFERENCED FROM SANGIS.
- BIOFILTRATION BASIN MUST BE FENCED TO PREVENT ACCESS.

SOURCE CONTROL BMP NOTES

SC-1: PREVENT ILLICIT DISCHARGES INTO THE MS4
SC-2: IDENTIFY THE STORM DRAIN SYSTEM USING STENCILING OR SIGNAGE
SC-6: ADDITIONAL BMPS BASED ON RUNOFF SOURCES
- ON-SITE STORM DRAIN INLETS
- LANDSCAPE/OUTDOOR PESTICIDE USE
- SIDEWALKS

SITE DESIGN BMP NOTES

SD-1: MAINTAIN NATURAL DRAINAGE PATHWAYS AND HYDROLOGIC FEATURES
SD-2: CONSERVE NATURAL AREAS, SOILS & VEGETATION
SD-3: MINIMIZE IMPERVIOUS AREA
SD-4: MINIMIZE SOIL COMPACTION
SD-7: LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES

LEGEND

(magenta line)	DRAINAGE MANAGEMENT AREA (DMA) BOUNDARY
XX.X AC.	TRIBUTARY AREA TO DRAINAGE MANAGEMENT AREA
DMA-X	DRAINAGE MANAGEMENT AREA ID
BMP X	STRUCTURAL BMP ID
	LOCATION OF COMPACT BIOFILTRATION BMP
	LOCATION OF UNDERGROUND VAULT
SD-X	SOURCE CONTROL & SITE-DESIGN BMP
→ → →	DRAINAGE FLOW PATH
	POINT OF COMPLIANCE (POC)

DRAINAGE MANAGEMENT AREA EXHIBIT FOR VISTA II

Date: April 7, 2023
Revised: October 13, 2023
Revised: February 27, 2024

J-19253B

RICK ENGINEERING COMPANY
San Diego
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SAN DIEGO, CA 92110
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(FAX) 619-291-4165
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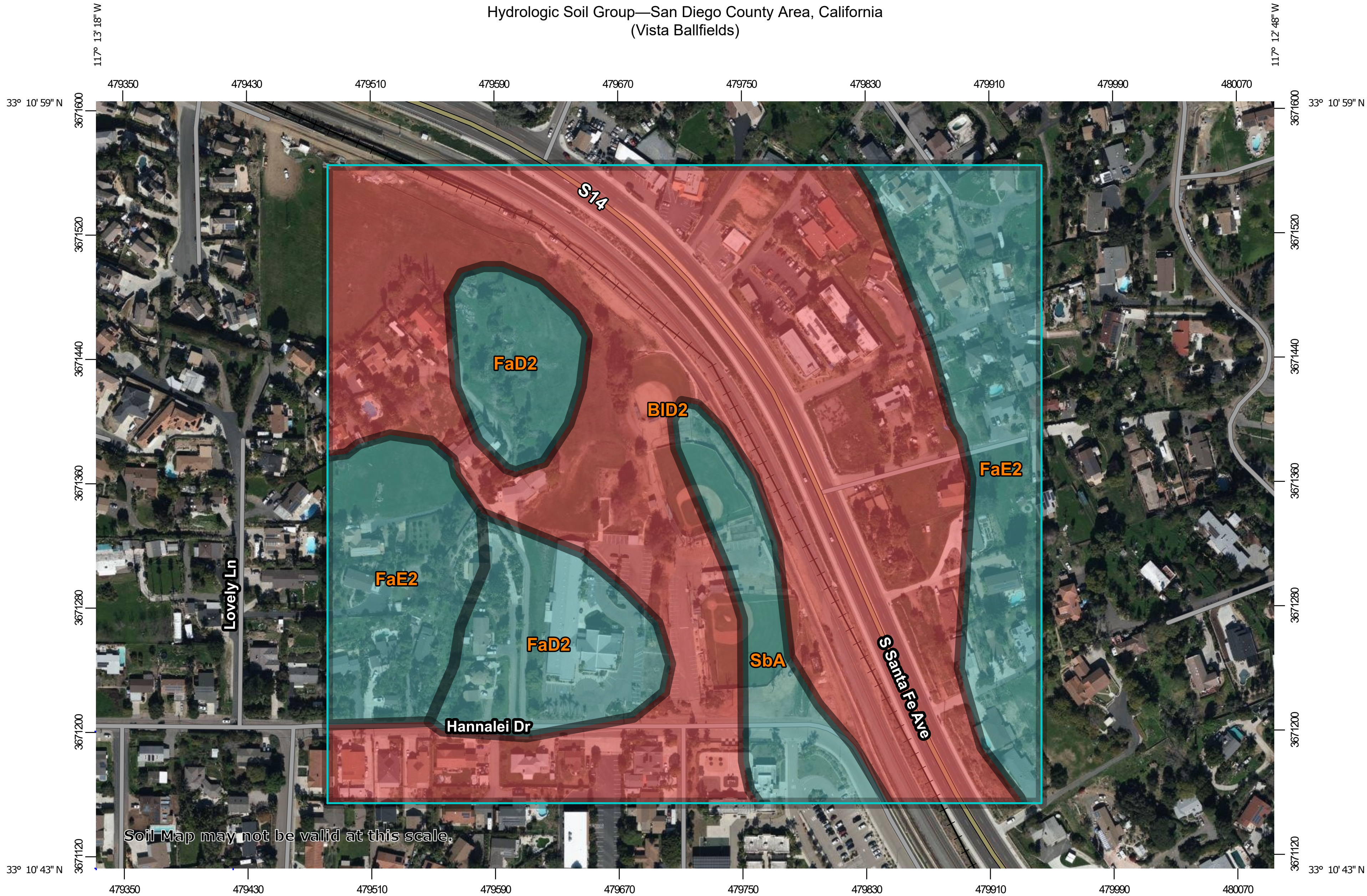
Riverside · Orange · Sacramento · San Luis Obispo · Phoenix · Tucson · Denver

J-19253B

NOT FOR CONSTRUCTION - EXHIBIT FOR PDP SWQMP

Hydrologic Soil Group—San Diego County Area, California
(Vista Ballfields)



Map Scale: 1:3,480 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 50, 100, 200, 300

Feet: 0, 150, 300, 600, 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 15, May 27, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 24, 2020—Feb 12, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

SWMM MODEL INPUTS
PRE-PROJECT

- POC-1

  -SCHEMATIC

  -PRE-DEVELOPMENT OUTPUT

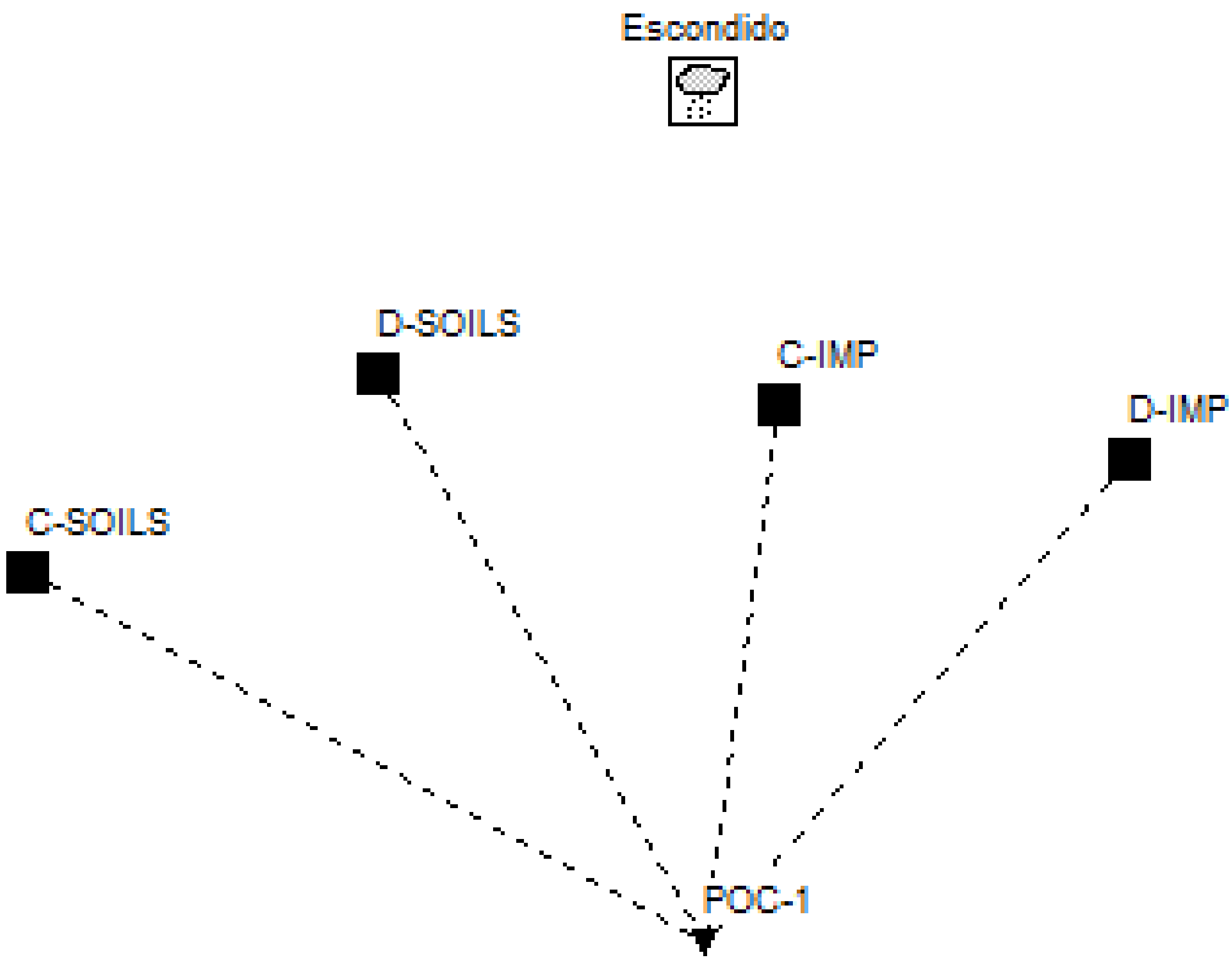
  -RATING CURVE

  -STORAGE CURVE

  -DRAWDOWN TIME

- NRCS Web Soil Survey Hydrologic Soil Group Report

POC-1
PRE-PROJECT



```
[TITLE]
;;Project Title/Notes
VISTA BALLFIELDS
POC-1 PRE-DEVELOPMENT CONDITION
J-19253 B

[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           09/24/1964
START_TIME           13:00:00
REPORT_START_DATE    09/24/1964
REPORT_START_TIME    13:00:00
END_DATE             05/23/2008
END_TIME             22:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
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          .06    .08    .11    .15    .17    .19    .19    .18    .15    .11    .08    .06
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
Escondido        INTENSITY 1:00     1.0      TIMESERIES TS-Escondido

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ----------------
C-SOILS          Escondido        POC-1            .7       0        514      8        0
D-SOILS          Escondido        POC-1            1.8      0        797      9        0
C-IMP            Escondido        POC-1            .3       0        172      3        0
D-IMP            Escondido        POC-1            .4       0        191      3        0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
C-SOILS          0.012      .15        0.05       0.1        25         OUTLET
D-SOILS          0.012      .15        0.05       0.1        25         OUTLET
C-IMP            0.012      0.15       0.05       0.1        25         OUTLET
D-IMP            0.012      0.15       0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
C-SOILS          6          0.1        0.31
D-SOILS          9          0.025      .3
C-IMP            6          0.075      .31
D-IMP            9          .01875     .3

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

```
[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
TS-Escondido     FILE "escondido.dat"

[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
;;-------------- ------------------ ------------------
POC-1            4655.597           5166.052

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

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
C-SOILS          2887.453           6110.086
C-SOILS          2887.453           6110.086
C-SOILS          2899.754           6110.086
C-SOILS          2912.054           6171.587
D-SOILS          3806.888           6642.066
C-IMP            4848.024           6565.350
C-IMP            4848.024           6565.350
D-IMP            5759.878           6423.506
D-IMP            5759.878           6423.506

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Escondido        4661.747           7367.774
```

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)
--------------------------------------------------------------

VISTA BALLFIELDS
POC-1 PRE-DEVELOPMENT CONDITION
J-19253 B


*********************************************************
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 ........... NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Starting Date ............ 09/24/1964 13:00:00
Ending Date .............. 05/23/2008 22:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 04:00:00


**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation ......       162.965       611.120
Evaporation Loss .........         5.305        19.893
Infiltration Loss ........       129.129       484.234
Surface Runoff ...........        31.459       117.972
Final Storage ............         0.000         0.000
Continuity Error (%) .....        -1.796


**************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......        31.459        10.251
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........        31.459        10.251
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 ......         0.000         0.000
Continuity Error (%) .....         0.000


***************************
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
----------------------------------------------------------------------------------------------------------
C-SOILS                    611.12       0.00       5.38     555.02      53.78        1.02     0.52   0.088
D-SOILS                    611.12       0.00      25.24     459.08     141.03        6.89     1.47   0.231
C-IMP                      611.12       0.00       7.18     550.25      56.89        0.46     0.23   0.093
D-IMP                      611.12       0.00      30.75     424.02     172.37        1.87     0.33   0.282


Analysis begun on:  Tue Oct 03 09:18:59 2023
Analysis ended on:  Tue Oct 03 09:19:10 2023
Total elapsed time: 00:00:11
```

SWMM MODEL INPUTS
POST-PROJECT

- POC-1

  - **-SCHEMATIC**

  - **-PRE-DEVELOPMENT OUTPUT**

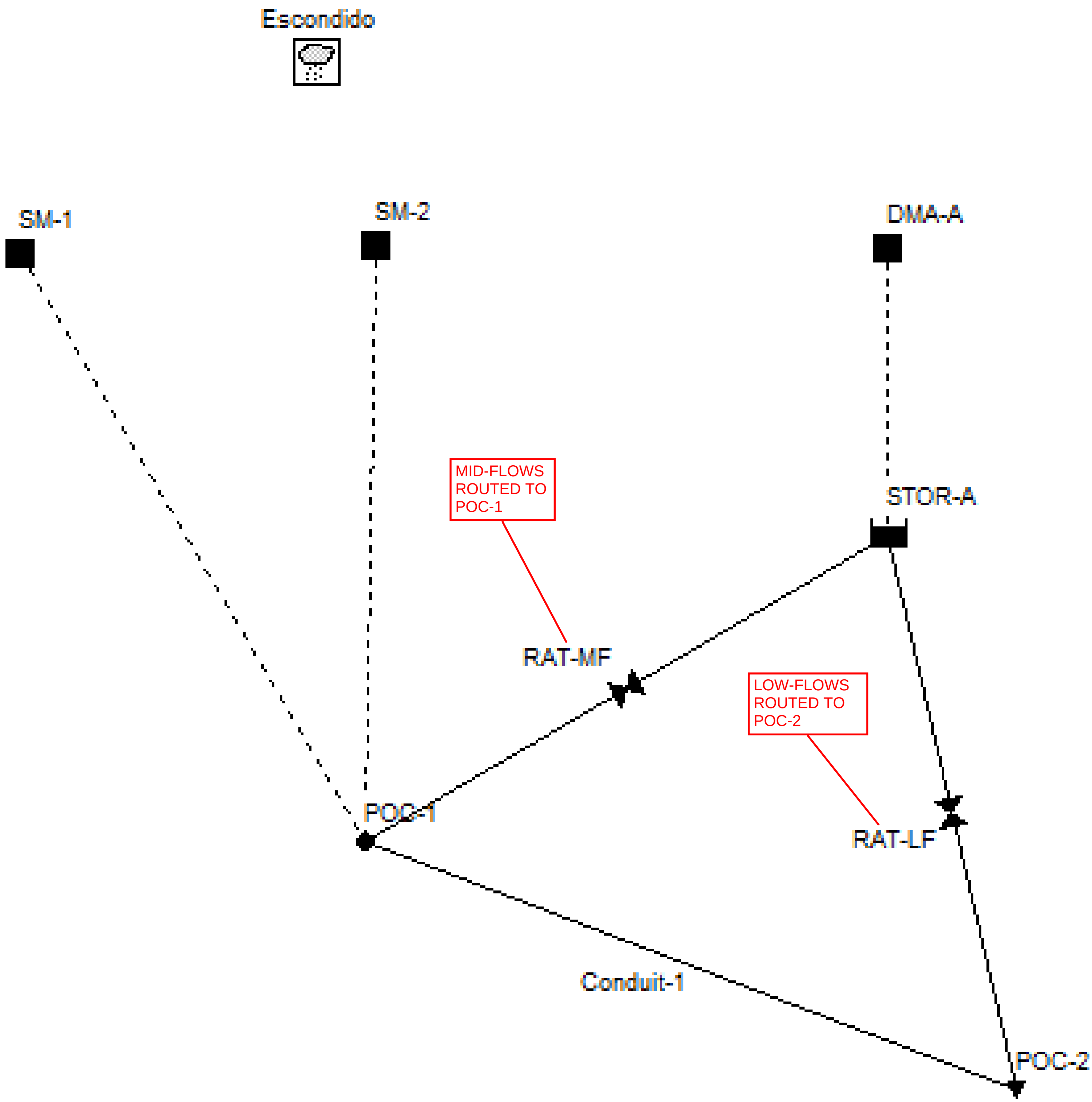
  - **-RATING CURVE**

  - **-STORAGE CURVE**

  - **-DRAWDOWN TIME**

- NRCS Web Soil Survey Hydrologic Soil Group Report

POC-1
POST-PROJECT



```
[TITLE]
;;Project Title/Notes
VISTA BALLFIELDS
POC-1 POST-PROJECT CONDITION
J-19253B

[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           09/24/1964
START_TIME           13:00:00
REPORT_START_DATE    09/24/1964
REPORT_START_TIME    13:00:00
END_DATE             05/23/2008
END_TIME             22:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
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          .06    .08    .11    .15    .17    .19    .19    .18    .15    .11    .08    .06
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
Escondido        VOLUME    1:00     1.0      TIMESERIES TS-Escondido

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack

;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
----------------
DMA-A            Escondido        STOR-A           2.5      80       1089     2.8      0

SM-1             Escondido        POC-1            .5       0        209      15       0

SM-2             Escondido        POC-1            .2       0        162      3        0
```

```
[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
DMA-A            .012       .15        0.05       .1         25         OUTLET
SM-1             .012       .15        0.05       .1         25         OUTLET
SM-2             .012       .15        0.05       .1         25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
DMA-A            9          .019       .3
SM-1             9          .025       .3
SM-2             9          .025       .3

[LID_CONTROLS]
;;Name           Type/Layer Parameters
;;-------------- ---------- ----------
Basin-A          BC
Basin-A          SURFACE    6.32       0.0        0          0          5
Basin-A          SOIL       21         0.4        0.2        0.1        5          5          1.5
Basin-A          STORAGE    45         0.67       0          0
Basin-A          DRAIN      .0526      0.5        0          6

[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSat    FromImp    ToPerv     RptFile
              DrainTo
;;-------------- ---------------- ------- ---------- ---------- ---------- ---------- ----------
------------------------ ----------------

[JUNCTIONS]
;;Name           Elevation  MaxDepth   InitDepth  SurDepth   Aponded
;;-------------- ---------- ---------- ---------- ---------- ----------
POC-1            0          0          0          0          0

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

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params            N/A      Fevap
Psi      Ksat     IMD
;;-------------- -------- ---------- ----------- ---------- ---------------------------- -------- --------
        -------- --------
STOR-A           0        10         0          TABULAR    STOR-A                       0        0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset   OutOffset  InitFlow
MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ----------
----------
Conduit-1        POC-1            POC-2            400        0.01       0          0          0          0


[OUTLETS]
;;Name           From Node        To Node          Offset     Type            QTable/Qcoeff    Qexpon
Gated
;;-------------- ---------------- ---------------- ---------- --------------- ---------------- ----------
--------
RAT-MF           STOR-A           POC-1            0          TABULAR/DEPTH   RAT-MF
NO
RAT-LF           STOR-A           POC-2            0          TABULAR/DEPTH   RAT-LF
NO
```

```
[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ---------- ----------
Conduit-1        DUMMY        0                0          0          0          1

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
RAT-MF           Rating     0.00       0.000
RAT-MF                      0.04       0.000
RAT-MF                      0.08       0.000
RAT-MF                      0.13       0.000
RAT-MF                      0.17       0.000
RAT-MF                      0.21       0.000
RAT-MF                      0.25       0.000
RAT-MF                      0.29       0.000
RAT-MF                      0.33       0.000
RAT-MF                      0.38       0.000
RAT-MF                      0.42       0.000
RAT-MF                      0.46       0.000
RAT-MF                      0.50       0.000
RAT-MF                      0.54       0.000
RAT-MF                      0.58       0.000
RAT-MF                      0.63       0.000
RAT-MF                      0.67       0.000
RAT-MF                      0.71       0.000
RAT-MF                      0.75       0.000
RAT-MF                      0.79       0.000
RAT-MF                      0.83       0.000
RAT-MF                      0.88       0.000
RAT-MF                      0.92       0.000
RAT-MF                      0.96       0.000
RAT-MF                      1.00       0.000
RAT-MF                      1.04       0.000
RAT-MF                      1.08       0.000
RAT-MF                      1.13       0.000
RAT-MF                      1.17       0.000
RAT-MF                      1.21       0.000
RAT-MF                      1.25       0.000
RAT-MF                      1.29       0.000
RAT-MF                      1.33       0.000
RAT-MF                      1.38       0.000
RAT-MF                      1.42       0.000
RAT-MF                      1.46       0.000
RAT-MF                      1.50       0.000
RAT-MF                      1.54       0.000
RAT-MF                      1.58       0.000
RAT-MF                      1.63       0.000
RAT-MF                      1.67       0.000
RAT-MF                      1.71       0.000
RAT-MF                      1.75       0.000
RAT-MF                      1.79       0.000
RAT-MF                      1.83       0.000
RAT-MF                      1.88       0.000
RAT-MF                      1.92       0.000
RAT-MF                      1.96       0.000
RAT-MF                      2.00       0.000
RAT-MF                      2.04       0.000
RAT-MF                      2.08       0.000
RAT-MF                      2.13       0.000
RAT-MF                      2.17       0.000
RAT-MF                      2.21       0.000
RAT-MF                      2.25       0.000
RAT-MF                      2.29       0.000
RAT-MF                      2.33       0.000
```

RAT-MF		2.38	0.000
RAT-MF		2.42	0.000
RAT-MF		2.46	0.000
RAT-MF		2.50	0.000
RAT-MF		2.58	0.000
RAT-MF		2.67	0.000
RAT-MF		2.75	0.000
RAT-MF		2.83	0.000
RAT-MF		2.92	0.000
RAT-MF		3.00	0.000
RAT-MF		3.08	0.000
RAT-MF		3.17	0.000
RAT-MF		3.25	0.027
RAT-MF		3.33	0.117
RAT-MF		3.42	0.242
RAT-MF		3.50	0.394
RAT-MF		3.58	0.587
RAT-MF		3.67	0.690
RAT-MF		3.75	0.780
RAT-MF		3.83	0.861
RAT-MF		3.92	0.935
RAT-MF		4.00	1.003
RAT-MF		4.08	1.067
RAT-MF		4.17	1.127
RAT-MF		4.25	1.185
RAT-MF		4.33	1.239
RAT-MF		4.42	1.292
RAT-MF		4.50	1.342
RAT-MF		4.58	1.390
RAT-MF		4.67	1.437
RAT-MF		4.75	1.483
RAT-MF		4.83	1.527
RAT-MF		4.92	1.569
RAT-MF		5.00	1.611
RAT-MF		5.08	1.652
RAT-MF		5.17	1.691
RAT-MF		5.25	1.730
RAT-MF		5.33	1.768
RAT-MF		5.42	1.805
RAT-MF		5.50	1.841
RAT-MF		5.58	1.877
RAT-MF		5.67	1.912
RAT-MF		5.75	1.946
RAT-MF		5.83	2.199
RAT-MF		5.92	3.448
RAT-MF		6.00	5.266
;			
RAT-LF	Rating	0.00	0.040
RAT-LF		0.04	0.040
RAT-LF		0.08	0.041
RAT-LF		0.13	0.041
RAT-LF		0.17	0.042
RAT-LF		0.21	0.043
RAT-LF		0.25	0.044
RAT-LF		0.29	0.045
RAT-LF		0.33	0.045
RAT-LF		0.38	0.046
RAT-LF		0.42	0.047
RAT-LF		0.46	0.048
RAT-LF		0.50	0.048
RAT-LF		0.54	0.049
RAT-LF		0.58	0.050
RAT-LF		0.63	0.051
RAT-LF		0.67	0.051
RAT-LF		0.71	0.052

