Appendix G

Preliminary Water Quality Management Plan, Evergreen Development – Cambren & Central

DRC Engineering Inc.

July 26, 2022

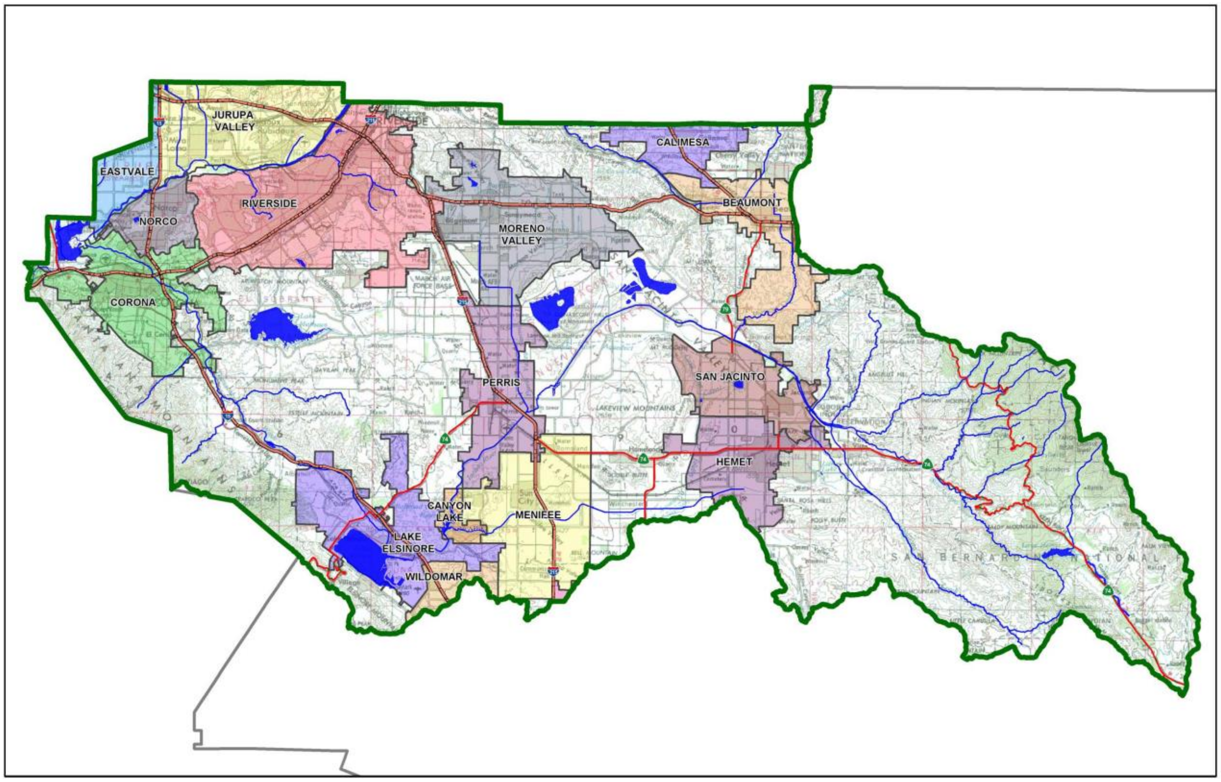
Project Specific Water Quality Management Plan

A Template for Projects located within the ***Santa Ana Watershed*** *Region of Riverside County*

Project Title: Evergreen Development - Cambern & Central

Development No: TBD

Design Review/Case No: PA 2021-34, PWQMP-2021-0012



☒ **Preliminary**
☐ **Final**

Original Date Prepared:06/09/2021

Revision Date(s): 10/25/2021
02/10/2022
04/28/2022
06/09/2022

Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**
Template revised June 30, 2016

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OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for Evergreen Devco, Inc. by DRC Engineering, Inc. for the Evergreen Development - Cambern & Central project.

This WQMP is intended to comply with the requirements of Lake Elsinore for Evergreen Development - Cambern & Central, which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under Lake Elsinore Ordinance No. 1296 (Municipal Code Section 14.08).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

See signature page attached	May 18, 2022
Owner's Signature	Date
Dana Dragon	Principal
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

	2/10/2022
Preparer's Signature	Date
Christopher McKee, P.E.	Project Manager
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

REGISTERED PROFESSIONAL ENGINEER
CHRISTOPHER McKEE
No. 74414
Exp. 9-30-23
CIVIL
STATE OF CALIFORNIA

Cambern & Central North, L.L.C., an Arizona limited liability company

By: Evergreen Development Company-2021, L.L.C.,
an Arizona limited liability company
Its: Managing Member

By: Evergreen Devco, Inc., a California corporation
Its: Manager

By: Dana D
Its: Principal
Date: 5/25/2022

Evergreen-Cambern & Central South Land, L.L.C., an Arizona limited liability company

By: Evergreen Development Company-2021, L.L.C.,
an Arizona limited liability company
Its: Managing Member

By: Evergreen Devco, Inc., a California corporation
Its: Manager

By: Dana D
Its: Principal
Date: 5/25/2022

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Section A: Project and Site Information

PROJECT INFORMATION

Type of Project:	Commercial
Planning Area:	N/A
Community Name:	N/A
Development Name:	Evergreen

PROJECT LOCATION

Latitude & Longitude (DMS): 33°41'43.47"N, 117°19'55.93"W
Project Watershed and Sub-Watershed: Santa Ana River Basin, RCFC&WCD Zone 3 watershed
Gross Acres: 9.07
APN(s): 377-020-016, 377-020-017, 377-020-018, 377-020-019 / 377-020-014-8

Map Book and Page No.: Book 54, Page 44 / Book 5 Page 105, Records of Riverside County, California

PROJECT CHARACTERISTICS

Proposed or Potential Land Use(s)	Commercial
Proposed or Potential SIC Code(s)	5541 Gasoline Service, 5411 Grocery Stores, 7542 Car Washes, 5812 Eating Places
Area of Impervious Project Footprint (SF)	332,672
Total Area of proposed Impervious Surfaces within the Project Footprint (SF)/or Replacement	332,672
Does the project consist of offsite road improvements?	☒ Y ☐ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N

EXISTING SITE CHARACTERISTICS

Total area of existing Impervious Surfaces within the Project limits Footprint (SF)	0
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	
Are there any natural hydrologic features on the project site?	☒ Y ☐ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	C
What is the Water Quality Design Storm Depth for the project?	0.675

PROJECT DESCRIPTION

The Evergreen development Project Site is approximately 9.07 acres of Commercial undeveloped land located at 18650 Cambern Street, Lake Elsinore, CA 92532. The Proposed Project will be divided into five (5) separate Parcels, with one (1) building each.

The Project will consist of the construction of five (5) total buildings including one (1) grocery building, one (1) gas station with building and fuel service pumps, one (1) car wash building, and two (2) quick service restaurant buildings; the construction of paved drive aisles & parking areas, sidewalks, landscape planters, and four (4) driveway entrances; construction of underground wet and dry utilities, City storm drain line, and a private underground storm drain system with five (5) separate underground detention systems and five (5) separate proprietary water quality treatment units dedicated to each of the separate parcels.

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a ***minimum****, your WQMP Site Plan should include the following:*

- *Drainage Management Areas*
- *Proposed Structural BMPs*
- *Drainage Path*
- *Drainage Infrastructure, Inlets, Overflows*
- *Source Control BMPs*
- *Buildings, Roof Lines, Downspouts*
- *Impervious Surfaces*
- *Standard Labeling*
- *BMP Locations (Lat/Long)*

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Temescal Creek, Reach 6 (Elsinore Groundwater sub basin boundary to Lake Elsinore Outlet)	N/A	INTERMITTENT – GWR, REC1, REC2, WARM, WILD	N/A
Temescal Creek, Reach 5	N/A	AGR, GWR, REC1, REC2, WARM, WILD, RARE	2.0 miles
Temescal Creek, Reach 4	N/A	RARE, INTERMITTENT – AGR, GWR, REC1, REC2, WARM, WILD	4.5 miles
Temescal Creek, Reach 3 (Lee Lake)	N/A	AGR, IND, GWR, REC1, REC2, WARM, WILD	N/A
Temescal Creek, Reach 2	N/A	INTERMITTENT – AGR, IND, GWR, REC1, REC2, LWARM, WILD	N/A
Temescal Creek, Reach 1	N/A	REC1, REC2, WARM, WILD	N/A
Santa Ana River, Reach 3	Copper, Indicator Bacteria, Lead	AGR, GWR, REC1, REC2, WARM, WILD, RARE	22.0 miles
Prado Basin Management Zone	Indicator Bacteria, Nutrients, Total Suspended Solids (Prado Area)	MUN, REC1, REC2, WARM, WILD, RARE	22.5 miles

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
*State Department of Fish and Game, 1602 Streambed Alteration Agreement	☒ Y	☐ N
*State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☒ Y	☐ N
*US Army Corps of Engineers, CWA Section 404 Permit	☒ Y	☐ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☐ Y	☒ N
Statewide Industrial General Permit Coverage	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
City of Lake Elsinore Grading Permit	☒ Y	☐ N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

*Permits required for Phase II Construction only

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, **constraints** might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. **Opportunities** might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Consideration of "highest and best use" of the discharge should also be considered. For example, Lake Elsinore is evaporating faster than runoff from natural precipitation can recharge it. Requiring infiltration of 85% of runoff events for projects tributary to Lake Elsinore would only exacerbate current water quality problems associated with Pollutant concentration due to lake water evaporation. In cases where rainfall events have low potential to recharge Lake Elsinore (i.e., no hydraulic connection between groundwater to Lake Elsinore, or other factors), requiring infiltration of Urban Runoff from projects is counterproductive to the overall watershed goals. Project proponents, in these cases, would be allowed to discharge Urban Runoff, provided they used equally effective filtration-based BMPs.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Identify and preserve existing drainage patterns? ☒ **Y** ☐ **N**

The majority of the Proposed Project Site was designed to be graded as close to the existing drainage pattern as possible. Currently the east corner and southeast side of the Project Site in the Existing Condition consists of a portion of an existing natural drainage course that conveys stormwater from the Third Street Channel Watershed, as referenced in the *Technical Drainage Study (JN 148215)* prepared by *Michael Baker International* dated April 11, 2016. In the Proposed Condition, a proposed grocery building with associated paved drive aisles and parking stalls will be constructed at the location of this On-Site portion of the existing natural drainage course. A Proposed headwall and City Storm Drain pipe will be designed and constructed to intercept the specific portion of stormwater from the existing natural drainage course that drained onto the Project Site in the Existing Condition. Ultimately, stormwater will drain into the existing underground RCFC&WCD 78-inch Storm Drain Pipe on Cambern Avenue. Additionally, retaining walls around the perimeter of the Site at the northeast and southeast property line will be designed and constructed to prevent offsite flows from entering the Project Site. The offsite portion of the existing natural drainage course will remain protected in place.

Identify and protect existing vegetation? ☐ **Y** ☒ **N**

Based on field topography survey data obtained by *DRC Engineering, Inc.* dated March 4, 2021 and based on google earth imagery, the existing drainage course consists of existing vegetation such as trees, shrubbery and grasses. The proposed improvements for the Project Site will remove the existing vegetation located on the On-Site portion of the existing drainage course.

Identify and preserve natural infiltration capacity? ☐ **Y** ☒ **N**

Per *Geotechnical Engineering Investigation with Geologic Hazard Study* prepared by *Salem Engineering Group, Inc.* dated April 22, 2021:

"*Based on the soil condition and percolation test results, the site is considered to be technically* ***infeasible*** *to attain an infiltration rate necessary to achieve reliable performance of infiltration of bioretention BMPs in retaining the stormwater quality design volume (SWQDv) on site.*"

Identify and minimize impervious area? ☒ **Y** ☐ **N**

Based on the proposed buildings and associated required parking spaces, the Site Layout was designed to minimize impervious area with proposed landscape areas and various landscape planters throughout the Project Site.

Identify and disperse runoff to adjacent pervious areas? ☐ **Y** ☒ **N**

Runoff generated on the Project Site will surface flow into proposed concrete gutters and drain inlets.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1][2]	Area (Sq. Ft.)	DMA Type
DMA A-1	Landscape	11,809	Area Draining to BMP
DMA A-2	Roof	4,186	Area Draining to BMP
DMA A-3	Pavement	36,908	Area Draining to BMP
DMA B-1	Landscape	11,675	Area Draining to BMP
DMA B-2	Roof	2,943	Area Draining to BMP
DMA B-3	Pavement	38,422	Area Draining to BMP
DMA C-1	Landscape	8,111	Area Draining to BMP
DMA C-2	Roof	8,684	Area Draining to BMP
DMA C-3	Pavement	38,914	Area Draining to BMP
DMA D-1	Landscape	15,150	Area Draining to BMP
DMA D-2	Roof	43,339	Area Draining to BMP
DMA D-3	Pavement	88,330	Area Draining to BMP
DMA E-1	Landscape	7,128	Area Draining to BMP
DMA E-2	Roof	3,000	Area Draining to BMP
DMA E-3	Pavement	40,350	Area Draining to BMP
DMA F-1	Landscape	11,288	N/A: Offsite Area (Public Right-of-Way)
DMA F-2	Pavement	16,296	N/A: Offsite Area (Public Right-of-Way)

[1] *Reference Table 2-1 in the WQMP Guidance Document to populate this column*

[2] *If multi-surface provide back-up*

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				**Type 'C' DMAs that are draining to the Self-Retaining Area**		
DMA Name/ ID	Post-project surface type	Area (square feet)	Storm Depth (inches)	DMA Name / ID	[C] from Table C.4 =	Required Retention Depth (inches)
		[A]	[B]		[C]	[D]

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type ‘C’, Areas that Drain to Self-Retaining Areas

DMA					**Receiving Self-Retaining DMA**		
DMA Name/ ID	Area (square feet)	Post-project surface type	Impervious fraction	Product	DMA name /ID	Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]		[D]	[C]/[D]

Table C.5 Type ‘D’, Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
DMA A-1	MWS UNIT A (Model #MWS L-4-8) & Underground Detention System DET-A
DMA A-2	MWS UNIT A (Model #MWS L-4-8) & Underground Detention System DET-A
DMA A-3	MWS UNIT A (Model #MWS L-4-8) & Underground Detention System DET-A
DMA B-1	MWS UNIT B (Model #MWS L-4-8) & Underground Detention System DET-B
DMA B-2	MWS UNIT B (Model #MWS L-4-8) & Underground Detention System DET-B
DMA B-3	MWS UNIT B (Model #MWS L-4-8) & Underground Detention System DET-B
DMA C-1	MWS UNIT C (Model #MWS L-4-8) & Underground Detention System DET-C
DMA C-2	MWS UNIT C (Model #MWS L-4-8) & Underground Detention System DET-C
DMA C-3	MWS UNIT C (Model #MWS L-4-8) & Underground Detention System DET-C
DMA D-1	MWS UNIT D (Model #MWS L-8-8) & Underground Detention System DET-D
DMA D-2	MWS UNIT D (Model #MWS L-8-8) & Underground Detention System DET-D
DMA D-3	MWS UNIT D (Model #MWS L-8-8) & Underground Detention System DET-D
DMA E-1	MWS UNIT E (Model #MWS L-4-8) & Underground Detention System DET-E
DMA E-2	MWS UNIT E (Model #MWS L-4-8) & Underground Detention System DET-E
DMA E-3	MWS UNIT E (Model #MWS L-4-8) & Underground Detention System DET-E

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site; proceed to section D.3.

If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	**YES**	**NO**
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?	X	
If Yes, list affected DMAs: DMA A, B and C		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		
If Yes, list affected DMAs:		X
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?		X
Describe here:		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

D.2 Harvest and Use Assessment

Please check what applies*:*

☐ Reclaimed water will be used for the non-potable water demands for the project.

☐ Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).

☐ The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If none of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: 1.50 acres

Type of Landscaping (Conservation Design or Active Turf): Convservation design

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 7.38 acres

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: 1.185 (for Design Capture Storm Depth = 0.675")

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: 8.75 acres

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
8.75 acres	1.50 acres

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: 350

Project Type: Commercial

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 7.38 acres

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-2 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: 145.5 (for Design Capture Storm depth = 0.675")

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: 1,074

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	**Projected number of toilet users (Step 1)**
1,074	350

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g., industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

N/A

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-4 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-4: N/A

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: N/A

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the projected average daily use (Step 1) to the minimum required non-potable use (Step 4).

Minimum required non-potable use (Step 4)	**Projected average daily use (Step 1)**
N/A	*N/A*

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment per Section 3.4.2 of the WQMP Guidance Document.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
DMA A-1	☐	☐	☐	☒	☐
DMA A-2	☐	☐	☐	☒	☐
DMA A-3	☐	☐	☐	☒	☐
DMA B-1	☐	☐	☐	☒	☐
DMA B-2	☐	☐	☐	☒	☐
DMA B-3	☐	☐	☐	☒	☐
DMA C-1	☐	☐	☐	☒	☐
DMA C-2	☐	☐	☐	☒	☐
DMA C-3	☐	☐	☐	☒	☐
DMA D-1	☐	☐	☐	☒	☐
DMA D-2	☐	☐	☐	☒	☐
DMA D-3	☐	☐	☐	☒	☐
DMA E-1	☐	☐	☐	☒	☐
DMA E-2	☐	☐	☐	☒	☐
DMA E-3	☐	☐	☐	☒	☐
DMA F-1	☐	☐	☐	☐	☒
DMA F-2	☐	☐	☐	☐	☒

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

DMA’s A through E drain to proposed grate inlet catch basins with Catch Basin Insert Filters (Oldcastle FloGard – Grated Inlet Style) to prevent debris from entering into the storm drain system. The catch basins within each DMA drains to underground detention systems and then to proposed biotreatment units (BioClean Modular Wetland System) to meet LID BMP DCV requirements.

Proposed Drainage Management Areas DMA F is currently undeveloped land on the Project Site property in the Existing Condition. These areas currently drain southerly toward Cambern Avenue and ultimately discharge into an existing concrete drop inlet on Cambern Avenue and into the existing 78” Storm Drain Lateral. In the Proposed (developed) Condition, DMA F will be dedicated to the City of Lake Elsinore and will be a part of the public street right-of-way. All flows generated in these DMA’s will drain along the proposed public curb & gutter and will ultimately discharge downstream towards the same existing concrete drop inlet on Cambern Avenue.

The Design Capture Volume (DCV) for DMA F will still be accounted for by distributing the required treatment volumes equally throughout DMA’s A through E. For a DCV of 886 for DMA F, this distribution adds approximately 180 cubic-feet of Design Capture Volume to each DMA.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First**,** calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

For the proposed volumes provided in Tables D.3 through D.7, the DMA Areas (square feet) were obtained in AutoCAD Civil3D. The Effective Impervious Fraction was determined based on Table 2-1 of *the Santa Ana Region of Riverside County WQMP Guidance Document*. The Design Storm Depth was determined based on the Isohyetal Map for the 85th percentile, 24-hour Storm Event as shown in Appendix 6 of this report. The Design Capture Volume was determined based on the equation calculations shown in each table. The Proposed LID BMP's (MWS Units) were sized based on the Design Capture Volume.

Table D.3 DCV Calculations for LID BMPs (**DMA A)**

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	***MWS UNIT A*** *Proprietary Biofiltration System* *Modular Wetland System* *Model #MWS-L-4-8*		
	[A]		[B]	[C]	[A] x [C]			
DMA A-1	*11,809*	*Ornamental Landscaping*	*0.10*	*0.11*	*1304.4*	*Design Storm Depth (in)*	*Design Capture Volume,* ***V_{BMP}*** *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA A-2	*4,186*	*Roofs*	*1.00*	*0.89*	*3733.9*			
DMA A-3	*36,908*	*Concrete/ Asphalt*	*1.00*	*0.89*	*32921.9*			
	$A_T = \Sigma[A]$ = 52,903				Σ= [D] = 37960.2	[E] =0.675	$[F] = \frac{[D]x[E]}{12}$ = 2,135.3	[G] **= 5,036**

Table D.4 DCV Calculations for LID BMPs **(DMA B)**

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	***MWS UNIT B*** *Proprietary Biofiltration System* *Modular Wetland System* *Model #MWS-L-4-8*		
	[A]		[B]	[C]	[A] x [C]			
DMA B-1	*11,675*	*Ornamental Landscaping*	*0.10*	*0.11*	*1,289.6*	*Design Storm Depth (in)*	*Design Capture Volume,* ***V_{BMP}*** *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA B-2	*2,943*	*Roofs*	*1.00*	*0.89*	*2625.2*			
DMA B-3	*38,422*	*Concrete/ Asphalt*	*1.00*	*0.89*	*34272.4*			
	$A_T = \Sigma[A]$ = 53,040				Σ= [D] = 38187.2	[E] =0.675	$[F] = \frac{[D]x[E]}{12}$ =2,148	[G] **= 5,036**

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Table D.5 DCV Calculations for LID BMPs (**DMA C**)

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	***MWS UNIT C*** *Proprietary Biofiltration System* *Modular Wetland System* *Model #MWS-L-4-8*		
	[A]		[B]	[C]	[A] x [C]			
DMA C-1	*8,111*	*Ornamental Landscaping*	*0.10*	*0.11*	*895.9*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA C-2	*8,684*	*Roofs*	*1.00*	*0.89*	*7746.1*			
DMA C-3	*38,914*	*Concrete/ Asphalt*	*1.00*	*0.89*	*34711.3*			
	$A_T = \Sigma[A]$ = 55,709				Σ= [D] = 43353.3	[E] =0.675	$[F] = \frac{[D]x[E]}{12}$ = 2438.6	[G] **= 5,036**

Table D.6 DCV Calculations for LID BMPs (**DMA D**)

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	***MWS UNIT D*** *Proprietary Biofiltration System* *Modular Wetland System* *Model #MWS-L-8-8*		
	[A]		[B]	[C]	[A] x [C]			
DMA D-1	*15,150*	*Ornamental Landscaping*	*0.10*	*0.11*	*1673.4*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA D-2	*43,339*	*Roofs*	*1.00*	*0.89*	*38658.4*			
DMA D-3	*88,330*	*Concrete/ Asphalt*	*1.00*	*0.89*	*78790.4*			
	$A_T = \Sigma[A]$ = 146,818				Σ= [D] =119,122.2	[E] =0.675	$[F] = \frac{[D]x[E]}{12}$ = 6,700.6	[G] **= 10,072**

Table D.7 DCV Calculations for LID BMPs (**DMA E**)

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	***MWS UNIT E*** *Proprietary Biofiltration System* *Modular Wetland System* *Model #MWS-L-4-8*		
	[A]		[B]	[C]	[A] x [C]			
DMA E-1	*7,128*	*Ornamental Landscaping*	*0.10*	*0.11*	*787.3*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA E-2	*3,000*	*Roofs*	*1.00*	*0.89*	*2676*			
DMA E-3	*40,350*	*Concrete/ Asphalt*	*1.00*	*0.89*	*35992.2*			
	$A_T = \Sigma[A]$ = 50,478				Σ= [D] =39455.5	[E] =0.675	$[F] = \frac{[D]x[E]}{12}$ =2,219.4	[G] **= 5,036**

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Table D.8 DCV Calculations for LID BMPs (**DMA F)**

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	***DMA F***		
	[A]		[B]	[C]	[A] x [C]			
DMA F-1	*11,288*	*Ornamental Landscaping*	*0.10*	*0.11*	*1246.8*	*Design Storm Depth (in)*	*Design Capture Volume,* **V_{BMP}** *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA F-2	*16,296*	*Concrete*	*1.00*	*0.89*	*14536*			
	$A_T = \Sigma[A]$ = 27,584				Σ= [D] =15782.8	[E] =0.675	$[F] = \frac{[D]x[E]}{12}$ =887.8	[G] **= N/A**

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following boxes:

> ☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.
>
> \- *Or* -
>
> ☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☐ Detached Residential Development	P	N	P	P	N	P	P	P
☐ Attached Residential Development	P	N	P	P	N	P	P	P(2)
☐ Commercial/Industrial Development	P(3)	P	P(1)	P(1)	P(5)	P(1)	P	P
☐ Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P
☐ Restaurants (>5,000 ft^2)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft^2)	P	N	P	P	N	P	P	P
☐ Parking Lots (>5,000 ft^2)	P(6)	P	P(1)	P(1)	P(4)	P(1)	P	P
☐ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☐	☐	☐	☐	☐	☐	☐	☐

P = Potential

N = Not Potential

(1) *A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected*

(2) *A potential Pollutant if the project includes uncovered parking areas; otherwise not expected*

(3) *A potential Pollutant is land use involving animal waste*

(4) *Specifically petroleum hydrocarbons*

(5) *Specifically solvents*

(6) *Bacterial indicators are routinely detected in pavement runoff*

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
Total Credit Percentage[1]	

[1] *Cannot Exceed 50%*

[2] *Obtain corresponding data from Table 3-8 in the WQMP Guidance Document*

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	**DMA Area (square feet)**	**Post-Project Surface Type**	**Effective Impervious Fraction, I_f**	**DMA Runoff Factor**	**DMA Area x Runoff Factor**		***Enter BMP Name / Identifier Here***		
	[A]		[B]	[C]	[A] x [C]				
						Design Storm Depth (in)	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	$A_T = \Sigma[A]$				Σ= [D]	[E]	$[F] = \frac{[D]x[E]}{[G]}$	[F] X (1-[H])	[I]

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document

[E] is for Flow-Based Treatment Control BMPs [E] = .2, for Volume-Based Control Treatment BMPs, [E] obtained from Exhibit A in the WQMP Guidance Document

[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12

[H] is from the Total Credit Percentage as Calculated from Table E.2 above

[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]

[1] *Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.*

[2] *Cross Reference Table E.1 above to populate this column.*

[3] *As documented in a Co-Permittee Approved Study and provided in Appendix 6.*

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration	N/A	N/A	N/A
Volume (Cubic Feet)	N/A	N/A	N/A

---

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Susceptibility Maps.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

This Project will meet condition "c." stated above: The Project proposes the installation of two (2) underground detention systems with outlet control in order to mitigate the storm frequencies for both the 2-year and 100-year storm events.

Table F.2.1 below demonstrates that the total post-development peak flow rates do not exceed the pre-development conditions. Calculations are shown in Appendix 7. Hydrologic Drainage Areas are shown on Hydrology Maps in Appendix 1.

Table F.2.1	2-Year Storm Event			100-Year Storm Event		
Hydrologic Drainage Area	Q_{exist} (cfs)	Q_{Prop} (cfs)	Q_{prop} (cfs) (after detention)	Q_{exist} (cfs)	Q_{Prop} (cfs)	Q_{prop} (cfs) (after detention)
A	0.270	2.040	0.246	5.940	5.730	5.654
B	0.040	0.280	0.038	0.750	0.790	0.716

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and "housekeeping", that must be implemented by the site's occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources*:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit*:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative*:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site storm drain inlets	☒ Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify. **(CASQA BMP SC-44, "Drainage System Maintenance"; SD-13, "Storm Drain System Signs")**	☒ Maintain and periodically repaint or replace inlet markings. ☒ Provide stormwater pollution prevention information to new site owners, lessees, or operators. ☒ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ☒ Include the following in lease agreements: "Tenant shall not allow anyone to discharge into storm drains or to store or

		deposit materials so as to create a potential discharge into storm drain.”
Interior floor drains and elevator shafts sump pumps	☒ State that interior floor drains and elevator shafts sump pumps will be plumbed to sanitary sewer. ***Interior floor drains will be plumbed to sanitary sewer. There is no elevator shaft.***	☒ Inspect and maintain drains to prevent blockages and overflow.
Landscape/ Outdoor Pesticide Use	State that final landscape plans will accomplish all of the following. ☒ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. ☒ Consider using pest-resistant plants, especially adjacent to hardscape. ☒ To ensure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions. **(CASQA BMP SD-10, “Site Design and Landscape Planning” and SD-12, “Efficient Irrigation”)**	☒ Maintain landscaping using minimum or no pesticides. ☒ See applicable operational BMPs in “What you should know for… Landscape and Gardening” at http://rcflood.org/stormwater/ ☒ Provide IPM (Intergraded Pest Management) information to new owners, lessees and operators. Applicable operational BMPs in “What you should know for… Landscape and Gardening”: ☒ Never apply pesticides or fertilizers when rain is predicted within the next 48 hours. ☒ Do not overwater. ☒ Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Dispose of green waste by composting, hauling it to a permitted landfill, or recycling it though city’s program.
Refuse areas	☒ State how site refuse will be handled and provide supporting detail to what is shown on plans. ***Refuse will be picked up by local waste management company on a weekly basis. Detail of the trash enclosure will be provided in the final WQMP.*** ☒ State that signs will be posted on or near dumpsters with the words “Do not dump hazardous materials here” or similar. **(CASQA BMP SD-32, “Trash Enclosures”)**	☒ State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post “no hazardous materials” signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, “Waste Handling and Disposal” in the CASQA Stormwater Quality Handbooks at www.cabmpbooks.com ***Tenant of each building is responsible for the inspection and maintenance of the refuse areas as stated in the CC&R’s or lease agreement.***
Vehicle and Equipment Cleaning		☒ Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system. Refer to “Outdoor Cleaning

		Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/
Fuel Dispensing Areas	☒ Fueling areas shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. ☒ Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area1.] The canopy [or cover] shall not drain onto the fueling area.	☒ The property owner shall dry sweep the fueling area routinely. ☒ See the Fact Sheet SD-30 , "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
Loading Docks		☒ Move loaded and unloaded item indoors as soon as possible. ☒ See Fact Sheet SC-30, "Outdoor loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
Fire Sprinkler Test Water	☒ Provide a means to drain fire sprinkler test water to the sanitary sewer. ***The drain line for fire sprinkler test water will be connected to the sanitary sewer line per plumbing plan.***	☒ See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
Miscellaneous Drain or Wash Water or Other Sources ☒ Condensate drain lines ☒ Rooftop equipment ☒ Roofing, gutters, and trim	☒ Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. ☒ Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment. ☒ Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.	Additional Operational BMPs suggested on Fact Sheet SC-10: ☒ Train employees to identify non-stormwater discharges and report them to the appropriate departments.

	(CASQA BMP SD-10, “Site Design and Landscape Planning” and SD-11, “Roof Runoff Controls”)	
Plazas, sidewalks, and parking lots	☒ Control the number of points for vehicle access ☒ Inspect BMP’s prior to forecast rain, daily during extended rain events, after rain events, weekly during rainy season and at two-week intervals during the non-rainy season ☒ Do not sweep up any unknown substance or any object that may be potentially hazardous ☒ After sweeping is finished, properly dispose of sweeper wastes **(CASQA BMP SE-7, “Street Sweeping and Vacuuming”)**	☒ Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of liter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.
Activity Restriction	If a property owners association (POA) is formed, conditions, covenants and restrictions shall include measures listed in BMPs for the purpose of surface water quality protection.	

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)	BMP Location (Lat/Long)
MWS UNIT A	Proprietary Biofiltration System (MWS Unit Model # MWS-L-4-8)	Conceptual Utility Plan WQMP Site Plan	33°41'45.58"N, 117°19'55.39"W
MWS UNIT B	Proprietary Biofiltration System (MWS Unit Model # MWS-L-4-8)	Conceptual Utility Plan WQMP Site Plan	33°41'44.11"N, 117°19'56.89"W
MWS UNIT C	Proprietary Biofiltration System (MWS Unit Model # MWS-L-4-8)	Conceptual Utility Plan WQMP Site Plan	33°41'42.24"N, 117°19'59.16"W
MWS UNIT D	Proprietary Biofiltration System (MWS Unit Model # MWS-L-8-8)	Conceptual Utility Plan WQMP Site Plan	33°41'41.20"N, 117°19'57.80"W
MWS UNIT E	Proprietary Biofiltration System (MWS Unit Model # MWS-L-4-8)	Conceptual Utility Plan WQMP Site Plan	33°41'40.45"N, 117°19'56.85"W
DET-A	Underground 60” Diameter Pipe Detention System	Conceptual Utility Plan WQMP Site Plan	33°41'46.22"N, 117°19'55.56"W
DET-B	Underground 60” Diameter Pipe Detention System	Conceptual Utility Plan WQMP Site Plan	33°41'44.64"N, 117°19'57.38"W
DET-C	Underground 60” Diameter Pipe Detention System	Conceptual Utility Plan WQMP Site Plan	33°41'42.86"N, 117°19'59.61"W
DET-D	Underground 60” Diameter Pipe Detention System	Conceptual Utility Plan WQMP Site Plan	33°41'42.44"N, 117°19'56.23"W
DET-E	Underground 60” Diameter Pipe Detention System	Conceptual Utility Plan WQMP Site Plan	33°41'40.85"N, 117°19'56.32"W

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: Insert text here describing how each included Site Design BMP will be implemented.

Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

☐ Y ☒ N

The maintenance of the proposed structure BMPs will be done by the property owner through site maintenance workers. The property owner will be responsible for funding of all onsite BMPs through its operating budget. The following party is responsible for the operation and maintenance of all Structural Source Control and Treatment Control BMPs until such time that the permanent sale of the parcel and transfer of ownership occurs:

Evergreen Devco, Inc.
2390 East Camelback Road, Suite 410
Phoenix, Arizona 85016
Jon Prystasz *(602) 808-8600* *jprystasz@evgre.com*

The owner will be responsible for ensuring that all personnel involved in the routine inspection, routine and non-routine maintenance, and record keeping tasks required by the O&M Plan are familiar with the contents of the WQMP and the requirements for the routine inspection as well as routine and non-routine tasks as described in Appendix 9. Corresponding fact sheets for source control BMPs and treatment control BMPs, as well as other educational materials, can be found in Appendix 10.

The owner will be responsible for ensuring that individuals involved in O&M activities, including but not limited to contractors, will be trained by the responsible party/trainer according to the training program herein.

Each proposed BMP for the feature developments will be maintained by the property owner.

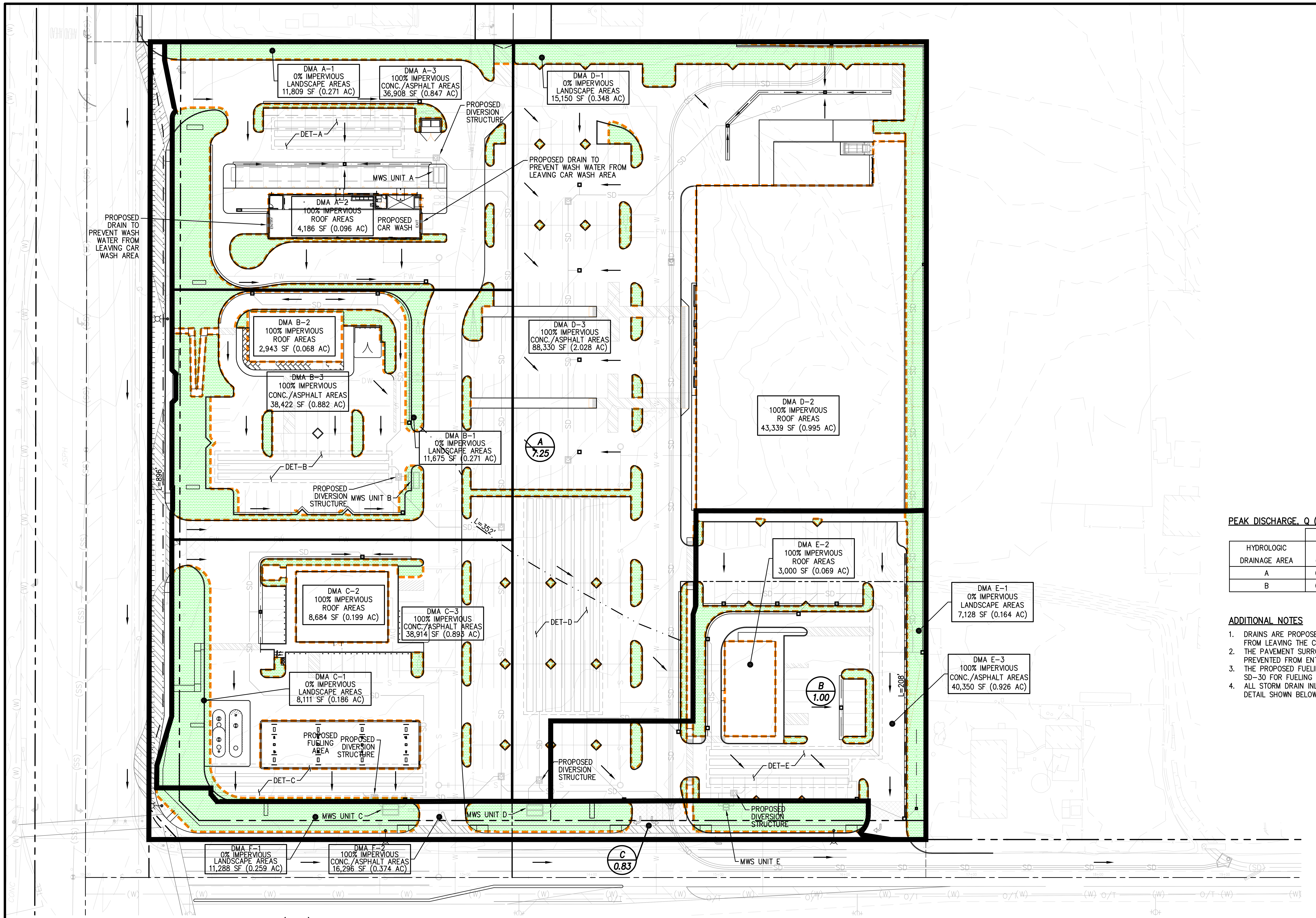
The owner shall be responsible for documenting all training activities and for maintaining records related to training. At a minimum, training documentation shall include:

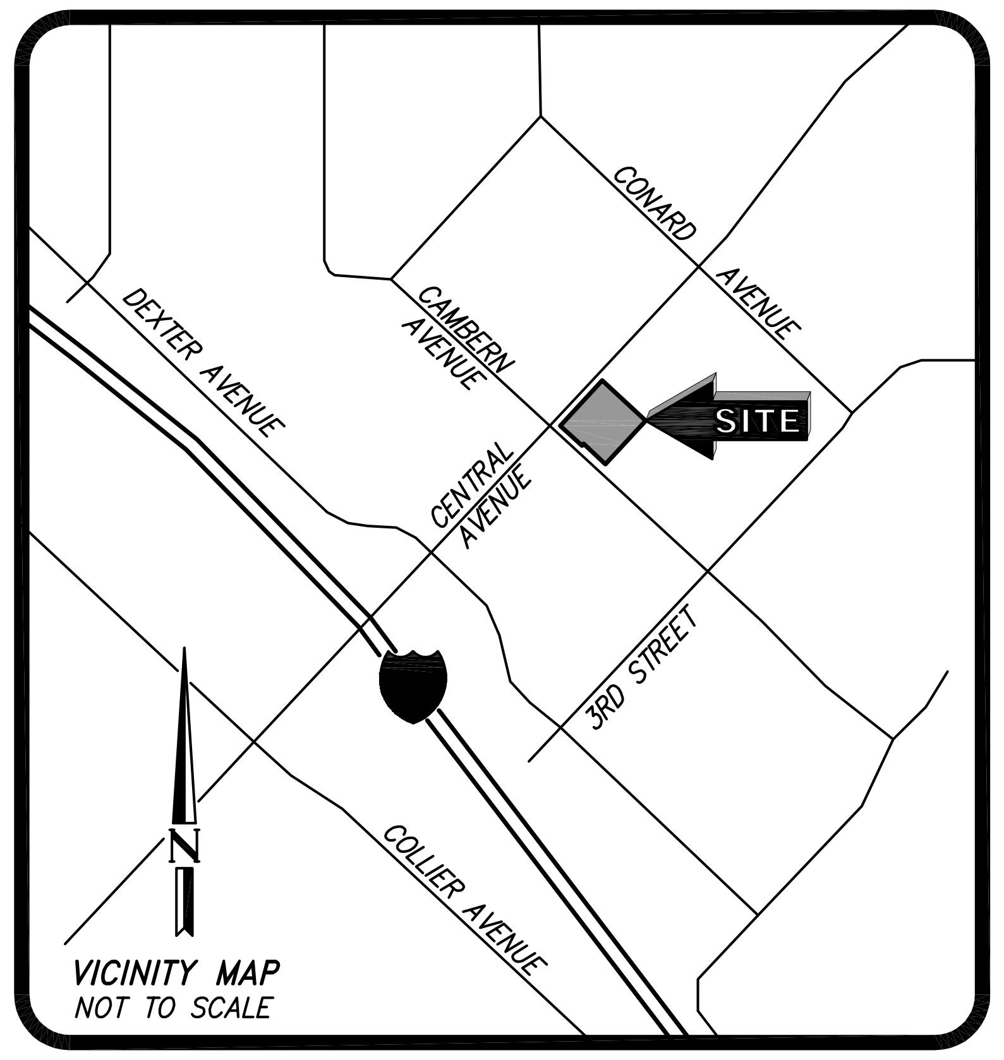
- Certification of Receipt and Review of the O&M Plan completed by trainees and owner
- Logging of all training activities at the same time that all training is complete.

Forms for documentation of training are included in Appendix 10. Training records must be maintained for a minimum period of 3 years.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map





LEGEND:

▬	HYDROLOGIC DRAINAGE AREA BOUNDARIES
—	DMA BOUNDARIES
- - -	DMA SUBAREA BOUNDARIES
🟩	LANDSCAPE AREA
←	SURFACE FLOW DIRECTION
X	DRAINAGE AREA DESIGNATION
X.XX	AREA OF DMA (ACRES)

PEAK DISCHARGE, Q (CFS)

	2-YEAR STORM EVENT			100-YEAR STORM EVENT		
HYDROLOGIC DRAINAGE AREA	Q_{EXIST} (CFS)	Q_{PROP} (CFS)	$Q_{PROP\ AFTER\ DETENTION}$ (CFS)	Q_{EXIST} (CFS)	Q_{PROP} (CFS)	$Q_{PROP\ AFTER\ DETENTION}$ (CFS)
A	0.270	2.040	0.246	5.940	5.730	5.654
B	0.040	0.280	0.038	0.750	0.790	0.716

ADDITIONAL NOTES

1. DRAINS ARE PROPOSED AT THE VEHICLE ENTRANCE AND EXIT TO PREVENT WASH WATER FROM LEAVING THE CAR WASH AREA.
2. THE PAVEMENT SURROUNDING THE FUELING AREAS ARE GRADED SUCH THAT RUNOFF IS PREVENTED FROM ENTERING THE FUELING AREAS.
3. THE PROPOSED FUELING AREA IS TO BE DESIGNED PER REQUIREMENTS IN CASQA BMP SD-30 FOR FUELING AREAS.
4. ALL STORM DRAIN INLETS TO BE MARKED WITH STENCILING EQUAL TO OR SIMILAR TO THE DETAIL SHOWN BELOW STATING "NO DUMPING" AND "DRAINS TO OCEAN"

"NO DUMPING – DRAINS TO OCEAN" STENCILING

DRAINAGE MANAGEMENT AREAS (DMAS)

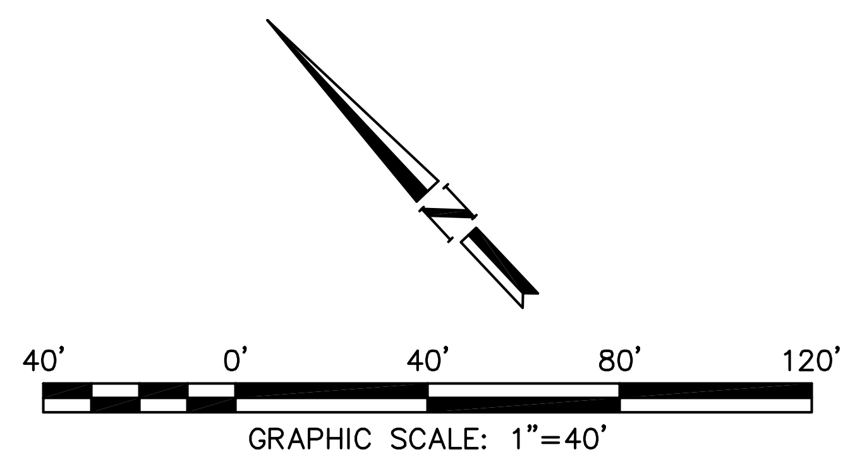
DMA ID	SURFACE TYPE(S)	AREA (SQ. FT.)	DMA TYPE	BMP NAME(S) OR ID(S)	MWS MODEL NO.
DMA A-1	ORNAMENTAL LANDSCAPING	11,809	AREA DRAINING TO BMPS	MWS UNIT A & UNDERGROUND DETENTION SYSTEM DET-A	MWS-L-4-8-V
DMA A-2	ROOFS	4,186	AREA DRAINING TO BMPS	MWS UNIT A & UNDERGROUND DETENTION SYSTEM DET-A	
DMA A-3	CONCRETE/ASPHALT	36,908	AREA DRAINING TO BMPS	MWS UNIT A & UNDERGROUND DETENTION SYSTEM DET-A	
DMA B-1	ORNAMENTAL LANDSCAPING	11,675	AREA DRAINING TO BMPS	MWS UNIT B & UNDERGROUND DETENTION SYSTEM DET-B	MWS-L-4-8-V
DMA B-2	ROOFS	2,943	AREA DRAINING TO BMPS	MWS UNIT B & UNDERGROUND DETENTION SYSTEM DET-B	
DMA B-3	CONCRETE/ASPHALT	38,422	AREA DRAINING TO BMPS	MWS UNIT B & UNDERGROUND DETENTION SYSTEM DET-B	
DMA C-1	ORNAMENTAL LANDSCAPING	8,111	AREA DRAINING TO BMPS	MWS UNIT C & UNDERGROUND DETENTION SYSTEM DET-C	MWS-L-4-8-V
DMA C-2	ROOFS	8,684	AREA DRAINING TO BMPS	MWS UNIT C & UNDERGROUND DETENTION SYSTEM DET-C	
DMA C-3	CONCRETE/ASPHALT	38,914	AREA DRAINING TO BMPS	MWS UNIT C & UNDERGROUND DETENTION SYSTEM DET-C	
DMA D-1	ORNAMENTAL LANDSCAPING	15,150	AREA DRAINING TO BMPS	MWS UNIT D & UNDERGROUND DETENTION SYSTEM DET-D	MWS-L-8-8-V
DMA D-2	ROOFS	43,339	AREA DRAINING TO BMPS	MWS UNIT D & UNDERGROUND DETENTION SYSTEM DET-D	
DMA D-3	CONCRETE/ASPHALT	88,330	AREA DRAINING TO BMPS	MWS UNIT D & UNDERGROUND DETENTION SYSTEM DET-D	
DMA E-1	ORNAMENTAL LANDSCAPING	7,128	AREA DRAINING TO BMPS	MWS UNIT E & UNDERGROUND DETENTION SYSTEM DET-E	MWS-L-4-8-V
DMA E-2	ROOFS	3,000	AREA DRAINING TO BMPS	MWS UNIT E & UNDERGROUND DETENTION SYSTEM DET-E	
DMA E-3	CONCRETE/ASPHALT	40,350	AREA DRAINING TO BMPS	MWS UNIT E & UNDERGROUND DETENTION SYSTEM DET-E	
DMA F-1	ORNAMENTAL LANDSCAPING	11,288	(N/A)		
DMA F-2	CONCRETE/ASPHALT	16,296	(N/A)		

BMP LOCATIONS

BMP NAME	LOCATION
UNDERGROUND DETENTION SYSTEM DET-A	33°41'46.22"N, 117°19'55.56"W
UNDERGROUND DETENTION SYSTEM DET-B	33°41'44.64"N, 117°19'57.38"W
UNDERGROUND DETENTION SYSTEM DET-C	33°41'42.86"N, 117°19'59.61"W
UNDERGROUND DETENTION SYSTEM DET-D	33°41'42.44"N, 117°19'56.23"W
UNDERGROUND DETENTION SYSTEM DET-E	33°41'40.85"N, 117°19'56.32"W
MWS UNIT A (MWS-L-4-8-V)	33°41'45.58"N, 117°19'55.39"W
MWS UNIT B (MWS-L-4-8-V)	33°41'44.11"N, 117°19'56.89"W
MWS UNIT C (MWS-L-4-8-V)	33°41'42.24"N, 117°19'59.16"W
MWS UNIT D (MWS-L-8-8-V)	33°41'41.20"N, 117°19'57.80"W
MWS UNIT E (MWS-L-4-8-V)	33°41'40.45"N, 117°19'56.85"W

OVERFLOW FROM UNDERGROUND DETENTION SYSTEMS

DRAINAGE FROM EACH DMA WILL FLOW THROUGH A DIVERSION STRUCTURE FEATURING A WEIR PLATE WHICH WILL LEAD THE DESIGN CAPTURE VOLUME TO EACH MODULAR WETLANDS UNIT. HIGHER FLOWS SUCH AS THE 2 YEAR 24 HOUR WILL BYPASS THE MODULAR WETLAND UNITS AND EXIT THROUGH A SMALL ORIFICE IN THE WEIR WHICH WILL MITIGATE THE OUTFLOW TO EXISTING CONDITIONS. EVEN LARGER FLOWS SUCH AS THE 100 YEAR STORM WILL CREST OVER THE WEIR AND ALSO CONTINUE TO FLOW TO THE PUBLIC STORM DRAIN.



GRAPHIC SCALE: 1"=40'

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

NOT FOR CONSTRUCTION

NO.:	REVISION:	DATE:

PROJECT:
EVERGREEN DEVELOPMENT
18650 CAMBERN STREEET
LAKE ELSINORE, CALIFORNIA

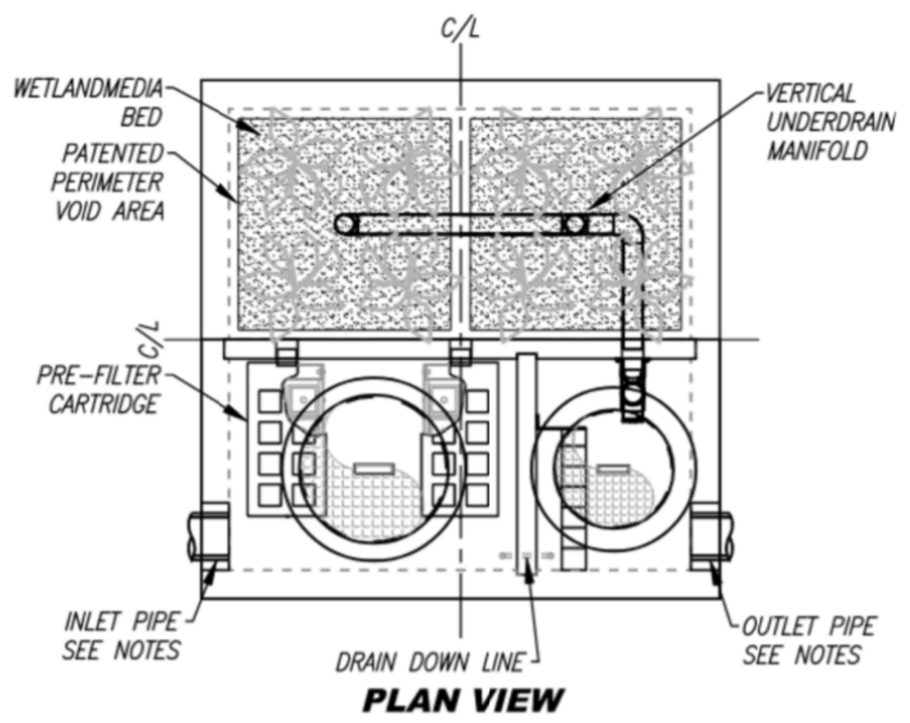
DRAWING NAME:
WQMP SITE PLAN

ISSUE: **PRELIMINARY**
DATE: **2/10/2022**
CHECKED: **CM** DRAWN: **LI**
DRAWING FILE: **19400WQMP**
PROJECT NO.: **19-400**
SHEET NUMBER: **1**
OF **2** SHEETS
SCALE: **AS SHOWN**

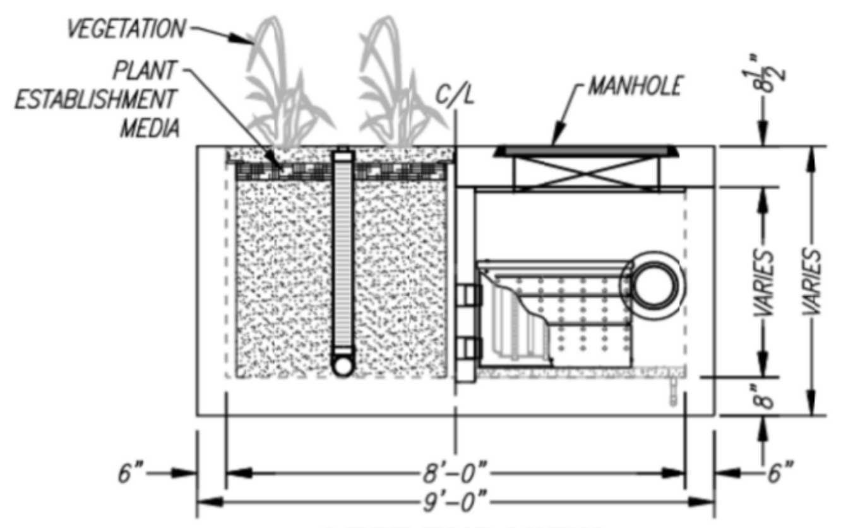
FILENAME: M:\2019\19-400 Evergreen Lake Elsinore\WQMP\Appendix 1 – Site Plan, Maps, Receiving Wa\19400 WQMP Site Plan.dwg, LAST SAVED ON: Apr 29 2022 8:11am PLOTTED BY: KENNY, ON: Apr 29 2022 8:11am, CFG:

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TBD		N/A	
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 ▼		
FRAME & COVER	ø30"	OPEN PLANT ▼	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



LEFT END VIEW

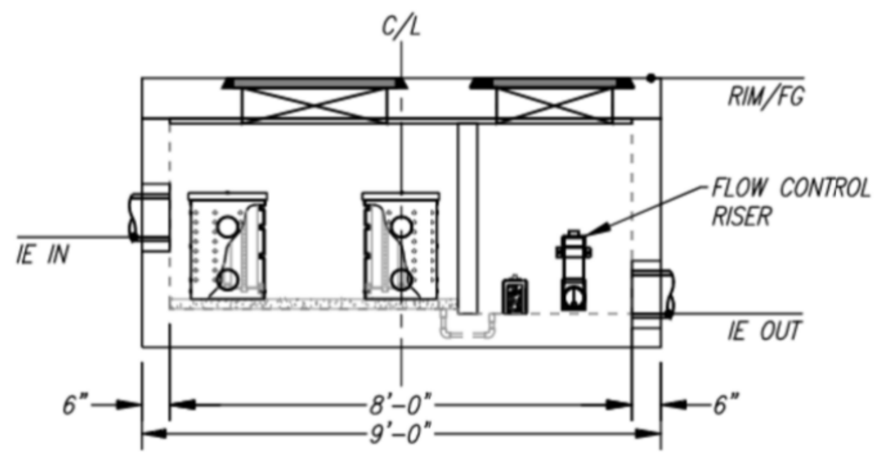
INSTALLATION NOTES

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 MANUFACTURERS 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 TO VERIFY PROJECT ENGINEERS 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 WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH 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 BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

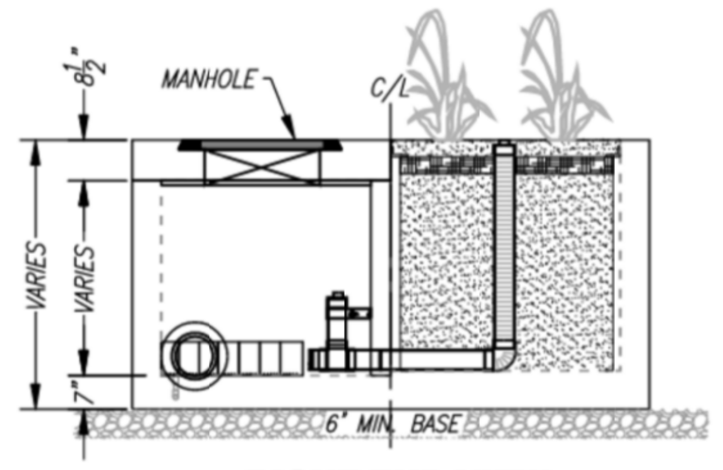
GENERAL NOTES

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 BIO CLEAN.

5/23/19TOLFF



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	TBD
OPERATING HEAD (FT)	TBD
PRETREATMENT LOADING RATE (GPM/SF)	TBD
WETLAND MEDIA LOADING RATE (GPM/SF)	TBD

MODULAR WETLANDS

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,378; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

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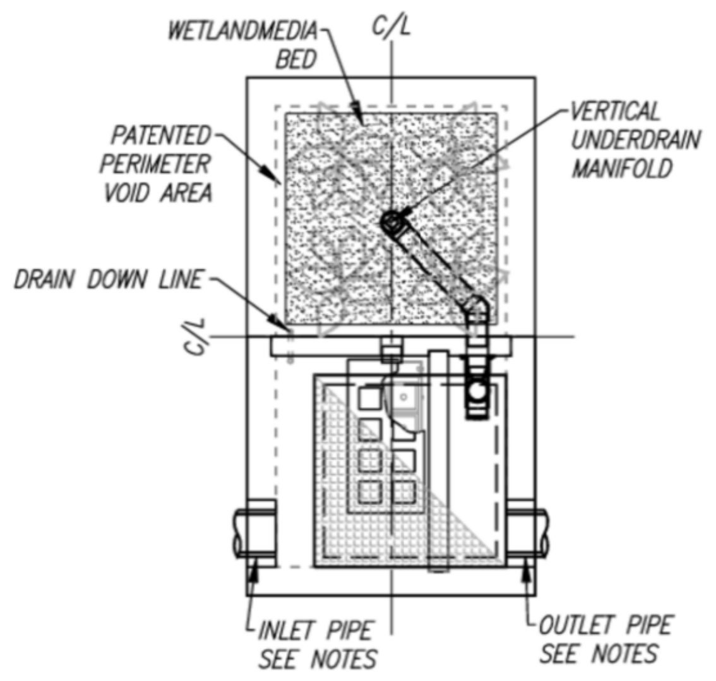
Bio Clean
A Forterra Company

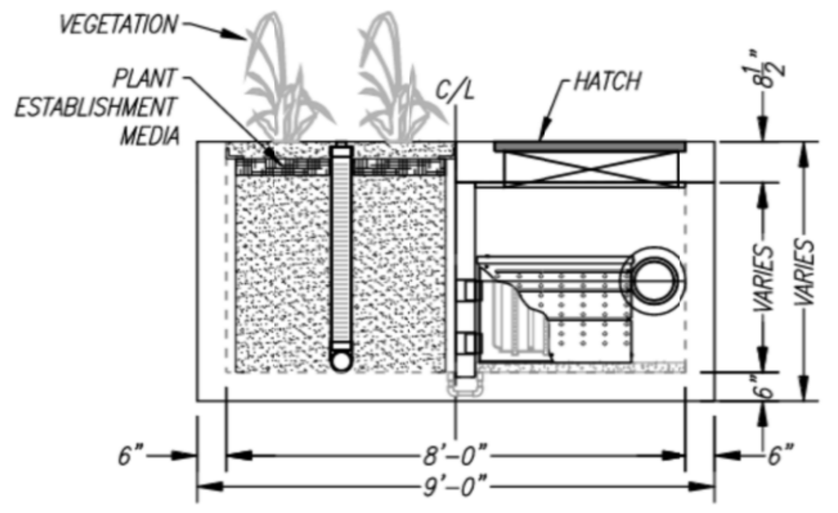
MWS-L-8-8-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TBD		N/A	
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 ▼		
FRAME & COVER	36" X 36"	OPEN PLANT ▼	N/A
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



LEFT END VIEW

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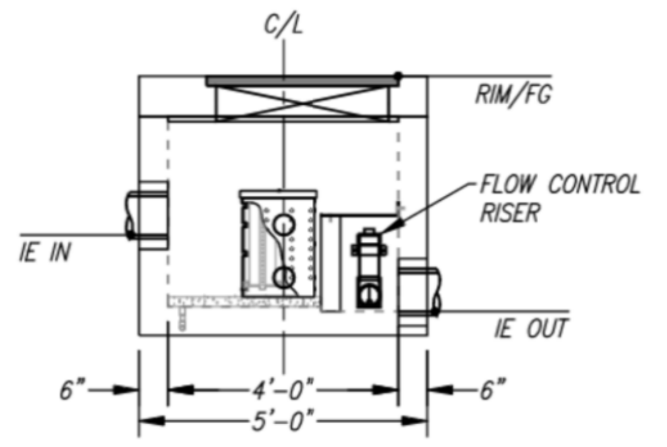
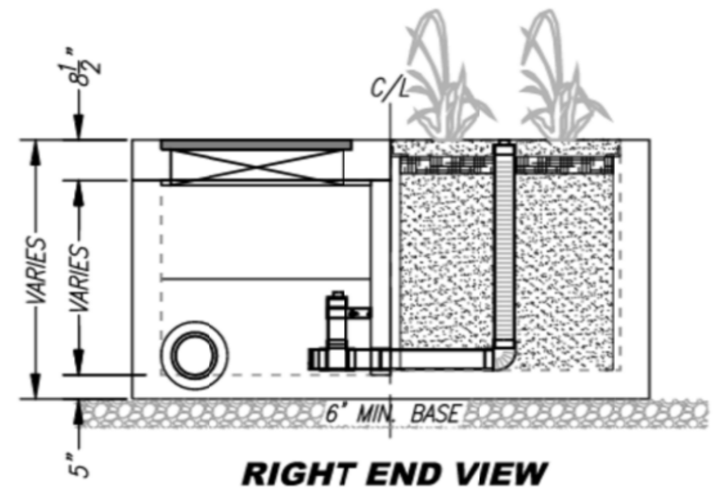
5/23/19TOLFF



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	TBD
OPERATING HEAD (FT)	TBD
PRETREATMENT LOADING RATE (GPM/SF)	TBD
WETLAND MEDIA LOADING RATE (GPM/SF)	TBD

MODULAR WETLANDS

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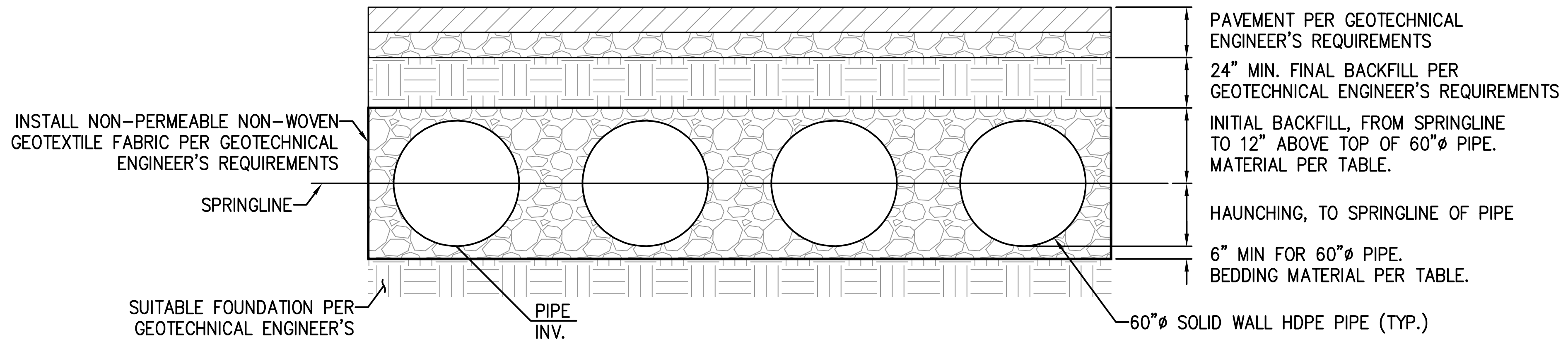
Bio Clean
A Forterra Company

MWS-L-4-8-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL



UNDERGROUND DETENTION SYSTEM
TYPICAL SECTION
N.T.S.

NOT FOR CONSTRUCTION

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

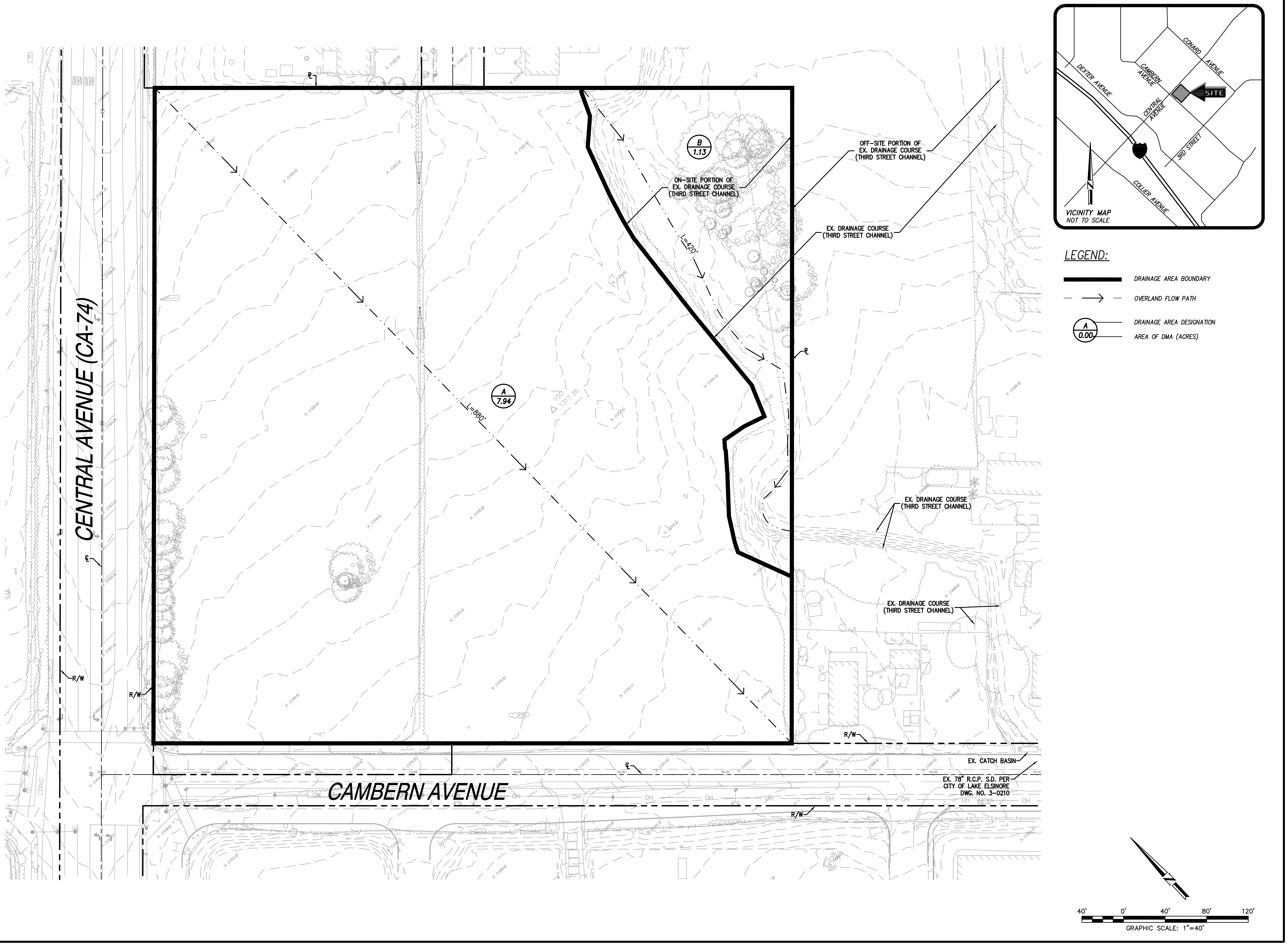
NO.:	REVISION:	DATE:

PROJECT:
EVERGREEN DEVELOPMENT
18650 CAMBERN STREET
LAKE ELSINORE, CALIFORNIA

DRAWING NAME:
WQMP SITE PLAN

ISSUE: **PRELIMINARY**
DATE: 2/10/2022
CHECKED: **CM** DRAWN: **LI**
DRAWING FILE: 19400WQMP
PROJECT NO.: **19-400**
SHEET NUMBER:
2
OF 2 SHEETS
SCALE: **AS SHOWN**

FILENAME: M:\2019\19–400 Evergreen Lake Elsinore\WQMP\Appendix 1 – Site Plan, Maps, Receiving Wa\19400 WQMP Site Plan.dwg, LAST SAVED ON: Apr 28 2022 4:26pm PLOTTED BY: KENNY, ON: Apr 29 2022 7:37am, CFG:



DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

GREGORY R. COOKE R.C.E. 39478 DATE

NOT FOR CONSTRUCTION

NO.:	REVISION:	DATE:

PROJECT:
EVERGREEN DEVELOPMENT
18650 CAMBERN STREET
LAKE ELSINORE, CALIFORNIA

DRAWING NAME:
EXISTING HYDROLOGY MAP

ISSUE:	PRELIMINARY
DATE:	6/9/2021
CHECKED: CM	DRAWN: LI
DRAWING FILE:	19400EXHM
PROJECT NO.:	19-400
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OF 1	SHEETS
SCALE:	AS SHOWN

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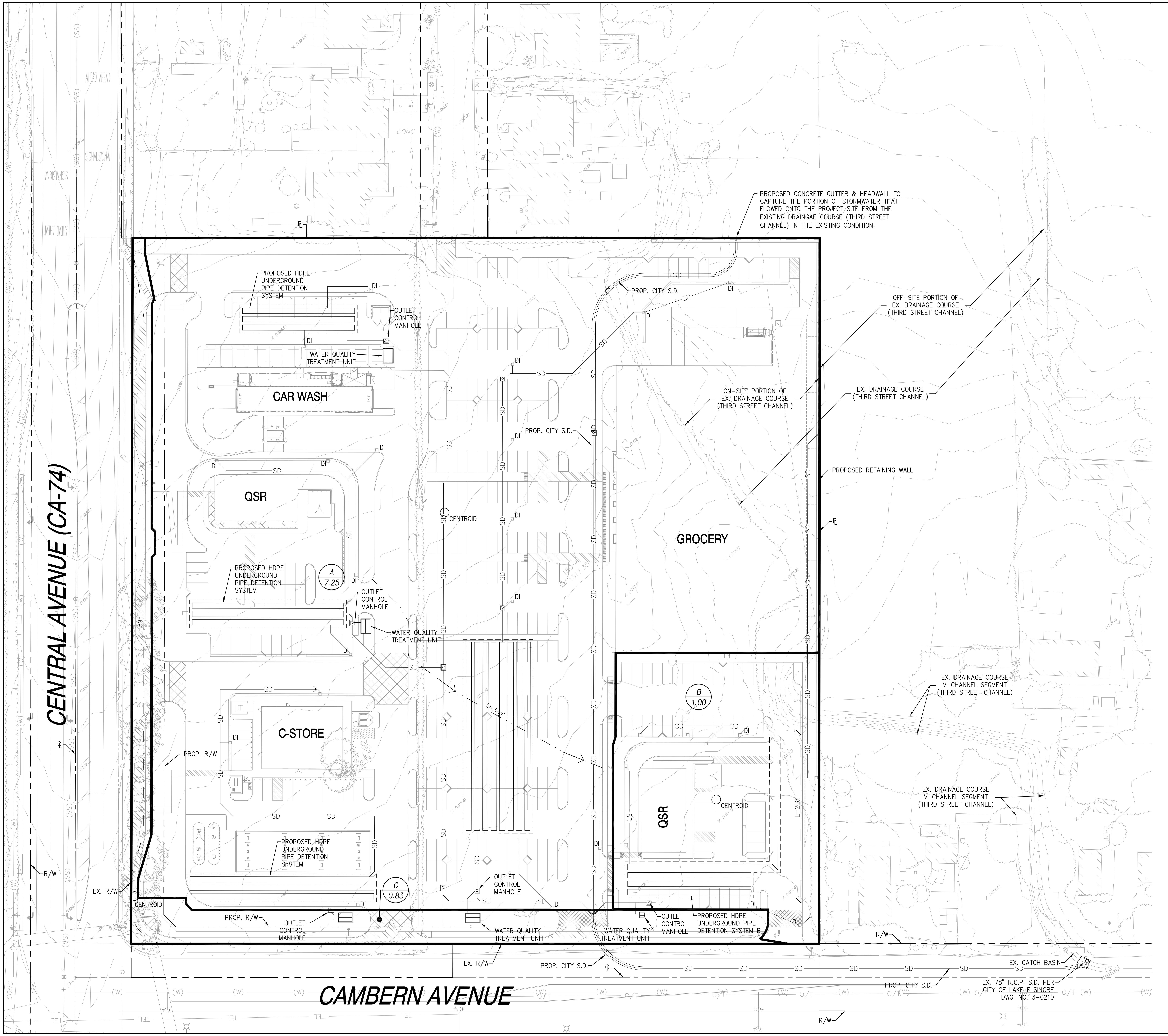
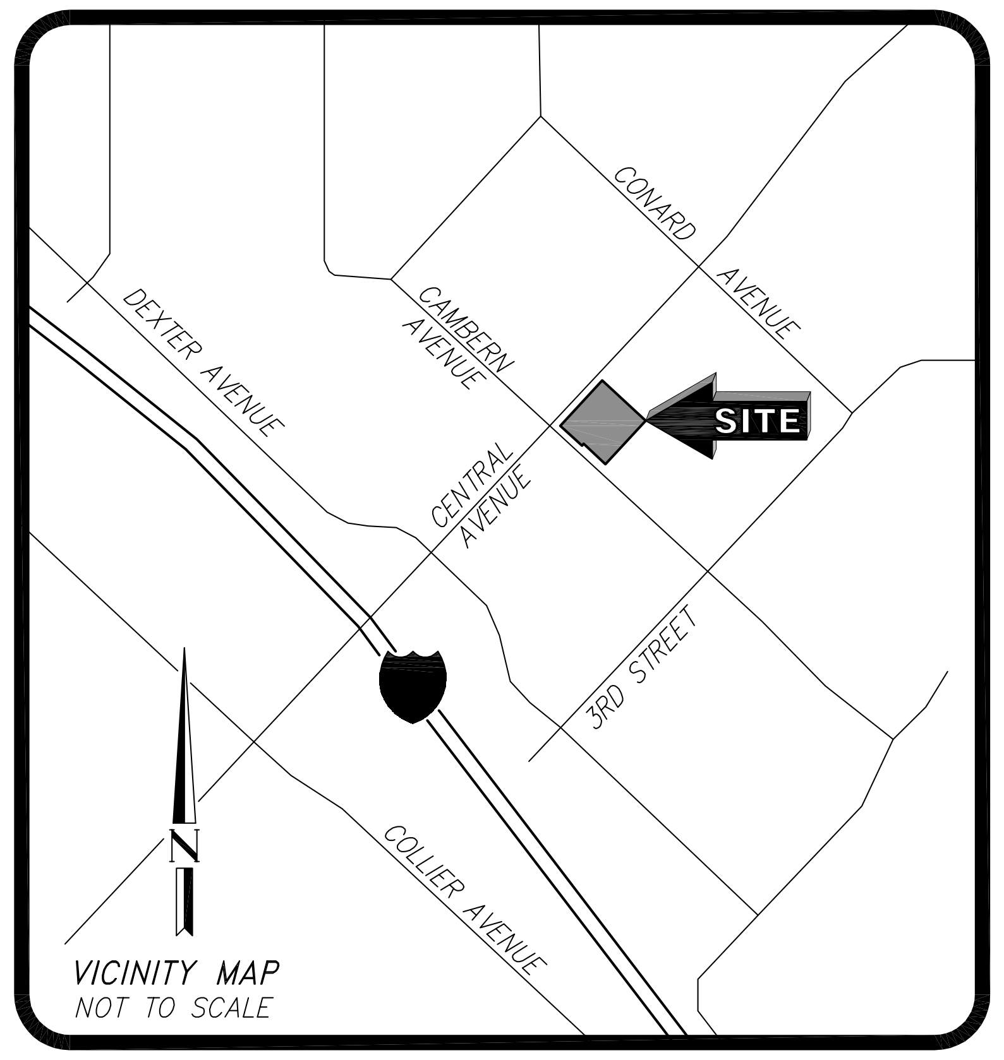




VICINITY MAP
NOT TO SCALE

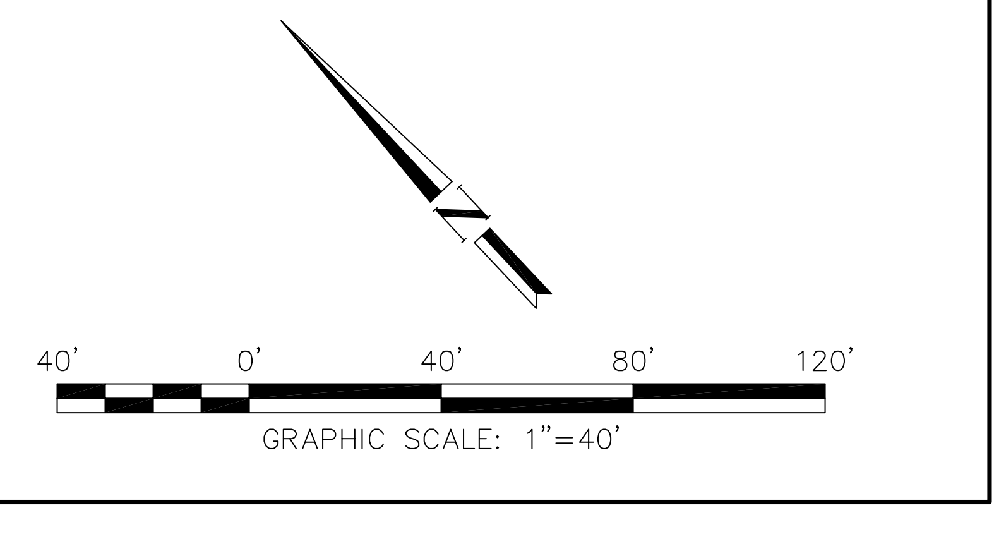
LEGEND:

▬ DRAINAGE AREA BOUNDARY

- - → - - OVERLAND FLOW PATH

A DRAINAGE AREA DESIGNATION

0.00 AREA OF DMA (ACRES)



GRAPHIC SCALE: 1"=40'

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

CHRISTOPHER MCKEE R.C.E. 74414 DATE

NOT FOR CONSTRUCTION

NO.:	REVISION:	DATE:

PROJECT:
EVERGREEN DEVELOPMENT
18650 CAMBERN STREEET
LAKE ELSINORE, CALIFORNIA

DRAWING NAME:
PROPOSED HYDROLOGY MAP

ISSUE:	PRELIMINARY
DATE:	6/9/2021
CHECKED: CM	DRAWN: LI
DRAWING FILE:	19400PRHM
PROJECT NO.:	**19-400**
SHEET NUMBER: **1** OF 1 SHEETS	
SCALE:	**AS SHOWN**