RAT-LF	0.75	0.053
RAT-LF	0.79	0.053
RAT-LF	0.83	0.054
RAT-LF	0.88	0.055
RAT-LF	0.92	0.055
RAT-LF	0.96	0.056
RAT-LF	1.00	0.056
RAT-LF	1.04	0.057
RAT-LF	1.08	0.058
RAT-LF	1.13	0.058
RAT-LF	1.17	0.059
RAT-LF	1.21	0.060
RAT-LF	1.25	0.060
RAT-LF	1.29	0.061
RAT-LF	1.33	0.061
RAT-LF	1.38	0.062
RAT-LF	1.42	0.062
RAT-LF	1.46	0.063
RAT-LF	1.50	0.064
RAT-LF	1.54	0.064
RAT-LF	1.58	0.065
RAT-LF	1.63	0.065
RAT-LF	1.67	0.066
RAT-LF	1.71	0.066
RAT-LF	1.75	0.067
RAT-LF	1.79	0.067
RAT-LF	1.83	0.068
RAT-LF	1.88	0.068
RAT-LF	1.92	0.069
RAT-LF	1.96	0.069
RAT-LF	2.00	0.070
RAT-LF	2.04	0.070
RAT-LF	2.08	0.071
RAT-LF	2.13	0.071
RAT-LF	2.17	0.072
RAT-LF	2.21	0.072
RAT-LF	2.25	0.073
RAT-LF	2.29	0.073
RAT-LF	2.33	0.074
RAT-LF	2.38	0.074
RAT-LF	2.42	0.075
RAT-LF	2.46	0.075
RAT-LF	2.50	0.076
RAT-LF	2.58	0.077
RAT-LF	2.67	0.077
RAT-LF	2.75	0.078
RAT-LF	2.83	0.079
RAT-LF	2.92	0.080
RAT-LF	3.00	0.081
RAT-LF	3.08	0.082
RAT-LF	3.17	0.083
RAT-LF	3.25	0.084
RAT-LF	3.33	0.084
RAT-LF	3.42	0.085
RAT-LF	3.50	0.086
RAT-LF	3.58	0.087
RAT-LF	3.67	0.088
RAT-LF	3.75	0.088
RAT-LF	3.83	0.089
RAT-LF	3.92	0.090
RAT-LF	4.00	0.091
RAT-LF	4.08	0.092
RAT-LF	4.17	0.092
RAT-LF	4.25	0.093
RAT-LF	4.33	0.094

```
RAT-LF                     4.42       0.095
RAT-LF                     4.50       0.095
RAT-LF                     4.58       0.096
RAT-LF                     4.67       0.097
RAT-LF                     4.75       0.098
RAT-LF                     4.83       0.098
RAT-LF                     4.92       0.099
RAT-LF                     5.00       0.100
RAT-LF                     5.08       0.100
RAT-LF                     5.17       0.101
RAT-LF                     5.25       0.102
RAT-LF                     5.33       0.102
RAT-LF                     5.42       0.103
RAT-LF                     5.50       0.104
RAT-LF                     5.58       0.104
RAT-LF                     5.67       0.105
RAT-LF                     5.75       0.106
RAT-LF                     5.83       0.106
RAT-LF                     5.92       0.107
RAT-LF                     6.00       0.108
;
STOR-A           Storage   0          2548
STOR-A                     6          2548

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
TS-Escondido     FILE "escondido.dat"

[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
;;-------------- ------------------ ------------------
POC-1            4108.409           6524.823
POC-2            6610.942           5572.442
STOR-A           6114.488           7700.101

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

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
DMA-A            6114.488           8804.458
DMA-A            6114.488           8804.458
SM-1             2781.155           8784.195
SM-2             4148.936           8814.590

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
```

Escondido	3936.170	9503.546

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)
--------------------------------------------------------------

VISTA BALLFIELDS
POC-1 POST-PROJECT CONDITION
J-19253B

WARNING 04: minimum elevation drop used for Conduit Conduit-1

*********************************************************
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 ............ 09/24/1964 13:00:00
Ending Date .............. 05/23/2008 22:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 04:00:00
Routing Time Step ........ 60.00 sec


**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation ......       162.965       611.120
Evaporation Loss .........        16.184        60.689
Infiltration Loss ........        44.270       166.012
Surface Runoff ...........       105.593       395.972
Final Storage ............         0.006         0.021
Continuity Error (%) .....        -1.894


**************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......       105.593        34.409
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........       105.677        34.436
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 ......         0.000         0.000
Continuity Error (%) .....        -0.080


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


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :    59.00 sec
Average Time Step           :    60.00 sec
Maximum Time Step           :    60.00 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
----------------------------------------------------------------------------------------------------------
DMA-A                  611.12       0.00      71.51      84.30     467.19       31.71     2.10   0.764
SM-1                   611.12       0.00      22.02     457.68     141.87        1.93     0.41   0.232
SM-2                   611.12       0.00      22.05     458.25     141.05        0.77     0.16   0.231

******************
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
---------------------------------------------------------------------------------
POC-1                JUNCTION     0.00     0.00     0.00      0  00:00       0.00
POC-2                OUTFALL      0.00     0.00     0.00      0  00:00       0.00
STOR-A               STORAGE      0.05     4.68     4.68  10332  04:06       4.63

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

-------------------------------------------------------------------------------------------------
                                Maximum  Maximum                  Lateral       Total        Flow
                                Lateral    Total  Time of Max      Inflow      Inflow     Balance
                                 Inflow   Inflow   Occurrence      Volume      Volume       Error
Node                 Type           CFS      CFS  days hr:min    10^6 gal    10^6 gal     Percent
-------------------------------------------------------------------------------------------------
POC-1                JUNCTION      0.57     1.99  10332  04:01       2.69        6.22       0.000
POC-2                OUTFALL       0.00     2.09  10332  04:01          0        34.4       0.000
STOR-A               STORAGE       2.10     2.10  15675  18:01       31.7        31.7      -0.086

*********************
Node Flooding Summary
*********************

No nodes were flooded.

**********************
Storage Volume Summary
**********************

--------------------------------------------------------------------------------------------------
                      Average     Avg  Evap Exfil       Maximum     Max    Time of Max    Maximum
                       Volume    Pcnt  Pcnt  Pcnt        Volume    Pcnt     Occurrence    Outflow
Storage Unit          1000 ft3    Full  Loss  Loss      1000 ft3    Full    days hr:min        CFS
--------------------------------------------------------------------------------------------------
STOR-A                  0.119       0     0     0        11.919      47    10332  04:06       1.54

***********************
Outfall Loading Summary
***********************

-----------------------------------------------------------
                      Flow       Avg       Max       Total
                      Freq      Flow      Flow      Volume
Outfall Node          Pcnt       CFS       CFS    10^6 gal
-----------------------------------------------------------
POC-2                 5.20      0.06      2.09      34.434
-----------------------------------------------------------
System                5.20      0.06      2.09      34.434