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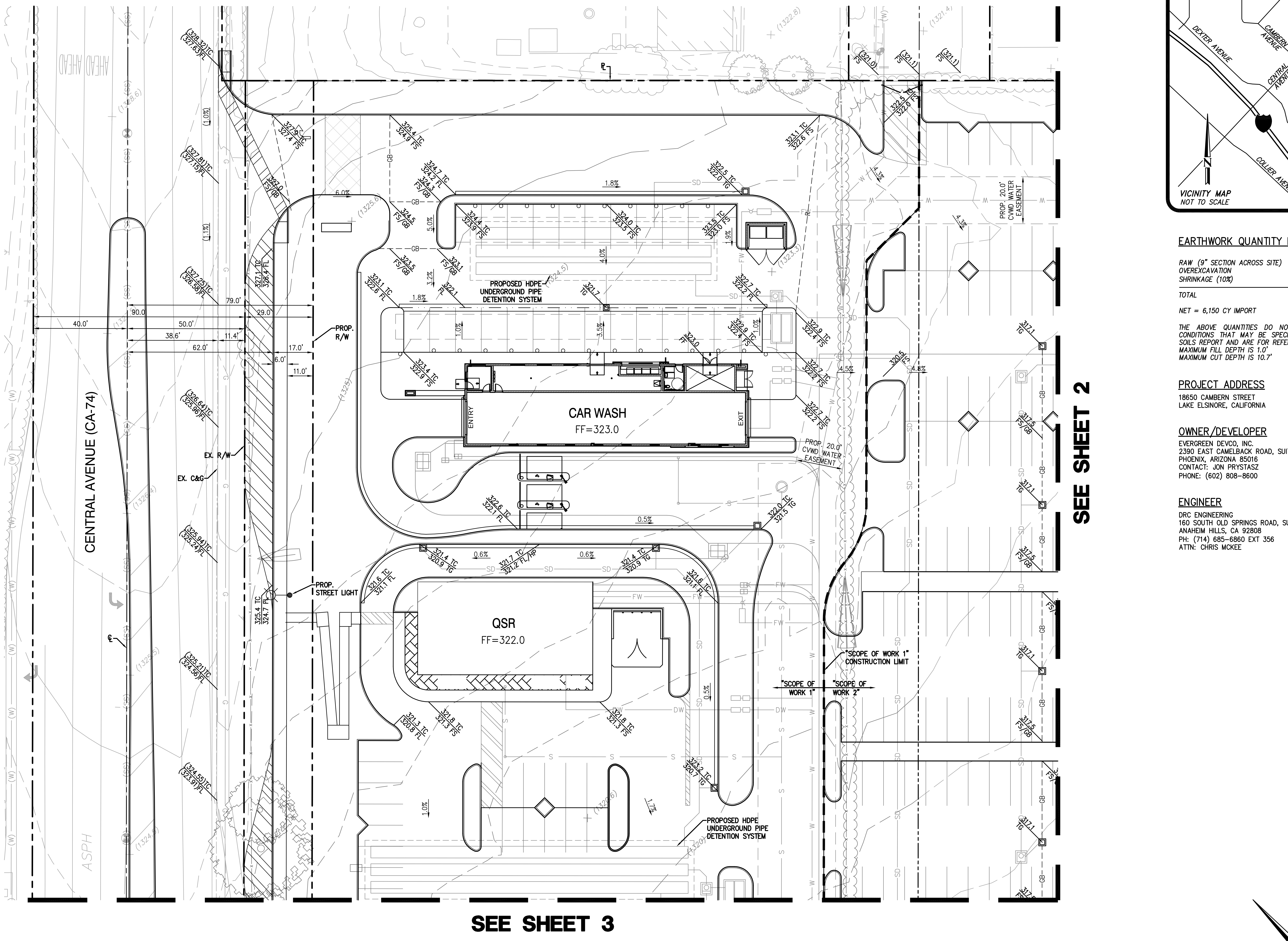
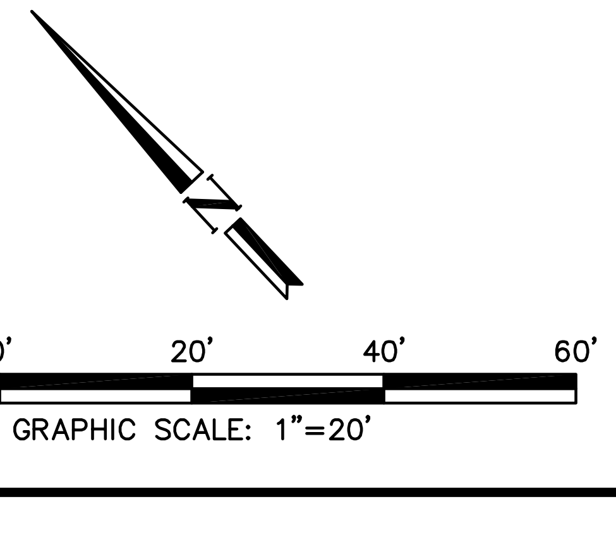
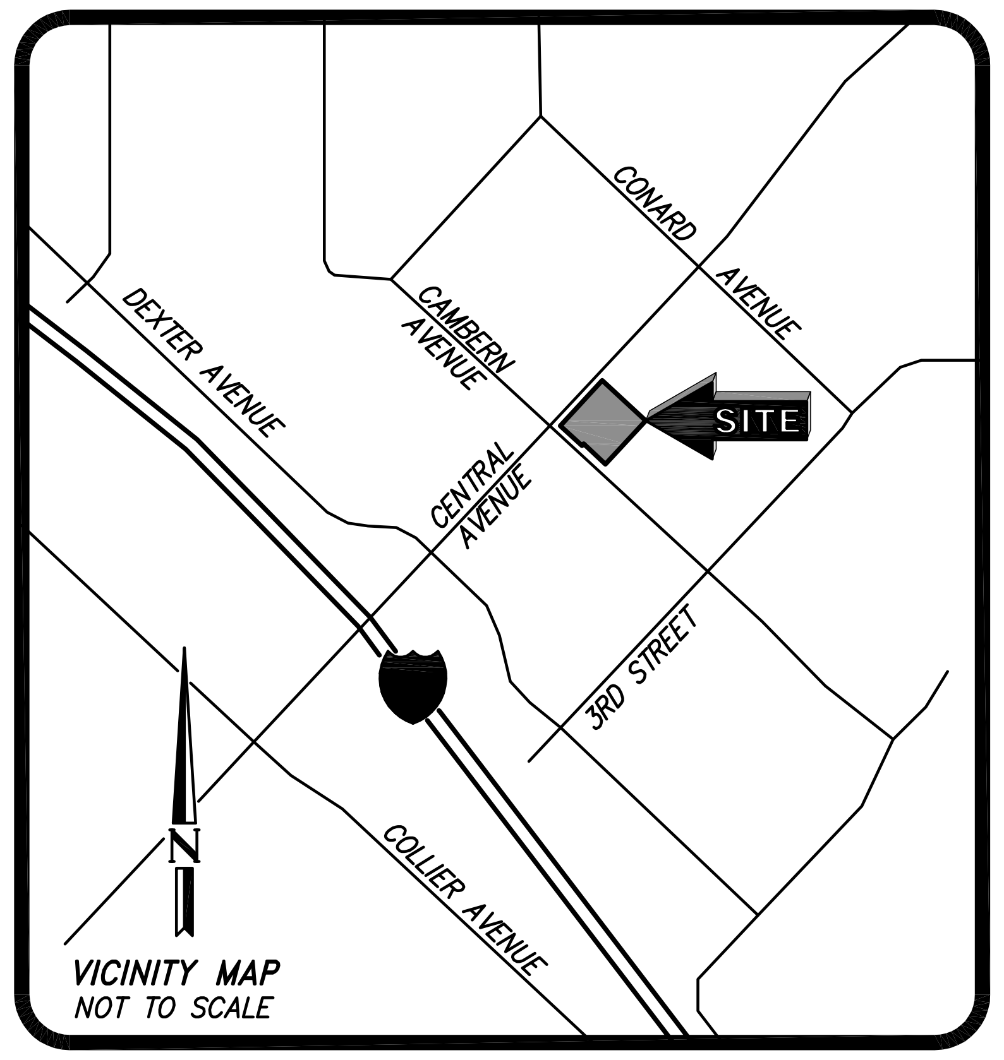
Appendix 2: Construction Plans

Grading and Drainage Plans







VICINITY MAP
NOT TO SCALE

EARTHWORK QUANTITY ESTIMATE:

	CUT (CY)	FILL (CY)
RAW (9" SECTION ACROSS SITE)	8,970	10,220
OVEREXCAVATION	40,000	40,000
SHRINKAGE (10%)	–	4,900
TOTAL	48,970	55,120

NET = 6,150 CY IMPORT

THE ABOVE QUANTITIES DO NOT REFLECT ANY SPECIAL CONDITIONS THAT MAY BE SPECIFIED IN THE PRELIMINARY SOILS REPORT AND ARE FOR REFERENCE PURPOSES ONLY.
MAXIMUM FILL DEPTH IS 1.0'
MAXIMUM CUT DEPTH IS 10.7'

PROJECT ADDRESS

18650 CAMBERN STREET
LAKE ELSINORE, CALIFORNIA

OWNER/DEVELOPER

EVERGREEN DEVCO, INC.
2390 EAST CAMELBACK ROAD, SUITE 410
PHOENIX, ARIZONA 85016
CONTACT: JON PRYSTASZ
PHONE: (602) 808-8600

ENGINEER

DRC ENGINEERING
160 SOUTH OLD SPRINGS ROAD, SUITE 210
ANAHEIM HILLS, CA 92808
PH: (714) 685-6860 EXT 356
ATTN: CHRIS MCKEE

NOT FOR CONSTRUCTION

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

CHRISTOPHER MCKEE
R.C.E. 74414
DATE

NO.:	REVISION:	DATE:

PROJECT:
EVERGREEN DEVELOPMENT
18650 CAMBERN STREET
LAKE ELSINORE, CA 92532

DRAWING NAME:
CONCEPT GRADING PLAN

ISSUE:	CONCEPT
DATE:	8/2/2021
CHECKED: LI	DRAWN: CM
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PROJECT NO.:	19-400
SHEET NUMBER:	1
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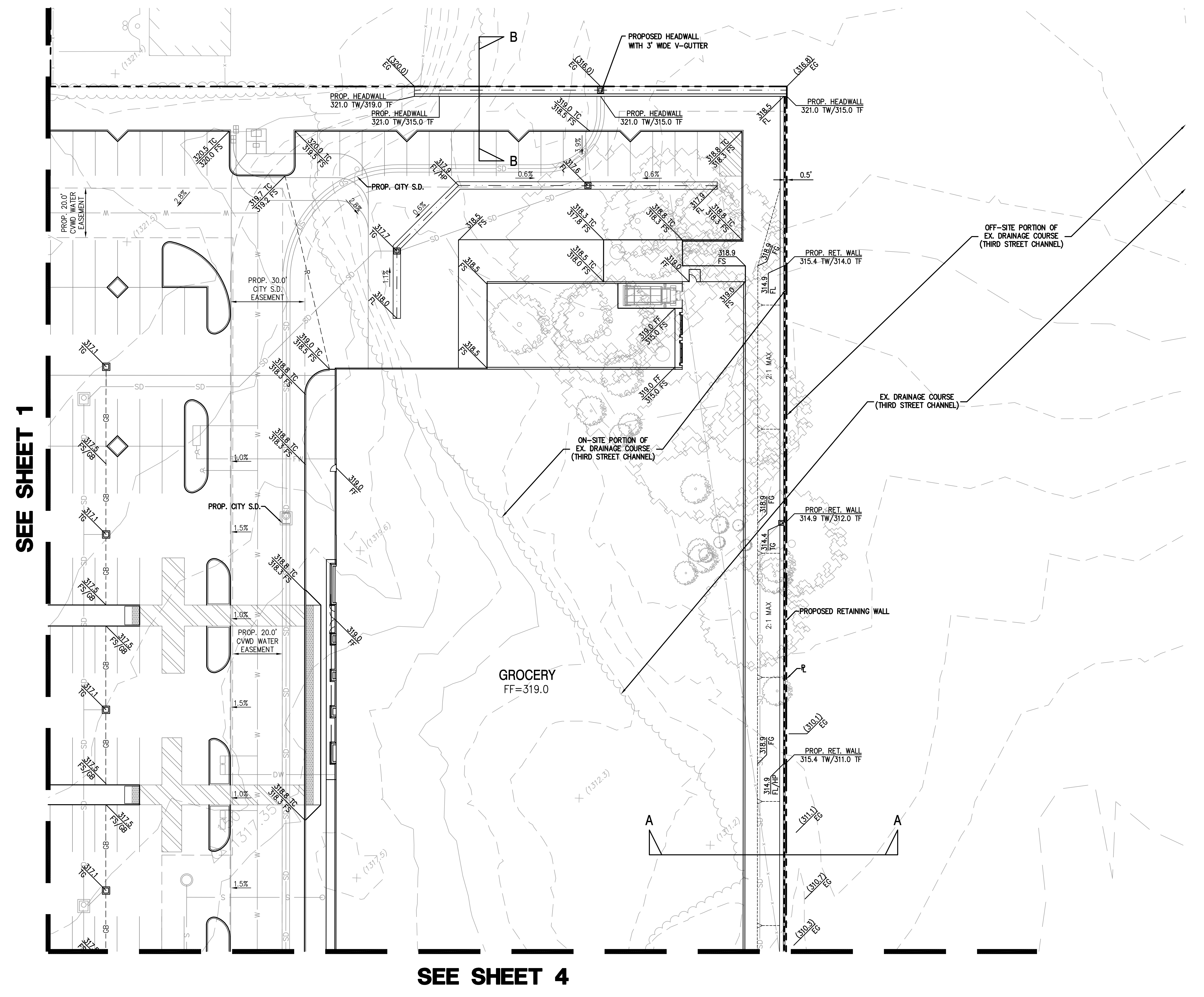

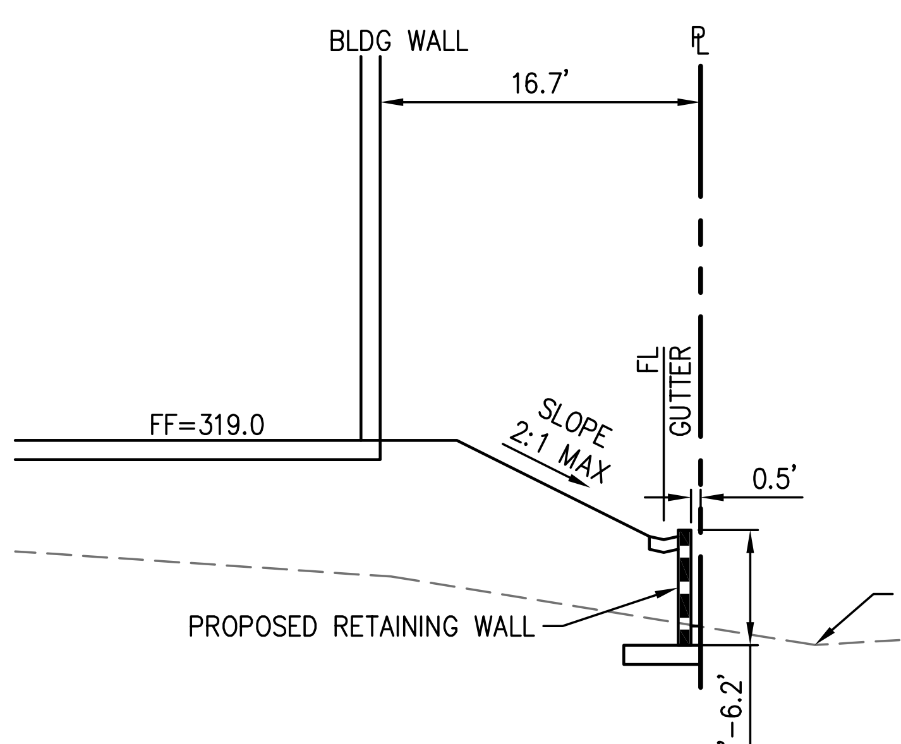

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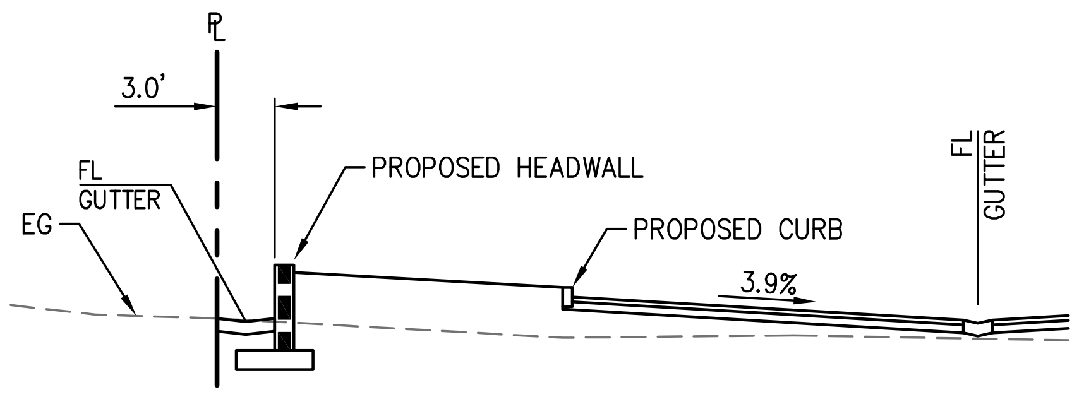

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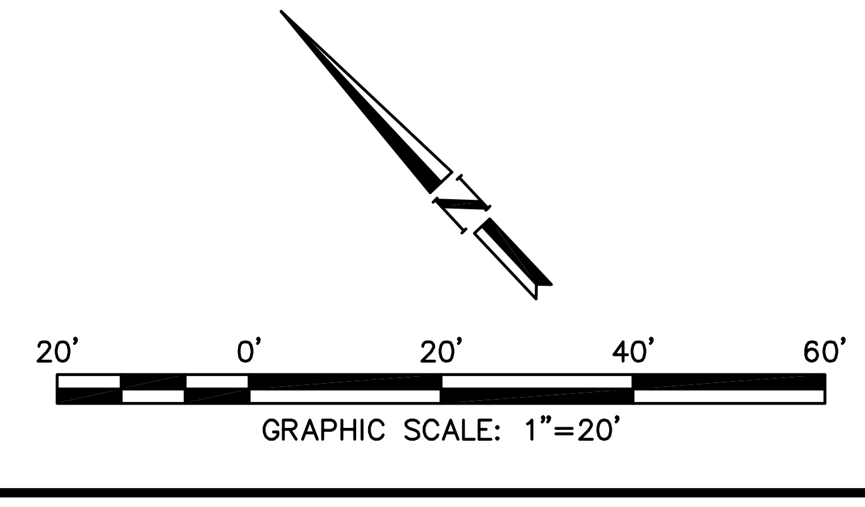

GRAPHIC SCALE: 1"=20'

NOT FOR CONSTRUCTION

160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

CHRISTOPHER MCKEE R.C.E. 74414
DATE

NO.:	REVISION:	DATE:

PROJECT:
EVERGREEN DEVELOPMENT
18650 CAMBERN STREET
LAKE ELSINORE, CA 92532

DRAWING NAME:
CONCEPT GRADING PLAN

ISSUE:	CONCEPT
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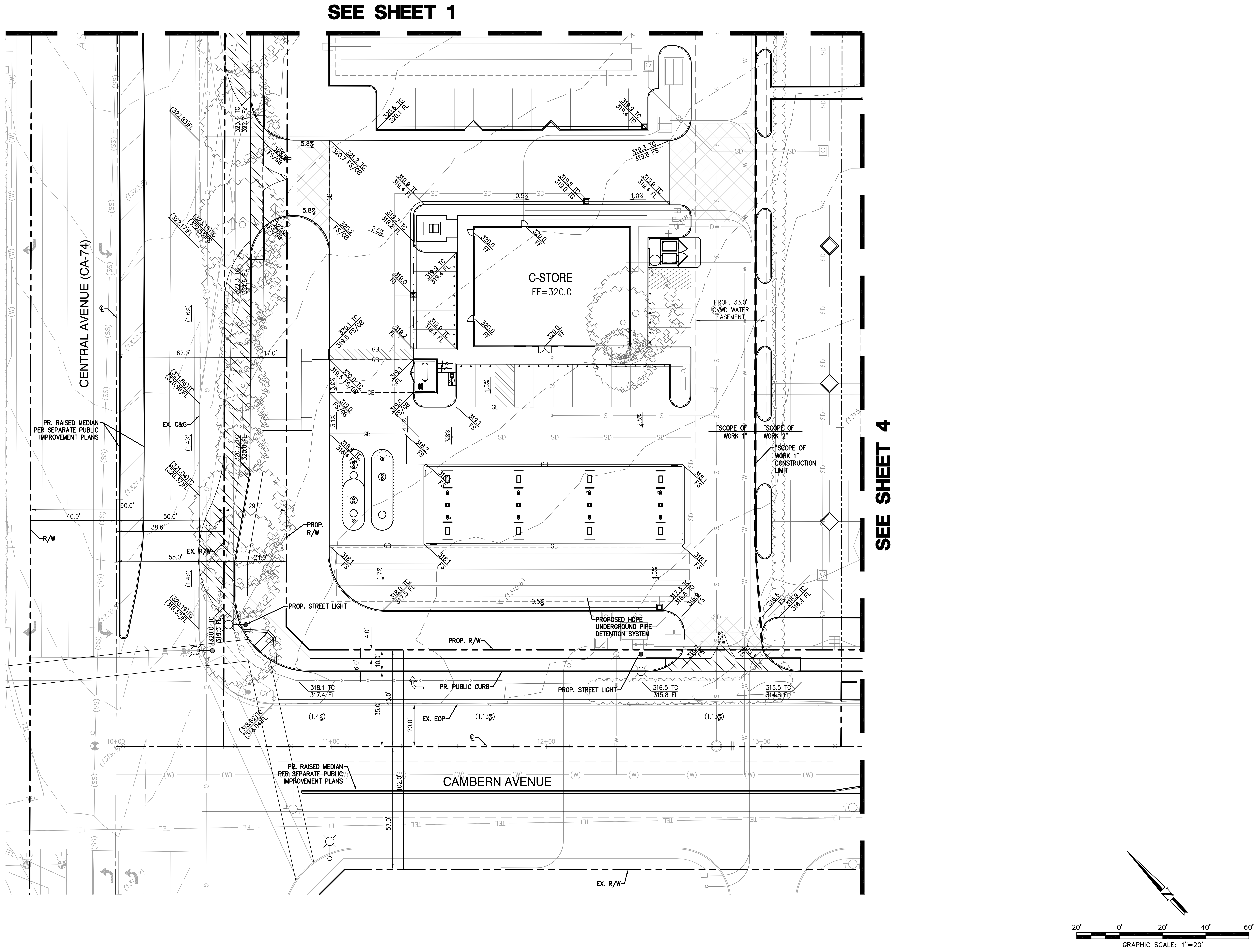

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

CHRISTOPHER MCKEE
R.C.E. 74414
DATE

NOT FOR CONSTRUCTION

NO.:	REVISION:	DATE:

PROJECT:
EVERGREEN DEVELOPMENT
18650 CAMBERN STREET
LAKE ELSINORE, CA 92532

DRAWING NAME:
CONCEPT GRADING PLAN

ISSUE:	CONCEPT
DATE:	8/2/2021
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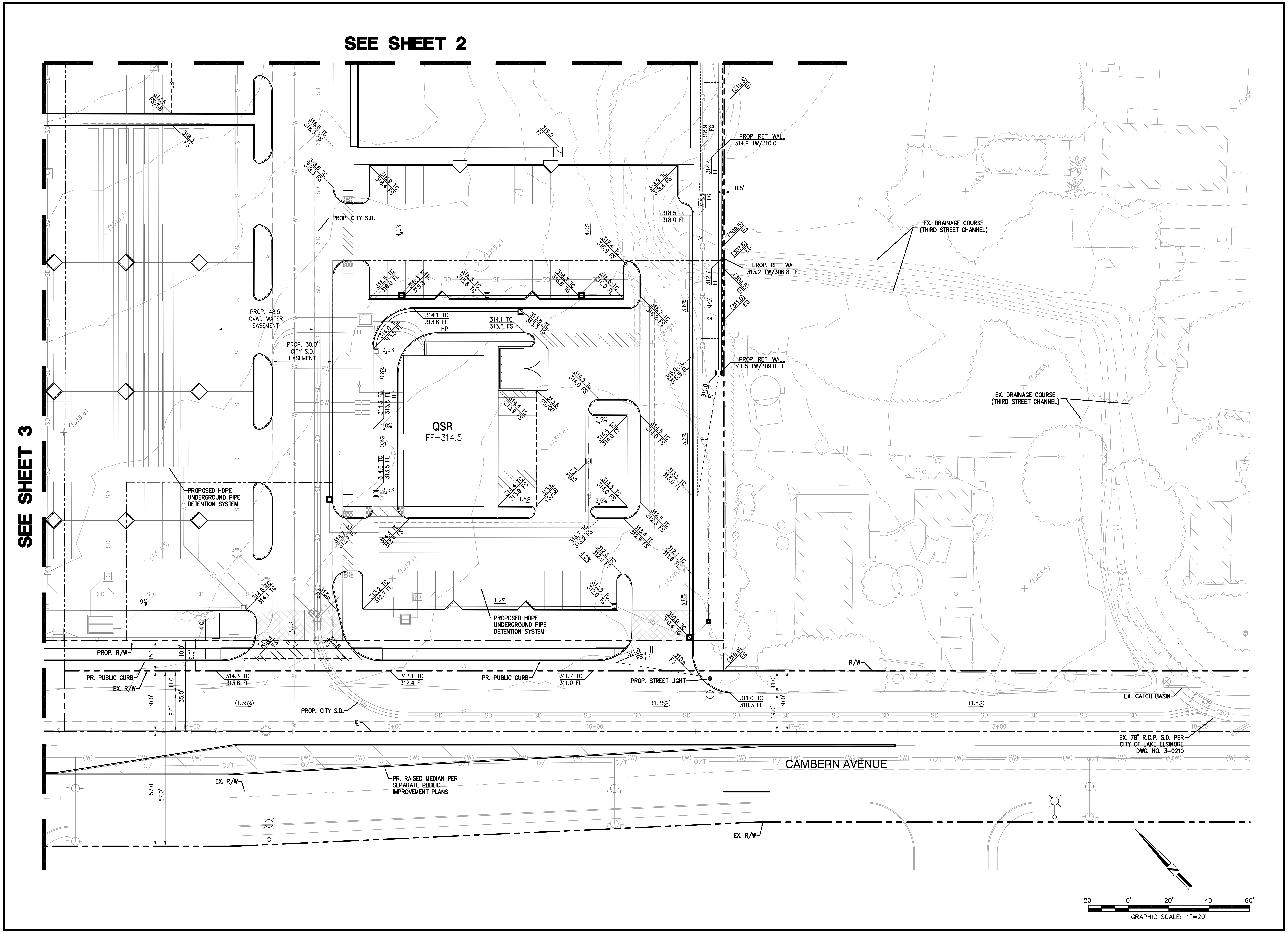

NOT FOR CONSTRUCTION

160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

CHRISTOPHER MCKEE
R.C.E. 74414
DATE

NO.	REVISION:	DATE:

PROJECT:
EVERGREEN DEVELOPMENT
18650 CAMBERN STREET
LAKE ELSINORE, CA 92532

DRAWING NAME:
CONCEPT GRADING PLAN

ISSUE:	CONCEPT
DATE:	8/2/2021
CHECKED: LI	DRAWN: CM
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OF 4	SHEETS
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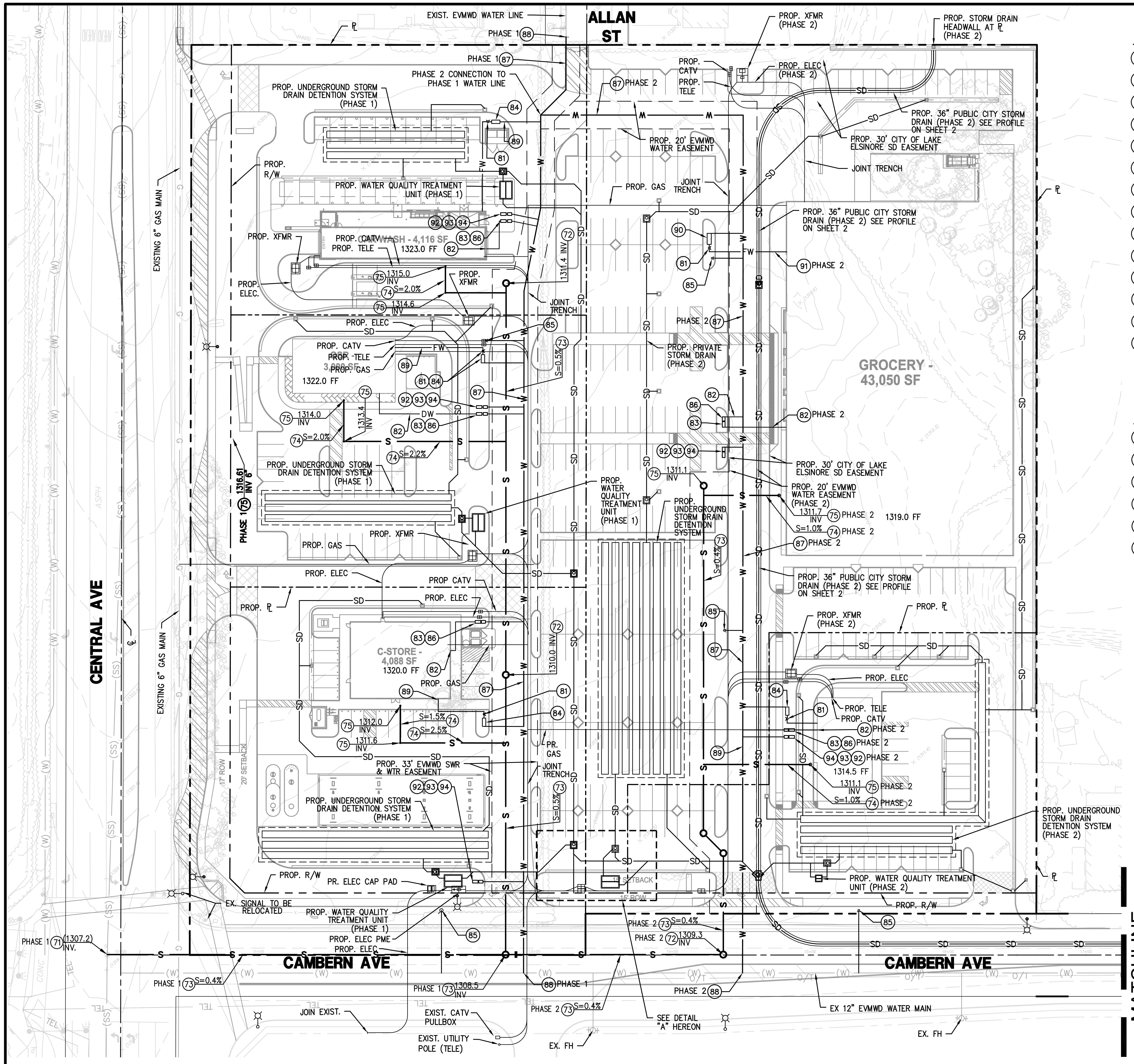
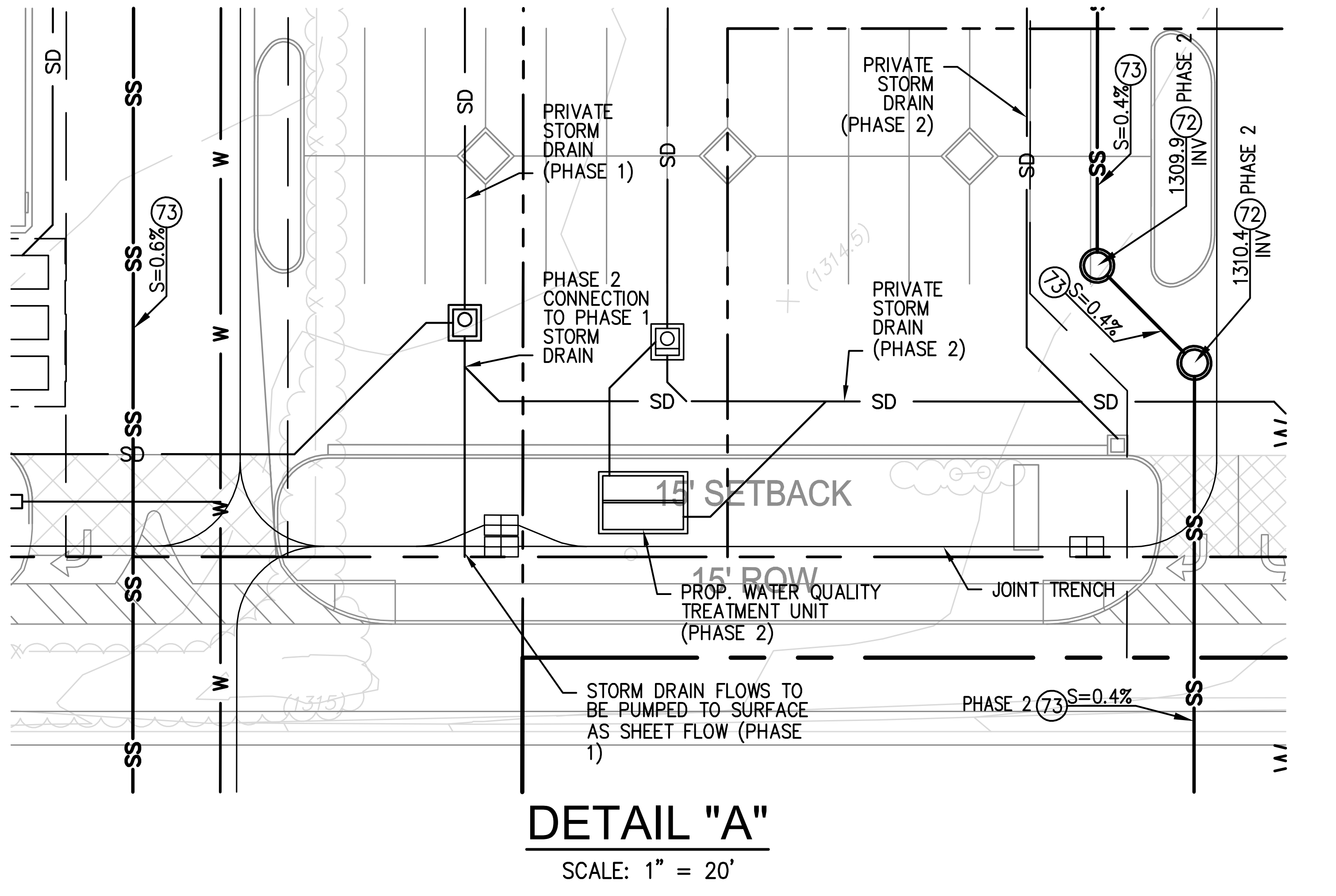
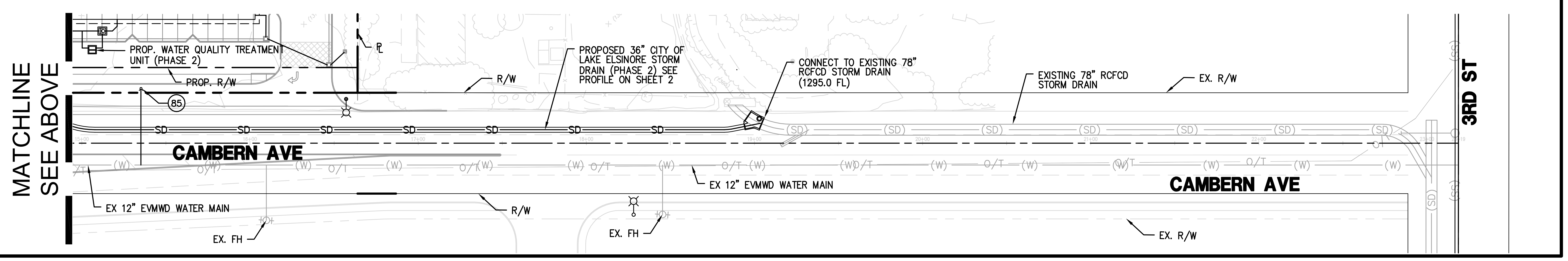




DETAIL "A"

SCALE: 1" = 20'



GRAPHIC SCALE: 1"=40'

DOMESTIC WATER CONSTRUCTION NOTES:

(81) INSTALL FIRE DEPARTMENT CONNECTION
(82) INSTALL 2" DOMESTIC WATER SERVICE
(83) INSTALL 2" DOMESTIC BACKFLOW PREVENTER
(84) INSTALL 4" BACKFLOW PREVENTER
(85) INSTALL PUBLIC FIRE HYDRANT PER EVMWD STANDARDS
(86) INSTALL 2" DOMESTIC WATER METER PER EVMWD STANDARDS
(87) INSTALL 8" PUBLIC WATER MAIN LINE PER EVMWD STANDARDS
(88) CONNECT TO EXISTING PUBLIC WATER MAIN LINE
(89) INSTALL 4" PRIVATE FIRE WATER LINE
(90) INSTALL 6" BACKFLOW PREVENTER
(91) INSTALL 6" PRIVATE FIRE WATER LINE
(92) INSTALL 1" IRRIGATION WATER METER PER EVMWD STANDARDS
(93) INSTALL 1" IRRIGATION BACKFLOW PER EVMWD STANDARDS
(94) INSTALL 1" IRRIGATION SERVICE PER EVMWD STANDARDS

SEWER CONSTRUCTION NOTES:

(71) CONNECT TO EXISTING EVMWD SEWER MANHOLE
(72) CONSTRUCT 48" SEWER MANHOLE
(73) INSTALL 8" SDR 35 PVC SEWER PIPE
(74) INSTALL 6" SDR 35 PVC PUBLIC SEWER LATERAL PER EVMWD STANDARDS
(75) INSTALL SEWER CLEAN OUT PER EVMWD STANDARDS
(76) INSTALL 6" SDR 35 PVC PRIVATE SEWER LATERAL PER EVMWD STANDARDS

CONCEPTUAL PLANS NOT FOR CONSTRUCTION

160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

NO.	REVISION:	DATE:

PROJECT:
RETAIL DEVELOPMENT
EAST CORNER OF CENTRAL AND
CAMBERN, LAKE ELSINORE

DRAWING NAME:
CONCEPTUAL UTILITY PLAN

ISSUE: CONCEPTUAL
DATE: 10/26/2021
CHECKED: CM DRAWN: JS
DRAWING FILE:
PROJECT NO.: 19-400
SHEET NUMBER:
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OF 2 SHEETS
SCALE: AS SHOWN

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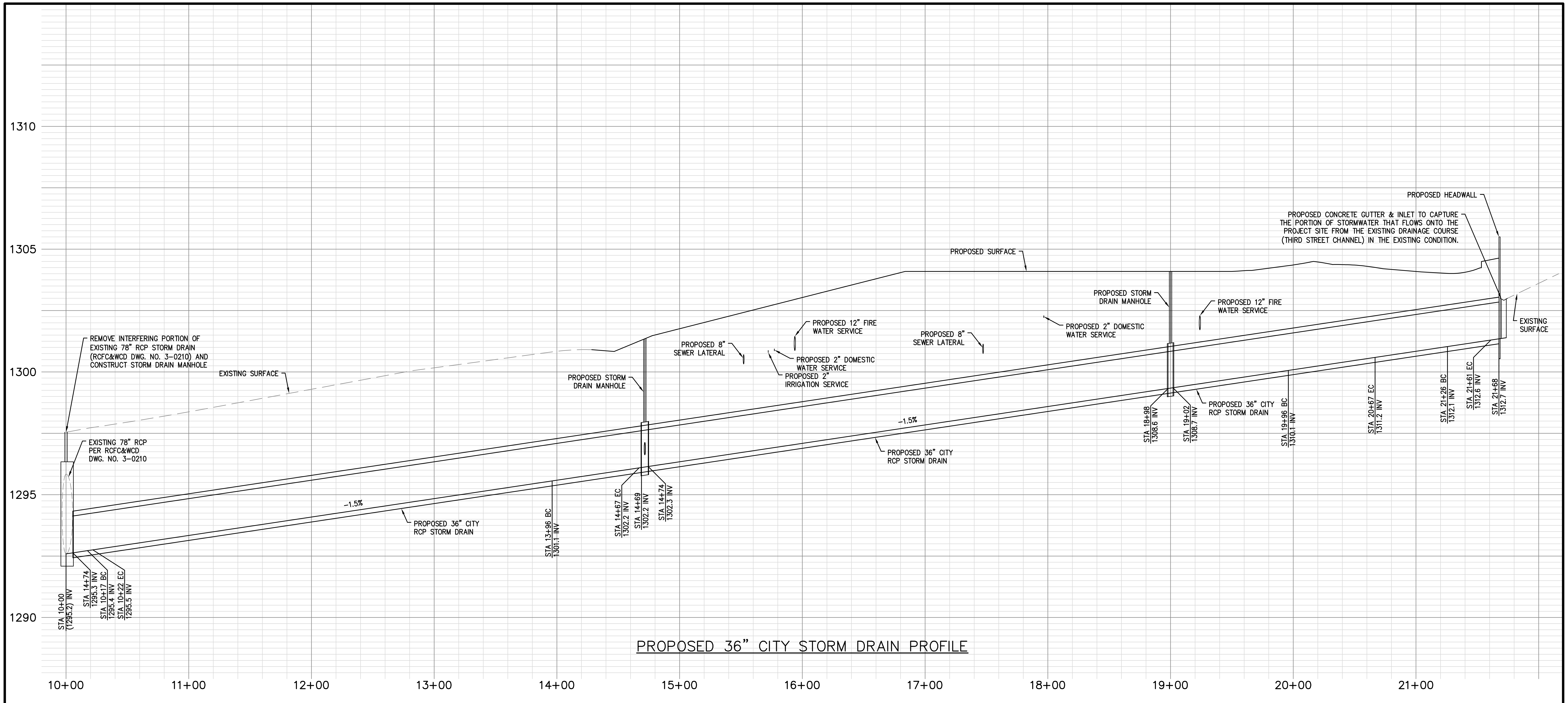

PROPOSED 36" CITY STORM DRAIN PROFILE

160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

CONCEPTUAL PLANS NOT FOR CONSTRUCTION

NO.:	REVISION:	DATE:

PROJECT:

RETAIL DEVELOPMENT
EAST CORNER OF CENTRAL AND CAMBERN, LAKE ELSINORE

DRAWING NAME:

CONCEPTUAL UTILITY PLAN

ISSUE: **CONCEPTUAL**
DATE: **10/26/2021**
CHECKED: **CM** DRAWN: **JS**
DRAWING FILE:
PROJECT NO.: **19-400**
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2
OF **2** SHEETS
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Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

GEOTECHNICAL • ENVIRONMENTAL • GEOLOGY • MATERIALS TESTING & INSPECTION • FORENSIC • LABORATORY

SALEM
engineering group, inc.

GEOTECHNICAL ENGINEERING INVESTIGATION WITH GEOLOGIC HAZARD STUDY

PROPOSED COMMERCIAL DEVELOPMENT
CENTRAL AVENUE AND CAMBERN AVENUE
LAKE ELSINORE, RIVERSIDE COUNTY, CALIFORNIA

SALEM PROJECT NO. 3-221-0167
APRIL 22, 2021

PREPARED FOR:

MR. JON PRYSTASZ
EVERGREEN DEVCO
2390 EAST CAMELBACK ROAD, SUITE 410
PHOENIX, ARIZONA 85016

PREPARED BY:

SALEM ENGINEERING GROUP, INC.
8711 MONROE COURT, SUITE A
RANCHO CUCAMONGA, CA 91730
P: (909) 980-6455
F: (909) 980-6435
www.salem.net

SALEM
engineering group, inc.

8711 Monroe Court, Suite A
Rancho Cucamonga, CA 91730
Phone (909) 980-6455
Fax (909) 980-6435

April 22, 2021

Project No. 3-221-0167

Mr. Jon Prystasz
Evergreen Devco
2390 East Camelback Road, Suite 410
Phoenix, AZ 85016

SUBJECT: **GEOTECHNICAL ENGINEERING INVESTIGATION**
WITH GEOLOGIC HAZARD STUDY
PROPOSED COMMERCIAL DEVELOPMENT
CENTRAL AVENUE AND CAMBERN AVENUE
LAKE ELSINORE, RIVERSIDE COUNTY, CALIFORNIA

Dear Mr. Prystasz:

At your request and authorization, SALEM Engineering Group, Inc. (SALEM) has prepared this Geotechnical Engineering Investigation with Geologic Hazard Study report for the Proposed Commercial Development to be located at the subject site.

The accompanying report presents our findings, conclusions, and recommendations regarding the geotechnical aspects of designing and constructing the project as presently proposed. In our opinion, the proposed project is feasible from a geotechnical viewpoint provided our recommendations are incorporated into the design and construction of the project.

We appreciate the opportunity to assist you with this project. Should you have questions regarding this report or need additional information, please contact the undersigned at (909) 980-6455.

Respectfully Submitted,

SALEM ENGINEERING GROUP, INC.

Ibrahim Foud Ibrahim, PE
Senior Managing Engineer
RCE 86724

Clarence Jiang, GE
Senior Geotechnical Engineer
RGE 2477

TABLE OF CONTENTS

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8711 Monroe Court, Suite A
Rancho Cucamonga, CA 91730
Phone (909) 980-6455
Fax (909) 980-6435

GEOTECHNICAL ENGINEERING INVESTIGATION
WITH GEOLOGIC HAZARD STUDY
PROPOSED COMMERCIAL DEVELOPMENT
CENTRAL AVENUE AND CAMBERN AVENUE
LAKE ELSINORE, RIVERSIDE COUNTY, CALIFORNIA

1. PURPOSE AND SCOPE

This report presents the results of our Geotechnical Engineering Investigation with Geologic Hazard Study for the proposed Commercial Development to be located at the east corner of Central Avenue and Cambern Avenue in the City of Lake Elsinore, County of Riverside, California (see Figure 1, Vicinity Map).

The purpose of our geotechnical engineering investigation was to observe and sample the subsurface conditions encountered at the site, and provide conclusions and recommendations relative to the geotechnical aspects of constructing the project as presently proposed.

The scope of this investigation included a field exploration, percolation testing, laboratory testing, engineering analysis and the preparation of this report. Our field exploration was performed on March 30 and 31, 2021 and included the drilling of twenty-four (24) small-diameter soil borings to a maximum depth of 41½ feet below existing grade at the site. Additionally, two (2) percolation tests were performed at depths of approximately 6 feet below existing grade for determination of the infiltration rate. The locations of the soil borings and percolation tests are depicted on Figure 2, Site Plan. A detailed discussion of our field investigation, exploratory boring logs and percolation test results are presented in Appendix A.

Laboratory tests were performed on selected soil samples obtained during the investigation to evaluate pertinent physical properties for engineering analyses. Appendix B presents the laboratory test results in tabular and graphic format. The recommendations presented herein are based on analysis of the data obtained during the investigation and our experience with similar soil and geologic conditions. If project details vary significantly from those described herein, SALEM should be contacted to determine the necessity for review and possible revision of this report. Earthwork and Pavement Specifications are presented in Appendix C. If text of the report conflict with the specifications in Appendix C, the recommendations in the text of the report have precedence.

2. PROJECT DESCRIPTION

Based on the Site Plan provided to us, we understand that the site will include construction of a commercial development in two potential phases on an approximately 8.3 acres of vacant land. Phase 1 (3.7 acres) will include a gas station, a 4,088 square-foot Convenience Store, a 3,000 square-foot QSR, and a 120-foot carwash tunnel. Phase 2 (4.6 acres) will include a 43,000 square-foot Grocery Building and a 3,000 square-foot QSR Building. On-site parking and landscaping are planned to be associated with the development.

Maximum wall load is expected to be on the order of 5 kips per linear foot. Maximum column load is expected to be on the order of 100 kips. Floor slab soil bearing pressure is expected to be on the order of 150 psf.

A site grading plan was not available at the time of preparation of this report. As the existing project area is essentially level, we anticipate that cuts and fills during the earthwork will be minimal to moderate and limited to providing level building pads and positive site drainage. In the event that changes occur in the nature or design of the project, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed and the conclusions of our report are modified.

3. GENERAL SITE INFORMATION

3.1 Site Location and Description

The site is near-square in shape and encompasses approximately 8.3 acres. The site is located on the east corner of Central Avenue and Cambern Avenue in the unincorporated Lake Elsinore area of the County of Riverside, California (see Vicinity Map, Figure 1). The northwest portion of the site is the proposed Phase 1 development and encompasses approximately 3.7 acres. The southeast portion of the site is the proposed Phase 2 development and encompasses approximately 4.6 acres.

The site is currently vacant with weeds and large trees. Dense large trees and weeds are present within the eastern portion of the site where a natural drainage course flows through that area. Scattered large eucalyptus trees are present within the western boundary and west-central portion of the site. A ground relief was observed on the eastern end of the site. The site is gently sloping to the south with elevations ranging from 1,333 to 1,313 feet above mean sea level based on Google Earth imagery.

3.2 Site History

Based on review of historical aerial photographs and topographic maps, between at least 1949 and 1974, the northwestern portion of the site appears to have been occupied by a rectangular-shaped pit that is deeper in the center and slopes out on each side. During this time period, the northern/northwestern portion of the site appears to be associated with the clay pit mining operations located adjoining to the northwest across Central Avenue. By 1978, the pit had been backfilled and the site appeared to have been graded.

Between at least 1985 and at least 1990, the northwestern portion of the site appears to have been occupied by a mobile home sales facility. By 1994, it appears that the sales facility had been removed and that the northwestern portion of the site appeared to have been graded. The site appears to remain mostly unchanged since 1994.

4. FIELD EXPLORATION

Our field exploration consisted of site surface reconnaissance and subsurface exploration. The exploratory test borings (B-1 through B-24) were drilled on March 30 and 31, 2021 in the areas shown on the Site Plan, Figure 2. The test borings were advanced with 4-inch diameter solid flight augers and 6.5-inch diameter hollow stem augers rotated by a truck-mounted CME 45C drill rig. Test borings B-23 and B-24 were advanced using a 4-inch diameter hand auger. The test borings were extended to a maximum depth of 41½ feet below existing grade. Drilling was limited due to auger refusal on dense soil/weathered bedrock formations.

The materials encountered in the test borings were visually classified in the field, and logs were recorded by a field engineer and stratification lines were approximated on the basis of observations made at the time of drilling. Visual classification of the materials encountered in the test borings were generally made in accordance with the Unified Soil Classification System (ASTM D2488). A soil classification chart and key to sampling is presented on the Unified Soil Classification Chart, in Appendix "A." The logs of the test borings are presented in Appendix "A." The Boring Logs include the soil type, color, moisture content, dry density, and the applicable Unified Soil Classification System symbol.

The location of the test borings were determined by measuring from features shown on the Site Plan, provided to us. Hence, accuracy can be implied only to the degree that this method warrants. The actual boundaries between different soil types may be gradual and soil conditions may vary. For a more detailed description of the materials encountered, the Boring Logs in Appendix "A" should be consulted.

Soil samples were obtained from the test borings at the depths shown on the logs of borings. The MCS samples were recovered and capped at both ends to preserve the samples at their natural moisture content; SPT samples were recovered and placed in a sealed bag to preserve their natural moisture content. The borings were backfilled with soil cuttings after completion of the drilling.

5. LABORATORY TESTING

Laboratory tests were performed on selected soil samples to evaluate their physical characteristics and engineering properties. The laboratory-testing program was formulated with emphasis on the evaluation of natural moisture, in-situ density, shear strength, consolidation potential, expansion index, maximum density and optimum moisture determination, and gradation of the materials encountered.

In addition, chemical tests were performed to evaluate the corrosivity of the soils to buried concrete and metal. Details of the laboratory test program and the results of laboratory test are summarized in Appendix "B." This information, along with the field observations, was used to prepare the final boring logs in Appendix "A."

6. GEOLOGIC SETTING

The subject site is located within the northern part of the Peninsular Ranges Geomorphic Province of California. The province varies in width from approximately 30 miles to 100 miles in width. In general, the province consists of rugged mountains underlain by Jurassic metavolcanic and metasedimentary rocks and Cretaceous igneous rocks of the Southern California batholith. The Peninsular Ranges Province is divided into three northwest-trending fault-bounded structural blocks – from west to east – the Santa Ana Mountains, Perris, and San Jacinto Mountains (Morton and Miller, 2006). The Santa Ana Mountains block (west of the subject site) extends from the coast to the Elsinore Fault zone. The western margin of the Perris structural block underlies the subject site.

Paleocene to Pliocene sedimentary rocks underlie the western portion of the Santa Ana Mountains structural block. The eastern portion, a highly faulted structural anticline, is cored by a basement assemblage of Mesozoic metasedimentary and Cretaceous batholithic and volcanic rocks. A thick section of primarily upper Cretaceous marine and Paleogene marine and nonmarine rocks overly this basement. The Perris structural block is a large mass of granitic rock generally bounded by the San Jacinto Fault, the Elsinore Fault, the Santa Ana River and a non-defined southeast boundary. The Perris Block has had a history of vertical land movements of several thousand feet due to shifts in the Elsinore and San Jacinto Faults.

6.1 Local Geologic Setting

The subject site lies near the southeast face of the Santa Ana Mountains in the Perris structural block. The site is in an area of relatively low relief between the Santa Jacinto Mountains to the northeast, the Santa Ana Mountains to the southwest. The Perris block is underlain by lithologically diverse prebatholithic metasedimentary rocks intruded by plutons of the Cretaceous Peninsular Ranges batholith. Supra-batholithic volcanic rocks are preserved in the western part of the block. Several erosional and depositional surfaces are developed on the Perris block and thin to relatively thick sections of nonmarine, mainly Quaternary sediments discontinuously cover the basement.

Surficial deposits in the vicinity of the subject site are indicated on regional geologic maps (Morton and Bovard, 2003) to be comprised predominately of Quaternary alluvium. Specifically, formational materials mapped at the subject site are young alluvial fan deposits (Qyf_a) and Silverado Formation (Tsi) on the Regional Geologic Map, Figure 3A). The alluvial fan deposits is composed of fluvial deposits along the valley floors and consists of unconsolidated sand, silt, and clay-bearing alluvium. The Silverado Formation is described as nonmarine and marine sandstone, siltstone, and conglomerate. Deposits encountered on the subject site during exploratory drilling are consistent with those mapped in the area. For approximate depths and more detailed descriptions, please refer to the enclosed logs of soil borings (Appendix A). The materials were visually classified in accordance with the Unified Soils Classification System.

7. GEOLOGIC HAZARDS

7.1 Faulting and Seismicity

Based on the proximity of several dominant active faults and seismogenic structures, as well as the historic seismic record, the area of the subject site is considered subject to relatively high seismicity. The seismic hazard most likely to impact the site is ground-shaking due to a large earthquake on one of the major active regional faults. Moderate to large earthquakes have affected the area of the subject site within historic time.

There are no known active fault traces in the project vicinity. The project area is not within an Alquist-Priolo Earthquake Fault (Special Studies) Zone and will not require a special site investigation by an Engineering Geologist. Soils on site are classified as Site Class D in accordance with Chapter 16 of the California Building Code. The proposed structures are determined to be in Seismic Design Category D.

To determine the distance of known active faults within 100 miles of the site, we used the United States Geological Survey (USGS) web-based application *2008 National Seismic Hazard Maps - Fault Parameters.* Site latitude is 33.6951° North; site longitude is 117.3315° West. The ten closest active faults are summarized below in Table 7.1.

TABLE 7.1
REGIONAL FAULT SUMMARY

Fault Name	Distance to Site (miles)	Maximum Earthquake Magnitude, M_w
Elsinore; W+GI	2.0	7.3
Elsinore; W+GI+T+J+CM	2.2	7.9
Elsinore; T+J+CM	3.3	7.6
Chino, alt 2	16.2	6.8
Elsinore; W	17.6	7.0
San Jacinto; A+CC+B+SM	18.6	7.6
Chino, alt 1	18.8	6.7
San Jacinto; SBV+SJV+A+CC+B+SM	19.9	7.9
San Jacinto; SBV+SJV	20.0	7.4
San Joaquin Hills	20.9	7.1

The faults tabulated above and numerous other faults in the region are sources of potential ground motion. However, earthquakes that might occur on other faults throughout California are also potential generators of significant ground motion and could subject the site to intense ground shaking.

7.2 Surface Fault Rupture

The site is not within a currently established State of California Earthquake Fault Zone for surface fault rupture hazards (Figure 4, Fault Map). No active faults with the potential for surface fault rupture are known to pass directly beneath the site. Therefore, the potential for surface rupture due to faulting occurring beneath the site during the design life of the proposed development is considered low. Site reconnaissance on March 30, 2021 did not reveal evidence of active faulting at the subject site.

7.3 Ground Shaking

Seismic coefficients and spectral response acceleration values were developed based on the 2019 California Building Code (CBC). The CBC methodology for determining design ground motion values is based on the Office of Statewide Health Planning and Development (OSHPD) Seismic Design Maps, which incorporate both probabilistic and deterministic seismic ground motion.

Based on the 2019 CBC, a Site Class D represents the on-site soil conditions with standard penetration resistance, N-values, averaging greater than 15 blow per foot but less than 50 blows per foot in the upper 100 feet below site grade. A table providing the recommended design acceleration parameters for the project site, based on a Site Class D designation, is included in Section 9.2.1 of this report.

Based on the Office of Statewide Health Planning and Development (OSHPD) Seismic Design Maps, the estimated design peak ground acceleration adjusted for site class effects (PGA_M) was determined to be 0.952g (based on both probabilistic and deterministic seismic ground motion).

7.4 Liquefaction

Soil liquefaction is a state of soil particles suspension caused by a complete loss of strength when the effective stress drops to zero. Liquefaction normally occurs under saturated conditions in soils such as sand in which the strength is purely frictional. Primary factors that trigger liquefaction are: moderate to strong ground shaking (seismic source), relatively clean, loose granular soils (primarily poorly graded sands and silty sands), and saturated soil conditions (shallow groundwater). Due to the increasing overburden pressure with depth, liquefaction of granular soils is generally limited to the upper 50 feet of a soil profile. However, liquefaction has occurred in soils other than clean sand.

The soils encountered within the depth of 41½ feet on the project site consisted predominately of medium dense to very dense silty sand with various amounts of clay and gravel; stiff to hard sandy silt with various amounts of clay, and hard weathered siltstone/claystone.

Groundwater was encountered at a depth of approximately 29 feet below ground surface during this investigation. The historically highest groundwater is estimated to be at a depth of 20 feet below ground surface based on the County of Riverside Geologic Hazards Map (2004) and regional groundwater data. The Riverside County Office of Information Technology GIS website shows the subject site to be in a very high liquefaction potential area (Figure 5, Liquefaction Potential Map).

Low to very low cohesion strength is commonly associated with the sandy soil profile at the site. A seismic hazard, which could cause damage to the proposed development during seismic shaking, is the post-liquefaction settlement of liquefied sands. The site was evaluated for liquefaction potential.

The potential for soil liquefaction during a seismic event was evaluated using LiqIT computer program (version 4.7.5) developed by GeoLogismiki of Greece. For the analysis, a maximum earthquake magnitude of 7.9 M_w, a peak horizontal ground surface acceleration of 0.95g (PGA_M) and a groundwater depth of 20 feet were considered appropriate for the liquefaction analysis. The analysis indicated that the on-site soils had a moderate potential for liquefaction and that the total liquefaction-induced settlement was calculated to be 1.42 inches. Differential settlement is estimated to be 0.71 inches over a horizontal distance of 40 feet. The liquefaction analysis is included in Appendix A.

7.5 Lateral Spreading

Lateral spreading is a phenomenon in which soils move laterally during seismic shaking and is often associated with liquefaction. The amount of movement depends on the soil strength, duration and intensity of seismic shaking, topography, and free face geometry. Due to the relatively flat site/ slightly sloping topography, we judge the likelihood of lateral spreading to be low.

7.6 Subsidence

The Riverside County Office of Information Technology GIS website shows the subject site to be in a susceptible subsidence potential area (Figure 7, Subsidence Potential Map). Based on the existence of medium dense to very dense silty sand with various amounts of clay and gravel, stiff to hard sandy silt with various amounts of clay, and hard weathered siltstone/claystone, subsidence potential is considered minimal.

7.7 Collapsible/Expansive or Hydroconsolidatable Soils

Test data in this geotechnical report show that soil samples consolidated from approximately 4 to 12 percent after a maximum 12.8 ksf load. Hydroconsolidation (collapse upon wetting) at a load of 1.6 ksf was approximately 2.5 to 3 percent for two of the samples at a load of 1.6 ksf, one sample expanded approximately 0.4 percent. The potential for collapse should be considered moderate. Soil samples collected from surface to the proposed foundation depths are considered to have a very low to low expansion potential, and the sample tested returned and Expansion Index value of 15. The proposed site preparation methods recommended on our geotechnical report should address these geotechnical issues.

7.8 Flood and Dam Inundation

The County of Riverside GIS website shows the subject site is partially located in a flood zone (Figure 6, Flood Zone Map). The Flood Zones Map shows the subject site to be in a 100-year flood zone as determined by approximate methods. The subject site is not located in areas of Riverside County Integrated Project map S-10, "Dam Failure Inundation Zones".

7.9 Landslides/Slope Instability/Debris Flow

The subject site is on a gently (<5%) sloping grade, over 3/4 mile from the nearest significant topographic change. As such, landslide/slope instability/rock fall issues pose a very low risk. Due to the site's distance from significant topography, topography-related debris flows are a low risk.

7.10 Wind and Water Erosion

Based on SALEM's soil boring logs for the subject site, surface soils consist predominantly of medium dense to very dense silty sand with various amounts of clay and gravel, stiff to hard sandy silt with various amounts of clay, and hard weathered siltstone/claystone. Soils of this consistency have been shown to possess good resistance to wind and water erosion. The site is essentially flat/slightly sloping, minimizing the potential for water erosion. The site will be completely covered by buildings, pavement or landscaping after development, minimizing long-term wind erosion potential.

7.11 Tsunamis and Seiches

The site is not located within a coastal area. Therefore, tsunamis (seismic sea waves) are not considered a significant hazard at the site. Seiches are large waves generated in enclosed bodies of water in response to ground shaking. No major water-retaining structures are located immediately up gradient from the project site. Flooding from a seismically-induced seiche is considered unlikely.

8. SOIL AND GROUNDWATER CONDITIONS

8.1 Subsurface Conditions

The subsurface conditions encountered appear typical of those found in the geologic region of the site. In general, the soils within the depth of exploration consisted of alluvium deposits of medium dense to very dense silty sand with various amounts of clay and gravel, stiff to hard sandy silt with various amounts of clay, and hard weathered siltstone/claystone.

No significant or obvious fill material was encountered in our borings. “Potential Fill” is noted on boring B-10 and B-13 where the former clay pit was located.

<u>Fill materials are anticipated to be present onsite between our boring locations since the northwest portion of the site was formerly excavated for use as a clay pit and regraded to its current condition</u>.

Undocumented fill materials are not suitable to support any future structures and should be replaced with Engineered Fill. The extent and consistency of the fills should be verified during site construction. Prior to fill placement, Salem Engineering Group, Inc. should inspect the bottom of the excavation to verify the fill condition.

The soils were classified in the field during the drilling and sampling operations. The stratification lines were approximated by the field engineer on the basis of observations made at the time of drilling. The actual boundaries between different soil types may be gradual and soil conditions may vary. For a more detailed description of the materials encountered, the Boring Logs in Appendix "A" should be consulted.

The Boring Logs include the soil type, color, moisture content, dry density, and the applicable Unified Soil Classification System symbol. The locations of the test borings were determined by measuring from feature shown on the Site Plan, provided to us. Hence, accuracy can be implied only to the degree that this method warrants.

8.2 Groundwater

The test boring locations were checked for the presence of groundwater during and after the drilling operations. Free groundwater was encountered at a depth of approximately 29 feet below ground surface during this time of investigation. The historically highest groundwater is estimated to be at a depth of approximately 20 feet below ground surface according to the County of Riverside Geologic Hazards Map (2004) and regional groundwater well data.

It should be recognized that water table elevations may fluctuate with time, being dependent upon seasonal precipitation, irrigation, land use, localized pumping, and climatic conditions as well as other factors. Therefore, water level observations at the time of the field investigation may vary from those encountered during the construction phase of the project. The evaluation of such factors is beyond the scope of this report.

8.3 Soil Corrosion Screening

Excessive sulfate in either the soil or native water may result in an adverse reaction between the cement in concrete and the soil. The 2014 Edition of ACI 318 (ACI 318) has established criteria for evaluation of sulfate and chloride levels and how they relate to cement reactivity with soil and/or water.

A soil sample was obtained from the project site and was tested for the evaluation of the potential for concrete deterioration or steel corrosion due to attack by soil-borne soluble salts and soluble chloride.

The water-soluble sulfate concentration in the saturation extract from the soil sample was detected to be 230 mg/kg. ACI 318 Tables 19.3.1.1 and 19.3.2.1 outline exposure categories, classes, and concrete requirements by exposure class. ACI 318 requirements for site concrete based upon soluble sulfate are summarized in Table 8.3 on the next page.

TABLE 8.3
WATER SOLUBLE SULFATE EXPOSURE REQUIREMENTS

Water Soluble Sulfate (SO_4) in Soil, Percentage by Weight	Exposure Severity	Exposure Class	Maximum w/cm Ratio	Minimum Concrete Compressive Strength	Cementations Materials Type
0.0230	Not Severe	S0	N/A	2,500 psi	II

The water-soluble chloride concentration detected in saturation extract from the soil samples was 195 mg/kg. This level of chloride concentration is considered to be mildly corrosive.

It is recommended that a qualified corrosion engineer be consulted regarding protection of buried steel or ductile iron piping and conduit or, at a minimum, applicable manufacturer's recommendations for corrosion protection of buried metal pipe be closely followed.

8.4 Percolation Testing

Two (2) percolation tests (P-1 and P-2) were performed within assumed infiltration areas and were conducted in accordance with the guidelines established by the County of Riverside. The approximate locations of the percolation tests are shown on the attached Site Plan, Figure 2.

Two boreholes were advanced to the depths shown on the percolation test worksheets. The holes were pre-saturated before percolation testing commenced. Percolation rates were measured by filling the test holes with clean water and measuring the water drops at a certain time interval.

The percolation rate data are presented in tabular format at the end of this Report. The difference in the percolation rates are reflected by the varied type of soil materials at the bottom of the test holes. The test results are shown on the table below.

PERCOLATION TEST RESULTS

Test No.	Depth (feet)	Measured Percolation Rate (min/inch)	Infiltration Rate* (inch/hour)	Soil Type**
P-1	6¼	35.7	**0.16**	Silty SAND (SM)
P-2	6	83.3	**0.07**	Silty SAND (SM)

*** Tested infiltration Rate = $(\Delta H\ 60\ r) / (\Delta t(r + 2H_{avg}))$**
**** At bottom of drilled holes**

Based on the soil condition and percolation test results, the site is considered to be technically **infeasible** to attain an infiltration rate necessary to achieve reliable performance of infiltration or bioretention BMPs in retaining the stormwater quality design volume (SWQDv) on site.

The soil infiltration or percolation rates are based on tests conducted with clear water. The infiltration/percolation rates may vary with time as a result of soil clogging from water impurities. The infiltration/percolation rates will deteriorate over time due to the soil conditions and an appropriate factor of safety (FS) may be applied. The owner or civil engineer may elect to use a lower FS for the design; however, more frequent maintenance will be expected. The soils may also become less permeable to impermeable if the soil is compacted. Thus, periodic maintenance consisting of clearing the bottom of the drainage system of clogged soils should be expected.

The infiltration/percolation rate may become slower if the surrounding soil is wet or saturated due to prolonged rainfalls. Additional percolation tests may be conducted at bottom of the drainage system during construction to verify the infiltration/percolation rate. Groundwater, if closer to the bottom of the drainage system, will also reduce the infiltration/percolation rate.

The scope of our services did not include a groundwater study and was limited to the performance of percolation testing and soil profile description, and the submitted data only. Our services did not include those associated with septic system design. Neither did services include an Environmental Site Assessment for the presence or absence of hazardous and/or toxic materials in the soil, groundwater, or atmosphere; or the presence of wetlands.

Any statements, or absence of statements, in this report or on any boring logs regarding odors, unusual or suspicious items, or conditions observed, are strictly for descriptive purposes and are not intended to convey engineering judgment regarding potential hazardous and/or toxic assessment. The geotechnical engineering information presented herein is based upon professional interpretation utilizing standard engineering practices. The work conducted through the course of this investigation, including the preparation of this report, has been performed in accordance with the generally accepted standards of geotechnical engineering practice, which existed in the geographic area at the time the report was written. No other warranty, express or implied, is made.

Please be advised that when performing percolation testing services in relatively small diameter borings, that the testing may not fully model the actual full scale long term performance of a given site. This is particularly true where percolation test data is to be used in the design of large infiltration system such as may be proposed for the site.

The measured percolation rate includes dispersion of the water at the sidewalls of the boring as well as into the underlying soils. Subsurface conditions, including percolation rates, can change over time as fine-grained soils migrate. It is not warranted that such information and interpretation cannot be superseded by future geotechnical engineering developments. We emphasize that this report is valid for the project outlined above and should not be used for any other sites.

9. CONCLUSIONS AND RECOMMENDATIONS

9.1 General

9.1.1 Based upon the data collected during this investigation, and from a geotechnical engineering standpoint, it is our opinion that the site is suitable for the proposed construction of improvements at the site as planned, provided the recommendations contained in this report are incorporated into the project design and construction. Conclusions and recommendations provided in this report are based on our review of available literature, analysis of data obtained from our field exploration and laboratory testing program, and our understanding of the proposed development at this time.

9.1.2 The primary geotechnical constraints identified in our investigation is the presence of potential fill soils, and potentially compressible (collapsible) soils at the site. Recommendations to mitigate the effects of these soils are provided in this report.

9.1.3 No significant or obvious fill material was encountered in our borings. <u>Fill materials are anticipated to be present onsite between our boring locations since the northwest portion of the site was formerly excavated for use as a clay pit and regraded to its current condition</u>. <u>Undocumented fill materials are not suitable to support any future structures and should be excavated and recompacted in accordance with section 9.5 of this report.</u> The extent and consistency of the fills should be verified during site construction. Prior to fill placement, Salem Engineering Group, Inc. should inspect the bottom of the excavation to verify the fill condition.

9.1.4 A geophysical survey has been recently performed to locate the former clay pit. However, the geophysical report is not available at the time of preparing this report. It's recommended the geophysical report be consulted to determine the depth and extent of the former clay pit. In addition, the extent and fill consistency of the clay pit should also be verified during site grading/construction.

9.1.5 Site demolition activities shall include removal of all surface obstructions not intended to be incorporated into final site design. In addition, underground buried structures and/or utility lines encountered during demolition and construction should be properly removed and the resulting excavations backfilled with Engineered Fill. It is suspected that possible demolition activities of the existing structures may disturb the upper soils. After demolition activities, it is recommended that disturbed soils be removed and/or recompacted.

9.1.6 Surface vegetation consisting of grasses and other similar vegetation should be removed by stripping to a sufficient depth to remove organic-rich topsoil. The upper 6 to 10 inches of the soils containing, vegetation, roots and other objectionable organic matter encountered at the time of grading should be stripped and removed from the surface. Deeper stripping may be required in localized areas. The stripped vegetation, will not be suitable for use as Engineered Fill or within 5 feet of building pads or within pavement areas. However, stripped topsoil may be stockpiled and reused in landscape or non-structural areas or exported from the site.

9.1.7 <u>Tree root systems in proposed improvement areas should be removed to a minimum depth of 3 feet and to such an extent which would permit removal of all roots greater than ½ inch in diameter.</u> Tree roots removed in parking areas may be limited to the upper 2 feet of the ground surface. Backfill of tree root excavations is not permitted until all exposed surfaces have been inspected and the Soils Engineer is present for the proper control of backfill placement and compaction. Burning in areas which are to receive fill materials shall not be permitted.

9.1.8 The near-surface onsite soils are moisture-sensitive and are moderately compressible (collapsible soil) under saturated conditions. Excessive post-construction settlement may be experienced by proposed structures if the foundation soils become near saturated. The collapsible or weak soils should be removed and re-compacted according to the recommendations in the Grading section of this report (Section 9.5).

9.1.9 In order to reduce differential settlement due to cut/fill transition zones, additional cut is required for cut/fill transition zones greater than 5 feet. All structures that are in cut/fill transition zones greater than 5 feet should be cut one-half the thickness of the fill placed on the "fill" portion to a maximum depth of 5 feet

9.1.10 Based on the subsurface conditions at the site and the anticipated structural loading, we anticipate that the proposed buildings may be supported using conventional shallow foundations provided that the recommendations presented herein are incorporated in the design and construction of the project.

9.1.11 Provided the site is graded in accordance with the recommendations of this report and foundations constructed as described herein, we estimate that total settlement due to static and seismic loads utilizing conventional shallow foundations for the proposed building will be within 1 inch and corresponding differential settlement will be less than ½ inch over 20 feet.

9.1.12 All references to relative compaction and optimum moisture content in this report are based on ASTM D 1557 (latest edition).

9.1.13 SALEM shall review the project grading and foundation plans prior to final design submittal to assess whether our recommendations have been properly implemented and evaluate if additional analysis and/or recommendations are required. If SALEM is not provided plans and specifications for review, we cannot assume any responsibility for the future performance of the project.

9.1.14 SALEM shall be present at the site during site demolition and preparation to observe site clearing/demolition, preparation of exposed surfaces after clearing, and placement, treatment and compaction of fill material.

9.1.15 SALEM's observations should be supplemented with periodic compaction tests to establish substantial conformance with these recommendations. Moisture content of footings and slab subgrade should be tested immediately prior to concrete placement. SALEM should observe foundation excavations prior to placement of reinforcing steel or concrete to assess whether the actual bearing conditions are compatible with the conditions anticipated during the preparation of this report.

9.2 Seismic Design Criteria

9.2.1 For seismic design of the structures, and in accordance with the seismic provisions of the 2016 CBC, our recommended parameters are shown below. These parameters are based on Probabilistic Ground Motion of 2% Probability of Exceedance in 50 years. The Site Class was determined based on the results of our field exploration.

TABLE 9.2.1
SEISMIC DESIGN PARAMETERS

Seismic Item	Symbol	Value	ASCE 7-16 or 2019 CBC Reference
Site Coordinates (Datum = NAD 83)		33.6951 Lat -117.3315 Lon	
Site Class	--	D	ASCE 7 Table 20.3-1
Soil Profile Name	--	Stiff Soil	ASCE 7 Table 20.3-1
Risk Category	--	II	Table 1604.5
Site Coefficient for PGA	F_{PGA}	1.1	ASCE 7 Table 11.8-1
Peak Ground Acceleration (adjusted for Site Class effects)	PGA_M	0.952 g	ASCE 7 Equation 11.8-1
Seismic Design Category	SDC	D	Table 1613.2.5
Mapped Spectral Acceleration (Short period - 0.2 sec)	S_S	2.033 g	Figure 1613.2.1(1-8)
Mapped Spectral Acceleration (1.0 sec. period)	S_1	0.729 g	Figure 1613.2.1(1-8)
Site Class Modified Site Coefficient	F_a	1.0	Table 1613.2.3(1)
Site Class Modified Site Coefficient	F_v	1.7*	Table 1613.2.3(2)
MCE Spectral Response Acceleration (Short period - 0.2 sec) $S_{MS} = F_a S_S$	S_{MS}	2.033 g	Equation 16-36
MCE Spectral Response Acceleration (1.0 sec. period) $S_{M1} = F_v S_1$	S_{M1}	1.239 g*	Equation 16-37
Design Spectral Response Acceleration $S_{DS}=⅔S_{MS}$ (short period - 0.2 sec)	S_{DS}	1.355 g	Equation 16-38
Design Spectral Response Acceleration $S_{D1}=⅔S_{M1}$ (1.0 sec. period)	S_{D1}	0.826 g*	Equation 16-39
Short Term Transition Period (S_{D1}/S_{DS}), Seconds	T_S	0.610	ASCE 7-16, Section 11.4.6
Long Period Transition Period (seconds)	T_L	8	ASCE 7-16, Figure 22-14

*** Determined per ASCE Table 11.4-2 for use in calculating T_S only.**

9.2.2 Site Specific Ground Motion Analysis was not included in the scope of this investigation. Per ASCE 11.4.8, structures on Site Class D with S_1 greater than or equal to 0.2 may require Site Specific Ground Motion Analysis. However, a site specific motion analysis may not be required based on Exceptions listed in ASCE 11.4.8. The Structural Engineer should verify whether

Exception No. 2 of ASCE 7-16, Section 11.4.8, is valid for the site. In the event that a site specific ground motion analysis is required, SALEM should be contacted for these services.

9.2.3 Conformance to the criteria in the above table for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a large earthquake occurs. The primary goal of seismic design is to protect life, not to avoid all damage, since such design may be economically prohibitive.

9.3 Soil and Excavation Characteristics

9.3.1 Based on the soil conditions encountered in our soil borings, the onsite soils can be excavated with moderate to laborious effort using conventional heavy-duty earthmoving equipment.

9.3.2 It is the responsibility of the contractor to ensure that all excavations and trenches are properly shored and maintained in accordance with applicable Occupational Safety and Health Administration (OSHA) rules and regulations to maintain safety and maintain the stability of adjacent existing improvements.

9.3.3 The upper soils are moisture-sensitive and moderately collapsible under saturated conditions. These soils, in their present condition, possess moderate risk to construction in terms of possible post-construction movement of the foundations and floor systems if no mitigation measures are employed. Accordingly, measures are considered necessary to reduce anticipated collapse potential. As recommended in Section 9.5, the collapsible soils should be overexcavated and recompacted. Mitigation measures will not eliminate post-construction soil movement, but will reduce the soil movement. Success of the mitigation measures will depend on the thoroughness of the contractor in dealing with the soil conditions.

9.3.4 The near surface soils identified as part of our investigation are, generally, slightly moist to very moist due to the absorption characteristics of the soil. Earthwork operations may encounter very moist unstable soils which may require removal to a stable bottom. Exposed native soils exposed as part of site grading operations shall not be allowed to dry out and should be kept continuously moist prior to placement of subsequent fill.

9.4 Materials for Fill

9.4.1 Excavated soils generated from cut operations at the site are suitable for use as general Engineered Fill in structural areas provided they do exhibit an Expansion Index greater than 20 (EI>20) and do not contain deleterious matter, organic material, or rock material larger than 3 inches in maximum dimension.

9.4.2 <u>Any soil with an Expansion Index greater than 20 and below 50 (20<EI<50) should not be placed within the upper 12 inches within the building pad or exterior flatwork areas.</u>

9.4.3 The preferred materials specified for Engineered Fill are suitable for most applications with the exception of exposure to erosion. Project site winterization and protection of exposed soils during the construction phase should be the sole responsibility of the Contractor, since they have complete control of the project site.

9.4.4 Import soil intended for use as Non-Expansive Engineered Fill soil shall be well-graded, slightly cohesive silty fine sand or sandy silt, with relatively impervious characteristics when compacted. A clean sand or very sandy soil is not acceptable for this purpose. This material should be approved by the Engineer prior to use and should typically possess the soil characteristics summarized below in Table 9.4.4.

TABLE 9.4.4
IMPORT FILL REQUIREMENTS

Minimum Percent Passing No. 200 Sieve	20
Maximum Percent Passing No. 200 Sieve	50
Minimum Percent Passing No. 4 Sieve	80
Maximum Particle Size	3"
Maximum Plasticity Index	12
Maximum CBC Expansion Index	20

9.4.5 Environmental characteristics and corrosion potential of import soil materials should also be considered.

9.4.6 Proposed import materials should be sampled, tested, and approved by SALEM prior to its transportation to the site.

9.5 Grading

9.5.1 A representative of our firm should be present during all site clearing and grading operations to test and observe earthwork construction. This testing and observation is an integral part of our service as acceptance of earthwork construction is dependent upon compaction of the material and the stability of the material. The Geotechnical Engineer may reject any material that does not meet compaction and stability requirements. Further recommendations of this report are predicated upon the assumption that earthwork construction will conform to recommendations set forth in this section as well as other portions of this report.

9.5.2 A preconstruction conference should be held at the site prior to the beginning of grading operations with the owner, contractor, civil engineer and geotechnical engineer in attendance.

9.5.3 Site preparation should begin with removal of existing surface/subsurface structures, underground utilities (as required), any existing uncertified fill, and debris. Excavations or depressions resulting from site clearing operations, or other existing excavations or depressions, should be restored with Engineered Fill in accordance with the recommendations of this report.

9.5.4 Surface vegetation consisting of grasses and other similar vegetation should be removed by stripping to a sufficient depth to remove organic-rich topsoil. The upper 6 to 10 inches of the soils containing, vegetation, roots and other objectionable organic matter encountered at the time of grading should be stripped and removed from the surface. Deeper stripping may be required in localized areas. The stripped vegetation, will not be suitable for use as Engineered Fill or within 5 feet of building pads or within pavement areas. However, stripped topsoil may be stockpiled and reused in landscape or non-structural areas or exported from the site.

9.5.5 Tree root systems in proposed improvement areas should be removed to a minimum depth of 3 feet and to such an extent which would permit removal of all roots greater than ½ inch in diameter. Tree roots removed in parking areas may be limited to the upper 1½ feet of the ground surface. Backfill of tree root excavations is not permitted until all exposed surfaces have been inspected and the Soils Engineer is present for the proper control of backfill placement and compaction. Burning in areas which are to receive fill materials shall not be permitted.

9.5.6 Fill materials are anticipated to be present onsite between our boring locations since the northwest portion of the site was formerly excavated for use as a clay pit and regraded to its current condition. Any undocumented and uncompacted fill materials encountered during grading should be removed and replaced with Engineered Fill. The actual depth of the overexcavation and recompaction should be determined by our field representative during construction.

9.5.7 Structural building pad areas should be considered as areas extending a minimum of 5 feet horizontally beyond the outside dimensions of building, including footings and non-cantilevered overhangs carrying structural loads.

9.5.8 To minimize post-construction soil movement and provide uniform support for the proposed buildings, overexcavation and recompaction within the proposed building areas should be performed to a minimum depth of **three (3) feet** below existing grade or **two (2) feet** below proposed footing bottom, **or to a depth below all undocumented fill materials**, whichever is deeper. The extent of the overexcavation and recompaction should be verified during site grading. The overexcavation and recompaction should also extend laterally to a minimum of 5 feet beyond the outside dimensions of building.

9.5.9 Deeper overexcavation and recompaction are also anticipated within the current dense tree areas (i.e. eastern portion of the proposed grocery building) to remove all stream sediments, loose soil, wet soil, oversized rocks, or unsuitable materials.

9.5.10 Within pavement, it is recommended overexcavation and recompaction be performed to a minimum depth of **two (2) feet** below existing grade or **two (2) feet** below proposed grade, whichever is deeper. The overexcavation and recompaction should also extend laterally to a minimum of 2 feet beyond the pavement.

9.5.11 Prior to placement of fill soils, the upper 10 to 12 inches of native subgrade soils should be scarified, moisture-conditioned to no less than the optimum moisture content and recompacted to a minimum of 95 percent of the maximum dry density based on ASTM D1557-07 Test Method.

9.5.12 All Engineered Fill (including scarified ground surfaces and backfill) should be placed in thin lifts to allow for adequate bonding and compaction (typically 6 to 8 inches in loose thickness).

9.5.13 Engineered Fill soils should be placed, moisture conditioned to near optimum moisture content, and compacted to at least 95% relative compaction.

9.5.14 An integral part of satisfactory fill placement is the stability of the placed lift of soil. If placed materials exhibit excessive instability as determined by a SALEM field representative, the lift will be considered unacceptable and shall be remedied prior to placement of additional fill material. Additional lifts should not be placed if the previous lift did not meet the required dry density or if soil conditions are not stable.

9.5.15 Final pavement subgrade should be finished to a smooth, unyielding surface. We further recommend proof-rolling the subgrade with a loaded water truck (or similar equipment with high contact pressure) to verify the stability of the subgrade prior to placing aggregate base.

9.5.16 The most effective site preparation alternatives will depend on site conditions prior to grading. We should evaluate site conditions and provide supplemental recommendations immediately prior to grading, if necessary.

9.5.17 We do not anticipate groundwater or seepage to adversely affect construction if conducted during the drier months of the year (typically summer and fall). However, groundwater and soil moisture conditions could be significantly different during the wet season (typically winter and spring) as surface soil becomes wet; perched groundwater conditions may develop. Grading during this time period will likely encounter wet materials resulting in possible excavation and fill placement difficulties. Project site winterization consisting of placement of aggregate base and protecting exposed soils during construction should be performed. If the construction schedule requires grading operations during the wet season, we can provide additional recommendations as conditions warrant.