********************
Link Flow Summary
********************

-----------------------------------------------------------------------------
                               Maximum  Time of Max   Maximum    Max/    Max/
```

Link	Type	|Flow| CFS	Occurrence days hr:min	|Veloc| ft/sec	Full Flow	Full Depth
Conduit-1	DUMMY	1.99	10332 04:01			
RAT-MF	DUMMY	1.44	10332 04:06			
RAT-LF	DUMMY	0.10	10332 04:06			

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Tue Feb 06 09:03:16 2024
Analysis ended on: Tue Feb 06 09:03:34 2024
Total elapsed time: 00:00:18

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BMP A1 (Stage-Storage-Discharge Rating Curve)

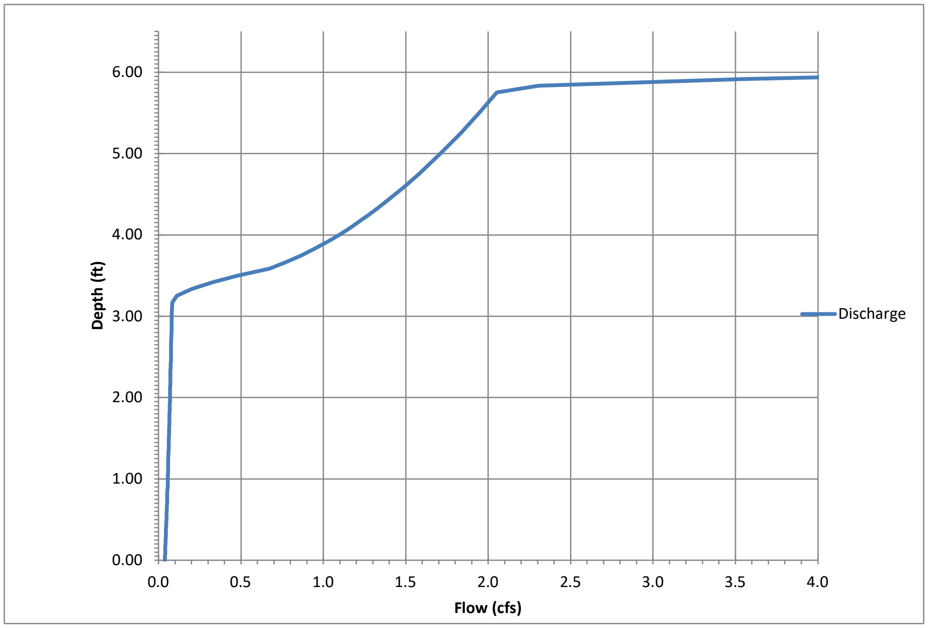
Vault Characteristics	
Vault Depth (ft) =	6

Low-Flow Orifice	
Num. of Orifices =	1
Orifice Invert (ft) =	-1
Orifice Diameter (in) =	1.25
Cg =	0.6

Mid-flow Orifice (Lower)	
Num. of Orifices =	3
Orifice Invert (ft) =	3.2
Orifice Diameter (in) =	4
Cg =	0.6

Mid-flow Orifice (Upper)(Rectangular)	
Num. of Orifices =	0
Orifice Invert (ft) =	0
Orifice Width (ft) =	0
Orifice Height (ft) =	0
Cg (orifice) =	0.6
Cg (weir) =	3

Top of Inlet	
Upper Weir Inv (ft) =	5.8
B (ft) =	12
Cs =	3



Outlet Link Rating Curve (Input to SWMM)

h (in)	h (ft)	Low-Flow Orifice	Mid-Flow Orifice (Lower)	Mid-Flow Orifice (Upper, Weir Calc)	Mid-flow Orifice Upper	Overflow Weir	Total Flow (cfs)	Surface Area (ft2)	Porosity	Incremental Volume (ft3)	Cumulative Volume (ft3)
0.0	0.00	0.040	0.000	0.000	0.000	0.000	0.040	2711	0.94	0	0
0.5	0.04	0.040	0.000	0.000	0.000	0.000	0.040	2711	0.94	106	106
1.0	0.08	0.041	0.000	0.000	0.000	0.000	0.041	2711	0.94	106	212
1.5	0.13	0.041	0.000	0.000	0.000	0.000	0.041	2711	0.94	106	319
2.0	0.17	0.042	0.000	0.000	0.000	0.000	0.042	2711	0.94	106	425
2.5	0.21	0.043	0.000	0.000	0.000	0.000	0.043	2711	0.94	106	531
3.0	0.25	0.044	0.000	0.000	0.000	0.000	0.044	2711	0.94	106	637
3.5	0.29	0.045	0.000	0.000	0.000	0.000	0.045	2711	0.94	106	743
4.0	0.33	0.045	0.000	0.000	0.000	0.000	0.045	2711	0.94	106	849
4.5	0.38	0.046	0.000	0.000	0.000	0.000	0.046	2711	0.94	106	956
5.0	0.42	0.047	0.000	0.000	0.000	0.000	0.047	2711	0.94	106	1062
5.5	0.46	0.048	0.000	0.000	0.000	0.000	0.048	2711	0.94	106	1168
6.0	0.50	0.048	0.000	0.000	0.000	0.000	0.048	2711	0.94	106	1274
6.5	0.54	0.049	0.000	0.000	0.000	0.000	0.049	2711	0.94	106	1380
7.0	0.58	0.050	0.000	0.000	0.000	0.000	0.050	2711	0.94	106	1487
7.5	0.63	0.051	0.000	0.000	0.000	0.000	0.051	2711	0.94	106	1593
8.0	0.67	0.051	0.000	0.000	0.000	0.000	0.051	2711	0.94	106	1699
8.5	0.71	0.052	0.000	0.000	0.000	0.000	0.052	2711	0.94	106	1805
9.0	0.75	0.053	0.000	0.000	0.000	0.000	0.053	2711	0.94	106	1911
9.5	0.79	0.053	0.000	0.000	0.000	0.000	0.053	2711	0.94	106	2017
10.0	0.83	0.054	0.000	0.000	0.000	0.000	0.054	2711	0.94	106	2124
10.5	0.88	0.055	0.000	0.000	0.000	0.000	0.055	2711	0.94	106	2230
11.0	0.92	0.055	0.000	0.000	0.000	0.000	0.055	2711	0.94	106	2336
11.5	0.96	0.056	0.000	0.000	0.000	0.000	0.056	2711	0.94	106	2442
12.0	1.00	0.056	0.000	0.000	0.000	0.000	0.056	2711	0.94	106	2548
12.5	1.04	0.057	0.000	0.000	0.000	0.000	0.057	2711	0.94	106	2655
13.0	1.08	0.058	0.000	0.000	0.000	0.000	0.058	2711	0.94	106	2761
13.5	1.13	0.058	0.000	0.000	0.000	0.000	0.058	2711	0.94	106	2867
14.0	1.17	0.059	0.000	0.000	0.000	0.000	0.059	2711	0.94	106	2973
14.5	1.21	0.060	0.000	0.000	0.000	0.000	0.060	2711	0.94	106	3079
15.0	1.25	0.060	0.000	0.000	0.000	0.000	0.060	2711	0.94	106	3185
15.5	1.29	0.061	0.000	0.000	0.000	0.000	0.061	2711	0.94	106	3292
16.0	1.33	0.061	0.000	0.000	0.000	0.000	0.061	2711	0.94	106	3398
16.5	1.38	0.062	0.000	0.000	0.000	0.000	0.062	2711	0.94	106	3504
17.0	1.42	0.062	0.000	0.000	0.000	0.000	0.062	2711	0.94	106	3610
17.5	1.46	0.063	0.000	0.000	0.000	0.000	0.063	2711	0.94	106	3716
18.0	1.50	0.064	0.000	0.000	0.000	0.000	0.064	2711	0.94	106	3823

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18.5	1.54	0.064	0.000	0.000	0.000	0.000	0.064	2711	0.94	106	3929
19.0	1.58	0.065	0.000	0.000	0.000	0.000	0.065	2711	0.94	106	4035
19.5	1.63	0.065	0.000	0.000	0.000	0.000	0.065	2711	0.94	106	4141
20.0	1.67	0.066	0.000	0.000	0.000	0.000	0.066	2711	0.94	106	4247
20.5	1.71	0.066	0.000	0.000	0.000	0.000	0.066	2711	0.94	106	4353
21.0	1.75	0.067	0.000	0.000	0.000	0.000	0.067	2711	0.94	106	4460
21.5	1.79	0.067	0.000	0.000	0.000	0.000	0.067	2711	0.94	106	4566
22.0	1.83	0.068	0.000	0.000	0.000	0.000	0.068	2711	0.94	106	4672
22.5	1.88	0.068	0.000	0.000	0.000	0.000	0.068	2711	0.94	106	4778
23.0	1.92	0.069	0.000	0.000	0.000	0.000	0.069	2711	0.94	106	4884
23.5	1.96	0.069	0.000	0.000	0.000	0.000	0.069	2711	0.94	106	4990
24.0	2.00	0.070	0.000	0.000	0.000	0.000	0.070	2711	0.94	106	5097
24.5	2.04	0.070	0.000	0.000	0.000	0.000	0.070	2711	0.94	106	5203
25.0	2.08	0.071	0.000	0.000	0.000	0.000	0.071	2711	0.94	106	5309
25.5	2.13	0.071	0.000	0.000	0.000	0.000	0.071	2711	0.94	106	5415
26.0	2.17	0.072	0.000	0.000	0.000	0.000	0.072	2711	0.94	106	5521
26.5	2.21	0.072	0.000	0.000	0.000	0.000	0.072	2711	0.94	106	5628
27.0	2.25	0.073	0.000	0.000	0.000	0.000	0.073	2711	0.94	106	5734
27.5	2.29	0.073	0.000	0.000	0.000	0.000	0.073	2711	0.94	106	5840
28.0	2.33	0.074	0.000	0.000	0.000	0.000	0.074	2711	0.94	106	5946
28.5	2.38	0.074	0.000	0.000	0.000	0.000	0.074	2711	0.94	106	6052
29.0	2.42	0.075	0.000	0.000	0.000	0.000	0.075	2711	0.94	106	6158
29.5	2.46	0.075	0.000	0.000	0.000	0.000	0.075	2711	0.94	106	6265
30.0	2.50	0.076	0.000	0.000	0.000	0.000	0.076	2711	0.94	106	6371
31.0	2.58	0.077	0.000	0.000	0.000	0.000	0.077	2711	0.94	212	6583
32.0	2.67	0.077	0.000	0.000	0.000	0.000	0.077	2711	0.94	212	6796
33.0	2.75	0.078	0.000	0.000	0.000	0.000	0.078	2711	0.94	212	7008
34.0	2.83	0.079	0.000	0.000	0.000	0.000	0.079	2711	0.94	212	7220
35.0	2.92	0.080	0.000	0.000	0.000	0.000	0.080	2711	0.94	212	7433
36.0	3.00	0.081	0.000	0.000	0.000	0.000	0.081	2711	0.94	212	7645
37.0	3.08	0.082	0.000	0.000	0.000	0.000	0.082	2711	0.94	212	7857
38.0	3.17	0.083	0.000	0.000	0.000	0.000	0.083	2711	0.94	212	8070
39.0	3.25	0.084	0.009	0.000	0.000	0.000	0.110	2711	0.94	212	8282
40.0	3.33	0.084	0.039	0.000	0.000	0.000	0.201	2711	0.94	212	8494
41.0	3.42	0.085	0.081	0.000	0.000	0.000	0.327	2711	0.94	212	8707
42.0	3.50	0.086	0.131	0.000	0.000	0.000	0.480	2711	0.94	212	8919
43.0	3.58	0.087	0.196	0.000	0.000	0.000	0.674	2711	0.94	212	9132
44.0	3.67	0.088	0.230	0.000	0.000	0.000	0.778	2711	0.94	212	9344
45.0	3.75	0.088	0.260	0.000	0.000	0.000	0.869	2711	0.94	212	9556
46.0	3.83	0.089	0.287	0.000	0.000	0.000	0.950	2711	0.94	212	9769
47.0	3.92	0.090	0.312	0.000	0.000	0.000	1.025	2711	0.94	212	9981
48.0	4.00	0.091	0.334	0.000	0.000	0.000	1.094	2711	0.94	212	10193
49.0	4.08	0.092	0.356	0.000	0.000	0.000	1.159	2711	0.94	212	10406
50.0	4.17	0.092	0.376	0.000	0.000	0.000	1.220	2711	0.94	212	10618
51.0	4.25	0.093	0.395	0.000	0.000	0.000	1.278	2711	0.94	212	10830
52.0	4.33	0.094	0.413	0.000	0.000	0.000	1.333	2711	0.94	212	11043
53.0	4.42	0.095	0.431	0.000	0.000						
54.0	4.50	0.095	0.447	0.000	0.000						
55.0	4.58	0.096	0.463	0.000	0.000						
56.0	4.67	0.097	0.479	0.000	0.000						
57.0	4.75	0.098	0.494	0.000	0.000						
58.0	4.83	0.098	0.509	0.000	0.000						
59.0	4.92	0.099	0.523	0.000	0.000						
60.0	5.00	0.100	0.537	0.000	0.000						
61.0	5.08	0.100	0.551	0.000	0.000						
62.0	5.17	0.101	0.564	0.000	0.000						
63.0	5.25	0.102	0.577	0.000	0.000						
64.0	5.33	0.102	0.589	0.000	0.000						
65.0	5.42	0.103	0.602	0.000	0.000						
66.0	5.50	0.104	0.614	0.000	0.000						
67.0	5.58	0.104	0.626	0.000	0.000	0.000	1.981	2711	0.94	212	14228
68.0	5.67	0.105	0.637	0.000	0.000	0.000	2.017	2711	0.94	212	14441
69.0	5.75	0.106	0.649	0.000	0.000	0.000	2.052	2711	0.94	212	14653
70.0	5.83	0.106	0.660	0.000	0.000	0.219	2.305	2711	0.94	212	14865
71.0	5.92	0.107	0.671	0.000	0.000	1.435	3.555	2711	0.94	212	15078
72.0	6.00	0.108	0.682	0.000	0.000	3.220	5.373	2711	0.94	212	15290

DMA-A DCV: 4884 CF

BMP-A1 WQ DDT: 37 HOURS

BMP-A1 STORAGE MULTIPLIER: 1.6 (CONSERVATIVE)

BMP-A1 REQ. TREATMENT VOLUME: 7815 CF

VOLUME TREATED BY BMP-A1 TO PROVIDE 92% ANNUAL CAPTURE: 8070 CF

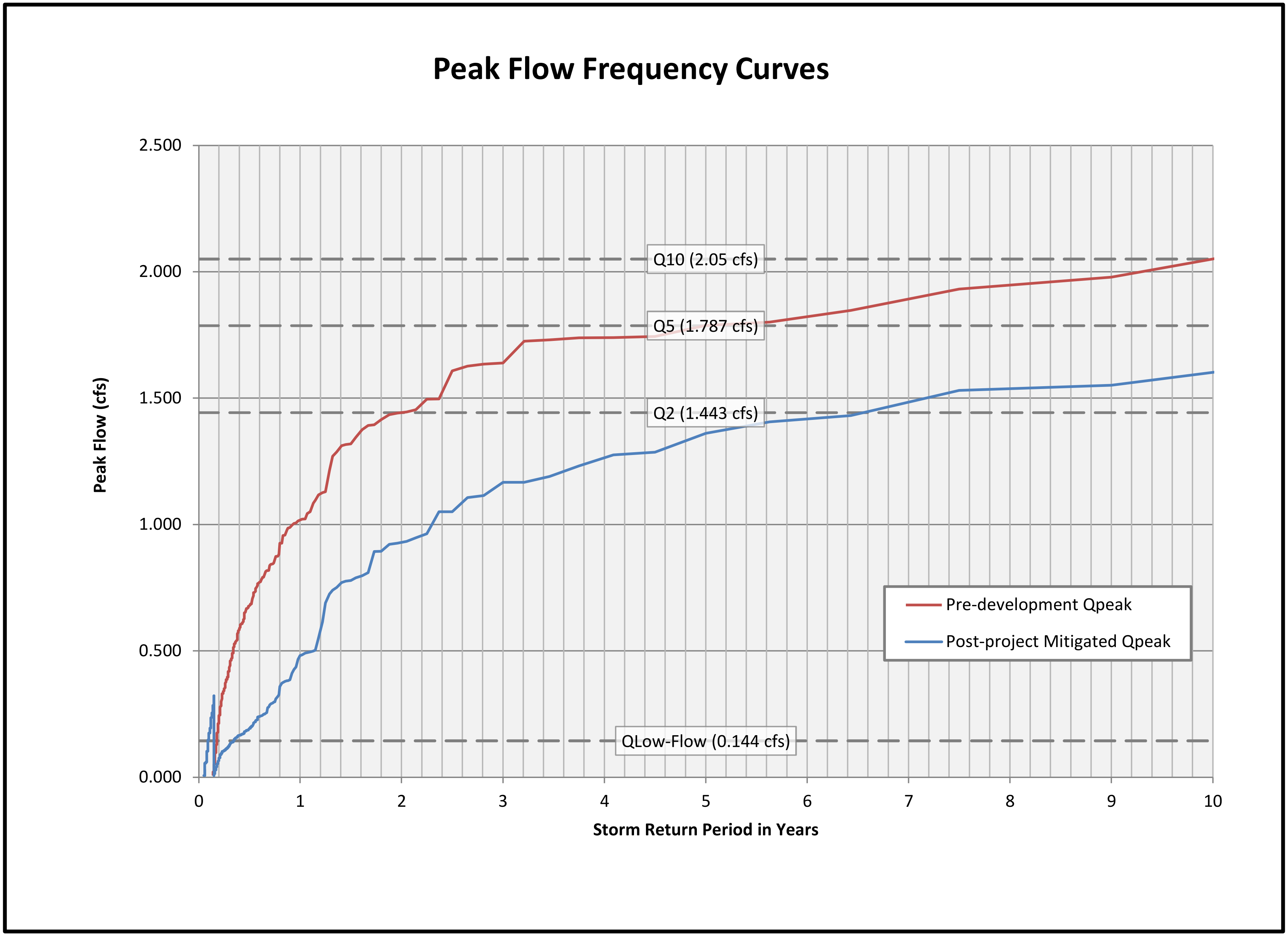
BMP A1 - VAULT				CALCULATED	
	STORAGE		DISCHARGE	DRAWDOWN TIME	
h (ft)	Incremental storage volume (ft3)	Cumulative storage volume (ft3)	Total Flow (cfs)	Incremental Drawdown Time (hr)	Cumulative Drawdown Time (hr)
0.00	0	0	0.040	0.00	0.00
0.04	106	106	0.040	0.74	0.74
0.08	106	212	0.041	0.73	1.47
0.13	106	319	0.041	0.72	2.19
0.17	106	425	0.042	0.70	2.90
0.21	106	531	0.043	0.69	3.59
0.25	106	637	0.044	0.68	4.27
0.29	106	743	0.045	0.67	4.93
0.33	106	849	0.045	0.65	5.59
0.38	106	956	0.046	0.64	6.23
0.42	106	1,062	0.047	0.63	6.86
0.46	106	1,168	0.048	0.62	7.48
0.50	106	1,274	0.048	0.61	8.10
0.54	106	1,380	0.049	0.60	8.70
0.58	106	1,487	0.050	0.60	9.30
0.63	106	1,593	0.051	0.59	9.88
0.67	106	1,699	0.051	0.58	10.46
0.71	106	1,805	0.052	0.57	11.03
0.75	106	1,911	0.053	0.56	11.60
0.79	106	2,017	0.053	0.56	12.15
0.83	106	2,124	0.054	0.55	12.70
0.88	106	2,230	0.055	0.54	13.25
0.92	106	2,336	0.055	0.54	13.78
0.96	106	2,442	0.056	0.53	14.31
1.00	106	2,548	0.056	0.52	14.84
1.04	106	2,655	0.057	0.52	15.36
1.08	106	2,761	0.058	0.51	15.87
1.13	106	2,867	0.058	0.51	16.38
1.17	106	2,973	0.059	0.50	16.88
1.21	106	3,079	0.060	0.50	17.38
1.25	106	3,185	0.060	0.49	17.87
1.29	106	3,292	0.061	0.49	18.36
1.33	106	3,398	0.061	0.48	18.85
1.38	106	3,504	0.062	0.48	19.33
1.42	106	3,610	0.062	0.47	19.80
1.46	106	3,716	0.063	0.47	20.27
1.50	106	3,823	0.064	0.47	20.74
1.54	106	3,929	0.064	0.46	21.20
1.58	106	4,035	0.065	0.46	21.66
1.63	106	4,141	0.065	0.45	22.11
1.67	106	4,247	0.066	0.45	22.56
1.71	106	4,353	0.066	0.45	23.01
1.75	106	4,460	0.067	0.44	23.45
1.79	106	4,566	0.067	0.44	23.90
1.83	106	4,672	0.068	0.44	24.33
1.88	106	4,778	0.068	0.43	24.77
1.92	106	4,884	0.069	0.43	25.20
1.96	106	4,990	0.069	0.43	25.62
2.00	106	5,097	0.070	0.42	26.05
2.04	106	5,203	0.070	0.42	26.47
2.08	106	5,309	0.071	0.42	26.89
2.13	106	5,415	0.071	0.42	27.30
2.17	106	5,521	0.072	0.41	27.71
2.21	106	5,628	0.072	0.41	28.12
2.25	106	5,734	0.073	0.41	28.53
2.29	106	5,840	0.073	0.40	28.93
2.33	106	5,946	0.074	0.40	29.33
2.38	106	6,052	0.074	0.40	29.73
2.42	106	6,158	0.075	0.40	30.13
2.46	106	6,265	0.075	0.39	30.52
2.50	106	6,371	0.076	0.39	30.91
2.58	212	6,583	0.077	0.78	31.69
2.67	212	6,796	0.077	0.77	32.45
2.75	212	7,008	0.078	0.76	33.21
2.83	212	7,220	0.079	0.75	33.96
2.92	212	7,433	0.080	0.74	34.70
3.00	212	7,645	0.081	0.73	35.43
3.08	212	7,857	0.082	0.72	36.16
3.17	212	8,070	0.083	0.72	36.87
3.25	212	8,282	0.110	0.61	37.49
3.33	212	8,494	0.201	0.38	37.86
3.42	212	8,707	0.327	0.22	38.09
3.50	212	8,919	0.480	0.15	38.23
3.58	212	9,132	0.674	0.10	38.34
3.67	212	9,344	0.778	0.08	38.42
3.75	212	9,556	0.869	0.07	38.49
3.83	212	9,769	0.950	0.06	38.55
3.92	212	9,981	1.025	0.06	38.61
4.00	212	10,193	1.094	0.06	38.67
4.08	212	10,406	1.159	0.05	38.72
4.17	212	10,618	1.220	0.05	38.77
4.25	212	10,830	1.278	0.05	38.82
4.33	212	11,043	1.333	0.05	38.86
4.42	212	11,255	1.386	0.04	38.91
4.50	212	11,468	1.437	0.04	38.95
4.58	212	11,680	1.486	0.04	38.99
4.67	212	11,892	1.534	0.04	39.03
4.75	212	12,105	1.580	0.04	39.07
4.83	212	12,317	1.625	0.04	39.10
4.92	212	12,529	1.668	0.04	39.14
5.00	212	12,742	1.711	0.03	39.17
5.08	212	12,954	1.752	0.03	39.21
5.17	212	13,166	1.792	0.03	39.24
5.25	212	13,379	1.832	0.03	39.27
5.33	212	13,591	1.870	0.03	39.31
5.42	212	13,804	1.908	0.03	39.34
5.50	212	14,016	1.945	0.03	39.37
5.58	212	14,228	1.981	0.03	39.40
5.67	212	14,441	2.017	0.03	39.43
5.75	212	14,653	2.052	0.03	39.46
5.83	212	14,865	2.305	0.03	39.48
5.92	212	15,078	3.555	0.02	39.50
6.00	212	15,290	5.373	0.01	39.52

Peak Flow Frequency Summary

HMP Flow Frequency Range Based on: **SWMM - Weibull**

Return Period	Pre-development Qpeak (cfs)	Post-project - Mitigated Q (cfs)
Low-Flow = 0.1*Q2	0.144	0.093
2-year	1.443	0.929
3-year	1.639	1.167
4-year	1.739	1.264
5-year	1.787	1.361
6-year	1.822	1.418
7-year	1.892	1.484
8-year	1.947	1.537
9-year	1.978	1.551
10-year	2.050	1.602

POC-1



Peak Flow Frequency Curves
2.500
2.000
1.500
1.000
0.500
0.000
Peak Flow (cfs)
0
1
2
3
4
5
6
7
8
9
10
Storm Return Period in Years
Q10 (2.05 cfs)
Q5 (1.787 cfs)
Q2 (1.443 cfs)
QLow-Flow (0.144 cfs)
Pre-development Qpeak
Post-project Mitigated Qpeak

Vista II
19253B
2/14/2024

POC1

Low-flow Threshold:	10%	
0.1xQ2 (Pre):	0.1443	cfs
Q10 (Pre):	2.050	cfs
# of Intervals between flow bins:	99	
Incremental Q (Pre):	0.01925	cfs
Total Hourly Data:	382736	hours
Flow Frequency Range Based on:	**SWMM - Weibull**	

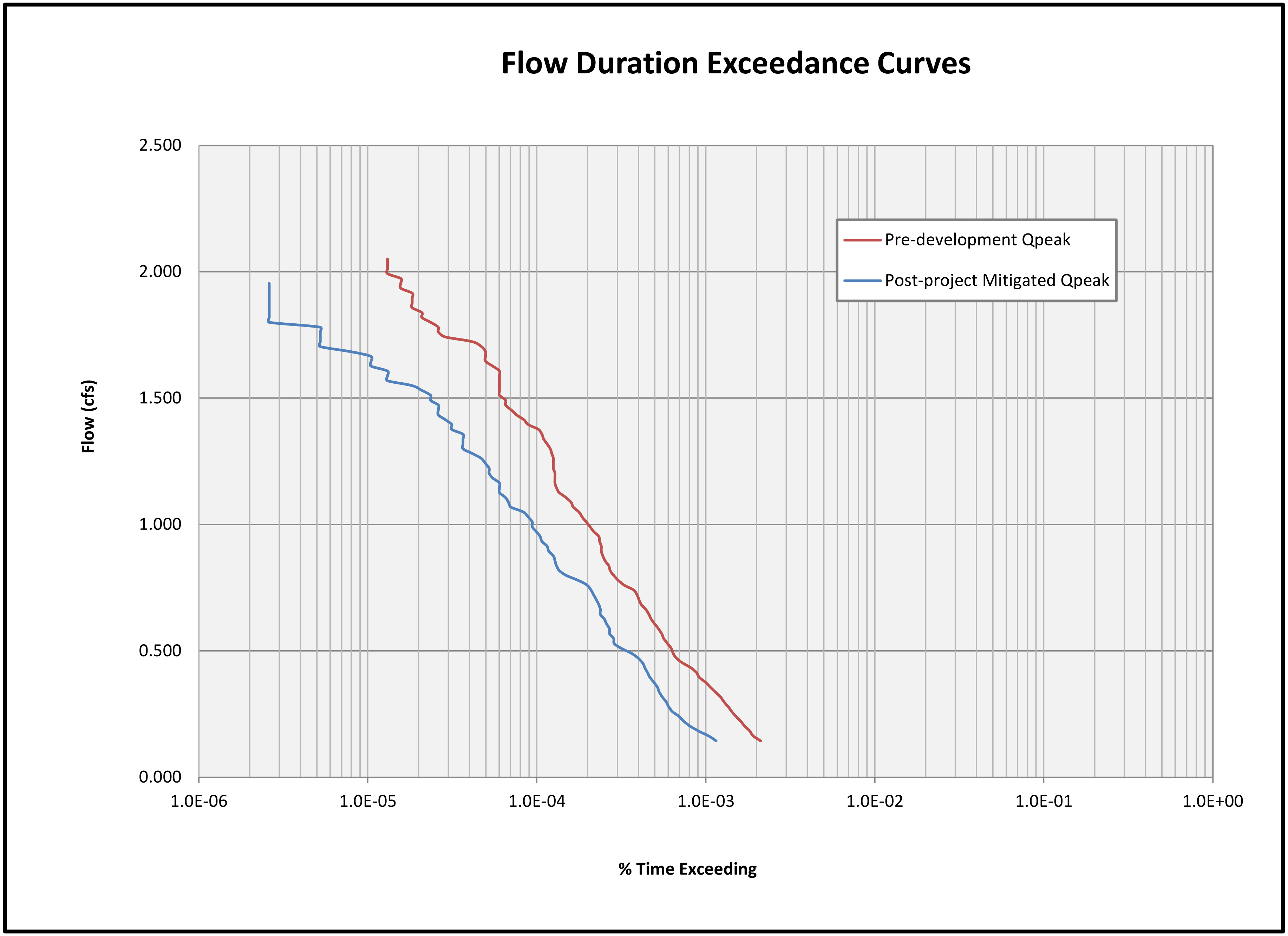
The proposed BMP: **PASSED**

Beginning of Interval (Flow Bin)	Pre-develop. Flow (cfs)	Pre-develop. Hours	Pre-develop. % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
1	0.144	808	2.11E-03	441	1.15E-03	55%	Pass
2	0.164	730	1.91E-03	398	1.04E-03	55%	Pass
3	0.183	697	1.82E-03	347	9.07E-04	50%	Pass
4	0.202	652	1.70E-03	310	8.10E-04	48%	Pass
5	0.221	616	1.61E-03	284	7.42E-04	46%	Pass
6	0.241	578	1.51E-03	266	6.95E-04	46%	Pass
7	0.260	545	1.42E-03	243	6.35E-04	45%	Pass
8	0.279	520	1.36E-03	231	6.04E-04	44%	Pass
9	0.298	490	1.28E-03	223	5.83E-04	46%	Pass
10	0.318	468	1.22E-03	212	5.54E-04	45%	Pass
11	0.337	437	1.14E-03	203	5.30E-04	46%	Pass
12	0.356	407	1.06E-03	198	5.17E-04	49%	Pass
13	0.375	382	9.98E-04	189	4.94E-04	49%	Pass
14	0.395	351	9.17E-04	179	4.68E-04	51%	Pass
15	0.414	337	8.81E-04	173	4.52E-04	51%	Pass
16	0.433	313	8.18E-04	167	4.36E-04	53%	Pass
17	0.452	279	7.29E-04	162	4.23E-04	58%	Pass
18	0.472	256	6.69E-04	152	3.97E-04	59%	Pass
19	0.491	245	6.40E-04	139	3.63E-04	57%	Pass
20	0.510	239	6.24E-04	121	3.16E-04	51%	Pass
21	0.529	227	5.93E-04	110	2.87E-04	48%	Pass
22	0.549	216	5.64E-04	109	2.85E-04	50%	Pass
23	0.568	210	5.49E-04	103	2.69E-04	49%	Pass
24	0.587	201	5.25E-04	103	2.69E-04	51%	Pass
25	0.606	191	4.99E-04	99	2.59E-04	52%	Pass
26	0.626	182	4.76E-04	96	2.51E-04	53%	Pass
27	0.645	176	4.60E-04	91	2.38E-04	52%	Pass
28	0.664	169	4.42E-04	91	2.38E-04	54%	Pass
29	0.683	159	4.15E-04	89	2.33E-04	56%	Pass
30	0.703	154	4.02E-04	86	2.25E-04	56%	Pass
31	0.722	150	3.92E-04	83	2.17E-04	55%	Pass
32	0.741	143	3.74E-04	80	2.09E-04	56%	Pass
33	0.760	126	3.29E-04	76	1.99E-04	60%	Pass
34	0.780	116	3.03E-04	67	1.75E-04	58%	Pass
35	0.799	109	2.85E-04	57	1.49E-04	52%	Pass
36	0.818	104	2.72E-04	52	1.36E-04	50%	Pass
37	0.837	102	2.67E-04	50	1.31E-04	49%	Pass
38	0.857	97	2.53E-04	49	1.28E-04	51%	Pass
39	0.876	94	2.46E-04	48	1.25E-04	51%	Pass
40	0.895	92	2.40E-04	45	1.18E-04	49%	Pass
41	0.914	92	2.40E-04	44	1.15E-04	48%	Pass
42	0.934	90	2.35E-04	41	1.07E-04	46%	Pass
43	0.953	89	2.33E-04	40	1.05E-04	45%	Pass
44	0.972	83	2.17E-04	38	9.93E-05	46%	Pass
45	0.991	79	2.06E-04	36	9.41E-05	46%	Pass
46	1.011	75	1.96E-04	36	9.41E-05	48%	Pass
47	1.030	71	1.86E-04	34	8.88E-05	48%	Pass
48	1.049	68	1.78E-04	32	8.36E-05	47%	Pass
49	1.068	63	1.65E-04	27	7.05E-05	43%	Pass
50	1.088	61	1.59E-04	26	6.79E-05	43%	Pass
51	1.107	57	1.49E-04	25	6.53E-05	44%	Pass
52	1.126	52	1.36E-04	23	6.01E-05	44%	Pass
53	1.145	50	1.31E-04	23	6.01E-05	46%	Pass

Flow Frequency Range Based on: **SWMM - Weibull**

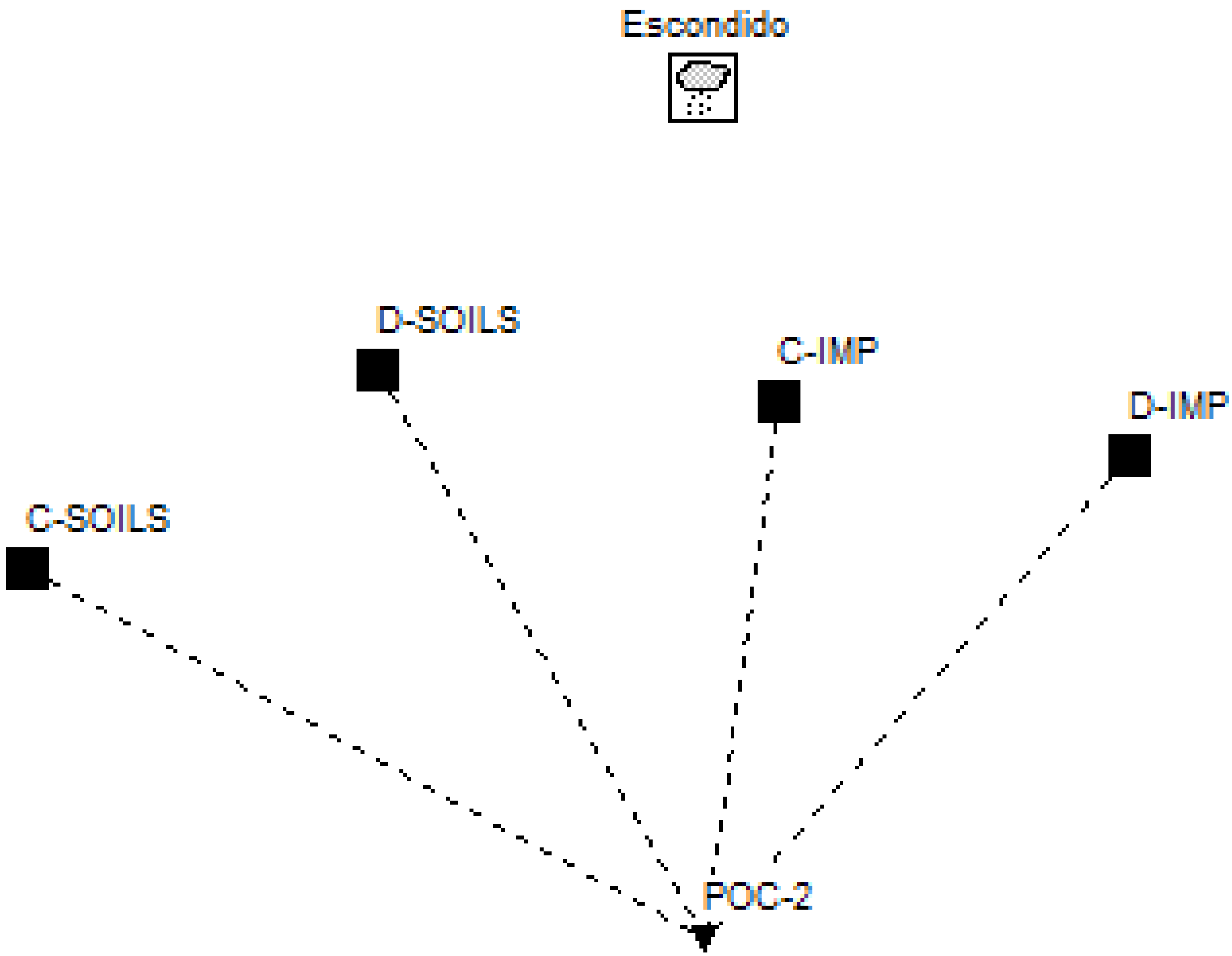
Beginning of Interval (Flow Bin)	Pre-develop. Flow (cfs)	Pre-develop. Hours	Pre-develop. % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
54	1.165	49	1.28E-04	23	6.01E-05	47%	Pass
55	1.184	49	1.28E-04	21	5.49E-05	43%	Pass
56	1.203	49	1.28E-04	20	5.23E-05	41%	Pass
57	1.223	48	1.25E-04	20	5.23E-05	42%	Pass
58	1.242	48	1.25E-04	19	4.96E-05	40%	Pass
59	1.261	48	1.25E-04	18	4.70E-05	38%	Pass
60	1.280	47	1.23E-04	16	4.18E-05	34%	Pass
61	1.300	46	1.20E-04	14	3.66E-05	30%	Pass
62	1.319	44	1.15E-04	14	3.66E-05	32%	Pass
63	1.338	42	1.10E-04	14	3.66E-05	33%	Pass
64	1.357	41	1.07E-04	14	3.66E-05	34%	Pass
65	1.377	39	1.02E-04	12	3.14E-05	31%	Pass
66	1.396	34	8.88E-05	12	3.14E-05	35%	Pass
67	1.415	32	8.36E-05	11	2.87E-05	34%	Pass
68	1.434	29	7.58E-05	10	2.61E-05	34%	Pass
69	1.454	27	7.05E-05	10	2.61E-05	37%	Pass
70	1.473	25	6.53E-05	10	2.61E-05	40%	Pass
71	1.492	25	6.53E-05	9	2.35E-05	36%	Pass
72	1.511	23	6.01E-05	9	2.35E-05	39%	Pass
73	1.531	23	6.01E-05	8	2.09E-05	35%	Pass
74	1.550	23	6.01E-05	7	1.83E-05	30%	Pass
75	1.569	23	6.01E-05	5	1.31E-05	22%	Pass
76	1.588	23	6.01E-05	5	1.31E-05	22%	Pass
77	1.608	23	6.01E-05	5	1.31E-05	22%	Pass
78	1.627	21	5.49E-05	4	1.05E-05	19%	Pass
79	1.646	19	4.96E-05	4	1.05E-05	21%	Pass
80	1.665	19	4.96E-05	4	1.05E-05	21%	Pass
81	1.685	19	4.96E-05	3	7.84E-06	16%	Pass
82	1.704	18	4.70E-05	2	5.23E-06	11%	Pass
83	1.723	16	4.18E-05	2	5.23E-06	13%	Pass
84	1.742	11	2.87E-05	2	5.23E-06	18%	Pass
85	1.762	10	2.61E-05	2	5.23E-06	20%	Pass
86	1.781	10	2.61E-05	2	5.23E-06	20%	Pass
87	1.800	9	2.35E-05	1	2.61E-06	11%	Pass
88	1.819	8	2.09E-05	1	2.61E-06	13%	Pass
89	1.839	8	2.09E-05	1	2.61E-06	13%	Pass
90	1.858	7	1.83E-05	1	2.61E-06	14%	Pass
91	1.877	7	1.83E-05	1	2.61E-06	14%	Pass
92	1.896	7	1.83E-05	1	2.61E-06	14%	Pass
93	1.916	7	1.83E-05	1	2.61E-06	14%	Pass
94	1.935	6	1.57E-05	1	2.61E-06	17%	Pass
95	1.954	6	1.57E-05	1	2.61E-06	17%	Pass
96	1.973	6	1.57E-05	1	2.61E-06	17%	Pass
97	1.993	5	1.31E-05	0	0.00E+00	0%	Pass
98	2.012	5	1.31E-05	0	0.00E+00	0%	Pass
99	2.031	5	1.31E-05	0	0.00E+00	0%	Pass
100	2.050	5	1.31E-05	0	0.00E+00	0%	Pass

POC-1



Flow Duration Exceedance Curves
Pre-development Qpeak
Post-project Mitigated Qpeak
2.500
2.000
1.500
1.000
0.500
0.000
Flow (cfs)
1.0E-06
1.0E-05
1.0E-04
1.0E-03
1.0E-02
1.0E-01
1.0E+00
% Time Exceeding

POC-2
PRE-PROJECT