9.5.18 Wet soils may become non conducive to site grading as the upper soils yield under the weight of the construction equipment. Therefore, mitigation measures should be performed for stabilization.

Typical remedial measures include: discing and aerating the soil during dry weather; mixing the soil with dryer materials; removing and replacing the soil with an approved fill material or placement of slurry, crushed rocks or aggregate base material; or mixing the soil with an approved lime or cement product. The most common remedial measure of stabilizing the bottom of the excavation due to wet soil condition is to reduce the moisture of the soil to near the optimum moisture content by having the subgrade soils scarified and aerated or mixed with drier soils prior to compacting. However, the drying process may require an extended period of time and delay the construction operation.

To expedite the stabilizing process, slurry or crushed rock may be utilized for stabilization provided this method is approved by the owner for the cost purpose. If the use of slurry, crushed rock is considered, it is recommended that the upper soft and wet soils be replaced by 6 to 24 inches of 2-sack slurry or ¾-inch to 1-inch crushed rocks. The thickness of the slurry or rock layer depends on the severity of the soil instability. The recommended 6 to 24 inches of crushed rock material will provide a stable platform.

It is further recommended that lighter compaction equipment be utilized for compacting the crushed rock. A layer of geofabric is recommended to be placed on top of the compacted crushed rock to minimize migration of soil particles into the voids of the crushed rock, resulting in soil movement. Although it is not required, the use of geogrid (e.g. Tensar TX7) below the slurry or crushed rock will enhance stability and reduce the required thickness of crushed rock necessary for stabilization. Our firm should be consulted prior to implementing remedial measures to provide appropriate recommendations.

9.6 Shallow Foundations

9.6.1 The site is suitable for use of conventional shallow foundations consisting of continuous footings and isolated pad footings bearing in properly compacted Engineered Fill.

9.6.2 The bearing wall footings considered for the structures should be continuous with a minimum width of 15 inches and extend to a minimum depth of 18 inches below the lowest adjacent grade. Isolated column footings should have a minimum width of 24 inches and extend a minimum depth of 18 inches below the lowest adjacent grade. The bottom of footing excavations should be maintained free of loose and disturbed soil. Footing concrete should be placed into a neat excavation.

9.6.3 For design purposes, total settlement due to static and seismic loadings on the order of 2 inches may be assumed for shallow footings. Differential settlement due to static and seismic loadings, along a 40-foot exterior wall footing or between adjoining column footings, should be 1 inch, producing an angular distortion of 0.002. Most of the settlement is expected to occur during construction as the loads are applied. However, additional post-construction settlement may occur if the foundation soils are flooded or saturated. The footing excavations should not be allowed to dry out any time prior to pouring concrete.

9.6.4 Footings proportioned as recommended above may be designed for the maximum allowable soil bearing pressures shown in the table below.

Loading Condition	Allowable Bearing
Dead Load Only	2,000 psf
Dead-Plus-Live Load	2,500 psf
Total Load, Including Wind or Seismic Loads	3,325 psf

9.6.5 Resistance to lateral footing displacement can be computed using an allowable coefficient of friction factor of 0.40 acting between the base of foundations and the supporting native subgrade.

9.6.6 Lateral resistance for footings can alternatively be developed using an allowable equivalent fluid passive pressure of 350 pounds per cubic foot acting against the appropriate vertical native footing faces. The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance. An increase of one-third is permitted when using the alternate load combination in CBC that includes wind or earthquake loads.

9.6.7 Underground utilities running parallel to footings should not be constructed in the zone of influence of footings. The zone of influence may be taken to be the area beneath the footing and within a 1:1 plane extending out and down from the bottom edge of the footing.

9.6.8 The foundation subgrade should be sprinkled as necessary to maintain a moist condition without significant shrinkage cracks as would be expected in any concrete placement. Prior to placing rebar reinforcement, foundation excavations should be evaluated by a representative of SALEM for appropriate support characteristics and moisture content. Moisture conditioning may be required for the materials exposed at footing bottom, particularly if foundation excavations are left open for an extended period.

9.7 Caisson Foundations for Canopy Structures

9.7.1 It is recommended that the caisson foundation should have a minimum diameter of 24 inches and a minimum depth of 7 feet below the lowest adjacent grade.

9.7.2 The caissons may be designed using an allowable sidewall friction of 250 psf. This value is for dead-plus-live loads. An allowable end bearing capacity of 3,000 psf may be used provided that the bottom of the caisson is cleaned with the use of a clean-out bucket or equivalent and inspected by our representative prior to placement of reinforcement and concrete. An increase of one-third is permitted when using the alternate load combination that includes wind or earthquake loads.

9.7.3 Uplift loads can be resisted by caissons using an allowable sidewall friction of 200 psf of the surface area and the weight of the caisson.

9.7.4 The total static settlement of the caisson footing is not expected to exceed 1 inch. Differential static settlement should be less than ½ inch. Most of the settlement is expected to occur during construction as the loads are applied.

9.7.5 The drilled caissons may be designed for a lateral capacity of 350 pounds per square foot per foot of depth below the lowest adjacent grade to a maximum of 5,250 psf.

9.7.6 The top one-foot of adjacent subgrade should be deleted from the passive pressure computation.

9.7.7 Sandy soils were encountered at the site. Casing of the drilled caisson will be required if caving is encountered or the drilled hole has to be left open for an extended period of time.

9.8 Concrete Slabs-on-Grade

9.8.1 Slab thickness and reinforcement should be determined by the structural engineer based on the anticipated loading. We recommend that non-structural slabs-on-grade be at least 4 inches thick and underlain by six (6) inches of compacted clean granular aggregate subbase material compacted to at least 95% relative compaction.

9.8.2 Granular aggregate subbase material shall conform to ASTM D-2940, Latest Edition (Table 1, bases) with at least 95 percent passing a 1½-inch sieve and not more than 8% passing a No. 200 sieve or clean Crushed Aggregate Base (CAB) to prevent capillary moisture rise. Crushed

<u>Miscellaneous Base (CMB) is not acceptable to be used as subbase material within the building pad area.</u>

9.8.3 We recommend reinforcing slabs, at a minimum, with No. 3 reinforcing bars placed 18 inches on center, each way.

9.8.4 Slabs subject to structural loading may be designed utilizing a modulus of subgrade reaction K of 150 pounds per square inch per inch. The K value was approximated based on inter-relationship of soil classification and bearing values (Portland Cement Association, Rocky Mountain Northwest).

9.8.5 The spacing of crack control joints should be designed by the project structural engineer. In order to regulate cracking of the slabs, we recommend that construction joints or control joints be provided at a maximum spacing of 15 feet in each direction for 5-inch thick slabs and 12 feet for 4-inch thick slabs.

9.8.6 Crack control joints should extend a minimum depth of one-fourth the slab thickness and should be constructed using saw-cuts or other methods as soon as practical after concrete placement. The exterior floors should be poured separately in order to act independently of the walls and foundation system.

9.8.7 It is recommended that the utility trenches within the structures be compacted, as specified in our report, to minimize the transmission of moisture through the utility trench backfill. Special attention to the immediate drainage and irrigation around the structures is recommended.

9.8.8 Moisture within the structures may be derived from water vapors, which were transformed from the moisture within the soils. This moisture vapor penetration can affect floor coverings and produce mold and mildew in the structures. To minimize moisture vapor intrusion, it is recommended that a vapor retarder be installed in accordance with manufacturer’s recommendations and/or ASTM guidelines, whichever is more stringent. In addition, ventilation of the structures is recommended to reduce the accumulation of interior moisture.

9.8.9 In areas where it is desired to reduce floor dampness where moisture-sensitive coverings are anticipated, construction should have a suitable waterproof vapor retarder (a minimum of 15 mils thick polyethylene vapor retarder sheeting, Raven Industries “VaporBlock 15, Stego Industries 15 mil “StegoWrap” or W.R. Meadows Sealtight 15 mil “Perminator”) incorporated into the floor slab design. The water vapor retarder should be decay resistant material complying with ASTM E96 not exceeding 0.04 perms, ASTM E154 and ASTM E1745 Class A. The vapor barrier should be placed between the concrete slab and the compacted granular aggregate subbase material. The water vapor retarder (vapor barrier) should be installed in accordance with ASTM Specification E 1643-94.

9.8.10 The concrete maybe placed directly on vapor retarder. The vapor retarder should be inspected prior to concrete placement. Cut or punctured retarder should be repaired using vapor retarder material lapped 6 inches beyond damaged areas and taped.

9.8.11 The recommendations of this report are intended to reduce the potential for cracking of slabs due to soil movement. However, even with the incorporation of the recommendations presented herein, foundations, stucco walls, and slabs-on-grade may exhibit some cracking due to soil movement. This is common for project areas that contain expansive soils since designing to eliminate potential soil movement is cost prohibitive. The occurrence of concrete shrinkage cracks is independent of the supporting soil characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, proper concrete placement and curing, and by the placement of crack control joints at periodic intervals, in particular, where re-entrant slab corners occur.

9.8.12 Proper finishing and curing should be performed in accordance with the latest guidelines provided by the American Concrete Institute, Portland Cement Association, and ASTM.

9.9 Lateral Earth Pressures and Frictional Resistance

9.9.1 Active, at-rest and passive unit lateral earth pressures against footings and walls are summarized in the table below:

Lateral Pressure Drained and Level Backfill Conditions	Equivalent Fluid Pressure, pcf
Active Pressure	40
At-Rest Pressure	60
Passive Pressure	350
Related Parameters	
Allowable Coefficient of Friction	0.40
In-Place Soil Density (lbs/ft^3)	120

9.9.2 Active pressure applies to walls, which are free to rotate. At-rest pressure applies to walls, which are restrained against rotation. The preceding lateral earth pressures assume sufficient drainage behind retaining walls to prevent the build-up of hydrostatic pressure.

9.9.3 The top one-foot of adjacent subgrade should be deleted from the passive pressure computation.

9.9.4 A safety factor consistent with the design conditions should be included in the usage of the values presented in the above table.

9.9.5 For stability against lateral sliding, which is resisted solely by the passive pressure, we recommend a minimum safety factor of 1.5.

9.9.6 For stability against lateral sliding, which is resisted by the combined passive and frictional resistance, a minimum safety factor of 2.0 is recommended.

9.9.7 For lateral stability against seismic loading conditions, we recommend a minimum safety factor of 1.1.

9.9.8 For dynamic seismic lateral loading the following equation shall be used:

Dynamic Seismic Lateral Loading Equation
Dynamic Seismic Lateral Load = $\frac{3}{8}\gamma K_h H^2$
Where: γ = In-Place Soil Density
K_h = Horizontal Acceleration = $\frac{2}{3}PGA_M$
H = Wall Height

9.10 Retaining Walls

9.10.1 Retaining and/or below grade walls should be drained with either perforated pipe encased in free-draining gravel or a prefabricated drainage system. The gravel zone should have a minimum width of 12 inches wide and should extend upward to within 12 inches of the top of the wall. The upper 12 inches of backfill should consist of native soils, concrete, asphaltic-concrete or other suitable backfill to minimize surface drainage into the wall drain system. The gravel should conform to Class II permeable materials graded in accordance with the current CalTrans Standard Specifications.

9.10.2 Prefabricated drainage systems, such as Miradrain®, Enkadrain®, or an equivalent substitute, are acceptable alternatives in lieu of gravel provided they are installed in accordance with the manufacturer’s recommendations. If a prefabricated drainage system is proposed, our firm should review the system for final acceptance prior to installation.

9.10.3 Drainage pipes should be placed with perforations down and should discharge in a non-erosive manner away from foundations and other improvements. The top of the perforated pipe should be placed at or below the bottom of the adjacent floor slab or pavements. The pipe should be placed in the center line of the drainage blanket and should have a minimum diameter of 4 inches. Slots should be no wider than 1/8-inch in diameter, while perforations should be no more than ¼-inch in diameter.

9.10.4 If retaining walls are less than 5 feet in height, the perforated pipe may be omitted in lieu of weep holes on 4 feet maximum spacing. The weep holes should consist of 2-inch minimum diameter holes (concrete walls) or unmortared head joints (masonry walls) and placed no higher than 18 inches above the lowest adjacent grade. Two 8-inch square overlapping patches of geotextile fabric (conforming to the CalTrans Standard Specifications for "edge drains") should be affixed to the rear wall opening of each weep hole to retard soil piping.

9.10.5 During grading and backfilling operations adjacent to any walls, heavy equipment should not be allowed to operate within a lateral distance of 5 feet from the wall, or within a lateral distance equal to the wall height, whichever is greater, to avoid developing excessive lateral pressures.

Within this zone, only hand operated equipment ("whackers," vibratory plates, or pneumatic compactors) should be used to compact the backfill soils.

9.11 Temporary Excavations

9.11.1 We anticipate that the majority of the sandy site soils will be classified as Cal-OSHA “Type C” soil when encountered in excavations during site development and construction. Excavation sloping, benching, the use of trench shields, and the placement of trench spoils should conform to the latest applicable Cal-OSHA standards. The contractor should have a Cal-OSHA-approved “competent person” onsite during excavation to evaluate trench conditions and make appropriate recommendations where necessary.

9.11.2 It is the contractor’s responsibility to provide sufficient and safe excavation support as well as protecting nearby utilities, structures, and other improvements which may be damaged by earth movements. All onsite excavations must be conducted in such a manner that potential surcharges from existing structures, construction equipment, and vehicle loads are resisted. The surcharge area may be defined by a 1:1 projection down and away from the bottom of an existing foundation or vehicle load.

9.11.3 Temporary excavations and slope faces should be protected from rainfall and erosion. Surface runoff should be directed away from excavations and slopes.

9.11.4 Open, unbraced excavations in undisturbed soils should be made according to the slopes presented in the following table:

RECOMMENDED EXCAVATION SLOPES

Depth of Excavation (ft)	Slope (Horizontal : Vertical)
0-5	1:1
5-10	2:1

9.11.5 If, due to space limitation, excavations near property lines or existing structures are performed in a vertical position, slot cuts, braced shorings or shields may be used for supporting vertical excavations. Therefore, in order to comply with the local and state safety regulations, a properly designed and installed shoring system would be required to accomplish planned excavations and installation. A Specialty Shoring Contractor should be responsible for the design and installation of such a shoring system during construction.

9.11.6 Braced shorings should be designed for a maximum pressure distribution of 30H, (where H is the depth of the excavation in feet). The foregoing does not include excess hydrostatic pressure or surcharge loading. Fifty percent of any surcharge load, such as construction equipment weight, should be added to the lateral load given herein. Equipment traffic should concurrently be limited to an area at least 3 feet from the shoring face or edge of the slope.

9.11.7 The excavation and shoring recommendations provided herein are based on soil characteristics derived from the borings within the area. Variations in soil conditions will likely be encountered during the excavations. SALEM Engineering Group, Inc. should be afforded the opportunity to provide field review to evaluate the actual conditions and account for field condition variations not otherwise anticipated in the preparation of this recommendation. Slope height, slope inclination, or excavation depth should in no case exceed those specified in local, state, or federal safety regulation, (e.g. OSHA) standards for excavations, 29 CFR part 1926, or Assessor's regulations.

9.12 Underground Utilities

9.12.1 Underground utility trenches should be backfilled with properly compacted material. The material excavated from the trenches should be adequate for use as backfill provided it does not contain deleterious matter, vegetation or rock larger than 3 inches in maximum dimension. Trench backfill should be placed in loose lifts not exceeding 8 inches and compacted to at least 95% relative compaction at no less than the optimum moisture content.

9.12.2 Bedding and pipe zone backfill typically extends from the bottom of the trench excavations to approximately 6 to 12 inches above the crown of the pipe. Pipe bedding and backfill material should conform to the requirements of the governing utility agency.

9.12.3 It is suggested that underground utilities crossing beneath new or existing structures be plugged at entry and exit locations to the buildings or structures to prevent water migration. Trench plugs can consist of on-site clay soils, if available, or sand cement slurry. The trench plugs should extend 2 feet beyond each side of individual perimeter foundations.

9.12.4 The contractor is responsible for removing all water-sensitive soils from the trench regardless of the backfill location and compaction requirements. The contractor should use appropriate equipment and methods to avoid damage to the utilities and/or structures during fill placement and compaction.

9.13 Surface Drainage

9.13.1 Proper surface drainage is critical to the future performance of the project. Uncontrolled infiltration of irrigation excess and storm runoff into the soils can adversely affect the performance of the planned improvements. Saturation of a soil can cause it to lose internal shear strength and increase its compressibility, resulting in a change to important engineering properties. Proper drainage should be maintained at all times.

9.13.2 The ground immediately adjacent to the foundation shall be sloped away from the building at a slope of not less than 5 percent for a minimum distance of 10 feet.

9.13.3 Impervious surfaces within 10 feet of the building foundation shall be sloped a minimum of 2 percent away from the building and drainage gradients maintained to carry all surface water to collection facilities and off site. These grades should be maintained for the life of the project. Ponding of water should not be allowed adjacent to the structure. Over-irrigation within landscaped areas adjacent to the structure should not be performed.

9.13.4 Roof drains should be installed with appropriate downspout extensions out-falling on splash blocks so as to direct water a minimum of 5 feet away from the structures or be connected to the storm drain system for the development.

9.14 Pavement Design

9.14.1 Based on site soil conditions, an R-value of 30 was used for the preliminary flexible asphaltic concrete pavement design. The R-value may be verified during grading of the pavement areas.

9.14.2 The asphaltic concrete (flexible pavement is based on a 20-year pavement life for traffic indexes of 5.0 and 6.5. If higher traffic loading is anticipated, SALEM should be contacted to provide revised pavement thickness recommendations.

TABLE 9.14.2
ASPHALT CONCRETE PAVEMENT

Traffic Index	Asphaltic Concrete	Clean Crushed Aggregate Base*	Compacted Subgrade*
5.0 (Parking and Vehicle Drive Areas)	3.0"	5.0"	24.0"
6.5 (Heavy Truck Areas)	4.0"	7.5"	24.0"

95% compaction based on ASTM D1557 Test Method

9.14.3 The following recommendations are for light-duty and heavy-duty Portland Cement Concrete pavement sections.

TABLE 9.14.3
PORTLAND CEMENT CONCRETE PAVEMENT

Traffic Index	Portland Cement Concrete*	Clean Crushed Aggregate Base**	Compacted Subgrade**
5.0 (Light Duty)	5.0"	4.0"	24.0"
6.5 (Heavy Duty)	7.0"	4.0"	24.0"

**** Min. Compressive Strength of 4,000 psi, Min. Reinforcement of No. 4 bars at 18 inches o.c. each way***
***** 95% compaction based on ASTM D1557 Test Method***

10. PLAN REVIEW, CONSTRUCTION OBSERVATION AND TESTING

10.1 Plan and Specification Review

10.1.1 SALEM should review the project grading and foundation plans and specifications prior to final design submittal to assess whether our recommendations have been properly implemented and evaluate if additional analysis and/or recommendations are required.

10.2 Construction Observation and Testing Services

10.2.1 The recommendations provided in this report are based on the assumption that we will continue as Geotechnical Engineer of Record throughout the construction phase. It is important to maintain continuity of geotechnical interpretation and confirm that field conditions encountered are similar to those anticipated during design. If we are not retained for these services, we cannot assume any responsibility for others interpretation of our recommendations, and therefore the future performance of the project.

10.2.2 SALEM should be present at the site during site preparation to observe site clearing, preparation of exposed surfaces after clearing, and placement, treatment and compaction of fill material.

10.2.3 SALEM's observations should be supplemented with periodic compaction tests to establish substantial conformance with these recommendations. Moisture content of footings and slab subgrade should be tested immediately prior to concrete placement. SALEM should observe foundation excavations prior to placement of reinforcing steel or concrete to assess whether the actual bearing conditions are compatible with the conditions anticipated during the preparation of this report.

11. LIMITATIONS AND CHANGED CONDITIONS

The analyses and recommendations submitted in this report are based upon the data obtained from the test borings drilled at the approximate locations shown on the Site Plan, Figure 1. The report does not reflect variations which may occur between borings. The nature and extent of such variations may not become evident until construction is initiated.

If variations then appear, a re-evaluation of the recommendations of this report will be necessary after performing on-site observations during the excavation period and noting the characteristics of such variations. The findings and recommendations presented in this report are valid as of the present and for the proposed construction. If site conditions change due to natural processes or human intervention on the property or adjacent to the site, or changes occur in the nature or design of the project, or if there is a substantial time lapse between the submission of this report and the start of the work at the site, the conclusions and recommendations contained in our report will not be considered valid unless the changes are reviewed by SALEM and the conclusions of our report are modified or verified in writing.

The validity of the recommendations contained in this report is also dependent upon an adequate testing and observations program during the construction phase. Our firm assumes no responsibility for construction compliance with the design concepts or recommendations unless we have been retained to perform the on-site testing and review during construction. SALEM has prepared this report for the exclusive use of the owner and project design consultants.

SALEM does not practice in the field of corrosion engineering. It is recommended that a qualified corrosion engineer be consulted regarding protection of buried steel or ductile iron piping and conduit or, at a minimum, that manufacturer’s recommendations for corrosion protection be closely followed. Further, a corrosion engineer may be needed to incorporate the necessary precautions to avoid premature corrosion of concrete slabs and foundations in direct contact with native soil.

The importation of soil and or aggregate materials to the site should be screened to determine the potential for corrosion to concrete and buried metal piping. The report has been prepared in accordance with generally accepted geotechnical engineering practices in the area. No other warranties, either express or implied, are made as to the professional advice provided under the terms of our agreement and included in this report.

If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (909) 980-6455.

Respectfully Submitted,

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Source Image: U.S. Geological Survey, Lake Elsinore, California, https://ngmdb.usgs.gov/topoview (2018)

VICINITY MAP

GEOTECHNICAL ENGINEERING INVESTIGATION
Proposed Commercial Development
Central Avenue & Cambern Avenue
Lake Elsinore, California

SCALE: NOT TO SCALE	DATE: 04/2021
DRAWN BY: JC	APPROVED BY: CJ
PROJECT NO. 3-221-0167	FIGURE NO. 1

SALEM
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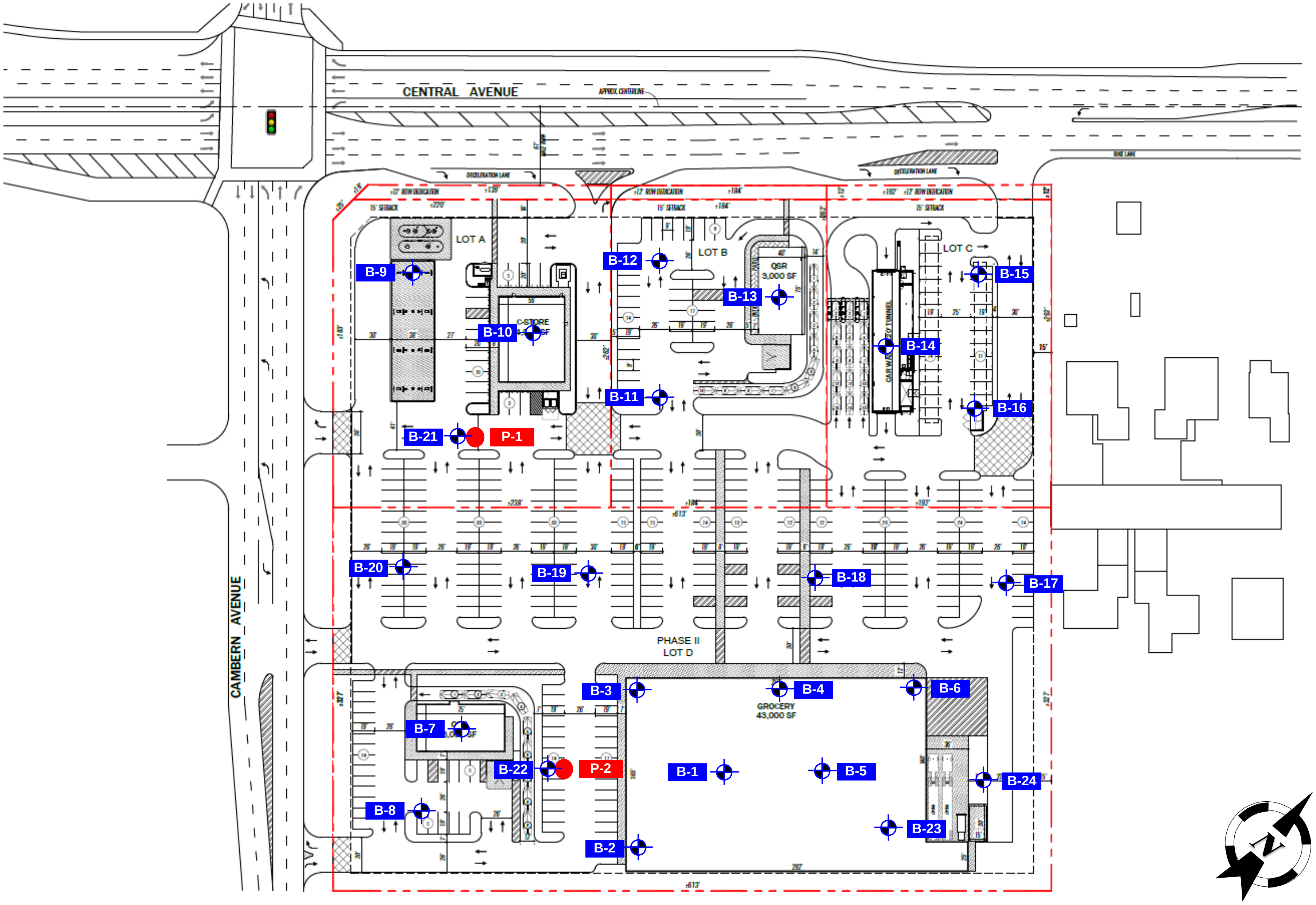


SITE PLAN

GEOTECHNICAL ENGINEERING INVESTIGATION
Proposed Commercial Development
Central Avenue & Cambern Avenue
Lake Elsinore, California

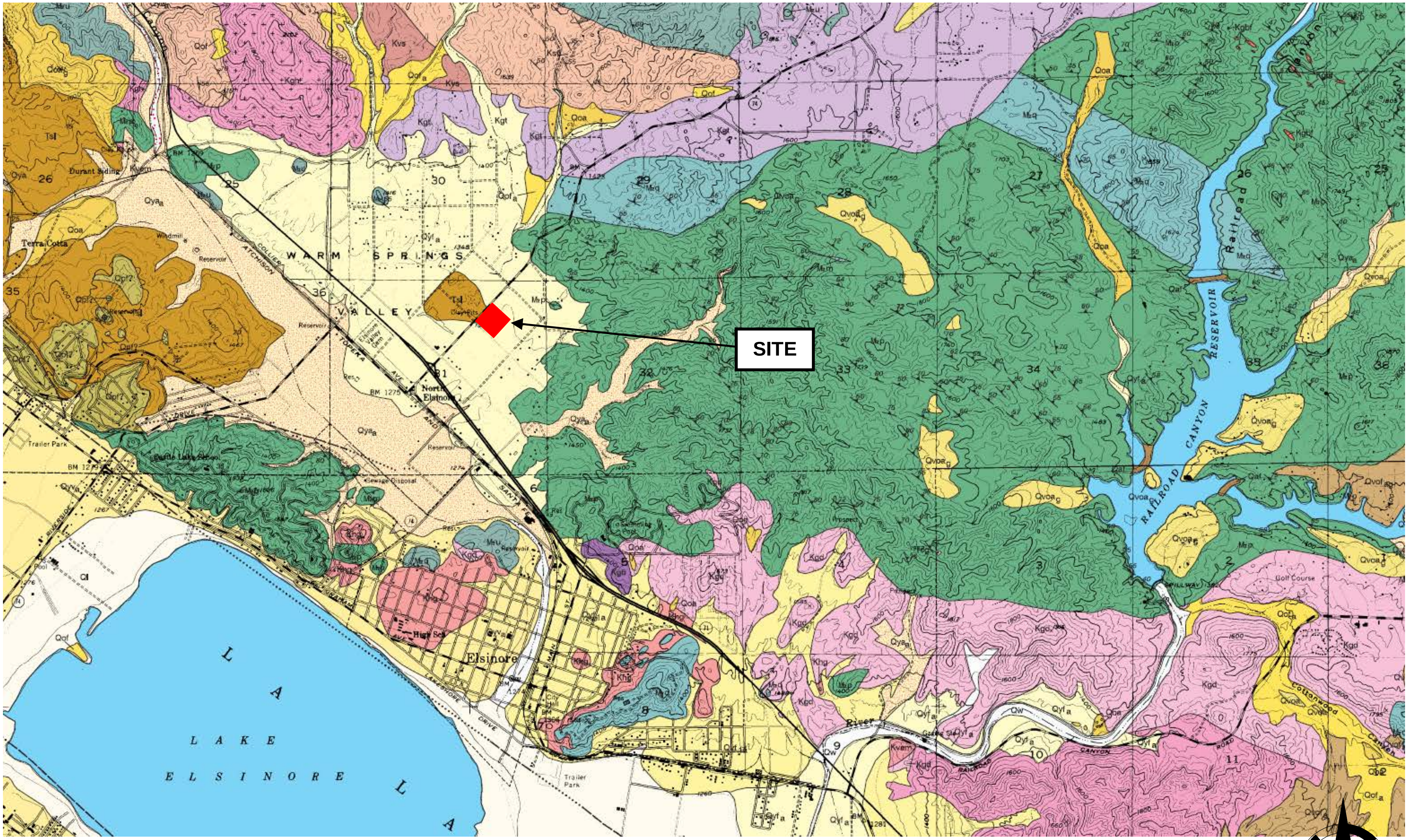
SCALE: NOT TO SCALE	DATE: 04/2021
DRAWN BY: JC	APPROVED BY: CJ
PROJECT NO. 3-221-0167	FIGURE NO. 2

LEGEND:

B-1	Soil Boring Locations
P-1	Percolation Locations

All Locations Approximate

SALEM
engineering group, inc.



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Regional Geologic Map

GEOTECHNICAL ENGINEERING INVESTIGATION
Proposed Commercial Development
Central Avenue & Cambern Avenue
Lake Elsinore, Riverside County, California

SCALE: NOT TO SCALE	DATE: 04/2019
DRAWN BY: JC	APPROVED BY: CJ
PROJECT NO. 3-221-0167	FIGURE NO. 3A

SALEM
engineering group, inc.

Geologic Unit Explanation

VERY YOUNG SURFICIAL DEPOSITS—Sediment recently transported and deposited in channels and washes, on surfaces of alluvial fans and alluvial plains, and on hillslopes. Soil-profile development is non-existent

Qaf **Artificial fill (late Holocene)**—Deposits of fill resulting from human construction, mining, or quarrying activities; includes compacted engineered and non-compacted non-engineered fill. Most large deposits are mapped, but in some areas, small deposits are not shown

Qw **Very young wash deposits (late Holocene)**—Unconsolidated bouldery to sandy alluvium of active and recently active washes

Qf **Very young alluvial-fan deposits (late Holocene)**—Active and recently active alluvial fans. Consists of unconsolidated, bouldery, cobbley, gravelly, sandy, or silty alluvial fan deposits, and headward channel parts of alluvial fans. Trunk drainages and proximal parts of fans contain greater percentage of coarse-grained sediment than distal parts

Ql **Very young lacustrine deposits (late Holocene)**—Dominantly gray, clayey, silty, and fine-grained sandy lacustrine deposits

YOUNG SURFICIAL DEPOSITS—Sedimentary units that are slightly consolidated to cemented and slightly to moderately dissected. Alluvial fan deposits (Qyf series) typically have high coarse:fine clast ratios. Younger surficial units have upper surfaces that are capped by slight to moderately developed pedogenic-soil profiles (A/C to A/AC/B$_{cambic}$C$_{ox}$ profiles)

Qyw **Young alluvial-wash deposits (Holocene and late Pleistocene)**—Unconsolidated bouldery to sandy alluvium marginal to active and recently active washes

Qyf **Young alluvial-fan deposits (Holocene and late Pleistocene)**—Unconsolidated deposits of alluvial fans and headward drainages of fans. Consists predominately of gravel, sand, and silt. Trunk drainages and proximal parts of fans contain higher percentage of coarse-grained sediment than distal parts. Includes:

Qyf$_1$ **Young alluvial-fan deposits, Unit 1 (early Holocene and late Pleistocene)**—Unconsolidated alluvial fan deposits. Consists of gravel, sand, and silt; old part of Qyf. In part distinguished on basis of relative terrace levels

Qya **Young alluvial-channel deposits (Holocene and late Pleistocene)**—Fluvial deposits along canyon floors. Consists of unconsolidated sand, silt, and clay-bearing alluvium

Qyv **Young alluvial-valley deposits (Holocene and late Pleistocene)**—Fluvial deposits along valley floors. Consists of unconsolidated sand, silt, and clay-bearing alluvium

OLD SURFICIAL DEPOSITS—Sedimentary units that are moderately consolidated and slightly to moderately dissected. Older surficial deposits have upper surfaces that are capped by moderately to well-developed pedogenic soils (A/AB/B/C$_{ox}$ profiles and Bt horizons as much as 1 to 2 m thick and maximum hues in the range of 10YR 5/4 and 6/4 through 7.5YR 6/4 to 4/4 and mature Bt horizons reaching 5YR 5/6)

Qof **Old alluvial-fan deposits (late to middle Pleistocene)**—Reddish-brown, gravel and sand, alluvial-fan deposits; indurated, commonly slightly dissected. In places includes thin alluvial-fan deposits of Holocene age. Includes:

Qof$_1$ **Old alluvial-fan deposits, Unit 1 (middle Pleistocene)**—Indurated, gravely alluvial-fan deposits. Most are slightly to moderately dissected, reddish-brown. Some deposits include thin, discontinuous surface layer of Holocene alluvial-fan material

Qoa **Old alluvial-channel deposits (late to middle Pleistocene)**—Fluvial sediments deposited on canyon floors, but much of unit now elevated. Consists of moderately indurated, commonly slightly dissected gravel, sand, silt, and clay-bearing alluvium. Locally capped by thin, discontinuous alluvial deposits of Holocene age

VERY OLD SURFICIAL DEPOSITS—Sediments that are slightly to well consolidated to indurated, and moderately to well dissected. Upper surfaces are capped by moderate to well developed pedogenic soils (A/AB/B/C$_{ox}$ profiles having Bt horizons as much as 2 to 3 m thick and maximum hues in the range 7.5YR 6/4 and 4/4 to 2.5YR 5/6)

Qvof **Very old alluvial-fan deposits (middle to early Pleistocene)**—Mostly well-dissected, well-indurated, reddish-brown alluvial-fan deposits. Grain

the range 7.5YR 6/4 and 4/4 to 2.5YR 5/6)

Qvof **Very old alluvial-fan deposits (middle to early Pleistocene)**—Mostly well-dissected, well-indurated, reddish-brown alluvial-fan deposits. Grain

size chiefly sand and gravel

Qvoa **Very old alluvial-channel deposits (middle to early Pleistocene)**—Fluvial sediments deposited on canyon floors. Consists of moderately to well-indurated, reddish-brown, mostly very dissected gravel, sand, silt, and clay-bearing alluvium. In places, includes thin, discontinuous alluvial deposits of Holocene age. Deposits in Quail Valley and Railroad Canyon area contain rounded cobbles

Qpf **Pauba Formation (Pleistocene)**—Siltstone, sandstone, and conglomerate. Named by Mann (1955) for exposures in Rancho Pauba area about 3.2 km southeast of Temecula. Vertebrate fauna from Pauba Formation are of late Irvingtonian and early Rancholabrean ages (Reynolds and Reynolds, 1990a; 1990b). In type area, subdivided into two informal members; only the sandstone member is exposed in the quadrangle

Qpfs **Sandstone member**—Brown, moderately well-indurated, cross-bedded sandstone containing sparse cobble- to boulder-conglomerate beds. Restricted to Rome Hill area southeast of Lake Elsinore

Tcg **Conglomerate (Paleogene?)**—Monolithic cobble conglomerate. Underlies a very small area (about 100m wide) on ridge crest 1.8 km west of Railroad Canyon Reservoir dam. Conglomerate fills depression in metamorphic rock. Conglomerate is composed of exotic welded tuff clasts, some of which contain piemontite, characteristic mineral in welded tuff clasts in conglomerates of Poway Group (Woodford and others, 1968) (Kennedy, 1977). Welded tuff clasts appear identical to those common in early Miocene to late Eocene Sespe Formation and in conglomerate of Eocene Poway Group. Reworked tuff clasts occur in older alluvial deposits bordering Railroad Canyon Reservoir (Qvoag) and in northern part of the quadrangle (Qvoag) in Goodhope area. Distribution of reworked clasts within Elsinore quadrangle and quadrangles to north suggests occurrence here is small remnant of a very extensive conglomerate unit

Tsi **Silverado Formation (Paleocene)**—Nonmarine and marine sandstone, siltstone, and conglomerate. Dickerson (1914) first recognized Paleocene rocks in Santa Ana Mountains to west, and based on faunal similarities, correlated strata with Martinez Formation of central California. Woodring and Popenoe (1945) described unit in detail and named it Silverado Formation. Formation was deposited on deeply weathered erosional surface. Rocks underlying Silverado are characteristically saprolitic. Silverado Formation consists of basal conglomerate overlain by relatively thin sequence of sandstone and siltstone. Distinctive Claymont clay bed overlies sandstone and siltstone sequence, and is overlain by thick sequence of sandstone, siltstone, and conglomerate that includes second clay bed, the Serrano clay bed. Basal conglomerate is thoroughly weathered, 2- to 25-m-thick, massive, pale gray to reddish-brown, pebble conglomerate. Very locally is boulder conglomerate. Overlying this conglomerate is sandstone and siltstone which is also thoroughly weathered, consisting largely of quartz and clay. Claymont clay bed is 1- to 3-m thick, brown, green, and gray clay that weathers to distinctive brownish-red. Bed is mostly clay, partly pisolitic, and has scattered quartz grains in it. Locally, supports large-scale clay operation. Upper part of unit above Claymont clay bed is diverse section of marine and nonmarine sandstone, siltstone, and conglomerate, and includes Serrano clay bed. Latter is about 1 m thick, pale gray to white, and composed of nearly equal amounts plastic clay and quartz. In addition to clay, upper part of section contains carbonaceous shale and lignite beds. Thicker lignite beds were locally mined for fuel. Upper part of unit also contains abundant marine mollusks. Some eastern exposures of formation contain distinctive and diagnostic Paleocene Turritella pachecoensis

Rocks of the Peninsular Ranges batholith

Katg **Granodiorite of Arroyo del Toro pluton (Cretaceous)**—Light gray, medium-grained, massive, very homogeneous, and inclusion-free biotite-hornblende granodiorite. Some of the rock in the western part of the pluton is slightly porphyritic. Informally named for Arroyo del Toro, located in center part of pluton (Morton, 1999). Termed Steele Valley granodiorite by Dudley(1935) and included by Larsen(1948) within Woodson Mountain granodiorite. Near circular Arroyo del Toro is located in center of Gavilan ring complex, but apparently is not part of complex. Zircon ages of the pluton are 108.6 Ma$_{id}$ and 111 Ma$_{ip}$. 40Ar/39Ar biotite age is 104.3 Ma and potassium feldspar 98.5 Ma

Gavilan ring complex (Cretaceous)—Composite ring structure consisting of a variety of granitic rocks that range from monzogranite to tonalite. Informally named for exposures in Gavilan Plateau area. In this quadrangle, western part of complex was termed Estelle quartz diorite and eastern part was included in Perris quartz diorite by Dudley (1935). Western part of complex was termed Estelle tonalite and eastern part was included within Bonsall tonalite by Larsen (1948). Hypersthene is characteristic mineral of many rocks in complex. Based on texture, depth of erosion is greater in eastern part of complex than in western part. Rocks on west side of complex commonly have hypabyssal texture and appear to grade into volcanic textured rock. Several gold mines (e.g., Good Hope, Gavilan, and Santa Rosa mines), which constituted Pinacate mining district (Sampson, 1935), are located within complex in this quadrangle and the Steele Peak quadrangle. Gold apparently occurred in arsenopyrite bearing quartz veins. Located in center of ring complex, but not part of it, is near-circular Arroyo del Toro pluton. Includes:

Kgt **Massive textured tonalite**—Brown-weathering, massive, relatively heterogeneous, hypersthene-bearing biotite-hornblende tonalite. Most abundant rock type in complex. Equant-shaped mesocratic to melanocratic inclusions are common. Zircon age is 112.9 Ma$_{id}$ and 113.6 Ma$_{ip}$

Kgh **Hypabyssal tonalite**—Massive, hypabyssal-textured tonalite and lesser granodiorite in southwestern part of complex. Contains small, equant shaped mesocratic inclusions

Kgbf **Fine grained hornblende gabbro, Railroad Canyon area (Cretaceous)**—Fine-grained hornblende gabbro constituting dikes, sills, and small elongate plutons. Emplaced in phyllite in Railroad Canyon area

Paloma Valley Ring Complex (Cretaceous)—Composite ring dike intrusion. Named and described by Morton and Baird (1976) for exposures in Paloma Valley area. Included within Woodson Mountain granodiorite and San Marcos gabbro by Larsen (1948). Ring complex consists of older, elliptical in plan, single ring-dike and two subsidiary short-arced dikes. A younger ring-set of thin dikes is largely within older ring dike. Older dike consists of granodiorite and monzogranite with vertical walls emplaced into gabbro by ring fracturing and magmatic stoping of gabbro. Younger ring-dike consists of hundreds of granitic pegmatite dikes. Most pegmatite dikes are 30 cm to over 1 m in thickness, and define a domal ring-dike geometry in which outer dikes are moderately to steeply outward dipping and pass inward to near horizontal dikes in center. Spatially associated with younger dikes in center of complex, are bodies of granophyre that contain stringers of granitic pegmatite. Younger dikes are interpreted as products of volatile-rich magma that filled a domal set of fractures resulting from cauldron subsidence. Granophyre is interpreted as a product of pressure quenching of pegmatite magma and attendant loss of volatiles. Zircon ages of rock from atypical hornblende-bearing granodiorite from western part of older dike near the mouth of the San Jacinto River is 121 Ma$_{id}$ and 118.5 Ma$_{ip}$. 40Ar/39Ar age of hornblende 117.7 Ma and biotite 118.8 Ma. Includes:

Kpvg **Monzogranite to granodiorite**—Pale gray, massive, medium-grained hypidiomorphic-granular biotite monzogranite, and less abundant hornblende-biotite granodiorite forming older ring dike. Plagioclase is An$_{20}$ to An$_{35}$, subhedral, tabular crystals. Contains inclusions of small to large stoped blocks of gabbro

Generic Cretaceous granitic rocks of the Peninsular Ranges batholith

Kgd **Granodiorite, undifferentiated (Cretaceous)**—Biotite and hornblende-biotite granodiorite, undifferentiated. Most is massive and medium grained

Kgb **Gabbro (Cretaceous)**—Mainly hornblende gabbro. Includes Virginia quartz-norite and gabbro of Dudley (1935), and San Marcos gabbro of Larsen (1948). Typically brown-weathering, medium-to very coarse-grained hornblende gabbro; very large poikilitic hornblende crystals are common, and very locally gabbro is pegmatitic. Much is quite heterogeneous in composition and texture. Includes noritic and dioritic composition rocks

Khg **Heterogeneous granitic rocks (Cretaceous)**—Includes wide variety of heterogeneous granitic rocks. Some heterogeneous assemblages include large proportions of schist and gneiss. Tonalite composition rock is most abundant rock type.

Kvsp **Santiago Peak Volcanics (Cretaceous)**—Basaltic andesite, andesite, dacite, rhyolite, volcaniclastic breccia, welded tuff, and epiclastic rocks (Herzig, 1991). Originally named Black Mountain volcanics by Hanna (1926), but name was pre-empted. Larsen (1948) renamed unit Santiago Peak Volcanics for exposures in vicinity of Santiago Peak, northern Santa Ana Mountains. Rocks are very heterogeneous, discontinuous, and poorly exposed. Most of unit is hydrothermally altered; alteration was contemporaneous with volcanism. Zircon ages of Santiago Peak Volcanics range from 123 to 134 Ma (Anderson, 1991), making it coeval with older part of Peninsular Ranges batholith

Kvem **Estelle Mountain volcanics of Herzig (1991) (Cretaceous)**—Heterogeneous mixture of rhyolite flows, shallow intrusive rocks, and volcaniclastic rocks; andesite is rare. Informally named by Herzig (1991) for exposures in vicinity of Estelle Mountain, Lake Mathews 7.5' quadrangle. These rocks were termed Temescal dacite-porphyry by Dudley (1935) and Temescal Wash quartz latite porphyry by Larsen (1948). Zircon age of rock from unit collected west of Lake Mathews, Lake Mathews 7.5" quadrangle, is 125.8 Ma (Anderson, 1991)

Kvs **Intermixed Estelle Mountain volcanics of Herzig (1991) and Cretaceous(?) sedimentary rocks (Cretaceous?)**—Complexly intermixed volcanic and sedimentary rocks, which appear to be coeval; sedimentary rocks predominate

Ksv **Intermixed Estelle Mountain volcanics of Herzig (1991) and Mesozoic sedimentary rocks (Mesozoic)**—Complexly intermixed volcanic and sedimentary rocks; volcanic rocks predominate. West of Lake Mathews much of sedimentary rocks predates volcanic rocks. In Elsinore quadrangle, much of sedimentary rocks appears coeval with volcanics

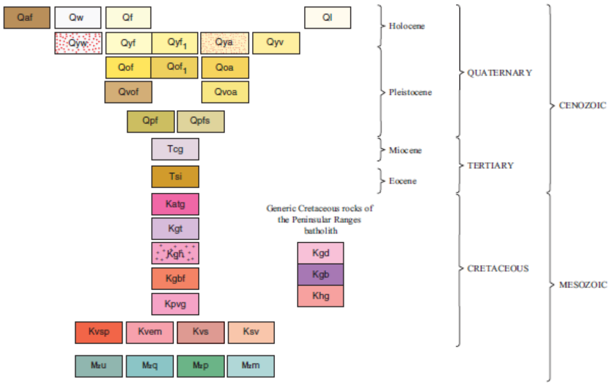
Mzu **Metasedimentary rocks, undifferentiated (Mesozoic)**—Wide variety of low-to high-metamorphic grade metamorphic rocks. Most occurrences include biotite schist

Mzq **Quartz-rich rocks (Mesozoic)**—Quartzite and quartz-rich metasandstone

Mzp **Phyllite (Mesozoic)**—Fissile black phyllite. Commonly has sheen produced by very fine-grained white mica on s-surface; locally contains small elongate prisms of fine-grained white mica, which may be pseudomorphs after chiastolite

Mzm **Marble (Mesozoic)**—Pod-like masses and elongate layers of relatively fine-grained, off-white to gray marble and calcsilicate rocks. Commonly contains massed radiating blades of white tremolite. In the Romoland quadrangle to the east, small mass of fine-grained dark gray to black marble and calcsilicate rock in hills east of Sun City contains deformed and poorly preserved pelycepods and crinoids

Map Units and Symbol Explanation



On some SCAMP geologic map plots, including the Elsinore 7.5' quadrangle, characteristic grain size information is displayed using subscripted alpha characters (e.g. Qyf$_g$, Qov$_a$), where the characters conform to the following definitions:

- a - arenaceous (very coarse sand through very fine sand)
- b - boulder gravel (>25mm)
- g - gravel (cobble through granule gravel)
- s - silty
- c - clayey

———— **Contact**—Generally located within ±15 meters

— — — — **Fault**—High angle. Strike-slip component on all faults is right-lateral; dip-slip component is unknown, but probably reflects valley-highland relations. Solid where located within ±15 meters; dashed where located within ±30 meters; dotted where concealed. Arrow and number indicate measured dip of fault plane that was exposed in trench.

Strike and dip of beds

70 **Inclined**

Strike and dip of igneous foliation

70 **Inclined**

Strike and dip of metamorphic foliation

70 **Inclined**

✦ **Vertical**

Morton, D.M. (1978, 1998) and Weber, Jr., F.H. (1973-77) Preliminary Geologic Map of the Elsinore 7.5' Quadrangle, Riverside County, California: U.S. Geological Survey Open-File Report 03-281 Scale 1:24,000.

Regional Geologic Map

GEOTECHNICAL ENGINEERING INVESTIGATION
Proposed Commercial Development
Central Avenue & Cambern Avenue
Lake Elsinore, Riverside County, California

SCALE:	DATE:
NOT TO SCALE	04/2021
DRAWN BY:	APPROVED BY:
JC	CJ
PROJECT NO.	FIGURE NO.
3-221-0167	3B

SALEM
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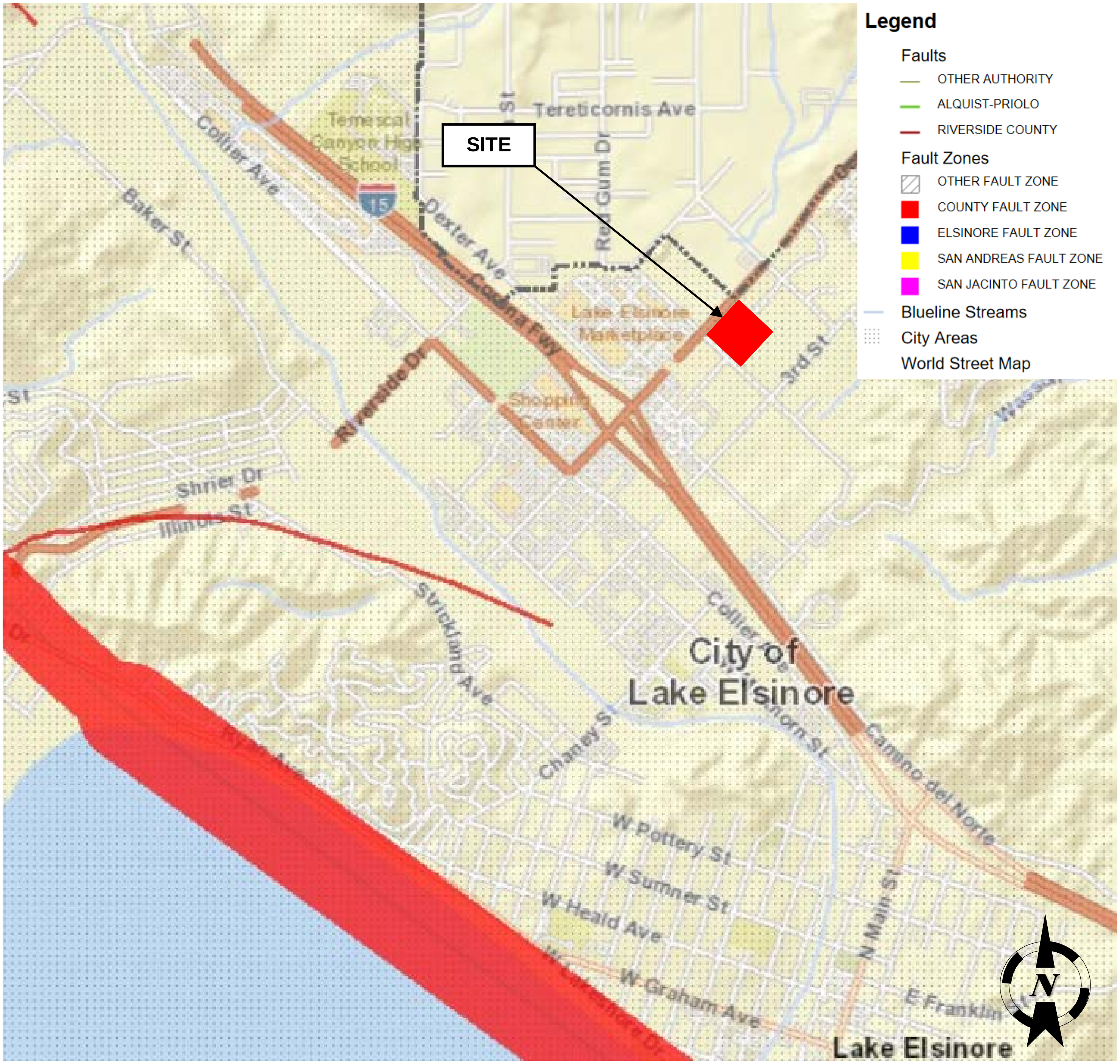

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Fault Map

GEOTECHNICAL ENGINEERING INVESTIGATION
Proposed Commercial Development
Central Avenue & Cambern Avenue
Lake Elsinore, Riverside County, California

SCALE: NOT TO SCALE	DATE: 04/2021
DRAWN BY: JC	APPROVED BY: CJ
PROJECT NO. 3-221-0167	FIGURE NO. 4

SALEM
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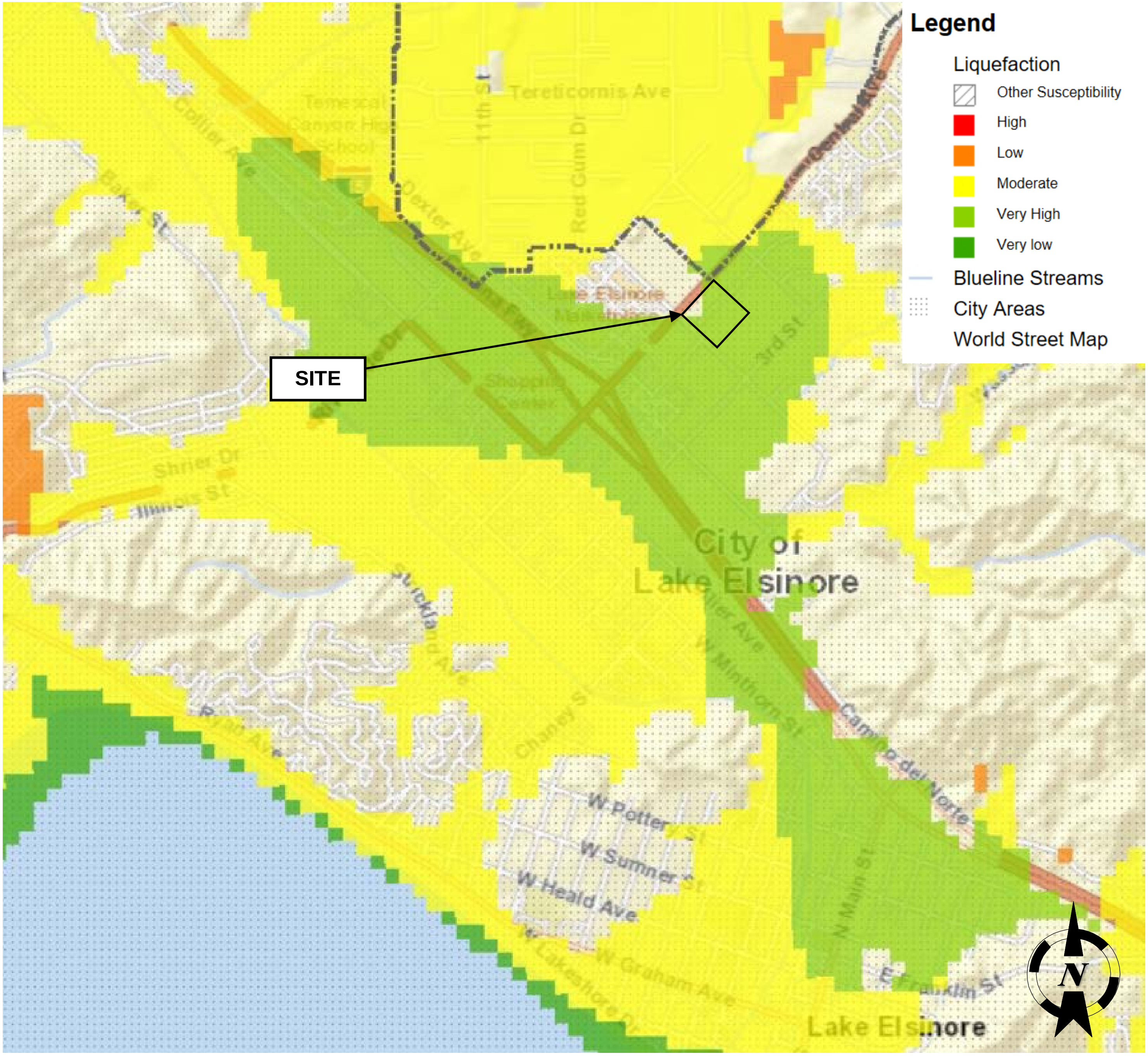

IMPORTANT Maps and data are to be used for reference purposes only. Map features are approximate, and are not necessarily accurate to surveying or engineering standards. The County of Riverside makes no warranty or guarantee as to the content (the source is often third party), accuracy, timeliness, or completeness of any of the data provided, and assumes no legal responsibility for the information contained on this map. Any use of this product with respect to accuracy and precision shall be the sole responsibility of the user.

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Liquefaction Potential Zone Map

GEOTECHNICAL ENGINEERING INVESTIGATION
Proposed Commercial Development
Central Avenue & Cambern Avenue
Lake Elsinore, Riverside County, California

SCALE: NOT TO SCALE	DATE: 04/2021
DRAWN BY: JC	APPROVED BY: CJ
PROJECT NO. 3-221-0167	FIGURE NO. 5

SALEM engineering group, inc.

IMPORTANT Maps and data are to be used for reference purposes only. Map features are approximate, and are not necessarily accurate to surveying or engineering standards. The County of Riverside makes no warranty or guarantee as to the content (the source is often third party), accuracy, timeliness, or completeness of any of the data provided, and assumes no legal responsibility for the information contained on this map. Any use of this product with respect to accuracy and precision shall be the sole responsibility of the user.

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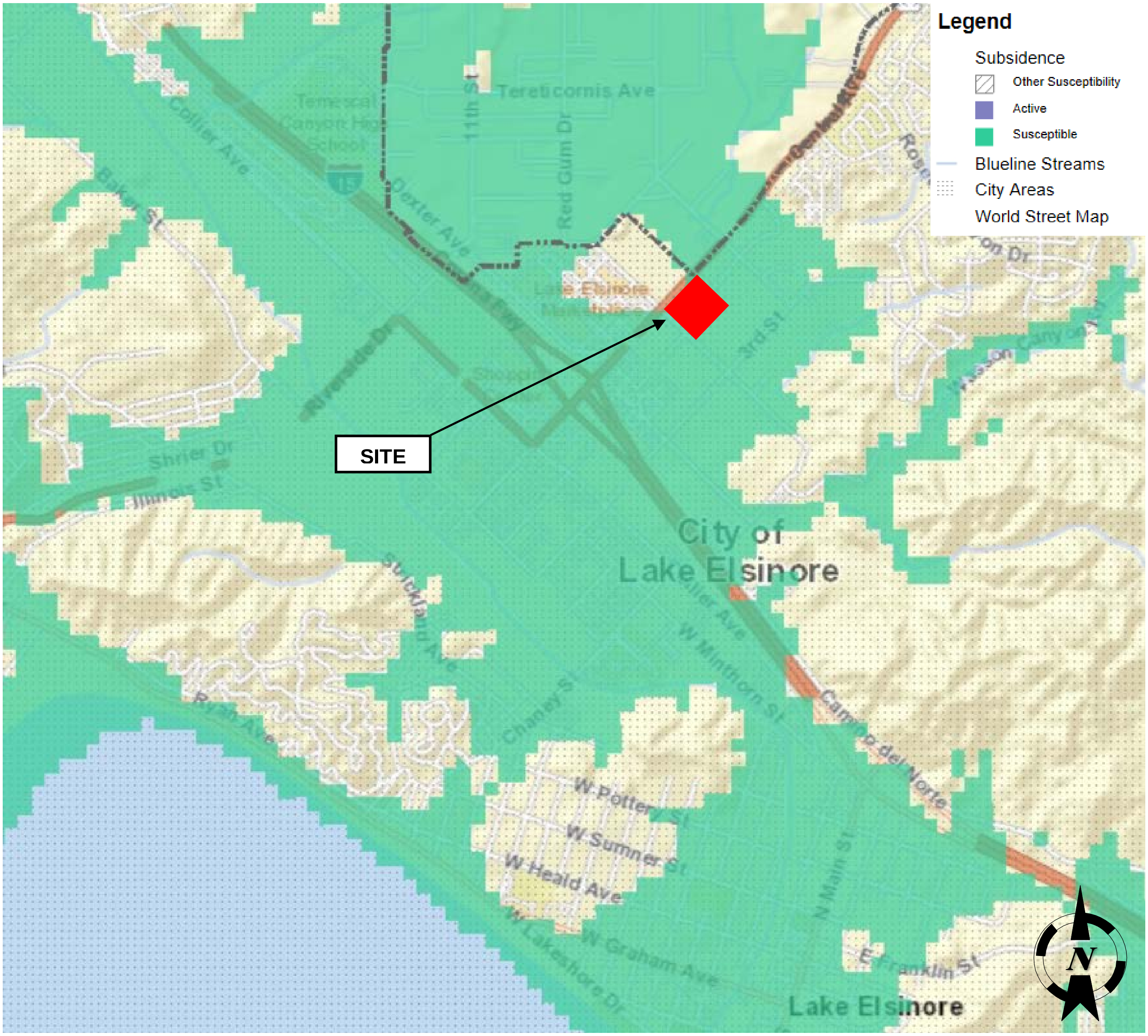
Flood Zone Map

GEOTECHNICAL ENGINEERING INVESTIGATION
Proposed Commercial Development
Central Avenue & Cambern Avenue
Lake Elsinore, Riverside County, California

SCALE: NOT TO SCALE	DATE: 04/2021
DRAWN BY: JC	APPROVED BY: CJ
PROJECT NO. 3-221-0167	FIGURE NO. 6

SALEM
engineering group, inc.



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Subsidence Zone Map

GEOTECHNICAL ENGINEERING INVESTIGATION
Proposed Commercial Development
Central Avenue & Cambern Avenue
Lake Elsinore, Riverside County, California

SCALE: NOT TO SCALE	DATE: 04/2021
DRAWN BY: JC	APPROVED BY: CJ
PROJECT NO. 3-221-0167	FIGURE NO. 7

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APPENDIX

A

APPENDIX A
FIELD EXPLORATION

Fieldwork for our investigation (drilling) was conducted on March 30 and 31, 2021 and included a site visit, subsurface exploration, percolation testing, and soil sampling. The percolation tests were performed on March 31, 2021. The locations of the exploratory borings and percolation tests are shown on the Site Plan, Figure 2. Boring logs for our exploration are presented in figures following the text in this appendix. Percolation data tables are presented in this appendix as well. Borings were located in the field using existing reference points. Therefore, actual boring locations may deviate slightly.

In general, our borings were performed using a truck-mounted CME 45C drill rig equipped with 4-inch diameter solid flight augers and 6.5-inch diameter hollow stem augers. Two (2) borings were drilled using a 4-inch diameter hand auger. Sampling in the borings was accomplished using a hydraulic 140-pound hammer with a 30-inch drop. Samples were obtained with a 3-inch outside-diameter (OD), split spoon (California Modified) sampler, and a 2-inch OD, Standard Penetration Test (SPT) sampler. The number of blows required to drive the sampler the last 12 inches (or fraction thereof) of the 18-inch sampling interval were recorded on the boring logs. The blow counts shown on the boring logs should not be interpreted as standard SPT "N" values; corrections have not been applied. Upon completion, the borings were backfilled with drill cuttings.

Subsurface conditions encountered in the exploratory borings were visually examined, classified and logged in general accordance with the American Society for Testing and Materials (ASTM) Practice for Description and Identification of Soils (Visual-Manual Procedure D2488). This system uses the Unified Soil Classification System (USCS) for soil designations. The logs depict soil and geologic conditions encountered and depths at which samples were obtained. The logs also include our interpretation of the conditions between sampling intervals. Therefore, the logs contain both observed and interpreted data. We determined the lines designating the interface between soil materials on the logs using visual observations, drill rig penetration rates, excavation characteristics and other factors. The transition between materials may be abrupt or gradual. Where applicable, the field logs were revised based on subsequent laboratory testing.

Test Boring: B-1 **Page** 1 **Of:** 2

SALEM engineering group, inc.

Project Number: 3-221-0167

Date: 03/31/2021

Client: Evergreen Devco

Project: Proposed Commercial Development

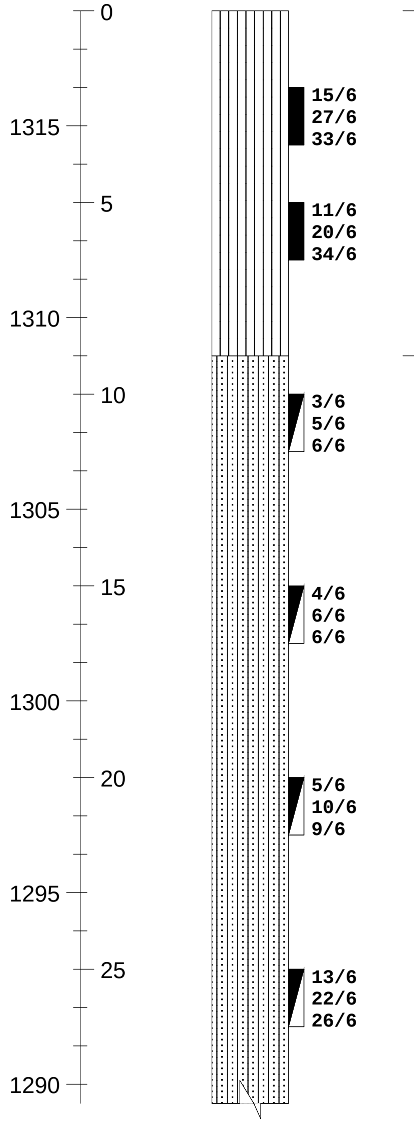
Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1318'

Auger Type: 6.5 in. Hollow Stem Auger **Initial Depth to Groundwater:** 33'

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** 29'



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
	15/6 27/6 33/6	ML	Sandy SILT Hard; moist; reddish brown; fine to medium grain sand; with trace clay.	60	8.3	124.2	
	11/6 20/6 34/6		Grades as above.	54	10.5	111.8	
	3/6 5/6 6/6	SM	Silty SAND Medium dense; moist; brown; fine to coarse grain sand; trace gravel.	11	8.0	-	
	4/6 6/6 6/6		Grades as above; dark brown.	12	7.6	-	
	5/6 10/6 9/6		Grades as above; very moist.	19	12.2	-	
	13/6 22/6 26/6		Grades as above; dense; slightly moist; mottled brown/blueish gray; with fine to coarse gravel.	48	5.0	-	

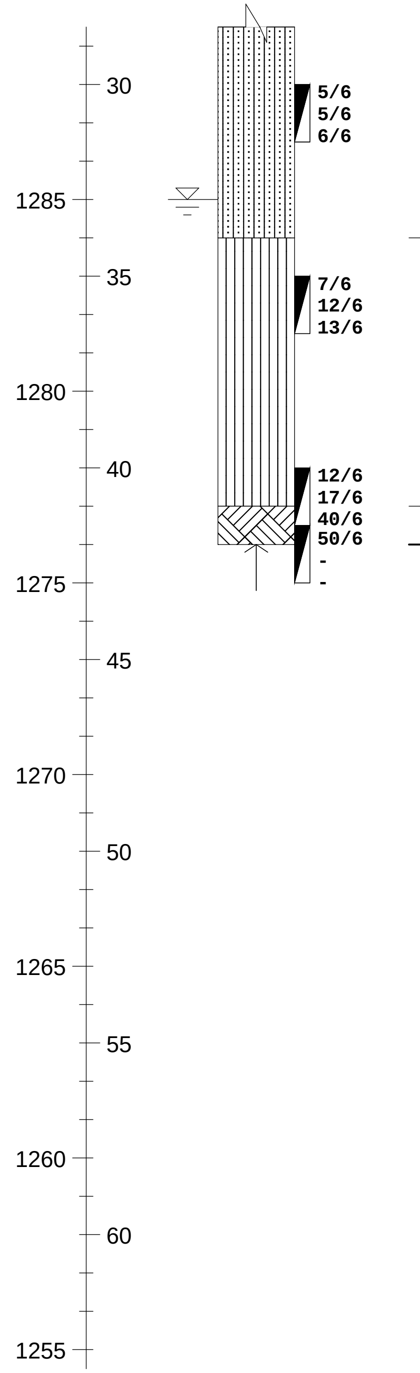
Notes:

Figure Number A-1

SALEM
engineering group, inc.

Project Number: 3-221-0167
Date: 03/31/2021
Test Boring: B-1

ELEVATION/ DEPTH (feet) | **SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA**



USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
	Grades as above; medium dense; very moist; dark brown; fine to coarse grain sand; with fine to coarse gravel.	11	16.5	-	
ML	Sandy SILT Very stiff; wet; tan/light red; fine to medium grain sand.	25	28.1	-	
	Grades as above; hard; saturated.	57	19.9	-	
ROCK	Weathered Siltstone/Claystone Hard; dry; mottled white/yellow/red.	50/6"	25.8	-	
	Auger refusal at 41.5 feet BSG due to hard drilling/ weathered bedrock.				

Notes:

Figure Number A-1

SALEM engineering group, inc.

Test Boring: B-2 **Page** 1 **Of:** 1
Project Number: 3-221-0167
Date: 03/30/2021
Client: Evergreen Devco

Project: Proposed Commercial Development
Location: Central Avenue and Cambern Avenue, Lake Elsinore, California
Drilled By: SALEM **Logged By:** JC
Drill Type: CME 45C **Elevation:** 1320'
Auger Type: 6.5 in. Hollow Stem Auger **Initial Depth to Groundwater:** N/A
Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
1320 0	4/6 16/6 20/6	SM	Silty SAND Dense; slightly moist; light brown; fine to coarse grain sand; with gravel; with trace clay.	36	6.1	-	
1315 5	4/6 13/6 25/6	ML	Sandy SILT Very stiff; moist; brown; fine to medium grain sand; with trace clay; with roots.	38	9.7	125.5	
1310 10	4/6 5/6 6/6	SM	Silty SAND Medium dense; moist; brown; fine to coarse grain sand; trace gravel.	11	5.6	-	
1305 15	4/6 6/6 7/6		Grades as above; dark brown.	13	5.8	-	
1300 20	4/6 15/6 15/6		Grades as above; slightly moist; mottled dark gray/reddish brown; fine to coarse grain sand; with gravel.	30	4.9	-	
			End of boring at 21.5 feet BSG.				
1295 25							

Notes:

Figure Number A-2

Test Boring: B-3 **Page** 1 **Of:** 1

SALEM engineering group, inc.

Project Number: 3-221-0167

Date: 03/30/2021

Client: Evergreen Devco

Project: Proposed Commercial Development

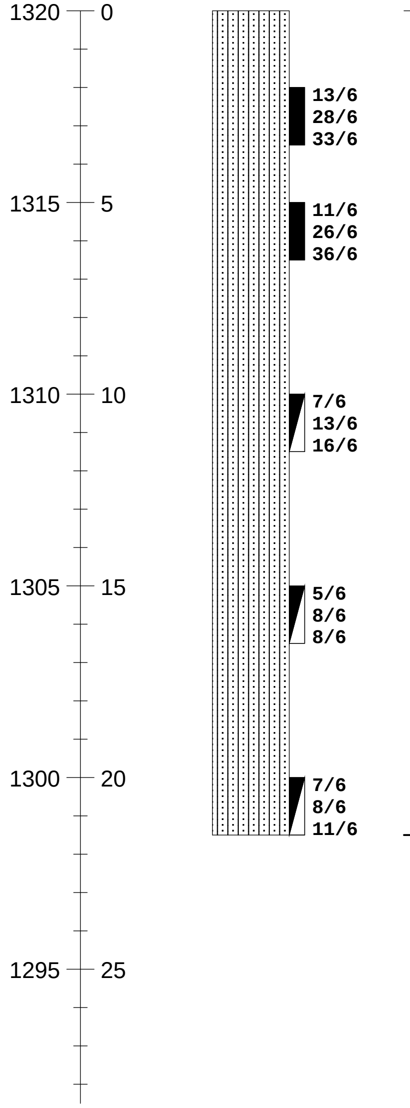
Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1320'

Auger Type: 6.5 in. Hollow Stem Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
1320 / 0		SM	Silty SAND Ver dense; slightly moist; light brown; fine to medium grain sand.				
	13/6 28/6 33/6			61	4.2	106.5	
1315 / 5	11/6 26/6 36/6		Grades as above; moist; brown.	62	6.1	116.4	
1310 / 10	7/6 13/6 16/6		Grades as above; medium dense.	29	10.6	-	
1305 / 15	5/6 8/6 8/6		Grades as above.	16	7.1	-	
1300 / 20	7/6 8/6 11/6		Grades as above; fine to coarse grain sand.	19	6.1	-	
			End of boring at 21.5 feet BSG.				
1295 / 25							

Notes:

Figure Number A-3

Test Boring: B-4 **Page** 1 **Of:** 1

Project Number: 3-221-0167

Date: 03/30/2021

Client: Evergreen Devco

Project: Proposed Commercial Development

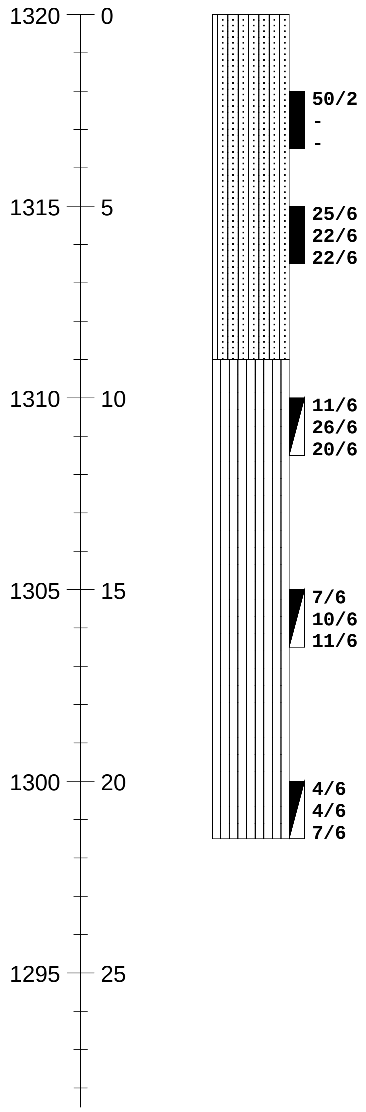
Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1320'

Auger Type: 6.5 in. Hollow Stem Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
1320 0		SM	Silty SAND				
	50/2 - -		Very dense; slightly moist; light brown; fine to medium grain sand.	50/2"	4.8	104.1	
1315 5	25/6 22/6 22/6		Grades as above; dense; brown; with roots.	44	5.2	130.7	
1310 10	11/6 26/6 20/6	ML	Sandy SILT Hard; moist; brown; fine grain sand; with trace clay.	46	12.1	-	
1305 15	7/6 10/6 11/6		Grades as above; very stiff.	21	.8	-	
1300 20	4/6 4/6 7/6		Grades as above; stiff.	11	15.1	-	
			End of boring at 21.5 feet BSG.				
1295 25							

Notes:

Figure Number A-4

Test Boring: B-5 **Page** 1 **Of:** 1

Project Number: 3-221-0167

Date: 03/30/2021

Client: Evergreen Devco

Project: Proposed Commercial Development

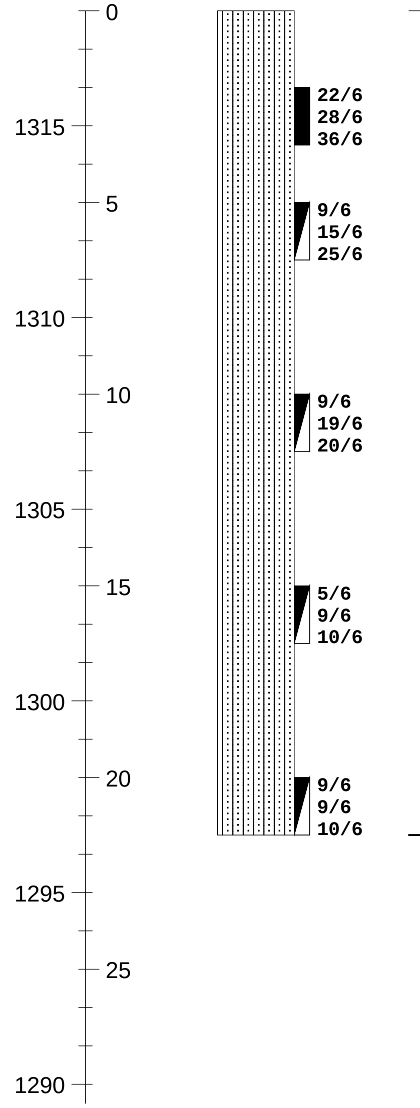
Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1318'

Auger Type: 6.5 in. Hollow Stem Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
	22/6 28/6 36/6	SM	Silty SAND Dense; moist; mottled brown/gray; fine to medium grain sand.	64	7.4	121.8	
	9/6 15/6 25/6		Grades as above; light brown.	40	7.6	-	
	9/6 19/6 20/6		Grades as above; brown.	39	9.2	-	
	5/6 9/6 10/6		Grades as above; medium dense; very moist; reddish brown; fine grain sand.	19	14.6	-	
	9/6 9/6 10/6		Grades as above; moist; mottled dark brown/gray; fine to medium grain sand.	19	6.1	-	
			End of boring at 21.5 feet BSG.				

Notes:

Figure Number A-5

SALEM engineering group, inc.

Test Boring: B-6 **Page** 1 **Of:** 1

Project Number: 3-221-0167

Date: 03/30/2021

Client: Evergreen Devco

Project: Proposed Commercial Development

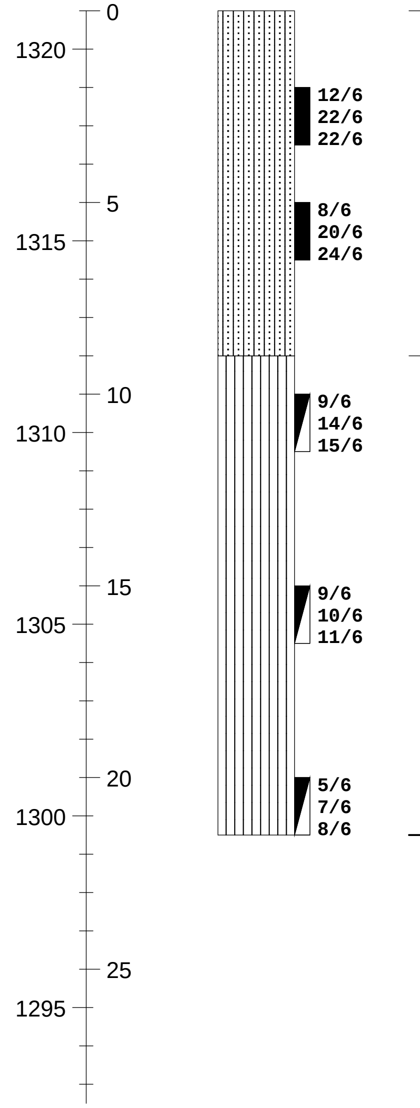
Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1321'

Auger Type: 6.5 in. Hollow Stem Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
		SM	Silty SAND Dense; moist; light brown; fine to medium grain sand; with clay.				
	12/6 22/6 22/6			44	7.8	122.7	
	8/6 20/6 24/6		Grades as above.	44	5.9	127.0	
	9/6 14/6 15/6	ML	Sandy SILT Very stiff; moist; light brown; fine grain sand; with tracel clay.	29	10.8	-	
	9/6 10/6 11/6		Grades as above; brown.	21	10.0	-	
	5/6 7/6 8/6		Grades as above; stiff; fine to medium grain sand; trace gravel.	15	10.5	-	
			End of boring at 21.5 feet BSG.				

Notes:

Figure Number A-6

SALEM
engineering group, inc.

Test Boring: B-7 **Page** 1 **Of:** 1

Project Number: 3-221-0167

Date: 03/30/2021

Client: Evergreen Devco

Project: Proposed Commercial Development

Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1316'

Auger Type: 6.5 in. Hollow Stem Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
0 1315	12/6 34/6 46/6	SM	Silty SAND Very dense; moist; light brown; fine to medium grain sand.	80	4.9	110.6	
5 1310	16/6 24/6 22/6		Grades as above; dense; mottled light brown/light gray; fine to coarse grain sand; with gravel.	46	6.1	-	Disturbed sample.
10 1305	5/6 7/6 11/6	ML	Sandy SILT Very stiff; moist; brown; fine grain sand.	18	14.2	-	
15 1300	10/6 10/6 7/6		Grades as above; fine to medium grain sand.	17	10.6	-	
20 1295	7/6 14/6 14/6	SM	Silty SAND Medium dense; moist; brown; fine to medium grain sand.	28	7.7	-	
			End of boring at 21.5 feet BSG.				
25 1290							

Notes:

Figure Number A-7

Test Boring: B-8 **Page** 1 **Of:** 1

Project Number: 3-221-0167

Date: 03/30/2021

Client: Evergreen Devco

Project: Proposed Commercial Development

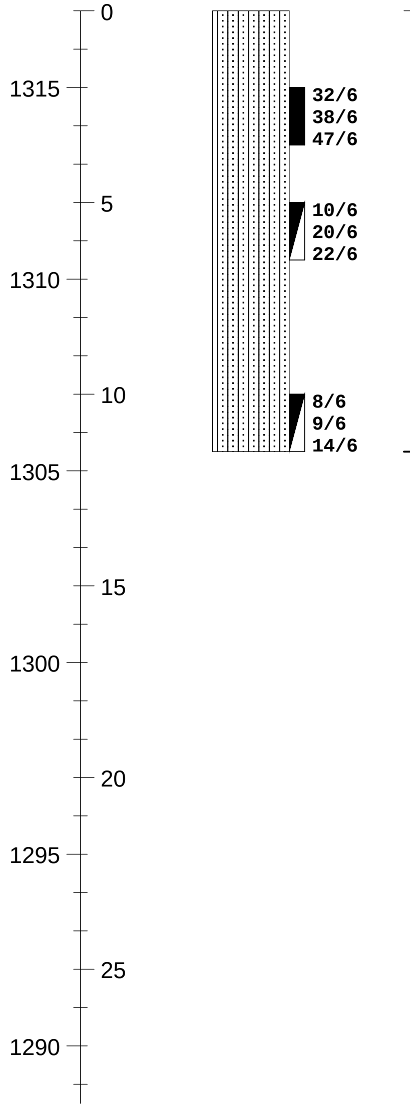
Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1317'

Auger Type: 6.5 in. Hollow Stem Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
0		SM	Silty SAND				
	32/6 38/6 47/6		Very dense; moist; light brown; fine to medium grain sand; with trace caly.	85	5.4	108.5	
5	10/6 20/6 22/6		Grades as above; dense; moist; fine grain sand.	42	7.5	-	
10	8/6 9/6 14/6		Grades as above; medium dense; very moist; reddish brown.	23	13.6	-	
			End of boring at 11.5 feet BSG.				