```
[TITLE]
;;Project Title/Notes
VISTA BALLFIELDS
POC-2 PRE-DEVELOPMENT CONDITION
J-19253 B

[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           09/24/1964
START_TIME           13:00:00
REPORT_START_DATE    09/24/1964
REPORT_START_TIME    13:00:00
END_DATE             05/23/2008
END_TIME             22:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
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          .06    .08    .11    .15    .17    .19    .19    .18    .15    .11    .08    .06
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
Escondido        INTENSITY 1:00     1.0      TIMESERIES TS-Escondido

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ----------------
C-SOILS          Escondido        POC-2            1.3      0        668      4        0
D-SOILS          Escondido        POC-2            2.8      0        1206     4        0
C-IMP            Escondido        POC-2            .3       0        229      4        0
D-IMP            Escondido        POC-2            .8       0        575      4        0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
C-SOILS          0.012      .15        0.05       0.1        25         OUTLET
D-SOILS          0.012      .15        0.05       0.1        25         OUTLET
C-IMP            0.012      0.15       0.05       0.1        25         OUTLET
D-IMP            0.012      0.15       0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
C-SOILS          6          0.1        0.31
D-SOILS          9          0.025      .3
C-IMP            6          0.075      .31
D-IMP            9          .01875     .3

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

```
[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
TS-Escondido     FILE "escondido.dat"

[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
;;-------------- ------------------ ------------------
POC-2            4655.597           5166.052

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

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
C-SOILS          2887.453           6110.086
C-SOILS          2887.453           6110.086
C-SOILS          2899.754           6110.086
C-SOILS          2912.054           6171.587
D-SOILS          3806.888           6642.066
C-IMP            4848.024           6565.350
C-IMP            4848.024           6565.350
D-IMP            5759.878           6423.506
D-IMP            5759.878           6423.506

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Escondido        4661.747           7367.774
```

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)

VISTA BALLFIELDS
POC-2 PRE-DEVELOPMENT CONDITION
J-19253 B

****
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	NO
Water Quality	NO
Infiltration Method	GREEN_AMPT
Starting Date	09/24/1964 13:00:00
Ending Date	05/23/2008 22:00:00
Antecedent Dry Days	0.0
Report Time Step	01:00:00
Wet Time Step	00:15:00
Dry Time Step	04:00:00

Runoff Quantity Continuity	Volume acre-feet	Depth inches
Total Precipitation	264.819	611.120
Evaporation Loss	8.730	20.145
Infiltration Loss	209.810	484.177
Surface Runoff	51.015	117.726
Final Storage	0.000	0.000
Continuity Error (%)	-1.788	

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	51.015	16.624
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	51.015	16.624
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	0.000	0.000
Continuity Error (%)	0.000	

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
C-SOILS	611.12	0.00	5.90	556.47	51.67	1.82	0.97	0.085
D-SOILS	611.12	0.00	25.20	461.21	138.37	10.52	2.28	0.226
C-IMP	611.12	0.00	7.34	548.96	58.64	0.48	0.23	0.096
D-IMP	611.12	0.00	30.40	422.80	174.99	3.80	0.66	0.286

Analysis begun on: Tue Oct 03 09:29:51 2023
Analysis ended on: Tue Oct 03 09:30:02 2023
Total elapsed time: 00:00:11

SWMM MODEL INPUTS
POST-PROJECT

-POC-2

-SCHEMATIC

-PRE-DEVELOPMENT OUTPUT

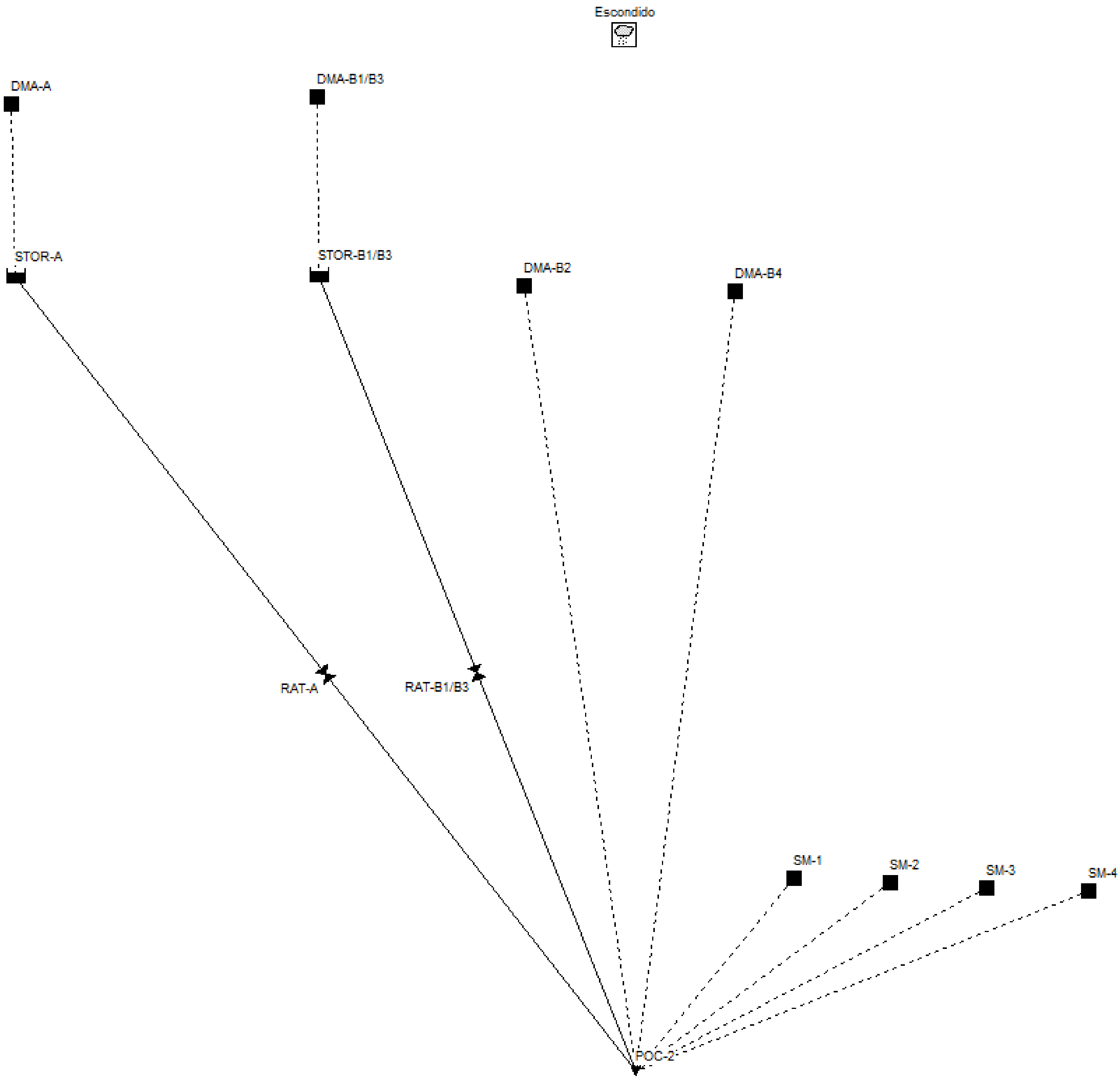
-RATING CURVE

-STORAGE CURVE

-DRAWDOWN TIME

- NRCS Web Soil Survey Hydrologic Soil Group Report

POC-2
POST-PROJECT



```
[TITLE]
;;Project Title/Notes
VISTA BALLFIELDS
POC-2 POST-PROJECT CONDITION
J-19253B

[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           09/24/1964
START_TIME           13:00:00
REPORT_START_DATE    09/24/1964
REPORT_START_TIME    13:00:00
END_DATE             05/23/2008
END_TIME             22:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
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          .06    .08    .11    .15    .17    .19    .19    .18    .15    .11    .08    .06
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
Escondido        VOLUME    1:00     1.0      TIMESERIES TS-Escondido

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ----------------
DMA-A            Escondido        STOR-A           2.5      80       1089     2.8      0
DMA-B1/B3        Escondido        STOR-B1/B3       1.8      80       784      2        0
DMA-B2           Escondido        POC-2            .035     95       26       5        0
SM-1             Escondido        POC-2            .5       0        209      15       0
SM-2             Escondido        POC-2            .2       0        162      3        0
SM-3             Escondido        POC-2            .1       0        63       3        0
SM-4             Escondido        POC-2            .1       0        78       3        0
DMA-B4           Escondido        POC-2            .1       95       69       2        0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
DMA-A            .012       .15        0.05       .1         25         OUTLET
DMA-B1/B3        .012       .15        0.05       .1         25         OUTLET
DMA-B2           .012       .15        0.05       .1         25         OUTLET
SM-1             .012       .15        0.05       .1         25         OUTLET
SM-2             .012       .15        0.05       .1         25         OUTLET
SM-3             .012       .15        0.05       .1         25         OUTLET
SM-4             .012       .15        0.05       .1         25         OUTLET
DMA-B4           .012       .15        0.05       .1         25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
DMA-A            9          .019       .3
DMA-B1/B3        9          .019       .3
```

```
DMA-B2           9          .019       .3
SM-1             9          .025       .3
SM-2             9          .025       .3
SM-3             9          .025       .3
SM-4             9          .025       .3
DMA-B4           9          .019       .3

[LID_CONTROLS]
;;Name           Type/Layer Parameters
;;-------------- ---------- ----------
Basin-A          BC
Basin-A          SURFACE    6.32       0.0        0          0          5
Basin-A          SOIL       21         0.4        0.2        0.1        5          5          1.5
Basin-A          STORAGE    45         0.67       0          0
Basin-A          DRAIN      .0526      0.5        0          6

[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSat    FromImp    ToPerv     RptFile                  DrainTo
;;-------------- ---------------- ------- ---------- ---------- ---------- ---------- ---------- ------------------------ ----------------

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

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params            N/A      Fevap    Psi      Ksat     IMD
;;-------------- -------- ---------- ----------- ---------- ---------------------------- -------- --------          -------- --------
STOR-A           0        10         0          TABULAR    STOR-A                       0        0
STOR-B1/B3       0        10         0          TABULAR    STOR-B1                      0        0

[OUTLETS]
;;Name           From Node        To Node          Offset     Type            QTable/Qcoeff    Qexpon     Gated
;;-------------- ---------------- ---------------- ---------- --------------- ---------------- ---------- --------
RAT-A            STOR-A           POC-2            0          TABULAR/DEPTH   RAT-A                       NO
RAT-B1/B3        STOR-B1/B3       POC-2            0          TABULAR/DEPTH   RAT-B1                      NO

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
RAT-A            Rating     0.00       0.040
RAT-A                       0.04       0.040
RAT-A                       0.08       0.041
RAT-A                       0.13       0.041
RAT-A                       0.17       0.042
RAT-A                       0.21       0.043
RAT-A                       0.25       0.044
RAT-A                       0.29       0.045
RAT-A                       0.33       0.045
RAT-A                       0.38       0.046
RAT-A                       0.42       0.047
RAT-A                       0.46       0.048
RAT-A                       0.50       0.048
RAT-A                       0.54       0.049
RAT-A                       0.58       0.050
RAT-A                       0.63       0.051
RAT-A                       0.67       0.051
RAT-A                       0.71       0.052
RAT-A                       0.75       0.053
RAT-A                       0.79       0.053
RAT-A                       0.83       0.054
RAT-A                       0.88       0.055
RAT-A                       0.92       0.055
RAT-A                       0.96       0.056
RAT-A                       1.00       0.056
RAT-A                       1.04       0.057
RAT-A                       1.08       0.058
RAT-A                       1.13       0.058
RAT-A                       1.17       0.059
RAT-A                       1.21       0.060
RAT-A                       1.25       0.060
RAT-A                       1.29       0.061
RAT-A                       1.33       0.061
RAT-A                       1.38       0.062
RAT-A                       1.42       0.062
RAT-A                       1.46       0.063
RAT-A                       1.50       0.064
RAT-A                       1.54       0.064
RAT-A                       1.58       0.065
RAT-A                       1.63       0.065
RAT-A                       1.67       0.066
RAT-A                       1.71       0.066
RAT-A                       1.75       0.067
```

RAT-A		1.79	0.067
RAT-A		1.83	0.068
RAT-A		1.88	0.068
RAT-A		1.92	0.069
RAT-A		1.96	0.069
RAT-A		2.00	0.070
RAT-A		2.04	0.070
RAT-A		2.08	0.071
RAT-A		2.13	0.071
RAT-A		2.17	0.072
RAT-A		2.21	0.072
RAT-A		2.25	0.073
RAT-A		2.29	0.073
RAT-A		2.33	0.074
RAT-A		2.38	0.074
RAT-A		2.42	0.075
RAT-A		2.46	0.075
RAT-A		2.50	0.076
RAT-A		2.58	0.077
RAT-A		2.67	0.077
RAT-A		2.75	0.078
RAT-A		2.83	0.079
RAT-A		2.92	0.080
RAT-A		3.00	0.081
RAT-A		3.08	0.082
RAT-A		3.17	0.083
RAT-A		3.25	0.110
RAT-A		3.33	0.201
RAT-A		3.42	0.327
RAT-A		3.50	0.480
RAT-A		3.58	0.674
RAT-A		3.67	0.778
RAT-A		3.75	0.869
RAT-A		3.83	0.950
RAT-A		3.92	1.025
RAT-A		4.00	1.094
RAT-A		4.08	1.159
RAT-A		4.17	1.220
RAT-A		4.25	1.278
RAT-A		4.33	1.333
RAT-A		4.42	1.386
RAT-A		4.50	1.437
RAT-A		4.58	1.486
RAT-A		4.67	1.534
RAT-A		4.75	1.580
RAT-A		4.83	1.625
RAT-A		4.92	1.668
RAT-A		5.00	1.711
RAT-A		5.08	1.752
RAT-A		5.17	1.792
RAT-A		5.25	1.832
RAT-A		5.33	1.870
RAT-A		5.42	1.908
RAT-A		5.50	1.945
RAT-A		5.58	1.981
RAT-A		5.67	2.017
RAT-A		5.75	2.052
RAT-A		5.83	2.305
RAT-A		5.92	3.555
RAT-A		6.00	5.373
;			
RAT-B1	Rating	0.00	0.033
RAT-B1		0.04	0.035
RAT-B1		0.08	0.036
RAT-B1		0.13	0.037
RAT-B1		0.17	0.039
RAT-B1		0.21	0.040
RAT-B1		0.25	0.041
RAT-B1		0.29	0.043
RAT-B1		0.33	0.044
RAT-B1		0.38	0.045
RAT-B1		0.42	0.046
RAT-B1		0.46	0.047
RAT-B1		0.50	0.048
RAT-B1		0.54	0.049
RAT-B1		0.58	0.050
RAT-B1		0.63	0.051
RAT-B1		0.67	0.052
RAT-B1		0.71	0.053
RAT-B1		0.75	0.054
RAT-B1		0.79	0.055
RAT-B1		0.83	0.056
RAT-B1		0.88	0.057

RAT-B1	0.92	0.058
RAT-B1	0.96	0.059
RAT-B1	1.00	0.060
RAT-B1	1.04	0.060
RAT-B1	1.08	0.061
RAT-B1	1.13	0.062
RAT-B1	1.17	0.063
RAT-B1	1.21	0.064
RAT-B1	1.25	0.065
RAT-B1	1.29	0.065
RAT-B1	1.33	0.066
RAT-B1	1.38	0.067
RAT-B1	1.42	0.068
RAT-B1	1.46	0.068
RAT-B1	1.50	0.069
RAT-B1	1.54	0.070
RAT-B1	1.58	0.071
RAT-B1	1.63	0.071
RAT-B1	1.67	0.072
RAT-B1	1.71	0.073
RAT-B1	1.75	0.074
RAT-B1	1.79	0.074
RAT-B1	1.83	0.075
RAT-B1	1.88	0.076
RAT-B1	1.92	0.076
RAT-B1	1.96	0.077
RAT-B1	2.00	0.078
RAT-B1	2.04	0.078
RAT-B1	2.08	0.079
RAT-B1	2.13	0.080
RAT-B1	2.17	0.080
RAT-B1	2.21	0.081
RAT-B1	2.25	0.081
RAT-B1	2.29	0.082
RAT-B1	2.33	0.083
RAT-B1	2.38	0.083
RAT-B1	2.42	0.084
RAT-B1	2.46	0.085
RAT-B1	2.50	0.085
RAT-B1	2.58	0.086
RAT-B1	2.67	0.088
RAT-B1	2.75	0.089
RAT-B1	2.83	0.090
RAT-B1	2.92	0.091
RAT-B1	3.00	0.092
RAT-B1	3.08	0.132
RAT-B1	3.17	0.203
RAT-B1	3.25	0.295
RAT-B1	3.33	0.440
RAT-B1	3.42	0.518
RAT-B1	3.50	0.584
RAT-B1	3.58	0.642
RAT-B1	3.67	0.695
RAT-B1	3.75	0.744
RAT-B1	3.83	0.789
RAT-B1	3.92	0.831
RAT-B1	4.00	0.872
RAT-B1	4.08	0.910
RAT-B1	4.17	0.947
RAT-B1	4.25	0.982
RAT-B1	4.33	1.016
RAT-B1	4.42	1.049
RAT-B1	4.50	1.081
RAT-B1	4.58	1.112
RAT-B1	4.67	1.141
RAT-B1	4.75	1.171
RAT-B1	4.83	1.199
RAT-B1	4.92	1.227
RAT-B1	5.00	1.254
RAT-B1	5.08	1.280
RAT-B1	5.17	1.306
RAT-B1	5.25	1.331
RAT-B1	5.33	1.356
RAT-B1	5.42	1.381
RAT-B1	5.50	1.405
RAT-B1	5.58	1.428
RAT-B1	5.67	1.451
RAT-B1	5.75	1.474
RAT-B1	5.83	1.497
RAT-B1	5.92	1.519
RAT-B1	6.00	1.541
RAT-B1	6.08	1.562
RAT-B1	6.17	1.583

```
RAT-B1                     6.25       1.604
RAT-B1                     6.33       1.625
RAT-B1                     6.42       1.645
RAT-B1                     6.50       1.665
RAT-B1                     6.58       1.685
RAT-B1                     6.67       1.705
RAT-B1                     6.75       1.724
RAT-B1                     6.83       1.743
RAT-B1                     6.92       1.762
RAT-B1                     7.00       1.781
RAT-B1                     7.08       1.799
RAT-B1                     7.17       1.818
RAT-B1                     7.25       1.836
RAT-B1                     7.33       2.720
RAT-B1                     7.42       4.321
RAT-B1                     7.50       6.389
RAT-B1                     7.58       8.835
RAT-B1                     7.67       11.607
RAT-B1                     7.75       14.669
;
STOR-A           Storage    0          2548
STOR-A                      6          2548
;
STOR-B1          Storage    0          1606
STOR-B1                     7.75       1606

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
TS-Escondido     FILE "escondido.dat"

[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
;;-------------- ------------------ ------------------
POC-2            4452.888           526.849
STOR-A           -45.593            6281.662
STOR-B1/B3       2152.989           6291.793

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

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
DMA-A            -75.988            7537.994
DMA-A            -75.988            7537.994
DMA-B1/B3        2142.857           7588.652
DMA-B2           3642.351           6220.871
SM-1             5597.771           1925.025
SM-2             6296.859           1894.630
SM-3             6995.947           1854.103
SM-4             7743.668           1835.867
SM-4             7743.668           1835.867
SM-4             7723.405           1815.603
SM-4             7733.536           1805.471
SM-4             7733.536           1876.393
DMA-B4           5212.766           6210.740
DMA-B4           5182.371           6220.871
DMA-B4           5151.976           6170.213
DMA-B4           5151.976           6170.213
DMA-B4           5162.107           6170.213
DMA-B4           5162.107           6170.213
DMA-B4           5162.107           6170.213
DMA-B4           5162.107           6170.213

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
```

Escondido	4685.917	9270.517

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)
--------------------------------------------------------------

VISTA BALLFIELDS
POC-2 POST-PROJECT CONDITION
J-19253B


*********************************************************
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 ............ 09/24/1964 13:00:00
Ending Date .............. 05/23/2008 22:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 04:00:00
Routing Time Step ........ 60.00 sec


**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation ......       271.694       611.120
Evaporation Loss .........        28.190        63.408
Infiltration Loss ........        64.808       145.772
Surface Runoff ...........       183.781       413.378
Final Storage ............         0.010         0.023
Continuity Error (%) .....        -1.875


**************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......       183.781        59.888
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........       183.957        59.945
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 ......         0.000         0.000
Continuity Error (%) .....        -0.096


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


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :    59.00 sec
Average Time Step           :    60.00 sec
Maximum Time Step           :    60.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     1.00
Percent Not Converging      :     0.00
```

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
DMA-A	611.12	0.00	71.48	84.41	467.06	31.71	2.10	0.764
DMA-B1/B3	611.12	0.00	71.78	84.29	466.67	22.81	1.51	0.764
DMA-B2	611.12	0.00	78.77	20.97	523.43	0.50	0.03	0.857
SM-1	611.12	0.00	21.81	457.55	141.85	1.93	0.41	0.232
SM-2	611.12	0.00	21.86	458.11	141.03	0.77	0.16	0.231
SM-3	611.12	0.00	21.93	459.19	139.50	0.38	0.08	0.228
SM-4	611.12	0.00	21.89	458.08	140.98	0.38	0.08	0.231
DMA-B4	611.12	0.00	79.60	20.96	522.25	1.42	0.09	0.855

****
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
POC-2	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
STOR-A	STORAGE	0.05	4.68	4.68	10332 04:06	4.63
STOR-B1/B3	STORAGE	0.03	4.60	4.60	10332 04:06	4.55

****
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
POC-2	OUTFALL	0.85	3.47	10332 04:01	5.37	59.9	0.000
STOR-A	STORAGE	2.10	2.10	15675 18:01	31.7	31.7	-0.086
STOR-B1/B3	STORAGE	1.51	1.51	15675 18:01	22.8	22.8	-0.131

****
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
STOR-A	0.119	0	0	0	11.919	47	10332 04:06	1.54
STOR-B1/B3	0.048	0	0	0	7.391	46	10332 04:06	1.12

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
POC-2	5.29	0.11	3.47	59.941
System	5.29	0.11	3.47	59.941

****

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
RAT-A	DUMMY	1.54	10332 04:06			
RAT-B1/B3	DUMMY	1.12	10332 04:06			

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Tue Oct 03 09:33:43 2023
Analysis ended on: Tue Oct 03 09:34:02 2023
Total elapsed time: 00:00:19

BMP A1 (Stage-Storage-Discharge Rating Curve)

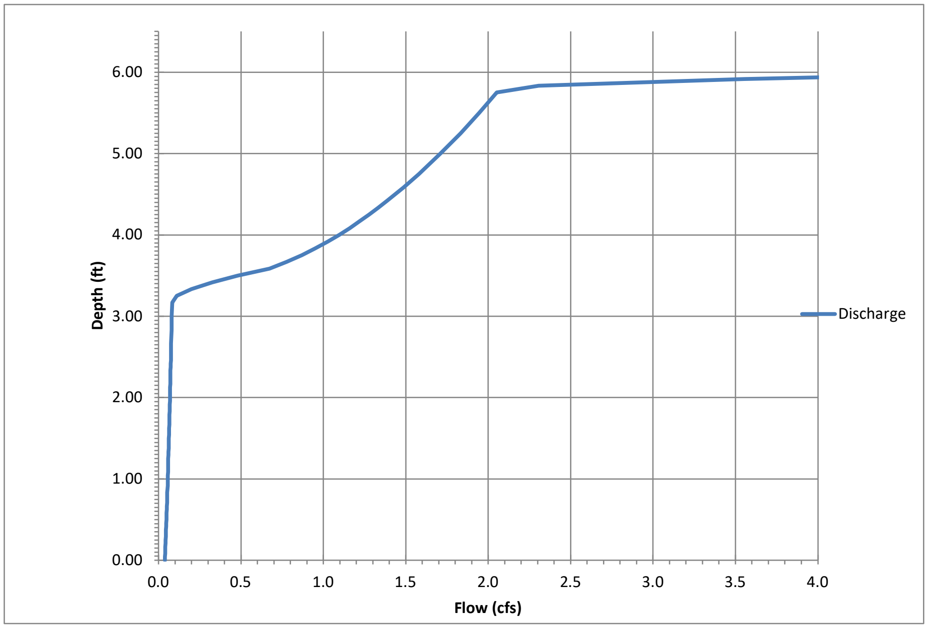
Vault Characteristics	
Vault Depth (ft) =	6

Low-Flow Orifice	
Num. of Orifices =	1
Orifice Invert (ft) =	-1
Orifice Diameter (in) =	1.25
Cg =	0.6

Mid-flow Orifice (Lower)	
Num. of Orifices =	3
Orifice Invert (ft) =	3.2
Orifice Diameter (in) =	4
Cg =	0.6

Mid-flow Orifice (Upper)(Rectangular)	
Num. of Orifices =	0
Orifice Invert (ft) =	0
Orifice Width (ft) =	0
Orifice Height (ft) =	0
Cg (orifice) =	0.6
Cg (weir) =	3

Top of Inlet	
Upper Weir Inv (ft) =	5.8
B (ft) =	12
Cs =	3



Outlet Link Rating Curve (Input to SWMM)

h (in)	h (ft)	Low-Flow Orifice	Mid-Flow Orifice (Lower)	Mid-Flow Orifice (Upper, Weir Calc)	Mid-flow Orifice Upper	Overflow Weir	Total Flow (cfs)	Surface Area (ft2)	Porosity	Incremental Volume (ft3)	Cumulative Volume (ft3)
0.0	0.00	0.040	0.000	0.000	0.000	0.000	0.040	2711	0.94	0	0
0.5	0.04	0.040	0.000	0.000	0.000	0.000	0.040	2711	0.94	106	106
1.0	0.08	0.041	0.000	0.000	0.000	0.000	0.041	2711	0.94	106	212
1.5	0.13	0.041	0.000	0.000	0.000	0.000	0.041	2711	0.94	106	319
2.0	0.17	0.042	0.000	0.000	0.000	0.000	0.042	2711	0.94	106	425
2.5	0.21	0.043	0.000	0.000	0.000	0.000	0.043	2711	0.94	106	531
3.0	0.25	0.044	0.000	0.000	0.000	0.000	0.044	2711	0.94	106	637
3.5	0.29	0.045	0.000	0.000	0.000	0.000	0.045	2711	0.94	106	743
4.0	0.33	0.045	0.000	0.000	0.000	0.000	0.045	2711	0.94	106	849
4.5	0.38	0.046	0.000	0.000	0.000	0.000	0.046	2711	0.94	106	956
5.0	0.42	0.047	0.000	0.000	0.000	0.000	0.047	2711	0.94	106	1062
5.5	0.46	0.048	0.000	0.000	0.000	0.000	0.048	2711	0.94	106	1168
6.0	0.50	0.048	0.000	0.000	0.000	0.000	0.048	2711	0.94	106	1274
6.5	0.54	0.049	0.000	0.000	0.000	0.000	0.049	2711	0.94	106	1380
7.0	0.58	0.050	0.000	0.000	0.000	0.000	0.050	2711	0.94	106	1487
7.5	0.63	0.051	0.000	0.000	0.000	0.000	0.051	2711	0.94	106	1593
8.0	0.67	0.051	0.000	0.000	0.000	0.000	0.051	2711	0.94	106	1699
8.5	0.71	0.052	0.000	0.000	0.000	0.000	0.052	2711	0.94	106	1805
9.0	0.75	0.053	0.000	0.000	0.000	0.000	0.053	2711	0.94	106	1911
9.5	0.79	0.053	0.000	0.000	0.000	0.000	0.053	2711	0.94	106	2017
10.0	0.83	0.054	0.000	0.000	0.000	0.000	0.054	2711	0.94	106	2124
10.5	0.88	0.055	0.000	0.000	0.000	0.000	0.055	2711	0.94	106	2230
11.0	0.92	0.055	0.000	0.000	0.000	0.000	0.055	2711	0.94	106	2336
11.5	0.96	0.056	0.000	0.000	0.000	0.000	0.056	2711	0.94	106	2442
12.0	1.00	0.056	0.000	0.000	0.000	0.000	0.056	2711	0.94	106	2548
12.5	1.04	0.057	0.000	0.000	0.000	0.000	0.057	2711	0.94	106	2655
13.0	1.08	0.058	0.000	0.000	0.000	0.000	0.058	2711	0.94	106	2761
13.5	1.13	0.058	0.000	0.000	0.000	0.000	0.058	2711	0.94	106	2867
14.0	1.17	0.059	0.000	0.000	0.000	0.000	0.059	2711	0.94	106	2973
14.5	1.21	0.060	0.000	0.000	0.000	0.000	0.060	2711	0.94	106	3079
15.0	1.25	0.060	0.000	0.000	0.000	0.000	0.060	2711	0.94	106	3185
15.5	1.29	0.061	0.000	0.000	0.000	0.000	0.061	2711	0.94	106	3292
16.0	1.33	0.061	0.000	0.000	0.000	0.000	0.061	2711	0.94	106	3398
16.5	1.38	0.062	0.000	0.000	0.000	0.000	0.062	2711	0.94	106	3504
17.0	1.42	0.062	0.000	0.000	0.000	0.000	0.062	2711	0.94	106	3610
17.5	1.46	0.063	0.000	0.000	0.000	0.000	0.063	2711	0.94	106	3716
18.0	1.50	0.064	0.000	0.000	0.000	0.000	0.064	2711	0.94	106	3823

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18.5	1.54	0.064	0.000	0.000	0.000	0.000	0.064	2711	0.94	106	3929
19.0	1.58	0.065	0.000	0.000	0.000	0.000	0.065	2711	0.94	106	4035
19.5	1.63	0.065	0.000	0.000	0.000	0.000	0.065	2711	0.94	106	4141
20.0	1.67	0.066	0.000	0.000	0.000	0.000	0.066	2711	0.94	106	4247
20.5	1.71	0.066	0.000	0.000	0.000	0.000	0.066	2711	0.94	106	4353
21.0	1.75	0.067	0.000	0.000	0.000	0.000	0.067	2711	0.94	106	4460
21.5	1.79	0.067	0.000	0.000	0.000	0.000	0.067	2711	0.94	106	4566
22.0	1.83	0.068	0.000	0.000	0.000	0.000	0.068	2711	0.94	106	4672
22.5	1.88	0.068	0.000	0.000	0.000	0.000	0.068	2711	0.94	106	4778
23.0	1.92	0.069	0.000	0.000	0.000	0.000	0.069	2711	0.94	106	4884
23.5	1.96	0.069	0.000	0.000	0.000	0.000	0.069	2711	0.94	106	4990
24.0	2.00	0.070	0.000	0.000	0.000	0.000	0.070	2711	0.94	106	5097
24.5	2.04	0.070	0.000	0.000	0.000	0.000	0.070	2711	0.94	106	5203
25.0	2.08	0.071	0.000	0.000	0.000	0.000	0.071	2711	0.94	106	5309
25.5	2.13	0.071	0.000	0.000	0.000	0.000	0.071	2711	0.94	106	5415
26.0	2.17	0.072	0.000	0.000	0.000	0.000	0.072	2711	0.94	106	5521
26.5	2.21	0.072	0.000	0.000	0.000	0.000	0.072	2711	0.94	106	5628
27.0	2.25	0.073	0.000	0.000	0.000	0.000	0.073	2711	0.94	106	5734
27.5	2.29	0.073	0.000	0.000	0.000	0.000	0.073	2711	0.94	106	5840
28.0	2.33	0.074	0.000	0.000	0.000	0.000	0.074	2711	0.94	106	5946
28.5	2.38	0.074	0.000	0.000	0.000	0.000	0.074	2711	0.94	106	6052
29.0	2.42	0.075	0.000	0.000	0.000	0.000	0.075	2711	0.94	106	6158
29.5	2.46	0.075	0.000	0.000	0.000	0.000	0.075	2711	0.94	106	6265
30.0	2.50	0.076	0.000	0.000	0.000	0.000	0.076	2711	0.94	106	6371
31.0	2.58	0.077	0.000	0.000	0.000	0.000	0.077	2711	0.94	212	6583
32.0	2.67	0.077	0.000	0.000	0.000	0.000	0.077	2711	0.94	212	6796
33.0	2.75	0.078	0.000	0.000	0.000	0.000	0.078	2711	0.94	212	7008
34.0	2.83	0.079	0.000	0.000	0.000	0.000	0.079	2711	0.94	212	7220
35.0	2.92	0.080	0.000	0.000	0.000	0.000	0.080	2711	0.94	212	7433
36.0	3.00	0.081	0.000	0.000	0.000	0.000	0.081	2711	0.94	212	7645
37.0	3.08	0.082	0.000	0.000	0.000	0.000	0.082	2711	0.94	212	7857
38.0	3.17	0.083	0.000	0.000	0.000	0.000	0.083	2711	0.94	212	8070
39.0	3.25	0.084	0.009	0.000	0.000	0.000	0.110	2711	0.94	212	8282
40.0	3.33	0.084	0.039	0.000	0.000	0.000	0.201	2711	0.94	212	8494
41.0	3.42	0.085	0.081	0.000	0.000	0.000	0.327	2711	0.94	212	8707
42.0	3.50	0.086	0.131	0.000	0.000	0.000	0.480	2711	0.94	212	8919
43.0	3.58	0.087	0.196	0.000	0.000	0.000	0.674	2711	0.94	212	9132
44.0	3.67	0.088	0.230	0.000	0.000	0.000	0.778	2711	0.94	212	9344
45.0	3.75	0.088	0.260	0.000	0.000	0.000	0.869	2711	0.94	212	9556
46.0	3.83	0.089	0.287	0.000	0.000	0.000	0.950	2711	0.94	212	9769
47.0	3.92	0.090	0.312	0.000	0.000	0.000	1.025	2711	0.94	212	9981
48.0	4.00	0.091	0.334	0.000	0.000	0.000	1.094	2711	0.94	212	10193
49.0	4.08	0.092	0.356	0.000	0.000	0.000	1.159	2711	0.94	212	10406
50.0	4.17	0.092	0.376	0.000	0.000	0.000	1.220	2711	0.94	212	10618
51.0	4.25	0.093	0.395	0.000	0.000	0.000	1.278	2711	0.94	212	10830
52.0	4.33	0.094	0.413	0.000	0.000	0.000	1.333	2711	0.94	212	11043
53.0	4.42	0.095	0.431	0.000	0.000	0.000	1.386	2711	0.94	212	11255
54.0	4.50	0.095	0.447	0.000	0.000	0.000	1.437	2711	0.94	212	11468
55.0	4.58	0.096	0.463	0.000	0.000	0.000	1.486	2711	0.94	212	11680
56.0	4.67	0.097	0.479	0.000	0.000	0.000	1.534	2711	0.94	212	11892
57.0	4.75	0.098	0.494	0.000	0.000	0.000	1.580	2711	0.94	212	12105
58.0	4.83	0.098	0.509	0.000	0.000	0.000	1.625	2711	0.94	212	12317
59.0	4.92	0.099	0.523	0.000	0.000	0.000	1.668	2711	0.94	212	12529
60.0	5.00	0.100	0.537	0.000	0.000	0.000	1.711	2711	0.94	212	12742
61.0	5.08	0.100	0.551	0.000	0.000	0.000	1.752	2711	0.94	212	12954
62.0	5.17	0.101	0.564	0.000	0.000	0.000	1.792	2711	0.94	212	13166
63.0	5.25	0.102	0.577	0.000	0.000	0.000	1.832	2711	0.94	212	13379
64.0	5.33	0.102	0.589	0.000	0.000	0.000	1.870	2711	0.94	212	13591
65.0	5.42	0.103	0.602	0.000	0.000	0.000	1.908	2711	0.94	212	13804
66.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.945	2711	0.94	212	14016
67.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.981	2711	0.94	212	14228
68.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.017	2711	0.94	212	14441
69.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.052	2711	0.94	212	14653
70.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.305	2711	0.94	212	14865
71.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.555	2711	0.94	212	15078
72.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5.373	2711	0.94	212	15290

DMA-A DCV: 4884 CF

BMP-A1 WQ DDT: 37 HOURS

BMP-A1 STORAGE MULTIPLIER: 1.6 (CONSERVATIVE)

BMP-A1 REQ. TREATMENT VOLUME: 7815 CF

VOLUME TREATED BY BMP-A1 TO PROVIDE 92%
ANNUAL CAPTURE: 8070 CF

BMP B1 (Stage-Storage-Discharge Rating Curve)

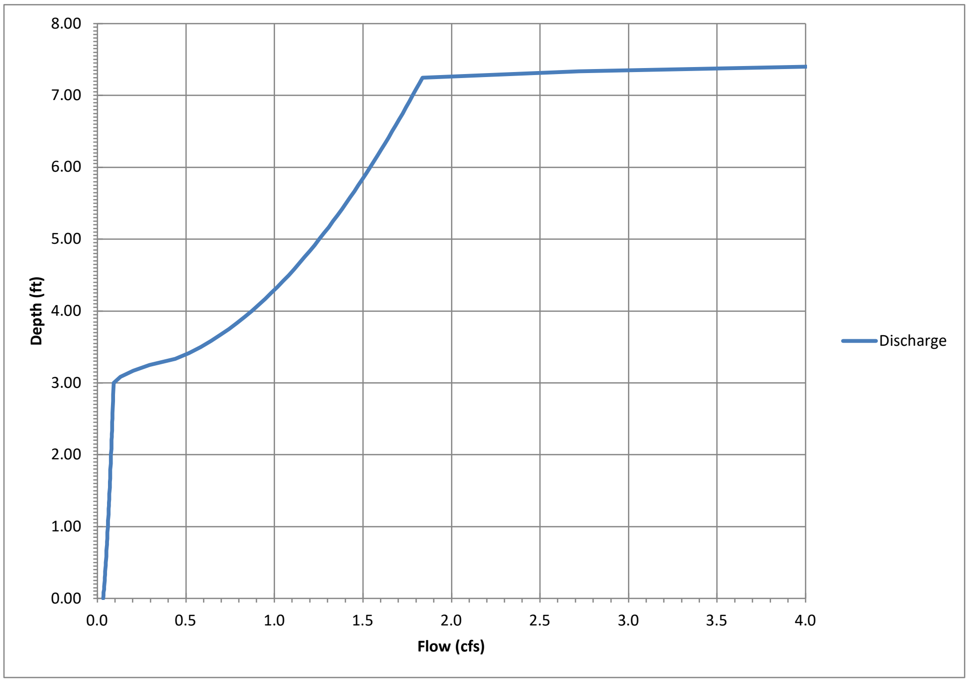
Vault Characteristics	
Vault Depth (ft) =	7.75

Low-Flow Orifice	
Num. of Orifices =	1
Orifice Invert (ft) =	-0.5
Orifice Diameter (in) =	1.375
Cg =	0.6

Mid-flow Orifice (Lower)	
Num. of Orifices =	2
Orifice Invert (ft) =	3
Orifice Diameter (in) =	4
Cg =	0.6

Mid-flow Orifice (Upper)(Rectangular)	
Num. of Orifices =	0
Orifice Invert (ft) =	0
Orifice Width (ft) =	0
Orifice Height (ft) =	0
Cg (orifice) =	0.6
Cg (weir) =	3

Top of Inlet	
Upper Weir Inv (ft) =	7.25
B (ft) =	12
Cs =	3



Outlet Link Rating Curve (Input to SWMM)

h (in)	h (ft)	Low-Flow Orifice	Mid-Flow Orifice (Lower)	Mid-Flow Orifice (Upper, Weir Calc)	Mid-flow Orifice Upper	Overflow Weir	Total Flow (cfs)	Surface Area (ft2)	Porosity	Incremental Volume (ft3)	Cumulative Volume (ft3)
0.0	0.00	0.033	0.000	0.000	0.000	0.000	0.033	1709	0.94	0	0
0.5	0.04	0.035	0.000	0.000	0.000	0.000	0.035	1709	0.94	67	67
1.0	0.08	0.036	0.000	0.000	0.000	0.000	0.036	1709	0.94	67	134
1.5	0.13	0.037	0.000	0.000	0.000	0.000	0.037	1709	0.94	67	201
2.0	0.17	0.039	0.000	0.000	0.000	0.000	0.039	1709	0.94	67	268
2.5	0.21	0.040	0.000	0.000	0.000	0.000	0.040	1709	0.94	67	335
3.0	0.25	0.041	0.000	0.000	0.000	0.000	0.041	1709	0.94	67	402
3.5	0.29	0.043	0.000	0.000	0.000	0.000	0.043	1709	0.94	67	469
4.0	0.33	0.044	0.000	0.000	0.000	0.000	0.044	1709	0.94	67	535
4.5	0.38	0.045	0.000	0.000	0.000	0.000	0.045	1709	0.94	67	602
5.0	0.42	0.046	0.000	0.000	0.000	0.000	0.046	1709	0.94	67	669
5.5	0.46	0.047	0.000	0.000	0.000	0.000	0.047	1709	0.94	67	736
6.0	0.50	0.048	0.000	0.000	0.000	0.000	0.048	1709	0.94	67	803
6.5	0.54	0.049	0.000	0.000	0.000	0.000	0.049	1709	0.94	67	870
7.0	0.58	0.050	0.000	0.000	0.000	0.000	0.050	1709	0.94	67	937
7.5	0.63	0.051	0.000	0.000	0.000	0.000	0.051	1709	0.94	67	1004
8.0	0.67	0.052	0.000	0.000	0.000	0.000	0.052	1709	0.94	67	1071
8.5	0.71	0.053	0.000	0.000	0.000	0.000	0.053	1709	0.94	67	1138
9.0	0.75	0.054	0.000	0.000	0.000	0.000	0.054	1709	0.94	67	1205
9.5	0.79	0.055	0.000	0.000	0.000	0.000	0.055	1709	0.94	67	1272
10.0	0.83	0.056	0.000	0.000	0.000	0.000	0.056	1709	0.94	67	1339
10.5	0.88	0.057	0.000	0.000	0.000	0.000	0.057	1709	0.94	67	1406
11.0	0.92	0.058	0.000	0.000	0.000	0.000	0.058	1709	0.94	67	1473
11.5	0.96	0.059	0.000	0.000	0.000	0.000	0.059	1709	0.94	67	1540
12.0	1.00	0.060	0.000	0.000	0.000	0.000	0.060	1709	0.94	67	1606
12.5	1.04	0.060	0.000	0.000	0.000	0.000	0.060	1709	0.94	67	1673
13.0	1.08	0.061	0.000	0.000	0.000	0.000	0.061	1709	0.94	67	1740
13.5	1.13	0.062	0.000	0.000	0.000	0.000	0.062	1709	0.94	67	1807
14.0	1.17	0.063	0.000	0.000	0.000	0.000	0.063	1709	0.94	67	1874
14.5	1.21	0.064	0.000	0.000	0.000	0.000	0.064	1709	0.94	67	1941
15.0	1.25	0.065	0.000	0.000	0.000	0.000	0.065	1709	0.94	67	2008
15.5	1.29	0.065	0.000	0.000	0.000	0.000	0.065	1709	0.94	67	2075