Notes:

Figure Number A-8

Test Boring: B-9 **Page** 1 **Of:** 1

Project Number: 3-221-0167

Date: 03/31/2021

Client: Evergreen Devco

SALEM engineering group, inc.

Project: Proposed Commercial Development

Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1323'

Auger Type: 6.5 in. Hollow Stem Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
0		SM	Silty SAND Very dense; slightly moist; brown; fine to medium grain sand.				
	20/6 34/6 39/6			73	4.3	110.1	
1320							
5	15/6 25/6 35/6		Grades as above; fine to coarse grain sand.	60	4.0	-	Disturbed sample.
1315							
10	8/6 13/6 12/6		Grades as above; moist; fine to medium grain sand.	25	5.7	-	
1310							
15	9/6 12/6 12/6		Grades as above.	24	5.8	117.0	
1305							
20	5/6 11/6 14/6		Grades as above.	25	6.9	-	
			End of boring at 21.5 feet BSG.				
1300							
25							
1295							

Notes:

Figure Number A-9

Test Boring: B-10 **Page** 1 **Of:** 1

Project Number: 3-221-0167

Date: 03/31/2021

Client: Evergreen Devco

Project: Proposed Commercial Development

Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1323'

Auger Type: 4 in. Solid Flight Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
0		SM	POTENTIAL FILL Silty SAND				
1320	20/6 35/6 40/6		Very dense; slightly moist; brown; fine to coarse grain sand.	75	4.0	115.0	
5	35/6 50/4 -		Grades as above.	50/4"	4.3	106.3	
1315							
10	8/6 10/6 11/6		Grades as above; medium dense; with gravel.	21	4.8	-	
1310							
15	6/6 10/6 14/6		Grades as above; fine to medium grain sand; no gravel.	24	4.6	-	
1305							
20	5/6 5/6 10/6		Grades as above; fine grain sand.	15	5.3	-	
			End of boring at 21.5 feet BSG.				
1300							
25							
1295							

Notes:

Figure Number A-10

SALEM engineering group, inc.

Test Boring: B-11 **Page** 1 **Of:** 1

Project Number: 3-221-0167

Date: 03/31/2021

Client: Evergreen Devco

Project: Proposed Commercial Development

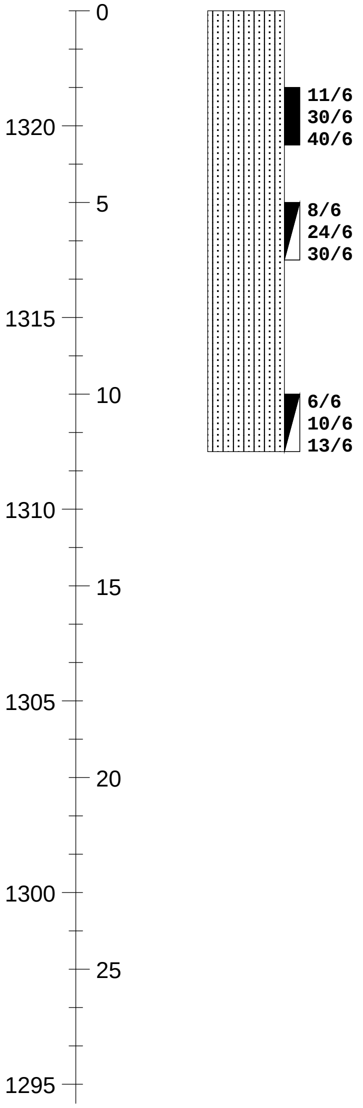
Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1323'

Auger Type: 4 in. Solid Flight Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
		SM	Silty SAND Very dense; slightly moist; brown; fine grain sand.				
	11/6 30/6 40/6			70	4.3	111.8	
	8/6 24/6 30/6		Grades as above; dense; moist; fine to coarse grain sand; trace gravel.	54	6.0	-	
	6/6 10/6 13/6		Grades as above; medium dense; reddish brown.	23	9.7	-	
			End of boring at 11.5 feet BSG.				

Notes:

Figure Number A-11

Test Boring: B-12 **Page** 1 **Of:** 1

Project Number: 3-221-0167

Date: 03/31/2021

Client: Evergreen Devco

Project: Proposed Commercial Development

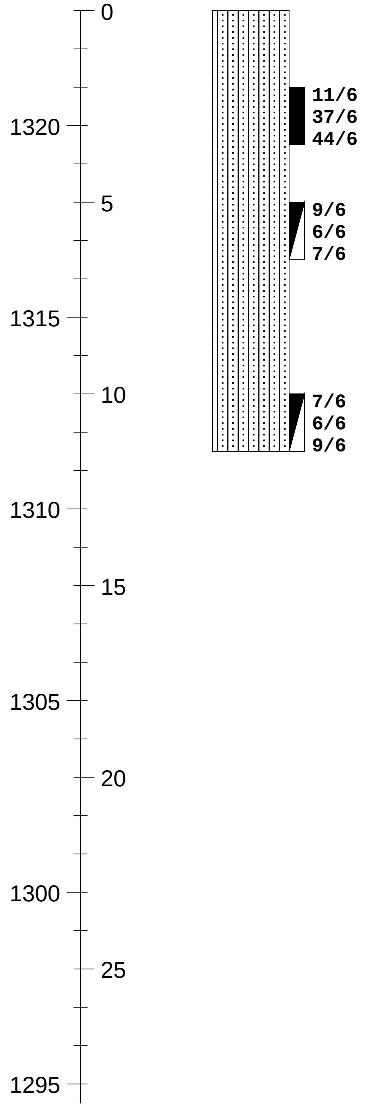
Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1323

Auger Type: 4 in. Solid Flight Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
	11/6 37/6 44/6	SM	Silty SAND Very dense; damp; brown; fine to medium grain sand.	81	2.5	113.1	
	9/6 6/6 7/6		Grades as above; medium dense; slightly moist.	13	4.9	-	
	7/6 6/6 9/6		Grades as above; fine grain sand.	15	4.4	-	
			End of boring at 11.5 feet BSG.				

Notes:

Figure Number A-12

SALEM engineering group, inc.

Test Boring: B-13 **Page** 1 **Of:** 1

Project Number: 3-221-0167

Date: 03/31/2021

Client: Evergreen Devco

Project: Proposed Commercial Development

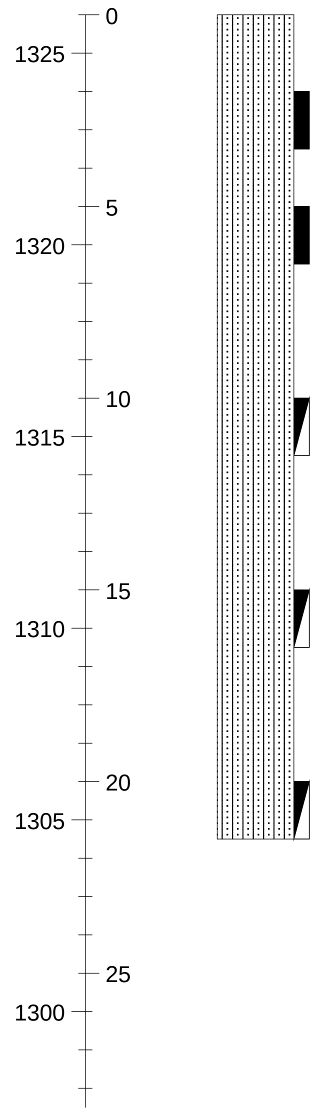
Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1326'

Auger Type: 4 in. Solid Flight Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
0		SM	POTENTIAL FILL Silty SAND Very dense; slightly moist; light brown; fine grain sand.	50/6"	4.0	106.0	
	25/6 50/6 -						
5	30/6 41/6 48/6		Grades as above.	89	4.4	117.0	
10	11/6 17/6 18/6		Grades as above; dense; moist.	35	7.3	-	
15	4/6 5/6 15/6		Grades as above; medium dense; slightly moist; fine to coarse grain sand; trace gravel.	20	3.6	-	
20	6/6 8/6 12/6		Grades as bove; moist; brown; fine grain sand.	20	8.7	-	
			End of boring at 21.5 feet BSG.				

Notes:

Figure Number A-13

Test Boring: B-14 **Page** 1 **Of:** 1

Project Number: 3-221-0167

Date: 03/31/2021

Client: Evergreen Devco

Project: Proposed Commercial Development

Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1329'

Auger Type: 4 in. Solid Flight Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
0	35/6 50/4 -	SM	Silty SAND Very dense; slightly moist; light brown; fine to coarse grain sand; trace gravel.	50/4"	3.7	120.2	
1325 5	50/5 - -		Grades as above; fine to medium grain sand; no gravel.	50/5"	4.4	103.7	
1320 10	10/6 14/6 30/6		Grades as above; dense; moist; brown.	44	7.6	-	
1315 15	13/6 15/6 16/6		Grades as above; slightly moist; reddish brown; fine to coarse grain sand; with gravel.	31	3.4	-	
1310 20	8/6 8/6 16/6		Grades as above; no gravel.	24	4.5	-	
1305 25			End of boring at 21.5 feet BSG.				

Notes:

Figure Number A-14

SALEM engineering group, inc.

Test Boring: B-15 **Page** 1 **Of:** 1

Project Number: 3-221-0167

Date: 03/31/2021

Client: Evergreen Devco

Project: Proposed Commercial Development

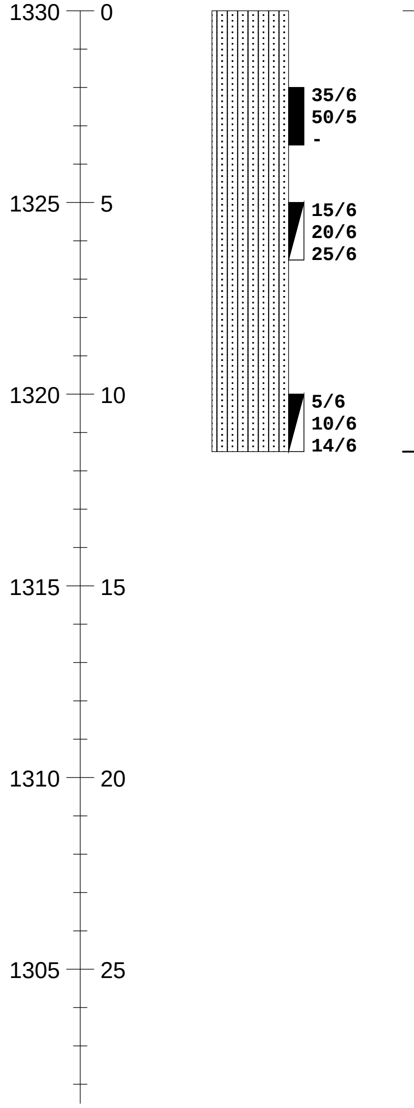
Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1330'

Auger Type: 4 in. Solid Flight Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
1330 0	35/6 50/5 -	SM	Silty SAND Very dense; slightly moist; light brown; fine to medium grain sand.	50/5"	3.7	111.6	
1325 5	15/6 20/6 25/6		Grades as above; dense.	45	5.5	-	
1320 10	5/6 10/6 14/6		Grades as above; medium dense; moist; brown.	24	9.6	-	
			End of boring at 11.5 feet BSG.				
1315 15							
1310 20							
1305 25							

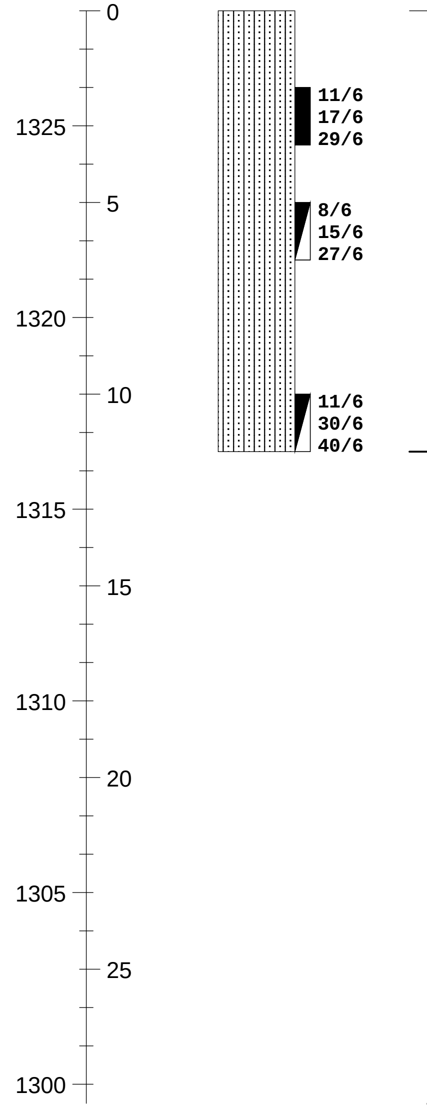
Notes:

Figure Number A-15

SALEM
engineering group, inc.

Test Boring: B-16 **Page** 1 **Of:** 1
Project Number: 3-221-0167
Date: 03/31/2021
Client: Evergreen Devco

Project: Proposed Commercial Development
Location: Central Avenue and Cambern Avenue, Lake Elsinore, California
Drilled By: SALEM **Logged By:** JC
Drill Type: CME 45C **Elevation:** 1328'
Auger Type: 4 in. Solid Flight Auger **Initial Depth to Groundwater:** N/A
Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
	11/6 17/6 29/6	SM	Silty SAND Dense; slightly moist; brown; fine to medium grain sand.	46	3.0	105.9	
	8/6 15/6 27/6		Grades as above; light brown; fine to coarse grain sand.	42	4.1	-	
	11/6 30/6 40/6		Grades as above; very dense; moist; with trace clay.	70	8.5	-	
			End of boring at 11.5 feet BSG.				

Notes:

Figure Number A-16

Test Boring: B-17 **Page** 1 **Of:** 1

Project Number: 3-221-0167

Date: 03/30/2021

Client: Evergreen Devco

SALEM engineering group, inc.

Project: Proposed Commercial Development

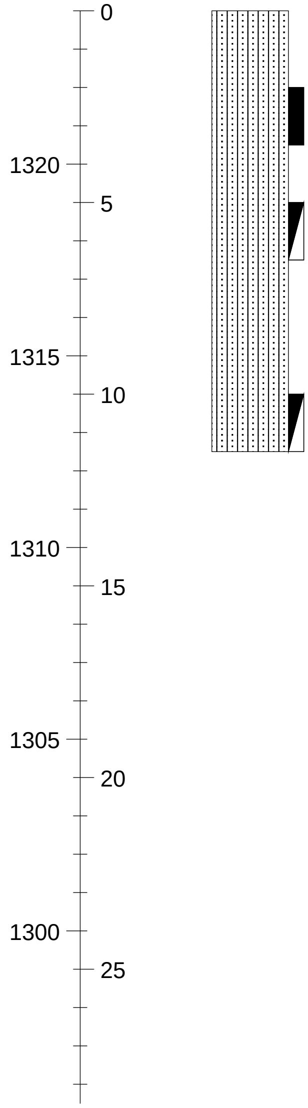
Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1324'

Auger Type: 6.5 in. Hollow Stem Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
	18/6 27/6 50/1	SM	Silty SAND Very dense; moist; brown; fine to medium grain sand; with trace clay.	77/7"	6.9	132.9	
	10/6 50/2 -		Grades as above; slightly moist; light brown.	50/2"	4.4	-	
	5/6 7/6 13/6		Grades as above; moist; fine grain sand.	20	8.0	-	
			End of boring at 21.5 feet BSG.				

Notes:

Figure Number A-17

Test Boring: B-18 **Page** 1 **Of:** 1

Project Number: 3-221-0167

Date: 03/30/2021

Client: Evergreen Devco

Project: Proposed Commercial Development

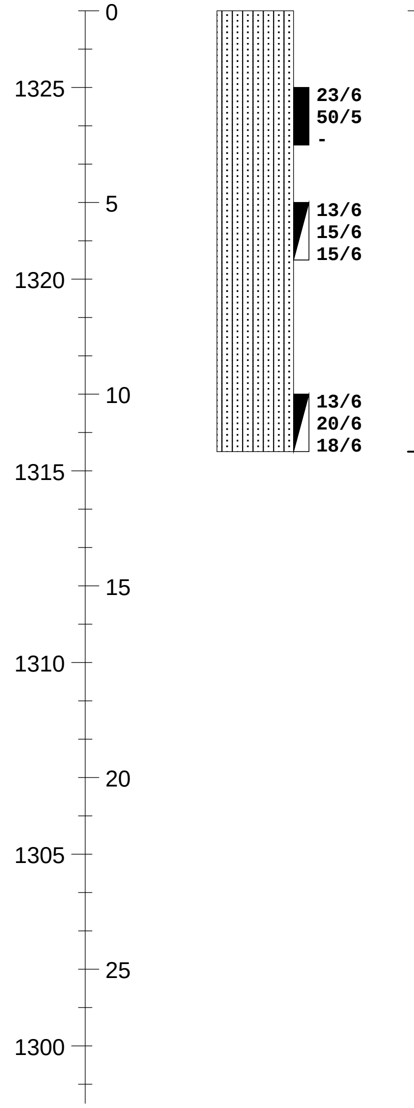
Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1327'

Auger Type: 6.5 in. Hollow Stem Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
		SM	Silty SAND				
	23/6 50/5 -		Very dense; slightly moist; light brown; fine to medium grain sand; with roots.	50/5"	3.3	110.6	
	13/6 15/6 15/6		Grades as above; medium dense; moist; no roots.	30	6.6	-	
	13/6 20/6 18/6		Grades as above; dense; brown.	38	8.9	-	
			End of boring at 11.5 feet BSG.				

Notes:

Figure Number A-18

Test Boring: B-19 **Page** 1 **Of:** 1

SALEM engineering group, inc.

Project Number: 3-221-0167

Date: 03/31/2021

Client: Evergreen Devco

Project: Proposed Commercial Development

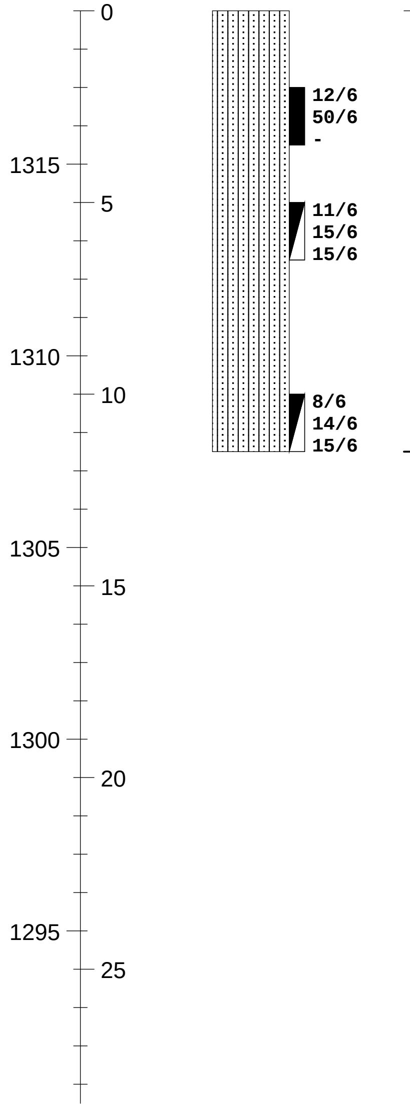
Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1319'

Auger Type: 6.5 in. Hollow Stem Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
	12/6 50/6 -	SM	Silty SAND Very dense; slightly moist; light brown; fine to medium grain sand; with trace clay.	50/6"	3.2	109.2	
	11/6 15/6 15/6		Grades as above; medium dense; moist; fine to coarse grain sand.	30	6.1	-	
	8/6 14/6 15/6		Grades as above; reddish brown; fine to medium grain sand.	29	7.0	-	
			End of boring at 11.5 feet BSG.				

Notes:

Figure Number A-19

SALEM
engineering group, inc.

Test Boring: B-20 **Page** 1 **Of:** 1

Project Number: 3-221-0167

Date: 03/31/2021

Client: Evergreen Devco

Project: Proposed Commercial Development

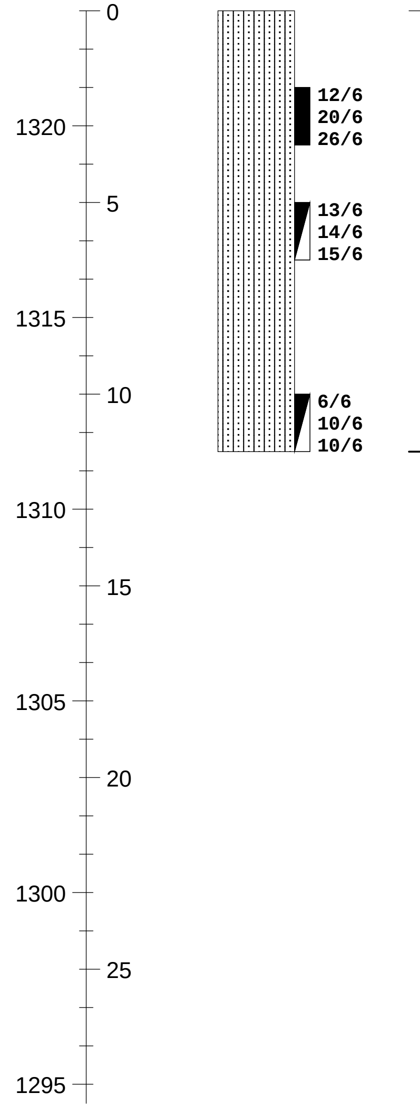
Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1323'

Auger Type: 6.5 in. Hollow Stem Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
0		SM	Silty SAND Dense; slightly moist; brown; fine to medium grain sand.				
	12/6 20/6 26/6			46	5.1	116.7	
5	13/6 14/6 15/6		Grades as above; medium dense; fine to coarse grain sand; trace gravel.	29	5.9	-	Limited recovery.
10	6/6 10/6 10/6		Grades as above; moist; reddish brown; fine to medium grain sand; no gravel.	20	12.0	-	
			End of boring at 11.5 feet BSG.				

Notes:

Figure Number A-20

Test Boring: B-21 **Page** 1 **Of:** 1

Project Number: 3-221-0167

Date: 03/30/2021

Client: Evergreen Devco

Project: Proposed Commercial Development

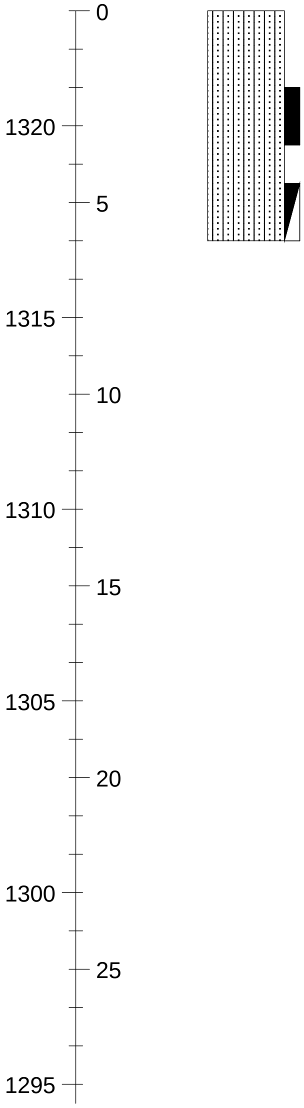
Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1323'

Auger Type: 6.5 in. Hollow Stem Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
0		SM	Silty SAND Very dense; damp; light brown; fine to medium grain sand.				
	10/6 37/6 39/6			76	2.8	105.2	
5	13/6 32/6 37/6		Grades as above; slightly moist.	69	3.8	-	
			End of boring at 6 feet BSG.				

Notes:

Figure Number A-21

Test Boring: B-22 **Page** 1 **Of:** 1

Project Number: 3-221-0167

Date: 03/30/2021

Client: Evergreen Devco

SALEM engineering group, inc.

Project: Proposed Commercial Development

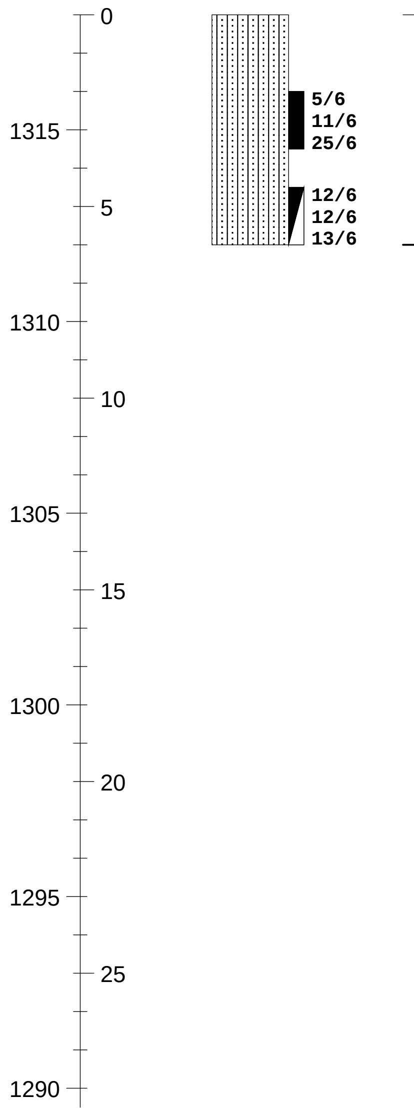
Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1318'

Auger Type: 6.5 in. Hollow Stem Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140 lb/30 in **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
0		SM	Silty SAND Medium dense; slightly moist; light brown; fine to medium grain sand.				
	5/6 11/6 25/6			36	4.8	110.4	
5	12/6 12/6 13/6		Grades as above; moist; mottled light brown/reddish brown/gray; trace gravel.	25	7.3	-	
			End of boring at 6 feet BSG.				

Notes:

Figure Number A-22

Test Boring: B-23 **Page** 1 **Of:** 1

Project Number: 3-221-0167

Date: 03/30/2021

Client: Evergreen Devco

Project: Proposed Commercial Development

Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

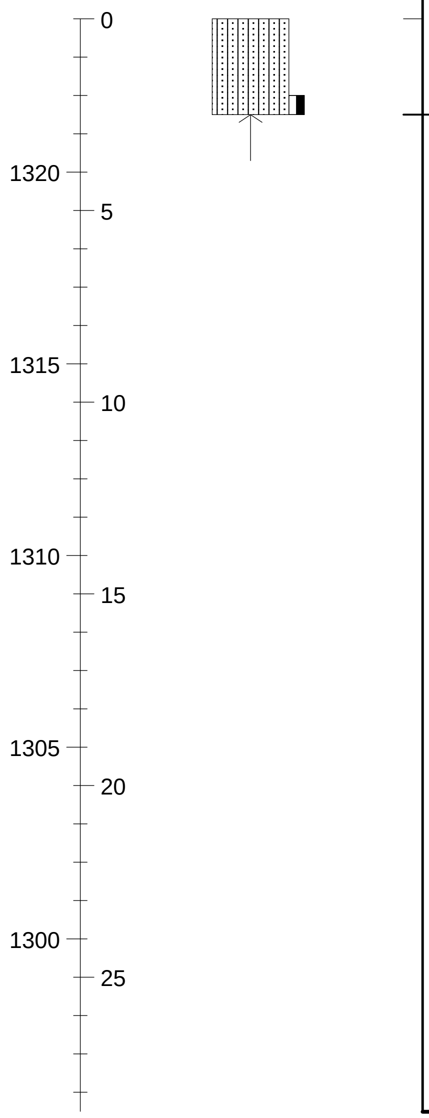
Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1324'

Auger Type: 4 in. Hand Auger **Initial Depth to Groundwater:** N/A

Hammer Type: N/A **Final Depth to Groundwater:** N/A

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
		SM	Silty SAND Moist; dark grayish brown; fine to coarse grain sand; with gravel.		5.9	-	
			Refusal at 2.5 feet due to gravel.				



Notes:

Figure Number A-23

SALEM engineering group, inc.

Test Boring: B-24 **Page** 1 **Of:** 1

Project Number: 3-221-0167

Date: 03/30/2021

Client: Evergreen Devco

Project: Proposed Commercial Development

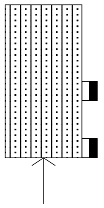
Location: Central Avenue and Cambern Avenue, Lake Elsinore, California

Drilled By: SALEM **Logged By:** JC

Drill Type: CME 45C **Elevation:** 1325'

Auger Type: 4 in. Hand Auger **Initial Depth to Groundwater:** N/A

Hammer Type: N/A **Final Depth to Groundwater:** N/A

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
1325 — 0		SM	Silty SAND Moist; brown; fine grain sand.				
					5.5	-	
			Grades as above; dark brown; with gravel.		4.5	-	
1320 — 5			Refusal at 4 feet due to gravel.				
1315 — 10							
1310 — 15							
1305 — 20							
1300 — 25							

Notes:

Figure Number A-24

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
▥	Silt
▦	Silty sand
▩	Bedrock
Misc. Symbols	
↑	Drill rejection
⌇	Boring continues
▽	Water table during drilling
Soil Samplers	
■	California sampler
◩	Standard penetration test
◨	Auger

Notes:

Granular Soils
Blows Per Foot (Uncorrected)

	MCS	SPT
Very loose	<5	<4
Loose	5-15	4-10
Medium dense	16-40	11-30
Dense	41-65	31-50
Very dense	>65	>50

Cohesive Soils
Blows Per Foot (Uncorrected)

	MCS	SPT
Very soft	<3	<2
Soft	3-5	2-4
Firm	6-10	5-8
Stiff	11-20	9-15
Very Stiff	21-40	16-30
Hard	>40	>30

MCS = Modified California Sampler
SPT = Standard Penetration Test Sampler

Percolation Test Worksheet

Project: Proposed Commercial Development
Central Ave. & Cambern Ave.
Lake Elsinore, California

Job No.: 3-221-0167
Date Drilled: 3/30/2021
Soil Classification: Silty SAND (SM)

Hole Radius: 4 in.
Pipe Dia.: 3 in.
Total Depth of Hole: 75 in.

Test Hole No.: **P-1**
Tested by: **JC**
Drilled Hole Depth: **6.25** ft.

Presoaking Date: 3/30/2021
Test Date: 3/31/2021

Pipe Stick up: 0.5 ft.

Time Start	Time Finish	Depth of Test Hole (ft)[#]	Refill-Yes or No	Elapsed Time (hrs:min)	Initial Water Level[#] (ft)	Final Water Level[#] (ft)	Δ Water Level (in.)	Δ Min.	Meas. Perc Rate (min/in)	Initial Height of Water (in)	Final Height of Water (in)	Average Height of Water (in)	Infiltration Rate, It (in/hr)
10:40	11:10	6.75	Y	0:30	4.02	4.22	2.40	30	12.5	32.8	30.4	31.6	0.29
11:10	11:40	6.75	N	0:30	4.22	4.39	2.04	30	14.7	30.4	28.3	29.3	0.26
11:40	12:10	6.75	N	0:30	4.39	4.54	1.80	30	16.7	28.3	26.5	27.4	0.24
12:10	12:40	6.75	N	0:30	4.54	4.67	1.56	30	19.2	26.5	25.0	25.7	0.22
12:40	13:10	6.75	N	0:30	4.67	4.78	1.32	30	22.7	25.0	23.6	24.3	0.20
13:10	13:40	6.75	N	0:30	4.78	4.88	1.20	30	25.0	23.6	22.4	23.0	0.19
13:40	14:10	6.75	N	0:30	4.88	4.97	1.08	30	27.8	22.4	21.4	21.9	0.18
14:10	14:40	6.75	N	0:30	4.97	5.05	0.96	30	31.3	21.4	20.4	20.9	0.17
14:40	15:10	6.75	N	0:30	5.05	5.13	0.96	30	31.3	20.4	19.4	19.9	0.18
15:10	15:40	6.75	N	0:30	5.13	5.20	0.84	30	35.7	19.4	18.6	19.0	0.16
15:40	16:10	6.75	N	0:30	5.20	5.27	0.84	30	35.7	18.6	17.8	18.2	0.17
16:10	16:40	6.75	N	0:30	5.27	5.34	0.84	30	35.7	17.8	16.9	17.3	0.17
Recommended for Design:										**Infiltration Rate**			**0.16**

SALEM engineering group, inc.

Percolation Test Worksheet

Project: Proposed Commercial Development
Central Ave. & Cambern Ave.
Lake Elsinore, California

Job No.: 3-221-0167
Date Drilled: 3/30/2021
Soil Classification: Silty SAND (SM)

Hole Radius: 4 in.
Pipe Dia.: 3 in.
Total Depth of Hole: 72 in.

Test Hole No.: **P-2**
Tested by: JC
Drilled Hole Depth: 6.0 ft.

Presoaking Date: 3/30/2021
Test Date: 3/31/2021

Pipe Stick up: 0.25 ft.

Time Start	Time Finish	Depth of Test Hole (ft)$^{\#}$	Refill-Yes or No	Elapsed Time (hrs:min)	Initial Water Level$^{\#}$ (ft)	Final Water Level$^{\#}$ (ft)	Δ Water Level (in.)	Δ Min.	Meas. Perc Rate (min/in)	Initial Height of Water (in)	Final Height of Water (in)	Average Height of Water (in)	Infiltration Rate, It (in/hr)
7:17	7:47	6.25	Y	0:30	4.24	4.33	1.08	30	27.8	24.1	23.0	23.6	0.17
7:47	8:17	6.25	N	0:30	4.33	4.40	0.84	30	35.7	23.0	22.2	22.6	0.14
8:17	8:47	6.25	N	0:30	4.40	4.47	0.84	30	35.7	22.2	21.4	21.8	0.14
8:47	9:17	6.25	N	0:30	4.47	4.53	0.72	30	41.7	21.4	20.6	21.0	0.13
9:17	9:47	6.25	N	0:30	4.53	4.58	0.60	30	50.0	20.6	20.0	20.3	0.11
9:47	10:17	6.25	N	0:30	4.58	4.63	0.60	30	50.0	20.0	19.4	19.7	0.11
10:17	10:47	6.25	N	0:30	4.63	4.67	0.48	30	62.5	19.4	19.0	19.2	0.09
10:47	11:17	6.25	N	0:30	4.67	4.71	0.48	30	62.5	19.0	18.5	18.7	0.09
11:17	11:47	6.25	N	0:30	4.71	4.75	0.48	30	62.5	18.5	18.0	18.2	0.09
11:47	12:17	6.25	N	0:30	4.75	4.78	0.36	30	83.3	18.0	17.6	17.8	0.07
12:17	12:47	6.25	N	0:30	4.78	4.81	0.36	30	83.3	17.6	17.3	17.5	0.07
12:47	13:17	6.25	N	0:30	4.81	4.84	0.36	30	83.3	17.3	16.9	17.1	0.08
Recommended for Design:										**Infiltration Rate**			**0.07**

SALEM
engineering group, inc.

Salem Engineering Group, Inc.
8711 Monroe Court, Suite A
Rancho Cucamonga, CA 91730
(909) 980-6455

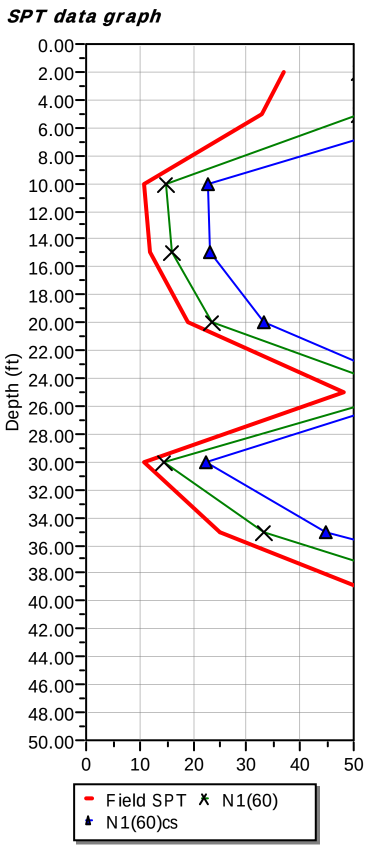
LIQUEFACTION ANALYSIS REPORT

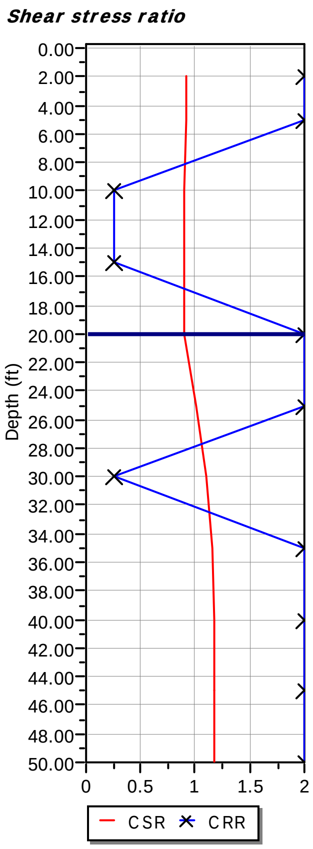
Project title : 3-221-0167

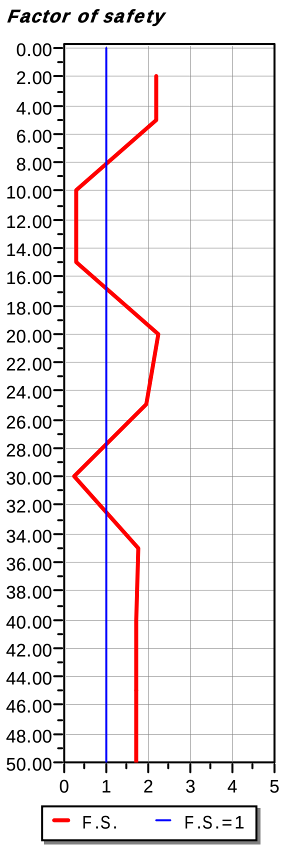
Project subtitle : Lake Elsinore

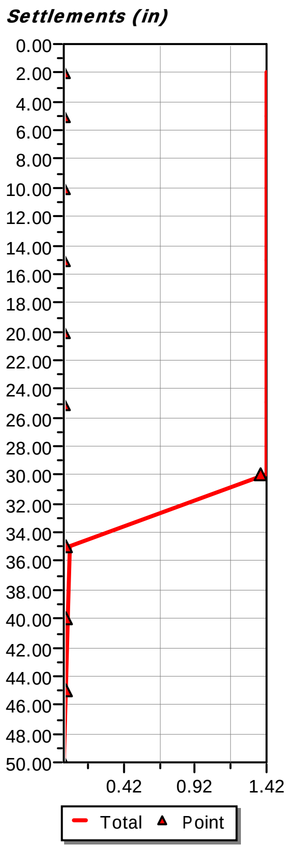
Input parameters and analysis data

In-situ data type:	Standard Penetration Test	Depth to water table:	20.00 ft
Analysis type:	Deterministic	Earthquake magnitude M_w:	7.90
Analysis method:	NCEER 1998	Peak ground accelaration:	0.95 g
Fines correction method:	Idriss & Seed	User defined F.S.:	1.30

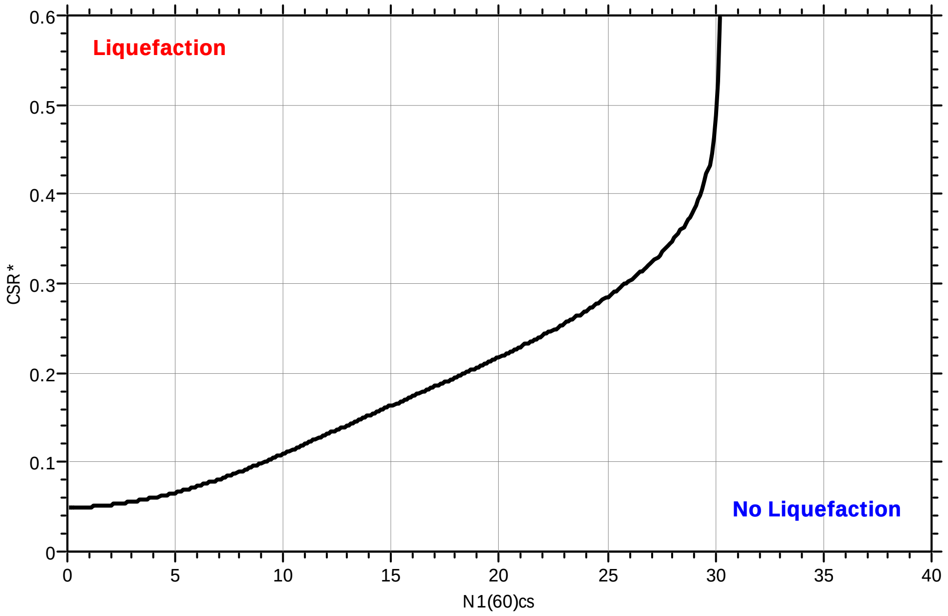

SPT data graph


Shear stress ratio


Factor of safety


Settlements (in)

$M_w=7^{1/2}$, sigma'=1 atm base curve



:: Field input data ::

Point ID	Depth (ft)	Field N_{SPT} (blows/feet)	Unit weight (pcf)	Fines content (%)
1	2.00	37.00	120.00	63.00
2	5.00	33.00	120.00	60.00
3	10.00	11.00	120.00	34.00
4	15.00	12.00	120.00	30.00
5	20.00	19.00	120.00	40.00
6	25.00	48.00	120.00	13.00
7	30.00	11.00	120.00	39.00
8	35.00	25.00	120.00	65.00
9	40.00	57.00	120.00	67.00
10	45.00	60.00	120.00	65.00
11	50.00	60.00	120.00	65.00

Depth : Depth from free surface, at which SPT was performed (ft)
Field SPT : SPT blows measured at field (blows/feet)
Unit weight : Bulk unit weight of soil at test depth (pcf)
Fines content : Percentage of fines in soil (%)

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Point ID	Depth (ft)	Sigma (tsf)	u (tsf)	Sigma' (tsf)	r_d	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*
1	2.00	0.12	0.00	0.12	1.00	0.61	0.88	0.70	1.00	0.70
2	5.00	0.30	0.00	0.30	0.99	0.61	0.88	0.70	1.00	0.70
3	10.00	0.60	0.00	0.60	0.98	0.60	0.88	0.69	1.00	0.69
4	15.00	0.90	0.00	0.90	0.97	0.60	0.88	0.68	1.00	0.68
5	20.00	1.20	0.00	1.20	0.95	0.59	0.88	0.67	0.97	0.69
6	25.00	1.50	0.16	1.34	0.94	0.65	0.88	0.74	0.95	0.78
7	30.00	1.80	0.31	1.49	0.93	0.69	0.88	0.79	0.93	0.85
8	35.00	2.10	0.47	1.63	0.89	0.71	0.88	0.81	0.91	0.88
9	40.00	2.40	0.62	1.78	0.85	0.71	0.88	0.81	0.90	0.90
10	45.00	2.70	0.78	1.92	0.81	0.70	0.88	0.80	0.89	0.91
11	50.00	3.00	0.94	2.06	0.77	0.69	0.88	0.79	0.87	0.90

Depth : Depth from free surface, at which SPT was performed (ft)
Sigma : Total overburden pressure at test point, during earthquake (tsf)
u : Water pressure at test point, during earthquake (tsf)
Sigma' : Effective overburden pressure, during earthquake (tsf)
r_d : Nonlinear shear mass factor
CSR : Cyclic Stress Ratio
MSF : Magnitude Scaling Factor
$CSR_{eq,M=7.5}$ CSR adjusted for M=7.5
K_{sigma} Effective overburden stress factor
CSR^* CSR fully adjusted

:: Cyclic Resistance Ratio calculation $CRR_{7.5}$ ::

Point ID	Field SPT	C_n	C_e	C_b	C_r	C_s	$N_{1(60)}$	DeltaN	$N_{1(60)cs}$	$CRR_{7.5}$
1	37.00	1.70	0.86	1.05	0.75	1.20	51.18	15.24	66.42	2.00
2	33.00	1.70	0.90	1.05	0.80	1.20	51.04	15.21	66.25	2.00
3	11.00	1.32	0.97	1.05	0.85	1.20	15.10	7.77	22.88	0.25
4	12.00	1.08	1.04	1.05	0.95	1.20	16.11	7.19	23.30	0.26
5	19.00	0.93	1.11	1.05	0.95	1.20	23.56	9.71	33.27	2.00
6	48.00	0.88	1.18	1.05	0.95	1.20	59.75	4.09	63.84	2.00
7	11.00	0.84	1.25	1.05	1.00	1.20	14.50	7.90	22.40	0.25
8	25.00	0.80	1.32	1.05	1.00	1.20	33.22	11.64	44.86	2.00
9	57.00	0.77	1.33	1.05	1.00	1.20	73.44	19.69	93.12	2.00
10	60.00	0.74	1.33	1.05	1.00	1.20	74.35	19.87	94.22	2.00
11	60.00	0.71	1.33	1.05	1.00	1.20	71.71	19.34	91.05	2.00

:: Cyclic Resistance Ratio calculation $CRR_{7.5}$ ::

Point ID	Field SPT	C_n	C_e	C_b	C_r	C_s	$N_{1(60)}$	DeltaN	$N_{1(60)cs}$	$CRR_{7.5}$

C_n :	Overburden corretion factor
C_e :	Energy correction factor
C_b :	Borehole diameter correction factor
C_r :	Rod length correction factor
C_s :	Liner correction factor
$N_{1(60)}$:	Corrected N_{SPT}
DeltaN :	Addition to corrected N_{SPT} value due to the presence of fines
$N_{1(60)cs}$:	Corected $N_{1(60)}$ value for fines
$CRR_{7.5)}$:	Cyclic resistance ratio for M=7.5

:: Settlements calculation for saturated sands ::

Point ID	$N_{1(60)}$	N_1	FS_L	e_v (%)	Settle. (in)
1	66.42	55.35	2.19	0.00	0.00
2	66.25	55.21	2.21	0.00	0.00
3	22.88	19.07	0.28	2.25	0.00
4	23.30	19.42	0.29	2.21	0.00
5	33.27	27.72	2.22	0.00	0.00
6	63.84	53.20	1.97	0.00	0.00
7	22.40	18.67	0.22	2.29	1.38
8	44.86	37.39	1.74	0.02	0.01
9	93.12	77.60	1.71	0.02	0.01
10	94.22	78.51	1.70	0.02	0.01
11	91.05	75.87	1.70	0.02	0.01

Total settlement : 1.42

$N_{1,(60)}$:	Stress normalized and corrected SPT blow count
N_1:	Japanese equivalent corrected value
FS_L:	Calculated factor of safety
e_v:	Post-liquefaction volumentric strain (%)
Settle.:	Calculated settlement (in)

:: Liquefaction potential according to Iwasaki ::

Point ID	F	w_z	I_L
1	0.00	9.70	0.00
2	0.00	9.24	0.00
3	0.72	8.48	9.26
4	0.71	7.71	8.31
5	0.00	6.95	0.00
6	0.00	6.19	0.00
7	0.78	5.43	6.43
8	0.00	4.67	0.00
9	0.00	3.90	0.00
10	0.00	3.14	0.00
11	0.00	2.38	0.00

Overall potential I_L : 24.01

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

APPENDIX

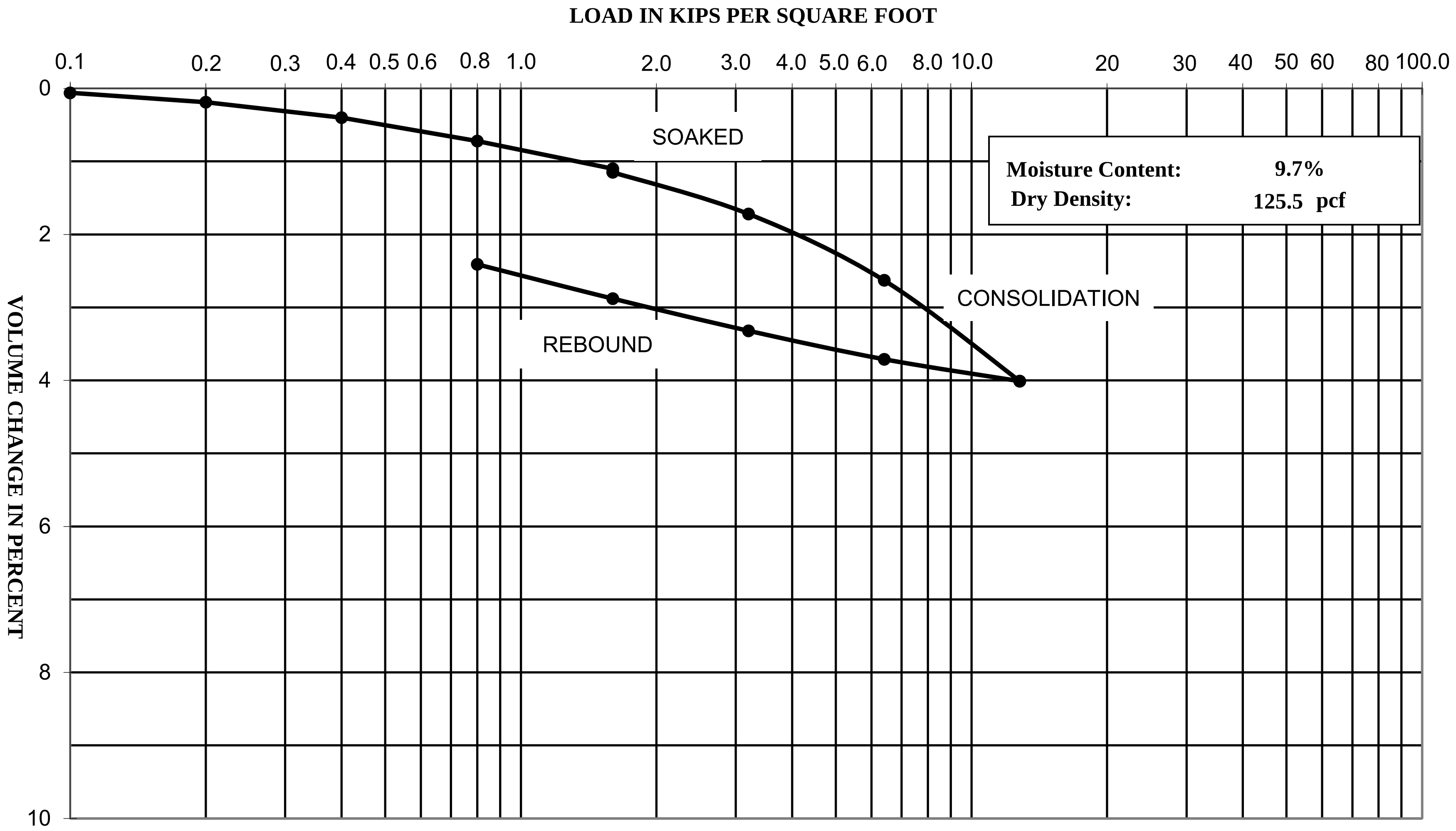
B

APPENDIX B
LABORATORY TESTING

Laboratory tests were performed in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM), Caltrans, or other suggested procedures. Selected samples were tested for in-situ dry density and moisture content, corrosivity, consolidation, shear strength, expansion index, maximum dry density and optimum moisture content and grain size distribution. The results of the laboratory tests are summarized in the following figures.

CONSOLIDATION - PRESSURE TEST DATA

ASTM D2435



Project Name: Proposed Commercial Development - Lake Elsinore, CA

Project Number: 3-221-0167

Boring: B-2 @ 5'

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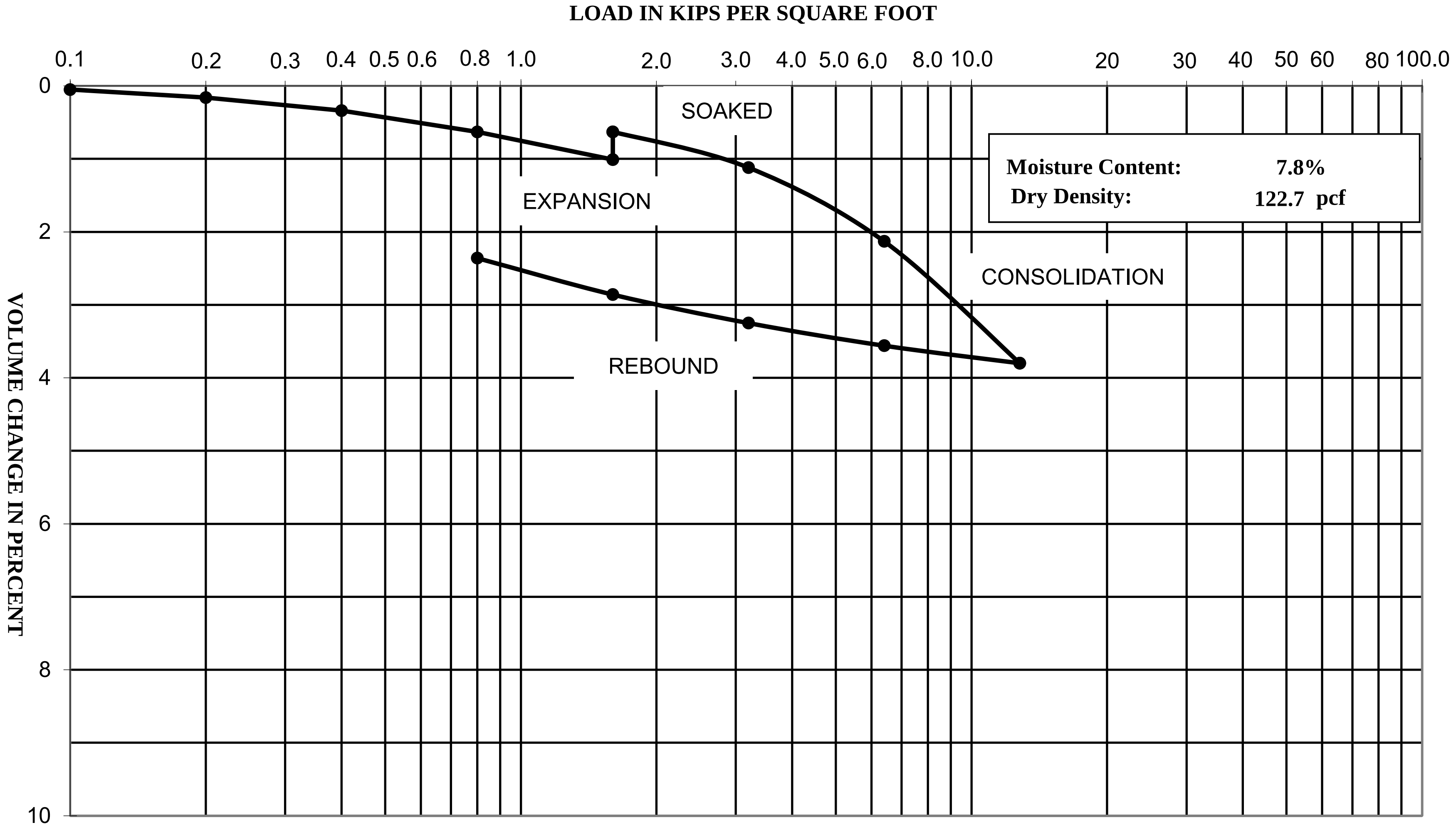
CONSOLIDATION - PRESSURE TEST DATA

ASTM D2435



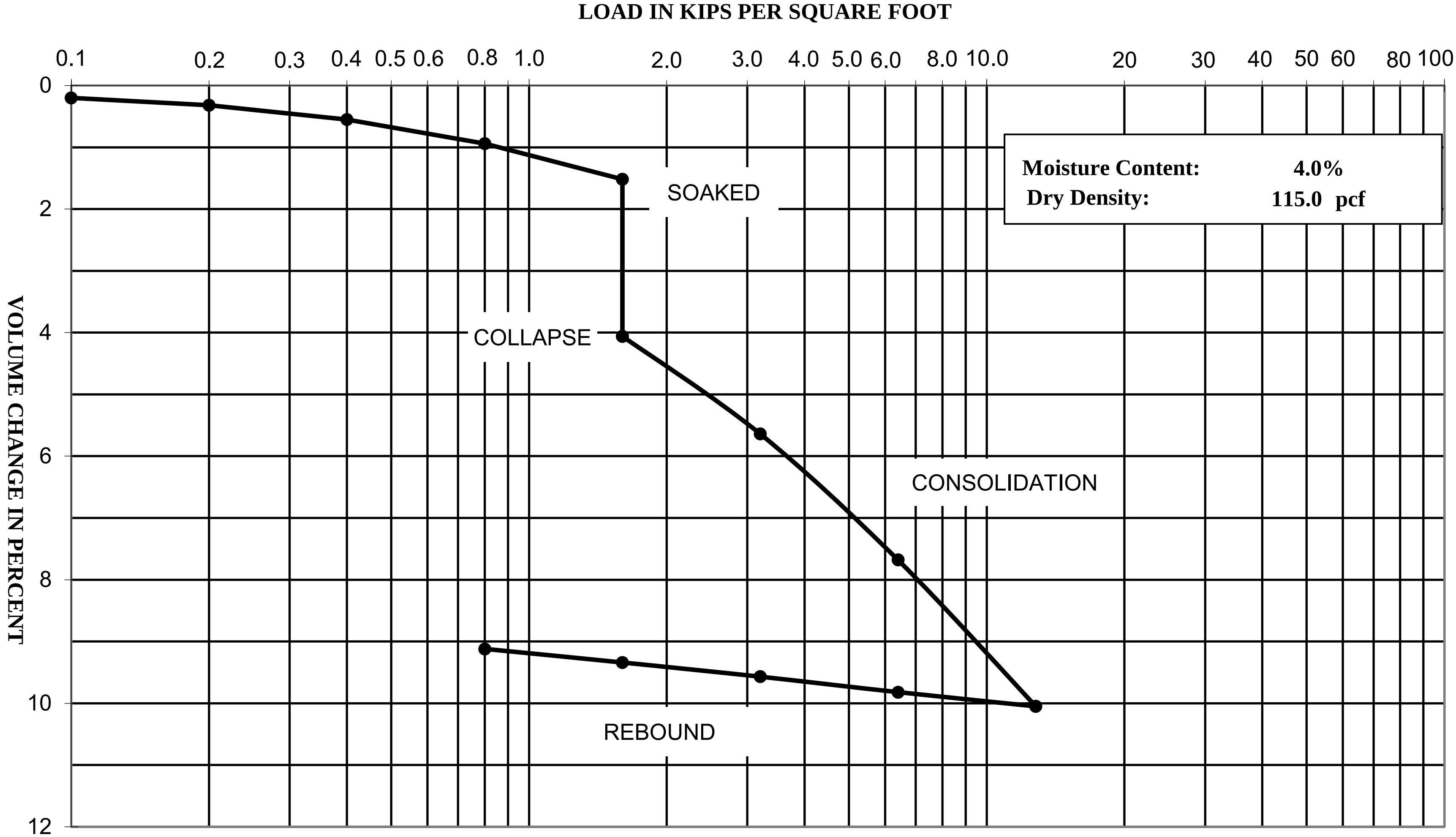
Project Name: Proposed Commercial Development - Lake Elsinore, CA

Project Number: 3-221-0167

Boring: B-6 @ 2'

SALEM
engineering group, inc.

CONSOLIDATION - PRESSURE TEST DATA
ASTM D2435



Moisture Content:	**4.0%**
Dry Density:	**115.0 pcf**

Project Name: Proposed Commercial Development - Lake Elsinore, CA

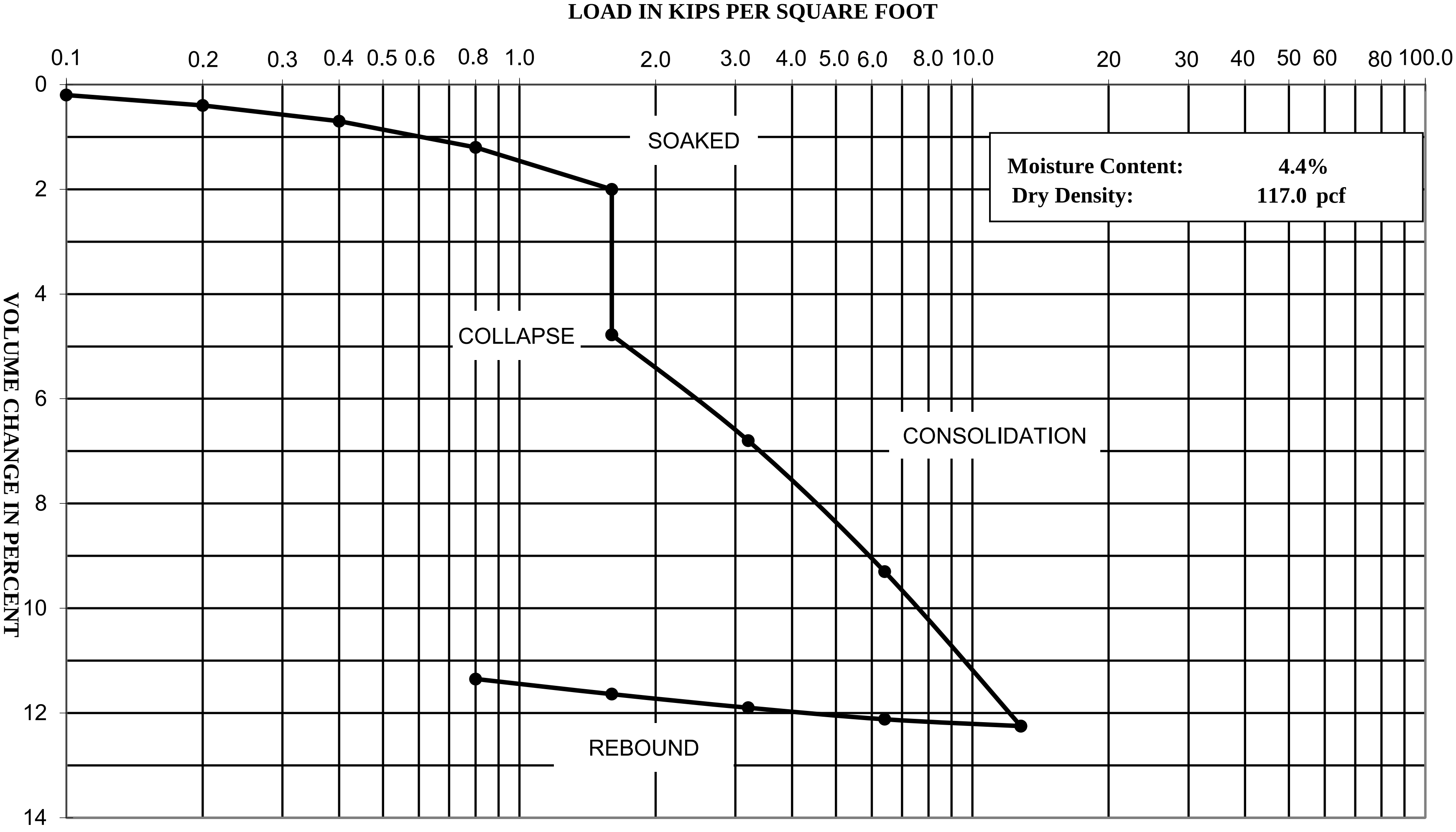
Project Number: 3-221-0167

Boring: B-10 @ 2'

SALEM engineering group, inc.

CONSOLIDATION - PRESSURE TEST DATA

ASTM D2435



Moisture Content:	**4.4%**
Dry Density:	**117.0 pcf**

Project Name: Proposed Commercial Development - Lake Elsinore, CA

Project Number: 3-221-0167
Boring: B-13 @ 5'

SALEM engineering group, inc.

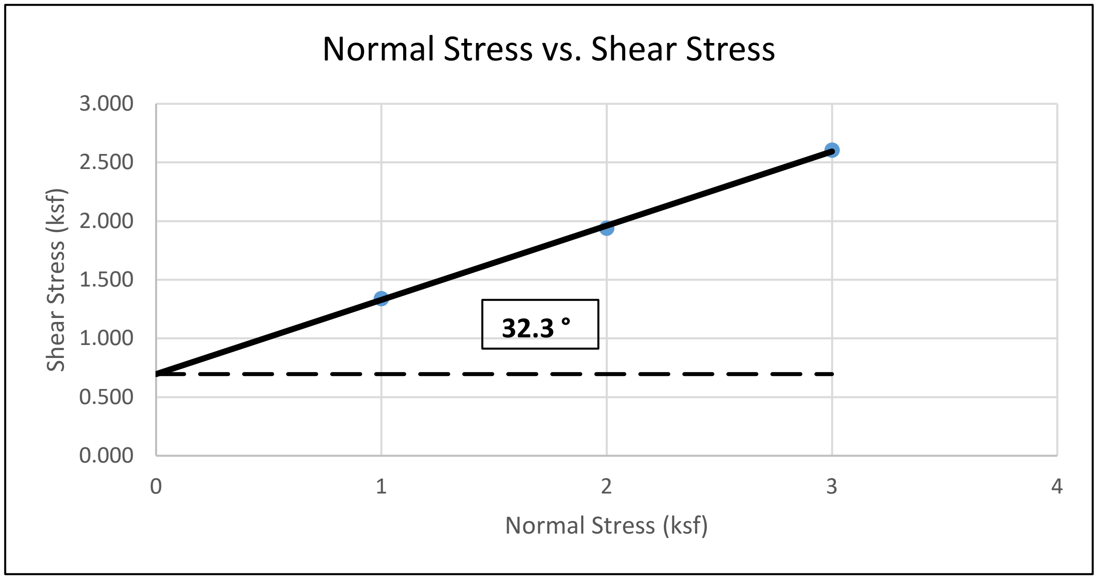
Direct Shear Test (ASTM D3080)

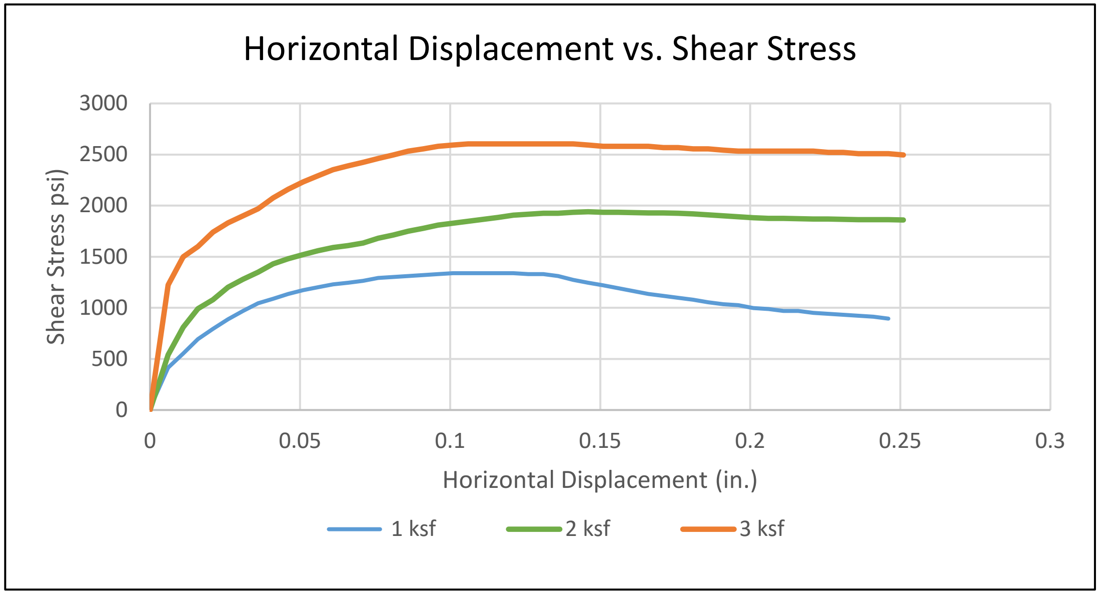
Project Name: Proposed Commercial Development - Lake Elsinore, CA
Project Number: 3-221-0167
Client: Evergreen Devco
Sample Location: B-1 @ 2'
Sample Type: Undisturbed Ring
Soil Classification: Sandy SILT (ML)
Tested By: M. Noorzay
Reviewed By: CJ
Date: 4/8/2021
Equipment Used: Geomatic Direct Shear Machine

	Sample 1	Sample 2	Sample 3
Normal Stress (ksf)	1.000	2.000	3.000
Shear Rate (in/min)	0.004		
Peak Shear Stress (ksf)	1.339	1.940	2.604
Residual Shear Stress (ksf)	0.000	0.000	0.000

Initial Height of Sample (in)	1.000	1.000	1.000
Height of Sample before Shear (in.)	1	1	1
Diameter of Sample (in)	2.416	2.416	2.416
Initial Moisture Content (%)	8.0		
Final Moisture Content (%)	14.6	14.4	13.7
Dry Density (pcf)	124.0	123.4	119.4

Peak Shear Strength Values	
Slope	0.63
Friction Angle	32.3
Cohesion (psf)	696





SALEM
engineering group, inc.

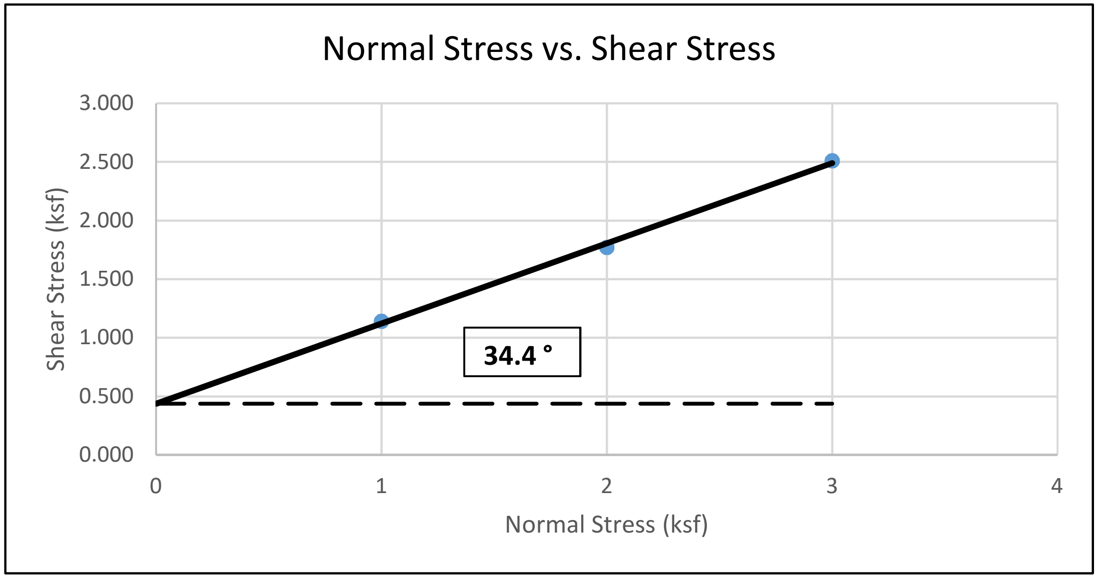
Direct Shear Test (ASTM D3080)

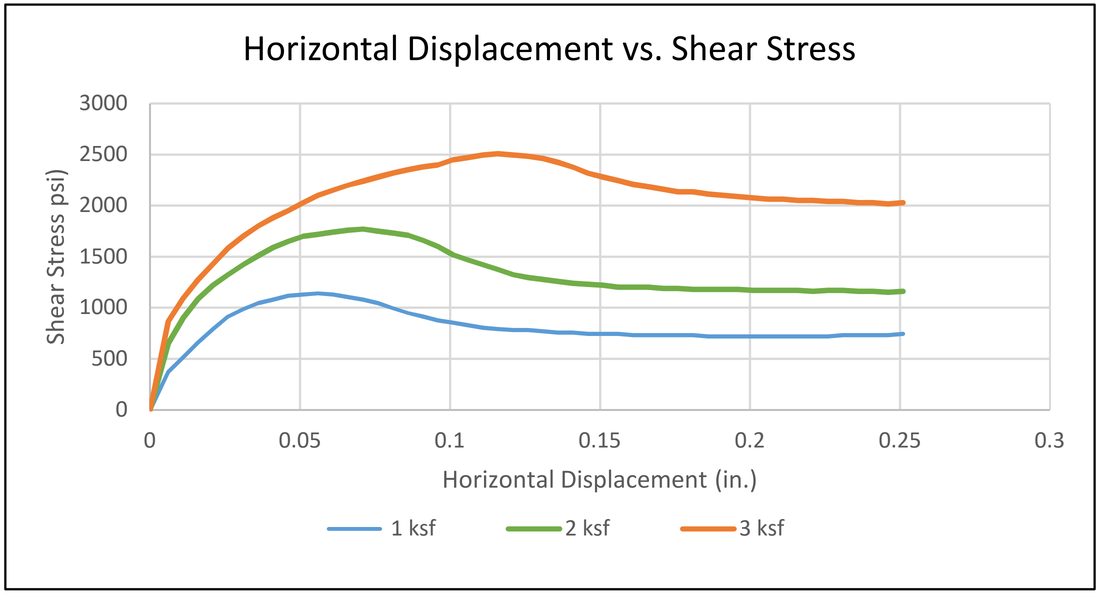
Project Name:	Proposed Commercial Development - Lake Elsinore, CA
Project Number:	3-221-0167
Client:	Evergreen Devco
Sample Location:	B-6 @ 5'
Sample Type:	Undisturbed Ring
Soil Classification:	Silty SAND (SM)
Tested By:	M. Noorzay
Reviewed By:	CJ
Date:	4/9/2021
Equipment Used:	Geomatic Direct Shear Machine

	Sample 1	Sample 2	Sample 3
Normal Stress (ksf)	1.000	2.000	3.000
Shear Rate (in/min)	0.004		
Peak Shear Stress (ksf)	1.140	1.770	2.508
Residual Shear Stress (ksf)	0.000	0.000	0.000

Initial Height of Sample (in)	1.000	1.000	1.000
Height of Sample before Shear (in.)	1	1	1
Diameter of Sample (in)	2.416	2.416	2.416
Initial Moisture Content (%)	5.7		
Final Moisture Content (%)	14.9	13.9	15.0
Dry Density (pcf)	124.3	127.6	124.4

Peak Shear Strength Values	
Slope	0.68
Friction Angle	34.4
Cohesion (psf)	438





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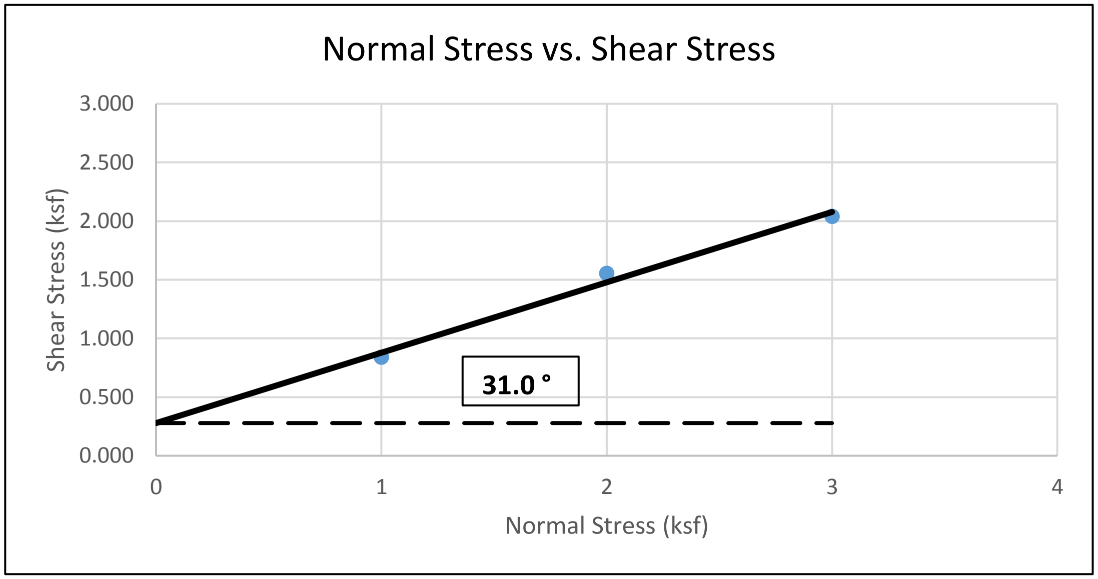
Direct Shear Test (ASTM D3080)

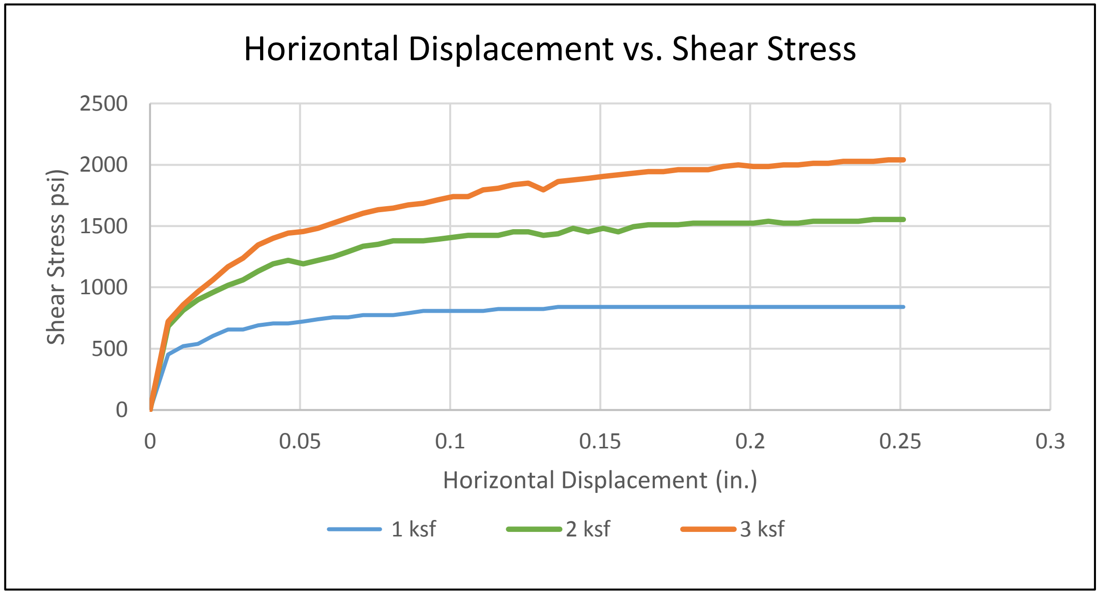
Project Name:	Proposed Commercial Development - Lake Elsinore, CA
Project Number:	3-221-0167
Client:	Evergreen Devco
Sample Location:	B-10 @ 5'
Sample Type:	Undisturbed Ring
Soil Classification:	Silty SAND (SM)
Tested By:	M. Noorzay
Reviewed By:	CJ
Date:	4/12/2021
Equipment Used:	Geomatic Direct Shear Machine

	Sample 1	Sample 2	Sample 3
Normal Stress (ksf)	1.000	2.000	3.000
Shear Rate (in/min)	0.004		
Peak Shear Stress (ksf)	0.840	1.554	2.040
Residual Shear Stress (ksf)	0.000	0.000	0.000

Initial Height of Sample (in)	1.000	1.000	1.000
Height of Sample before Shear (in.)	1	1	1
Diameter of Sample (in)	2.416	2.416	2.416
Initial Moisture Content (%)	4.2		
Final Moisture Content (%)	17.5	15.7	14.7
Dry Density (pcf)	104.6	106.2	106.7

Peak Shear Strength Values	
Slope	0.60
Friction Angle	31.0
Cohesion (psf)	278





SALEM
engineering group, inc.

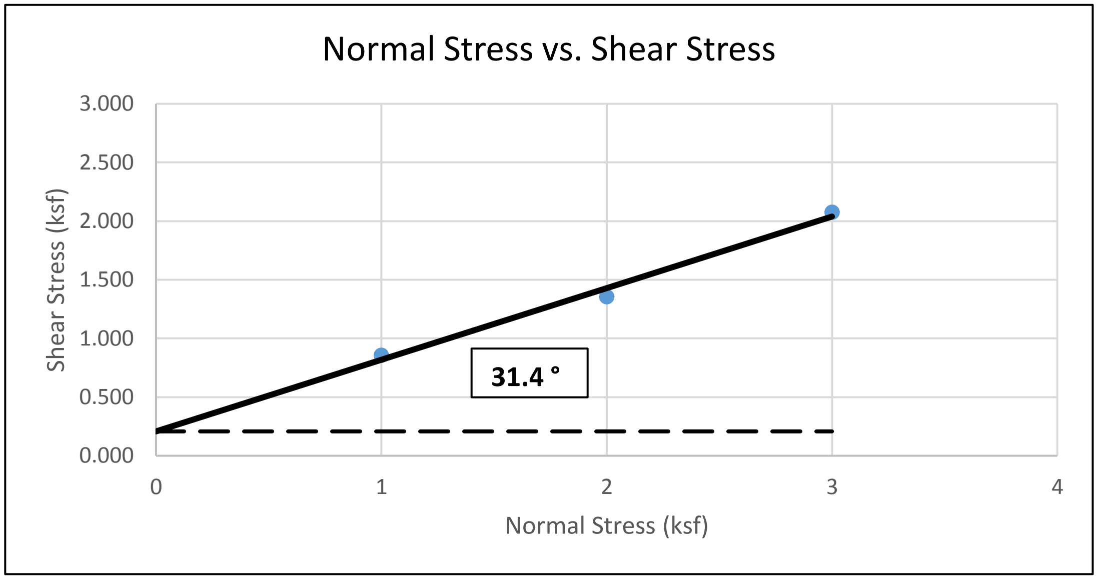
Direct Shear Test (ASTM D3080)

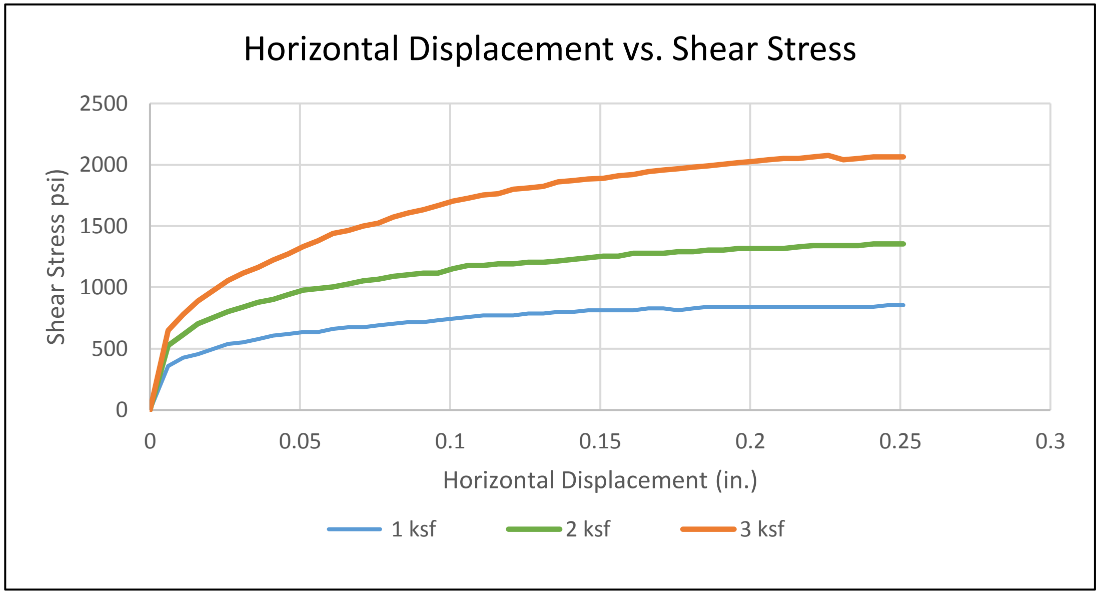
Project Name:	Proposed Commercial Development - Lake Elsinore, CA
Project Number:	3-221-0167
Client:	Evergreen Devco
Sample Location:	B-13 @ 2'
Sample Type:	Undisturbed Ring
Soil Classification:	Silty SAND (SM)
Tested By:	M. Noorzay
Reviewed By:	CJ
Date:	4/13/2021
Equipment Used:	Geomatic Direct Shear Machine

	Sample 1	Sample 2	Sample 3
Normal Stress (ksf)	1.000	2.000	3.000
Shear Rate (in/min)	0.004		
Peak Shear Stress (ksf)	0.855	1.354	2.076
Residual Shear Stress (ksf)	0.000	0.000	0.000

Initial Height of Sample (in)	1.000	1.000	1.000
Height of Sample before Shear (in.)	1	1	1
Diameter of Sample (in)	2.416	2.416	2.416
Initial Moisture Content (%)	3.8		
Final Moisture Content (%)	15.3	14.3	14.5
Dry Density (pcf)	109.6	99.4	100.9

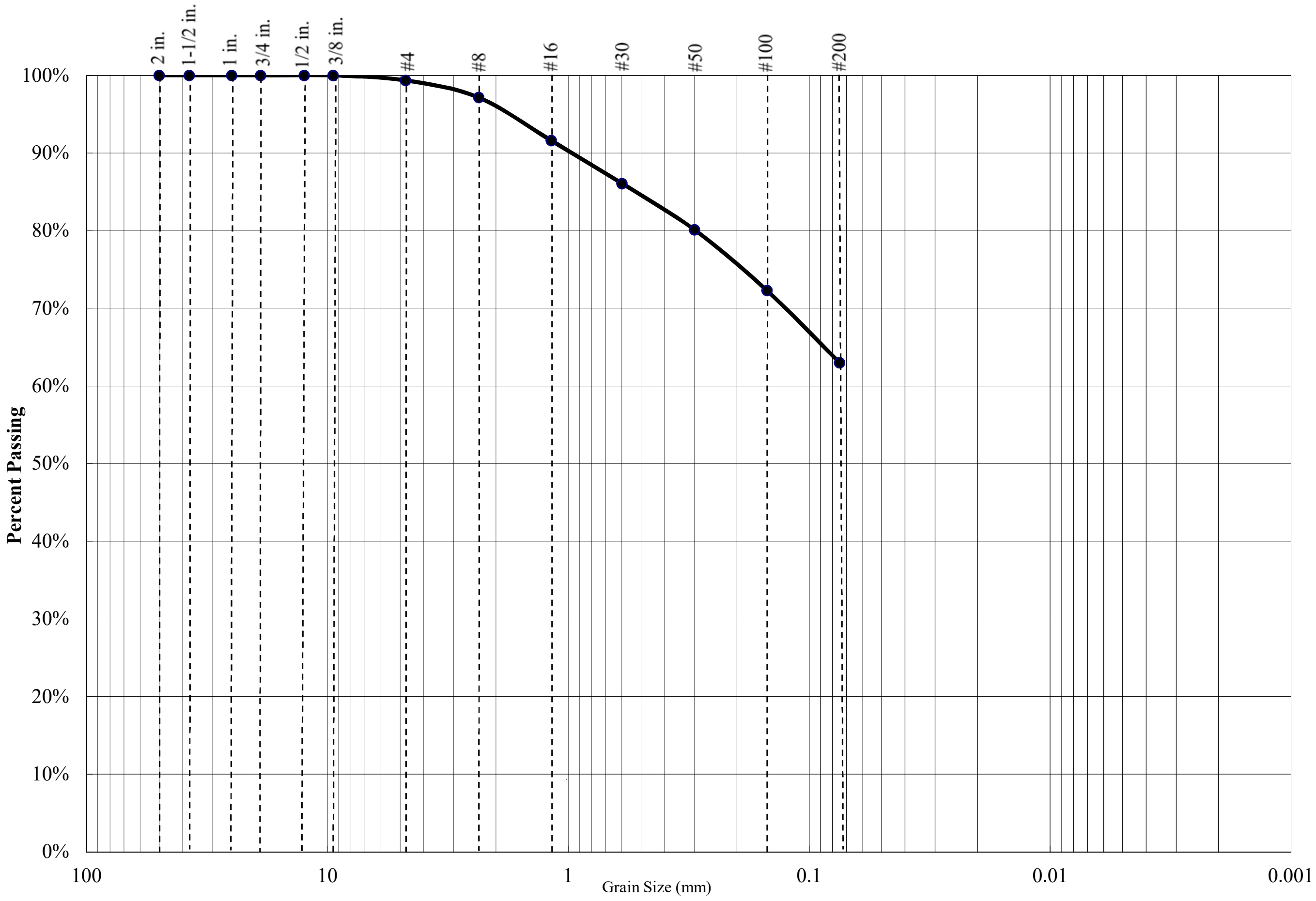
Peak Shear Strength Values	
Slope	0.61
Friction Angle	31.4
Cohesion (psf)	208





PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
1%	36%	63%

Sieve Size	Percent Passing
3/4 inch	100.0%
1/2 inch	100.0%
3/8 inch	100.0%
#4	99.4%
#8	97.1%
#16	91.6%
#30	86.1%
#50	80.1%
#100	72.3%
#200	63.0%

Atterberg Limits		
PL=	LL=	PI=

Coefficients					
D_{85}=		D_{60}=		D_{50}=	
D_{30}=		D_{15}=		D_{10}=	
C_u=	N/A	C_c=	N/A		

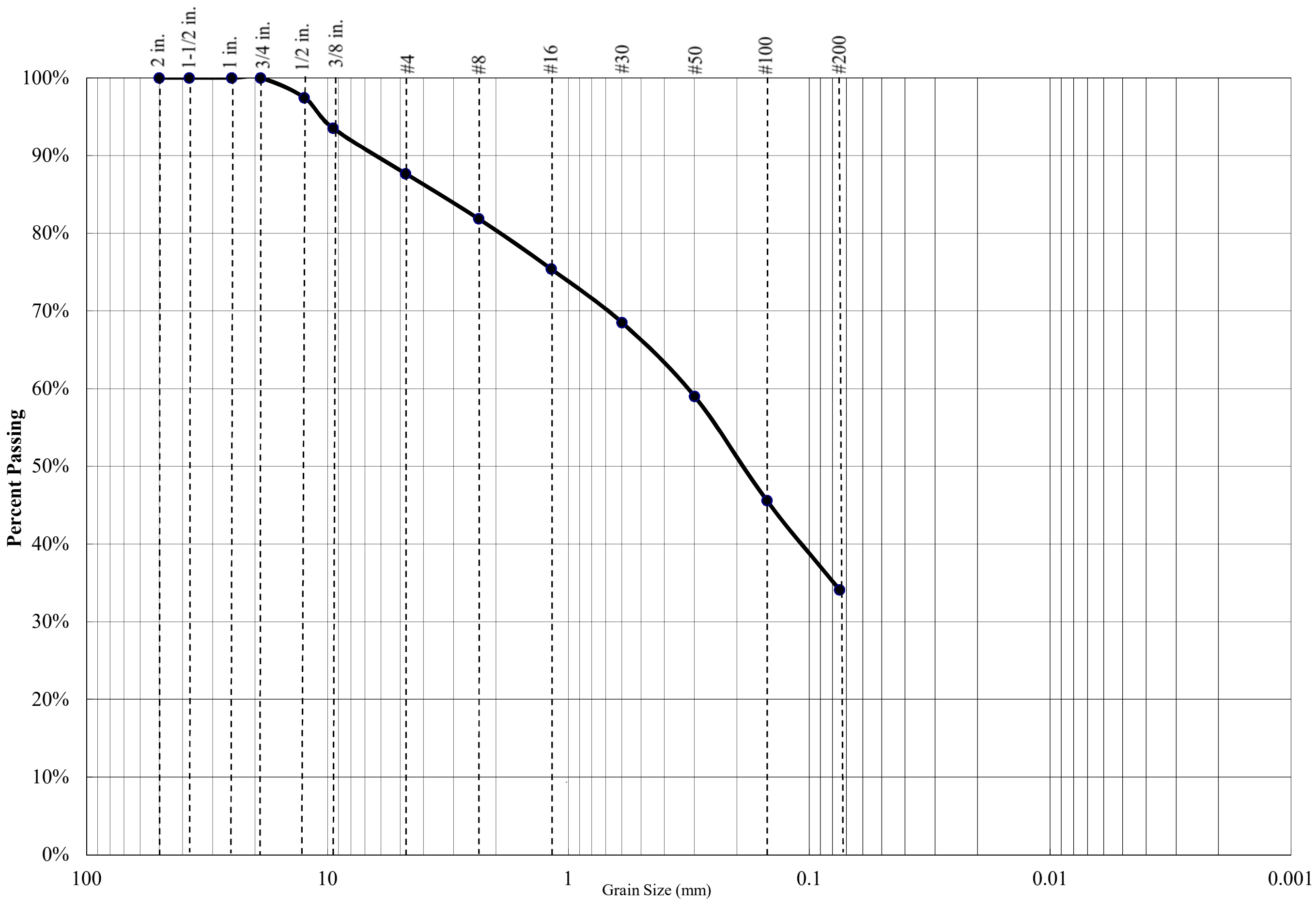
USCS CLASSIFICATION
Sandy SILT (ML)

Project Name: Proposed Commercial Development - Lake Elsinore, CA
Project Number: 3-221-0167
Boring: B-1 @ 2'

SALEM engineering group, inc.

PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
12%	54%	34%

Sieve Size	Percent Passing
3/4 inch	100.0%
1/2 inch	97.5%
3/8 inch	93.5%
#4	87.7%
#8	81.9%
#16	75.4%
#30	68.5%
#50	59.0%
#100	45.6%
#200	34.1%

Atterberg Limits		
PL=	**LL=**	**PI=**

Coefficients					
D_{85}=		**D_{60}=**		**D_{50}=**	
D_{30}=		**D_{15}=**		**D_{10}=**	
C_u=	N/A	C_c=	N/A		

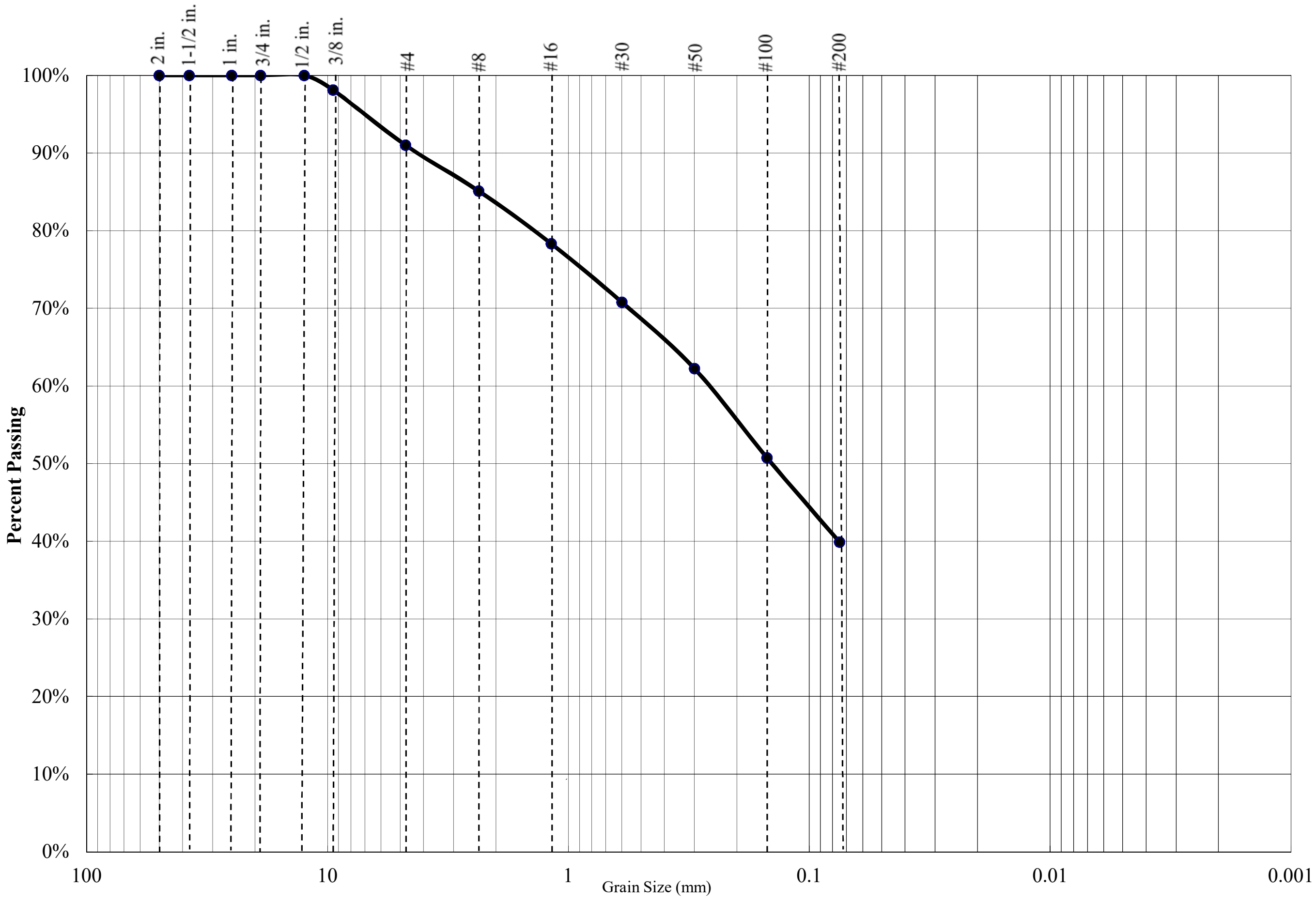
USCS CLASSIFICATION
Silty SAND (SM)

Project Name: Proposed Commercial Development - Lake Elsinore, CA
Project Number: 3-221-0167
Boring: B-1 @ 10'

SALEM
engineering group, inc.

PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
9%	51%	40%

Sieve Size	Percent Passing
3/4 inch	100.0%
1/2 inch	100.0%
3/8 inch	98.1%
#4	91.0%
#8	85.1%
#16	78.3%
#30	70.8%
#50	62.2%
#100	50.8%
#200	39.9%

Atterberg Limits		
PL=	**LL=**	**PI=**

Coefficients				
D_{85}=		**D_{60}=**		**D_{50}=**
D_{30}=		**D_{15}=**		**D_{10}=**
C_u=	N/A	**C_c=**	N/A	

USCS CLASSIFICATION
Silty SAND (SM)

Project Name: Proposed Commercial Development - Lake Elsinore, CA

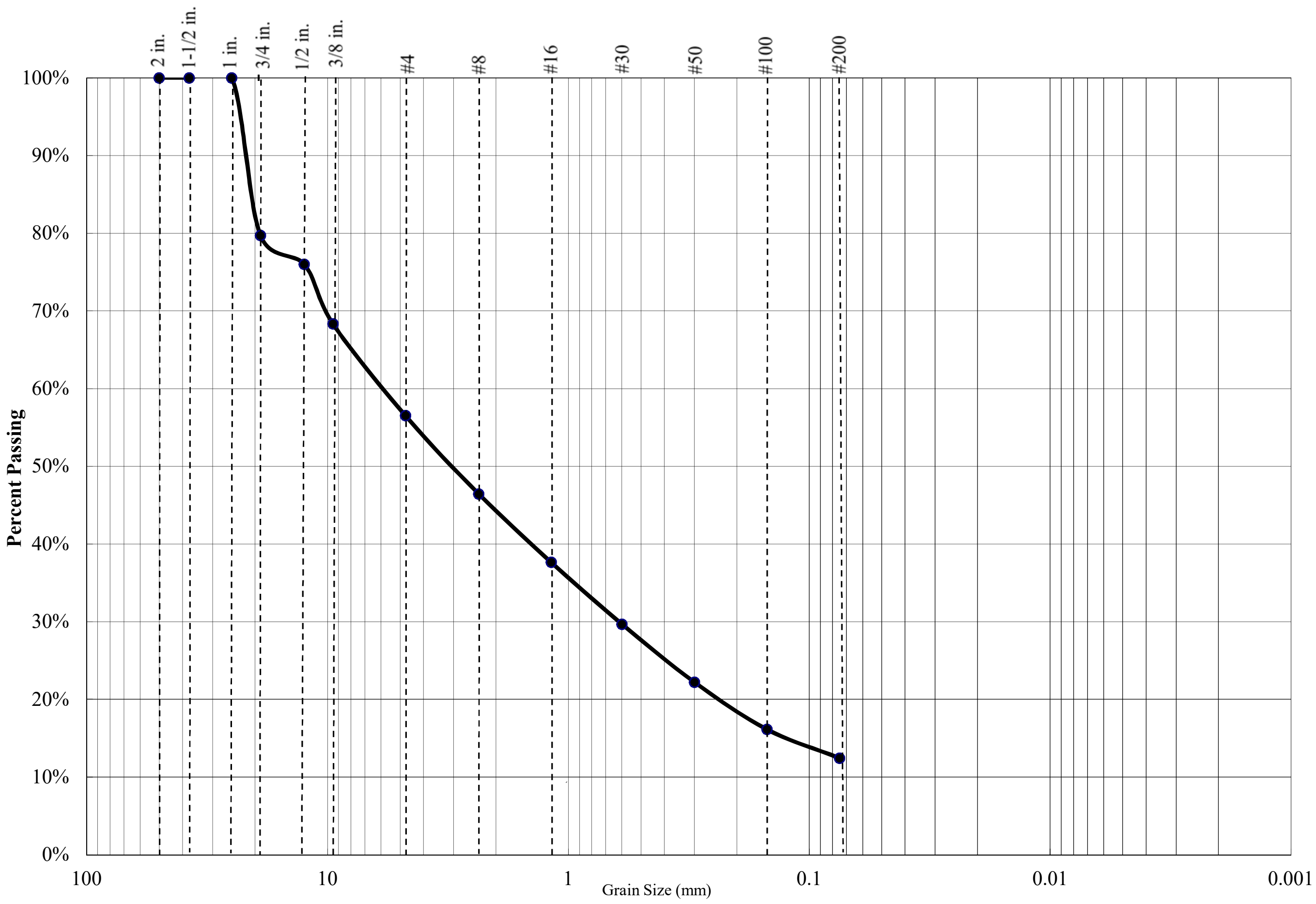
Project Number: 3-221-0167

Boring: B-1 @ 20'

SALEM engineering group, inc.

PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
43%	44%	12%

Sieve Size	Percent Passing
3/4 inch	79.7%
1/2 inch	76.0%
3/8 inch	68.3%
#4	56.5%
#8	46.5%
#16	37.7%
#30	29.7%
#50	22.2%
#100	16.1%
#200	12.5%

Atterberg Limits		
PL=	**LL=**	**PI=**

Coefficients					
D85=		**D60=**		**D50=**	
D30=		**D15=**		**D10=**	
C_u=	N/A	**C_c=**	N/A		

USCS CLASSIFICATION
Silty SAND (SM)

Project Name: Proposed Commercial Development - Lake Elsinore, CA

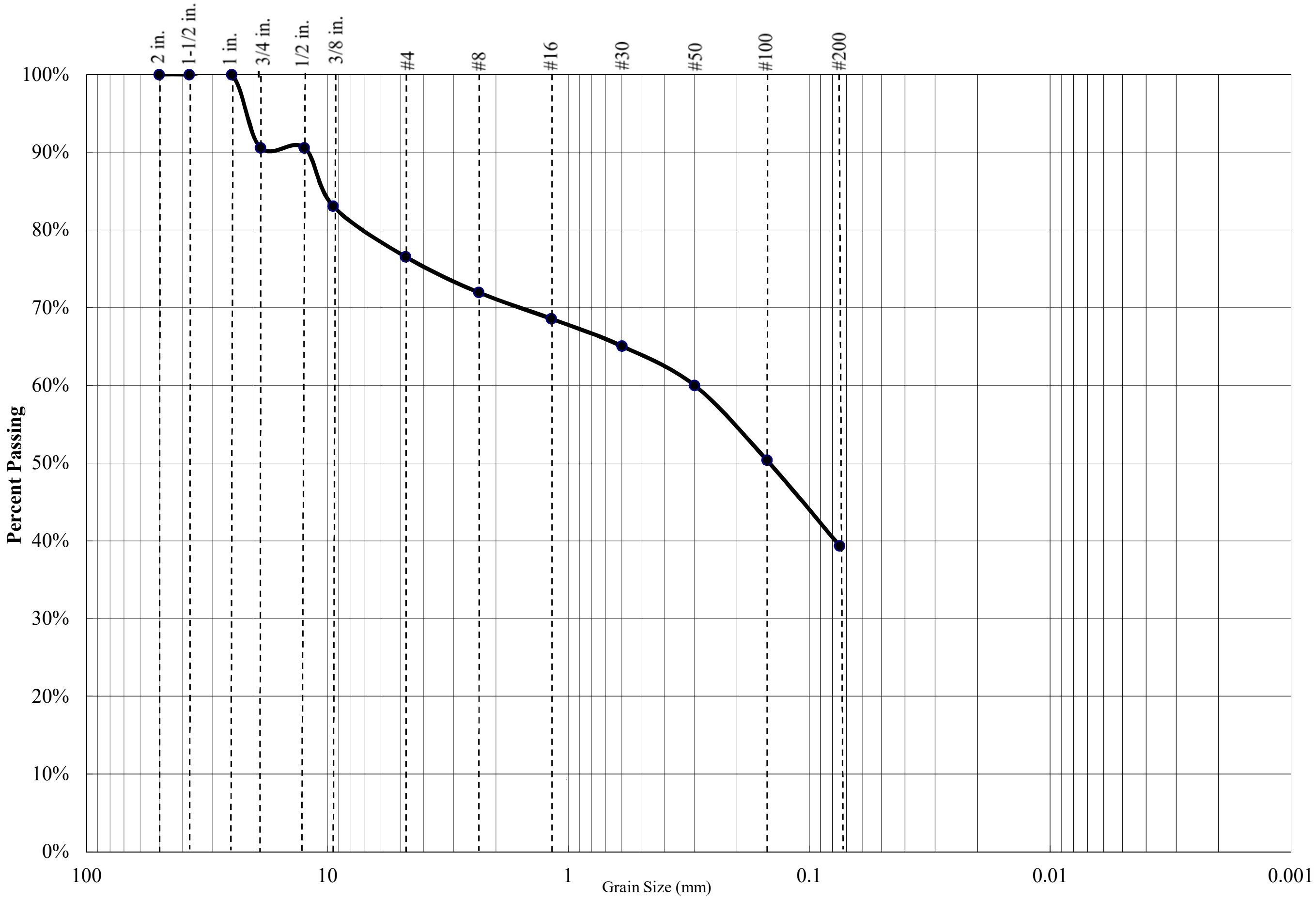
Project Number: 3-221-0167

Boring: B-1 @ 25'

SALEM engineering group, inc.

PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
23%	37%	39%

Sieve Size	Percent Passing
3/4 inch	90.6%
1/2 inch	90.6%
3/8 inch	83.1%
#4	76.6%
#8	72.0%
#16	68.6%
#30	65.1%
#50	60.0%
#100	50.4%
#200	39.4%

Atterberg Limits

PL= **LL=** **PI=**

Coefficients

D_{85}=		**D_{60}=**		**D_{50}=**	
D_{30}=		**D_{15}=**		**D_{10}=**	
C_u=	N/A	**C_c=**	N/A		

USCS CLASSIFICATION

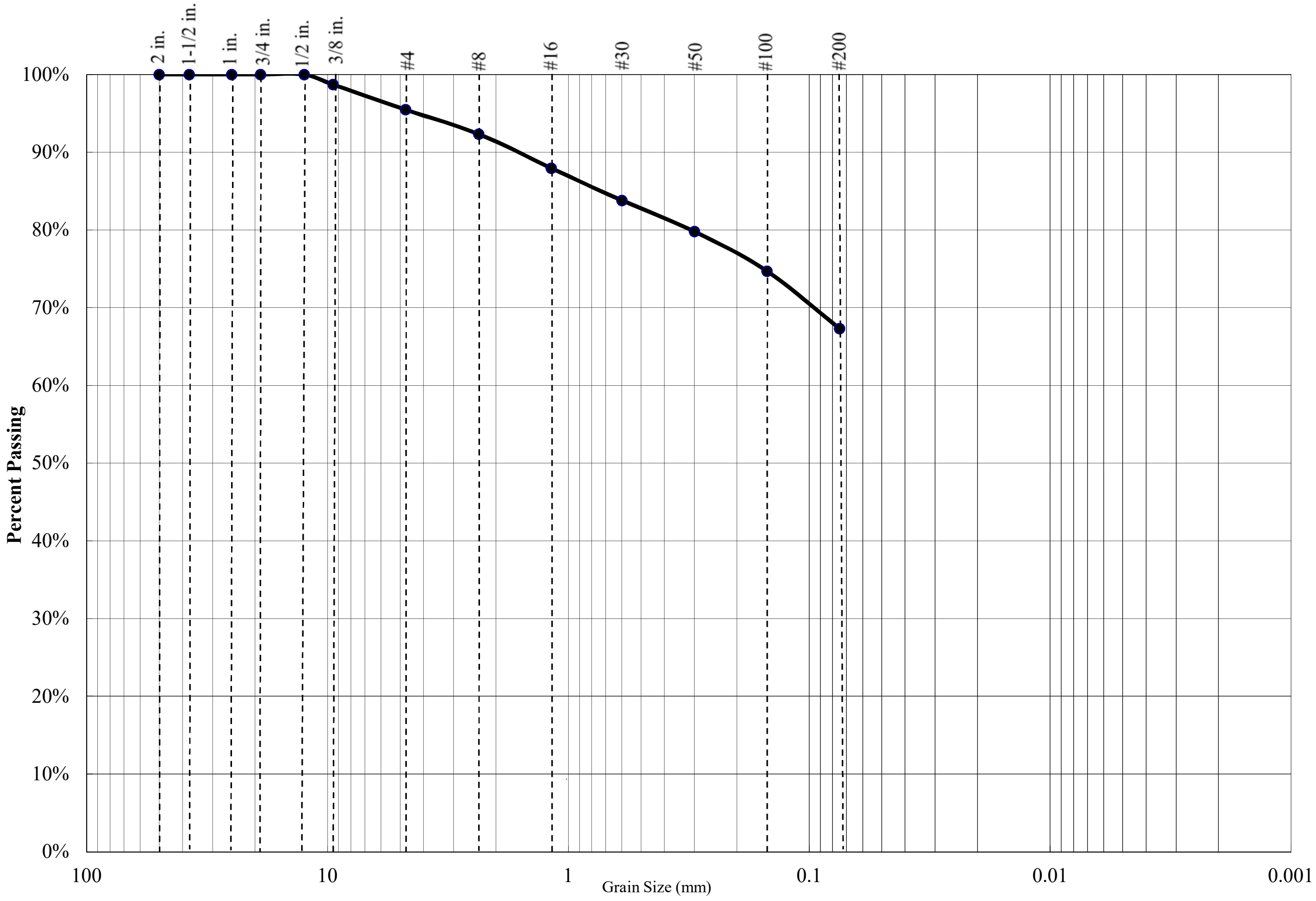
Silty SAND (SM)

Project Name: Proposed Commercial Development - Lake Elsinore, CA
Project Number: 3-221-0167
Boring: B-1 @ 30'

SALEM engineering group, inc.

PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
5%	28%	67%

Sieve Size	Percent Passing
3/4 inch	100.0%
1/2 inch	100.0%
3/8 inch	98.7%
#4	95.5%
#8	92.3%
#16	87.9%
#30	83.8%
#50	79.8%
#100	74.7%
#200	67.3%

Atterberg Limits		
PL=	**LL=**	**PI=**

Coefficients					
D_{85}=		**D_{60}=**		**D_{50}=**	
D_{30}=		**D_{15}=**		**D_{10}=**	
C_u=	N/A	**C_c=**	N/A		

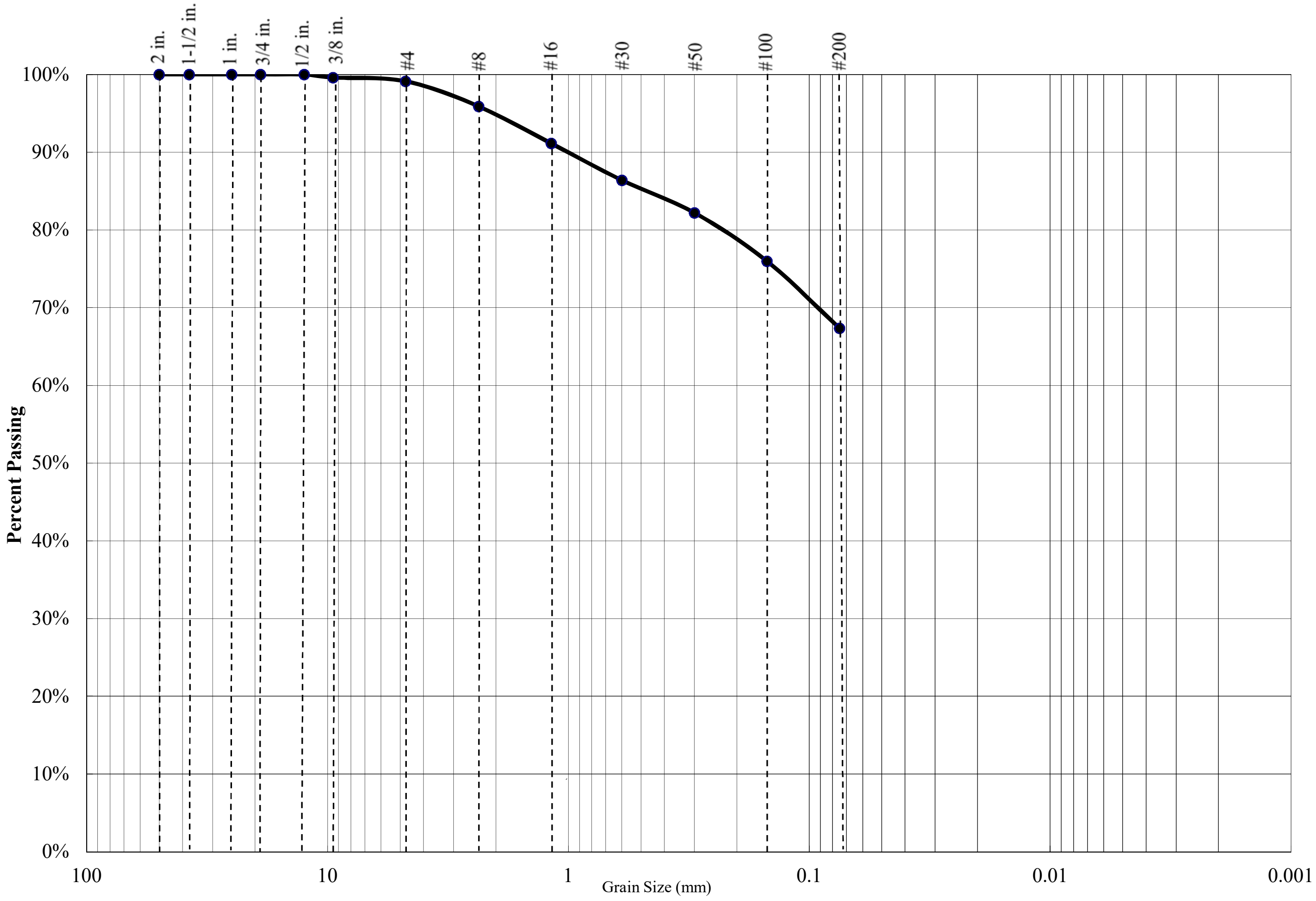
USCS CLASSIFICATION
Sandy SILT (ML)

Project Name: Proposed Commercial Development - Lake Elsinore, CA
Project Number: 3-221-0167
Boring: B-1 @ 40'

SALEM engineering group, inc.

PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
1%	32%	67%

Sieve Size	Percent Passing
3/4 inch	100.0%
1/2 inch	100.0%
3/8 inch	99.6%
#4	99.1%
#8	95.9%
#16	91.1%
#30	86.4%
#50	82.2%
#100	76.0%
#200	67.4%

Atterberg Limits		
PL=	LL=	PI=

Coefficients					
D_{85}=		D_{60}=		D_{50}=	
D_{30}=		D_{15}=		D_{10}=	
C_u=	N/A	C_c=	N/A		

USCS CLASSIFICATION
Sandy SILT (ML)

Project Name: Proposed Commercial Development - Lake Elsinore, CA

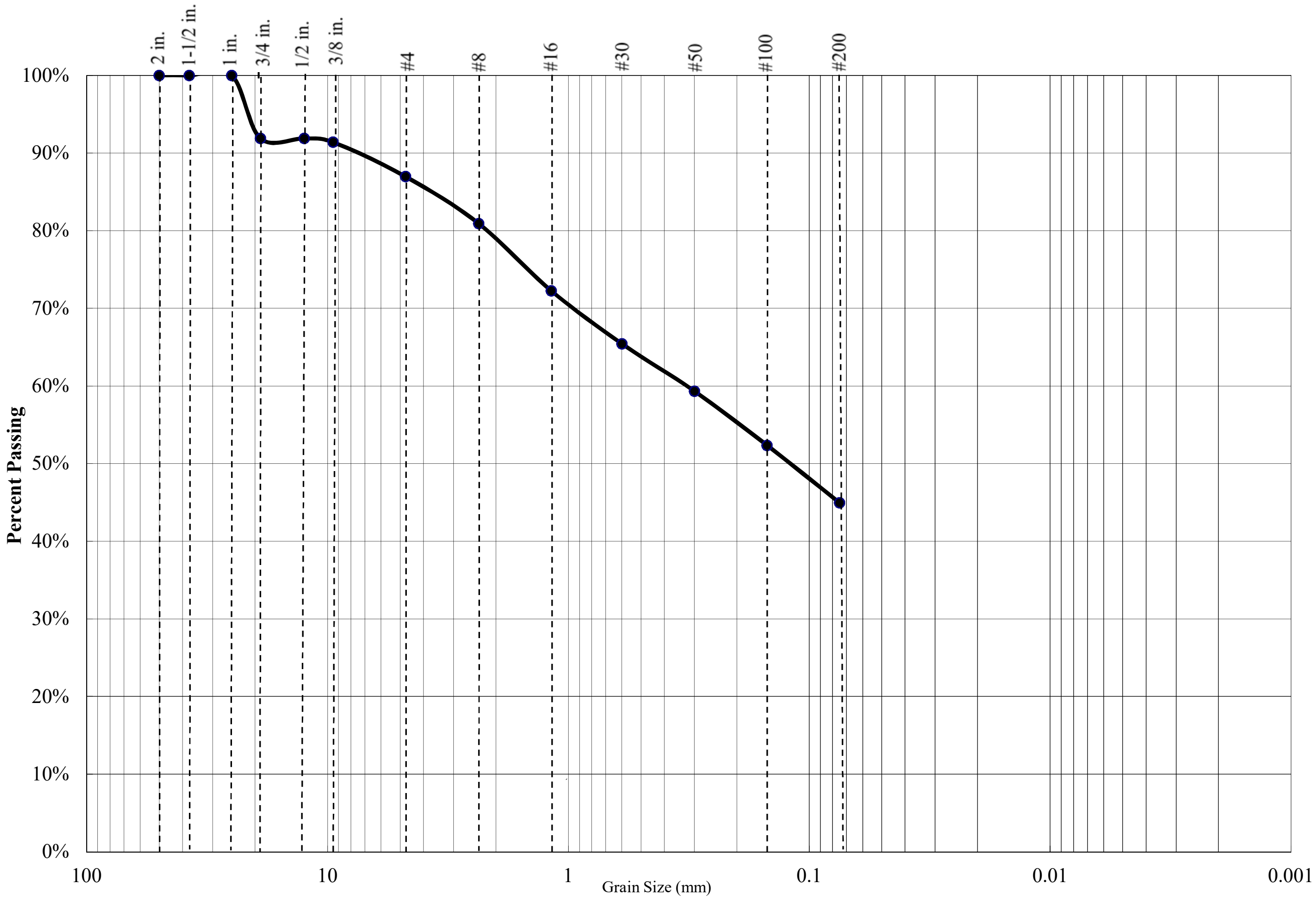
Project Number: 3-221-0167

Boring: B-2 @ 5'

SALEM engineering group, inc.

PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
13%	42%	45%

Sieve Size	Percent Passing
3/4 inch	91.9%
1/2 inch	91.9%
3/8 inch	91.4%
#4	87.0%
#8	80.9%
#16	72.3%
#30	65.4%
#50	59.3%
#100	52.4%
#200	45.0%

Atterberg Limits		
PL=	LL=	PI=

Coefficients		
D85=	D60=	D50=
D30=	D15=	D10=
C_u= N/A	C_c= N/A	

USCS CLASSIFICATION
Silty SAND (SM)

Project Name: Proposed Commercial Development - Lake Elsinore, CA

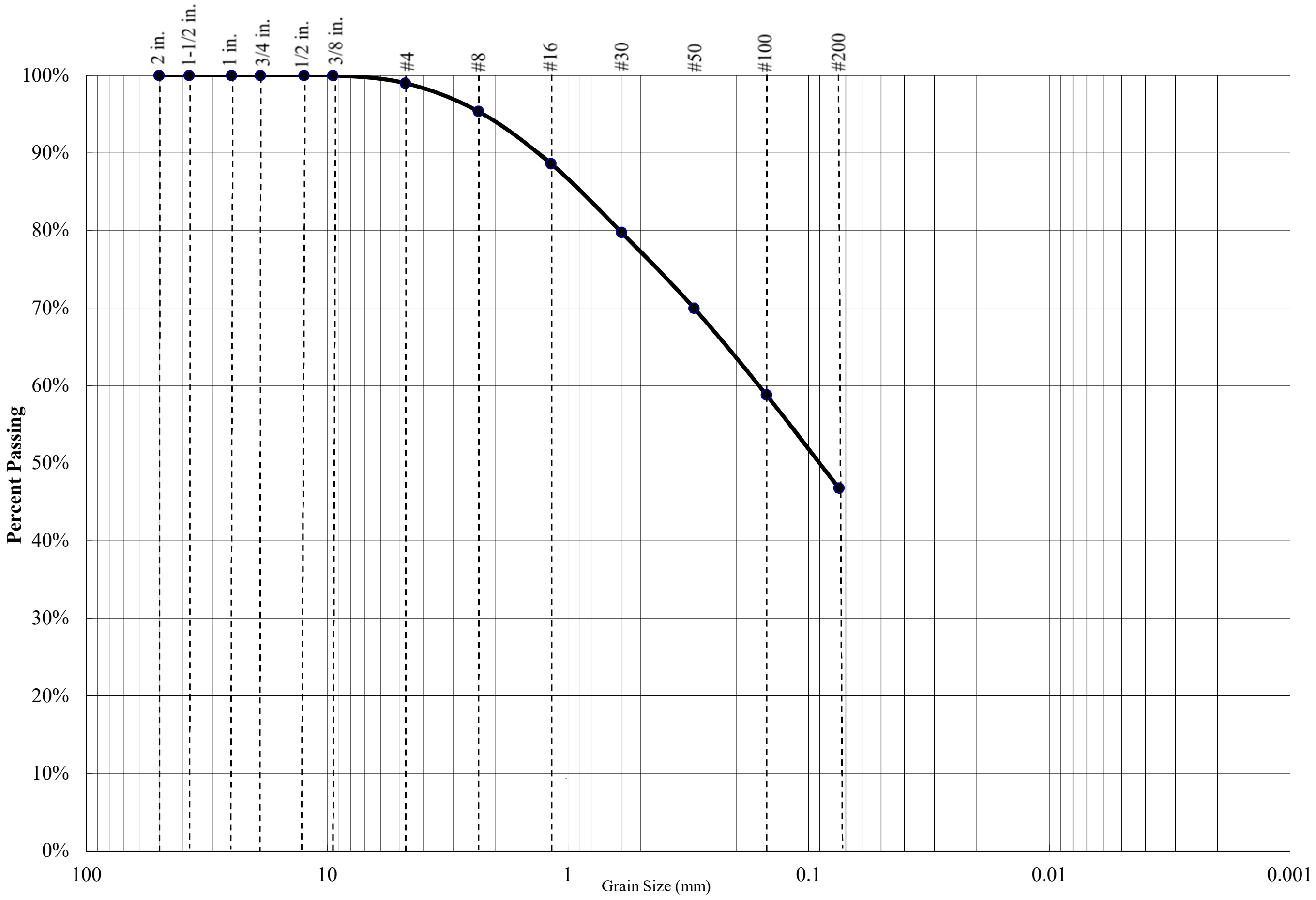
Project Number: 3-221-0167

Boring: B-6 @ 2'

SALEM engineering group, inc.

PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
1%	52%	47%

Sieve Size	Percent Passing
3/4 inch	100.0%
1/2 inch	100.0%
3/8 inch	100.0%
#4	99.0%
#8	95.4%
#16	88.6%
#30	79.8%
#50	70.0%
#100	58.8%
#200	46.8%

Atterberg Limits		
PL=	**LL=**	**PI=**

Coefficients					
D85=		**D60=**		**D50=**	
D30=		**D15=**		**D10=**	
C_u=	N/A	**C_c=**	N/A		

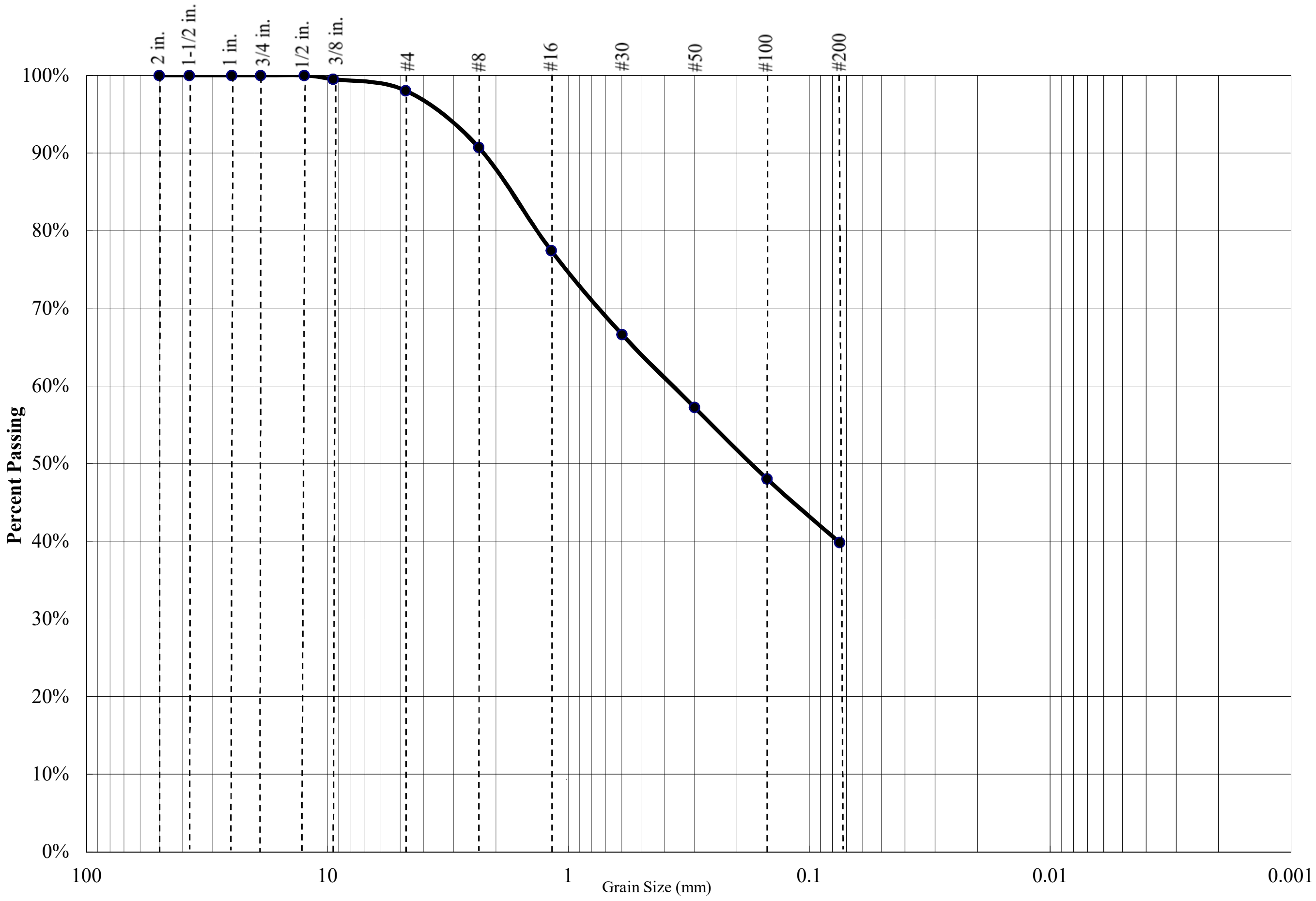
USCS CLASSIFICATION
Silty SAND (SM)

Project Name: Proposed Commercial Development - Lake Elsinore, CA
Project Number: 3-221-0167
Boring: B-6 @ 5'

SALEM
engineering group, inc.

PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
2%	58%	40%

Sieve Size	Percent Passing
3/4 inch	100.0%
1/2 inch	100.0%
3/8 inch	99.5%
#4	98.0%
#8	90.7%
#16	77.4%
#30	66.6%
#50	57.2%
#100	48.0%
#200	39.8%

Atterberg Limits		
PL=	**LL=**	**PI=**

Coefficients

D85=		**D60=**		**D50=**	
D30=		**D15=**		**D10=**	
C_u=	N/A	**C_c=**	N/A		

USCS CLASSIFICATION

Silty SAND (SM)

Project Name: Proposed Commercial Development - Lake Elsinore, CA

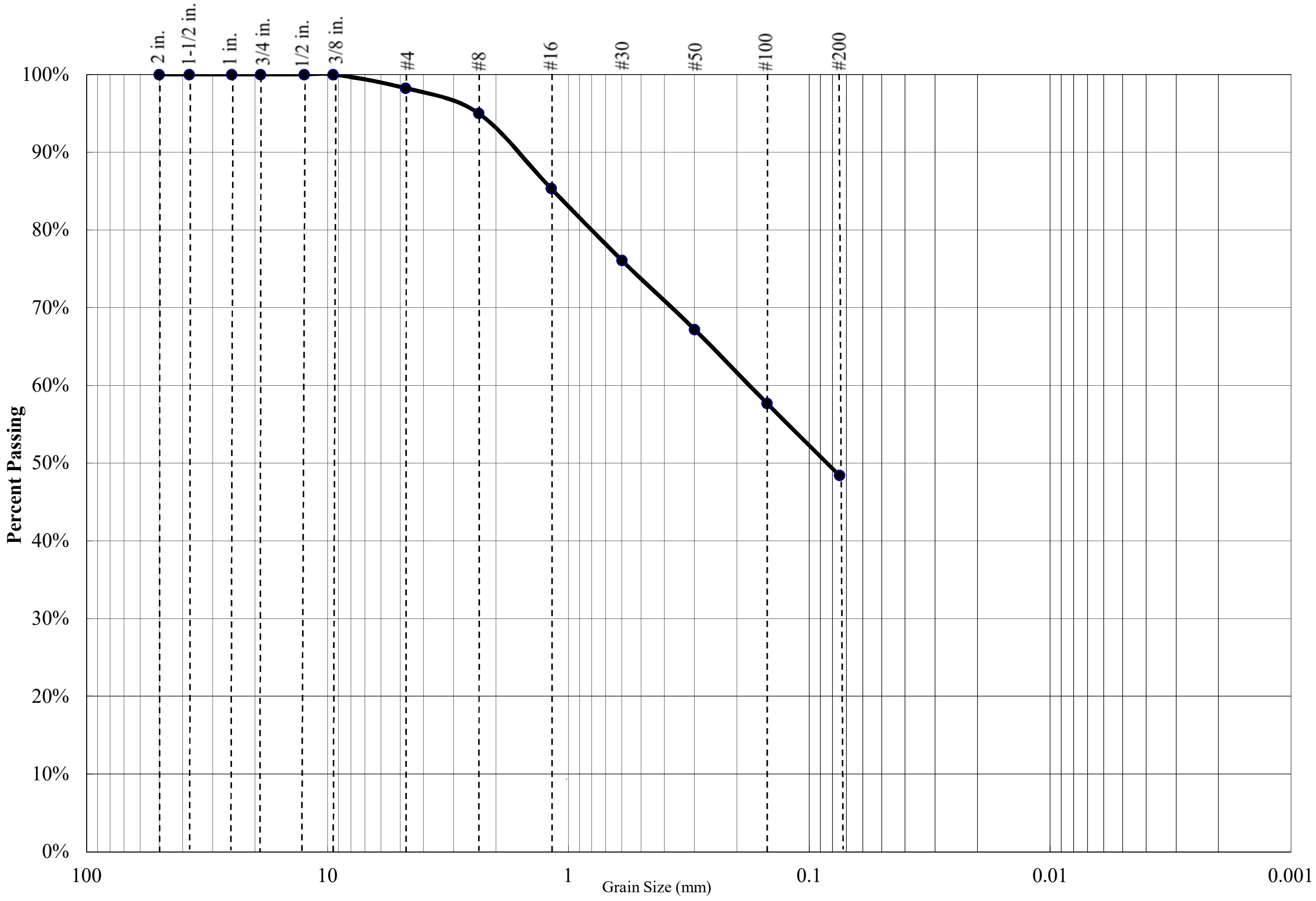
Project Number: 3-221-0167

Boring: B-10 @ 2'

SALEM engineering group, inc.

PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
2%	50%	48%

Sieve Size	Percent Passing
3/4 inch	100.0%
1/2 inch	100.0%
3/8 inch	100.0%
#4	98.3%
#8	95.0%
#16	85.3%
#30	76.1%
#50	67.2%
#100	57.7%
#200	48.4%

Atterberg Limits

PL= **LL=** **PI=**

Coefficients

D_{85}=		**D_{60}=**		**D_{50}=**	
D_{30}=		**D_{15}=**		**D_{10}=**	
C_u=	N/A	**C_c=**	N/A		

USCS CLASSIFICATION

Silty SAND (SM)

Project Name: Proposed Commercial Development - Lake Elsinore, CA

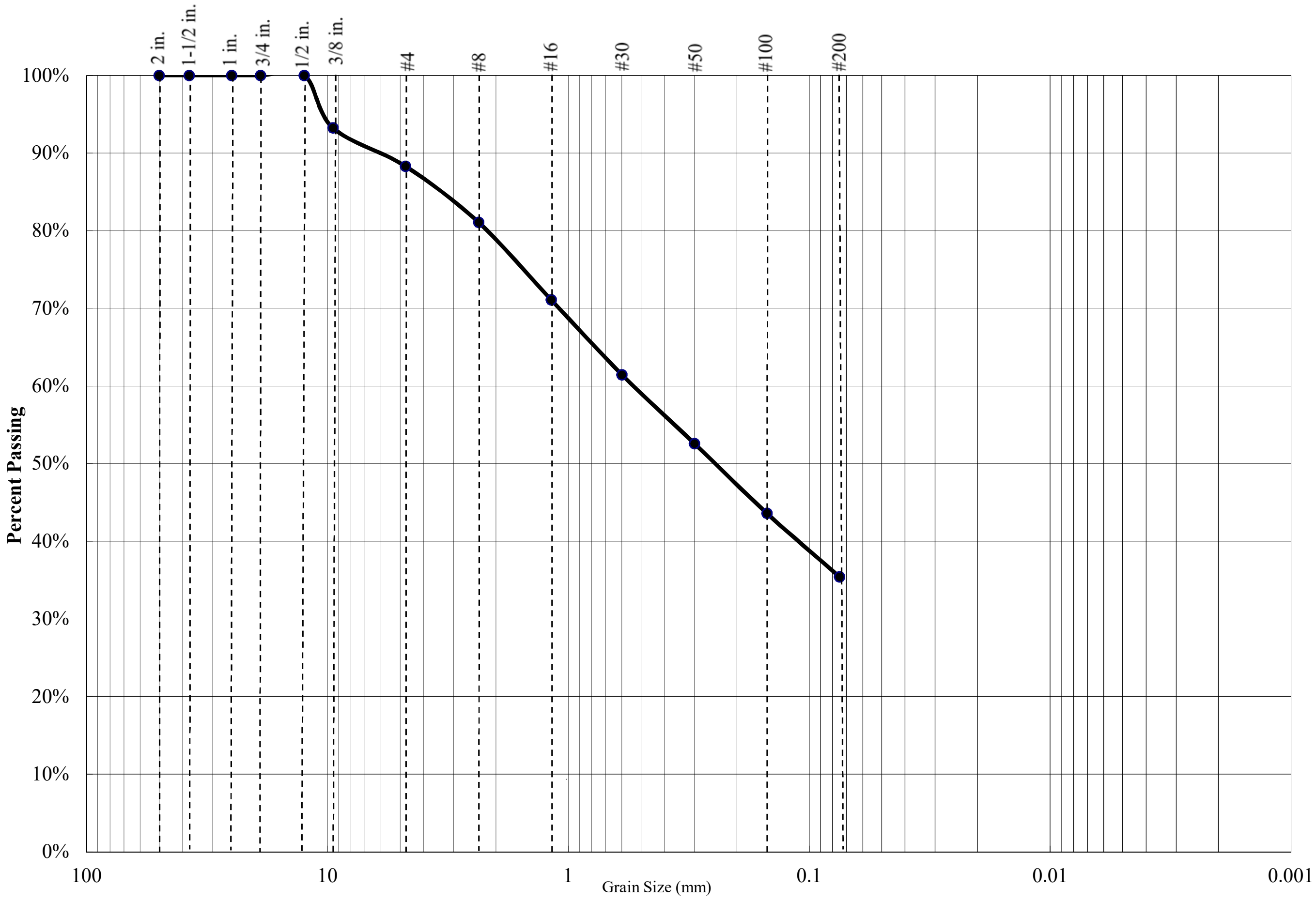
Project Number: 3-221-0167

Boring: B-10 @ 5'

SALEM engineering group, inc.

PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
12%	53%	35%

Sieve Size	Percent Passing
3/4 inch	100.0%
1/2 inch	100.0%
3/8 inch	93.2%
#4	88.3%
#8	81.1%
#16	71.1%
#30	61.5%
#50	52.6%
#100	43.6%
#200	35.4%

Atterberg Limits		
PL=	**LL=**	**PI=**

Coefficients

D_{85}=		**D_{60}=**		**D_{50}=**	
D_{30}=		**D_{15}=**		**D_{10}=**	
C_u=	N/A	**C_c=**	N/A		

USCS CLASSIFICATION

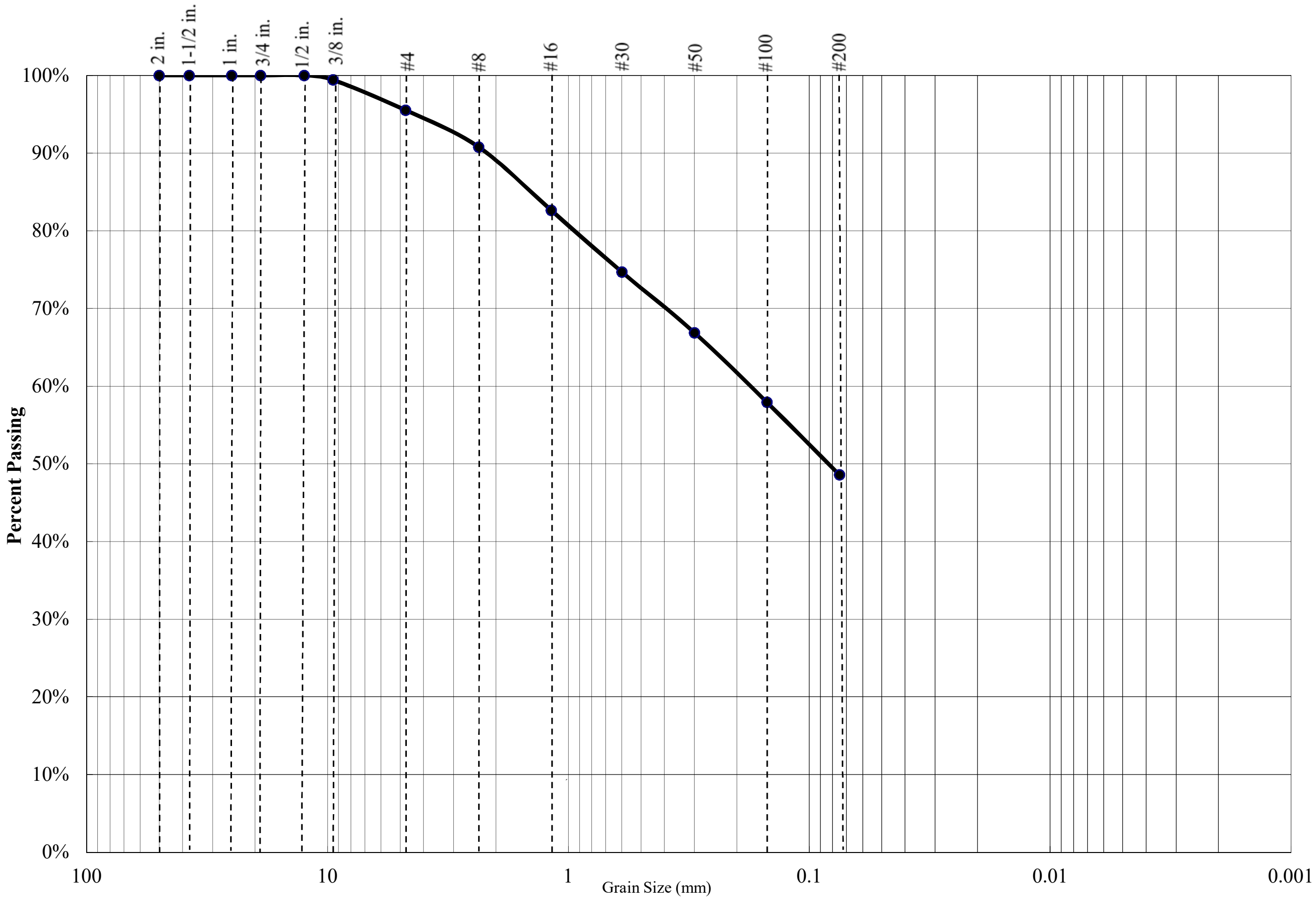
Silty SAND (SM)

Project Name: Proposed Commercial Development - Lake Elsinore, CA
Project Number: 3-221-0167
Boring: B-13 @ 2'

SALEM engineering group, inc.

PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
4%	47%	49%

Sieve Size	Percent Passing
3/4 inch	100.0%
1/2 inch	100.0%
3/8 inch	99.4%
#4	95.5%
#8	90.8%
#16	82.7%
#30	74.7%
#50	66.9%
#100	57.9%
#200	48.6%

Atterberg Limits		
PL=	**LL=**	**PI=**

Coefficients				
D_{85}=		**D_{60}=**		**D_{50}=**
D_{30}=		**D_{15}=**		**D_{10}=**
C_u=	N/A	**C_c=**	N/A	

USCS CLASSIFICATION
Silty SAND (SM)

Project Name: Proposed Commercial Development - Lake Elsinore, CA
Project Number: 3-221-0167
Boring: B-13 @ 5'

SALEM
engineering group, inc.

EXPANSION INDEX TEST
ASTM D4829

Project Name: Proposed Commercial Development - Lake Elsinore, CA
Project Number: 3-221-0167
Date Sampled: 3/30/2021- 3/31/2021 Date Tested: 4/12/2021
Sampled By: JC Tested By: Mobin Noorzay
Sample Location: B-10 @ 0'-4'
Soil Description: Reddish Brown Sandy SILT (ML) with trace clay

Trial #	1	2	3
Weight of Soil & Mold, g.	798.1		
Weight of Mold, g.	368.4		
Weight of Soil, g.	429.7		
Wet Density, pcf	129.6		
Weight of Moisture Sample (Wet), g.	324.5		
Weight of Moisture Sample (Dry), g.	301.8		
Moisture Content, %	7.5		
Dry Density, pcf	120.5		
Specific Gravity of Soil	2.7		
Degree of Saturation, %	51.0		

Time	Inital	30 min	1 hr	6 hrs	12 hrs	24 hrs
Dial Reading	0	0.012	0.015	--	--	0.015

Expansion Index $_{\text{measured}}$ = 15
Expansion Index $_{50}$ = 15.5

Expansion Index = 15

Expansion Potential Table	
Exp. Index	Potential Exp.
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

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CHEMICAL ANALYSIS

SO_4 - Modified CTM 417 & Cl - Modified CTM 417/422

Project Name: Proposed Commercial Development - Lake Elsinore, CA
Project Number: 3-221-0167
Date Sampled: 3/30/2021- 3/31/2021 Date Tested: 4/13/2021
Sampled By: JC Tested By: Mass Noorzay
Soil Description: Reddish Brown Sandy SILT (ML) with trace clay

Sample Number	Sample Location	Soluble Sulfate SO_4-S	Soluble Chloride Cl	pH
1a.	B-1 @ 0'-4'	230 mg/kg	196 mg/kg	7.9
1b.	B-1 @ 0'-4'	230 mg/kg	195 mg/kg	7.9
1c.	B-1 @ 0'-4'	230 mg/kg	195 mg/kg	7.9
Average:		**230 mg/kg**	**195 mg/kg**	**7.9**

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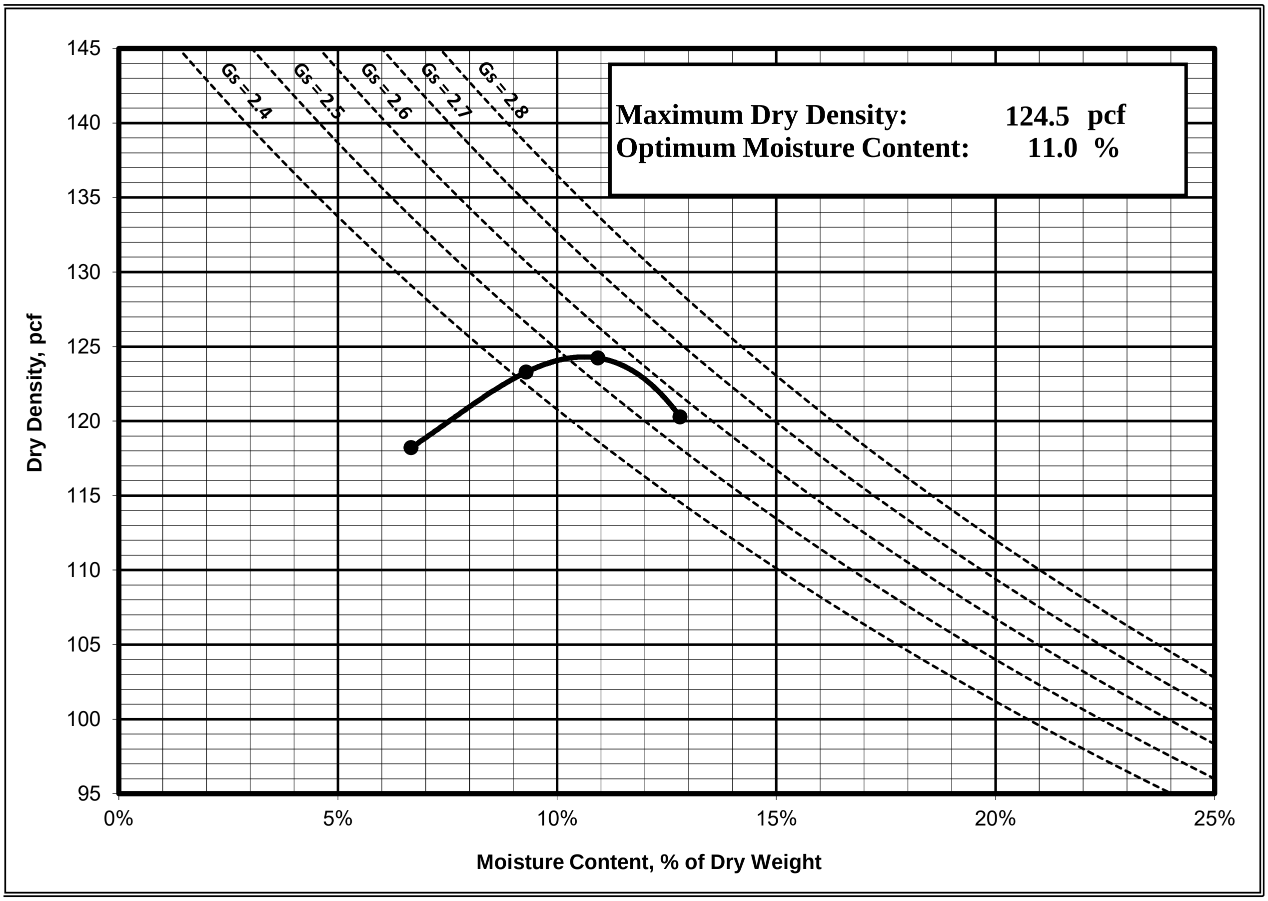
Laboratory Compaction Curve
ASTM D1557

Project Name: Proposed Commercial Development - Lake Elsinore, CA
Project Number: 3-221-0167
Date Sampled: 3/30/2021- 3/31/2021 Date Tested: 4/11/2021
Sampled By: JC Tested By: Mobin Noorzay
Sample Location: B-1 @ 0'-4'
Soil Description: Reddish Brown Sandy SILT (ML) with trace clay
Test Method: Method B

	1	2	3	4
Weight of Moist Specimen & Mold, (g)	6197.5	6328.0	6374.6	6342.5
Weight of Compaction Mold, (g)	4290.9	4290.9	4290.9	4290.9
Weight of Moist Specimen, (g)	1906.6	2037.1	2083.7	2051.6
Volume of Mold, (ft^3)	0.0333	0.0333	0.0333	0.0333
Wet Density, (pcf)	126.1	134.7	137.8	135.7
Weight of Wet (Moisture) Sample, (g)	200.0	200.0	200.0	200.0
Weight of Dry (Moisture) Sample, (g)	187.5	183.0	180.3	177.3
Moisture Content, (%)	6.7%	9.3%	10.9%	12.8%
Dry Density, (pcf)	118.2	123.3	124.2	120.3



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APPENDIX

C

APPENDIX C
GENERAL EARTHWORK AND PAVEMENT SPECIFICATIONS

When the text of the report conflicts with the general specifications in this appendix, the recommendations in the report have precedence.

1.0 SCOPE OF WORK: These specifications and applicable plans pertain to and include all earthwork associated with the site rough grading, including, but not limited to, the furnishing of all labor, tools and equipment necessary for site clearing and grubbing, stripping, preparation of foundation materials for receiving fill, excavation, processing, placement and compaction of fill and backfill materials to the lines and grades shown on the project grading plans and disposal of excess materials.

2.0 PERFORMANCE: The Contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications. This work shall be inspected and tested by a representative of SALEM Engineering Group, Incorporated, hereinafter referred to as the Soils Engineer and/or Testing Agency. Attainment of design grades, when achieved, shall be certified by the project Civil Engineer. Both the Soils Engineer and the Civil Engineer are the Owner's representatives. If the Contractor should fail to meet the technical or design requirements embodied in this document and on the applicable plans, he shall make the necessary adjustments until all work is deemed satisfactory as determined by both the Soils Engineer and the Civil Engineer. No deviation from these specifications shall be made except upon written approval of the Soils Engineer, Civil Engineer, or project Architect.

No earthwork shall be performed without the physical presence or approval of the Soils Engineer. The Contractor shall notify the Soils Engineer at least 2 working days prior to the commencement of any aspect of the site earthwork.

The Contractor shall assume sole and complete responsibility for job site conditions during the course of construction of this project, including safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; and that the Contractor shall defend, indemnify and hold the Owner and the Engineers harmless from any and all liability, real or alleged, in connection with the performance of work on this project, except for liability arising from the sole negligence of the Owner or the Engineers.

3.0 TECHNICAL REQUIREMENTS: All compacted materials shall be densified to no less that 95 percent relative compaction based on ASTM D1557 Test Method (latest edition), UBC or CAL-216, or as specified in the technical portion of the Soil Engineer's report. The location and frequency of field density tests shall be determined by the Soils Engineer. The results of these tests and compliance with these specifications shall be the basis upon which satisfactory completion of work will be judged by the Soils Engineer.

4.0 SOILS AND FOUNDATION CONDITIONS: The Contractor is presumed to have visited the site and to have familiarized himself with existing site conditions and the contents of the data presented in the Geotechnical Engineering Report. The Contractor shall make his own interpretation of the data contained in the Geotechnical Engineering Report and the Contractor shall not be relieved of liability for any loss sustained as a result of any variance between conditions indicated by or deduced from said report and the actual conditions encountered during the progress of the work.

5.0 DUST CONTROL: The work includes dust control as required for the alleviation or prevention of any dust nuisance on or about the site or the borrow area, or off-site if caused by the Contractor's operation either during the performance of the earthwork or resulting from the conditions in which the Contractor leaves the site. The Contractor shall assume all liability, including court costs of codefendants, for all claims related to dust or wind-blown materials attributable to his work. Site preparation shall consist of site clearing and grubbing and preparation of foundation materials for receiving fill.

6.0 CLEARING AND GRUBBING: The Contractor shall accept the site in this present condition and shall demolish and/or remove from the area of designated project earthwork all structures, both surface and subsurface, trees, brush, roots, debris, organic matter and all other matter determined by the Soils Engineer to be deleterious. Such materials shall become the property of the Contractor and shall be removed from the site.

Tree root systems in proposed improvement areas should be removed to a minimum depth of 3 feet and to such an extent which would permit removal of all roots greater than 1 inch in diameter. Tree roots removed in parking areas may be limited to the upper 1½ feet of the ground surface. Backfill of tree root excavations is not permitted until all exposed surfaces have been inspected and the Soils Engineer is present for the proper control of backfill placement and compaction. Burning in areas which are to receive fill materials shall not be permitted.

7.0 SUBGRADE PREPARATION: Surfaces to receive Engineered Fill and/or building or slab loads shall be prepared as outlined above, scarified to a minimum of 12 inches, moisture-conditioned as necessary, and recompacted to 95 percent relative compaction.

Loose soil areas and/or areas of disturbed soil shall be moisture-conditioned as necessary and recompacted to 95 percent relative compaction. All ruts, hummocks, or other uneven surface features shall be removed by surface grading prior to placement of any fill materials. All areas which are to receive fill materials shall be approved by the Soils Engineer prior to the placement of any fill material.

8.0 EXCAVATION: All excavation shall be accomplished to the tolerance normally defined by the Civil Engineer as shown on the project grading plans. All over-excavation below the grades specified shall be backfilled at the Contractor's expense and shall be compacted in accordance with the applicable technical requirements.

9.0 FILL AND BACKFILL MATERIAL: No material shall be moved or compacted without the presence or approval of the Soils Engineer. Material from the required site excavation may be utilized for construction site fills, provided prior approval is given by the Soils Engineer. All materials utilized for constructing site fills shall be free from vegetation or other deleterious matter as determined by the Soils Engineer.

10.0 PLACEMENT, SPREADING AND COMPACTION: The placement and spreading of approved fill materials and the processing and compaction of approved fill and native materials shall be the responsibility of the Contractor. Compaction of fill materials by flooding, ponding, or jetting shall not be permitted unless specifically approved by local code, as well as the Soils Engineer. Both cut and fill shall be surface-compacted to the satisfaction of the Soils Engineer prior to final acceptance.

11.0 SEASONAL LIMITS: No fill material shall be placed, spread, or rolled while it is frozen or thawing, or during unfavorable wet weather conditions. When the work is interrupted by heavy rains, fill operations shall not be resumed until the Soils Engineer indicates that the moisture content and density of previously placed fill is as specified.

12.0 DEFINITIONS - The term "pavement" shall include asphaltic concrete surfacing, untreated aggregate base, and aggregate subbase. The term "subgrade" is that portion of the area on which surfacing, base, or subbase is to be placed. The term "Standard Specifications": hereinafter referred to, is the most recent edition of the Standard Specifications of the State of California, Department of Transportation. The term "relative compaction" refers to the field density expressed as a percentage of the maximum laboratory density as determined by ASTM D1557 Test Method (latest edition) or California Test Method 216 (CAL-216), as applicable.

13.0 PREPARATION OF THE SUBGRADE - The Contractor shall prepare the surface of the various subgrades receiving subsequent pavement courses to the lines, grades, and dimensions given on the plans. The upper 12 inches of the soil subgrade beneath the pavement section shall be compacted to a minimum relative compaction of 95 percent relative compaction based upon ASTM D1557. The finished subgrades shall be tested and approved by the Soils Engineer prior to the placement of additional pavement courses.

14.0 AGGREGATE BASE - The aggregate base material shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate base material shall conform to the requirements of Section 26 of the Standard Specifications for Class II material, ¾-inch or 1½-inches maximum size. The aggregate base material shall be compacted to a minimum relative compaction of 95 percent based upon CAL-216. The aggregate base material shall be spread in layers not exceeding 6 inches and each layer of aggregate material course shall be tested and approved by the Soils Engineer prior to the placement of successive layers.

15.0 AGGREGATE SUBBASE - The aggregate subbase shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate subbase material shall conform to the requirements of Section 25 of the Standard Specifications for Class II Subbase material. The aggregate subbase material shall be compacted to a minimum relative compaction of 95 percent based upon CAL-216, and it shall be spread and compacted in accordance with the Standard Specifications. Each layer of aggregate subbase shall be tested and approved by the Soils Engineer prior to the placement of successive layers.

16.0 ASPHALTIC CONCRETE SURFACING - Asphaltic concrete surfacing shall consist of a mixture of mineral aggregate and paving grade asphalt, mixed at a central mixing plant and spread and compacted on a prepared base in conformity with the lines, grades, and dimensions shown on the plans. The viscosity grade of the asphalt shall be PG 64-10, unless otherwise stipulated or local conditions warrant more stringent grade. The mineral aggregate shall be Type A or B, ½ inch maximum size, medium grading, and shall conform to the requirements set forth in Section 39 of the Standard Specifications. The drying, proportioning, and mixing of the materials shall conform to Section 39. The prime coat, spreading and compacting equipment, and spreading and compacting the mixture shall conform to the applicable chapters of Section 39, with the exception that no surface course shall be placed when the atmospheric temperature is below 50 degrees F. The surfacing shall be rolled with a combination steel-wheel and pneumatic rollers, as described in the Standard Specifications. The surface course shall be placed with an approved self-propelled mechanical spreading and finishing machine.

Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

TECHNICAL
DRAINAGE STUDY

THIRD STREET DRAINAGE IMPROVEMENTS
Lake Elsinore, California
April 11th, 2016

Prepared for:

Brad Fagrell, P.E., City Engineer
City of Lake Elsinore
130 S. Main Street
Lake Elsinore, CA 92530
Ph. (951) 674-3124 x212

Report Prepared By:

Michael Baker
INTERNATIONAL

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951.676.8042 telephone
951.676.7240 fax

Engineer of Work/ Contact Person:
Francisco Martinez Jr P.E.

JN 148215

REGISTERED PROFESSIONAL ENGINEER
FRANCISCO MARTINEZ JR
C-84640
CIVIL
STATE OF CALIFORNIA

4/11/2016

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Appendix D Watershed Area A3: Synthetic Unit Hydrograph Analysis, 100-year frequency, 3-hr, 6-hr & 24-hr

SECTION 1 – INTRODUCTION

1.1 BACKGROUND

Michael Baker International has been retained by the City of Lake Elsinore to provide professional engineering services for the design and plan preparation of final PS&E for Third Street Channel Watershed Drainage Improvements, a Master Drainage facility or as cited in City's RFP as Third Street Drainage Improvements.

The watershed is approximately 700-acres, located in the City of Lake Elsinore, County of Riverside, California. It lays within the Santa Ana River Basin and the RCFC&WCD Zone 3 watershed. It is bounded roughly to north by Central Avenue (State Highway 74) and Mauricio Avenue, to the east by the ridgeline of Wasson Canyon Wash, to the west by Collier Avenue and to the south by 2nd Street. The existing land use consists primarily of vacant parcels with fewer medium to low residential development with some commercial areas.

The watershed topography ranges from mildly steep-sloped foothills to relatively flat valley terrain and generally flows in the southwesterly direction. The Third Street Drainage Improvements will convey storm water through this area, out-letting into the existing Third Street Channel and double culvert located on 3rd Street and Collier Avenue.

On February 11, 2016 the City met with Riverside County Flood Control & Water Conservation District (RCFC&WCD) to discuss the master drainage improvements (MDP) for the existing Third Street Channel Watershed, its funding, operation and maintenance, where agreement was made for RCFC&WCD to own, operate and maintain the Third Street Channel Watershed Improvements.

1.2 PURPOSE

The purpose of this technical drainage study is to investigate and evaluate deficiencies in the Third Street Channel watershed and to develop an economical drainage plan which considers protection of both existing development and potential future development. The results from the engineering analysis will ultimately serve as technical documentation for the preparation of Final engineering design and selection of the recommended watershed improvements.

The recommendations of this Plan will provide increased flood protection as facilities are installed and will be used as a guide for locating and sizing major drainage facilities, as development increases in the area.

SECTION 2 - HYDROLOGY

2.1 METHODOLOGY

The hydrology analysis for this watershed will be developed using the Synthetic Unit Hydrograph Method (SUH) which is suitable for watersheds larger than 300 to 500 acres as described and in accordance with the procedures and recommendations outlined in the Riverside County Flood Control and Water Conservation District Hydrology Manual 1978 edition (Ref. 1), referred to hereafter as "Hydrology Manual". CivilDesign® Unit Hydrograph Hydrology, Riverside County Software was used to perform the Synthetic Unit Hydrograph Hydrology.

The Antecedent Moisture Conditions (AMC) used in this study is AMC II, defined in the District's Hydrology Manual as moderate runoff potential, an intermediate condition. The composite runoff index coefficients for each sub-basin were determined based upon land-use and hydrological soil types.

The SUH 100 year frequency storm flows are summarized in Table 1.

TABLE 1

Duration Storm Analyzed	A1	A2	A3	A4	A
	Peak flow rates (cfs)	Peak flow rates (cfs)	Peak flow rates (cfs)	Peak flow rates (cfs)	Peak flow rates (cfs)
3-HR	485.7	500.6	529.5	832.1	926.0
6-HR	457.4	470.9	506.6	776.2	869.0
24-HR	257.3	265.0	290.2	436.7	493.2
Tributary Area (acres)	378.2	387.9	425.0	625.0	698.4

2.2 CRITERIA

A preliminary analysis, hydrology study and 35% schematic drawings were previously completed by Otte Berkeley Group on behalf of Walmart, and provided to Michael Baker International for reference. The schematic drawings under Otte Berkely's preliminary design proposes drainage improvements along 3rd street between Collier Avenue and Cambern Avenue.

The drainage watercourse was determined based on Flood Control topography, City as-built drawings, sub division and road survey plans and field investigations. The watershed under this study has been designated watershed "A" and divided into 4 sub areas, where each sub area corresponds to the segment or reach evaluated for necessary drainage improvements along the proposed alignment. The initial area is Watershed "A1" with concentration point at Cambern

Avenue, roughly 400 lineal feet north of 3rd Street. Most of the storm flows at this location are being released upstream from an existing storm drain located at Conard Avenue, approximately 90 lineal feet north of Welch Drive. From the outlet point on Cambern, storm flows travel downstream traversing private property via a meandering natural channel with unknown widths towards Cambern Avenue. However there appears to be a more or less defined small v-shape earthen channel located between private properties at the “A1” concentration point.