16.0	1.33	0.066	0.000	0.000	0.000	0.000	0.066	1709	0.94	67	2142
16.5	1.38	0.067	0.000	0.000	0.000	0.000	0.067	1709	0.94	67	2209
17.0	1.42	0.068	0.000	0.000	0.000	0.000	0.068	1709	0.94	67	2276
17.5	1.46	0.068	0.000	0.000	0.000	0.000	0.068	1709	0.94	67	2343

18.0	1.50	0.069	0.000	0.000	0.000	0.000	0.069	1709	0.94	67	2410
18.5	1.54	0.070	0.000	0.000	0.000	0.000	0.070	1709	0.94	67	2477
19.0	1.58	0.071	0.000	0.000	0.000	0.000	0.071	1709	0.94	67	2544
19.5	1.63	0.071	0.000	0.000	0.000	0.000	0.071	1709	0.94	67	2610
20.0	1.67	0.072	0.000	0.000	0.000	0.000	0.072	1709	0.94	67	2677
20.5	1.71	0.073	0.000	0.000	0.000	0.000	0.073	1709	0.94	67	2744
21.0	1.75	0.074	0.000	0.000	0.000	0.000	0.074	1709	0.94	67	2811
21.5	1.79	0.074	0.000	0.000	0.000	0.000	0.074	1709	0.94	67	2878
22.0	1.83	0.075	0.000	0.000	0.000	0.000	0.075	1709	0.94	67	2945
22.5	1.88	0.076	0.000	0.000	0.000	0.000	0.076	1709	0.94	67	3012
23.0	1.92	0.076	0.000	0.000	0.000	0.000	0.076	1709	0.94	67	3079
23.5	1.96	0.077	0.000	0.000	0.000	0.000	0.077	1709	0.94	67	3146
24.0	2.00	0.078	0.000	0.000	0.000	0.000	0.078	1709	0.94	67	3213
24.5	2.04	0.078	0.000	0.000	0.000	0.000	0.078	1709	0.94	67	3280
25.0	2.08	0.079	0.000	0.000	0.000	0.000	0.079	1709	0.94	67	3347
25.5	2.13	0.080	0.000	0.000	0.000	0.000	0.080	1709	0.94	67	3414
26.0	2.17	0.080	0.000	0.000	0.000	0.000	0.080	1709	0.94	67	3481
26.5	2.21	0.081	0.000	0.000	0.000	0.000	0.081	1709	0.94	67	3548
27.0	2.25	0.081	0.000	0.000	0.000	0.000	0.081	1709	0.94	67	3615
27.5	2.29	0.082	0.000	0.000	0.000	0.000	0.082	1709	0.94	67	3681
28.0	2.33	0.083	0.000	0.000	0.000	0.000	0.083	1709	0.94	67	3748
28.5	2.38	0.083	0.000	0.000	0.000	0.000	0.083	1709	0.94	67	3815
29.0	2.42	0.084	0.000	0.000	0.000	0.000	0.084	1709	0.94	67	3882
29.5	2.46	0.085	0.000	0.000	0.000	0.000	0.085	1709	0.94	67	3949
30.0	2.50	0.085	0.000	0.000	0.000	0.000	0.085	1709	0.94	67	4016
31.0	2.58	0.086	0.000	0.000	0.000	0.000	0.086	1709	0.94	134	4150
32.0	2.67	0.088	0.000	0.000	0.000	0.000	0.088	1709	0.94	134	4284
33.0	2.75	0.089	0.000	0.000	0.000	0.000	0.089	1709	0.94	134	4418
34.0	2.83	0.090	0.000	0.000	0.000	0.000	0.090	1709	0.94	134	4552
35.0	2.92	0.091	0.000	0.000	0.000	0.000	0.091	1709	0.94	134	4686
36.0	3.00	0.092	0.000	0.000	0.000	0.000	0.092	1709	0.94	134	4819
37.0	3.08	0.093	0.019	0.000	0.000	0.000	0.132	1709	0.94	134	4953
38.0	3.17	0.094	0.054	0.000	0.000	0.000	0.203	1709	0.94	134	5087
39.0	3.25	0.095	0.100	0.000	0.000	0.000	0.295	1709	0.94	134	5221
40.0	3.33	0.096	0.172	0.000	0.000	0.000	0.440	1709	0.94	134	5355
41.0	3.42	0.098	0.210	0.000	0.000	0.000	0.518	1709	0.94	134	5489
42.0	3.50	0.099	0.243	0.000	0.000	0.000	0.584	1709	0.94	134	5623
43.0	3.58	0.100	0.271	0.000	0.000	0.000	0.642	1709	0.94	134	5756
44.0	3.67	0.101	0.297	0.000	0.000	0.000	0.695	1709	0.94	134	5890
45.0	3.75	0.102	0.321	0.000	0.000	0.000	0.744	1709	0.94	134	6024
46.0	3.83	0.103	0.343	0.000	0.000	0.000	0.789	1709	0.94	134	6158
47.0	3.92	0.104	0.364	0.000	0.000	0.000	0.831	1709	0.94	134	6292
48.0	4.00	0.105	0.384	0.000	0.000	0.000	0.872	1709	0.94	134	6426
49.0	4.08	0.106	0.402	0.000	0.000	0.000	0.910	1709	0.94	134	6560
50.0	4.17	0.107	0.420	0.000	0.000	0.000	0.947	1709	0.94	134	6694
51.0	4.25	0.108	0.437	0.000	0.000	0.000	0.982	1709	0.94	134	6827
52.0	4.33	0.109	0.454	0.000	0.000	0.000	1.016	1709	0.94	134	6961
53.0	4.42	0.109	0.470	0.000	0.000	0.000	1.049	1709	0.94	134	7095
54.0	4.50	0.						1709	0.94	134	7229
55.0	4.58	0.						1709	0.94	134	7363
56.0	4.67	0.						1709	0.94	134	7497
57.0	4.75	0.						1709	0.94	134	7631
58.0	4.83	0.						1709	0.94	134	7765
59.0	4.92	0.						1709	0.94	134	7898
60.0	5.00	0.						1709	0.94	134	8032
61.0	5.08	0.						1709	0.94	134	8166
62.0	5.17	0.						1709	0.94	134	8300
63.0	5.25	0.						1709	0.94	134	8434
64.0	5.33	0.						1709	0.94	134	8568
65.0	5.42	0.						1709	0.94	134	8702
66.0	5.50	0.						1709	0.94	134	8836
67.0	5.58	0.						1709	0.94	134	8969
68.0	5.67	0.						1709	0.94	134	9103
69.0	5.75	0.124	0.675	0.000	0.000	0.000	1.474	1709	0.94	134	9237
70.0	5.83	0.124	0.686	0.000	0.000	0.000	1.497	1709	0.94	134	9371
71.0	5.92	0.125	0.697	0.000	0.000	0.000	1.519	1709	0.94	134	9505
72.0	6.00	0.126	0.707	0.000	0.000	0.000	1.541	1709	0.94	134	9639
73.0	6.08	0.127	0.718	0.000	0.000	0.000	1.562	1709	0.94	134	9773
74.0	6.17	0.128	0.728	0.000	0.000	0.000	1.583	1709	0.94	134	9907
75.0	6.25	0.128	0.738	0.000	0.000	0.000	1.604	1709	0.94	134	10040
76.0	6.33	0.129	0.748	0.000	0.000	0.000	1.625	1709	0.94	134	10174

DMA-B DCV: 3517 CF

BMP-B1 WQ DDT: 21.4 HOURS

BMP-B1/BF1 STORAGE MULTIPLIER: 1.25 (CONSERVATIVE)

BMP-B1/BF1 REQ. TREATMENT VOLUME: 4396 CF

VOLUME TREATED BY BMP-B1/BF1 TO PROVIDE 92% ANNUAL CAPTURE: 4819 CF

J-19253B

77.0	6.42	0.130	0.758	0.000	0.000	0.000	1.645	1709	0.94	134	10308
78.0	6.50	0.131	0.767	0.000	0.000	0.000	1.665	1709	0.94	134	10442
79.0	6.58	0.132	0.777	0.000	0.000	0.000	1.685	1709	0.94	134	10576
80.0	6.67	0.132	0.786	0.000	0.000	0.000	1.705	1709	0.94	134	10710
81.0	6.75	0.133	0.795	0.000	0.000	0.000	1.724	1709	0.94	134	10844
82.0	6.83	0.134	0.805	0.000	0.000	0.000	1.743	1709	0.94	134	10977
83.0	6.92	0.135	0.814	0.000	0.000	0.000	1.762	1709	0.94	134	11111

BMP A1 - VAULT				CALCULATED	
	STORAGE		DISCHARGE	DRAWDOWN TIME	
h (ft)	Incremental storage volume (ft3)	Cumulative storage volume (ft3)	Total Flow (cfs)	Incremental Drawdown Time (hr)	Cumulative Drawdown Time (hr)
0.00	0	0	0.040	0.00	0.00
0.04	106	106	0.040	0.74	0.74
0.08	106	212	0.041	0.73	1.47
0.13	106	319	0.041	0.72	2.19
0.17	106	425	0.042	0.70	2.90
0.21	106	531	0.043	0.69	3.59
0.25	106	637	0.044	0.68	4.27
0.29	106	743	0.045	0.67	4.93
0.33	106	849	0.045	0.65	5.59
0.38	106	956	0.046	0.64	6.23
0.42	106	1,062	0.047	0.63	6.86
0.46	106	1,168	0.048	0.62	7.48
0.50	106	1,274	0.048	0.61	8.10
0.54	106	1,380	0.049	0.60	8.70
0.58	106	1,487	0.050	0.60	9.30
0.63	106	1,593	0.051	0.59	9.88
0.67	106	1,699	0.051	0.58	10.46
0.71	106	1,805	0.052	0.57	11.03
0.75	106	1,911	0.053	0.56	11.60
0.79	106	2,017	0.053	0.56	12.15
0.83	106	2,124	0.054	0.55	12.70
0.88	106	2,230	0.055	0.54	13.25
0.92	106	2,336	0.055	0.54	13.78
0.96	106	2,442	0.056	0.53	14.31
1.00	106	2,548	0.056	0.52	14.84
1.04	106	2,655	0.057	0.52	15.36
1.08	106	2,761	0.058	0.51	15.87
1.13	106	2,867	0.058	0.51	16.38
1.17	106	2,973	0.059	0.50	16.88
1.21	106	3,079	0.060	0.50	17.38
1.25	106	3,185	0.060	0.49	17.87
1.29	106	3,292	0.061	0.49	18.36
1.33	106	3,398	0.061	0.48	18.85
1.38	106	3,504	0.062	0.48	19.33
1.42	106	3,610	0.062	0.47	19.80
1.46	106	3,716	0.063	0.47	20.27
1.50	106	3,823	0.064	0.47	20.74
1.54	106	3,929	0.064	0.46	21.20
1.58	106	4,035	0.065	0.46	21.66
1.63	106	4,141	0.065	0.45	22.11
1.67	106	4,247	0.066	0.45	22.56
1.71	106	4,353	0.066	0.45	23.01
1.75	106	4,460	0.067	0.44	23.45
1.79	106	4,566	0.067	0.44	23.90
1.83	106	4,672	0.068	0.44	24.33
1.88	106	4,778	0.068	0.43	24.77
1.92	106	4,884	0.069	0.43	25.20
1.96	106	4,990	0.069	0.43	25.62
2.00	106	5,097	0.070	0.42	26.05
2.04	106	5,203	0.070	0.42	26.47
2.08	106	5,309	0.071	0.42	26.89
2.13	106	5,415	0.071	0.42	27.30
2.17	106	5,521	0.072	0.41	27.71
2.21	106	5,628	0.072	0.41	28.12
2.25	106	5,734	0.073	0.41	28.53
2.29	106	5,840	0.073	0.40	28.93
2.33	106	5,946	0.074	0.40	29.33
2.38	106	6,052	0.074	0.40	29.73
2.42	106	6,158	0.075	0.40	30.13
2.46	106	6,265	0.075	0.39	30.52
2.50	106	6,371	0.076	0.39	30.91
2.58	212	6,583	0.077	0.78	31.69
2.67	212	6,796	0.077	0.77	32.45
2.75	212	7,008	0.078	0.76	33.21
2.83	212	7,220	0.079	0.75	33.96
2.92	212	7,433	0.080	0.74	34.70
3.00	212	7,645	0.081	0.73	35.43
3.08	212	7,857	0.082	0.72	36.16
3.17	212	8,070	0.083	0.72	36.87
3.25	212	8,282	0.110	0.61	37.49
3.33	212	8,494	0.201	0.38	37.86
3.42	212	8,707	0.327	0.22	38.09
3.50	212	8,919	0.480	0.15	38.23
3.58	212	9,132	0.674	0.10	38.34
3.67	212	9,344	0.778	0.08	38.42
3.75	212	9,556	0.869	0.07	38.49
3.83	212	9,769	0.950	0.06	38.55
3.92	212	9,981	1.025	0.06	38.61
4.00	212	10,193	1.094	0.06	38.67
4.08	212	10,406	1.159	0.05	38.72
4.17	212	10,618	1.220	0.05	38.77
4.25	212	10,830	1.278	0.05	38.82
4.33	212	11,043	1.333	0.05	38.86
4.42	212	11,255	1.386	0.04	38.91
4.50	212	11,468	1.437	0.04	38.95
4.58	212	11,680	1.486	0.04	38.99
4.67	212	11,892	1.534	0.04	39.03
4.75	212	12,105	1.580	0.04	39.07
4.83	212	12,317	1.625	0.04	39.10
4.92	212	12,529	1.668	0.04	39.14
5.00	212	12,742	1.711	0.03	39.17
5.08	212	12,954	1.752	0.03	39.21
5.17	212	13,166	1.792	0.03	39.24
5.25	212	13,379	1.832	0.03	39.27
5.33	212	13,591	1.870	0.03	39.31
5.42	212	13,804	1.908	0.03	39.34
5.50	212	14,016	1.945	0.03	39.37
5.58	212	14,228	1.981	0.03	39.40
5.67	212	14,441	2.017	0.03	39.43
5.75	212	14,653	2.052	0.03	39.46
5.83	212	14,865	2.305	0.03	39.48
5.92	212	15,078	3.555	0.02	39.50
6.00	212	15,290	5.373	0.01	39.52

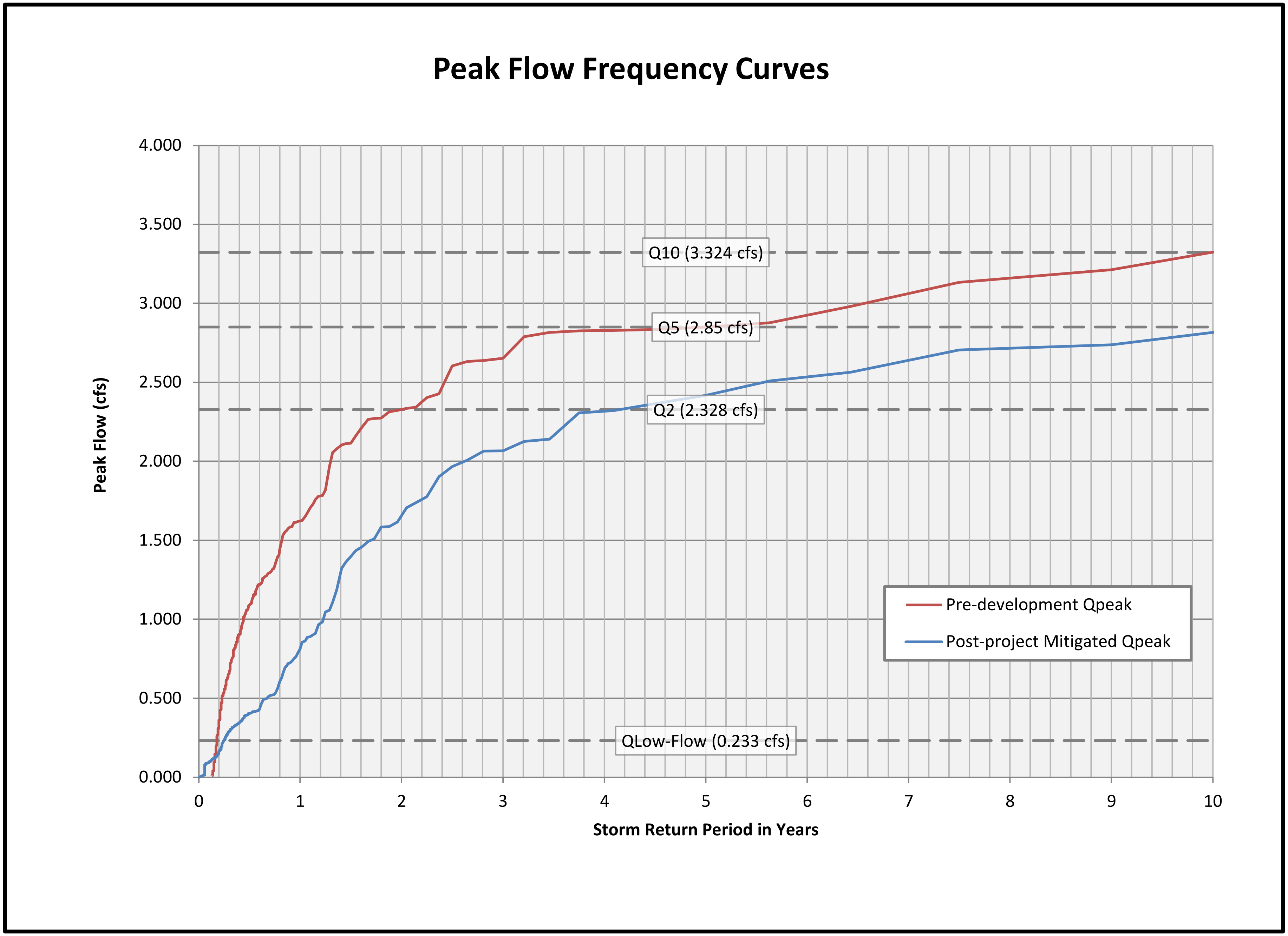
BMP B1 - VAULT				CALCULATED	
	STORAGE		DISCHARGE	DRAWDOWN TIME	
h (ft)	Incremental storage volume (ft3)	Cumulative storage volume (ft3)	Total Flow (cfs)	Incremental Drawdown Time (hr)	Cumulative Drawdown Time (hr)
0.000	0	0	0.033	0.00	0.00
0.042	67	67	0.035	0.55	0.55
0.083	67	134	0.036	0.53	1.08
0.125	67	201	0.037	0.51	1.58
0.167	67	268	0.039	0.49	2.07
0.208	67	335	0.040	0.47	2.54
0.250	67	402	0.041	0.46	3.00
0.292	67	469	0.043	0.44	3.44
0.333	67	535	0.044	0.43	3.87
0.375	67	602	0.045	0.42	4.29
0.417	67	669	0.046	0.41	4.70
0.458	67	736	0.047	0.40	5.10
0.500	67	803	0.048	0.39	5.49
0.542	67	870	0.049	0.38	5.87
0.583	67	937	0.050	0.37	6.25
0.625	67	1,004	0.051	0.37	6.61
0.667	67	1,071	0.052	0.36	6.97
0.708	67	1,138	0.053	0.35	7.32
0.750	67	1,205	0.054	0.35	7.67
0.792	67	1,272	0.055	0.34	8.01
0.833	67	1,339	0.056	0.33	8.35
0.875	67	1,406	0.057	0.33	8.67
0.917	67	1,473	0.058	0.32	9.00
0.958	67	1,540	0.059	0.32	9.32
1.000	67	1,606	0.060	0.31	9.63
1.042	67	1,673	0.060	0.31	9.94
1.083	67	1,740	0.061	0.31	10.25
1.125	67	1,807	0.062	0.30	10.55
1.167	67	1,874	0.063	0.30	10.84
1.208	67	1,941	0.064	0.29	11.14
1.250	67	2,008	0.065	0.29	11.43
1.292	67	2,075	0.065	0.29	11.71
1.333	67	2,142	0.066	0.28	12.00
1.375	67	2,209	0.067	0.28	12.27
1.417	67	2,276	0.068	0.28	12.55
1.458	67	2,343	0.068	0.27	12.82
1.500	67	2,410	0.069	0.27	13.09
1.542	67	2,477	0.070	0.27	13.36
1.583	67	2,544	0.071	0.26	13.63
1.625	67	2,610	0.071	0.26	13.89
1.667	67	2,677	0.072	0.26	14.15
1.708	67	2,744	0.073	0.26	14.40
1.750	67	2,811	0.074	0.25	14.66
1.792	67	2,878	0.074	0.25	14.91
1.833	67	2,945	0.075	0.25	15.16
1.875	67	3,012	0.076	0.25	15.41
1.917	67	3,079	0.076	0.24	15.65
1.958	67	3,146	0.077	0.24	15.89
2.000	67	3,213	0.078	0.24	16.13
2.042	67	3,280	0.078	0.24	16.37
2.083	67	3,347	0.079	0.24	16.61
2.125	67	3,414	0.080	0.23	16.84
2.167	67	3,481	0.080	0.23	17.08
2.208	67	3,548	0.081	0.23	17.31
2.250	67	3,615	0.081	0.23	17.54
2.292	67	3,681	0.082	0.23	17.76
2.333	67	3,748	0.083	0.23	17.99
2.375	67	3,815	0.083	0.22	18.21
2.417	67	3,882	0.084	0.22	18.44
2.458	67	3,949	0.085	0.22	18.66
2.500	67	4,016	0.085	0.22	18.88
2.583	134	4,150	0.086	0.43	19.31
2.667	134	4,284	0.088	0.43	19.74
2.750	134	4,418	0.089	0.42	20.16
2.833	134	4,552	0.090	0.42	20.57
2.917	134	4,686	0.091	0.41	20.99
3.000	134	4,819	0.092	0.41	21.39
3.083	134	4,953	0.132	0.33	21.72
3.167	134	5,087	0.203	0.22	21.95
3.250	134	5,221	0.295	0.15	22.10
3.333	134	5,355	0.440	0.10	22.20
3.417	134	5,489	0.518	0.08	22.27
3.500	134	5,623	0.584	0.07	22.34
3.583	134	5,756	0.642	0.06	22.40
3.667	134	5,890	0.695	0.06	22.46
3.750	134	6,024	0.744	0.05	22.51
3.833	134	6,158	0.789	0.05	22.56
3.917	134	6,292	0.831	0.05	22.60
4.000	134	6,426	0.872	0.04	22.65
4.083	134	6,560	0.910	0.04	22.69
4.167	134	6,694	0.947	0.04	22.73
4.250	134	6,827	0.982	0.04	22.77
4.333	134	6,961	1.016	0.04	22.81
4.417	134	7,095	1.049	0.04	22.84
4.500	134	7,229	1.081	0.03	22.88
4.583	134	7,363	1.112	0.03	22.91
4.667	134	7,497	1.141	0.03	22.94
4.750	134	7,631	1.171	0.03	22.98
4.833	134	7,765	1.199	0.03	23.01
4.917	134	7,898	1.227	0.03	23.04
5.000	134	8,032	1.254	0.03	23.07
5.083	134	8,166	1.280	0.03	23.10
5.167	134	8,300	1.306	0.03	23.13
5.250	134	8,434	1.331	0.03	23.15
5.333	134	8,568	1.356	0.03	23.18
5.417	134	8,702	1.381	0.03	23.21
5.500	134	8,836	1.405	0.03	23.24
5.583	134	8,969	1.428	0.03	23.26
5.667	134	9,103	1.451	0.03	23.29
5.750	134	9,237	1.474	0.03	23.31
5.833	134	9,371	1.497	0.03	23.34
5.917	134	9,505	1.519	0.02	23.36
6.000	134	9,639	1.541	0.02	23.39
6.083	134	9,773	1.562	0.02	23.41
6.167	134	9,907	1.583	0.02	23.43
6.250	134	10,040	1.604	0.02	23.46
6.333	134	10,174	1.625	0.02	23.48
6.417	134	10,308	1.645	0.02	23.50
6.500	134	10,442	1.665	0.02	23.53
6.583	134	10,576	1.685	0.02	23.55
6.667	134	10,710	1.705	0.02	23.57
6.750	134	10,844	1.724	0.02	23.59
6.833	134	10,977	1.743	0.02	23.61
6.917	134	11,111	1.762	0.02	23.63
7.000	134	11,245	1.781	0.02	23.66