A preliminary normal depth analysis performed for the v-channel segment and based on the aerial topography shows a maximum channel capacity of 80 cfs. Therefore it is being assumed that actual developed storm flows do not concentrate at this point but disperse and continue in the southerly direction. The proposed inlet structure proposed at this location is for an interim condition until the master drainage facility is extended to the intersection of Conard Avenue and Welch Drive and collects storm flows tributary to this point. It is anticipated that the flows at “A1” under ultimate conditions will be less than the interim.

The next sub-area is “A2” which allows us to estimate developed storm water flows within Cambern Avenue between Highway 74 and 3rd Street; and it is followed by the next downstream Sub-area “A3 with a concentration point at the Intersection of Dexter Avenue and 3rd Street; the next and final sub-area is “A4” with a concentration point at the existing low point located at the existing CALTRANS 8’x6’ RCB, approximately 450 lineal feet south of 3rd Street along highway right-of-way. Finally, watershed “A” has the concentration point at the existing double reinforced concrete culvert located at the intersection of 3rd street and Collier Avenue.

The watershed is traversed at the lower end (downstream) in a north-south direction by California Interstate 15. Per our investigation, there are five (5) storm drain culverts crossing underneath the highway. The culverts lay roughly perpendicular to the highway allowing storm water to flow unobstructed from its natural watercourse. There is an existing 24-inch pipe culvert beginning from the north, followed in a southerly direction by a 30, 36, and 54-inch pipe culverts; and near the southerly end of the watershed an 8’x6’ Reinforced Concrete Box. These facilities are owned, maintained and located in CALTRANS right-of-way.

2.3 RAINFALL VALUES

The NOAA Atlas 14 rainfall data was used in this technical drainage study. This will be consistent with the data used in recent studies prepared by RCFC&WCD for the Lakeland Village MDP, as described in the Memorandum of Understanding (Ref. 2). See Table 2 for Point Rainfall amounts.

TABLE 2: POINT RAINFALL AMOUNTS

FREQUENCY YEARS	DURATION HOURS	POINT RAINFALL INCHES (1)
2	1	0.48
	3	0.86
	6	1.24
	24	2.34
100	1	1.34
	3	2.17
	6	3.06
	24	6.29

(1) AREA WEIGHTED POINT RAINFALL. SOURCE: Ref. 2

2.4 HYDROLOGIC SOIL TYPES

Hydrologic soil types were determined from City G.I.S database which includes soil names and descriptions. The majority of the area consists of soil types D, to lesser extent C, small amounts of B and negligible amounts of A. The composite soil map is included in Appendix.

2.5 LAND USE

Land use assumptions used throughout the study were based on the City of Lake Elsinore General Plan, updated 2011 and with revisions adopted by the City Council on April 23, 2013. The watershed lays within two City Districts, the Lake Elsinore Hills District and the Business District, with an area within the Ramsgate Specific Plan.

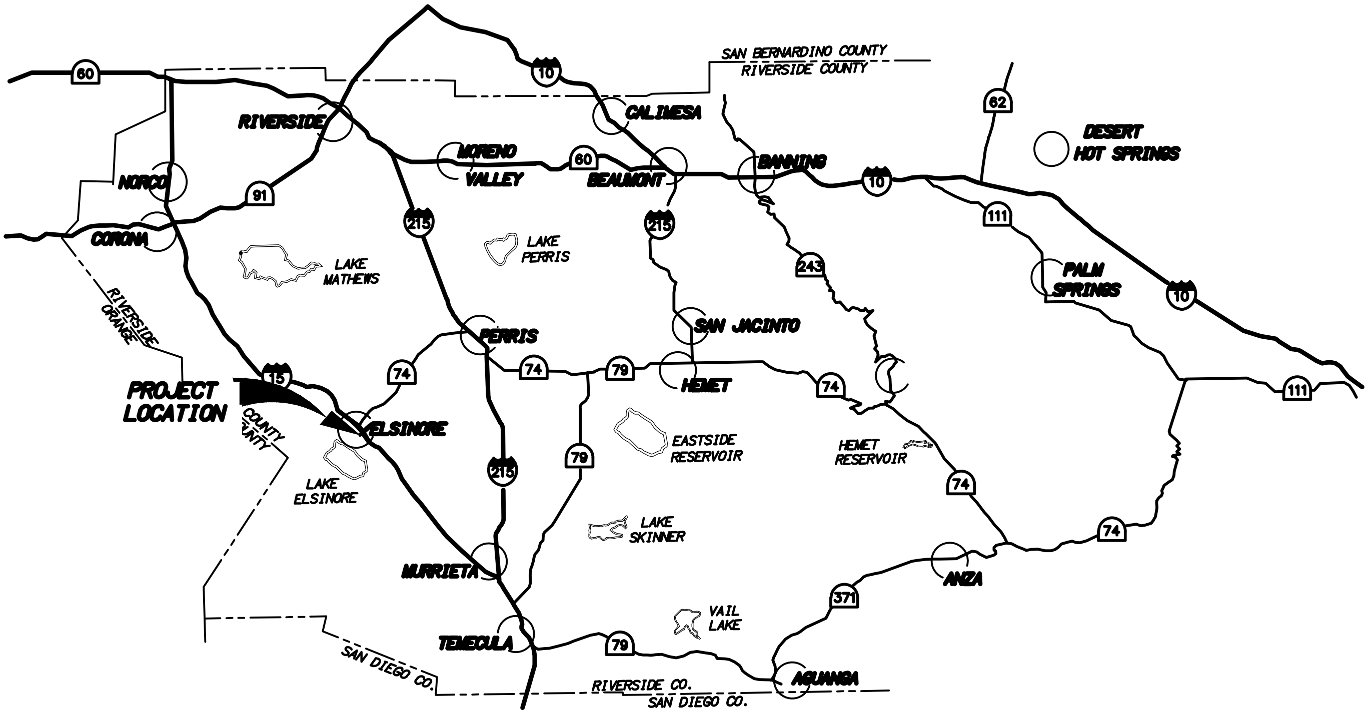
SECTION 3 - HYDRAULICS

3.1 STORM DRAIN ANALYSIS

The storm drains were sized to convey the 100-year storm without exceeding RCF&WCD hydraulic criteria. The hydraulic analysis was performed using the Water Surface Pressure Gradient (WSPG) computer program. The starting water surface elevation controls for storm drains out-letting into the Third Street Channel uses the maximum 100-year water surface in the channel. For laterals, the starting water surface used was the hydraulic grade line at the confluence. The WSPG input and output files are included in Appendix.

SECTION 4 – REFERENCES

1. Riverside County Flood Control and Water Conservation District (RCFC&WCD) *Hydrology Manual, 1978*
2. Memorandum of Understanding by Albert A. Webb Associates, dated July 20, 2015.
3. CivilDesign® *Unit Hydrograph Hydrology, Riverside County*. Ver. 9.0
4. CivilDesign® *Water Surface and Pressure Gradient Hydraulic Analysis System Program WSPGW*. Ver. 14.07



VICINITY MAP

NTS

Michael Baker
INTERNATIONAL

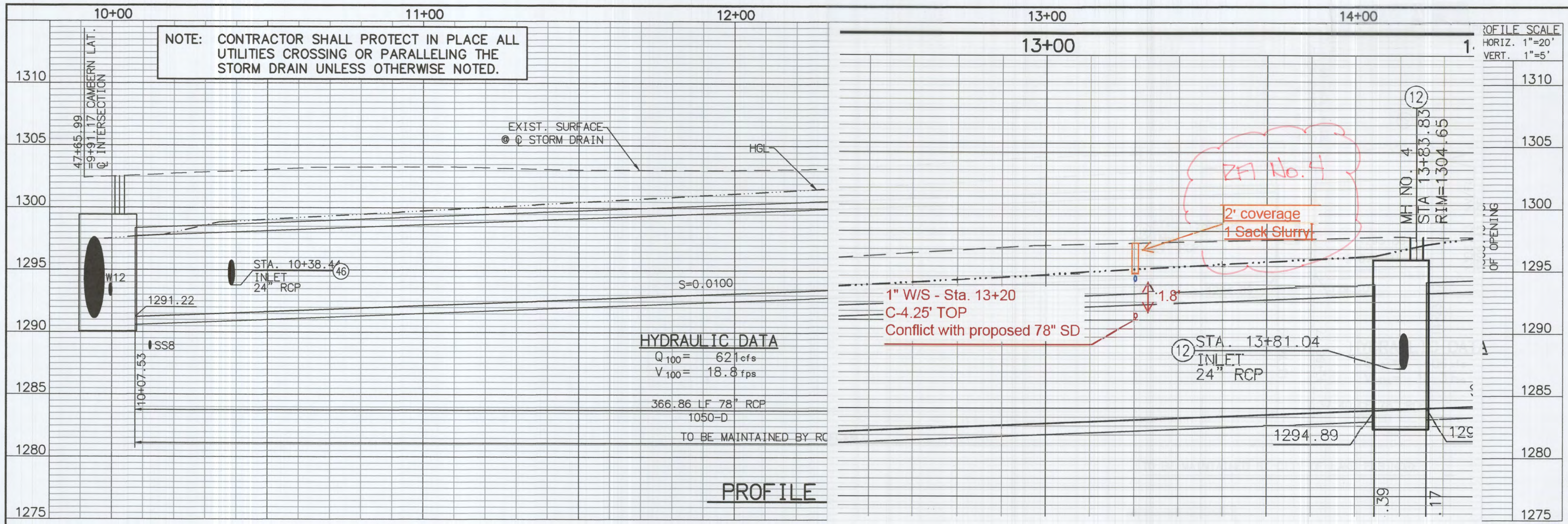
40810 COUNTY CENTER DR.,
SUITE 100
TEMECULA, CA 92591
PHONE: (951) 676-8042
MBAKERINTL.COM

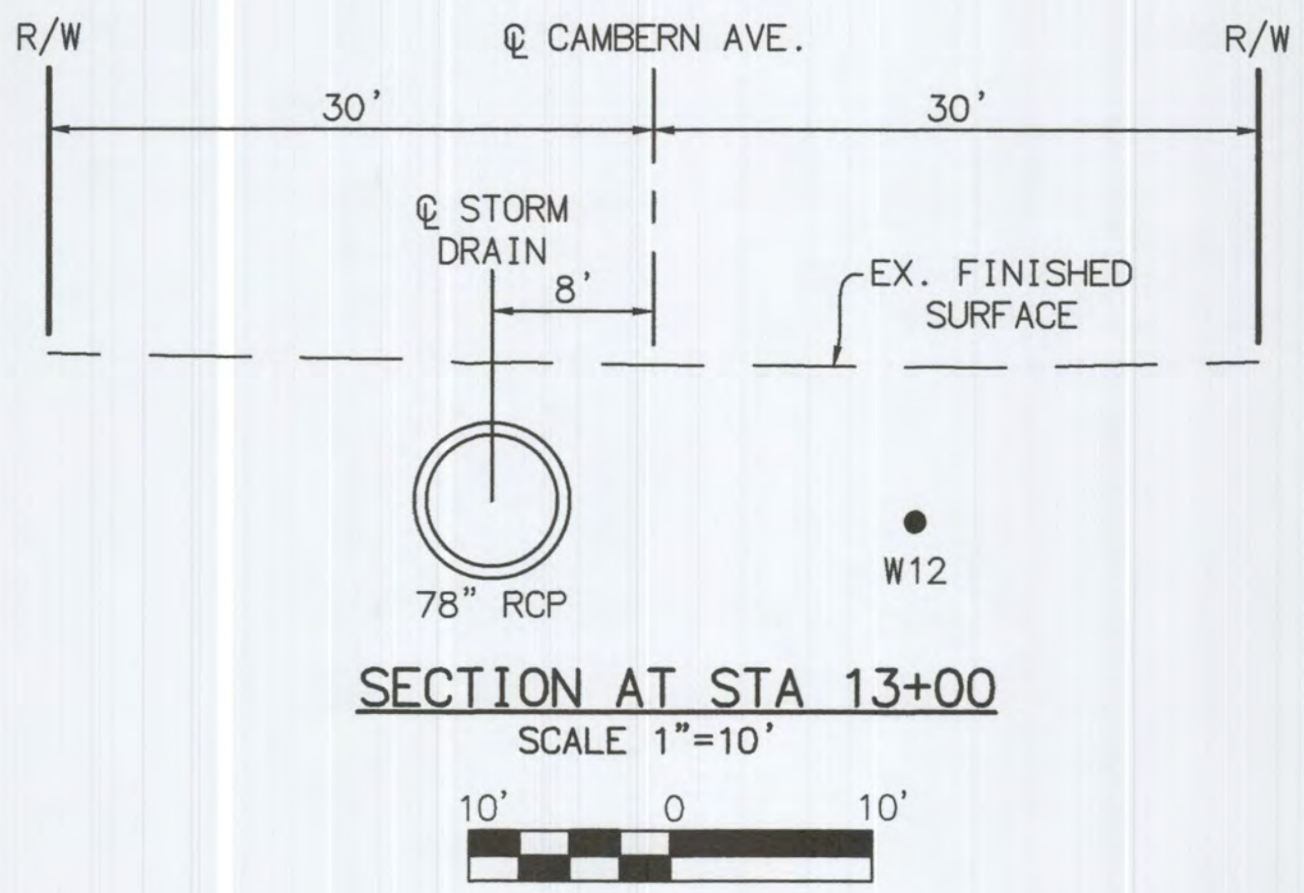
3rd STREET STORM DRAIN

FIGURE 1
VICINITY MAP

H:\PDATA\148215\ADMIN\REPORTS\SURFACE WATER\H&H\148215-FIG-001-VICINITY.DWG CHRIS.MORLOK 4/11/16 1:36 pm

NOTE: CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES CROSSING OR PARALLELING THE STORM DRAIN UNLESS OTHERWISE NOTED.





SECTION AT STA 13+00

SCALE 1"=10'

INFORMATIONAL NOTE

ALL X-SECTIONS TAKEN LOOKING DOWN STREAM

CONSTRUCTION NOTES

① INSTALL 24" RCP STORM DRAIN PIPE, D-LOAD PER PLAN.

⑥ INSTALL 78" RCP STORM DRAIN PIPE, D-LOAD PER PLAN.

⑫ CONSTRUCT MANHOLE NO. 4 PER RCFC&WCD STD. DWG. NO. MH254. INCLUDE A 6' X 6' X 6" THICK CONCRETE PAD WITH #4 @ 12" O.C. E.W. REINFORCEMENT AROUND ALL MANHOLES LOCATED IN UNPAVED AREAS.

⑱ CONSTRUCT CONCRETE BULKHEAD PER RCFC&WCD STD. DWG. NO. M816.

⑲ CONSTRUCT CONCRETE DROP INLET/OUTLET CONTROL PER RCFC&WCD STD. DWG. NO. CB110 AS MODIFIED PER DETAIL ON SHEET 11.

㉑ INTERFERING 12" WATER TO BE RELOCATED PER EVMWD RELOCATION PLANS, SPECIFICATIONS AND STANDARDS.

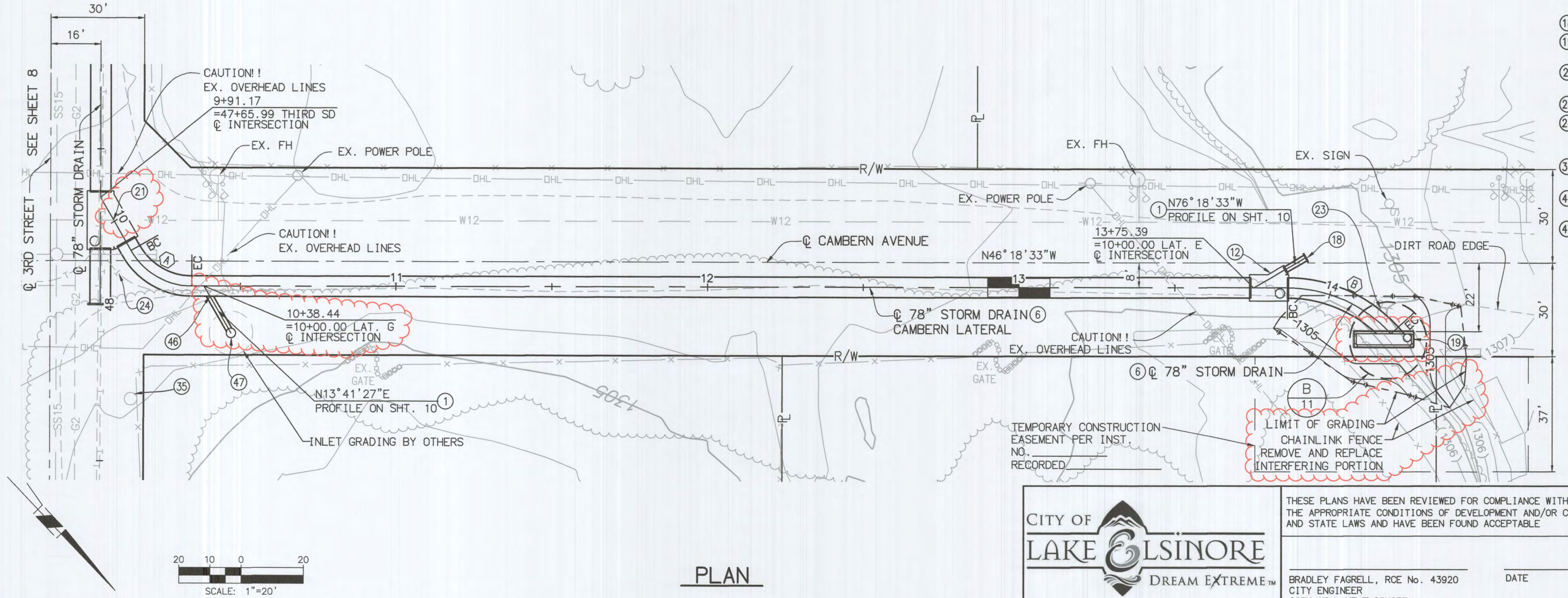
㉓ EXISTING SIGN TO BE REMOVED AND RELOCATED BY CONTRACTOR.

㉔ INTERFERING TELEPHONE LINE ABANDONED IN PLACE BY UTILITY OWNER (FRONTIER). CONFLICTING STRUCTURES AND CONDUITS TO BE REMOVED AND DISPOSED BY CONTRACTOR. REFER TO FRONTIER RELOCATION PLANS.

㉟ PROTECT IN PLACE EXISTING TREE. CONTRACTOR TO INFORM ENGINEER IF TREE POSES AN ISSUE FOR CONSTRUCTION.

㊻ CONSTRUCT JUNCTION STRUCTURE NO. 4 PER RCFC&WCD STD. DWG. NO. JS229.

㊼ CONSTRUCT INLET TYPE X PER RCFC&WCD STD. DWG. NO. CB108.



PLAN

Ⓐ ℄ CURVE DATA
Δ = 60°04'41"
R = 22.50'
T = 13.01'
L = 23.59'
BC = STA. 10+10.85
~~EC = STA. 10+34.44~~
PI = N 2197480.752
E 6232944.927

Ⓑ ℄ CURVE DATA
Δ = 47°37'25"
R = 45.00'
T = 19.86'
L = 37.40'
BC = STA. 13+86.17
~~EC = STA. 14+23.57~~
PI = N 2197746.418
E 6232666.835

MANHOLE NO. 4 TABLE (LAT. E)	
STA.	13+75.39
CALLOUT	VALUE
A	30°
B	24"
C	11.94'
D1	78"
D2	78"
ELEV. R	1297.31
ELEV. S	1297.26

CITY OF LAKE ELSINORE
DREAM EXTREME™

THESE PLANS HAVE BEEN REVIEWED FOR COMPLIANCE WITH THE APPROPRIATE CONDITIONS OF DEVELOPMENT AND/OR CITY AND STATE LAWS AND HAVE BEEN FOUND ACCEPTABLE

BRADLEY FAGRELL, RCE No. 43920
CITY ENGINEER
CITY OF LAKE ELSINORE
DATE

MS 170
CALTRANS PERMIT NO. 08-16-N-TN-0291

Don't Dig...Until You Call U.S.A. Toll Free
1-800-227-2600
for the location of buried utility lines.
Don't disrupt vital services.
BURIED CABLE
TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK
B.M. NO. EL-37-80
A 1 1/2" ALUM. CAP IN 6" CONC. COLLAR, FROM INTER. OF RIVERSIDE DR. AND LAKESHORE DR, SE 1.7 MI. TO THE INTER. OF MOHR ST. AND LAKESHORE DR; 40'± SW FROM ABOVE INTER; 16'± SW OF PP #46330; 1'± S OF SURVEY MARKER POST.
1264.85 EL.

REF.	REVISIONS DESCRIPTION	APPR.	DATE

DESIGNED BY: C. MORLOK
DRAWN BY: J. STOUFFER
DATE DRAWN: 04-2018
CHECKED BY: J. TANNER

Michael Baker
INTERNATIONAL
40810 COUNTY CENTER DR., SUITE 200
TEMECULA, CA 92591
PHONE: (951) 676-8042
MBAKERINTL.COM
JOHN D. TANNER III, RCE 60132
DATE:

JOHN D. TANNER III
No. 60132
CIVIL

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY:
DATE:
APPROVED BY:
DATE:

THIRD STREET
CHANNEL
STAGE 2
CAMBERN LATERAL
STA 9+91.17 TO STA 14+23.57

PROJECT NO. 3-0-00175
DRAWING NO. 3-0210
SHEET NO. 9 OF 13

19-374

H:\PDATA\148215\CADD\STRMWATER\DLV\STORMD\148215-SD-RCFCWCD-009.DWG JASON.STOUFFER 4/5/2018 5:46 PM

Appendix 5: LID Infeasibility

LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: 🟦 Required Entries
▨ Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name DRC Engineering, Inc.
Date 2/10/2022
Designed by Leo Ilog
Case No
Company Project Number/Name 19-400 Evergreen Development Co.

BMP Identification

BMP NAME / ID DMA A

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth,
from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.68 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
1	*11,809*	*Ornamental Landscaping*	*0.1*	*0.11*	*1304.4*			
2	*4,186*	*Roofs*	*1*	*0.89*	*3733.9*			
3	*36,908*	*Concrete or Asphalt*	*1*	*0.89*	*32921.9*			
	52903	***Total***			**37960.2**	**0.68**	***2135.3***	***5036***

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: 🟦 Required Entries
▨ Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name DRC Engineering, Inc.
Date 2/10/2022
Designed by Leo Ilog
Case No
Company Project Number/Name 19-400 Evergreen Development Co.

BMP Identification

BMP NAME / ID DMA B

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth,
from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.68 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
1	*11,675*	*Ornamental Landscaping*	*0.1*	*0.11*	*1289.6*			
2	*2,943*	*Roofs*	*1*	*0.89*	*2625.2*			
3	*38,422*	*Concrete or Asphalt*	*1*	*0.89*	*34272.4*			
	53040	***Total***			**38187.2**	**0.68**	***2148***	***5036***

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend:	🟦	Required Entries
	▨	Calculated Cells

(Note this worksheet shall ***only*** *be used in conjunction with BMP designs from the* ***LID BMP Design Handbook****)*

Company Name	DRC Engineering, Inc.	Date	2/10/2022
Designed by	Leo Ilog	Case No	
Company Project Number/Name	19-400 Evergreen Development Co.		

BMP Identification

BMP NAME / ID DMA C

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth,
from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.68 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume,* V_{BMP} *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
1	*8,111*	*Ornamental Landscaping*	*0.1*	*0.11*	*895.9*			
2	*8,684*	*Roofs*	*1*	*0.89*	*7746.1*			
3	*38,914*	*Concrete or Asphalt*	*1*	*0.89*	*34711.3*			
	55709	***Total***			**43353.3**	**0.68**	***2438.6***	***5036***

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: ▭ Required Entries
▨ Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name DRC Engineering, Inc.
Date 2/10/2022
Designed by Leo Ilog
Case No
Company Project Number/Name 19-400 Evergreen Development Co.

BMP Identification

BMP NAME / ID DMA D

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth,
from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.68 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
1	*15,150*	*Ornamental Landscaping*	*0.1*	*0.11*	*1673.4*			
2	*43,339*	*Roofs*	*1*	*0.89*	*38658.4*			
3	*88,330*	*Concrete or Asphalt*	*1*	*0.89*	*78790.4*			
	146819	***Total***			**119122.2**	**0.68**	***6700.6***	***10072***

Santa Ana Watershed - BMP Design Volume, $\mathbf{V}_{\mathbf{BMP}}$

(Rev. 10-2011)

Legend:	Required Entries
	Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	DRC Engineering, Inc.	Date	2/10/2022
Designed by	Leo Ilog	Case No	
Company Project Number/Name	19-400 Evergreen Development Co.		

BMP Identification

BMP NAME / ID DMA E

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth,
from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.68 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, $\mathbf{V}_{\mathbf{BMP}}$ (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
1	*7,128*	*Ornamental Landscaping*	*0.1*	*0.11*	*787.3*			
2	*3,000*	*Roofs*	*1*	*0.89*	*2676*			
3	*40,350*	*Concrete or Asphalt*	*1*	*0.89*	*35992.2*			
	50478	***Total***			**39455.5**	**0.68**	***2219.4***	***5036***

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend:	
🟦	Required Entries
▨	Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name DRC Engineering, Inc.

Date 2/10/2022

Designed by Leo Ilog

Case No

Company Project Number/Name 19-400 Evergreen Development Co.

BMP Identification

BMP NAME / ID DMA F

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

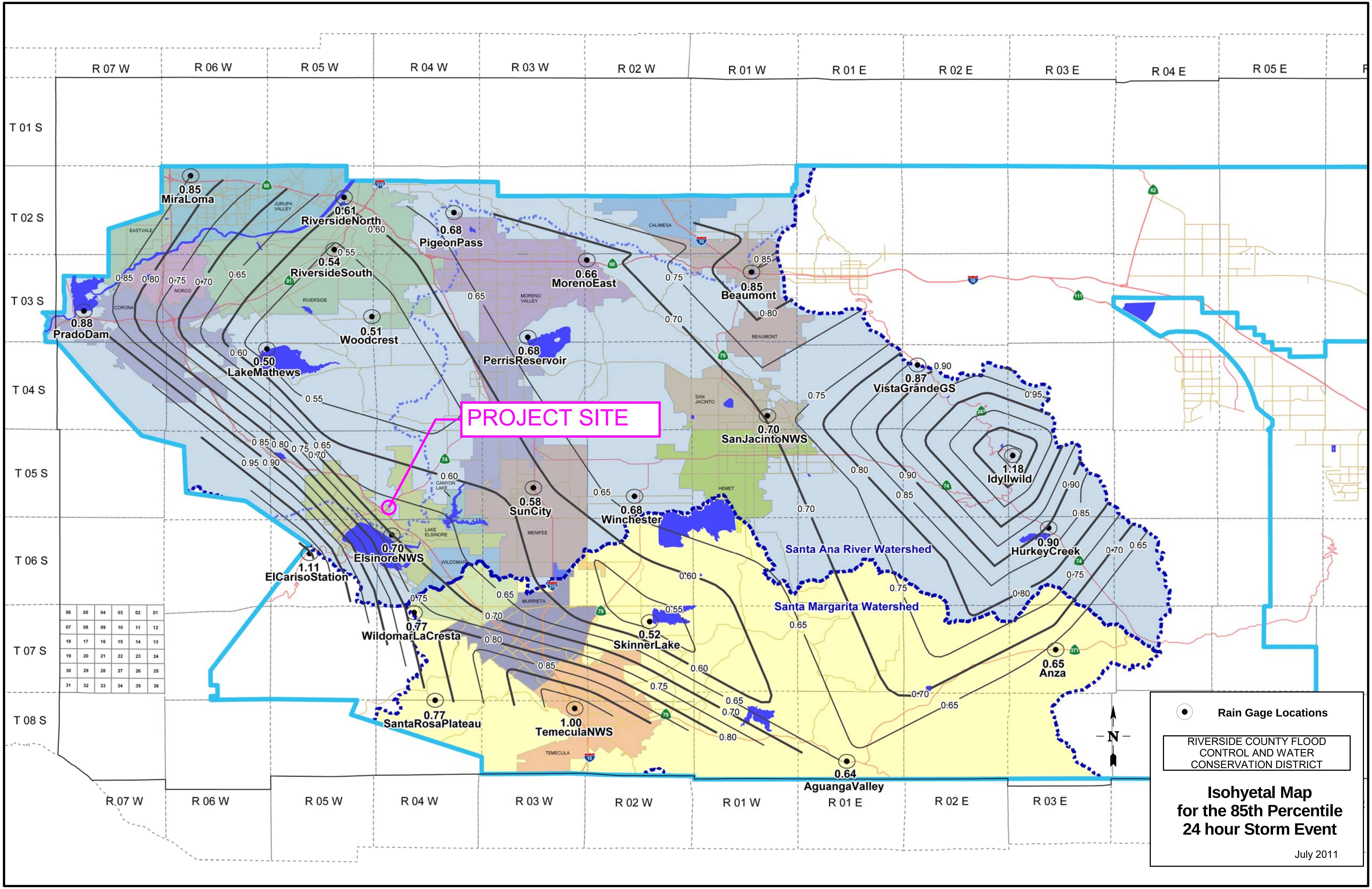
85th Percentile, 24-hour Rainfall Depth,
from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.68 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
1	*11,288*	*Ornamental Landscaping*	*0.1*	*0.11*	*1246.8*			
2	*16,296*	*Concrete or Asphalt*	*1*	*0.89*	*14536*			
	27584	***Total***			**15782.8**	**0.68**	***887.8***	-



Rain Gage Locations

RIVERSIDE COUNTY FLOOD
CONTROL AND WATER
CONSERVATION DISTRICT

Isohyetal Map for the 85th Percentile 24 hour Storm Event

July 2011

Flow Based Sizing

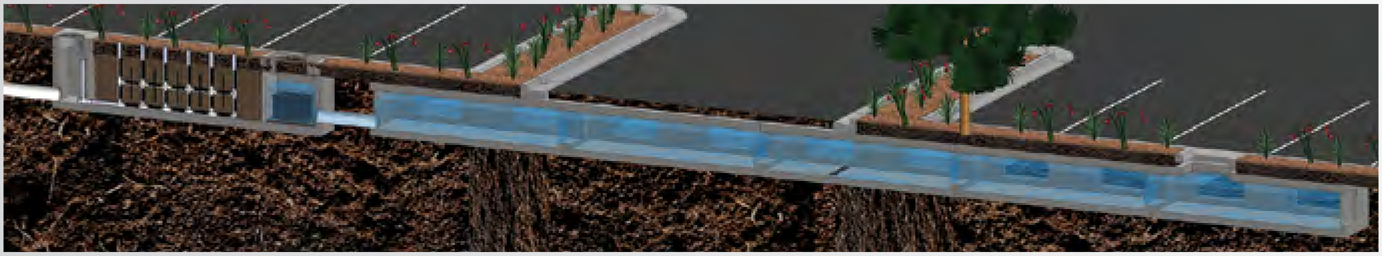
The MWS Linear can be used in stand alone applications to meet treatment flow requirements. Since the MWS Linear is the only biofiltration system that can accept inflow pipes several feet below the surface it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.

Treatment Flow Sizing Table

Model #	Dimensions	WetlandMedia Surface Area	Treatment Flow Rate (cfs)
MWS-L-4-4	4' x 4'	23 ft^2	0.052
MWS-L-4-6	4' x 6'	32 ft^2	0.073
MWS-L-4-8	4' x 8'	50 ft^2	0.115
MWS-L-4-13	4' x 13'	63 ft^2	0.144
MWS-L-4-15	4' x 15'	76 ft^2	0.175
MWS-L-4-17	4' x 17'	90 ft^2	0.206
MWS-L-4-19	4' x 19'	103 ft^2	0.237
MWS-L-4-21	4' x 21'	117 ft^2	0.268
MWS-L-8-8	8' x 8'	100 ft^2	0.230
MWS-L-8-12	8' x 12'	151 ft^2	0.346
MWS-L-8-16	8' x 16'	201 ft^2	0.462

Volume Based Sizing

Many states require treatment of a water quality volume and do not offer the option of flow based design. The MWS Linear and its unique horizontal flow makes it the only biofilter that can be used in volume based design installed downstream of ponds, detention basins, and underground storage systems.



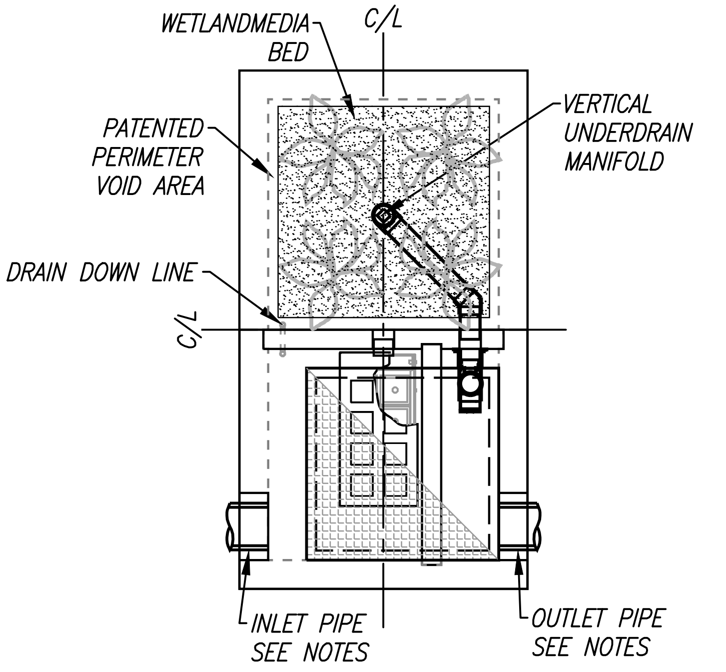
Treatment Volume Sizing Table

Model #	Treatment Capacity (cu. ft.) @ 24-Hour Drain Down	Treatment Capacity (cu. ft.) @ 48-Hour Drain Down
MWS-L-4-4	1140	2280
MWS-L-4-6	1600	3200
MWS-L-4-8	2518	5036
MWS-L-4-13	3131	6261
MWS-L-4-15	3811	7623
MWS-L-4-17	4492	8984
MWS-L-4-19	5172	10345
MWS-L-4-21	5853	11706
MWS-L-8-8	5036	10072
MWS-L-8-12	7554	15109
MWS-L-8-16	10073	20145

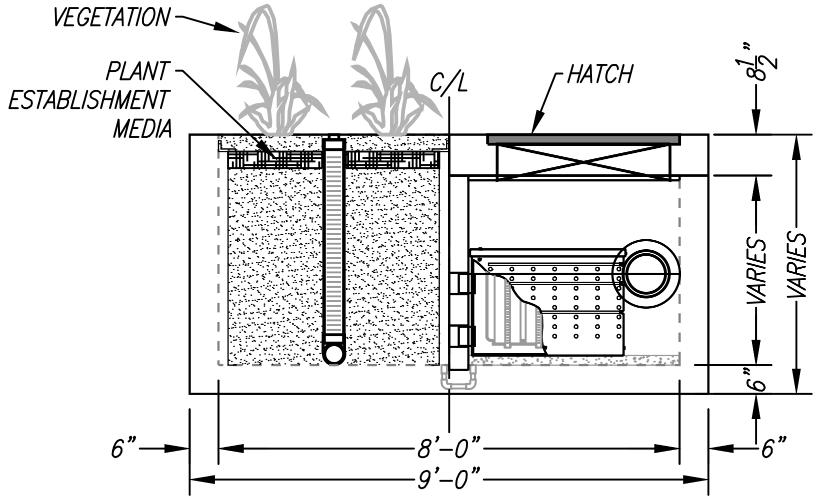
SITE SPECIFIC DATA

PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TBD		0.145 N/A	
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		
FRAME & COVER	36" X 36"	OPEN PLANTER	N/A
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



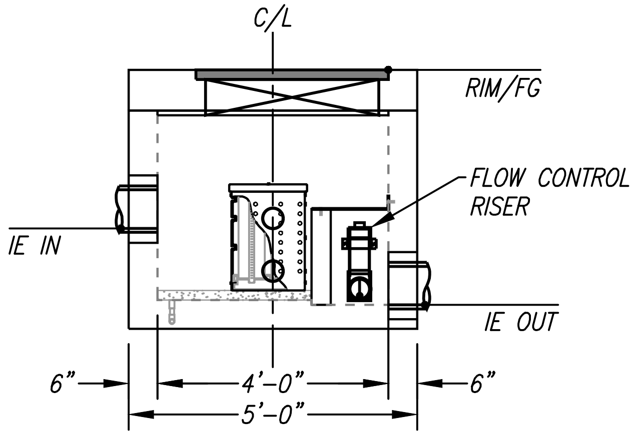
LEFT END VIEW

INSTALLATION NOTES

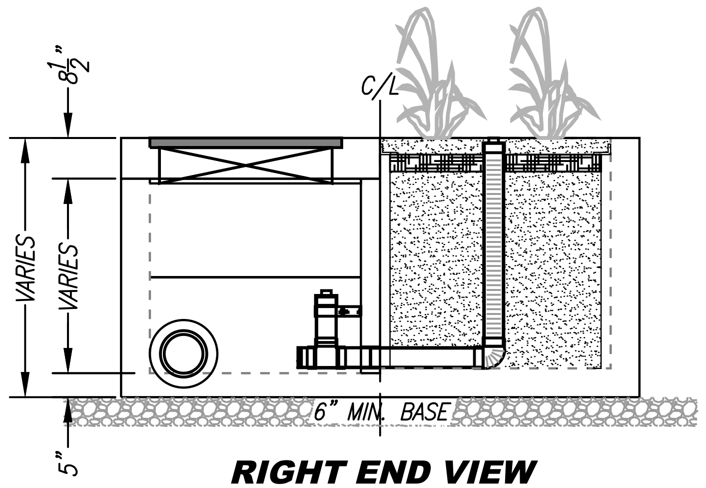
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS 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 WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH 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 BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN 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 BIO CLEAN.



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.115 TBD
OPERATING HEAD (FT)	3.4 TBD
PRETREATMENT LOADING RATE (GPM/SF)	2.50 TBD
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0 TBD

MODULAR WETLANDS

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,378; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

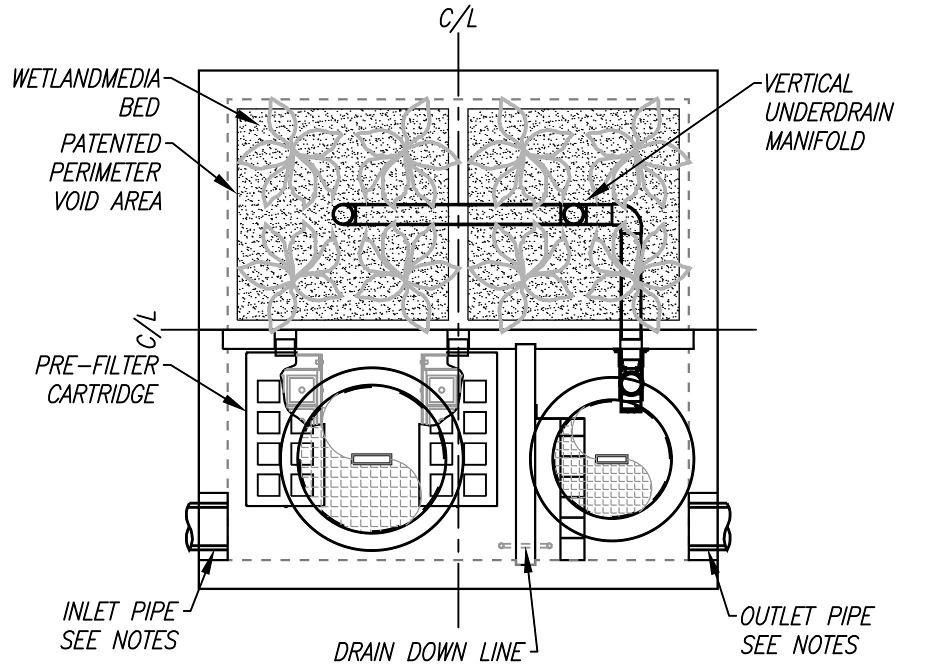
Bio Clean
A Forterra Company

MWS-L-4-8-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

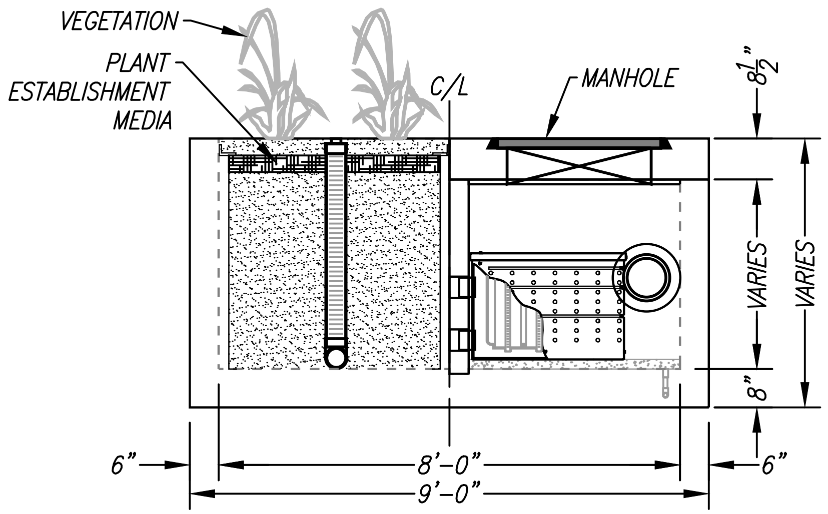
5/23/19TOLFE

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TBD		0.231 N/A	
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		
FRAME & COVER	ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



LEFT END VIEW

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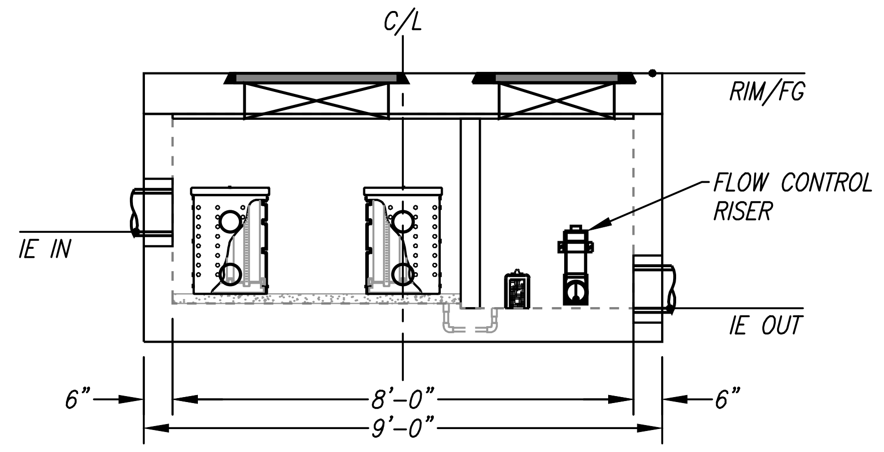
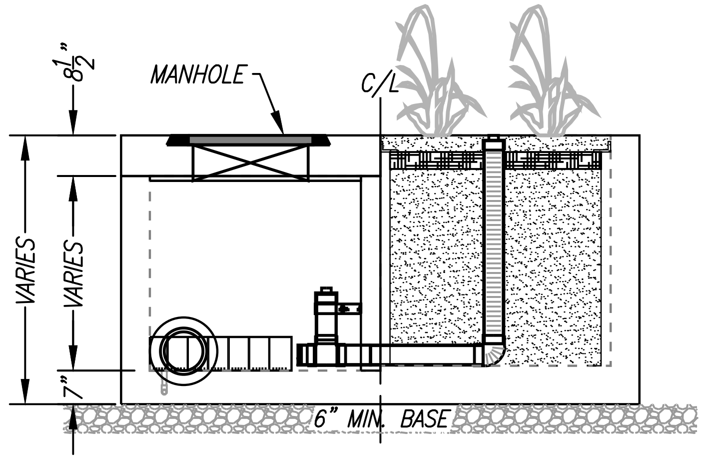


ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.231 TBD
OPERATING HEAD (FT)	3.4 TBD
PRETREATMENT LOADING RATE (GPM/SF)	2.0 TBD
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0 TBD

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
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MODULAR WETLANDS

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Bio Clean
A Forterra Company

MWS-L-8-8-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

5/23/19TOLFF

WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

August 2021

GENERAL USE LEVEL DESIGNATION FOR BASIC (TSS) ENHANCED AND PHOSPHORUS TREATMENT

For

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, Phosphorus, and Enhanced treatment
   - Sized at a hydraulic loading rate of:
     - 1 gallon per minute (gpm) per square foot (sq ft) of Wetland Cell Surface Area
     - Prefilter box (approved at either 22 inches or 33 inches tall)
       - 3.0 gpm/sq ft of prefilter box surface area for moderate pollutant loading rates (low to medium density residential basins).
       - 2.1 gpm/sq ft of prefilter box surface area for high pollutant loading rates (commercial and industrial basins).
2. 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 water quality treatment design 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 water quality treatment design 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 treatment design flow rate is the full 2-year release rate of the detention facility.

3. These use level designations have no expiration date but may be amended or revoked 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) MSW – 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 stormwater treatment technology.
   - 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 the 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 fo 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:	5796 Armada Drive, Suite 250 Carlsbad, CA 92008

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 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 60-percent of dissolved zinc from stormwater with influent concentrations between 0.02 and 0.30 mg/L.

Ecology's Recommendations:

- Modular Wetland System, 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, Phosphorus, and Enhanced treatment goals.

Findings of Fact:

Laboratory Testing

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 5796 Armada Drive, Suite 250 Carlsbad, CA 92008 zach.kent@forterrabp.com
Applicant website:	http://www.modularwetlands.com/

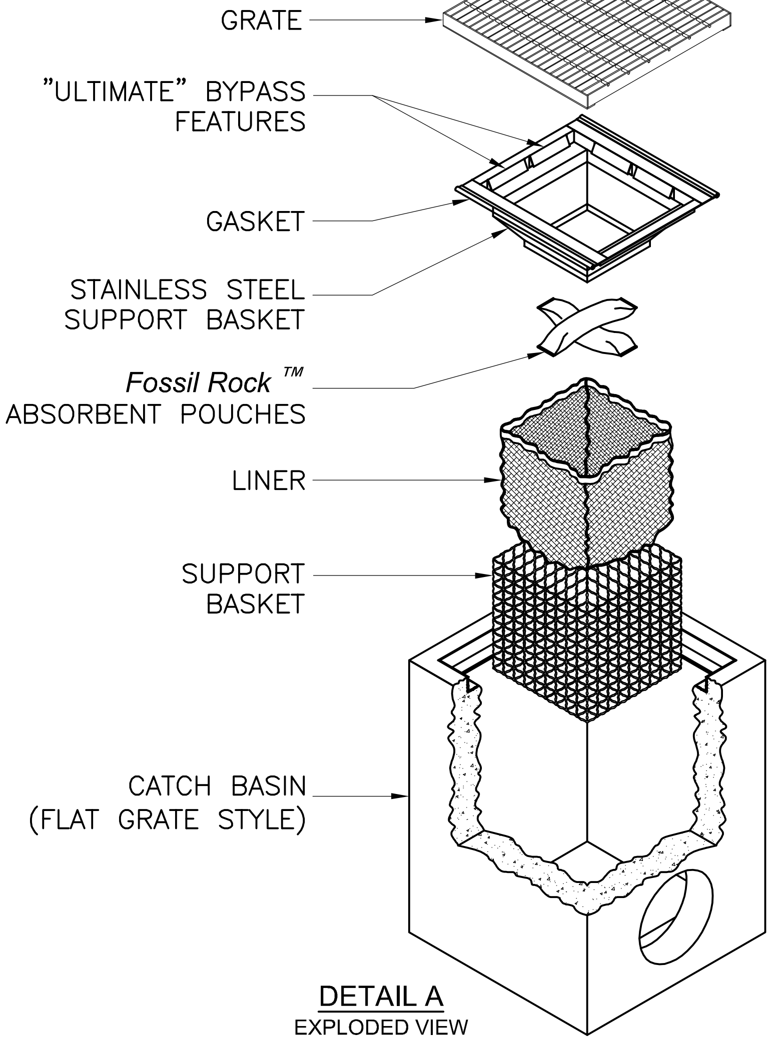
Ecology web link: http://www.ecy.wa.gov/programs/wg/stormwater/newtech/index.html

Ecology:	Douglas C. Howie, P.E. Department of Ecology Water Quality Program (360) 870-0983 douglas.howie@ecy.wa.gov

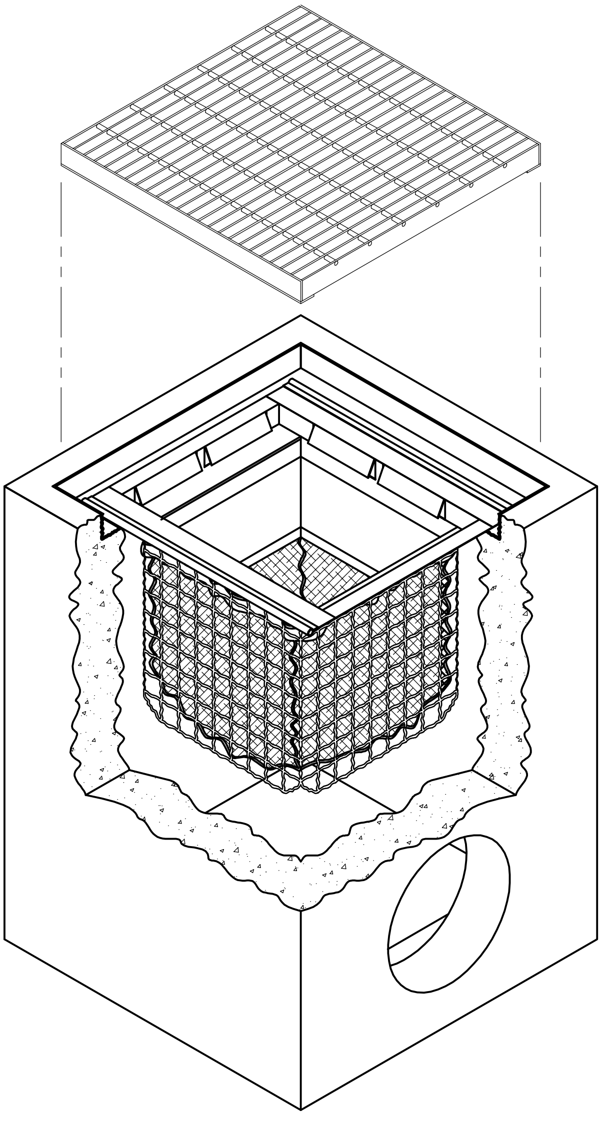
Revision History

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)
December 2019	Revised Manufacturer Contact Address
July 2021	Added additional prefilter sized at 33 inches
August 2021	Changed “Prefilter” to “Prefilter box”

FGP-0001



DETAIL A
EXPLODED VIEW



FloGard® FILTER
-INSTALLED INTO CATCH BASIN-

NOTES:

1. Filter insert shall have a high flow bypass feature.

2. Filter support frame shall be constructed from stainless steel Type 304.

3. Filter medium shall be *Fossil Rock* ™, installed and maintained in accordance with manufacturer specifications.

4. Storage capacity reflects 80% of maximum solids collection prior to impeding filtering bypass.

U.S. PATENT # 6,00,023 & 6,877,029

Inlet
Filtration

FloGard®

Catch Basin Insert Filter

Grated Inlet Style

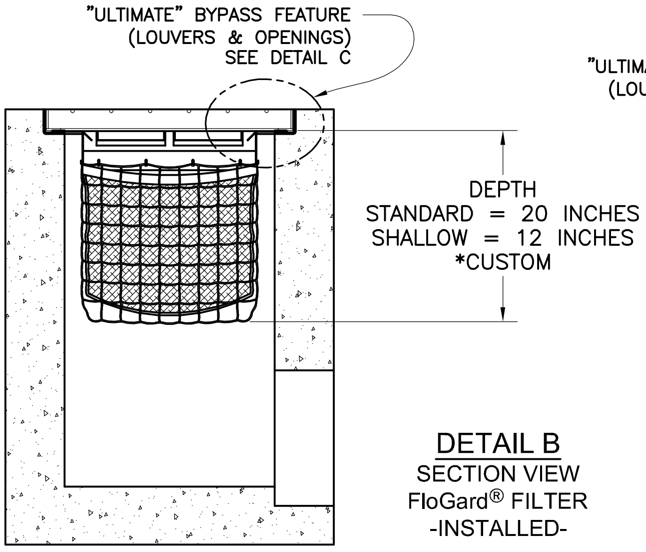
Oldcastle®
Stormwater Solutions

7921 Southpark Plaza, Suite 200 | Littleton, CO | 80120 | Ph: 800.579.8819 | oldcastlestormwater.com

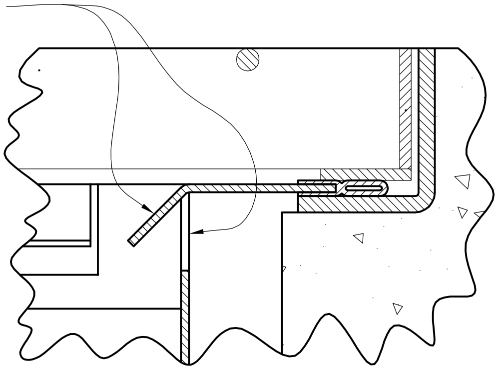
DRAWING NO.	REV	ECO	DATE	
FGP-0001	F	ECO-0127 JPR 5/18/15	JPR 11/3/06	SHEET 1 OF 2

FGP-0001

U.S. PATENT # 6,00,023 & 6,877,029



DETAIL B
SECTION VIEW
FloGard® FILTER
-INSTALLED-



DETAIL C
"ULTIMATE"
BYPASS FEATURES

* MANY OTHER STANDARD & CUSTOM SIZES & DEPTHS AVAILABLE UPON REQUEST.

SPECIFIER CHART

MODEL NO. STANDARD DEPTH	STANDARD & SHALLOW DEPTH (Data in these columes is the same for both STANDARD & SHALLOW versions)			STANDARD DEPTH -20 Inches-		MODEL NO. SHALLOW DEPTH	SHALLOW DEPTH -12 Inches-	
	INLET ID Inside Dimension (inch x inch)	GRATE OD Outside Dimension (inch x inch)	TOTAL BYPASS CAPACITY (cu. ft. / sec.)	SOLIDS STORAGE CAPACITY (cu. ft.)	FILTERED FLOW (cu. ft. / sec.)		SOLIDS STORAGE CAPACITY (cu. ft.)	FILTERED FLOW (cu. ft. / sec.)
FGP-12F	12 X 12	12 X 14	2.8	0.3	0.4	FGP-12F8	.15	.25
FGP-1530F	15 X 30	15 X 35	6.9	2.3	1.6	FGP-1530F8	1.3	.9
FGP-16F	16 X 16	16 X 19	4.7	0.8	0.7	FGP-16F8	.45	.4
FGP-1624F	16 X 24	16 X 26	5.0	1.5	1.2	FGP-1624F8	.85	.7
FGP-18F	18 X 18	18 X 20	4.7	0.8	0.7	FGP-18F8	.45	.4
FGP-1820F	16 X 19	18 X 21	5.9	2.1	1.4	FGP-1820F8	1.2	.8
FGP-1824F	16 X 22	18 X 24	5.0	1.5	1.2	FGP-1824F8	.85	.7
FGP-1836F	18 X 36	18 X 40	6.9	2.3	1.6	FGP-1836F8	1.3	.9
FGP-2024F	18 X 22	20 X 24	5.9	1.2	1.0	FGP-2024F8	.7	.55
FGP-21F	22 X 22	22 X 24	6.1	2.2	1.5	FGP-21F8	1.25	.85
FGP-2142F	21 X 40	24 X 40	9.1	4.3	2.4	FGP-2142F8	2.45	1.35
FGP-2148F	19 X 46	22 X 48	9.8	4.7	2.6	FGP-2148F8	2.7	1.5
FGP-24F	24 X 24	24 X 27	6.1	2.2	1.5	FGP-24F8	1.25	.85
FGP-2430F	24 X 30	26 X 30	7.0	2.8	1.8	FGP-2430F8	1.6	1.05
FGP-2436F	24 X 36	24 X 40	8.0	3.4	2.0	FGP-2436F8	1.95	1.15
FGP-2448F	24 X 48	26 X 48	9.3	4.4	2.4	FGP-2448F8	2.5	1.35
FGP-28F	28 X 28	32 X 32	6.3	2.2	1.5	FGP-28F8	1.25	.85
FGP-2440F	24 X 36	28 X 40	8.3	4.2	2.3	FGP-2440F8	2.4	1.3
FGP-30F	30 X 30	30 X 34	8.1	3.6	2.0	FGP-30F8	2.05	1.15
FGP-36F	36 X 36	36 X 40	9.1	4.6	2.4	FGP-36F8	2.65	1.35
FGP-3648F	36 X 48	40 X 48	11.5	6.8	3.2	FGP-3648F8	3.9	1.85
FGP-48F	48 X 48	48 X 54	13.2	9.5	3.9	FGP-48F8	5.45	2.25
FGP-SD24F	24 X 24	28 X 28	6.1	2.2	1.5	FGP-SD24F8	1.25	.85

Inlet
Filtration

FloGard®

Catch Basin Insert Filter

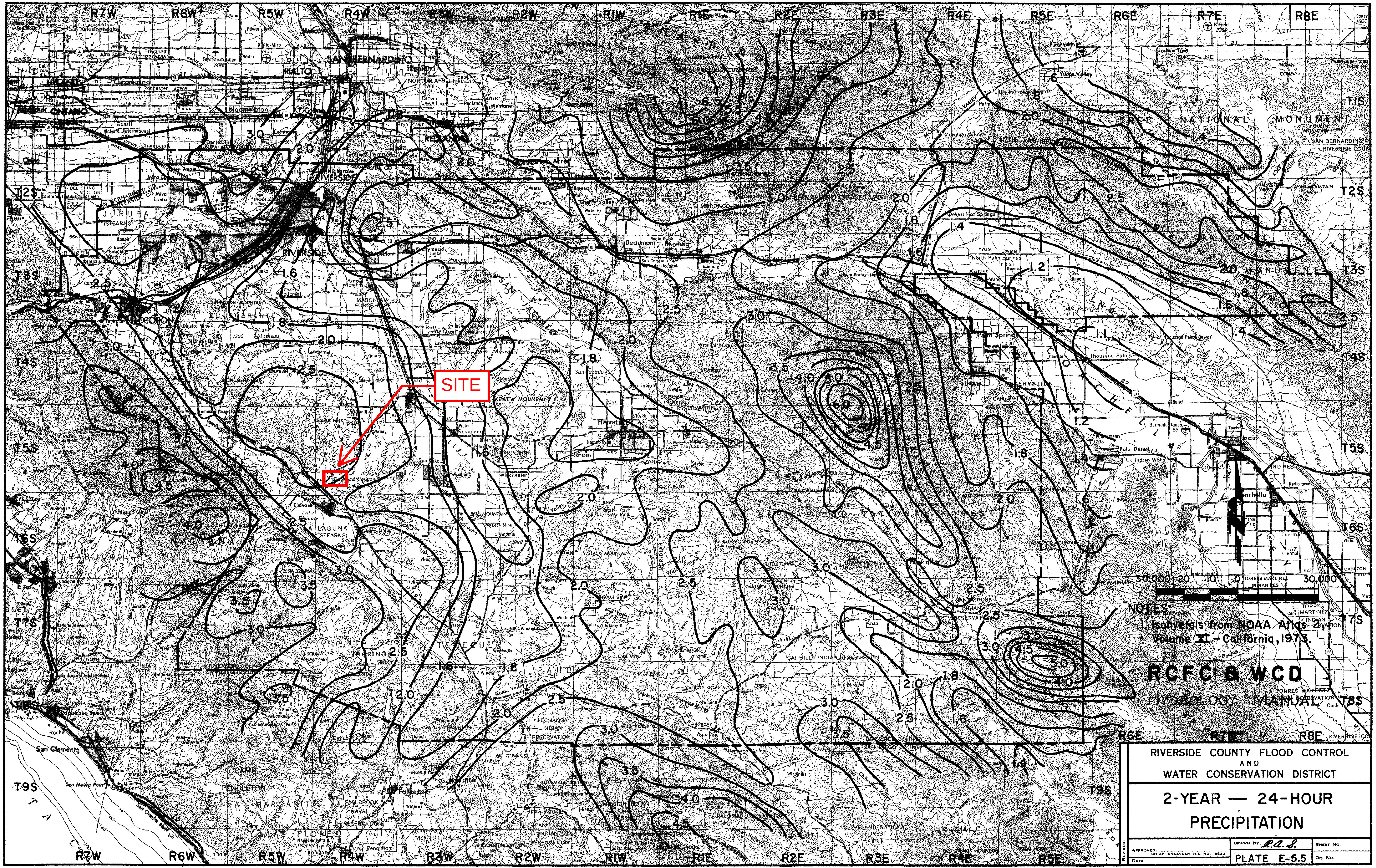
Grated Inlet Style

Oldcastle®
Stormwater Solutions
7921 Southpark Plaza, Suite 200 | Littleton, CO | 80120 | Ph: 800.579.8819 | oldcastlestormwater.com

DRAWING NO.	REV	ECO	DATE	
FGP-0001	F	ECO-0127 JPR 5/18/15	JPR 11/3/06	SHEET 2 OF 2

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

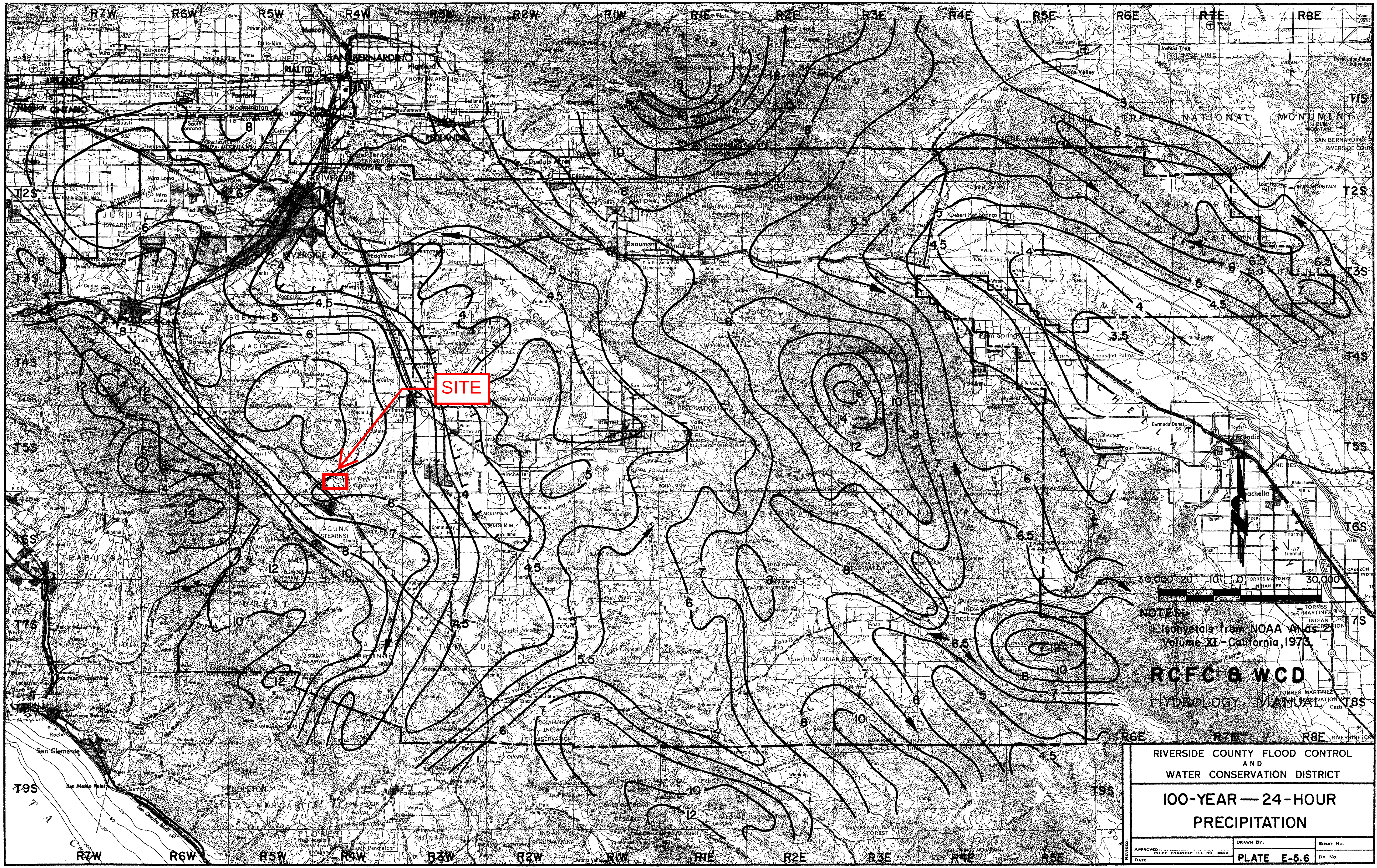


NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

2-YEAR — 24-HOUR PRECIPITATION

REVISED:	DRAWN BY: R.A.S.	SHEET NO.
APPROVED: CHIEF ENGINEER R.E. NO. 8822	PLATE E-5.5	DR. NO.
DATE:		



NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.

RCFC & WCD

Hydrology Manual

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

100-YEAR — 24-HOUR PRECIPITATION

REVISED:

APPROVED:
CHIEF ENGINEER R.E. NO. 8822

DATE:

DRAWN BY:

PLATE E-5.6

SHEET NO.

DR. NO.

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group			
		A	B	C	D
NATURAL COVERS -					
Barren		78	86	91	93
(Rockland, eroded and graded land)					
Chaparrel, Broadleaf	Poor	53	70	80	85
(Manzonita, ceanothus and scrub oak)	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf	Poor	71	82	88	91
(Chamise and redshank)	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas	Poor	63	77	85	88
(Areas with seasonally high water table,	Fair	51	70	80	84
principal vegetation is sod forming grass)	Good	30	58	72	78
Open Brush	Poor	62	76	84	88
(Soft wood shrubs - buckwheat, sage, etc.)	Fair	46	66	77	83
	Good	41	63	75	81
Woodland	Poor	45	66	77	83
(Coniferous or broadleaf trees predominate.	Fair	36	60	73	79
Canopy density is at least 50 percent)	Good	28	55	70	77
Woodland, Grass	Poor	57	73	82	86
(Coniferous or broadleaf trees with canopy	Fair	44	65	77	82
density from 20 to 50 percent)	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping	Good	32	56	69	75
(Lawn, shrubs, etc.)					
Turf	Poor	58	74	83	87
(Irrigated and mowed grass)	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow		76	85	90	92
(Land plowed but not tilled or seeded)					

RCFC & WCD
HYDROLOGY MANUAL

RUNOFF INDEX NUMBERS
FOR
PERVIOUS AREA

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	Soil Group B	Soil Group C	Soil Group D
AGRICULTURAL COVERS (cont.) -					
Legumes, Close Seeded	Poor	66	77	85	89
(Alfalfa, sweetclover, timothy, etc.)	Good	58	72	81	85
Orchards, Deciduous		See Note 4			
(Apples, apricots, pears, walnuts, etc.)					
Orchards, Evergreen	Poor	57	73	82	86
(Citrus, avocados, etc.)	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland	Poor	67	78	86	89
(Annual grasses)	Fair	50	69	79	84
	Good	38	61	74	80
Pasture, Irrigated	Poor	58	74	83	87
(Legumes and perennial grass)	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops	Poor	72	81	88	91
(Field crops - tomatoes, sugar beets, etc.)	Good	67	78	85	89
Small Grain	Poor	65	76	84	88
(Wheat, oats, barley, etc.)	Good	63	75	83	87
Vineyard		See Note 4			

Notes:

1. All runoff index (RI) numbers are for Antecedent Moisture Condition (AMC) II.
2. Quality of cover definitions:
   Poor-Heavily grazed or regularly burned areas. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.
   Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.
   Good-Heavy or dense cover with more than 75 percent of the ground surface protected.
3. See Plate C-2 for a detailed description of cover types.
4. Use runoff index numbers based on ground cover type. See discussion under "Cover Type Descriptions" on Plate C-2.
5. Reference Bibliography item 17.

RCFC & WCD
HYDROLOGY MANUAL

RUNOFF INDEX NUMBERS FOR PERVIOUS AREA

```
       U n i t   H y d r o g r a p h   A n a l y s i s

       Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2012, Version 8.2
               Study date  06/03/21 File: 19400E002Y24HA242.out

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------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6310

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
19-400
EXISTING CONDITION
2-YEAR, 24-HOUR
AREA A
--------------------------------------------------------------------
Drainage Area =       7.94(Ac.)  =      0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       7.94(Ac.)  =      0.012 Sq. Mi.
Length along longest watercourse =     880.00(Ft.)
Length along longest watercourse measured to centroid =     540.00(Ft.)
Length along longest watercourse =      0.167 Mi.
Length along longest watercourse measured to centroid =      0.102 Mi.
Difference in elevation =      19.00(Ft.)
Slope along watercourse =    114.0000 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time =    0.062 Hr.
Lag time =     3.74 Min.
25% of lag time =     0.93 Min.
40% of lag time =     1.50 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        7.94           2.50                 19.84

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        7.94           6.00                 47.63

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    2.500(In)
Area Averaged 100-Year Rainfall =    6.000(In)

Point rain (area averaged) =    2.500(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    2.500(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     7.938           84.00         0.000
 Total Area Entered =      7.94(Ac.)
```

```
        RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
        AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
        84.0  68.6      0.377     0.000        0.377       1.000      0.377
                                                         Sum (F) =   0.377
        Area averaged mean soil loss (F) (In/Hr) =  0.377
        Minimum soil loss rate ((In/Hr)) =  0.189
        (for 24 hour storm duration)
        Soil low loss rate (decimal) =   0.900
        ---------------------------------------------------------------------

                       U n i t  H y d r o g r a p h
                              VALLEY S-Curve
        --------------------------------------------------------------------
                       Unit Hydrograph Data
        ---------------------------------------------------------------------
        Unit time period   Time % of lag   Distribution   Unit Hydrograph
            (hrs)                             Graph %          (CFS)
        ---------------------------------------------------------------------
            1   0.083        133.748         29.035             2.323
            2   0.167        267.496         48.088             3.847
            3   0.250        401.244         12.232             0.979
            4   0.333        534.992          5.435             0.435
            5   0.417        668.739          2.965             0.237
            6   0.500        802.487          2.246             0.180
                                    Sum = 100.000   Sum=       8.000
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   │   Low        (In/Hr)
   1   0.08     0.07      0.020        (  0.669)       0.018         0.002
   2   0.17     0.07      0.020        (  0.666)       0.018         0.002
   3   0.25     0.07      0.020        (  0.663)       0.018         0.002
   4   0.33     0.10      0.030        (  0.661)       0.027         0.003
   5   0.42     0.10      0.030        (  0.658)       0.027         0.003
   6   0.50     0.10      0.030        (  0.656)       0.027         0.003
   7   0.58     0.10      0.030        (  0.653)       0.027         0.003
   8   0.67     0.10      0.030        (  0.651)       0.027         0.003
   9   0.75     0.10      0.030        (  0.648)       0.027         0.003
  10   0.83     0.13      0.040        (  0.645)       0.036         0.004
  11   0.92     0.13      0.040        (  0.643)       0.036         0.004
  12   1.00     0.13      0.040        (  0.640)       0.036         0.004
  13   1.08     0.10      0.030        (  0.638)       0.027         0.003
  14   1.17     0.10      0.030        (  0.635)       0.027         0.003
  15   1.25     0.10      0.030        (  0.633)       0.027         0.003
  16   1.33     0.10      0.030        (  0.630)       0.027         0.003
  17   1.42     0.10      0.030        (  0.628)       0.027         0.003
  18   1.50     0.10      0.030        (  0.625)       0.027         0.003
  19   1.58     0.10      0.030        (  0.623)       0.027         0.003
  20   1.67     0.10      0.030        (  0.620)       0.027         0.003
  21   1.75     0.10      0.030        (  0.618)       0.027         0.003
  22   1.83     0.13      0.040        (  0.615)       0.036         0.004
  23   1.92     0.13      0.040        (  0.613)       0.036         0.004
  24   2.00     0.13      0.040        (  0.610)       0.036         0.004
  25   2.08     0.13      0.040        (  0.608)       0.036         0.004
  26   2.17     0.13      0.040        (  0.605)       0.036         0.004
  27   2.25     0.13      0.040        (  0.603)       0.036         0.004
  28   2.33     0.13      0.040        (  0.600)       0.036         0.004
  29   2.42     0.13      0.040        (  0.598)       0.036         0.004
  30   2.50     0.13      0.040        (  0.596)       0.036         0.004
  31   2.58     0.17      0.050        (  0.593)       0.045         0.005
  32   2.67     0.17      0.050        (  0.591)       0.045         0.005
  33   2.75     0.17      0.050        (  0.588)       0.045         0.005
  34   2.83     0.17      0.050        (  0.586)       0.045         0.005
  35   2.92     0.17      0.050        (  0.583)       0.045         0.005
  36   3.00     0.17      0.050        (  0.581)       0.045         0.005
```

```
 37   3.08     0.17     0.050      (  0.579)      0.045       0.005
 38   3.17     0.17     0.050      (  0.576)      0.045       0.005
 39   3.25     0.17     0.050      (  0.574)      0.045       0.005
 40   3.33     0.17     0.050      (  0.571)      0.045       0.005
 41   3.42     0.17     0.050      (  0.569)      0.045       0.005
 42   3.50     0.17     0.050      (  0.567)      0.045       0.005
 43   3.58     0.17     0.050      (  0.564)      0.045       0.005
 44   3.67     0.17     0.050      (  0.562)      0.045       0.005
 45   3.75     0.17     0.050      (  0.560)      0.045       0.005
 46   3.83     0.20     0.060      (  0.557)      0.054       0.006
 47   3.92     0.20     0.060      (  0.555)      0.054       0.006
 48   4.00     0.20     0.060      (  0.553)      0.054       0.006
 49   4.08     0.20     0.060      (  0.550)      0.054       0.006
 50   4.17     0.20     0.060      (  0.548)      0.054       0.006
 51   4.25     0.20     0.060      (  0.546)      0.054       0.006
 52   4.33     0.23     0.070      (  0.543)      0.063       0.007
 53   4.42     0.23     0.070      (  0.541)      0.063       0.007
 54   4.50     0.23     0.070      (  0.539)      0.063       0.007
 55   4.58     0.23     0.070      (  0.536)      0.063       0.007
 56   4.67     0.23     0.070      (  0.534)      0.063       0.007
 57   4.75     0.23     0.070      (  0.532)      0.063       0.007
 58   4.83     0.27     0.080      (  0.529)      0.072       0.008
 59   4.92     0.27     0.080      (  0.527)      0.072       0.008
 60   5.00     0.27     0.080      (  0.525)      0.072       0.008
 61   5.08     0.20     0.060      (  0.522)      0.054       0.006
 62   5.17     0.20     0.060      (  0.520)      0.054       0.006
 63   5.25     0.20     0.060      (  0.518)      0.054       0.006
 64   5.33     0.23     0.070      (  0.516)      0.063       0.007
 65   5.42     0.23     0.070      (  0.513)      0.063       0.007
 66   5.50     0.23     0.070      (  0.511)      0.063       0.007
 67   5.58     0.27     0.080      (  0.509)      0.072       0.008
 68   5.67     0.27     0.080      (  0.507)      0.072       0.008
 69   5.75     0.27     0.080      (  0.504)      0.072       0.008
 70   5.83     0.27     0.080      (  0.502)      0.072       0.008
 71   5.92     0.27     0.080      (  0.500)      0.072       0.008
 72   6.00     0.27     0.080      (  0.498)      0.072       0.008
 73   6.08     0.30     0.090      (  0.496)      0.081       0.009
 74   6.17     0.30     0.090      (  0.493)      0.081       0.009
 75   6.25     0.30     0.090      (  0.491)      0.081       0.009
 76   6.33     0.30     0.090      (  0.489)      0.081       0.009
 77   6.42     0.30     0.090      (  0.487)      0.081       0.009
 78   6.50     0.30     0.090      (  0.485)      0.081       0.009
 79   6.58     0.33     0.100      (  0.482)      0.090       0.010
 80   6.67     0.33     0.100      (  0.480)      0.090       0.010
 81   6.75     0.33     0.100      (  0.478)      0.090       0.010
 82   6.83     0.33     0.100      (  0.476)      0.090       0.010
 83   6.92     0.33     0.100      (  0.474)      0.090       0.010
 84   7.00     0.33     0.100      (  0.472)      0.090       0.010
 85   7.08     0.33     0.100      (  0.469)      0.090       0.010
 86   7.17     0.33     0.100      (  0.467)      0.090       0.010
 87   7.25     0.33     0.100      (  0.465)      0.090       0.010
 88   7.33     0.37     0.110      (  0.463)      0.099       0.011
 89   7.42     0.37     0.110      (  0.461)      0.099       0.011
 90   7.50     0.37     0.110      (  0.459)      0.099       0.011
 91   7.58     0.40     0.120      (  0.457)      0.108       0.012
 92   7.67     0.40     0.120      (  0.455)      0.108       0.012
 93   7.75     0.40     0.120      (  0.453)      0.108       0.012
 94   7.83     0.43     0.130      (  0.450)      0.117       0.013
 95   7.92     0.43     0.130      (  0.448)      0.117       0.013
 96   8.00     0.43     0.130      (  0.446)      0.117       0.013
 97   8.08     0.50     0.150      (  0.444)      0.135       0.015
 98   8.17     0.50     0.150      (  0.442)      0.135       0.015
 99   8.25     0.50     0.150      (  0.440)      0.135       0.015
100   8.33     0.50     0.150      (  0.438)      0.135       0.015
101   8.42     0.50     0.150      (  0.436)      0.135       0.015
102   8.50     0.50     0.150      (  0.434)      0.135       0.015
103   8.58     0.53     0.160      (  0.432)      0.144       0.016
104   8.67     0.53     0.160      (  0.430)      0.144       0.016
105   8.75     0.53     0.160      (  0.428)      0.144       0.016
106   8.83     0.57     0.170      (  0.426)      0.153       0.017
107   8.92     0.57     0.170      (  0.424)      0.153       0.017
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108   9.00     0.57      0.170       (  0.422)       0.153        0.017
109   9.08     0.63      0.190       (  0.420)       0.171        0.019
110   9.17     0.63      0.190       (  0.418)       0.171        0.019
111   9.25     0.63      0.190       (  0.416)       0.171        0.019
112   9.33     0.67      0.200       (  0.414)       0.180        0.020
113   9.42     0.67      0.200       (  0.412)       0.180        0.020
114   9.50     0.67      0.200       (  0.410)       0.180        0.020
115   9.58     0.70      0.210       (  0.408)       0.189        0.021
116   9.67     0.70      0.210       (  0.406)       0.189        0.021
117   9.75     0.70      0.210       (  0.404)       0.189        0.021
118   9.83     0.73      0.220       (  0.402)       0.198        0.022
119   9.92     0.73      0.220       (  0.400)       0.198        0.022
120  10.00     0.73      0.220       (  0.398)       0.198        0.022
121  10.08     0.50      0.150       (  0.396)       0.135        0.015
122  10.17     0.50      0.150       (  0.394)       0.135        0.015
123  10.25     0.50      0.150       (  0.392)       0.135        0.015
124  10.33     0.50      0.150       (  0.391)       0.135        0.015
125  10.42     0.50      0.150       (  0.389)       0.135        0.015
126  10.50     0.50      0.150       (  0.387)       0.135        0.015
127  10.58     0.67      0.200       (  0.385)       0.180        0.020
128  10.67     0.67      0.200       (  0.383)       0.180        0.020
129  10.75     0.67      0.200       (  0.381)       0.180        0.020
130  10.83     0.67      0.200       (  0.379)       0.180        0.020
131  10.92     0.67      0.200       (  0.377)       0.180        0.020
132  11.00     0.67      0.200       (  0.376)       0.180        0.020
133  11.08     0.63      0.190       (  0.374)       0.171        0.019
134  11.17     0.63      0.190       (  0.372)       0.171        0.019
135  11.25     0.63      0.190       (  0.370)       0.171        0.019
136  11.33     0.63      0.190       (  0.368)       0.171        0.019
137  11.42     0.63      0.190       (  0.366)       0.171        0.019
138  11.50     0.63      0.190       (  0.365)       0.171        0.019
139  11.58     0.57      0.170       (  0.363)       0.153        0.017
140  11.67     0.57      0.170       (  0.361)       0.153        0.017
141  11.75     0.57      0.170       (  0.359)       0.153        0.017
142  11.83     0.60      0.180       (  0.357)       0.162        0.018
143  11.92     0.60      0.180       (  0.356)       0.162        0.018
144  12.00     0.60      0.180       (  0.354)       0.162        0.018
145  12.08     0.83      0.250       (  0.352)       0.225        0.025
146  12.17     0.83      0.250       (  0.350)       0.225        0.025
147  12.25     0.83      0.250       (  0.349)       0.225        0.025
148  12.33     0.87      0.260       (  0.347)       0.234        0.026
149  12.42     0.87      0.260       (  0.345)       0.234        0.026
150  12.50     0.87      0.260       (  0.343)       0.234        0.026
151  12.58     0.93      0.280       (  0.342)       0.252        0.028
152  12.67     0.93      0.280       (  0.340)       0.252        0.028
153  12.75     0.93      0.280       (  0.338)       0.252        0.028
154  12.83     0.97      0.290       (  0.336)       0.261        0.029
155  12.92     0.97      0.290       (  0.335)       0.261        0.029
156  13.00     0.97      0.290       (  0.333)       0.261        0.029
157  13.08     1.13      0.340       (  0.331)       0.306        0.034
158  13.17     1.13      0.340       (  0.330)       0.306        0.034
159  13.25     1.13      0.340       (  0.328)       0.306        0.034
160  13.33     1.13      0.340       (  0.326)       0.306        0.034
161  13.42     1.13      0.340       (  0.325)       0.306        0.034
162  13.50     1.13      0.340       (  0.323)       0.306        0.034
163  13.58     0.77      0.230       (  0.321)       0.207        0.023
164  13.67     0.77      0.230       (  0.320)       0.207        0.023
165  13.75     0.77      0.230       (  0.318)       0.207        0.023
166  13.83     0.77      0.230       (  0.316)       0.207        0.023
167  13.92     0.77      0.230       (  0.315)       0.207        0.023
168  14.00     0.77      0.230       (  0.313)       0.207        0.023
169  14.08     0.90      0.270       (  0.312)       0.243        0.027
170  14.17     0.90      0.270       (  0.310)       0.243        0.027
171  14.25     0.90      0.270       (  0.308)       0.243        0.027
172  14.33     0.87      0.260       (  0.307)       0.234        0.026
173  14.42     0.87      0.260       (  0.305)       0.234        0.026
174  14.50     0.87      0.260       (  0.304)       0.234        0.026
175  14.58     0.87      0.260       (  0.302)       0.234        0.026
176  14.67     0.87      0.260       (  0.301)       0.234        0.026
177  14.75     0.87      0.260       (  0.299)       0.234        0.026
178  14.83     0.83      0.250       (  0.298)       0.225        0.025
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179  14.92     0.83      0.250       (  0.296)       0.225         0.025
180  15.00     0.83      0.250       (  0.295)       0.225         0.025
181  15.08     0.80      0.240       (  0.293)       0.216         0.024
182  15.17     0.80      0.240       (  0.292)       0.216         0.024
183  15.25     0.80      0.240       (  0.290)       0.216         0.024
184  15.33     0.77      0.230       (  0.289)       0.207         0.023
185  15.42     0.77      0.230       (  0.287)       0.207         0.023
186  15.50     0.77      0.230       (  0.286)       0.207         0.023
187  15.58     0.63      0.190       (  0.284)       0.171         0.019
188  15.67     0.63      0.190       (  0.283)       0.171         0.019
189  15.75     0.63      0.190       (  0.281)       0.171         0.019
190  15.83     0.63      0.190       (  0.280)       0.171         0.019
191  15.92     0.63      0.190       (  0.278)       0.171         0.019
192  16.00     0.63      0.190       (  0.277)       0.171         0.019
193  16.08     0.13      0.040       (  0.276)       0.036         0.004
194  16.17     0.13      0.040       (  0.274)       0.036         0.004
195  16.25     0.13      0.040       (  0.273)       0.036         0.004
196  16.33     0.13      0.040       (  0.271)       0.036         0.004
197  16.42     0.13      0.040       (  0.270)       0.036         0.004
198  16.50     0.13      0.040       (  0.269)       0.036         0.004
199  16.58     0.10      0.030       (  0.267)       0.027         0.003
200  16.67     0.10      0.030       (  0.266)       0.027         0.003
201  16.75     0.10      0.030       (  0.264)       0.027         0.003
202  16.83     0.10      0.030       (  0.263)       0.027         0.003
203  16.92     0.10      0.030       (  0.262)       0.027         0.003
204  17.00     0.10      0.030       (  0.260)       0.027         0.003
205  17.08     0.17      0.050       (  0.259)       0.045         0.005
206  17.17     0.17      0.050       (  0.258)       0.045         0.005
207  17.25     0.17      0.050       (  0.257)       0.045         0.005
208  17.33     0.17      0.050       (  0.255)       0.045         0.005
209  17.42     0.17      0.050       (  0.254)       0.045         0.005
210  17.50     0.17      0.050       (  0.253)       0.045         0.005
211  17.58     0.17      0.050       (  0.251)       0.045         0.005
212  17.67     0.17      0.050       (  0.250)       0.045         0.005
213  17.75     0.17      0.050       (  0.249)       0.045         0.005
214  17.83     0.13      0.040       (  0.248)       0.036         0.004
215  17.92     0.13      0.040       (  0.247)       0.036         0.004
216  18.00     0.13      0.040       (  0.245)       0.036         0.004
217  18.08     0.13      0.040       (  0.244)       0.036         0.004
218  18.17     0.13      0.040       (  0.243)       0.036         0.004
219  18.25     0.13      0.040       (  0.242)       0.036         0.004
220  18.33     0.13      0.040       (  0.241)       0.036         0.004
221  18.42     0.13      0.040       (  0.239)       0.036         0.004
222  18.50     0.13      0.040       (  0.238)       0.036         0.004
223  18.58     0.10      0.030       (  0.237)       0.027         0.003
224  18.67     0.10      0.030       (  0.236)       0.027         0.003
225  18.75     0.10      0.030       (  0.235)       0.027         0.003
226  18.83     0.07      0.020       (  0.234)       0.018         0.002
227  18.92     0.07      0.020       (  0.233)       0.018         0.002
228  19.00     0.07      0.020       (  0.231)       0.018         0.002
229  19.08     0.10      0.030       (  0.230)       0.027         0.003
230  19.17     0.10      0.030       (  0.229)       0.027         0.003
231  19.25     0.10      0.030       (  0.228)       0.027         0.003
232  19.33     0.13      0.040       (  0.227)       0.036         0.004
233  19.42     0.13      0.040       (  0.226)       0.036         0.004
234  19.50     0.13      0.040       (  0.225)       0.036         0.004
235  19.58     0.10      0.030       (  0.224)       0.027         0.003
236  19.67     0.10      0.030       (  0.223)       0.027         0.003
237  19.75     0.10      0.030       (  0.222)       0.027         0.003
238  19.83     0.07      0.020       (  0.221)       0.018         0.002
239  19.92     0.07      0.020       (  0.220)       0.018         0.002
240  20.00     0.07      0.020       (  0.219)       0.018         0.002
241  20.08     0.10      0.030       (  0.218)       0.027         0.003
242  20.17     0.10      0.030       (  0.217)       0.027         0.003
243  20.25     0.10      0.030       (  0.216)       0.027         0.003
244  20.33     0.10      0.030       (  0.215)       0.027         0.003
245  20.42     0.10      0.030       (  0.214)       0.027         0.003
246  20.50     0.10      0.030       (  0.213)       0.027         0.003
247  20.58     0.10      0.030       (  0.212)       0.027         0.003
248  20.67     0.10      0.030       (  0.212)       0.027         0.003
249  20.75     0.10      0.030       (  0.211)       0.027         0.003
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250  20.83     0.07      0.020       (  0.210)      0.018        0.002
251  20.92     0.07      0.020       (  0.209)      0.018        0.002
252  21.00     0.07      0.020       (  0.208)      0.018        0.002
253  21.08     0.10      0.030       (  0.207)      0.027        0.003
254  21.17     0.10      0.030       (  0.207)      0.027        0.003
255  21.25     0.10      0.030       (  0.206)      0.027        0.003
256  21.33     0.07      0.020       (  0.205)      0.018        0.002
257  21.42     0.07      0.020       (  0.204)      0.018        0.002
258  21.50     0.07      0.020       (  0.203)      0.018        0.002
259  21.58     0.10      0.030       (  0.203)      0.027        0.003
260  21.67     0.10      0.030       (  0.202)      0.027        0.003
261  21.75     0.10      0.030       (  0.201)      0.027        0.003
262  21.83     0.07      0.020       (  0.200)      0.018        0.002
263  21.92     0.07      0.020       (  0.200)      0.018        0.002
264  22.00     0.07      0.020       (  0.199)      0.018        0.002
265  22.08     0.10      0.030       (  0.198)      0.027        0.003
266  22.17     0.10      0.030       (  0.198)      0.027        0.003
267  22.25     0.10      0.030       (  0.197)      0.027        0.003
268  22.33     0.07      0.020       (  0.197)      0.018        0.002
269  22.42     0.07      0.020       (  0.196)      0.018        0.002
270  22.50     0.07      0.020       (  0.195)      0.018        0.002
271  22.58     0.07      0.020       (  0.195)      0.018        0.002
272  22.67     0.07      0.020       (  0.194)      0.018        0.002
273  22.75     0.07      0.020       (  0.194)      0.018        0.002
274  22.83     0.07      0.020       (  0.193)      0.018        0.002
275  22.92     0.07      0.020       (  0.193)      0.018        0.002
276  23.00     0.07      0.020       (  0.192)      0.018        0.002
277  23.08     0.07      0.020       (  0.192)      0.018        0.002
278  23.17     0.07      0.020       (  0.191)      0.018        0.002
279  23.25     0.07      0.020       (  0.191)      0.018        0.002
280  23.33     0.07      0.020       (  0.191)      0.018        0.002
281  23.42     0.07      0.020       (  0.190)      0.018        0.002
282  23.50     0.07      0.020       (  0.190)      0.018        0.002
283  23.58     0.07      0.020       (  0.190)      0.018        0.002
284  23.67     0.07      0.020       (  0.189)      0.018        0.002
285  23.75     0.07      0.020       (  0.189)      0.018        0.002
286  23.83     0.07      0.020       (  0.189)      0.018        0.002
287  23.92     0.07      0.020       (  0.189)      0.018        0.002
288  24.00     0.07      0.020       (  0.189)      0.018        0.002
              (Loss Rate Not Used)
    Sum =     100.0                                     Sum =     3.0
      Flood volume = Effective rainfall      0.25(In)
       times area       7.9(Ac.)/[(In)/(Ft.)] =       0.2(Ac.Ft)
      Total soil loss =      2.25(In)
      Total soil loss =     1.488(Ac.Ft)
      Total rainfall =      2.50(In)
      Flood volume =        7203.6 Cubic Feet
      Total soil loss =       64832.6 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.272(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 -----------------------------------------------------------------------
   0+ 5       0.0000      0.00  Q         |         |         |         |
   0+10       0.0001      0.01  Q         |         |         |         |
   0+15       0.0002      0.01  Q         |         |         |         |
   0+20       0.0003      0.02  Q         |         |         |         |
   0+25       0.0005      0.02  Q         |         |         |         |
   0+30       0.0006      0.02  Q         |         |         |         |
   0+35       0.0008      0.02  Q         |         |         |         |
   0+40       0.0010      0.02  Q         |         |         |         |
   0+45       0.0011      0.02  Q         |         |         |         |
   0+50       0.0013      0.03  Q         |         |         |         |
   0+55       0.0015      0.03  Q         |         |         |         |
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1+ 0       0.0017      0.03  Q         |         |         |         |
1+ 5       0.0019      0.03  Q         |         |         |         |
1+10       0.0021      0.03  Q         |         |         |         |
1+15       0.0023      0.02  Q         |         |         |         |
1+20       0.0025      0.02  Q         |         |         |         |
1+25       0.0026      0.02  Q         |         |         |         |
1+30       0.0028      0.02  Q         |         |         |         |
1+35       0.0030      0.02  Q         |         |         |         |
1+40       0.0031      0.02  Q         |         |         |         |
1+45       0.0033      0.02  Q         |         |         |         |
1+50       0.0035      0.03  Q         |         |         |         |
1+55       0.0037      0.03  Q         |         |         |         |
2+ 0       0.0039      0.03  Q         |         |         |         |
2+ 5       0.0041      0.03  Q         |         |         |         |
2+10       0.0043      0.03  QV        |         |         |         |
2+15       0.0045      0.03  QV        |         |         |         |
2+20       0.0048      0.03  QV        |         |         |         |
2+25       0.0050      0.03  QV        |         |         |         |
2+30       0.0052      0.03  QV        |         |         |         |
2+35       0.0054      0.03  QV        |         |         |         |
2+40       0.0057      0.04  QV        |         |         |         |
2+45       0.0060      0.04  QV        |         |         |         |
2+50       0.0063      0.04  QV        |         |         |         |
2+55       0.0065      0.04  QV        |         |         |         |
3+ 0       0.0068      0.04  QV        |         |         |         |
3+ 5       0.0071      0.04  QV        |         |         |         |
3+10       0.0074      0.04  QV        |         |         |         |
3+15       0.0076      0.04  QV        |         |         |         |
3+20       0.0079      0.04  QV        |         |         |         |
3+25       0.0082      0.04  QV        |         |         |         |
3+30       0.0085      0.04  Q V       |         |         |         |
3+35       0.0087      0.04  Q V       |         |         |         |
3+40       0.0090      0.04  Q V       |         |         |         |
3+45       0.0093      0.04  Q V       |         |         |         |
3+50       0.0096      0.04  Q V       |         |         |         |
3+55       0.0099      0.05  Q V       |         |         |         |
4+ 0       0.0102      0.05  Q V       |         |         |         |
4+ 5       0.0105      0.05  Q V       |         |         |         |
4+10       0.0109      0.05  Q V       |         |         |         |
4+15       0.0112      0.05  Q V       |         |         |         |
4+20       0.0116      0.05  Q V       |         |         |         |
4+25       0.0119      0.05  Q V       |         |         |         |
4+30       0.0123      0.06  Q V       |         |         |         |
4+35       0.0127      0.06  Q  V      |         |         |         |
4+40       0.0131      0.06  Q  V      |         |         |         |
4+45       0.0135      0.06  Q  V      |         |         |         |
4+50       0.0139      0.06  Q  V      |         |         |         |
4+55       0.0143      0.06  Q  V      |         |         |         |
5+ 0       0.0147      0.06  Q  V      |         |         |         |
5+ 5       0.0151      0.06  Q  V      |         |         |         |
5+10       0.0155      0.05  Q  V      |         |         |         |
5+15       0.0158      0.05  Q  V      |         |         |         |
5+20       0.0162      0.05  Q  V      |         |         |         |
5+25       0.0166      0.05  Q   V     |         |         |         |
5+30       0.0169      0.06  Q   V     |         |         |         |
5+35       0.0173      0.06  Q   V     |         |         |         |
5+40       0.0178      0.06  Q   V     |         |         |         |
5+45       0.0182      0.06  Q   V     |         |         |         |
5+50       0.0186      0.06  Q   V     |         |         |         |
5+55       0.0191      0.06  Q   V     |         |         |         |
6+ 0       0.0195      0.06  Q   V     |         |         |         |
6+ 5       0.0200      0.07  Q   V     |         |         |         |
6+10       0.0205      0.07  Q   V     |         |         |         |
6+15       0.0209      0.07  Q    V    |         |         |         |
6+20       0.0214      0.07  Q    V    |         |         |         |
6+25       0.0219      0.07  Q    V    |         |         |         |
6+30       0.0224      0.07  Q    V    |         |         |         |
6+35       0.0229      0.07  Q    V    |         |         |         |
6+40       0.0235      0.08  Q    V    |         |         |         |
6+45       0.0240      0.08  Q    V    |         |         |         |
6+50       0.0246      0.08  Q    V    |         |         |         |
```