7.083	134	11,379	1.799	0.02	23.68
7.167	134	11,513	1.818	0.02	23.70
7.250	134	11,647	1.836	0.02	23.72
7.333	134	11,781	2.720	0.02	23.73
7.417	134	11,915	4.321	0.01	23.74
7.500	134	12,048	6.389	0.01	23.75
7.583	134	12,182	8.835	0.00	23.76
7.667	134	12,316	11.607	0.00	23.76
7.750	134	12,450	14.669	0.00	23.76

Peak Flow Frequency Summary

HMP Flow Frequency Range Based on: SWMM - Weibull

Return Period	Pre-development Qpeak (cfs)	Post-project - Mitigated Q (cfs)
Low-Flow = 0.1*Q2	0.233	0.166
2-year	2.328	1.655
3-year	2.652	2.066
4-year	2.828	2.316
5-year	2.850	2.417
6-year	2.925	2.534
7-year	3.062	2.639
8-year	3.159	2.715
9-year	3.212	2.737
10-year	3.324	2.816

POC-2


Peak Flow Frequency Curves
Peak Flow (cfs)
4.000
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
0
1
2
3
4
5
6
7
8
9
10
Storm Return Period in Years
Q10 (3.324 cfs)
Q5 (2.85 cfs)
Q2 (2.328 cfs)
QLow-Flow (0.233 cfs)
Pre-development Qpeak
Post-project Mitigated Qpeak

Low-flow Threshold:	10%	
0.1xQ2 (Pre):	0.2328	cfs
Q10 (Pre):	3.324	cfs
# of Intervals between flow bins:	99	
Incremental Q (Pre):	0.03122	cfs
Total Hourly Data:	382736	hours
Flow Frequency Range Based on:	**SWMM - Weibull**	

The proposed BMP: **PASSED**

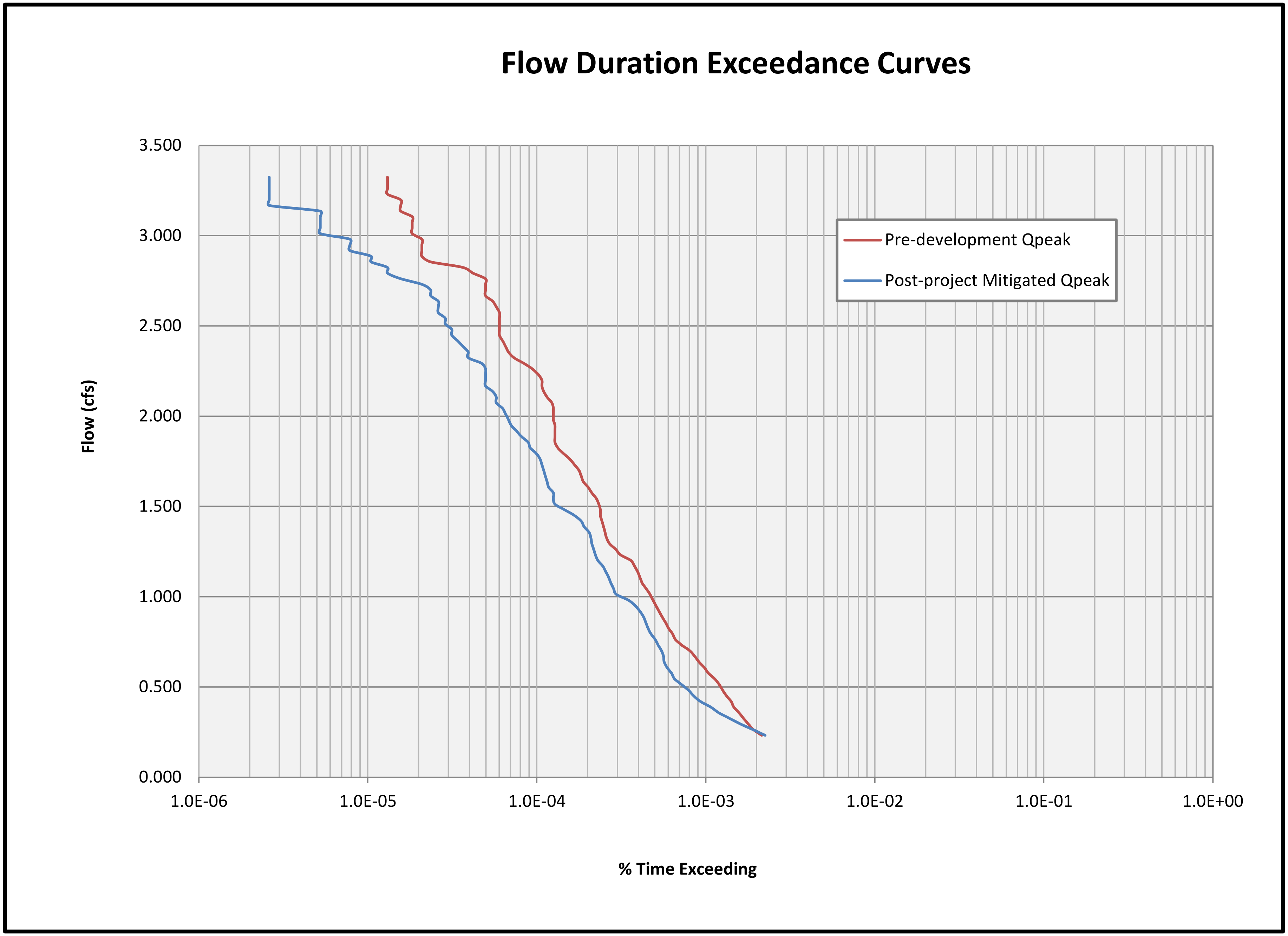
Beginning of Interval (Flow Bin)	Pre-develop. Flow (cfs)	Pre-develop. Hours	Pre-develop. % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
1	0.233	820	2.14E-03	859	2.24E-03	*105%*	*Pass^*
2	0.264	732	1.91E-03	729	1.90E-03	100%	Pass
3	0.295	683	1.78E-03	614	1.60E-03	90%	Pass
4	0.326	640	1.67E-03	529	1.38E-03	83%	Pass
5	0.358	601	1.57E-03	457	1.19E-03	76%	Pass
6	0.389	561	1.47E-03	410	1.07E-03	73%	Pass
7	0.420	540	1.41E-03	355	9.28E-04	66%	Pass
8	0.451	507	1.32E-03	324	8.47E-04	64%	Pass
9	0.483	481	1.26E-03	302	7.89E-04	63%	Pass
10	0.514	460	1.20E-03	275	7.19E-04	60%	Pass
11	0.545	432	1.13E-03	250	6.53E-04	58%	Pass
12	0.576	397	1.04E-03	240	6.27E-04	60%	Pass
13	0.607	375	9.80E-04	226	5.90E-04	60%	Pass
14	0.639	349	9.12E-04	217	5.67E-04	62%	Pass
15	0.670	329	8.60E-04	215	5.62E-04	65%	Pass
16	0.701	308	8.05E-04	209	5.46E-04	68%	Pass
17	0.732	276	7.21E-04	200	5.23E-04	72%	Pass
18	0.764	253	6.61E-04	192	5.02E-04	76%	Pass
19	0.795	243	6.35E-04	181	4.73E-04	74%	Pass
20	0.826	230	6.01E-04	174	4.55E-04	76%	Pass
21	0.857	221	5.77E-04	169	4.42E-04	76%	Pass
22	0.888	211	5.51E-04	164	4.28E-04	78%	Pass
23	0.920	202	5.28E-04	156	4.08E-04	77%	Pass
24	0.951	194	5.07E-04	146	3.81E-04	75%	Pass
25	0.982	186	4.86E-04	133	3.47E-04	72%	Pass
26	1.013	179	4.68E-04	113	2.95E-04	63%	Pass
27	1.044	170	4.44E-04	109	2.85E-04	64%	Pass
28	1.076	161	4.21E-04	105	2.74E-04	65%	Pass
29	1.107	156	4.08E-04	102	2.67E-04	65%	Pass
30	1.138	151	3.95E-04	98	2.56E-04	65%	Pass
31	1.169	145	3.79E-04	94	2.46E-04	65%	Pass
32	1.201	138	3.61E-04	88	2.30E-04	64%	Pass
33	1.232	120	3.14E-04	85	2.22E-04	71%	Pass
34	1.263	112	2.93E-04	83	2.17E-04	74%	Pass
35	1.294	103	2.69E-04	81	2.12E-04	79%	Pass
36	1.325	99	2.59E-04	80	2.09E-04	81%	Pass
37	1.357	97	2.53E-04	78	2.04E-04	80%	Pass
38	1.388	95	2.48E-04	73	1.91E-04	77%	Pass
39	1.419	93	2.43E-04	70	1.83E-04	75%	Pass
40	1.450	91	2.38E-04	64	1.67E-04	70%	Pass
41	1.482	91	2.38E-04	56	1.46E-04	62%	Pass
42	1.513	89	2.33E-04	49	1.28E-04	55%	Pass
43	1.544	86	2.25E-04	48	1.25E-04	56%	Pass
44	1.575	81	2.12E-04	48	1.25E-04	59%	Pass
45	1.606	77	2.01E-04	45	1.18E-04	58%	Pass
46	1.638	72	1.88E-04	44	1.15E-04	61%	Pass
47	1.669	70	1.83E-04	43	1.12E-04	61%	Pass
48	1.700	68	1.78E-04	42	1.10E-04	62%	Pass
49	1.731	64	1.67E-04	41	1.07E-04	64%	Pass
50	1.763	60	1.57E-04	40	1.05E-04	67%	Pass
51	1.794	55	1.44E-04	38	9.93E-05	69%	Pass
52	1.825	51	1.33E-04	35	9.14E-05	69%	Pass
53	1.856	49	1.28E-04	34	8.88E-05	69%	Pass

POC-2

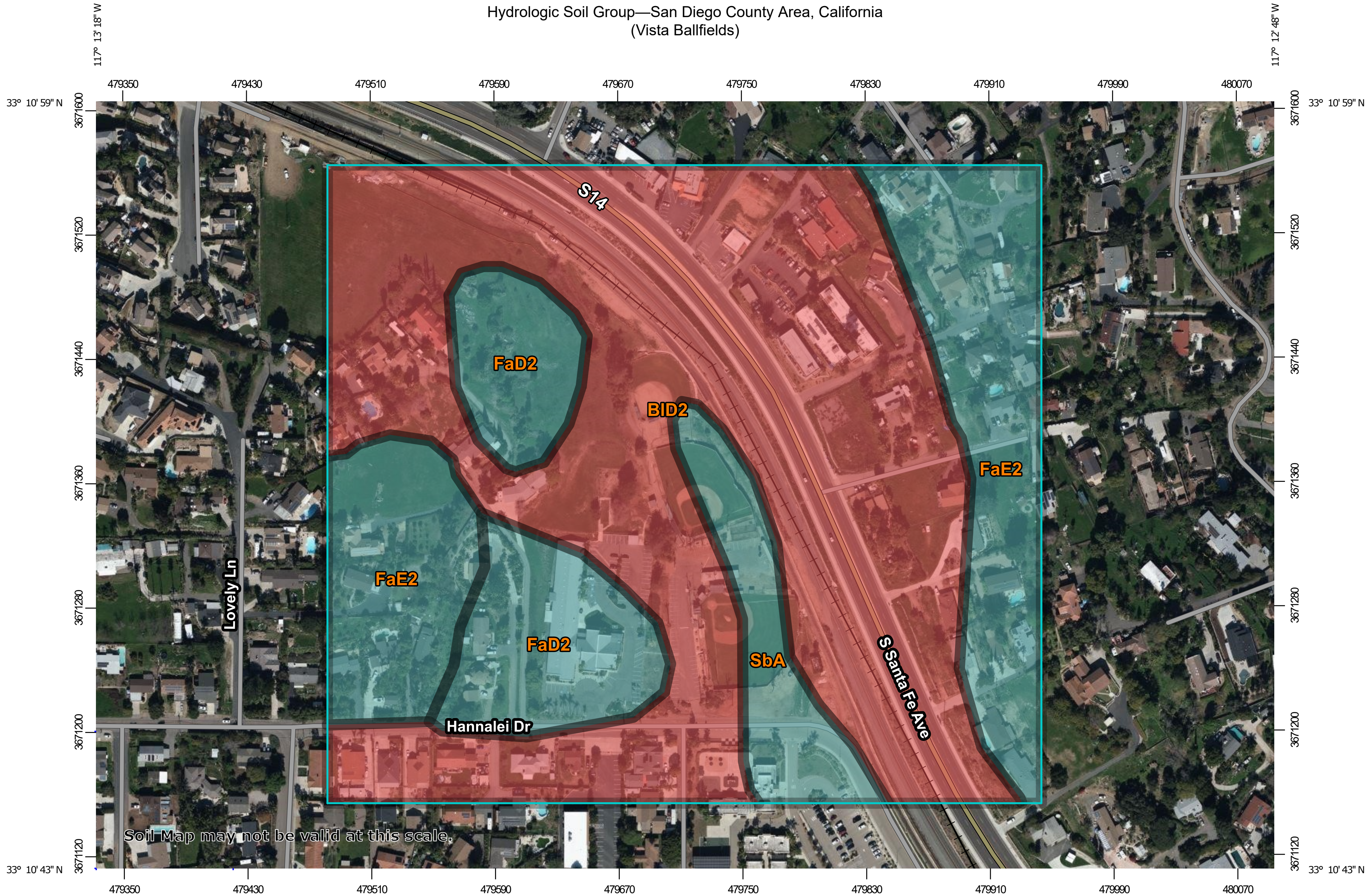
Flow Frequency Range Based on: **SWMM - Weibull**

Beginning of Interval (Flow Bin)	Pre-develop. Flow (cfs)	Pre-develop. Hours	Pre-develop. % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
54	1.887	49	1.28E-04	31	8.10E-05	63%	Pass
55	1.919	49	1.28E-04	29	7.58E-05	59%	Pass
56	1.950	49	1.28E-04	27	7.05E-05	55%	Pass
57	1.981	48	1.25E-04	26	6.79E-05	54%	Pass
58	2.012	48	1.25E-04	25	6.53E-05	52%	Pass
59	2.044	48	1.25E-04	24	6.27E-05	50%	Pass
60	2.075	47	1.23E-04	22	5.75E-05	47%	Pass
61	2.106	44	1.15E-04	22	5.75E-05	50%	Pass
62	2.137	42	1.10E-04	21	5.49E-05	50%	Pass
63	2.168	41	1.07E-04	19	4.96E-05	46%	Pass
64	2.200	41	1.07E-04	19	4.96E-05	46%	Pass
65	2.231	39	1.02E-04	19	4.96E-05	49%	Pass
66	2.262	36	9.41E-05	19	4.96E-05	53%	Pass
67	2.293	32	8.36E-05	18	4.70E-05	56%	Pass
68	2.325	28	7.32E-05	15	3.92E-05	54%	Pass
69	2.356	26	6.79E-05	15	3.92E-05	58%	Pass
70	2.387	25	6.53E-05	14	3.66E-05	56%	Pass
71	2.418	24	6.27E-05	13	3.40E-05	54%	Pass
72	2.449	23	6.01E-05	12	3.14E-05	52%	Pass
73	2.481	23	6.01E-05	12	3.14E-05	52%	Pass
74	2.512	23	6.01E-05	11	2.87E-05	48%	Pass
75	2.543	23	6.01E-05	11	2.87E-05	48%	Pass
76	2.574	23	6.01E-05	10	2.61E-05	43%	Pass
77	2.605	22	5.75E-05	10	2.61E-05	45%	Pass
78	2.637	21	5.49E-05	10	2.61E-05	48%	Pass
79	2.668	19	4.96E-05	9	2.35E-05	47%	Pass
80	2.699	19	4.96E-05	9	2.35E-05	47%	Pass
81	2.730	19	4.96E-05	8	2.09E-05	42%	Pass
82	2.762	19	4.96E-05	6	1.57E-05	32%	Pass
83	2.793	16	4.18E-05	5	1.31E-05	31%	Pass
84	2.824	14	3.66E-05	5	1.31E-05	36%	Pass
85	2.855	9	2.35E-05	4	1.05E-05	44%	Pass
86	2.886	8	2.09E-05	4	1.05E-05	50%	Pass
87	2.918	8	2.09E-05	3	7.84E-06	38%	Pass
88	2.949	8	2.09E-05	3	7.84E-06	38%	Pass
89	2.980	8	2.09E-05	3	7.84E-06	38%	Pass
90	3.011	7	1.83E-05	2	5.23E-06	29%	Pass
91	3.043	7	1.83E-05	2	5.23E-06	29%	Pass
92	3.074	7	1.83E-05	2	5.23E-06	29%	Pass
93	3.105	7	1.83E-05	2	5.23E-06	29%	Pass
94	3.136	6	1.57E-05	2	5.23E-06	33%	Pass
95	3.167	6	1.57E-05	1	2.61E-06	17%	Pass
96	3.199	6	1.57E-05	1	2.61E-06	17%	Pass
97	3.230	5	1.31E-05	1	2.61E-06	20%	Pass
98	3.261	5	1.31E-05	1	2.61E-06	20%	Pass
99	3.292	5	1.31E-05	1	2.61E-06	20%	Pass
100	3.324	5	1.31E-05	1	2.61E-06	20%	Pass

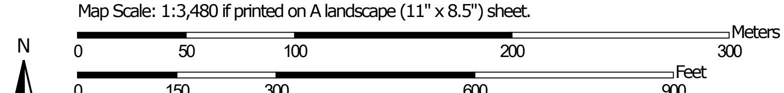
POC-2


Flow Duration Exceedance Curves
Flow (cfs)
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
1.0E-06
1.0E-05
1.0E-04
1.0E-03
1.0E-02
1.0E-01
1.0E+00
% Time Exceeding
Pre-development Qpeak
Post-project Mitigated Qpeak

Hydrologic Soil Group—San Diego County Area, California
(Vista Ballfields)



Map Scale: 1:3,480 if printed on A landscape (11" x 8.5") sheet.



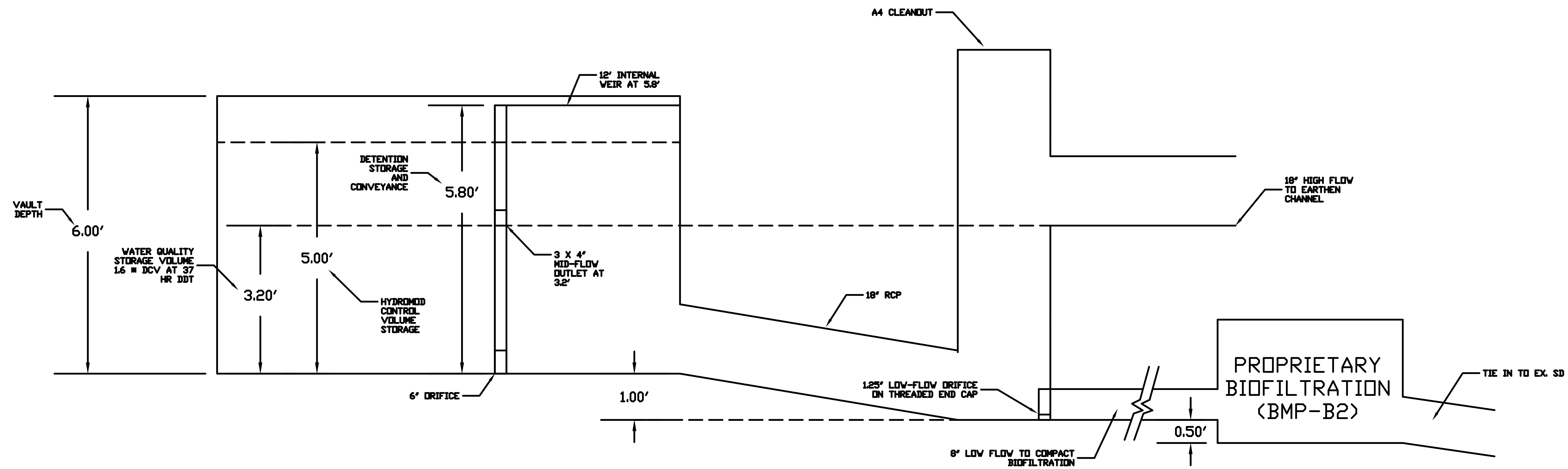
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

NOTES:

THREE VAULT SYSTEM IDEALIZED AS SINGLE VAULT

COMBINED VAULT STORAGE VOLUME: 15290 CUBIC FEET

COMBINED VAULT FOOTPRINT: 2711 SQUARE FEET



NOT TO SCALE

NOTES:

1. VAULTS JOINED AS SINGLE SYSTEM AND INTENDED TO POND/DRAIN CONCURRENTLY.
2. 8" PIPE TO CONVEY WQ TREATMENT FLOWS TO PROPRIETARY BIOFILTRATION. 18' PIPE TO BYPASS BIOFILTRATION AND CONVEY Q100.

RICK ENGINEERING COMPANY
San Diego
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619.291.0707
(FAX)619.291.4165
rickengineering.com
Riverside - Orange - San Luis Obispo - Denver - Sacramento - Phoenix - Tucson

VISTA II

BMP-A1/A2 CONFIGURATION

VAULT TO PROPRIETARY BIOFILTRATION

10/4/2023
JN-19253B

NOT FOR CONSTRUCTION

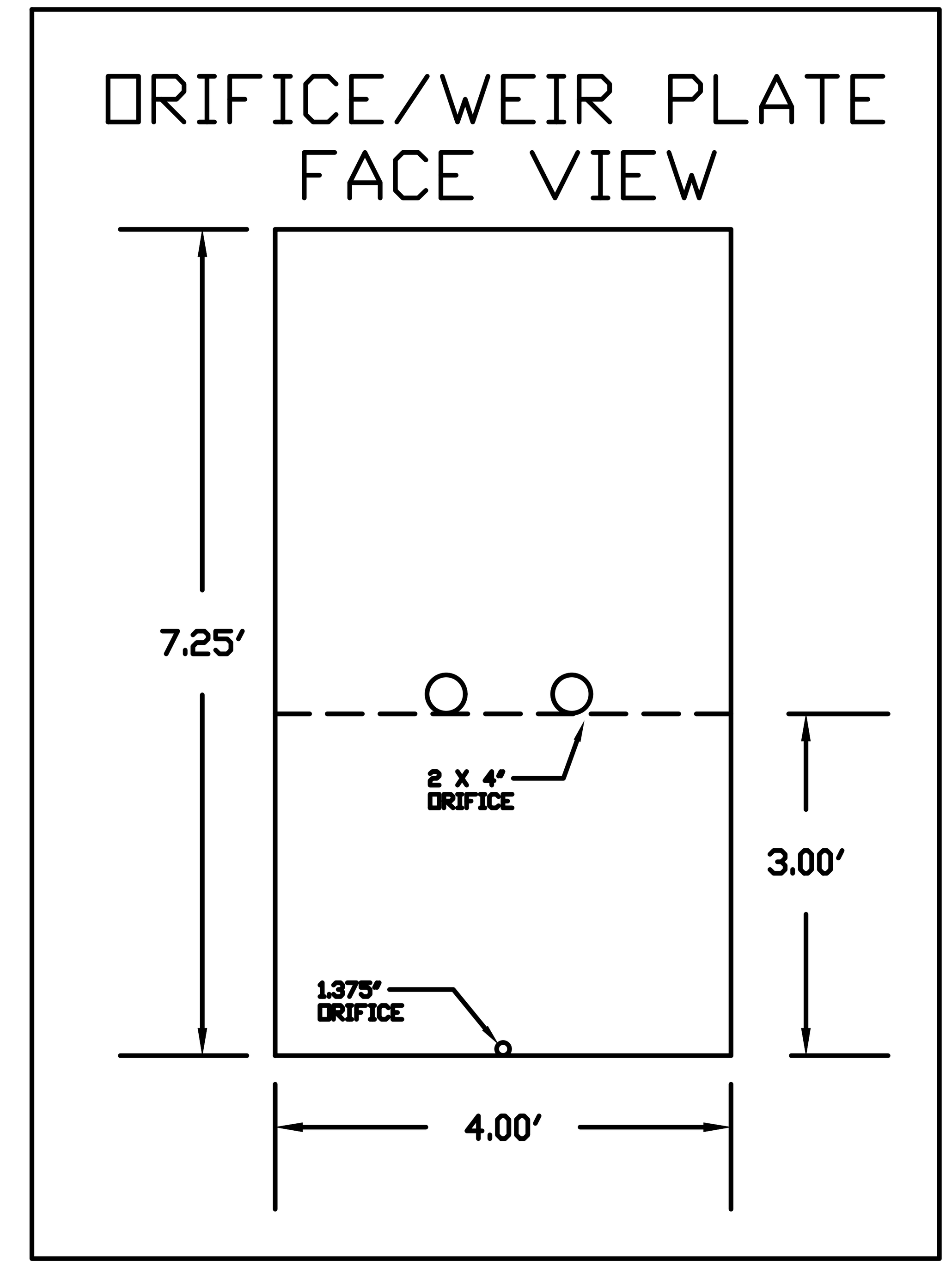
NOTES:

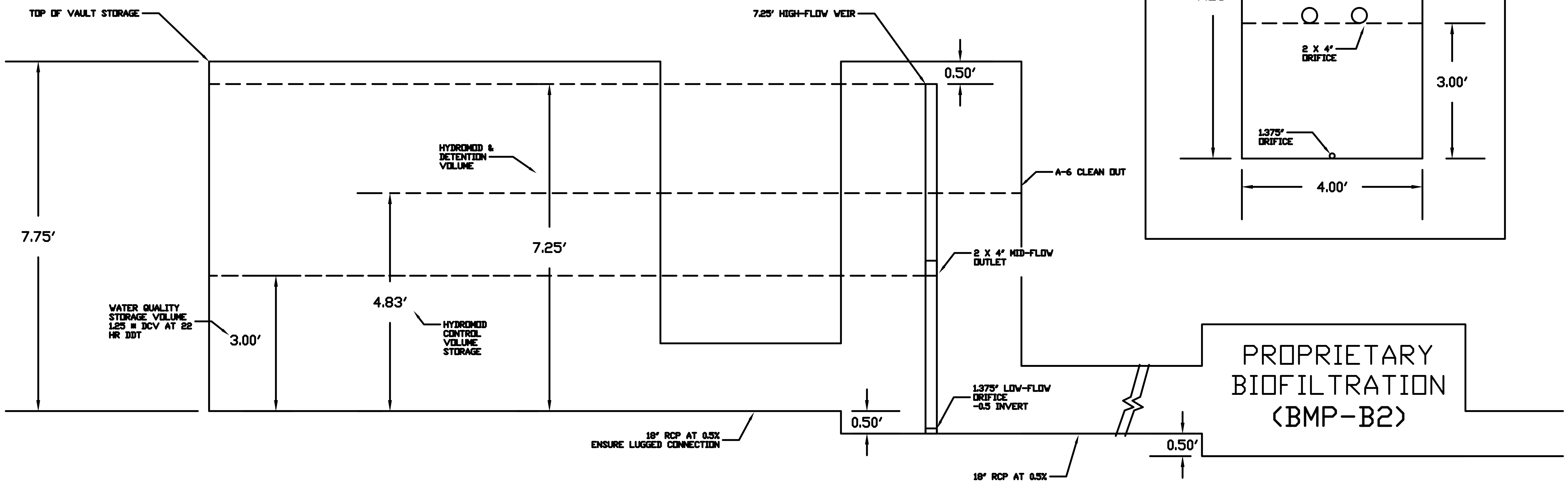
TWO VAULT SYSTEM IDEALIZED AS SINGLE VAULT

COMBINED VAULT STORAGE VOLUME: 12450 CUBIC FEET

COMBINED VAULT FOOTPRINT: 1709 SQUARE FEET

ENSURE LUGGED CONNECTION AT INTERSECTION OF VAULTS





NOT TO SCALE

NOTES:

1. VAULTS JOINED AS SINGLE SYSTEM AND INTENDED TO POND/DRAIN CONCURRENTLY.

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VISTA II
BMP-B1/B2 CONFIGURATION
VAULT TO BIOFILTRATION

10/4/2023
JN-19253B

NOT FOR CONSTRUCTION

9.0 General Requirements

- Complete the table below to indicate which compliance pathway was selected in PDP SWQMP Table 6. Include the corresponding sub-attachment with your SWQMP submittal. Other sub-attachments do not need to be included.
- See the BMPDM sections and appendices listed under "BMPDM Design Resources" for additional explanation of design requirements. Constructed features must fully satisfy the requirements described in these resources, and any other guidance identified by the County.
- DMA Exhibits and Construction Plans: CCSYAs and applicable BMPs identified and described in this attachment must be shown on DMA Exhibits and all applicable construction plans submitted for the project. See Attachment 2 for additional instruction on exhibits and plans.

Sub-attachments	BMPDM Design Resources
☐ **9.1: Documentation of Hydromodification Management Exemption**[1]	Section 1.6
☒ **9.2: Watershed Management Area Analysis (WMAA) Mapping**[1]	Appendix H.1.1.2
☐ **9.3: Resource Protection Ordinance (RPO) Methods**	Appendix H.1.1.1
☐ **9.4: No Net Impact Analysis**	Appendix H.4

[1] The San Diego County Regional comprehensive WMAA mapping data can be found on the Project Clean Water website here: http://www.projectcleanwater.org/download/wmaa_attc_data/

9.2 Watershed Management Area Analysis (WMAA) Mapping (BMPDM Appendix H.1.1.2)

Watershed Management Area Analysis (WMAA) mapping is a simple way to screen projects to determine the presence of onsite or offsite upstream Potential Critical Coarse Sediment Yield Areas (PCCSYAs). The San Diego County Regional WMAA mapping data can be found on the Project Clean Water website here: http://www.projectcleanwater.org/download/wmaa_attc_data/ .[3]

- Based on the WMAA map and the proposed project design, demonstrate below that both of the following conditions apply to the PDP:

  (a) Less than 5% of PCCSYAs will be impacted (built on or obstructed) by the PDP, and

  (b) All upstream offsite PCCYSAs will be bypassed (see BMPDM Appendix H.3).

A. Mapping Results -- At a minimum, show: (1) the project footprint, (2) areas of proposed development, (3) impacted onsite PCCSYAs, (4) offsite tributary areas[4], and (5) bypass of upstream offsite PCCSYAs.
See PCCSYA Exhibit on Following Page

[3] Applicants may refine initial mapping results using options identified in BMPDM Appendix H.1.2.
[4] Tributary areas must be shown to demonstrate that upstream offsite PCCSYAs do not exist. If bypassing these areas, only the bypass should be shown.

B. Explanation -- Provide documentation as needed to demonstrate that (1) impacts to PCCSYAs are below 5%, and (2) upstream offsite PCCYSAs are effectively bypassed. Add pages as necessary.

RICK ENGINEERING COMPANY

1 inch = 200 feet

0 100 200 400 Feet

DATE: 2/27/2024

REC JN: 19253B

PCCSYA EXHIBIT

This form must be accepted by the County prior to the release of construction permits or granting of occupancy for applicable portions of a Priority Development Project (PDP). Its purpose is to provide documentation of the final installation of permanent Best Management Practices (BMPs) used to satisfy Structural Performance Standards for the development project. Compliance with these standards reduces the discharge of pollutants and flows from the completed project site. Applicable standards may be satisfied using Structural BMPs (S-BMPs), Significant Site Design BMPs (SSD-BMPs), or both. Applicants are responsible for providing all requested information.

PART 1 PROJECT INFORMATION

A. Project Summary Information	
Project Name	Vista II
Record ID (e.g. grading/improvement plan number, building permit)	
Project Address	143 Hannalei Drive, Vista, CA 92083
Assessor's Parcel Number(s) APN(s)	183-060-78-00, 183-060-84-00
Project Watershed (Hydrologic Unit, Area, and Subarea Name with Numeric Identifier)	Buena Vista
B. Owner Information	
Name	Warmington Residential
Address	3090 Pullman Street Costa Mesa, CA 92626
Email Address	
Phone Number	(714) 557-5511

COUNTY – OFFICIAL USE ONLY	
INTAKE ID#	
ACCEPTANCE ID#	

PART 2 BMP INVENTORY INFORMATION

Use this table to document Structural BMPs (S-BMPs) and Significant Site Design BMPs (SSD-BMPs) for the PDP. All DMAs that are not self-mitigating or de minimis must have at least one Structural BMP or Significant Site Design BMP.

- In **Part A** list all Structural BMPs (including both Pollutant Control and/or Hydromodification as applicable) by DMA.
- Complete **Part B** for all DMAs that contain only Significant Site Design BMPs. SSD-BMPs are Site Design BMPs (SD-BMPs) that are sized and constructed to satisfy Structural Performance Standards for a DMA.
- The information provided for each BMP in the table must match that provided in the Stormwater Quality Management Plan (SWQMP), construction plans, maintenance agreements, and other relevant project documentation.

DMA #	BMP Information			Maintenance Category (1, 2, 3, or 4)	Maintenance Agreement Recorded DOC #	Construction Plan Sheet #	Landscape Plan Sheet #	FOR DPW-WPP USE ONLY
	Quantity	Description/Type of Structural BMP	BMP ID #					
A. Structural BMPs (S-BMPs)								
DMA-A	1	Vaulted Storage Unit	BMP-A1	2				
DMA-A	1	Proprietary Biofiltration	BMP-A2	2				
DMA-B	1	Vaulted Storage Unit	BMP-B1	2				
DMA-B	1	Biofiltration Basin	BMP-B2	2				
Add rows as needed. Click into the last column in the row below this, then press TAB to add a new row.								
B. Significant Site Design BMPs (SSD-BMPs)								
		Choose an item.		Choose				
		Choose an item.		Choose				
		Choose an item.		Choose				
		Choose an item.		Choose				
		Choose an item.		Choose				
		Choose an item.		Choose				
Add rows as needed. Click into the last column in the row below this, then press TAB to add a new row.								

PART 3 REQUIRED ATTACHMENTS

For the permanent BMPs listed in Part 2, submit the following to the County inspector along with this Verification form as a package (check all that are attached):

☐ **PHOTOGRAPHS:** Final construction photos of every permanent BMP listed in Part 2 are required. Final photos must be recent and be labeled with the date and a BMP Identifier. Additional photographs illustrating proper construction of the BMPs are recommended to be included and may be requested by WPP prior to acceptance of this Verification (e.g. excavation depths, liners, hydromodification orifices, Biofiltration Soil Media (BSM), vegetation, mulch).

☐ **MAINTENANCE AGREEMENTS:** Copies of approved and recorded Storm Water Maintenance Agreements (SWMA), Category 1 Maintenance Notification Agreements (MN), or Encroachment Maintenance and Removal Agreements (EMRA) for all S-BMPs.

Note: Significant Site Design (SSD) BMPs and most Category 4 BMPs do not require recorded maintenance agreements.

☒ **CONSTRUCTION PLANS:** Submit electronic and/or 11” X 17” hard copies of the current approved Construction Plan sheets for the Record ID(s) listed on Page 1:

☒ Grading Plans
☐ Improvement Plans
☐ Precise Grading Plan
☐ Building Plan (Applicable BMP Sheets only)
☐ Other (Please specify) _____

For each Construction Plan, the sheets submitted must incorporate all of the following:

- A BMP Table on Sheet 1, AND
- A plan detail cross-section of each verified as-built BMP, AND
- The location of each verified as-built BMP

☐ **LANDSCAPE PLANS**: If the PDP includes vegetated BMPs and has a Landscape Plan, submit the following:

☐ Final Landscape Plans
☐ Proof of Irrigation Installed (if applicable)

PART 4 PREPARER'S CERTIFICATION

By signing below, I certify that the BMP(s) listed in Part 2 of this Verification Form have been constructed and are in substantial conformance with the approved plans and applicable regulations. I understand the County reserves the right to inspect the above BMPs to verify compliance with the approved plans and Watershed Protection Ordinance (WPO). Should it be determined that the BMPs were not constructed to plan or code, corrective actions may be necessary before permits can be closed.

Note: Structural BMPs must be certified by a licensed professional engineer.

Please sign and, if applicable, provide your seal below.

Preparer's Name:	Brendan Hastie
Email Address:	bhastie@rickengineering.com
Phone Number:	(619) 291 4165
Preparer's Signature:	
Date:	9/30/2022

[SEAL]

PROJECT RECORD ID: ____________________________

COUNTY - OFFICIAL USE ONLY

County Inspector Approval:

***NOTE: The County approved SWQMP document and any Addendums or Revisions must be included with this BMP Installation Verification submittal package.**

☐ DPW Private Development Construction Inspection (PDCI)

☐ PDS Building

☐ DGS

☐ DPR

By signing below, the County Inspector concurs that every BMP listed in Part 2 of this BMP Installation Verification form has been installed per plan.

Inspector Name: ____

Inspector's Signature: ____________________________ Date: _______________

DPW Watershed Protection Program (WPP) Acceptance:

Date Received: ____

WPP Reviewer: ____

WPP Reviewer concurs that the BMPs accepted in **Part 2** above may be entered into County inventory.

WPP Reviewer's Signature: ____________________________ Date: _______________

Enter Acceptance ID# on page 1.

NOTES:

11.0 Cover Sheet and General Requirements

- All Structural BMPs must have a plan and mechanism to ensure on-going maintenance. Use the table below to document the types of agreements to be submitted for the PDP and submit them under cover of this sheet.
- See BMPDM Section 7.3 for a description of maintenance categories and responsibilities. Note that since Category 3 and 4 BMPs are County-maintained, they do not require maintenance agreements.

a. Applicability of Maintenance Agreements

Check the boxes below to indicate which types of agreements are included with this attachment.

☐ **Maintenance Notification Agreement for Category 1 Stormwater Structural BMPs**

- Exhibit A: Project Site Map; and a Map for each BMP and its Drainage Management Area (DMA).
- Exhibit B: BMP Maintenance Plan (see below)

CATEGORY 1 MAINTENANCE AGREEMENTS ARE RECORDED PRIOR TO OCCUPANCY.

☒ **Storm Water Facilities Maintenance Agreement (SWMA) (Category 2 BMPs)**

- Exhibit A: Legal Description of Property
- Exhibit B: BMP Maintenance Program (see below)
- Exhibit C: BMP Locations

CATEGORY 2 MAINTENANCE AGREEMENTS ARE RECORDED PRIOR TO PERMIT ISSUANCE.

Maintenance agreement templates and instructions are available on the County's website: www.sandiegocounty.gov/stormwater under the Development Resources tab, Submittal Templates.

b. Maintenance Plan Requirements

Maintenance plans should include the following:

☒ Specific **maintenance indicators and actions** for proposed structural BMP(s). These must be based on maintenance indicators presented in BMP Design Manual Fact Sheets in Appendix E and enhanced to reflect actual proposed components of the structural BMP(s).

☒ **Access** to inspect and perform maintenance on the structural BMP(s).

☒ Features to **facilitate inspection** (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds).

☒ Manufacturer and part number for **proprietary parts** of structural BMP(s) when applicable.

☒ **Maintenance thresholds** specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP).

☒ Recommended **equipment** to perform maintenance.

☒ When applicable, necessary special **training or certification** requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management.

POST-CONSTRUCTION PERMANENT BMP
OPERATION & MAINTENANCE PROCEDURE DETAILS[1]

O&M RESPONSIBLE PARTY DESIGNEE: PROPERTY OWNER

BMP DESCRIPTION		INSPECTION FREQUENCY[2]	MAINTENANCE FREQUENCY	MAINTENANCE METHOD
SITE DESIGN	LANDSCAPED AREAS	MONTHLY (NOTE: INSPECTOR SHALL CHECK FOR THE FOLLOWING MAINTENANCE INDICATORS: EROSION IN THE FORM OF RILLS OR GULLIES, PONDING WATER, BARE AREAS, ANIMAL BURROWS, HOLES, MOUNDS, AND TRASH)	1. AS DETERMINED BY INSPECTION; AND 2. ON OR BEFORE SEPTEMBER 30TH.	1. FILL AND COMPACT AREAS OF RUTS, RILLS, OR GULLIES; 2. RE-SEED AND/OR PLANT SLOPES AND AREAS OF EXPOSED SOILS; AND 3. ROUTINE MOWING AND TRIMMING AND TRASH REMOVAL.
	AMENDED SOILS	MONTHLY (NOTE: INSPECTOR SHALL CHECK FOR THE FOLLOWING MAINTENANCE INDICATORS: EROSION IN THE FORM OF RILLS OR GULLIES, PONDING WATER, BARE AREAS, ANIMAL BURROWS, HOLES, MOUNDS, AND TRASH)	1. AS DETERMINED BY INSPECTION; AND 2. ON OR BEFORE SEPTEMBER 30TH.	1. REAPPLICATION OF AMENDED SOILS IF SIGNS OF COMPACTION, WATERLOGGING AND UNHEALTHY VEGETATION IS PRESENT 2. RE-SEED AND/OR PLANT SLOPES AND AREAS OF EXPOSED SOILS; AND 3. ROUTINE MOWING AND TRIMMING AND TRASH REMOVAL.
	IMPERVIOUS AREA DISPERSION	MONTHLY (NOTE: INSPECTOR SHALL CHECK FOR THE FOLLOWING MAINTENANCE INDICATORS: EROSION IN THE FORM OF RILLS OR GULLIES, PONDING WATER, BARE AREAS, ANIMAL BURROWS, HOLES, MOUNDS, AND TRASH)	1. AS DETERMINED BY INSPECTION; AND 2. ON OR BEFORE SEPTEMBER 30TH.	1. REAPPLICATION OF AMENDED SOILS. 2. RE-SEED AND/OR PLANT SLOPES AND AREAS OF EXPOSED SOILS; AND 3. ROUTINE MOWING AND TRIMMING AND TRASH REMOVAL.
	ENERGY DISSIPATION	MONTHLY (NOTE: INSPECTOR SHALL CHECK FOR THE FOLLOWING MAINTENANCE INDICATORS: EROSION IN THE FORM OF RILLS OR GULLIES, PONDING WATER, BARE AREAS, ANIMAL BURROWS, HOLES, MOUNDS, AND TRASH)	1. AS DETERMINED BY INSPECTION; AND 2. ON OR BEFORE SEPTEMBER 30TH.	1. ROUTINE TRIM VEGETATION AND REMOVE TRASH IN AND AROUND THE ENERGY DISSIPATION AREA. 2. REAPPLY COBBLE TO ENERGY DISSIPATION AREA AS NEEDED.

BMP DESCRIPTION		INSPECTION FREQUENCY[2]	MAINTENANCE FREQUENCY	MAINTENANCE METHOD
		POST-CONSTRUCTION PERMANENT BMP OPERATION & MAINTENANCE PROCEDURE DETAILS[1]		
		O&M RESPONSIBLE PARTY DESIGNEE: PROPERTY OWNER		
SOURCE CONTROL	INTEGRATED PEST MANAGEMENT	MONTHLY (NOTE: INSPECTOR SHALL CHECK FOR INDICATIONS OF THE PRESENCE OF PESTS ON-SITE)	WHEN THE PEST OR PESTS, OBSERVED IN GREATEST ABUNDANCE OR CAUSE THE MOST OBSERVED SYMPTOMS, ARE IDENTIFIED.	CHECK FREQUENTLY FOR PESTS, AND TREAT WITH A PESTICIDE ONLY WHEN A PEST IS PRESENT, ETC.
	PREVENTIVE STENCILING AND SIGNAGE	ANNUALLY	WHEN FULLY OR PARTIALLY ERASED SIGNS ARE OBSERVED; WHEN DUMPING OF TRASH ARE OBSERVED AT PUBLIC ACCESS POINTS, BUILDING ENTRANCES, PUBLIC PARKS, ETC.	1. REPLACE OR REPAINT THE STENCILS AND SIGNAGE SO THAT THEY ARE LEGIBLE; AND 2. MAKE SURE THAT THEY ARE PLACED AT ALL REQUIRED LOCATIONS (I.E. - ALL INLETS).
	EFFECTIVE IRRIGATION SYSTEM	MONTHLY	WHEN BROKEN SPRINKLER HEADS, RAIN SHUTOFF DEVICES, AND FLOW REDUCERS ARE OBSERVED; OR RUNNING SPRINKLERS IN RAIN ARE OBSERVED	REPAIR OR REPLACE THE BROKEN AND/OR MALFUNCTIONING PARTS OF IRRIGATION SYSTEM.
	BIOFILTRATION WITH NO RETENTION BASIN (BF-1) [BMP-B-2]	TWICE A YEAR AND AFTER MAJOR STORM EVENTS (NOTE: INSPECTOR SHALL CHECK FOR THE FOLLOWING MAINTENANCE INIDICATORS: EROSION IN THE FORM OF RILLS OR GULLIES, PONDING WATER, BARE AREAS, ANIMAL BURROWS, HOLES, MOUNDS, AND TRASH)	1. AS DETERMINED BY INSPECTION; AND 2. ON OR BEFORE SEPTEMBER 30TH AND FOLLOWING THE RAINY SEASON AFTER MAY 1ST.	1. REPLACE MULCH IN AREAS OF RUTS, RILLS, OR GULLIES; 2. RE-SEED AND/OR PLANT SLOPES AND AREAS OF EXPOSED SOILS; AND 3. ROUTINE MAINTENANCE TO REMOVE ACCUMULATED MATERIALS SUCH AS TRASH AND DEBRIS. 4. NON-ROUTINE MAINTENANCE WILL BE REQUIRED TO BACKWASH AND CLEAR UNDERDRAINS IF INSPECTION INDICATES UNDERDRAINS ARE CLOGGED. 5. DEPENDING ON POLLUTANT LOADS, SOILS MAY NEED TO BE REPLACED EVERY 5 TO 10 YEARS. 6. THE RISER STRUCTURE SHOULD BE MAINTAINED TO AVOID CLOGGING AND ANY LEAKAGE THROUGH BOLTHOLES. 7. TRIM VEGETATION AT THE BEGINNING AND END OF WET SEASON AND INSPECT MONTHLY TO PREVENT ESTABLISHMENT OF WOODY VEGETATION AND FOR AESTHETIC AND VECTOR REASONS

BMP DESCRIPTION		POST-CONSTRUCTION PERMANENT BMP OPERATION & MAINTENANCE PROCEDURE DETAILS[1] — O&M RESPONSIBLE PARTY DESIGNEE: PROPERTY OWNER		
		INSPECTION FREQUENCY[2]	**MAINTENANCE FREQUENCY**	**MAINTENANCE METHOD**
STRUCTURAL BMPs	UNDERGROUND DETENTION BASIN /VAULT (BMP-A-1 AND BMP-B-1)	1. TWICE A YEAR (ON OR BEFORE SEPTEMBER 30TH AND FOLLOWING THE RAINY SEASON AFTER MAY 1ST); AND 2. AFTER EACH "SIGNIFICANT RAIN EVENT"[2]	1. TWICE A YEAR (ON OR BEFORE SEPTEMBER 30TH AND FOLLOWING THE RAINY SEASON AFTER MAY 1ST); AND 2. AFTER EACH "SIGNIFICANT RAIN EVENT"[2]	1. REMOVE ACCUMULATED MATERIALS SUCH AS TRASH AND DEBRIS AND SEDIMENTS; 2. MAINTAIN INLET AND OUTLET PIPES TO AVOID CLOGGING. (NOTE: FOR MORE DETAILS, REFER TO STORMTRAP - MANUFACTURER'S MAINTENANCE RECOMMENDATION)
	MODULAR WETLAND SYSTEM MWS-L-4-15-V (BMP-A-2) (POLLUTANT CONTROL BMP)	ANNUALLY, ON OR BEFORE SEPTEMBER 30TH	AS NEEDED BASED ON INSPECTION FINDINGS	1. ROUTINE MAINTENANCE TO REMOVE THE ACCUMULATED MATERIALS IN THE SCREENING FILTER, SEPARATION CHAMBER, AND PERIMETER FILTER (BIOMEDIA GREEN) AND REPLACE FILTER MEDIA PERFORMED BY A QUALIFIED SERVICE PROVIDER PER MANUFACTUER'S GUIDELINES AND CONDITIONS AND CONDITIONS DEFINED IN THE WASHINGTON ECOLOGY T.A.P.E. CERTIFICATION. 2. IF INSPECTION INDICATES INTERNAL COMPONENTS ARE DAMAGED, ADDITIONAL NON-ROUTINE MAINTENANCE WILL BE REQUIRED TO REPAIR OR REPLACE DAMAGED PARTS AS APPLICABLE.

NOTE:
1. A SIGNIFICANT RAIN EVENT CONSIDERED WHENEVER THE NATIONAL WEATHER SERVICE REPORTS 0.50" OF RAIN IN 48 HOURS FOR THE LOCAL COMMUNITY
2. DURING THE FIRST YEAR OF NORMAL OPERATION, ALL BMPS SHOULD BE INSPECTED ONCE BEFORE AUGUST 31 AND THEN MONTHLY FROM SEPTEMBER THROUGH MAY. THE MINIMUM INSPECTION AND MAINTENANCE FREQUENCY SHOULD BE DETERMINED BASED ON THE RESULTS OF THE FIRST YEAR INSPECTIONS.