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 6+55       0.0251      0.08  Q     V   |         |         |         |
 7+ 0       0.0257      0.08  Q     V   |         |         |         |
 7+ 5       0.0262      0.08  Q     V   |         |         |         |
 7+10       0.0268      0.08  Q     V   |         |         |         |
 7+15       0.0273      0.08  Q     V   |         |         |         |
 7+20       0.0279      0.08  Q     V   |         |         |         |
 7+25       0.0285      0.09  Q     V   |         |         |         |
 7+30       0.0291      0.09  Q      V  |         |         |         |
 7+35       0.0297      0.09  Q      V  |         |         |         |
 7+40       0.0304      0.09  Q      V  |         |         |         |
 7+45       0.0310      0.10  Q      V  |         |         |         |
 7+50       0.0317      0.10  Q      V  |         |         |         |
 7+55       0.0324      0.10  Q      V  |         |         |         |
 8+ 0       0.0331      0.10  Q       V |         |         |         |
 8+ 5       0.0338      0.11  Q       V |         |         |         |
 8+10       0.0346      0.12  Q       V |         |         |         |
 8+15       0.0355      0.12  Q       V |         |         |         |
 8+20       0.0363      0.12  Q       V |         |         |         |
 8+25       0.0371      0.12  Q       V |         |         |         |
 8+30       0.0379      0.12  Q        V|         |         |         |
 8+35       0.0388      0.12  Q        V|         |         |         |
 8+40       0.0396      0.13  Q        V|         |         |         |
 8+45       0.0405      0.13  Q        V|         |         |         |
 8+50       0.0414      0.13  Q         V         |         |         |
 8+55       0.0423      0.13  Q         V         |         |         |
 9+ 0       0.0433      0.14  Q         V         |         |         |
 9+ 5       0.0442      0.14  Q         V         |         |         |
 9+10       0.0453      0.15  Q         V         |         |         |
 9+15       0.0463      0.15  Q         |V        |         |         |
 9+20       0.0474      0.15  Q         |V        |         |         |
 9+25       0.0484      0.16  Q         |V        |         |         |
 9+30       0.0495      0.16  Q         |V        |         |         |
 9+35       0.0507      0.16  Q         | V       |         |         |
 9+40       0.0518      0.17  Q         | V       |         |         |
 9+45       0.0530      0.17  Q         | V       |         |         |
 9+50       0.0541      0.17  Q         |  V      |         |         |
 9+55       0.0553      0.17  Q         |  V      |         |         |
10+ 0       0.0565      0.18  Q         |  V      |         |         |
10+ 5       0.0576      0.16  Q         |  V      |         |         |
10+10       0.0585      0.13  Q         |   V     |         |         |
10+15       0.0594      0.13  Q         |   V     |         |         |
10+20       0.0603      0.12  Q         |   V     |         |         |
10+25       0.0611      0.12  Q         |   V     |         |         |
10+30       0.0619      0.12  Q         |   V     |         |         |
10+35       0.0628      0.13  Q         |    V    |         |         |
10+40       0.0639      0.15  Q         |    V    |         |         |
10+45       0.0649      0.16  Q         |    V    |         |         |
10+50       0.0660      0.16  Q         |    V    |         |         |
10+55       0.0671      0.16  Q         |     V   |         |         |
11+ 0       0.0682      0.16  Q         |     V   |         |         |
11+ 5       0.0693      0.16  Q         |     V   |         |         |
11+10       0.0704      0.15  Q         |      V  |         |         |
11+15       0.0714      0.15  Q         |      V  |         |         |
11+20       0.0725      0.15  Q         |      V  |         |         |
11+25       0.0735      0.15  Q         |      V  |         |         |
11+30       0.0746      0.15  Q         |       V |         |         |
11+35       0.0756      0.15  Q         |       V |         |         |
11+40       0.0765      0.14  Q         |       V |         |         |
11+45       0.0775      0.14  Q         |       V |         |         |
11+50       0.0785      0.14  Q         |       V |         |         |
11+55       0.0794      0.14  Q         |        V|         |         |
12+ 0       0.0804      0.14  Q         |        V|         |         |
12+ 5       0.0815      0.16  Q         |        V|         |         |
12+10       0.0828      0.19  Q         |         V         |         |
12+15       0.0841      0.19  Q         |         V         |         |
12+20       0.0855      0.20  Q         |         V         |         |
12+25       0.0869      0.21  Q         |         |V        |         |
12+30       0.0884      0.21  Q         |         |V        |         |
12+35       0.0898      0.21  Q         |         |V        |         |
12+40       0.0913      0.22  Q         |         | V       |         |
12+45       0.0929      0.22  Q         |         | V       |         |
```

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12+50       0.0944      0.23  Q         |         | V       |         |
12+55       0.0960      0.23  Q         |         |  V      |         |
13+ 0       0.0976      0.23  Q         |         |  V      |         |
13+ 5       0.0993      0.24  Q         |         |   V     |         |
13+10       0.1011      0.26  |Q        |         |   V     |         |
13+15       0.1029      0.27  |Q        |         |   V     |         |
13+20       0.1048      0.27  |Q        |         |    V    |         |
13+25       0.1067      0.27  |Q        |         |    V    |         |
13+30       0.1085      0.27  |Q        |         |     V   |         |
13+35       0.1102      0.25  Q         |         |     V   |         |
13+40       0.1116      0.20  Q         |         |      V  |         |
13+45       0.1130      0.19  Q         |         |      V  |         |
13+50       0.1143      0.19  Q         |         |      V  |         |
13+55       0.1156      0.19  Q         |         |      V  |         |
14+ 0       0.1168      0.18  Q         |         |       V |         |
14+ 5       0.1182      0.19  Q         |         |       V |         |
14+10       0.1196      0.21  Q         |         |       V |         |
14+15       0.1211      0.21  Q         |         |        V|         |
14+20       0.1225      0.21  Q         |         |        V|         |
14+25       0.1240      0.21  Q         |         |        V|         |
14+30       0.1254      0.21  Q         |         |         V         |
14+35       0.1268      0.21  Q         |         |         V         |
14+40       0.1283      0.21  Q         |         |         |V        |
14+45       0.1297      0.21  Q         |         |         |V        |
14+50       0.1311      0.21  Q         |         |         |V        |
14+55       0.1325      0.20  Q         |         |         | V       |
15+ 0       0.1339      0.20  Q         |         |         | V       |
15+ 5       0.1353      0.20  Q         |         |         | V       |
15+10       0.1366      0.19  Q         |         |         |  V      |
15+15       0.1379      0.19  Q         |         |         |  V      |
15+20       0.1392      0.19  Q         |         |         |  V      |
15+25       0.1405      0.19  Q         |         |         |  V      |
15+30       0.1418      0.18  Q         |         |         |   V     |
15+35       0.1430      0.18  Q         |         |         |   V     |
15+40       0.1441      0.16  Q         |         |         |   V     |
15+45       0.1452      0.16  Q         |         |         |    V    |
15+50       0.1462      0.15  Q         |         |         |    V    |
15+55       0.1473      0.15  Q         |         |         |    V    |
16+ 0       0.1483      0.15  Q         |         |         |    V    |
16+ 5       0.1491      0.12  Q         |         |         |     V   |
16+10       0.1495      0.06  Q         |         |         |     V   |
16+15       0.1498      0.04  Q         |         |         |     V   |
16+20       0.1501      0.04  Q         |         |         |     V   |
16+25       0.1504      0.03  Q         |         |         |     V   |
16+30       0.1506      0.03  Q         |         |         |     V   |
16+35       0.1508      0.03  Q         |         |         |     V   |
16+40       0.1510      0.03  Q         |         |         |     V   |
16+45       0.1511      0.02  Q         |         |         |     V   |
16+50       0.1513      0.02  Q         |         |         |     V   |
16+55       0.1515      0.02  Q         |         |         |     V   |
17+ 0       0.1516      0.02  Q         |         |         |     V   |
17+ 5       0.1518      0.03  Q         |         |         |     V   |
17+10       0.1521      0.04  Q         |         |         |     V   |
17+15       0.1523      0.04  Q         |         |         |     V   |
17+20       0.1526      0.04  Q         |         |         |     V   |
17+25       0.1529      0.04  Q         |         |         |     V   |
17+30       0.1532      0.04  Q         |         |         |      V  |
17+35       0.1534      0.04  Q         |         |         |      V  |
17+40       0.1537      0.04  Q         |         |         |      V  |
17+45       0.1540      0.04  Q         |         |         |      V  |
17+50       0.1542      0.04  Q         |         |         |      V  |
17+55       0.1545      0.03  Q         |         |         |      V  |
18+ 0       0.1547      0.03  Q         |         |         |      V  |
18+ 5       0.1549      0.03  Q         |         |         |      V  |
18+10       0.1551      0.03  Q         |         |         |      V  |
18+15       0.1554      0.03  Q         |         |         |      V  |
18+20       0.1556      0.03  Q         |         |         |      V  |
18+25       0.1558      0.03  Q         |         |         |      V  |
18+30       0.1560      0.03  Q         |         |         |      V  |
18+35       0.1562      0.03  Q         |         |         |      V  |
18+40       0.1564      0.03  Q         |         |         |      V  |
```

```
   18+45       0.1566      0.02  Q         |         |         |      V  |
   18+50       0.1567      0.02  Q         |         |         |      V  |
   18+55       0.1569      0.02  Q         |         |         |      V  |
   19+ 0       0.1570      0.02  Q         |         |         |      V  |
   19+ 5       0.1571      0.02  Q         |         |         |       V |
   19+10       0.1573      0.02  Q         |         |         |       V |
   19+15       0.1574      0.02  Q         |         |         |       V |
   19+20       0.1576      0.03  Q         |         |         |       V |
   19+25       0.1578      0.03  Q         |         |         |       V |
   19+30       0.1580      0.03  Q         |         |         |       V |
   19+35       0.1582      0.03  Q         |         |         |       V |
   19+40       0.1584      0.03  Q         |         |         |       V |
   19+45       0.1586      0.02  Q         |         |         |       V |
   19+50       0.1587      0.02  Q         |         |         |       V |
   19+55       0.1588      0.02  Q         |         |         |       V |
   20+ 0       0.1590      0.02  Q         |         |         |       V |
   20+ 5       0.1591      0.02  Q         |         |         |       V |
   20+10       0.1592      0.02  Q         |         |         |       V |
   20+15       0.1594      0.02  Q         |         |         |       V |
   20+20       0.1596      0.02  Q         |         |         |       V |
   20+25       0.1597      0.02  Q         |         |         |       V |
   20+30       0.1599      0.02  Q         |         |         |       V |
   20+35       0.1601      0.02  Q         |         |         |       V |
   20+40       0.1602      0.02  Q         |         |         |       V |
   20+45       0.1604      0.02  Q         |         |         |       V |
   20+50       0.1605      0.02  Q         |         |         |       V |
   20+55       0.1607      0.02  Q         |         |         |       V |
   21+ 0       0.1608      0.02  Q         |         |         |       V |
   21+ 5       0.1609      0.02  Q         |         |         |       V |
   21+10       0.1611      0.02  Q         |         |         |       V |
   21+15       0.1612      0.02  Q         |         |         |       V |
   21+20       0.1614      0.02  Q         |         |         |        V|
   21+25       0.1615      0.02  Q         |         |         |        V|
   21+30       0.1616      0.02  Q         |         |         |        V|
   21+35       0.1617      0.02  Q         |         |         |        V|
   21+40       0.1619      0.02  Q         |         |         |        V|
   21+45       0.1620      0.02  Q         |         |         |        V|
   21+50       0.1622      0.02  Q         |         |         |        V|
   21+55       0.1623      0.02  Q         |         |         |        V|
   22+ 0       0.1624      0.02  Q         |         |         |        V|
   22+ 5       0.1626      0.02  Q         |         |         |        V|
   22+10       0.1627      0.02  Q         |         |         |        V|
   22+15       0.1629      0.02  Q         |         |         |        V|
   22+20       0.1630      0.02  Q         |         |         |        V|
   22+25       0.1631      0.02  Q         |         |         |        V|
   22+30       0.1633      0.02  Q         |         |         |        V|
   22+35       0.1634      0.02  Q         |         |         |        V|
   22+40       0.1635      0.02  Q         |         |         |        V|
   22+45       0.1636      0.02  Q         |         |         |        V|
   22+50       0.1637      0.02  Q         |         |         |        V|
   22+55       0.1638      0.02  Q         |         |         |        V|
   23+ 0       0.1639      0.02  Q         |         |         |        V|
   23+ 5       0.1640      0.02  Q         |         |         |        V|
   23+10       0.1641      0.02  Q         |         |         |        V|
   23+15       0.1643      0.02  Q         |         |         |        V|
   23+20       0.1644      0.02  Q         |         |         |        V|
   23+25       0.1645      0.02  Q         |         |         |        V|
   23+30       0.1646      0.02  Q         |         |         |        V|
   23+35       0.1647      0.02  Q         |         |         |        V|
   23+40       0.1648      0.02  Q         |         |         |        V|
   23+45       0.1649      0.02  Q         |         |         |        V|
   23+50       0.1650      0.02  Q         |         |         |        V|
   23+55       0.1651      0.02  Q         |         |         |        V|
   24+ 0       0.1652      0.02  Q         |         |         |        V|
   24+ 5       0.1653      0.01  Q         |         |         |        V|
   24+10       0.1654      0.00  Q         |         |         |        V|
   24+15       0.1654      0.00  Q         |         |         |        V|
   24+20       0.1654      0.00  Q         |         |         |        V|
   24+25       0.1654      0.00  Q         |         |         |         V
-----------------------------------------------------------------------
```

```
       U n i t   H y d r o g r a p h   A n a l y s i s

       Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2012, Version 8.2
               Study date  06/03/21 File: 19400e002y24hb242.out

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------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6310

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
19-400
EXISTING CONDITION
2-YEAR, 24-HOUR
AREA B
--------------------------------------------------------------------
Drainage Area =       1.13(Ac.)  =      0.002 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       1.13(Ac.)  =      0.002 Sq. Mi.
Length along longest watercourse =     420.00(Ft.)
Length along longest watercourse measured to centroid =     172.00(Ft.)
Length along longest watercourse =      0.080 Mi.
Length along longest watercourse measured to centroid =      0.033 Mi.
Difference in elevation =      12.00(Ft.)
Slope along watercourse =    150.8571 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time =    0.029 Hr.
Lag time =     1.73 Min.
25% of lag time =     0.43 Min.
40% of lag time =     0.69 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        1.13           2.50                  2.84

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        1.13           6.00                  6.80

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    2.500(In)
Area Averaged 100-Year Rainfall =    6.000(In)

Point rain (area averaged) =    2.500(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    2.500(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     1.134           70.00         0.000
 Total Area Entered =      1.13(Ac.)
```

```
       RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
       AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
       70.0  51.0      0.562     0.000        0.562       1.000      0.562
                                                          Sum (F) =   0.562
       Area averaged mean soil loss (F) (In/Hr) =  0.562
       Minimum soil loss rate ((In/Hr)) =  0.281
       (for 24 hour storm duration)
       Soil low loss rate (decimal) =   0.900
       ---------------------------------------------------------------------

                      U n i t  H y d r o g r a p h
                             VALLEY S-Curve
       --------------------------------------------------------------------
                      Unit Hydrograph Data
       ---------------------------------------------------------------------
       Unit time period   Time % of lag   Distribution   Unit Hydrograph
           (hrs)                            Graph %            (CFS)
       ---------------------------------------------------------------------
           1   0.083        288.589         55.478             0.634
           2   0.167        577.178         37.766             0.432
           3   0.250        865.767          6.757             0.077
                                      Sum = 100.000   Sum=       1.143
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   |   Low        (In/Hr)
   1   0.08     0.07      0.020        (  0.996)       0.018        0.002
   2   0.17     0.07      0.020        (  0.992)       0.018        0.002
   3   0.25     0.07      0.020        (  0.988)       0.018        0.002
   4   0.33     0.10      0.030        (  0.984)       0.027        0.003
   5   0.42     0.10      0.030        (  0.981)       0.027        0.003
   6   0.50     0.10      0.030        (  0.977)       0.027        0.003
   7   0.58     0.10      0.030        (  0.973)       0.027        0.003
   8   0.67     0.10      0.030        (  0.969)       0.027        0.003
   9   0.75     0.10      0.030        (  0.965)       0.027        0.003
  10   0.83     0.13      0.040        (  0.962)       0.036        0.004
  11   0.92     0.13      0.040        (  0.958)       0.036        0.004
  12   1.00     0.13      0.040        (  0.954)       0.036        0.004
  13   1.08     0.10      0.030        (  0.950)       0.027        0.003
  14   1.17     0.10      0.030        (  0.946)       0.027        0.003
  15   1.25     0.10      0.030        (  0.943)       0.027        0.003
  16   1.33     0.10      0.030        (  0.939)       0.027        0.003
  17   1.42     0.10      0.030        (  0.935)       0.027        0.003
  18   1.50     0.10      0.030        (  0.931)       0.027        0.003
  19   1.58     0.10      0.030        (  0.928)       0.027        0.003
  20   1.67     0.10      0.030        (  0.924)       0.027        0.003
  21   1.75     0.10      0.030        (  0.920)       0.027        0.003
  22   1.83     0.13      0.040        (  0.917)       0.036        0.004
  23   1.92     0.13      0.040        (  0.913)       0.036        0.004
  24   2.00     0.13      0.040        (  0.909)       0.036        0.004
  25   2.08     0.13      0.040        (  0.906)       0.036        0.004
  26   2.17     0.13      0.040        (  0.902)       0.036        0.004
  27   2.25     0.13      0.040        (  0.898)       0.036        0.004
  28   2.33     0.13      0.040        (  0.895)       0.036        0.004
  29   2.42     0.13      0.040        (  0.891)       0.036        0.004
  30   2.50     0.13      0.040        (  0.887)       0.036        0.004
  31   2.58     0.17      0.050        (  0.884)       0.045        0.005
  32   2.67     0.17      0.050        (  0.880)       0.045        0.005
  33   2.75     0.17      0.050        (  0.876)       0.045        0.005
  34   2.83     0.17      0.050        (  0.873)       0.045        0.005
  35   2.92     0.17      0.050        (  0.869)       0.045        0.005
  36   3.00     0.17      0.050        (  0.866)       0.045        0.005
  37   3.08     0.17      0.050        (  0.862)       0.045        0.005
  38   3.17     0.17      0.050        (  0.858)       0.045        0.005
  39   3.25     0.17      0.050        (  0.855)       0.045        0.005
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 40   3.33    0.17     0.050       (  0.851)       0.045        0.005
 41   3.42    0.17     0.050       (  0.848)       0.045        0.005
 42   3.50    0.17     0.050       (  0.844)       0.045        0.005
 43   3.58    0.17     0.050       (  0.841)       0.045        0.005
 44   3.67    0.17     0.050       (  0.837)       0.045        0.005
 45   3.75    0.17     0.050       (  0.834)       0.045        0.005
 46   3.83    0.20     0.060       (  0.830)       0.054        0.006
 47   3.92    0.20     0.060       (  0.827)       0.054        0.006
 48   4.00    0.20     0.060       (  0.823)       0.054        0.006
 49   4.08    0.20     0.060       (  0.820)       0.054        0.006
 50   4.17    0.20     0.060       (  0.816)       0.054        0.006
 51   4.25    0.20     0.060       (  0.813)       0.054        0.006
 52   4.33    0.23     0.070       (  0.809)       0.063        0.007
 53   4.42    0.23     0.070       (  0.806)       0.063        0.007
 54   4.50    0.23     0.070       (  0.802)       0.063        0.007
 55   4.58    0.23     0.070       (  0.799)       0.063        0.007
 56   4.67    0.23     0.070       (  0.795)       0.063        0.007
 57   4.75    0.23     0.070       (  0.792)       0.063        0.007
 58   4.83    0.27     0.080       (  0.789)       0.072        0.008
 59   4.92    0.27     0.080       (  0.785)       0.072        0.008
 60   5.00    0.27     0.080       (  0.782)       0.072        0.008
 61   5.08    0.20     0.060       (  0.778)       0.054        0.006
 62   5.17    0.20     0.060       (  0.775)       0.054        0.006
 63   5.25    0.20     0.060       (  0.772)       0.054        0.006
 64   5.33    0.23     0.070       (  0.768)       0.063        0.007
 65   5.42    0.23     0.070       (  0.765)       0.063        0.007
 66   5.50    0.23     0.070       (  0.762)       0.063        0.007
 67   5.58    0.27     0.080       (  0.758)       0.072        0.008
 68   5.67    0.27     0.080       (  0.755)       0.072        0.008
 69   5.75    0.27     0.080       (  0.751)       0.072        0.008
 70   5.83    0.27     0.080       (  0.748)       0.072        0.008
 71   5.92    0.27     0.080       (  0.745)       0.072        0.008
 72   6.00    0.27     0.080       (  0.742)       0.072        0.008
 73   6.08    0.30     0.090       (  0.738)       0.081        0.009
 74   6.17    0.30     0.090       (  0.735)       0.081        0.009
 75   6.25    0.30     0.090       (  0.732)       0.081        0.009
 76   6.33    0.30     0.090       (  0.728)       0.081        0.009
 77   6.42    0.30     0.090       (  0.725)       0.081        0.009
 78   6.50    0.30     0.090       (  0.722)       0.081        0.009
 79   6.58    0.33     0.100       (  0.719)       0.090        0.010
 80   6.67    0.33     0.100       (  0.715)       0.090        0.010
 81   6.75    0.33     0.100       (  0.712)       0.090        0.010
 82   6.83    0.33     0.100       (  0.709)       0.090        0.010
 83   6.92    0.33     0.100       (  0.706)       0.090        0.010
 84   7.00    0.33     0.100       (  0.703)       0.090        0.010
 85   7.08    0.33     0.100       (  0.699)       0.090        0.010
 86   7.17    0.33     0.100       (  0.696)       0.090        0.010
 87   7.25    0.33     0.100       (  0.693)       0.090        0.010
 88   7.33    0.37     0.110       (  0.690)       0.099        0.011
 89   7.42    0.37     0.110       (  0.687)       0.099        0.011
 90   7.50    0.37     0.110       (  0.684)       0.099        0.011
 91   7.58    0.40     0.120       (  0.680)       0.108        0.012
 92   7.67    0.40     0.120       (  0.677)       0.108        0.012
 93   7.75    0.40     0.120       (  0.674)       0.108        0.012
 94   7.83    0.43     0.130       (  0.671)       0.117        0.013
 95   7.92    0.43     0.130       (  0.668)       0.117        0.013
 96   8.00    0.43     0.130       (  0.665)       0.117        0.013
 97   8.08    0.50     0.150       (  0.662)       0.135        0.015
 98   8.17    0.50     0.150       (  0.659)       0.135        0.015
 99   8.25    0.50     0.150       (  0.656)       0.135        0.015
100   8.33    0.50     0.150       (  0.653)       0.135        0.015
101   8.42    0.50     0.150       (  0.650)       0.135        0.015
102   8.50    0.50     0.150       (  0.646)       0.135        0.015
103   8.58    0.53     0.160       (  0.643)       0.144        0.016
104   8.67    0.53     0.160       (  0.640)       0.144        0.016
105   8.75    0.53     0.160       (  0.637)       0.144        0.016
106   8.83    0.57     0.170       (  0.634)       0.153        0.017
107   8.92    0.57     0.170       (  0.631)       0.153        0.017
108   9.00    0.57     0.170       (  0.628)       0.153        0.017
109   9.08    0.63     0.190       (  0.625)       0.171        0.019
110   9.17    0.63     0.190       (  0.622)       0.171        0.019
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111   9.25     0.63      0.190       (  0.619)       0.171        0.019
112   9.33     0.67      0.200       (  0.617)       0.180        0.020
113   9.42     0.67      0.200       (  0.614)       0.180        0.020
114   9.50     0.67      0.200       (  0.611)       0.180        0.020
115   9.58     0.70      0.210       (  0.608)       0.189        0.021
116   9.67     0.70      0.210       (  0.605)       0.189        0.021
117   9.75     0.70      0.210       (  0.602)       0.189        0.021
118   9.83     0.73      0.220       (  0.599)       0.198        0.022
119   9.92     0.73      0.220       (  0.596)       0.198        0.022
120  10.00     0.73      0.220       (  0.593)       0.198        0.022
121  10.08     0.50      0.150       (  0.590)       0.135        0.015
122  10.17     0.50      0.150       (  0.588)       0.135        0.015
123  10.25     0.50      0.150       (  0.585)       0.135        0.015
124  10.33     0.50      0.150       (  0.582)       0.135        0.015
125  10.42     0.50      0.150       (  0.579)       0.135        0.015
126  10.50     0.50      0.150       (  0.576)       0.135        0.015
127  10.58     0.67      0.200       (  0.573)       0.180        0.020
128  10.67     0.67      0.200       (  0.571)       0.180        0.020
129  10.75     0.67      0.200       (  0.568)       0.180        0.020
130  10.83     0.67      0.200       (  0.565)       0.180        0.020
131  10.92     0.67      0.200       (  0.562)       0.180        0.020
132  11.00     0.67      0.200       (  0.559)       0.180        0.020
133  11.08     0.63      0.190       (  0.557)       0.171        0.019
134  11.17     0.63      0.190       (  0.554)       0.171        0.019
135  11.25     0.63      0.190       (  0.551)       0.171        0.019
136  11.33     0.63      0.190       (  0.549)       0.171        0.019
137  11.42     0.63      0.190       (  0.546)       0.171        0.019
138  11.50     0.63      0.190       (  0.543)       0.171        0.019
139  11.58     0.57      0.170       (  0.540)       0.153        0.017
140  11.67     0.57      0.170       (  0.538)       0.153        0.017
141  11.75     0.57      0.170       (  0.535)       0.153        0.017
142  11.83     0.60      0.180       (  0.532)       0.162        0.018
143  11.92     0.60      0.180       (  0.530)       0.162        0.018
144  12.00     0.60      0.180       (  0.527)       0.162        0.018
145  12.08     0.83      0.250       (  0.524)       0.225        0.025
146  12.17     0.83      0.250       (  0.522)       0.225        0.025
147  12.25     0.83      0.250       (  0.519)       0.225        0.025
148  12.33     0.87      0.260       (  0.517)       0.234        0.026
149  12.42     0.87      0.260       (  0.514)       0.234        0.026
150  12.50     0.87      0.260       (  0.511)       0.234        0.026
151  12.58     0.93      0.280       (  0.509)       0.252        0.028
152  12.67     0.93      0.280       (  0.506)       0.252        0.028
153  12.75     0.93      0.280       (  0.504)       0.252        0.028
154  12.83     0.97      0.290       (  0.501)       0.261        0.029
155  12.92     0.97      0.290       (  0.499)       0.261        0.029
156  13.00     0.97      0.290       (  0.496)       0.261        0.029
157  13.08     1.13      0.340       (  0.494)       0.306        0.034
158  13.17     1.13      0.340       (  0.491)       0.306        0.034
159  13.25     1.13      0.340       (  0.489)       0.306        0.034
160  13.33     1.13      0.340       (  0.486)       0.306        0.034
161  13.42     1.13      0.340       (  0.484)       0.306        0.034
162  13.50     1.13      0.340       (  0.481)       0.306        0.034
163  13.58     0.77      0.230       (  0.479)       0.207        0.023
164  13.67     0.77      0.230       (  0.476)       0.207        0.023
165  13.75     0.77      0.230       (  0.474)       0.207        0.023
166  13.83     0.77      0.230       (  0.471)       0.207        0.023
167  13.92     0.77      0.230       (  0.469)       0.207        0.023
168  14.00     0.77      0.230       (  0.467)       0.207        0.023
169  14.08     0.90      0.270       (  0.464)       0.243        0.027
170  14.17     0.90      0.270       (  0.462)       0.243        0.027
171  14.25     0.90      0.270       (  0.460)       0.243        0.027
172  14.33     0.87      0.260       (  0.457)       0.234        0.026
173  14.42     0.87      0.260       (  0.455)       0.234        0.026
174  14.50     0.87      0.260       (  0.453)       0.234        0.026
175  14.58     0.87      0.260       (  0.450)       0.234        0.026
176  14.67     0.87      0.260       (  0.448)       0.234        0.026
177  14.75     0.87      0.260       (  0.446)       0.234        0.026
178  14.83     0.83      0.250       (  0.443)       0.225        0.025
179  14.92     0.83      0.250       (  0.441)       0.225        0.025
180  15.00     0.83      0.250       (  0.439)       0.225        0.025
181  15.08     0.80      0.240       (  0.437)       0.216        0.024
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182  15.17     0.80      0.240       (  0.434)       0.216         0.024
183  15.25     0.80      0.240       (  0.432)       0.216         0.024
184  15.33     0.77      0.230       (  0.430)       0.207         0.023
185  15.42     0.77      0.230       (  0.428)       0.207         0.023
186  15.50     0.77      0.230       (  0.425)       0.207         0.023
187  15.58     0.63      0.190       (  0.423)       0.171         0.019
188  15.67     0.63      0.190       (  0.421)       0.171         0.019
189  15.75     0.63      0.190       (  0.419)       0.171         0.019
190  15.83     0.63      0.190       (  0.417)       0.171         0.019
191  15.92     0.63      0.190       (  0.415)       0.171         0.019
192  16.00     0.63      0.190       (  0.413)       0.171         0.019
193  16.08     0.13      0.040       (  0.410)       0.036         0.004
194  16.17     0.13      0.040       (  0.408)       0.036         0.004
195  16.25     0.13      0.040       (  0.406)       0.036         0.004
196  16.33     0.13      0.040       (  0.404)       0.036         0.004
197  16.42     0.13      0.040       (  0.402)       0.036         0.004
198  16.50     0.13      0.040       (  0.400)       0.036         0.004
199  16.58     0.10      0.030       (  0.398)       0.027         0.003
200  16.67     0.10      0.030       (  0.396)       0.027         0.003
201  16.75     0.10      0.030       (  0.394)       0.027         0.003
202  16.83     0.10      0.030       (  0.392)       0.027         0.003
203  16.92     0.10      0.030       (  0.390)       0.027         0.003
204  17.00     0.10      0.030       (  0.388)       0.027         0.003
205  17.08     0.17      0.050       (  0.386)       0.045         0.005
206  17.17     0.17      0.050       (  0.384)       0.045         0.005
207  17.25     0.17      0.050       (  0.382)       0.045         0.005
208  17.33     0.17      0.050       (  0.380)       0.045         0.005
209  17.42     0.17      0.050       (  0.378)       0.045         0.005
210  17.50     0.17      0.050       (  0.377)       0.045         0.005
211  17.58     0.17      0.050       (  0.375)       0.045         0.005
212  17.67     0.17      0.050       (  0.373)       0.045         0.005
213  17.75     0.17      0.050       (  0.371)       0.045         0.005
214  17.83     0.13      0.040       (  0.369)       0.036         0.004
215  17.92     0.13      0.040       (  0.367)       0.036         0.004
216  18.00     0.13      0.040       (  0.365)       0.036         0.004
217  18.08     0.13      0.040       (  0.364)       0.036         0.004
218  18.17     0.13      0.040       (  0.362)       0.036         0.004
219  18.25     0.13      0.040       (  0.360)       0.036         0.004
220  18.33     0.13      0.040       (  0.358)       0.036         0.004
221  18.42     0.13      0.040       (  0.357)       0.036         0.004
222  18.50     0.13      0.040       (  0.355)       0.036         0.004
223  18.58     0.10      0.030       (  0.353)       0.027         0.003
224  18.67     0.10      0.030       (  0.351)       0.027         0.003
225  18.75     0.10      0.030       (  0.350)       0.027         0.003
226  18.83     0.07      0.020       (  0.348)       0.018         0.002
227  18.92     0.07      0.020       (  0.346)       0.018         0.002
228  19.00     0.07      0.020       (  0.345)       0.018         0.002
229  19.08     0.10      0.030       (  0.343)       0.027         0.003
230  19.17     0.10      0.030       (  0.342)       0.027         0.003
231  19.25     0.10      0.030       (  0.340)       0.027         0.003
232  19.33     0.13      0.040       (  0.338)       0.036         0.004
233  19.42     0.13      0.040       (  0.337)       0.036         0.004
234  19.50     0.13      0.040       (  0.335)       0.036         0.004
235  19.58     0.10      0.030       (  0.334)       0.027         0.003
236  19.67     0.10      0.030       (  0.332)       0.027         0.003
237  19.75     0.10      0.030       (  0.331)       0.027         0.003
238  19.83     0.07      0.020       (  0.329)       0.018         0.002
239  19.92     0.07      0.020       (  0.328)       0.018         0.002
240  20.00     0.07      0.020       (  0.326)       0.018         0.002
241  20.08     0.10      0.030       (  0.325)       0.027         0.003
242  20.17     0.10      0.030       (  0.323)       0.027         0.003
243  20.25     0.10      0.030       (  0.322)       0.027         0.003
244  20.33     0.10      0.030       (  0.321)       0.027         0.003
245  20.42     0.10      0.030       (  0.319)       0.027         0.003
246  20.50     0.10      0.030       (  0.318)       0.027         0.003
247  20.58     0.10      0.030       (  0.316)       0.027         0.003
248  20.67     0.10      0.030       (  0.315)       0.027         0.003
249  20.75     0.10      0.030       (  0.314)       0.027         0.003
250  20.83     0.07      0.020       (  0.313)       0.018         0.002
251  20.92     0.07      0.020       (  0.311)       0.018         0.002
252  21.00     0.07      0.020       (  0.310)       0.018         0.002
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253  21.08     0.10      0.030       (  0.309)       0.027        0.003
254  21.17     0.10      0.030       (  0.308)       0.027        0.003
255  21.25     0.10      0.030       (  0.306)       0.027        0.003
256  21.33     0.07      0.020       (  0.305)       0.018        0.002
257  21.42     0.07      0.020       (  0.304)       0.018        0.002
258  21.50     0.07      0.020       (  0.303)       0.018        0.002
259  21.58     0.10      0.030       (  0.302)       0.027        0.003
260  21.67     0.10      0.030       (  0.301)       0.027        0.003
261  21.75     0.10      0.030       (  0.300)       0.027        0.003
262  21.83     0.07      0.020       (  0.299)       0.018        0.002
263  21.92     0.07      0.020       (  0.298)       0.018        0.002
264  22.00     0.07      0.020       (  0.297)       0.018        0.002
265  22.08     0.10      0.030       (  0.296)       0.027        0.003
266  22.17     0.10      0.030       (  0.295)       0.027        0.003
267  22.25     0.10      0.030       (  0.294)       0.027        0.003
268  22.33     0.07      0.020       (  0.293)       0.018        0.002
269  22.42     0.07      0.020       (  0.292)       0.018        0.002
270  22.50     0.07      0.020       (  0.291)       0.018        0.002
271  22.58     0.07      0.020       (  0.290)       0.018        0.002
272  22.67     0.07      0.020       (  0.289)       0.018        0.002
273  22.75     0.07      0.020       (  0.289)       0.018        0.002
274  22.83     0.07      0.020       (  0.288)       0.018        0.002
275  22.92     0.07      0.020       (  0.287)       0.018        0.002
276  23.00     0.07      0.020       (  0.286)       0.018        0.002
277  23.08     0.07      0.020       (  0.286)       0.018        0.002
278  23.17     0.07      0.020       (  0.285)       0.018        0.002
279  23.25     0.07      0.020       (  0.285)       0.018        0.002
280  23.33     0.07      0.020       (  0.284)       0.018        0.002
281  23.42     0.07      0.020       (  0.283)       0.018        0.002
282  23.50     0.07      0.020       (  0.283)       0.018        0.002
283  23.58     0.07      0.020       (  0.282)       0.018        0.002
284  23.67     0.07      0.020       (  0.282)       0.018        0.002
285  23.75     0.07      0.020       (  0.282)       0.018        0.002
286  23.83     0.07      0.020       (  0.281)       0.018        0.002
287  23.92     0.07      0.020       (  0.281)       0.018        0.002
288  24.00     0.07      0.020       (  0.281)       0.018        0.002
               (Loss Rate Not Used)
    Sum =     100.0                                  Sum =     3.0
      Flood volume = Effective rainfall      0.25(In)
       times area       1.1(Ac.)/[(In)/(Ft.)] =       0.0(Ac.Ft)
      Total soil loss =      2.25(In)
      Total soil loss =     0.213(Ac.Ft)
      Total rainfall =      2.50(In)
      Flood volume =        1029.1 Cubic Feet
      Total soil loss =        9261.9 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.039(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 -----------------------------------------------------------------------
   0+ 5       0.0000      0.00  Q         |         |         |         |
   0+10       0.0000      0.00  Q         |         |         |         |
   0+15       0.0000      0.00  Q         |         |         |         |
   0+20       0.0001      0.00  Q         |         |         |         |
   0+25       0.0001      0.00  Q         |         |         |         |
   0+30       0.0001      0.00  Q         |         |         |         |
   0+35       0.0001      0.00  Q         |         |         |         |
   0+40       0.0002      0.00  Q         |         |         |         |
   0+45       0.0002      0.00  Q         |         |         |         |
   0+50       0.0002      0.00  Q         |         |         |         |
   0+55       0.0002      0.00  Q         |         |         |         |
   1+ 0       0.0003      0.00  Q         |         |         |         |
   1+ 5       0.0003      0.00  Q         |         |         |         |
   1+10       0.0003      0.00  Q         |         |         |         |
```

```
1+15       0.0003      0.00  Q          |         |         |         |
1+20       0.0004      0.00  Q          |         |         |         |
1+25       0.0004      0.00  Q          |         |         |         |
1+30       0.0004      0.00  Q          |         |         |         |
1+35       0.0004      0.00  Q          |         |         |         |
1+40       0.0005      0.00  Q          |         |         |         |
1+45       0.0005      0.00  Q          |         |         |         |
1+50       0.0005      0.00  Q          |         |         |         |
1+55       0.0005      0.00  Q          |         |         |         |
2+ 0       0.0006      0.00  Q          |         |         |         |
2+ 5       0.0006      0.00  QV         |         |         |         |
2+10       0.0006      0.00  QV         |         |         |         |
2+15       0.0007      0.00  QV         |         |         |         |
2+20       0.0007      0.00  QV         |         |         |         |
2+25       0.0007      0.00  QV         |         |         |         |
2+30       0.0008      0.00  QV         |         |         |         |
2+35       0.0008      0.01  QV         |         |         |         |
2+40       0.0008      0.01  QV         |         |         |         |
2+45       0.0009      0.01  QV         |         |         |         |
2+50       0.0009      0.01  QV         |         |         |         |
2+55       0.0010      0.01  QV         |         |         |         |
3+ 0       0.0010      0.01  QV         |         |         |         |
3+ 5       0.0010      0.01  QV         |         |         |         |
3+10       0.0011      0.01  QV         |         |         |         |
3+15       0.0011      0.01  QV         |         |         |         |
3+20       0.0012      0.01  QV         |         |         |         |
3+25       0.0012      0.01  Q V        |         |         |         |
3+30       0.0012      0.01  Q V        |         |         |         |
3+35       0.0013      0.01  Q V        |         |         |         |
3+40       0.0013      0.01  Q V        |         |         |         |
3+45       0.0014      0.01  Q V        |         |         |         |
3+50       0.0014      0.01  Q V        |         |         |         |
3+55       0.0014      0.01  Q V        |         |         |         |
4+ 0       0.0015      0.01  Q V        |         |         |         |
4+ 5       0.0015      0.01  Q V        |         |         |         |
4+10       0.0016      0.01  Q V        |         |         |         |
4+15       0.0016      0.01  Q V        |         |         |         |
4+20       0.0017      0.01  Q V        |         |         |         |
4+25       0.0017      0.01  Q V        |         |         |         |
4+30       0.0018      0.01  Q  V       |         |         |         |
4+35       0.0018      0.01  Q  V       |         |         |         |
4+40       0.0019      0.01  Q  V       |         |         |         |
4+45       0.0020      0.01  Q  V       |         |         |         |
4+50       0.0020      0.01  Q  V       |         |         |         |
4+55       0.0021      0.01  Q  V       |         |         |         |
5+ 0       0.0021      0.01  Q  V       |         |         |         |
5+ 5       0.0022      0.01  Q  V       |         |         |         |
5+10       0.0022      0.01  Q  V       |         |         |         |
5+15       0.0023      0.01  Q  V       |         |         |         |
5+20       0.0023      0.01  Q  V       |         |         |         |
5+25       0.0024      0.01  Q   V      |         |         |         |
5+30       0.0025      0.01  Q   V      |         |         |         |
5+35       0.0025      0.01  Q   V      |         |         |         |
5+40       0.0026      0.01  Q   V      |         |         |         |
5+45       0.0026      0.01  Q   V      |         |         |         |
5+50       0.0027      0.01  Q   V      |         |         |         |
5+55       0.0028      0.01  Q   V      |         |         |         |
6+ 0       0.0028      0.01  Q   V      |         |         |         |
6+ 5       0.0029      0.01  Q   V      |         |         |         |
6+10       0.0030      0.01  Q    V     |         |         |         |
6+15       0.0030      0.01  Q    V     |         |         |         |
6+20       0.0031      0.01  Q    V     |         |         |         |
6+25       0.0032      0.01  Q    V     |         |         |         |
6+30       0.0032      0.01  Q    V     |         |         |         |
6+35       0.0033      0.01  Q    V     |         |         |         |
6+40       0.0034      0.01  Q    V     |         |         |         |
6+45       0.0035      0.01  Q    V     |         |         |         |
6+50       0.0036      0.01  Q     V    |         |         |         |
6+55       0.0036      0.01  Q     V    |         |         |         |
7+ 0       0.0037      0.01  Q     V    |         |         |         |
7+ 5       0.0038      0.01  Q     V    |         |         |         |
```

```
 7+10       0.0039      0.01  Q     V   |         |         |         |
 7+15       0.0040      0.01  Q     V   |         |         |         |
 7+20       0.0040      0.01  Q     V   |         |         |         |
 7+25       0.0041      0.01  Q     V   |         |         |         |
 7+30       0.0042      0.01  Q      V  |         |         |         |
 7+35       0.0043      0.01  Q      V  |         |         |         |
 7+40       0.0044      0.01  Q      V  |         |         |         |
 7+45       0.0045      0.01  Q      V  |         |         |         |
 7+50       0.0046      0.01  Q      V  |         |         |         |
 7+55       0.0047      0.01  Q      V  |         |         |         |
 8+ 0       0.0048      0.01  Q       V |         |         |         |
 8+ 5       0.0049      0.02  Q       V |         |         |         |
 8+10       0.0050      0.02  Q       V |         |         |         |
 8+15       0.0051      0.02  Q       V |         |         |         |
 8+20       0.0053      0.02  Q       V |         |         |         |
 8+25       0.0054      0.02  Q        V|         |         |         |
 8+30       0.0055      0.02  Q        V|         |         |         |
 8+35       0.0056      0.02  Q        V|         |         |         |
 8+40       0.0057      0.02  Q        V|         |         |         |
 8+45       0.0059      0.02  Q        V|         |         |         |
 8+50       0.0060      0.02  Q         V         |         |         |
 8+55       0.0061      0.02  Q         V         |         |         |
 9+ 0       0.0063      0.02  Q         V         |         |         |
 9+ 5       0.0064      0.02  Q         V         |         |         |
 9+10       0.0066      0.02  Q         |V        |         |         |
 9+15       0.0067      0.02  Q         |V        |         |         |
 9+20       0.0069      0.02  Q         |V        |         |         |
 9+25       0.0070      0.02  Q         |V        |         |         |
 9+30       0.0072      0.02  Q         | V       |         |         |
 9+35       0.0073      0.02  Q         | V       |         |         |
 9+40       0.0075      0.02  Q         | V       |         |         |
 9+45       0.0077      0.02  Q         | V       |         |         |
 9+50       0.0078      0.02  Q         |  V      |         |         |
 9+55       0.0080      0.03  Q         |  V      |         |         |
10+ 0       0.0082      0.03  Q         |  V      |         |         |
10+ 5       0.0083      0.02  Q         |   V     |         |         |
10+10       0.0084      0.02  Q         |   V     |         |         |
10+15       0.0086      0.02  Q         |   V     |         |         |
10+20       0.0087      0.02  Q         |   V     |         |         |
10+25       0.0088      0.02  Q         |   V     |         |         |
10+30       0.0089      0.02  Q         |    V    |         |         |
10+35       0.0091      0.02  Q         |    V    |         |         |
10+40       0.0092      0.02  Q         |    V    |         |         |
10+45       0.0094      0.02  Q         |    V    |         |         |
10+50       0.0095      0.02  Q         |     V   |         |         |
10+55       0.0097      0.02  Q         |     V   |         |         |
11+ 0       0.0098      0.02  Q         |     V   |         |         |
11+ 5       0.0100      0.02  Q         |     V   |         |         |
11+10       0.0101      0.02  Q         |      V  |         |         |
11+15       0.0103      0.02  Q         |      V  |         |         |
11+20       0.0104      0.02  Q         |      V  |         |         |
11+25       0.0106      0.02  Q         |      V  |         |         |
11+30       0.0107      0.02  Q         |       V |         |         |
11+35       0.0109      0.02  Q         |       V |         |         |
11+40       0.0110      0.02  Q         |       V |         |         |
11+45       0.0112      0.02  Q         |       V |         |         |
11+50       0.0113      0.02  Q         |        V|         |         |
11+55       0.0114      0.02  Q         |        V|         |         |
12+ 0       0.0116      0.02  Q         |        V|         |         |
12+ 5       0.0117      0.03  Q         |        V|         |         |
12+10       0.0119      0.03  Q         |         V         |         |
12+15       0.0121      0.03  Q         |         V         |         |
12+20       0.0123      0.03  Q         |         V         |         |
12+25       0.0125      0.03  Q         |         |V        |         |
12+30       0.0127      0.03  Q         |         |V        |         |
12+35       0.0130      0.03  Q         |         |V        |         |
12+40       0.0132      0.03  Q         |         | V       |         |
12+45       0.0134      0.03  Q         |         | V       |         |
12+50       0.0136      0.03  Q         |         |  V      |         |
12+55       0.0139      0.03  Q         |         |  V      |         |
13+ 0       0.0141      0.03  Q         |         |  V      |         |
```

```
13+ 5       0.0143      0.04  Q         |         |   V     |         |
13+10       0.0146      0.04  Q         |         |   V     |         |
13+15       0.0149      0.04  Q         |         |    V    |         |
13+20       0.0151      0.04  Q         |         |    V    |         |
13+25       0.0154      0.04  Q         |         |     V   |         |
13+30       0.0157      0.04  Q         |         |     V   |         |
13+35       0.0159      0.03  Q         |         |     V   |         |
13+40       0.0161      0.03  Q         |         |      V  |         |
13+45       0.0163      0.03  Q         |         |      V  |         |
13+50       0.0164      0.03  Q         |         |      V  |         |
13+55       0.0166      0.03  Q         |         |       V |         |
14+ 0       0.0168      0.03  Q         |         |       V |         |
14+ 5       0.0170      0.03  Q         |         |       V |         |
14+10       0.0172      0.03  Q         |         |        V|         |
14+15       0.0174      0.03  Q         |         |        V|         |
14+20       0.0176      0.03  Q         |         |        V|         |
14+25       0.0178      0.03  Q         |         |         V         |
14+30       0.0180      0.03  Q         |         |         V         |
14+35       0.0182      0.03  Q         |         |         V         |
14+40       0.0184      0.03  Q         |         |         |V        |
14+45       0.0187      0.03  Q         |         |         |V        |
14+50       0.0189      0.03  Q         |         |         |V        |
14+55       0.0191      0.03  Q         |         |         | V       |
15+ 0       0.0192      0.03  Q         |         |         | V       |
15+ 5       0.0194      0.03  Q         |         |         | V       |
15+10       0.0196      0.03  Q         |         |         |  V      |
15+15       0.0198      0.03  Q         |         |         |  V      |
15+20       0.0200      0.03  Q         |         |         |  V      |
15+25       0.0202      0.03  Q         |         |         |   V     |
15+30       0.0204      0.03  Q         |         |         |   V     |
15+35       0.0205      0.02  Q         |         |         |   V     |
15+40       0.0207      0.02  Q         |         |         |    V    |
15+45       0.0208      0.02  Q         |         |         |    V    |
15+50       0.0210      0.02  Q         |         |         |    V    |
15+55       0.0211      0.02  Q         |         |         |    V    |
16+ 0       0.0213      0.02  Q         |         |         |     V   |
16+ 5       0.0214      0.01  Q         |         |         |     V   |
16+10       0.0214      0.01  Q         |         |         |     V   |
16+15       0.0214      0.00  Q         |         |         |     V   |
16+20       0.0215      0.00  Q         |         |         |     V   |
16+25       0.0215      0.00  Q         |         |         |     V   |
16+30       0.0215      0.00  Q         |         |         |     V   |
16+35       0.0216      0.00  Q         |         |         |     V   |
16+40       0.0216      0.00  Q         |         |         |     V   |
16+45       0.0216      0.00  Q         |         |         |     V   |
16+50       0.0216      0.00  Q         |         |         |     V   |
16+55       0.0217      0.00  Q         |         |         |     V   |
17+ 0       0.0217      0.00  Q         |         |         |     V   |
17+ 5       0.0217      0.00  Q         |         |         |     V   |
17+10       0.0217      0.01  Q         |         |         |     V   |
17+15       0.0218      0.01  Q         |         |         |     V   |
17+20       0.0218      0.01  Q         |         |         |     V   |
17+25       0.0219      0.01  Q         |         |         |      V  |
17+30       0.0219      0.01  Q         |         |         |      V  |
17+35       0.0219      0.01  Q         |         |         |      V  |
17+40       0.0220      0.01  Q         |         |         |      V  |
17+45       0.0220      0.01  Q         |         |         |      V  |
17+50       0.0221      0.01  Q         |         |         |      V  |
17+55       0.0221      0.00  Q         |         |         |      V  |
18+ 0       0.0221      0.00  Q         |         |         |      V  |
18+ 5       0.0222      0.00  Q         |         |         |      V  |
18+10       0.0222      0.00  Q         |         |         |      V  |
18+15       0.0222      0.00  Q         |         |         |      V  |
18+20       0.0222      0.00  Q         |         |         |      V  |
18+25       0.0223      0.00  Q         |         |         |      V  |
18+30       0.0223      0.00  Q         |         |         |      V  |
18+35       0.0223      0.00  Q         |         |         |      V  |
18+40       0.0224      0.00  Q         |         |         |      V  |
18+45       0.0224      0.00  Q         |         |         |      V  |
18+50       0.0224      0.00  Q         |         |         |      V  |
18+55       0.0224      0.00  Q         |         |         |      V  |
```

```
   19+ 0       0.0224      0.00  Q          |         |         |      V  |
   19+ 5       0.0225      0.00  Q          |         |         |       V |
   19+10       0.0225      0.00  Q          |         |         |       V |
   19+15       0.0225      0.00  Q          |         |         |       V |
   19+20       0.0225      0.00  Q          |         |         |       V |
   19+25       0.0226      0.00  Q          |         |         |       V |
   19+30       0.0226      0.00  Q          |         |         |       V |
   19+35       0.0226      0.00  Q          |         |         |       V |
   19+40       0.0226      0.00  Q          |         |         |       V |
   19+45       0.0227      0.00  Q          |         |         |       V |
   19+50       0.0227      0.00  Q          |         |         |       V |
   19+55       0.0227      0.00  Q          |         |         |       V |
   20+ 0       0.0227      0.00  Q          |         |         |       V |
   20+ 5       0.0227      0.00  Q          |         |         |       V |
   20+10       0.0228      0.00  Q          |         |         |       V |
   20+15       0.0228      0.00  Q          |         |         |       V |
   20+20       0.0228      0.00  Q          |         |         |       V |
   20+25       0.0228      0.00  Q          |         |         |       V |
   20+30       0.0229      0.00  Q          |         |         |       V |
   20+35       0.0229      0.00  Q          |         |         |       V |
   20+40       0.0229      0.00  Q          |         |         |       V |
   20+45       0.0229      0.00  Q          |         |         |       V |
   20+50       0.0229      0.00  Q          |         |         |       V |
   20+55       0.0230      0.00  Q          |         |         |       V |
   21+ 0       0.0230      0.00  Q          |         |         |       V |
   21+ 5       0.0230      0.00  Q          |         |         |       V |
   21+10       0.0230      0.00  Q          |         |         |       V |
   21+15       0.0230      0.00  Q          |         |         |        V|
   21+20       0.0231      0.00  Q          |         |         |        V|
   21+25       0.0231      0.00  Q          |         |         |        V|
   21+30       0.0231      0.00  Q          |         |         |        V|
   21+35       0.0231      0.00  Q          |         |         |        V|
   21+40       0.0231      0.00  Q          |         |         |        V|
   21+45       0.0232      0.00  Q          |         |         |        V|
   21+50       0.0232      0.00  Q          |         |         |        V|
   21+55       0.0232      0.00  Q          |         |         |        V|
   22+ 0       0.0232      0.00  Q          |         |         |        V|
   22+ 5       0.0232      0.00  Q          |         |         |        V|
   22+10       0.0233      0.00  Q          |         |         |        V|
   22+15       0.0233      0.00  Q          |         |         |        V|
   22+20       0.0233      0.00  Q          |         |         |        V|
   22+25       0.0233      0.00  Q          |         |         |        V|
   22+30       0.0233      0.00  Q          |         |         |        V|
   22+35       0.0233      0.00  Q          |         |         |        V|
   22+40       0.0234      0.00  Q          |         |         |        V|
   22+45       0.0234      0.00  Q          |         |         |        V|
   22+50       0.0234      0.00  Q          |         |         |        V|
   22+55       0.0234      0.00  Q          |         |         |        V|
   23+ 0       0.0234      0.00  Q          |         |         |        V|
   23+ 5       0.0234      0.00  Q          |         |         |        V|
   23+10       0.0235      0.00  Q          |         |         |        V|
   23+15       0.0235      0.00  Q          |         |         |        V|
   23+20       0.0235      0.00  Q          |         |         |        V|
   23+25       0.0235      0.00  Q          |         |         |        V|
   23+30       0.0235      0.00  Q          |         |         |        V|
   23+35       0.0235      0.00  Q          |         |         |        V|
   23+40       0.0236      0.00  Q          |         |         |        V|
   23+45       0.0236      0.00  Q          |         |         |        V|
   23+50       0.0236      0.00  Q          |         |         |        V|
   23+55       0.0236      0.00  Q          |         |         |        V|
   24+ 0       0.0236      0.00  Q          |         |         |        V|
   24+ 5       0.0236      0.00  Q          |         |         |        V|
   24+10       0.0236      0.00  Q          |         |         |         V
-----------------------------------------------------------------------
```

```
       U n i t   H y d r o g r a p h   A n a l y s i s

       Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2012, Version 8.2
               Study date  06/03/21 File: 19400e100y24ha24100.out


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------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6310

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
19-400
EXISTING CONDITION
100-YEAR, 24-HOUR
AREA A
--------------------------------------------------------------------
Drainage Area =       7.94(Ac.)  =      0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       7.94(Ac.)  =      0.012 Sq. Mi.
Length along longest watercourse =     880.00(Ft.)
Length along longest watercourse measured to centroid =     540.00(Ft.)
Length along longest watercourse =      0.167 Mi.
Length along longest watercourse measured to centroid =      0.102 Mi.
Difference in elevation =      19.00(Ft.)
Slope along watercourse =    114.0000 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time =    0.062 Hr.
Lag time =     3.74 Min.
25% of lag time =     0.93 Min.
40% of lag time =     1.50 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        7.94           2.50                 19.84

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        7.94           6.00                 47.63

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    2.500(In)
Area Averaged 100-Year Rainfall =    6.000(In)

Point rain (area averaged) =    6.000(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    6.000(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     7.938           84.00         0.000
 Total Area Entered =      7.94(Ac.)
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        RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
        AMC2 AMC-3     (In/Hr)    (Dec.%)      (In/Hr)      (Dec.)    (In/Hr)
        84.0  93.4      0.086     0.000        0.086       1.000      0.086
                                                          Sum (F) =   0.086
        Area averaged mean soil loss (F) (In/Hr) =  0.086
        Minimum soil loss rate ((In/Hr)) =  0.043
        (for 24 hour storm duration)
        Soil low loss rate (decimal) =   0.900
        --------------------------------------------------------------------

                       U n i t  H y d r o g r a p h
                              VALLEY S-Curve
        -------------------------------------------------------------------
                       Unit Hydrograph Data
        --------------------------------------------------------------------
        Unit time period   Time % of lag   Distribution   Unit Hydrograph
            (hrs)                            Graph %          (CFS)
        --------------------------------------------------------------------
            1   0.083        133.748         29.035             2.323
            2   0.167        267.496         48.088             3.847
            3   0.250        401.244         12.232             0.979
            4   0.333        534.992          5.435             0.435
            5   0.417        668.739          2.965             0.237
            6   0.500        802.487          2.246             0.180
                                      Sum = 100.000   Sum=       8.000
--------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max    |    Low        (In/Hr)
   1   0.08     0.07      0.048        (  0.152)       0.043         0.005
   2   0.17     0.07      0.048        (  0.152)       0.043         0.005
   3   0.25     0.07      0.048        (  0.151)       0.043         0.005
   4   0.33     0.10      0.072        (  0.150)       0.065         0.007
   5   0.42     0.10      0.072        (  0.150)       0.065         0.007
   6   0.50     0.10      0.072        (  0.149)       0.065         0.007
   7   0.58     0.10      0.072        (  0.149)       0.065         0.007
   8   0.67     0.10      0.072        (  0.148)       0.065         0.007
   9   0.75     0.10      0.072        (  0.147)       0.065         0.007
  10   0.83     0.13      0.096        (  0.147)       0.086         0.010
  11   0.92     0.13      0.096        (  0.146)       0.086         0.010
  12   1.00     0.13      0.096        (  0.146)       0.086         0.010
  13   1.08     0.10      0.072        (  0.145)       0.065         0.007
  14   1.17     0.10      0.072        (  0.145)       0.065         0.007
  15   1.25     0.10      0.072        (  0.144)       0.065         0.007
  16   1.33     0.10      0.072        (  0.143)       0.065         0.007
  17   1.42     0.10      0.072        (  0.143)       0.065         0.007
  18   1.50     0.10      0.072        (  0.142)       0.065         0.007
  19   1.58     0.10      0.072        (  0.142)       0.065         0.007
  20   1.67     0.10      0.072        (  0.141)       0.065         0.007
  21   1.75     0.10      0.072        (  0.141)       0.065         0.007
  22   1.83     0.13      0.096        (  0.140)       0.086         0.010
  23   1.92     0.13      0.096        (  0.139)       0.086         0.010
  24   2.00     0.13      0.096        (  0.139)       0.086         0.010
  25   2.08     0.13      0.096        (  0.138)       0.086         0.010
  26   2.17     0.13      0.096        (  0.138)       0.086         0.010
  27   2.25     0.13      0.096        (  0.137)       0.086         0.010
  28   2.33     0.13      0.096        (  0.137)       0.086         0.010
  29   2.42     0.13      0.096        (  0.136)       0.086         0.010
  30   2.50     0.13      0.096        (  0.136)       0.086         0.010
  31   2.58     0.17      0.120        (  0.135)       0.108         0.012
  32   2.67     0.17      0.120        (  0.134)       0.108         0.012
  33   2.75     0.17      0.120        (  0.134)       0.108         0.012
  34   2.83     0.17      0.120        (  0.133)       0.108         0.012
  35   2.92     0.17      0.120        (  0.133)       0.108         0.012
  36   3.00     0.17      0.120        (  0.132)       0.108         0.012
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 37   3.08     0.17      0.120        (  0.132)       0.108        0.012
 38   3.17     0.17      0.120        (  0.131)       0.108        0.012
 39   3.25     0.17      0.120        (  0.131)       0.108        0.012
 40   3.33     0.17      0.120        (  0.130)       0.108        0.012
 41   3.42     0.17      0.120        (  0.129)       0.108        0.012
 42   3.50     0.17      0.120        (  0.129)       0.108        0.012
 43   3.58     0.17      0.120        (  0.128)       0.108        0.012
 44   3.67     0.17      0.120        (  0.128)       0.108        0.012
 45   3.75     0.17      0.120        (  0.127)       0.108        0.012
 46   3.83     0.20      0.144           0.127    (  0.130)        0.017
 47   3.92     0.20      0.144           0.126    (  0.130)        0.018
 48   4.00     0.20      0.144           0.126    (  0.130)        0.018
 49   4.08     0.20      0.144           0.125    (  0.130)        0.019
 50   4.17     0.20      0.144           0.125    (  0.130)        0.019
 51   4.25     0.20      0.144           0.124    (  0.130)        0.020
 52   4.33     0.23      0.168           0.124    (  0.151)        0.044
 53   4.42     0.23      0.168           0.123    (  0.151)        0.045
 54   4.50     0.23      0.168           0.123    (  0.151)        0.045
 55   4.58     0.23      0.168           0.122    (  0.151)        0.046
 56   4.67     0.23      0.168           0.121    (  0.151)        0.047
 57   4.75     0.23      0.168           0.121    (  0.151)        0.047
 58   4.83     0.27      0.192           0.120    (  0.173)        0.072
 59   4.92     0.27      0.192           0.120    (  0.173)        0.072
 60   5.00     0.27      0.192           0.119    (  0.173)        0.073
 61   5.08     0.20      0.144           0.119    (  0.130)        0.025
 62   5.17     0.20      0.144           0.118    (  0.130)        0.026
 63   5.25     0.20      0.144           0.118    (  0.130)        0.026
 64   5.33     0.23      0.168           0.117    (  0.151)        0.051
 65   5.42     0.23      0.168           0.117    (  0.151)        0.051
 66   5.50     0.23      0.168           0.116    (  0.151)        0.052
 67   5.58     0.27      0.192           0.116    (  0.173)        0.076
 68   5.67     0.27      0.192           0.115    (  0.173)        0.077
 69   5.75     0.27      0.192           0.115    (  0.173)        0.077
 70   5.83     0.27      0.192           0.114    (  0.173)        0.078
 71   5.92     0.27      0.192           0.114    (  0.173)        0.078
 72   6.00     0.27      0.192           0.113    (  0.173)        0.079
 73   6.08     0.30      0.216           0.113    (  0.194)        0.103
 74   6.17     0.30      0.216           0.112    (  0.194)        0.104
 75   6.25     0.30      0.216           0.112    (  0.194)        0.104
 76   6.33     0.30      0.216           0.111    (  0.194)        0.105
 77   6.42     0.30      0.216           0.111    (  0.194)        0.105
 78   6.50     0.30      0.216           0.110    (  0.194)        0.106
 79   6.58     0.33      0.240           0.110    (  0.216)        0.130
 80   6.67     0.33      0.240           0.109    (  0.216)        0.131
 81   6.75     0.33      0.240           0.109    (  0.216)        0.131
 82   6.83     0.33      0.240           0.108    (  0.216)        0.132
 83   6.92     0.33      0.240           0.108    (  0.216)        0.132
 84   7.00     0.33      0.240           0.107    (  0.216)        0.133
 85   7.08     0.33      0.240           0.107    (  0.216)        0.133
 86   7.17     0.33      0.240           0.106    (  0.216)        0.134
 87   7.25     0.33      0.240           0.106    (  0.216)        0.134
 88   7.33     0.37      0.264           0.105    (  0.238)        0.159
 89   7.42     0.37      0.264           0.105    (  0.238)        0.159
 90   7.50     0.37      0.264           0.104    (  0.238)        0.160
 91   7.58     0.40      0.288           0.104    (  0.259)        0.184
 92   7.67     0.40      0.288           0.103    (  0.259)        0.185
 93   7.75     0.40      0.288           0.103    (  0.259)        0.185
 94   7.83     0.43      0.312           0.102    (  0.281)        0.210
 95   7.92     0.43      0.312           0.102    (  0.281)        0.210
 96   8.00     0.43      0.312           0.102    (  0.281)        0.210
 97   8.08     0.50      0.360           0.101    (  0.324)        0.259
 98   8.17     0.50      0.360           0.101    (  0.324)        0.259
 99   8.25     0.50      0.360           0.100    (  0.324)        0.260
100   8.33     0.50      0.360           0.100    (  0.324)        0.260
101   8.42     0.50      0.360           0.099    (  0.324)        0.261
102   8.50     0.50      0.360           0.099    (  0.324)        0.261
103   8.58     0.53      0.384           0.098    (  0.346)        0.286
104   8.67     0.53      0.384           0.098    (  0.346)        0.286
105   8.75     0.53      0.384           0.097    (  0.346)        0.287
106   8.83     0.57      0.408           0.097    (  0.367)        0.311
107   8.92     0.57      0.408           0.096    (  0.367)        0.312
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108   9.00     0.57      0.408          0.096    (  0.367)        0.312
109   9.08     0.63      0.456          0.096    (  0.410)        0.360
110   9.17     0.63      0.456          0.095    (  0.410)        0.361
111   9.25     0.63      0.456          0.095    (  0.410)        0.361
112   9.33     0.67      0.480          0.094    (  0.432)        0.386
113   9.42     0.67      0.480          0.094    (  0.432)        0.386
114   9.50     0.67      0.480          0.093    (  0.432)        0.387
115   9.58     0.70      0.504          0.093    (  0.454)        0.411
116   9.67     0.70      0.504          0.092    (  0.454)        0.412
117   9.75     0.70      0.504          0.092    (  0.454)        0.412
118   9.83     0.73      0.528          0.091    (  0.475)        0.437
119   9.92     0.73      0.528          0.091    (  0.475)        0.437
120  10.00     0.73      0.528          0.091    (  0.475)        0.437
121  10.08     0.50      0.360          0.090    (  0.324)        0.270
122  10.17     0.50      0.360          0.090    (  0.324)        0.270
123  10.25     0.50      0.360          0.089    (  0.324)        0.271
124  10.33     0.50      0.360          0.089    (  0.324)        0.271
125  10.42     0.50      0.360          0.088    (  0.324)        0.272
126  10.50     0.50      0.360          0.088    (  0.324)        0.272
127  10.58     0.67      0.480          0.088    (  0.432)        0.392
128  10.67     0.67      0.480          0.087    (  0.432)        0.393
129  10.75     0.67      0.480          0.087    (  0.432)        0.393
130  10.83     0.67      0.480          0.086    (  0.432)        0.394
131  10.92     0.67      0.480          0.086    (  0.432)        0.394
132  11.00     0.67      0.480          0.085    (  0.432)        0.395
133  11.08     0.63      0.456          0.085    (  0.410)        0.371
134  11.17     0.63      0.456          0.085    (  0.410)        0.371
135  11.25     0.63      0.456          0.084    (  0.410)        0.372
136  11.33     0.63      0.456          0.084    (  0.410)        0.372
137  11.42     0.63      0.456          0.083    (  0.410)        0.373
138  11.50     0.63      0.456          0.083    (  0.410)        0.373
139  11.58     0.57      0.408          0.083    (  0.367)        0.325
140  11.67     0.57      0.408          0.082    (  0.367)        0.326
141  11.75     0.57      0.408          0.082    (  0.367)        0.326
142  11.83     0.60      0.432          0.081    (  0.389)        0.351
143  11.92     0.60      0.432          0.081    (  0.389)        0.351
144  12.00     0.60      0.432          0.080    (  0.389)        0.351
145  12.08     0.83      0.600          0.080    (  0.540)        0.520
146  12.17     0.83      0.600          0.080    (  0.540)        0.520
147  12.25     0.83      0.600          0.079    (  0.540)        0.521
148  12.33     0.87      0.624          0.079    (  0.562)        0.545
149  12.42     0.87      0.624          0.078    (  0.562)        0.545
150  12.50     0.87      0.624          0.078    (  0.562)        0.546
151  12.58     0.93      0.672          0.078    (  0.605)        0.594
152  12.67     0.93      0.672          0.077    (  0.605)        0.595
153  12.75     0.93      0.672          0.077    (  0.605)        0.595
154  12.83     0.97      0.696          0.077    (  0.626)        0.619
155  12.92     0.97      0.696          0.076    (  0.626)        0.620
156  13.00     0.97      0.696          0.076    (  0.626)        0.620
157  13.08     1.13      0.816          0.075    (  0.734)        0.741
158  13.17     1.13      0.816          0.075    (  0.734)        0.741
159  13.25     1.13      0.816          0.075    (  0.734)        0.741
160  13.33     1.13      0.816          0.074    (  0.734)        0.742
161  13.42     1.13      0.816          0.074    (  0.734)        0.742
162  13.50     1.13      0.816          0.073    (  0.734)        0.742
163  13.58     0.77      0.552          0.073    (  0.497)        0.479
164  13.67     0.77      0.552          0.073    (  0.497)        0.479
165  13.75     0.77      0.552          0.072    (  0.497)        0.480
166  13.83     0.77      0.552          0.072    (  0.497)        0.480
167  13.92     0.77      0.552          0.072    (  0.497)        0.480
168  14.00     0.77      0.552          0.071    (  0.497)        0.481
169  14.08     0.90      0.648          0.071    (  0.583)        0.577
170  14.17     0.90      0.648          0.071    (  0.583)        0.577
171  14.25     0.90      0.648          0.070    (  0.583)        0.578
172  14.33     0.87      0.624          0.070    (  0.562)        0.554
173  14.42     0.87      0.624          0.069    (  0.562)        0.555
174  14.50     0.87      0.624          0.069    (  0.562)        0.555
175  14.58     0.87      0.624          0.069    (  0.562)        0.555
176  14.67     0.87      0.624          0.068    (  0.562)        0.556
177  14.75     0.87      0.624          0.068    (  0.562)        0.556
178  14.83     0.83      0.600          0.068    (  0.540)        0.532
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179  14.92     0.83      0.600          0.067    (  0.540)        0.533
180  15.00     0.83      0.600          0.067    (  0.540)        0.533
181  15.08     0.80      0.576          0.067    (  0.518)        0.509
182  15.17     0.80      0.576          0.066    (  0.518)        0.510
183  15.25     0.80      0.576          0.066    (  0.518)        0.510
184  15.33     0.77      0.552          0.066    (  0.497)        0.486
185  15.42     0.77      0.552          0.065    (  0.497)        0.487
186  15.50     0.77      0.552          0.065    (  0.497)        0.487
187  15.58     0.63      0.456          0.065    (  0.410)        0.391
188  15.67     0.63      0.456          0.064    (  0.410)        0.392
189  15.75     0.63      0.456          0.064    (  0.410)        0.392
190  15.83     0.63      0.456          0.064    (  0.410)        0.392
191  15.92     0.63      0.456          0.063    (  0.410)        0.393
192  16.00     0.63      0.456          0.063    (  0.410)        0.393
193  16.08     0.13      0.096          0.063    (  0.086)        0.033
194  16.17     0.13      0.096          0.062    (  0.086)        0.034
195  16.25     0.13      0.096          0.062    (  0.086)        0.034
196  16.33     0.13      0.096          0.062    (  0.086)        0.034
197  16.42     0.13      0.096          0.061    (  0.086)        0.035
198  16.50     0.13      0.096          0.061    (  0.086)        0.035
199  16.58     0.10      0.072          0.061    (  0.065)        0.011
200  16.67     0.10      0.072          0.060    (  0.065)        0.012
201  16.75     0.10      0.072          0.060    (  0.065)        0.012
202  16.83     0.10      0.072          0.060    (  0.065)        0.012
203  16.92     0.10      0.072          0.060    (  0.065)        0.012
204  17.00     0.10      0.072          0.059    (  0.065)        0.013
205  17.08     0.17      0.120          0.059    (  0.108)        0.061
206  17.17     0.17      0.120          0.059    (  0.108)        0.061
207  17.25     0.17      0.120          0.058    (  0.108)        0.062
208  17.33     0.17      0.120          0.058    (  0.108)        0.062
209  17.42     0.17      0.120          0.058    (  0.108)        0.062
210  17.50     0.17      0.120          0.058    (  0.108)        0.062
211  17.58     0.17      0.120          0.057    (  0.108)        0.063
212  17.67     0.17      0.120          0.057    (  0.108)        0.063
213  17.75     0.17      0.120          0.057    (  0.108)        0.063
214  17.83     0.13      0.096          0.056    (  0.086)        0.040
215  17.92     0.13      0.096          0.056    (  0.086)        0.040
216  18.00     0.13      0.096          0.056    (  0.086)        0.040
217  18.08     0.13      0.096          0.056    (  0.086)        0.040
218  18.17     0.13      0.096          0.055    (  0.086)        0.041
219  18.25     0.13      0.096          0.055    (  0.086)        0.041
220  18.33     0.13      0.096          0.055    (  0.086)        0.041
221  18.42     0.13      0.096          0.054    (  0.086)        0.042
222  18.50     0.13      0.096          0.054    (  0.086)        0.042
223  18.58     0.10      0.072          0.054    (  0.065)        0.018
224  18.67     0.10      0.072          0.054    (  0.065)        0.018
225  18.75     0.10      0.072          0.053    (  0.065)        0.019
226  18.83     0.07      0.048      (   0.053)        0.043         0.005
227  18.92     0.07      0.048      (   0.053)        0.043         0.005
228  19.00     0.07      0.048      (   0.053)        0.043         0.005
229  19.08     0.10      0.072          0.052    (  0.065)        0.020
230  19.17     0.10      0.072          0.052    (  0.065)        0.020
231  19.25     0.10      0.072          0.052    (  0.065)        0.020
232  19.33     0.13      0.096          0.052    (  0.086)        0.044
233  19.42     0.13      0.096          0.051    (  0.086)        0.045
234  19.50     0.13      0.096          0.051    (  0.086)        0.045
235  19.58     0.10      0.072          0.051    (  0.065)        0.021
236  19.67     0.10      0.072          0.051    (  0.065)        0.021
237  19.75     0.10      0.072          0.050    (  0.065)        0.022
238  19.83     0.07      0.048      (   0.050)        0.043         0.005
239  19.92     0.07      0.048      (   0.050)        0.043         0.005
240  20.00     0.07      0.048      (   0.050)        0.043         0.005
241  20.08     0.10      0.072          0.050    (  0.065)        0.022
242  20.17     0.10      0.072          0.049    (  0.065)        0.023
243  20.25     0.10      0.072          0.049    (  0.065)        0.023
244  20.33     0.10      0.072          0.049    (  0.065)        0.023
245  20.42     0.10      0.072          0.049    (  0.065)        0.023
246  20.50     0.10      0.072          0.049    (  0.065)        0.023
247  20.58     0.10      0.072          0.048    (  0.065)        0.024
248  20.67     0.10      0.072          0.048    (  0.065)        0.024
249  20.75     0.10      0.072          0.048    (  0.065)        0.024
```

```
250  20.83     0.07      0.048       (  0.048)       0.043        0.005
251  20.92     0.07      0.048       (  0.048)       0.043        0.005
252  21.00     0.07      0.048       (  0.047)       0.043        0.005
253  21.08     0.10      0.072          0.047    (  0.065)        0.025
254  21.17     0.10      0.072          0.047    (  0.065)        0.025
255  21.25     0.10      0.072          0.047    (  0.065)        0.025
256  21.33     0.07      0.048       (  0.047)       0.043        0.005
257  21.42     0.07      0.048       (  0.046)       0.043        0.005
258  21.50     0.07      0.048       (  0.046)       0.043        0.005
259  21.58     0.10      0.072          0.046    (  0.065)        0.026
260  21.67     0.10      0.072          0.046    (  0.065)        0.026
261  21.75     0.10      0.072          0.046    (  0.065)        0.026
262  21.83     0.07      0.048       (  0.046)       0.043        0.005
263  21.92     0.07      0.048       (  0.045)       0.043        0.005
264  22.00     0.07      0.048       (  0.045)       0.043        0.005
265  22.08     0.10      0.072          0.045    (  0.065)        0.027
266  22.17     0.10      0.072          0.045    (  0.065)        0.027
267  22.25     0.10      0.072          0.045    (  0.065)        0.027
268  22.33     0.07      0.048       (  0.045)       0.043        0.005
269  22.42     0.07      0.048       (  0.045)       0.043        0.005
270  22.50     0.07      0.048       (  0.044)       0.043        0.005
271  22.58     0.07      0.048       (  0.044)       0.043        0.005
272  22.67     0.07      0.048       (  0.044)       0.043        0.005
273  22.75     0.07      0.048       (  0.044)       0.043        0.005
274  22.83     0.07      0.048       (  0.044)       0.043        0.005
275  22.92     0.07      0.048       (  0.044)       0.043        0.005
276  23.00     0.07      0.048       (  0.044)       0.043        0.005
277  23.08     0.07      0.048       (  0.044)       0.043        0.005
278  23.17     0.07      0.048       (  0.044)       0.043        0.005
279  23.25     0.07      0.048       (  0.043)       0.043        0.005
280  23.33     0.07      0.048       (  0.043)       0.043        0.005
281  23.42     0.07      0.048       (  0.043)       0.043        0.005
282  23.50     0.07      0.048       (  0.043)       0.043        0.005
283  23.58     0.07      0.048          0.043    (  0.043)        0.005
284  23.67     0.07      0.048          0.043    (  0.043)        0.005
285  23.75     0.07      0.048          0.043    (  0.043)        0.005
286  23.83     0.07      0.048          0.043    (  0.043)        0.005
287  23.92     0.07      0.048          0.043    (  0.043)        0.005
288  24.00     0.07      0.048          0.043    (  0.043)        0.005
               (Loss Rate Not Used)
    Sum =     100.0                                     Sum =    49.9
       Flood volume = Effective rainfall      4.16(In)
        times area       7.9(Ac.)/[(In)/(Ft.)] =       2.8(Ac.Ft)
       Total soil loss =      1.84(In)
       Total soil loss =     1.219(Ac.Ft)
       Total rainfall =      6.00(In)
       Flood volume =      119791.2 Cubic Feet
       Total soil loss =       53095.8 Cubic Feet
       --------------------------------------------------------------------
        Peak flow rate of this hydrograph =      5.940(CFS)
       --------------------------------------------------------------------
       ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                           24 - H O U R   S T O R M
                      R u n o f f     H y d r o g r a p h
       --------------------------------------------------------------------
                   Hydrograph in   5   Minute intervals ((CFS))

       --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 -----------------------------------------------------------------------
   0+ 5       0.0001      0.01  Q         |         |         |         |
   0+10       0.0003      0.03  Q         |         |         |         |
   0+15       0.0005      0.03  Q         |         |         |         |
   0+20       0.0008      0.04  Q         |         |         |         |
   0+25       0.0012      0.05  Q         |         |         |         |
   0+30       0.0016      0.06  Q         |         |         |         |
   0+35       0.0019      0.06  Q         |         |         |         |
   0+40       0.0023      0.06  Q         |         |         |         |
   0+45       0.0027      0.06  Q         |         |         |         |
   0+50       0.0032      0.06  Q         |         |         |         |
   0+55       0.0037      0.07  Q         |         |         |         |
```

```
1+ 0       0.0042      0.07  Q          |         |         |         |
1+ 5       0.0047      0.07  Q          |         |         |         |
1+10       0.0051      0.06  Q          |         |         |         |
1+15       0.0055      0.06  Q          |         |         |         |
1+20       0.0059      0.06  Q          |         |         |         |
1+25       0.0063      0.06  Q          |         |         |         |
1+30       0.0067      0.06  Q          |         |         |         |
1+35       0.0071      0.06  Q          |         |         |         |
1+40       0.0075      0.06  Q          |         |         |         |
1+45       0.0079      0.06  Q          |         |         |         |
1+50       0.0083      0.06  Q          |         |         |         |
1+55       0.0088      0.07  Q          |         |         |         |
2+ 0       0.0093      0.07  Q          |         |         |         |
2+ 5       0.0099      0.08  Q          |         |         |         |
2+10       0.0104      0.08  Q          |         |         |         |
2+15       0.0109      0.08  Q          |         |         |         |
2+20       0.0114      0.08  Q          |         |         |         |
2+25       0.0120      0.08  Q          |         |         |         |
2+30       0.0125      0.08  Q          |         |         |         |
2+35       0.0131      0.08  Q          |         |         |         |
2+40       0.0137      0.09  Q          |         |         |         |
2+45       0.0144      0.09  Q          |         |         |         |
2+50       0.0150      0.10  Q          |         |         |         |
2+55       0.0157      0.10  Q          |         |         |         |
3+ 0       0.0163      0.10  Q          |         |         |         |
3+ 5       0.0170      0.10  Q          |         |         |         |
3+10       0.0176      0.10  Q          |         |         |         |
3+15       0.0183      0.10  Q          |         |         |         |
3+20       0.0190      0.10  Q          |         |         |         |
3+25       0.0196      0.10  Q          |         |         |         |
3+30       0.0203      0.10  Q          |         |         |         |
3+35       0.0210      0.10  Q          |         |         |         |
3+40       0.0216      0.10  Q          |         |         |         |
3+45       0.0223      0.10  Q          |         |         |         |
3+50       0.0230      0.11  Q          |         |         |         |
3+55       0.0239      0.13  Q          |         |         |         |
4+ 0       0.0249      0.14  Q          |         |         |         |
4+ 5       0.0259      0.14  Q          |         |         |         |
4+10       0.0269      0.15  Q          |         |         |         |
4+15       0.0280      0.15  Q          |         |         |         |
4+20       0.0294      0.21  Q          |         |         |         |
4+25       0.0316      0.31  VQ         |         |         |         |
4+30       0.0339      0.34  VQ         |         |         |         |
4+35       0.0363      0.35  VQ         |         |         |         |
4+40       0.0388      0.36  VQ         |         |         |         |
4+45       0.0414      0.37  VQ         |         |         |         |
4+50       0.0444      0.43  VQ         |         |         |         |
4+55       0.0480      0.53  V Q        |         |         |         |
5+ 0       0.0518      0.56  V Q        |         |         |         |
5+ 5       0.0550      0.46  VQ         |         |         |         |
5+10       0.0570      0.28  VQ         |         |         |         |
5+15       0.0587      0.25  Q          |         |         |         |
5+20       0.0606      0.28  VQ         |         |         |         |
5+25       0.0632      0.37  VQ         |         |         |         |
5+30       0.0658      0.39  VQ         |         |         |         |
5+35       0.0690      0.46  |Q         |         |         |         |
5+40       0.0729      0.56  |VQ        |         |         |         |
5+45       0.0769      0.59  |VQ        |         |         |         |
5+50       0.0811      0.61  |VQ        |         |         |         |
5+55       0.0854      0.62  |VQ        |         |         |         |
6+ 0       0.0897      0.63  |VQ        |         |         |         |
6+ 5       0.0944      0.69  |VQ        |         |         |         |
6+10       0.0998      0.78  |V Q       |         |         |         |
6+15       0.1054      0.81  |V Q       |         |         |         |
6+20       0.1111      0.82  |V Q       |         |         |         |
6+25       0.1168      0.83  |V Q       |         |         |         |
6+30       0.1226      0.84  |V Q       |         |         |         |
6+35       0.1288      0.90  |V Q       |         |         |         |
6+40       0.1357      1.00  |V Q       |         |         |         |
6+45       0.1427      1.03  | V Q      |         |         |         |
6+50       0.1499      1.04  | V Q      |         |         |         |
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 6+55       0.1571      1.05  | V Q     |         |         |         |
 7+ 0       0.1644      1.06  | V Q     |         |         |         |
 7+ 5       0.1717      1.06  | V Q     |         |         |         |
 7+10       0.1791      1.07  | V Q     |         |         |         |
 7+15       0.1864      1.07  | V Q     |         |         |         |
 7+20       0.1942      1.13  | V Q     |         |         |         |
 7+25       0.2026      1.23  | V Q     |         |         |         |
 7+30       0.2113      1.25  |  V Q    |         |         |         |
 7+35       0.2204      1.32  |  V Q    |         |         |         |
 7+40       0.2302      1.42  |  V Q    |         |         |         |
 7+45       0.2402      1.46  |  V Q    |         |         |         |
 7+50       0.2507      1.53  |  V  Q   |         |         |         |
 7+55       0.2619      1.63  |  V  Q   |         |         |         |
 8+ 0       0.2734      1.66  |  V  Q   |         |         |         |
 8+ 5       0.2857      1.79  |   V  Q  |         |         |         |
 8+10       0.2993      1.98  |   V  Q  |         |         |         |
 8+15       0.3133      2.03  |   V   Q |         |         |         |
 8+20       0.3275      2.06  |   V   Q |         |         |         |
 8+25       0.3418      2.07  |   V   Q |         |         |         |
 8+30       0.3562      2.09  |    V  Q |         |         |         |
 8+35       0.3710      2.15  |    V  Q |         |         |         |
 8+40       0.3864      2.24  |    V  Q |         |         |         |
 8+45       0.4020      2.27  |    V   Q|         |         |         |
 8+50       0.4181      2.34  |     V  Q|         |         |         |
 8+55       0.4350      2.44  |     V  Q|         |         |         |
 9+ 0       0.4520      2.47  |     V  Q|         |         |         |
 9+ 5       0.4699      2.60  |     V   Q         |         |         |
 9+10       0.4891      2.79  |      V  |Q        |         |         |
 9+15       0.5087      2.85  |      V  |Q        |         |         |
 9+20       0.5289      2.93  |      V  |Q        |         |         |
 9+25       0.5498      3.04  |      V  | Q       |         |         |
 9+30       0.5709      3.07  |       V | Q       |         |         |
 9+35       0.5926      3.14  |       V | Q       |         |         |
 9+40       0.6149      3.24  |       V | Q       |         |         |
 9+45       0.6375      3.27  |        V|  Q      |         |         |
 9+50       0.6605      3.34  |        V|  Q      |         |         |
 9+55       0.6842      3.45  |        V|  Q      |         |         |
10+ 0       0.7082      3.48  |         V  Q      |         |         |
10+ 5       0.7295      3.10  |         V Q       |         |         |
10+10       0.7465      2.46  |        QV         |         |         |
10+15       0.7623      2.31  |        Q|V        |         |         |
10+20       0.7777      2.24  |       Q |V        |         |         |
10+25       0.7929      2.20  |       Q |V        |         |         |
10+30       0.8079      2.17  |       Q |V        |         |         |
10+35       0.8248      2.46  |        Q|V        |         |         |
10+40       0.8449      2.92  |         |QV       |         |         |
10+45       0.8658      3.04  |         | Q       |         |         |
10+50       0.8872      3.10  |         | Q       |         |         |
10+55       0.9087      3.13  |         | QV      |         |         |
11+ 0       0.9304      3.15  |         | QV      |         |         |
11+ 5       0.9518      3.10  |         | QV      |         |         |
11+10       0.9726      3.01  |         | Q V     |         |         |
11+15       0.9932      2.99  |         |Q  V     |         |         |
11+20       1.0137      2.99  |         |Q  V     |         |         |
11+25       1.0343      2.98  |         |Q   V    |         |         |
11+30       1.0548      2.98  |         |Q   V    |         |         |
11+35       1.0746      2.87  |         |Q   V    |         |         |
11+40       1.0932      2.69  |         Q    V    |         |         |
11+45       1.1114      2.65  |         Q     V   |         |         |
11+50       1.1299      2.69  |         Q     V   |         |         |
11+55       1.1490      2.77  |         |Q    V   |         |         |
12+ 0       1.1682      2.79  |         |Q    V   |         |         |
12+ 5       1.1902      3.19  |         | Q    V  |         |         |
12+10       1.2167      3.85  |         |    Q V  |         |         |
12+15       1.2444      4.02  |         |     Q V |         |         |
12+20       1.2730      4.15  |         |     Q V |         |         |
12+25       1.3025      4.29  |         |      QV |         |         |
12+30       1.3325      4.35  |         |      Q V|         |         |
12+35       1.3632      4.47  |         |      Q V|         |         |
12+40       1.3954      4.66  |         |       Q V         |         |
12+45       1.4279      4.72  |         |       Q V         |         |
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12+50       1.4609      4.80  |         |        Q|V        |         |
12+55       1.4947      4.91  |         |        Q|V        |         |
13+ 0       1.5287      4.94  |         |        Q| V       |         |
13+ 5       1.5648      5.23  |         |         Q V       |         |
13+10       1.6040      5.70  |         |         | QV      |         |
13+15       1.6442      5.83  |         |         |  Q      |         |
13+20       1.6847      5.88  |         |         |  QV     |         |
13+25       1.7254      5.92  |         |         |  Q V    |         |
13+30       1.7663      5.94  |         |         |  Q V    |         |
13+35       1.8030      5.33  |         |         |Q    V   |         |
13+40       1.8328      4.32  |         |      Q  |     V   |         |
13+45       1.8607      4.06  |         |     Q   |      V  |         |
13+50       1.8879      3.95  |         |    Q    |      V  |         |
13+55       1.9147      3.89  |         |    Q    |      V  |         |
14+ 0       1.9412      3.84  |         |    Q    |       V |         |
14+ 5       1.9692      4.07  |         |     Q   |       V |         |
14+10       1.9998      4.44  |         |      Q  |        V|         |
14+15       2.0311      4.54  |         |       Q |        V|         |
14+20       2.0623      4.53  |         |       Q |        V|         |
14+25       2.0930      4.46  |         |      Q  |         V         |
14+30       2.1237      4.46  |         |      Q  |         V         |
14+35       2.1544      4.45  |         |      Q  |         |V        |
14+40       2.1850      4.45  |         |      Q  |         |V        |
14+45       2.2156      4.45  |         |      Q  |         | V       |
14+50       2.2459      4.39  |         |      Q  |         | V       |
14+55       2.2755      4.30  |         |      Q  |         |  V      |
15+ 0       2.3050      4.28  |         |      Q  |         |  V      |
15+ 5       2.3341      4.22  |         |     Q   |         |  V      |
15+10       2.3625      4.12  |         |     Q   |         |   V     |
15+15       2.3907      4.10  |         |     Q   |         |   V     |
15+20       2.4185      4.04  |         |     Q   |         |    V    |
15+25       2.4457      3.94  |         |    Q    |         |    V    |
15+30       2.4726      3.92  |         |    Q    |         |    V    |
15+35       2.4980      3.68  |         |   Q     |         |     V   |
15+40       2.5208      3.31  |         |  Q      |         |     V   |
15+45       2.5430      3.22  |         | Q       |         |     V   |
15+50       2.5649      3.18  |         | Q       |         |      V  |
15+55       2.5866      3.16  |         | Q       |         |      V  |
16+ 0       2.6082      3.14  |         | Q       |         |      V  |
16+ 5       2.6241      2.31  |        Q|         |         |       V |
16+10       2.6305      0.93  |  Q      |         |         |       V |
16+15       2.6345      0.58  | Q       |         |         |       V |
16+20       2.6374      0.42  |Q        |         |         |       V |
16+25       2.6397      0.34  |Q        |         |         |       V |
16+30       2.6416      0.28  |Q        |         |         |       V |
16+35       2.6432      0.22  Q         |         |         |       V |
16+40       2.6441      0.13  Q         |         |         |       V |
16+45       2.6449      0.11  Q         |         |         |       V |
16+50       2.6456      0.10  Q         |         |         |       V |
16+55       2.6463      0.10  Q         |         |         |       V |
17+ 0       2.6470      0.10  Q         |         |         |       V |
17+ 5       2.6484      0.21  Q         |         |         |       V |
17+10       2.6512      0.40  |Q        |         |         |       V |
17+15       2.6543      0.45  |Q        |         |         |       V |
17+20       2.6575      0.47  |Q        |         |         |       V |
17+25       2.6609      0.49  |Q        |         |         |       V |
17+30       2.6643      0.50  |Q        |         |         |       V |
17+35       2.6678      0.50  |Q        |         |         |       V |
17+40       2.6712      0.50  | Q       |         |         |       V |
17+45       2.6747      0.50  | Q       |         |         |       V |
17+50       2.6778      0.45  |Q        |         |         |       V |
17+55       2.6803      0.36  |Q        |         |         |       V |
18+ 0       2.6826      0.34  |Q        |         |         |        V|
18+ 5       2.6849      0.33  |Q        |         |         |        V|
18+10       2.6872      0.33  |Q        |         |         |        V|
18+15       2.6894      0.33  |Q        |         |         |        V|
18+20       2.6917      0.33  |Q        |         |         |        V|
18+25       2.6939      0.33  |Q        |         |         |        V|
18+30       2.6962      0.33  |Q        |         |         |        V|
18+35       2.6981      0.28  |Q        |         |         |        V|
18+40       2.6994      0.19  Q         |         |         |        V|
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   18+45       2.7006      0.17  Q         |         |         |        V|
   18+50       2.7015      0.13  Q         |         |         |        V|
   18+55       2.7019      0.07  Q         |         |         |        V|
   19+ 0       2.7023      0.05  Q         |         |         |        V|
   19+ 5       2.7028      0.08  Q         |         |         |        V|
   19+10       2.7037      0.13  Q         |         |         |        V|
   19+15       2.7047      0.15  Q         |         |         |        V|
   19+20       2.7062      0.21  Q         |         |         |        V|
   19+25       2.7083      0.31  |Q        |         |         |        V|
   19+30       2.7106      0.34  |Q        |         |         |        V|
   19+35       2.7126      0.29  |Q        |         |         |        V|
   19+40       2.7141      0.21  Q         |         |         |        V|
   19+45       2.7154      0.19  Q         |         |         |        V|
   19+50       2.7164      0.14  Q         |         |         |        V|
   19+55       2.7169      0.07  Q         |         |         |        V|
   20+ 0       2.7172      0.05  Q         |         |         |        V|
   20+ 5       2.7178      0.09  Q         |         |         |        V|
   20+10       2.7188      0.15  Q         |         |         |        V|
   20+15       2.7200      0.17  Q         |         |         |        V|
   20+20       2.7212      0.18  Q         |         |         |        V|
   20+25       2.7224      0.18  Q         |         |         |        V|
   20+30       2.7237      0.19  Q         |         |         |        V|
   20+35       2.7250      0.19  Q         |         |         |        V|
   20+40       2.7263      0.19  Q         |         |         |        V|
   20+45       2.7276      0.19  Q         |         |         |        V|
   20+50       2.7287      0.15  Q         |         |         |        V|
   20+55       2.7292      0.07  Q         |         |         |        V|
   21+ 0       2.7295      0.05  Q         |         |         |        V|
   21+ 5       2.7302      0.09  Q         |         |         |        V|
   21+10       2.7313      0.17  Q         |         |         |        V|
   21+15       2.7326      0.18  Q         |         |         |        V|
   21+20       2.7336      0.15  Q         |         |         |        V|
   21+25       2.7341      0.07  Q         |         |         |        V|
   21+30       2.7345      0.06  Q         |         |         |        V|
   21+35       2.7351      0.10  Q         |         |         |        V|
   21+40       2.7363      0.17  Q         |         |         |        V|
   21+45       2.7376      0.19  Q         |         |         |        V|
   21+50       2.7387      0.15  Q         |         |         |        V|
   21+55       2.7392      0.07  Q         |         |         |        V|
   22+ 0       2.7396      0.06  Q         |         |         |        V|
   22+ 5       2.7402      0.10  Q         |         |         |        V|
   22+10       2.7415      0.18  Q         |         |         |        V|
   22+15       2.7428      0.20  Q         |         |         |        V|
   22+20       2.7439      0.16  Q         |         |         |        V|
   22+25       2.7444      0.08  Q         |         |         |        V|
   22+30       2.7448      0.06  Q         |         |         |        V|
   22+35       2.7451      0.05  Q         |         |         |        V|
   22+40       2.7454      0.04  Q         |         |         |        V|
   22+45       2.7457      0.04  Q         |         |         |        V|
   22+50       2.7460      0.04  Q         |         |         |        V|
   22+55       2.7462      0.04  Q         |         |         |        V|
   23+ 0       2.7465      0.04  Q         |         |         |        V|
   23+ 5       2.7468      0.04  Q         |         |         |        V|
   23+10       2.7470      0.04  Q         |         |         |        V|
   23+15       2.7473      0.04  Q         |         |         |        V|
   23+20       2.7475      0.04  Q         |         |         |        V|
   23+25       2.7478      0.04  Q         |         |         |        V|
   23+30       2.7481      0.04  Q         |         |         |        V|
   23+35       2.7483      0.04  Q         |         |         |        V|
   23+40       2.7486      0.04  Q         |         |         |        V|
   23+45       2.7489      0.04  Q         |         |         |        V|
   23+50       2.7492      0.04  Q         |         |         |        V|
   23+55       2.7494      0.04  Q         |         |         |        V|
   24+ 0       2.7497      0.04  Q         |         |         |        V|
   24+ 5       2.7499      0.03  Q         |         |         |        V|
   24+10       2.7500      0.01  Q         |         |         |        V|
   24+15       2.7500      0.00  Q         |         |         |        V|
   24+20       2.7500      0.00  Q         |         |         |        V|
   24+25       2.7500      0.00  Q         |         |         |         V
-----------------------------------------------------------------------
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       U n i t   H y d r o g r a p h   A n a l y s i s

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              Study date  06/03/21 File: 19400e100y24hb24100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6310

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
19-400
EXISTING CONDITION
100-YEAR, 24-HOUR
AREA B
--------------------------------------------------------------------
Drainage Area =       1.13(Ac.)  =      0.002 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       1.13(Ac.)  =      0.002 Sq. Mi.
Length along longest watercourse =     420.00(Ft.)
Length along longest watercourse measured to centroid =     172.00(Ft.)
Length along longest watercourse =      0.080 Mi.
Length along longest watercourse measured to centroid =      0.033 Mi.
Difference in elevation =      12.00(Ft.)
Slope along watercourse =    150.8571 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time =    0.029 Hr.
Lag time =     1.73 Min.
25% of lag time =     0.43 Min.
40% of lag time =     0.69 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        1.13           2.50                  2.84

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        1.13           6.00                  6.80

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    2.500(In)
Area Averaged 100-Year Rainfall =    6.000(In)

Point rain (area averaged) =    6.000(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    6.000(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     1.134           70.00         0.000
 Total Area Entered =      1.13(Ac.)
```

```
        RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
        AMC2 AMC-3     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
        70.0  85.0      0.187     0.000        0.187       1.000      0.187
                                                           Sum (F) =   0.187
        Area averaged mean soil loss (F) (In/Hr) =  0.187
        Minimum soil loss rate ((In/Hr)) =  0.094
        (for 24 hour storm duration)
        Soil low loss rate (decimal) =   0.900
        ---------------------------------------------------------------------

                       U n i t  H y d r o g r a p h
                              VALLEY S-Curve
        --------------------------------------------------------------------
                       Unit Hydrograph Data
        ---------------------------------------------------------------------
        Unit time period   Time % of lag  Distribution   Unit Hydrograph
            (hrs)                            Graph %           (CFS)
        ---------------------------------------------------------------------
            1   0.083        288.589         55.478             0.634
            2   0.167        577.178         37.766             0.432
            3   0.250        865.767          6.757             0.077
                                       Sum = 100.000   Sum=       1.143
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   |   Low         (In/Hr)
   1   0.08     0.07      0.048       (  0.331)       0.043        0.005
   2   0.17     0.07      0.048       (  0.330)       0.043        0.005
   3   0.25     0.07      0.048       (  0.329)       0.043        0.005
   4   0.33     0.10      0.072       (  0.328)       0.065        0.007
   5   0.42     0.10      0.072       (  0.326)       0.065        0.007
   6   0.50     0.10      0.072       (  0.325)       0.065        0.007
   7   0.58     0.10      0.072       (  0.324)       0.065        0.007
   8   0.67     0.10      0.072       (  0.323)       0.065        0.007
   9   0.75     0.10      0.072       (  0.321)       0.065        0.007
  10   0.83     0.13      0.096       (  0.320)       0.086        0.010
  11   0.92     0.13      0.096       (  0.319)       0.086        0.010
  12   1.00     0.13      0.096       (  0.318)       0.086        0.010
  13   1.08     0.10      0.072       (  0.316)       0.065        0.007
  14   1.17     0.10      0.072       (  0.315)       0.065        0.007
  15   1.25     0.10      0.072       (  0.314)       0.065        0.007
  16   1.33     0.10      0.072       (  0.313)       0.065        0.007
  17   1.42     0.10      0.072       (  0.311)       0.065        0.007
  18   1.50     0.10      0.072       (  0.310)       0.065        0.007
  19   1.58     0.10      0.072       (  0.309)       0.065        0.007
  20   1.67     0.10      0.072       (  0.308)       0.065        0.007
  21   1.75     0.10      0.072       (  0.306)       0.065        0.007
  22   1.83     0.13      0.096       (  0.305)       0.086        0.010
  23   1.92     0.13      0.096       (  0.304)       0.086        0.010
  24   2.00     0.13      0.096       (  0.303)       0.086        0.010
  25   2.08     0.13      0.096       (  0.301)       0.086        0.010
  26   2.17     0.13      0.096       (  0.300)       0.086        0.010
  27   2.25     0.13      0.096       (  0.299)       0.086        0.010
  28   2.33     0.13      0.096       (  0.298)       0.086        0.010
  29   2.42     0.13      0.096       (  0.297)       0.086        0.010
  30   2.50     0.13      0.096       (  0.295)       0.086        0.010
  31   2.58     0.17      0.120       (  0.294)       0.108        0.012
  32   2.67     0.17      0.120       (  0.293)       0.108        0.012
  33   2.75     0.17      0.120       (  0.292)       0.108        0.012
  34   2.83     0.17      0.120       (  0.291)       0.108        0.012
  35   2.92     0.17      0.120       (  0.289)       0.108        0.012
  36   3.00     0.17      0.120       (  0.288)       0.108        0.012
  37   3.08     0.17      0.120       (  0.287)       0.108        0.012
  38   3.17     0.17      0.120       (  0.286)       0.108        0.012
  39   3.25     0.17      0.120       (  0.285)       0.108        0.012
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 40   3.33     0.17      0.120       (  0.283)       0.108        0.012
 41   3.42     0.17      0.120       (  0.282)       0.108        0.012
 42   3.50     0.17      0.120       (  0.281)       0.108        0.012
 43   3.58     0.17      0.120       (  0.280)       0.108        0.012
 44   3.67     0.17      0.120       (  0.279)       0.108        0.012
 45   3.75     0.17      0.120       (  0.277)       0.108        0.012
 46   3.83     0.20      0.144       (  0.276)       0.130        0.014
 47   3.92     0.20      0.144       (  0.275)       0.130        0.014
 48   4.00     0.20      0.144       (  0.274)       0.130        0.014
 49   4.08     0.20      0.144       (  0.273)       0.130        0.014
 50   4.17     0.20      0.144       (  0.272)       0.130        0.014
 51   4.25     0.20      0.144       (  0.270)       0.130        0.014
 52   4.33     0.23      0.168       (  0.269)       0.151        0.017
 53   4.42     0.23      0.168       (  0.268)       0.151        0.017
 54   4.50     0.23      0.168       (  0.267)       0.151        0.017
 55   4.58     0.23      0.168       (  0.266)       0.151        0.017
 56   4.67     0.23      0.168       (  0.265)       0.151        0.017
 57   4.75     0.23      0.168       (  0.264)       0.151        0.017
 58   4.83     0.27      0.192       (  0.262)       0.173        0.019
 59   4.92     0.27      0.192       (  0.261)       0.173        0.019
 60   5.00     0.27      0.192       (  0.260)       0.173        0.019
 61   5.08     0.20      0.144       (  0.259)       0.130        0.014
 62   5.17     0.20      0.144       (  0.258)       0.130        0.014
 63   5.25     0.20      0.144       (  0.257)       0.130        0.014
 64   5.33     0.23      0.168       (  0.256)       0.151        0.017
 65   5.42     0.23      0.168       (  0.255)       0.151        0.017
 66   5.50     0.23      0.168       (  0.253)       0.151        0.017
 67   5.58     0.27      0.192       (  0.252)       0.173        0.019
 68   5.67     0.27      0.192       (  0.251)       0.173        0.019
 69   5.75     0.27      0.192       (  0.250)       0.173        0.019
 70   5.83     0.27      0.192       (  0.249)       0.173        0.019
 71   5.92     0.27      0.192       (  0.248)       0.173        0.019
 72   6.00     0.27      0.192       (  0.247)       0.173        0.019
 73   6.08     0.30      0.216       (  0.246)       0.194        0.022
 74   6.17     0.30      0.216       (  0.245)       0.194        0.022
 75   6.25     0.30      0.216       (  0.244)       0.194        0.022
 76   6.33     0.30      0.216       (  0.242)       0.194        0.022
 77   6.42     0.30      0.216       (  0.241)       0.194        0.022
 78   6.50     0.30      0.216       (  0.240)       0.194        0.022
 79   6.58     0.33      0.240       (  0.239)       0.216        0.024
 80   6.67     0.33      0.240       (  0.238)       0.216        0.024
 81   6.75     0.33      0.240       (  0.237)       0.216        0.024
 82   6.83     0.33      0.240       (  0.236)       0.216        0.024
 83   6.92     0.33      0.240       (  0.235)       0.216        0.024
 84   7.00     0.33      0.240       (  0.234)       0.216        0.024
 85   7.08     0.33      0.240       (  0.233)       0.216        0.024
 86   7.17     0.33      0.240       (  0.232)       0.216        0.024
 87   7.25     0.33      0.240       (  0.231)       0.216        0.024
 88   7.33     0.37      0.264          0.230    (  0.238)       0.034
 89   7.42     0.37      0.264          0.229    (  0.238)       0.035
 90   7.50     0.37      0.264          0.228    (  0.238)       0.036
 91   7.58     0.40      0.288          0.226    (  0.259)       0.062
 92   7.67     0.40      0.288          0.225    (  0.259)       0.063
 93   7.75     0.40      0.288          0.224    (  0.259)       0.064
 94   7.83     0.43      0.312          0.223    (  0.281)       0.089
 95   7.92     0.43      0.312          0.222    (  0.281)       0.090
 96   8.00     0.43      0.312          0.221    (  0.281)       0.091
 97   8.08     0.50      0.360          0.220    (  0.324)       0.140
 98   8.17     0.50      0.360          0.219    (  0.324)       0.141
 99   8.25     0.50      0.360          0.218    (  0.324)       0.142
100   8.33     0.50      0.360          0.217    (  0.324)       0.143
101   8.42     0.50      0.360          0.216    (  0.324)       0.144
102   8.50     0.50      0.360          0.215    (  0.324)       0.145
103   8.58     0.53      0.384          0.214    (  0.346)       0.170
104   8.67     0.53      0.384          0.213    (  0.346)       0.171
105   8.75     0.53      0.384          0.212    (  0.346)       0.172
106   8.83     0.57      0.408          0.211    (  0.367)       0.197
107   8.92     0.57      0.408          0.210    (  0.367)       0.198
108   9.00     0.57      0.408          0.209    (  0.367)       0.199
109   9.08     0.63      0.456          0.208    (  0.410)       0.248
110   9.17     0.63      0.456          0.207    (  0.410)       0.249
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111   9.25     0.63      0.456          0.206    (  0.410)        0.250
112   9.33     0.67      0.480          0.205    (  0.432)        0.275
113   9.42     0.67      0.480          0.204    (  0.432)        0.276
114   9.50     0.67      0.480          0.203    (  0.432)        0.277
115   9.58     0.70      0.504          0.202    (  0.454)        0.302
116   9.67     0.70      0.504          0.201    (  0.454)        0.303
117   9.75     0.70      0.504          0.200    (  0.454)        0.304
118   9.83     0.73      0.528          0.199    (  0.475)        0.329
119   9.92     0.73      0.528          0.198    (  0.475)        0.330
120  10.00     0.73      0.528          0.197    (  0.475)        0.331
121  10.08     0.50      0.360          0.197    (  0.324)        0.163
122  10.17     0.50      0.360          0.196    (  0.324)        0.164
123  10.25     0.50      0.360          0.195    (  0.324)        0.165
124  10.33     0.50      0.360          0.194    (  0.324)        0.166
125  10.42     0.50      0.360          0.193    (  0.324)        0.167
126  10.50     0.50      0.360          0.192    (  0.324)        0.168
127  10.58     0.67      0.480          0.191    (  0.432)        0.289
128  10.67     0.67      0.480          0.190    (  0.432)        0.290
129  10.75     0.67      0.480          0.189    (  0.432)        0.291
130  10.83     0.67      0.480          0.188    (  0.432)        0.292
131  10.92     0.67      0.480          0.187    (  0.432)        0.293
132  11.00     0.67      0.480          0.186    (  0.432)        0.294
133  11.08     0.63      0.456          0.185    (  0.410)        0.271
134  11.17     0.63      0.456          0.184    (  0.410)        0.272
135  11.25     0.63      0.456          0.183    (  0.410)        0.273
136  11.33     0.63      0.456          0.183    (  0.410)        0.273
137  11.42     0.63      0.456          0.182    (  0.410)        0.274
138  11.50     0.63      0.456          0.181    (  0.410)        0.275
139  11.58     0.57      0.408          0.180    (  0.367)        0.228
140  11.67     0.57      0.408          0.179    (  0.367)        0.229
141  11.75     0.57      0.408          0.178    (  0.367)        0.230
142  11.83     0.60      0.432          0.177    (  0.389)        0.255
143  11.92     0.60      0.432          0.176    (  0.389)        0.256
144  12.00     0.60      0.432          0.175    (  0.389)        0.257
145  12.08     0.83      0.600          0.175    (  0.540)        0.425
146  12.17     0.83      0.600          0.174    (  0.540)        0.426
147  12.25     0.83      0.600          0.173    (  0.540)        0.427
148  12.33     0.87      0.624          0.172    (  0.562)        0.452
149  12.42     0.87      0.624          0.171    (  0.562)        0.453
150  12.50     0.87      0.624          0.170    (  0.562)        0.454
151  12.58     0.93      0.672          0.169    (  0.605)        0.503
152  12.67     0.93      0.672          0.169    (  0.605)        0.503
153  12.75     0.93      0.672          0.168    (  0.605)        0.504
154  12.83     0.97      0.696          0.167    (  0.626)        0.529
155  12.92     0.97      0.696          0.166    (  0.626)        0.530
156  13.00     0.97      0.696          0.165    (  0.626)        0.531
157  13.08     1.13      0.816          0.164    (  0.734)        0.652
158  13.17     1.13      0.816          0.163    (  0.734)        0.653
159  13.25     1.13      0.816          0.163    (  0.734)        0.653
160  13.33     1.13      0.816          0.162    (  0.734)        0.654
161  13.42     1.13      0.816          0.161    (  0.734)        0.655
162  13.50     1.13      0.816          0.160    (  0.734)        0.656
163  13.58     0.77      0.552          0.159    (  0.497)        0.393
164  13.67     0.77      0.552          0.159    (  0.497)        0.393
165  13.75     0.77      0.552          0.158    (  0.497)        0.394
166  13.83     0.77      0.552          0.157    (  0.497)        0.395
167  13.92     0.77      0.552          0.156    (  0.497)        0.396
168  14.00     0.77      0.552          0.155    (  0.497)        0.397
169  14.08     0.90      0.648          0.155    (  0.583)        0.493
170  14.17     0.90      0.648          0.154    (  0.583)        0.494
171  14.25     0.90      0.648          0.153    (  0.583)        0.495
172  14.33     0.87      0.624          0.152    (  0.562)        0.472
173  14.42     0.87      0.624          0.151    (  0.562)        0.473
174  14.50     0.87      0.624          0.151    (  0.562)        0.473
175  14.58     0.87      0.624          0.150    (  0.562)        0.474
176  14.67     0.87      0.624          0.149    (  0.562)        0.475
177  14.75     0.87      0.624          0.148    (  0.562)        0.476
178  14.83     0.83      0.600          0.148    (  0.540)        0.452
179  14.92     0.83      0.600          0.147    (  0.540)        0.453
180  15.00     0.83      0.600          0.146    (  0.540)        0.454
181  15.08     0.80      0.576          0.145    (  0.518)        0.431
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182  15.17     0.80      0.576         0.145    (  0.518)        0.431
183  15.25     0.80      0.576         0.144    (  0.518)        0.432
184  15.33     0.77      0.552         0.143    (  0.497)        0.409
185  15.42     0.77      0.552         0.142    (  0.497)        0.410
186  15.50     0.77      0.552         0.142    (  0.497)        0.410
187  15.58     0.63      0.456         0.141    (  0.410)        0.315
188  15.67     0.63      0.456         0.140    (  0.410)        0.316
189  15.75     0.63      0.456         0.139    (  0.410)        0.317
190  15.83     0.63      0.456         0.139    (  0.410)        0.317
191  15.92     0.63      0.456         0.138    (  0.410)        0.318
192  16.00     0.63      0.456         0.137    (  0.410)        0.319
193  16.08     0.13      0.096       (  0.137)      0.086        0.010
194  16.17     0.13      0.096       (  0.136)      0.086        0.010
195  16.25     0.13      0.096       (  0.135)      0.086        0.010
196  16.33     0.13      0.096       (  0.135)      0.086        0.010
197  16.42     0.13      0.096       (  0.134)      0.086        0.010
198  16.50     0.13      0.096       (  0.133)      0.086        0.010
199  16.58     0.10      0.072       (  0.132)      0.065        0.007
200  16.67     0.10      0.072       (  0.132)      0.065        0.007
201  16.75     0.10      0.072       (  0.131)      0.065        0.007
202  16.83     0.10      0.072       (  0.130)      0.065        0.007
203  16.92     0.10      0.072       (  0.130)      0.065        0.007
204  17.00     0.10      0.072       (  0.129)      0.065        0.007
205  17.08     0.17      0.120       (  0.129)      0.108        0.012
206  17.17     0.17      0.120       (  0.128)      0.108        0.012
207  17.25     0.17      0.120       (  0.127)      0.108        0.012
208  17.33     0.17      0.120       (  0.127)      0.108        0.012
209  17.42     0.17      0.120       (  0.126)      0.108        0.012
210  17.50     0.17      0.120       (  0.125)      0.108        0.012
211  17.58     0.17      0.120       (  0.125)      0.108        0.012
212  17.67     0.17      0.120       (  0.124)      0.108        0.012
213  17.75     0.17      0.120       (  0.123)      0.108        0.012
214  17.83     0.13      0.096       (  0.123)      0.086        0.010
215  17.92     0.13      0.096       (  0.122)      0.086        0.010
216  18.00     0.13      0.096       (  0.122)      0.086        0.010
217  18.08     0.13      0.096       (  0.121)      0.086        0.010
218  18.17     0.13      0.096       (  0.120)      0.086        0.010
219  18.25     0.13      0.096       (  0.120)      0.086        0.010
220  18.33     0.13      0.096       (  0.119)      0.086        0.010
221  18.42     0.13      0.096       (  0.119)      0.086        0.010
222  18.50     0.13      0.096       (  0.118)      0.086        0.010
223  18.58     0.10      0.072       (  0.118)      0.065        0.007
224  18.67     0.10      0.072       (  0.117)      0.065        0.007
225  18.75     0.10      0.072       (  0.116)      0.065        0.007
226  18.83     0.07      0.048       (  0.116)      0.043        0.005
227  18.92     0.07      0.048       (  0.115)      0.043        0.005
228  19.00     0.07      0.048       (  0.115)      0.043        0.005
229  19.08     0.10      0.072       (  0.114)      0.065        0.007
230  19.17     0.10      0.072       (  0.114)      0.065        0.007
231  19.25     0.10      0.072       (  0.113)      0.065        0.007
232  19.33     0.13      0.096       (  0.113)      0.086        0.010
233  19.42     0.13      0.096       (  0.112)      0.086        0.010
234  19.50     0.13      0.096       (  0.112)      0.086        0.010
235  19.58     0.10      0.072       (  0.111)      0.065        0.007
236  19.67     0.10      0.072       (  0.111)      0.065        0.007
237  19.75     0.10      0.072       (  0.110)      0.065        0.007
238  19.83     0.07      0.048       (  0.110)      0.043        0.005
239  19.92     0.07      0.048       (  0.109)      0.043        0.005
240  20.00     0.07      0.048       (  0.109)      0.043        0.005
241  20.08     0.10      0.072       (  0.108)      0.065        0.007
242  20.17     0.10      0.072       (  0.108)      0.065        0.007
243  20.25     0.10      0.072       (  0.107)      0.065        0.007
244  20.33     0.10      0.072       (  0.107)      0.065        0.007
245  20.42     0.10      0.072       (  0.106)      0.065        0.007
246  20.50     0.10      0.072       (  0.106)      0.065        0.007
247  20.58     0.10      0.072       (  0.105)      0.065        0.007
248  20.67     0.10      0.072       (  0.105)      0.065        0.007
249  20.75     0.10      0.072       (  0.104)      0.065        0.007
250  20.83     0.07      0.048       (  0.104)      0.043        0.005
251  20.92     0.07      0.048       (  0.104)      0.043        0.005
252  21.00     0.07      0.048       (  0.103)      0.043        0.005
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253  21.08     0.10      0.072       (  0.103)      0.065        0.007
254  21.17     0.10      0.072       (  0.102)      0.065        0.007
255  21.25     0.10      0.072       (  0.102)      0.065        0.007
256  21.33     0.07      0.048       (  0.102)      0.043        0.005
257  21.42     0.07      0.048       (  0.101)      0.043        0.005
258  21.50     0.07      0.048       (  0.101)      0.043        0.005
259  21.58     0.10      0.072       (  0.100)      0.065        0.007
260  21.67     0.10      0.072       (  0.100)      0.065        0.007
261  21.75     0.10      0.072       (  0.100)      0.065        0.007
262  21.83     0.07      0.048       (  0.099)      0.043        0.005
263  21.92     0.07      0.048       (  0.099)      0.043        0.005
264  22.00     0.07      0.048       (  0.099)      0.043        0.005
265  22.08     0.10      0.072       (  0.098)      0.065        0.007
266  22.17     0.10      0.072       (  0.098)      0.065        0.007
267  22.25     0.10      0.072       (  0.098)      0.065        0.007
268  22.33     0.07      0.048       (  0.097)      0.043        0.005
269  22.42     0.07      0.048       (  0.097)      0.043        0.005
270  22.50     0.07      0.048       (  0.097)      0.043        0.005
271  22.58     0.07      0.048       (  0.097)      0.043        0.005
272  22.67     0.07      0.048       (  0.096)      0.043        0.005
273  22.75     0.07      0.048       (  0.096)      0.043        0.005
274  22.83     0.07      0.048       (  0.096)      0.043        0.005
275  22.92     0.07      0.048       (  0.096)      0.043        0.005
276  23.00     0.07      0.048       (  0.095)      0.043        0.005
277  23.08     0.07      0.048       (  0.095)      0.043        0.005
278  23.17     0.07      0.048       (  0.095)      0.043        0.005
279  23.25     0.07      0.048       (  0.095)      0.043        0.005
280  23.33     0.07      0.048       (  0.095)      0.043        0.005
281  23.42     0.07      0.048       (  0.094)      0.043        0.005
282  23.50     0.07      0.048       (  0.094)      0.043        0.005
283  23.58     0.07      0.048       (  0.094)      0.043        0.005
284  23.67     0.07      0.048       (  0.094)      0.043        0.005
285  23.75     0.07      0.048       (  0.094)      0.043        0.005
286  23.83     0.07      0.048       (  0.094)      0.043        0.005
287  23.92     0.07      0.048       (  0.094)      0.043        0.005
288  24.00     0.07      0.048       (  0.094)      0.043        0.005
               (Loss Rate Not Used)
    Sum =     100.0                                   Sum =    35.9
      Flood volume = Effective rainfall      2.99(In)
       times area       1.1(Ac.)/[(In)/(Ft.)] =       0.3(Ac.Ft)
      Total soil loss =      3.01(In)
      Total soil loss =     0.284(Ac.Ft)
      Total rainfall =      6.00(In)
      Flood volume =       12306.4 Cubic Feet
      Total soil loss =       12392.1 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.749(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
   0+ 5       0.0000      0.00  Q         |         |         |         |
   0+10       0.0001      0.01  Q         |         |         |         |
   0+15       0.0001      0.01  Q         |         |         |         |
   0+20       0.0001      0.01  Q         |         |         |         |
   0+25       0.0002      0.01  Q         |         |         |         |
   0+30       0.0003      0.01  Q         |         |         |         |
   0+35       0.0003      0.01  Q         |         |         |         |
   0+40       0.0004      0.01  Q         |         |         |         |
   0+45       0.0004      0.01  Q         |         |         |         |
   0+50       0.0005      0.01  Q         |         |         |         |
   0+55       0.0006      0.01  Q         |         |         |         |
   1+ 0       0.0006      0.01  Q         |         |         |         |
   1+ 5       0.0007      0.01  Q         |         |         |         |
   1+10       0.0008      0.01  Q         |         |         |         |
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 1+15        0.0008       0.01  Q          |         |         |         |
 1+20        0.0009       0.01  Q          |         |         |         |
 1+25        0.0009       0.01  Q          |         |         |         |
 1+30        0.0010       0.01  Q          |         |         |         |
 1+35        0.0010       0.01  Q          |         |         |         |
 1+40        0.0011       0.01  Q          |         |         |         |
 1+45        0.0012       0.01  Q          |         |         |         |
 1+50        0.0012       0.01  Q          |         |         |         |
 1+55        0.0013       0.01  Q          |         |         |         |
 2+ 0        0.0014       0.01  Q          |         |         |         |
 2+ 5        0.0015       0.01  Q          |         |         |         |
 2+10        0.0015       0.01  Q          |         |         |         |
 2+15        0.0016       0.01  Q          |         |         |         |
 2+20        0.0017       0.01  Q          |         |         |         |
 2+25        0.0018       0.01  Q          |         |         |         |
 2+30        0.0018       0.01  Q          |         |         |         |
 2+35        0.0019       0.01  Q          |         |         |         |
 2+40        0.0020       0.01  Q          |         |         |         |
 2+45        0.0021       0.01  Q          |         |         |         |
 2+50        0.0022       0.01  Q          |         |         |         |
 2+55        0.0023       0.01  Q          |         |         |         |
 3+ 0        0.0024       0.01  Q          |         |         |         |
 3+ 5        0.0025       0.01  Q          |         |         |         |
 3+10        0.0026       0.01  Q          |         |         |         |
 3+15        0.0027       0.01  Q          |         |         |         |
 3+20        0.0028       0.01  Q          |         |         |         |
 3+25        0.0029       0.01  Q          |         |         |         |
 3+30        0.0030       0.01  Q          |         |         |         |
 3+35        0.0031       0.01  Q          |         |         |         |
 3+40        0.0031       0.01  Q          |         |         |         |
 3+45        0.0032       0.01  Q          |         |         |         |
 3+50        0.0033       0.02  Q          |         |         |         |
 3+55        0.0035       0.02  Q          |         |         |         |
 4+ 0        0.0036       0.02  Q          |         |         |         |
 4+ 5        0.0037       0.02  Q          |         |         |         |
 4+10        0.0038       0.02  Q          |         |         |         |
 4+15        0.0039       0.02  Q          |         |         |         |
 4+20        0.0040       0.02  Q          |         |         |         |
 4+25        0.0042       0.02  Q          |         |         |         |
 4+30        0.0043       0.02  Q          |         |         |         |
 4+35        0.0044       0.02  Q          |         |         |         |
 4+40        0.0046       0.02  Q          |         |         |         |
 4+45        0.0047       0.02  Q          |         |         |         |
 4+50        0.0048       0.02  Q          |         |         |         |
 4+55        0.0050       0.02  Q          |         |         |         |
 5+ 0        0.0051       0.02  Q          |         |         |         |
 5+ 5        0.0053       0.02  Q          |         |         |         |
 5+10        0.0054       0.02  Q          |         |         |         |
 5+15        0.0055       0.02  Q          |         |         |         |
 5+20        0.0056       0.02  Q          |         |         |         |
 5+25        0.0058       0.02  Q          |         |         |         |
 5+30        0.0059       0.02  Q          |         |         |         |
 5+35        0.0060       0.02  Q          |         |         |         |
 5+40        0.0062       0.02  Q          |         |         |         |
 5+45        0.0063       0.02  Q          |         |         |         |
 5+50        0.0065       0.02  Q          |         |         |         |
 5+55        0.0066       0.02  Q          |         |         |         |
 6+ 0        0.0068       0.02  Q          |         |         |         |
 6+ 5        0.0069       0.02  Q          |         |         |         |
 6+10        0.0071       0.02  QV         |         |         |         |
 6+15        0.0073       0.02  QV         |         |         |         |
 6+20        0.0075       0.02  QV         |         |         |         |
 6+25        0.0076       0.02  QV         |         |         |         |
 6+30        0.0078       0.02  QV         |         |         |         |
 6+35        0.0080       0.03  QV         |         |         |         |
 6+40        0.0082       0.03  QV         |         |         |         |
 6+45        0.0084       0.03  QV         |         |         |         |
 6+50        0.0085       0.03  QV         |         |         |         |
 6+55        0.0087       0.03  QV         |         |         |         |
 7+ 0        0.0089       0.03  QV         |         |         |         |
 7+ 5        0.0091       0.03  QV         |         |         |         |
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 7+10       0.0093      0.03  QV        |         |         |         |
 7+15       0.0095      0.03  QV        |         |         |         |
 7+20       0.0097      0.03  QV        |         |         |         |
 7+25       0.0100      0.04  QV        |         |         |         |
 7+30       0.0103      0.04  QV        |         |         |         |
 7+35       0.0107      0.06  QV        |         |         |         |
 7+40       0.0111      0.07  QV        |         |         |         |
 7+45       0.0116      0.07  QV        |         |         |         |
 7+50       0.0123      0.09  QV        |         |         |         |
 7+55       0.0129      0.10  QV        |         |         |         |
 8+ 0       0.0136      0.10  QV        |         |         |         |
 8+ 5       0.0146      0.13  Q V       |         |         |         |
 8+10       0.0157      0.16  Q V       |         |         |         |
 8+15       0.0168      0.16  Q V       |         |         |         |
 8+20       0.0179      0.16  Q V       |         |         |         |
 8+25       0.0190      0.16  Q V       |         |         |         |
 8+30       0.0202      0.16  Q V       |         |         |         |
 8+35       0.0214      0.18  Q  V      |         |         |         |
 8+40       0.0227      0.19  Q  V      |         |         |         |
 8+45       0.0241      0.20  Q  V      |         |         |         |
 8+50       0.0255      0.21  Q  V      |         |         |         |
 8+55       0.0271      0.22  Q  V      |         |         |         |
 9+ 0       0.0286      0.23  Q   V     |         |         |         |
 9+ 5       0.0304      0.26  |Q  V     |         |         |         |
 9+10       0.0324      0.28  |Q  V     |         |         |         |
 9+15       0.0343      0.29  |Q  V     |         |         |         |
 9+20       0.0364      0.30  |Q   V    |         |         |         |
 9+25       0.0385      0.31  |Q   V    |         |         |         |
 9+30       0.0407      0.32  |Q   V    |         |         |         |
 9+35       0.0430      0.33  |Q    V   |         |         |         |
 9+40       0.0454      0.34  |Q    V   |         |         |         |
 9+45       0.0478      0.35  |Q    V   |         |         |         |
 9+50       0.0503      0.36  |Q     V  |         |         |         |
 9+55       0.0528      0.37  |Q     V  |         |         |         |
10+ 0       0.0554      0.38  |Q     V  |         |         |         |
10+ 5       0.0573      0.27  |Q      V |         |         |         |
10+10       0.0587      0.20  Q       V |         |         |         |
10+15       0.0600      0.19  Q       V |         |         |         |
10+20       0.0613      0.19  Q       V |         |         |         |
10+25       0.0626      0.19  Q       V |         |         |         |
10+30       0.0639      0.19  Q        V|         |         |         |
10+35       0.0658      0.27  |Q       V|         |         |         |
10+40       0.0680      0.32  |Q       V|         |         |         |
10+45       0.0703      0.33  |Q       V|         |         |         |
10+50       0.0726      0.33  |Q        V         |         |         |
10+55       0.0749      0.33  |Q        V         |         |         |
11+ 0       0.0772      0.34  |Q        V         |         |         |
11+ 5       0.0794      0.32  |Q        |V        |         |         |
11+10       0.0816      0.31  |Q        |V        |         |         |
11+15       0.0837      0.31  |Q        |V        |         |         |
11+20       0.0859      0.31  |Q        | V       |         |         |
11+25       0.0880      0.31  |Q        | V       |         |         |
11+30       0.0902      0.31  |Q        | V       |         |         |
11+35       0.0921      0.28  |Q        |  V      |         |         |
11+40       0.0940      0.27  |Q        |  V      |         |         |
11+45       0.0958      0.26  |Q        |  V      |         |         |
11+50       0.0977      0.28  |Q        |  V      |         |         |
11+55       0.0997      0.29  |Q        |   V     |         |         |
12+ 0       0.1017      0.29  |Q        |   V     |         |         |
12+ 5       0.1045      0.40  |Q        |   V     |         |         |
12+10       0.1077      0.47  |Q        |    V    |         |         |
12+15       0.1111      0.49  |Q        |    V    |         |         |
12+20       0.1146      0.50  | Q       |     V   |         |         |
12+25       0.1181      0.52  | Q       |     V   |         |         |
12+30       0.1217      0.52  | Q       |      V  |         |         |
12+35       0.1255      0.55  | Q       |      V  |         |         |
12+40       0.1294      0.57  | Q       |       V |         |         |
12+45       0.1334      0.58  | Q       |       V |         |         |
12+50       0.1374      0.59  | Q       |        V|         |         |
12+55       0.1416      0.60  | Q       |         V         |         |
13+ 0       0.1458      0.61  | Q       |         V         |         |
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13+ 5       0.1505      0.68  | Q       |         |V        |         |
13+10       0.1556      0.74  | Q       |         | V       |         |
13+15       0.1607      0.75  | Q       |         | V       |         |
13+20       0.1658      0.75  | Q       |         |  V      |         |
13+25       0.1710      0.75  | Q       |         |   V     |         |
13+30       0.1762      0.75  | Q       |         |   V     |         |
13+35       0.1802      0.58  | Q       |         |    V    |         |
13+40       0.1834      0.47  |Q        |         |    V    |         |
13+45       0.1865      0.45  |Q        |         |     V   |         |
13+50       0.1896      0.45  |Q        |         |     V   |         |
13+55       0.1927      0.45  |Q        |         |      V  |         |
14+ 0       0.1959      0.45  |Q        |         |      V  |         |
14+ 5       0.1994      0.51  | Q       |         |       V |         |
14+10       0.2032      0.56  | Q       |         |       V |         |
14+15       0.2071      0.57  | Q       |         |        V|         |
14+20       0.2109      0.55  | Q       |         |        V|         |
14+25       0.2147      0.54  | Q       |         |         V         |
14+30       0.2184      0.54  | Q       |         |         V         |
14+35       0.2221      0.54  | Q       |         |         |V        |
14+40       0.2259      0.54  | Q       |         |         |V        |
14+45       0.2296      0.54  | Q       |         |         | V       |
14+50       0.2332      0.53  | Q       |         |         |  V      |
14+55       0.2368      0.52  | Q       |         |         |  V      |
15+ 0       0.2404      0.52  | Q       |         |         |   V     |
15+ 5       0.2439      0.50  | Q       |         |         |   V     |
15+10       0.2473      0.49  |Q        |         |         |    V    |
15+15       0.2507      0.49  |Q        |         |         |    V    |
15+20       0.2540      0.48  |Q        |         |         |    V    |
15+25       0.2572      0.47  |Q        |         |         |     V   |
15+30       0.2604      0.47  |Q        |         |         |     V   |
15+35       0.2633      0.41  |Q        |         |         |      V  |
15+40       0.2658      0.37  |Q        |         |         |      V  |
15+45       0.2683      0.36  |Q        |         |         |      V  |
15+50       0.2708      0.36  |Q        |         |         |       V |
15+55       0.2733      0.36  |Q        |         |         |       V |
16+ 0       0.2758      0.36  |Q        |         |         |        V|
16+ 5       0.2769      0.17  Q         |         |         |        V|
16+10       0.2772      0.03  Q         |         |         |        V|
16+15       0.2773      0.01  Q         |         |         |        V|
16+20       0.2773      0.01  Q         |         |         |        V|
16+25       0.2774      0.01  Q         |         |         |        V|
16+30       0.2775      0.01  Q         |         |         |        V|
16+35       0.2776      0.01  Q         |         |         |        V|
16+40       0.2776      0.01  Q         |         |         |        V|
16+45       0.2777      0.01  Q         |         |         |        V|
16+50       0.2777      0.01  Q         |         |         |        V|
16+55       0.2778      0.01  Q         |         |         |        V|
17+ 0       0.2778      0.01  Q         |         |         |        V|
17+ 5       0.2779      0.01  Q         |         |         |        V|
17+10       0.2780      0.01  Q         |         |         |        V|
17+15       0.2781      0.01  Q         |         |         |        V|
17+20       0.2782      0.01  Q         |         |         |        V|
17+25       0.2783      0.01  Q         |         |         |        V|
17+30       0.2784      0.01  Q         |         |         |        V|
17+35       0.2785      0.01  Q         |         |         |        V|
17+40       0.2786      0.01  Q         |         |         |        V|
17+45       0.2787      0.01  Q         |         |         |        V|
17+50       0.2788      0.01  Q         |         |         |        V|
17+55       0.2788      0.01  Q         |         |         |        V|
18+ 0       0.2789      0.01  Q         |         |         |        V|
18+ 5       0.2790      0.01  Q         |         |         |        V|
18+10       0.2791      0.01  Q         |         |         |        V|
18+15       0.2791      0.01  Q         |         |         |        V|
18+20       0.2792      0.01  Q         |         |         |        V|
18+25       0.2793      0.01  Q         |         |         |        V|
18+30       0.2794      0.01  Q         |         |         |        V|
18+35       0.2794      0.01  Q         |         |         |        V|
18+40       0.2795      0.01  Q         |         |         |        V|
18+45       0.2795      0.01  Q         |         |         |        V|
18+50       0.2796      0.01  Q         |         |         |        V|
18+55       0.2796      0.01  Q         |         |         |        V|
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   19+ 0        0.2797      0.01  Q          |          |          |        V|
   19+ 5        0.2797      0.01  Q          |          |          |        V|
   19+10        0.2798      0.01  Q          |          |          |        V|
   19+15        0.2798      0.01  Q          |          |          |        V|
   19+20        0.2799      0.01  Q          |          |          |        V|
   19+25        0.2800      0.01  Q          |          |          |        V|
   19+30        0.2800      0.01  Q          |          |          |        V|
   19+35        0.2801      0.01  Q          |          |          |        V|
   19+40        0.2802      0.01  Q          |          |          |        V|
   19+45        0.2802      0.01  Q          |          |          |        V|
   19+50        0.2803      0.01  Q          |          |          |        V|
   19+55        0.2803      0.01  Q          |          |          |        V|
   20+ 0        0.2803      0.01  Q          |          |          |        V|
   20+ 5        0.2804      0.01  Q          |          |          |        V|
   20+10        0.2804      0.01  Q          |          |          |        V|
   20+15        0.2805      0.01  Q          |          |          |        V|
   20+20        0.2806      0.01  Q          |          |          |        V|
   20+25        0.2806      0.01  Q          |          |          |        V|
   20+30        0.2807      0.01  Q          |          |          |        V|
   20+35        0.2807      0.01  Q          |          |          |        V|
   20+40        0.2808      0.01  Q          |          |          |        V|
   20+45        0.2808      0.01  Q          |          |          |        V|
   20+50        0.2809      0.01  Q          |          |          |        V|
   20+55        0.2809      0.01  Q          |          |          |        V|
   21+ 0        0.2810      0.01  Q          |          |          |        V|
   21+ 5        0.2810      0.01  Q          |          |          |        V|
   21+10        0.2811      0.01  Q          |          |          |        V|
   21+15        0.2811      0.01  Q          |          |          |        V|
   21+20        0.2812      0.01  Q          |          |          |        V|
   21+25        0.2812      0.01  Q          |          |          |        V|
   21+30        0.2812      0.01  Q          |          |          |        V|
   21+35        0.2813      0.01  Q          |          |          |        V|
   21+40        0.2814      0.01  Q          |          |          |        V|
   21+45        0.2814      0.01  Q          |          |          |        V|
   21+50        0.2815      0.01  Q          |          |          |        V|
   21+55        0.2815      0.01  Q          |          |          |        V|
   22+ 0        0.2815      0.01  Q          |          |          |        V|
   22+ 5        0.2816      0.01  Q          |          |          |        V|
   22+10        0.2816      0.01  Q          |          |          |        V|
   22+15        0.2817      0.01  Q          |          |          |        V|
   22+20        0.2817      0.01  Q          |          |          |        V|
   22+25        0.2818      0.01  Q          |          |          |        V|
   22+30        0.2818      0.01  Q          |          |          |        V|
   22+35        0.2819      0.01  Q          |          |          |        V|
   22+40        0.2819      0.01  Q          |          |          |        V|
   22+45        0.2819      0.01  Q          |          |          |        V|
   22+50        0.2820      0.01  Q          |          |          |        V|
   22+55        0.2820      0.01  Q          |          |          |        V|
   23+ 0        0.2820      0.01  Q          |          |          |        V|
   23+ 5        0.2821      0.01  Q          |          |          |        V|
   23+10        0.2821      0.01  Q          |          |          |        V|
   23+15        0.2822      0.01  Q          |          |          |        V|
   23+20        0.2822      0.01  Q          |          |          |        V|
   23+25        0.2822      0.01  Q          |          |          |        V|
   23+30        0.2823      0.01  Q          |          |          |        V|
   23+35        0.2823      0.01  Q          |          |          |        V|
   23+40        0.2823      0.01  Q          |          |          |        V|
   23+45        0.2824      0.01  Q          |          |          |        V|
   23+50        0.2824      0.01  Q          |          |          |        V|
   23+55        0.2825      0.01  Q          |          |          |        V|
   24+ 0        0.2825      0.01  Q          |          |          |        V|
   24+ 5        0.2825      0.00  Q          |          |          |        V|
   24+10        0.2825      0.00  Q          |          |          |         V
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       U n i t   H y d r o g r a p h   A n a l y s i s

       Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2012, Version 8.2
               Study date  06/04/21 File: 19400P002Y24HA242.out


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---------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6310

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
19-400
PROPOSED CONDITION
2-YEAR, 24-HOUR
AREA A
--------------------------------------------------------------------
Drainage Area =       7.25(Ac.)  =      0.011 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       7.25(Ac.)  =      0.011 Sq. Mi.
Length along longest watercourse =     352.00(Ft.)
Length along longest watercourse measured to centroid =     351.00(Ft.)
Length along longest watercourse =      0.067 Mi.
Length along longest watercourse measured to centroid =      0.066 Mi.
Difference in elevation =       7.50(Ft.)
Slope along watercourse =    112.5000 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.019 Hr.
Lag time =     1.12 Min.
25% of lag time =     0.28 Min.
40% of lag time =     0.45 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        7.25           2.50                 18.11

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        7.25           6.00                 43.47

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    2.500(In)
Area Averaged 100-Year Rainfall =    6.000(In)

Point rain (area averaged) =    2.500(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    2.500(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     7.245           69.00         0.900
 Total Area Entered =      7.25(Ac.)
```

```
       RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
       AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
       69.0  49.8      0.574     0.900        0.109       1.000      0.109
                                                         Sum (F) =   0.109
       Area averaged mean soil loss (F) (In/Hr) =  0.109
       Minimum soil loss rate ((In/Hr)) =  0.055
       (for 24 hour storm duration)
       Soil low loss rate (decimal) =   0.180
       ---------------------------------------------------------------------

                      U n i t  H y d r o g r a p h
                             VALLEY S-Curve
       --------------------------------------------------------------------
                      Unit Hydrograph Data
       ---------------------------------------------------------------------
       Unit time period   Time % of lag  Distribution   Unit Hydrograph
           (hrs)                           Graph %          (CFS)
       ---------------------------------------------------------------------
           1   0.083        445.178         67.961             4.962
           2   0.167        890.357         32.039             2.339
                                     Sum = 100.000   Sum=       7.302
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   |   Low        (In/Hr)
   1   0.08     0.07      0.020       (  0.193)       0.004        0.016
   2   0.17     0.07      0.020       (  0.193)       0.004        0.016
   3   0.25     0.07      0.020       (  0.192)       0.004        0.016
   4   0.33     0.10      0.030       (  0.191)       0.005        0.025
   5   0.42     0.10      0.030       (  0.190)       0.005        0.025
   6   0.50     0.10      0.030       (  0.190)       0.005        0.025
   7   0.58     0.10      0.030       (  0.189)       0.005        0.025
   8   0.67     0.10      0.030       (  0.188)       0.005        0.025
   9   0.75     0.10      0.030       (  0.187)       0.005        0.025
  10   0.83     0.13      0.040       (  0.187)       0.007        0.033
  11   0.92     0.13      0.040       (  0.186)       0.007        0.033
  12   1.00     0.13      0.040       (  0.185)       0.007        0.033
  13   1.08     0.10      0.030       (  0.184)       0.005        0.025
  14   1.17     0.10      0.030       (  0.184)       0.005        0.025
  15   1.25     0.10      0.030       (  0.183)       0.005        0.025
  16   1.33     0.10      0.030       (  0.182)       0.005        0.025
  17   1.42     0.10      0.030       (  0.182)       0.005        0.025
  18   1.50     0.10      0.030       (  0.181)       0.005        0.025
  19   1.58     0.10      0.030       (  0.180)       0.005        0.025
  20   1.67     0.10      0.030       (  0.179)       0.005        0.025
  21   1.75     0.10      0.030       (  0.179)       0.005        0.025
  22   1.83     0.13      0.040       (  0.178)       0.007        0.033
  23   1.92     0.13      0.040       (  0.177)       0.007        0.033
  24   2.00     0.13      0.040       (  0.176)       0.007        0.033
  25   2.08     0.13      0.040       (  0.176)       0.007        0.033
  26   2.17     0.13      0.040       (  0.175)       0.007        0.033
  27   2.25     0.13      0.040       (  0.174)       0.007        0.033
  28   2.33     0.13      0.040       (  0.174)       0.007        0.033
  29   2.42     0.13      0.040       (  0.173)       0.007        0.033
  30   2.50     0.13      0.040       (  0.172)       0.007        0.033
  31   2.58     0.17      0.050       (  0.172)       0.009        0.041
  32   2.67     0.17      0.050       (  0.171)       0.009        0.041
  33   2.75     0.17      0.050       (  0.170)       0.009        0.041
  34   2.83     0.17      0.050       (  0.169)       0.009        0.041
  35   2.92     0.17      0.050       (  0.169)       0.009        0.041
  36   3.00     0.17      0.050       (  0.168)       0.009        0.041
  37   3.08     0.17      0.050       (  0.167)       0.009        0.041
  38   3.17     0.17      0.050       (  0.167)       0.009        0.041
  39   3.25     0.17      0.050       (  0.166)       0.009        0.041
  40   3.33     0.17      0.050       (  0.165)       0.009        0.041
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 41   3.42     0.17      0.050       (  0.165)       0.009        0.041
 42   3.50     0.17      0.050       (  0.164)       0.009        0.041
 43   3.58     0.17      0.050       (  0.163)       0.009        0.041
 44   3.67     0.17      0.050       (  0.162)       0.009        0.041
 45   3.75     0.17      0.050       (  0.162)       0.009        0.041
 46   3.83     0.20      0.060       (  0.161)       0.011        0.049
 47   3.92     0.20      0.060       (  0.160)       0.011        0.049
 48   4.00     0.20      0.060       (  0.160)       0.011        0.049
 49   4.08     0.20      0.060       (  0.159)       0.011        0.049
 50   4.17     0.20      0.060       (  0.158)       0.011        0.049
 51   4.25     0.20      0.060       (  0.158)       0.011        0.049
 52   4.33     0.23      0.070       (  0.157)       0.013        0.057
 53   4.42     0.23      0.070       (  0.156)       0.013        0.057
 54   4.50     0.23      0.070       (  0.156)       0.013        0.057
 55   4.58     0.23      0.070       (  0.155)       0.013        0.057
 56   4.67     0.23      0.070       (  0.154)       0.013        0.057
 57   4.75     0.23      0.070       (  0.154)       0.013        0.057
 58   4.83     0.27      0.080       (  0.153)       0.014        0.066
 59   4.92     0.27      0.080       (  0.152)       0.014        0.066
 60   5.00     0.27      0.080       (  0.152)       0.014        0.066
 61   5.08     0.20      0.060       (  0.151)       0.011        0.049
 62   5.17     0.20      0.060       (  0.150)       0.011        0.049
 63   5.25     0.20      0.060       (  0.150)       0.011        0.049
 64   5.33     0.23      0.070       (  0.149)       0.013        0.057
 65   5.42     0.23      0.070       (  0.148)       0.013        0.057
 66   5.50     0.23      0.070       (  0.148)       0.013        0.057
 67   5.58     0.27      0.080       (  0.147)       0.014        0.066
 68   5.67     0.27      0.080       (  0.147)       0.014        0.066
 69   5.75     0.27      0.080       (  0.146)       0.014        0.066
 70   5.83     0.27      0.080       (  0.145)       0.014        0.066
 71   5.92     0.27      0.080       (  0.145)       0.014        0.066
 72   6.00     0.27      0.080       (  0.144)       0.014        0.066
 73   6.08     0.30      0.090       (  0.143)       0.016        0.074
 74   6.17     0.30      0.090       (  0.143)       0.016        0.074
 75   6.25     0.30      0.090       (  0.142)       0.016        0.074
 76   6.33     0.30      0.090       (  0.141)       0.016        0.074
 77   6.42     0.30      0.090       (  0.141)       0.016        0.074
 78   6.50     0.30      0.090       (  0.140)       0.016        0.074
 79   6.58     0.33      0.100       (  0.140)       0.018        0.082
 80   6.67     0.33      0.100       (  0.139)       0.018        0.082
 81   6.75     0.33      0.100       (  0.138)       0.018        0.082
 82   6.83     0.33      0.100       (  0.138)       0.018        0.082
 83   6.92     0.33      0.100       (  0.137)       0.018        0.082
 84   7.00     0.33      0.100       (  0.136)       0.018        0.082
 85   7.08     0.33      0.100       (  0.136)       0.018        0.082
 86   7.17     0.33      0.100       (  0.135)       0.018        0.082
 87   7.25     0.33      0.100       (  0.135)       0.018        0.082
 88   7.33     0.37      0.110       (  0.134)       0.020        0.090
 89   7.42     0.37      0.110       (  0.133)       0.020        0.090
 90   7.50     0.37      0.110       (  0.133)       0.020        0.090
 91   7.58     0.40      0.120       (  0.132)       0.022        0.098
 92   7.67     0.40      0.120       (  0.131)       0.022        0.098
 93   7.75     0.40      0.120       (  0.131)       0.022        0.098
 94   7.83     0.43      0.130       (  0.130)       0.023        0.107
 95   7.92     0.43      0.130       (  0.130)       0.023        0.107
 96   8.00     0.43      0.130       (  0.129)       0.023        0.107
 97   8.08     0.50      0.150       (  0.128)       0.027        0.123
 98   8.17     0.50      0.150       (  0.128)       0.027        0.123
 99   8.25     0.50      0.150       (  0.127)       0.027        0.123
100   8.33     0.50      0.150       (  0.127)       0.027        0.123
101   8.42     0.50      0.150       (  0.126)       0.027        0.123
102   8.50     0.50      0.150       (  0.125)       0.027        0.123
103   8.58     0.53      0.160       (  0.125)       0.029        0.131
104   8.67     0.53      0.160       (  0.124)       0.029        0.131
105   8.75     0.53      0.160       (  0.124)       0.029        0.131
106   8.83     0.57      0.170       (  0.123)       0.031        0.139
107   8.92     0.57      0.170       (  0.123)       0.031        0.139
108   9.00     0.57      0.170       (  0.122)       0.031        0.139
109   9.08     0.63      0.190       (  0.121)       0.034        0.156
110   9.17     0.63      0.190       (  0.121)       0.034        0.156
111   9.25     0.63      0.190       (  0.120)       0.034        0.156
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112   9.33     0.67      0.200       (  0.120)       0.036        0.164
113   9.42     0.67      0.200       (  0.119)       0.036        0.164
114   9.50     0.67      0.200       (  0.119)       0.036        0.164
115   9.58     0.70      0.210       (  0.118)       0.038        0.172
116   9.67     0.70      0.210       (  0.117)       0.038        0.172
117   9.75     0.70      0.210       (  0.117)       0.038        0.172
118   9.83     0.73      0.220       (  0.116)       0.040        0.180
119   9.92     0.73      0.220       (  0.116)       0.040        0.180
120  10.00     0.73      0.220       (  0.115)       0.040        0.180
121  10.08     0.50      0.150       (  0.115)       0.027        0.123
122  10.17     0.50      0.150       (  0.114)       0.027        0.123
123  10.25     0.50      0.150       (  0.113)       0.027        0.123
124  10.33     0.50      0.150       (  0.113)       0.027        0.123
125  10.42     0.50      0.150       (  0.112)       0.027        0.123
126  10.50     0.50      0.150       (  0.112)       0.027        0.123
127  10.58     0.67      0.200       (  0.111)       0.036        0.164
128  10.67     0.67      0.200       (  0.111)       0.036        0.164
129  10.75     0.67      0.200       (  0.110)       0.036        0.164
130  10.83     0.67      0.200       (  0.110)       0.036        0.164
131  10.92     0.67      0.200       (  0.109)       0.036        0.164
132  11.00     0.67      0.200       (  0.109)       0.036        0.164
133  11.08     0.63      0.190       (  0.108)       0.034        0.156
134  11.17     0.63      0.190       (  0.108)       0.034        0.156
135  11.25     0.63      0.190       (  0.107)       0.034        0.156
136  11.33     0.63      0.190       (  0.106)       0.034        0.156
137  11.42     0.63      0.190       (  0.106)       0.034        0.156
138  11.50     0.63      0.190       (  0.105)       0.034        0.156
139  11.58     0.57      0.170       (  0.105)       0.031        0.139
140  11.67     0.57      0.170       (  0.104)       0.031        0.139
141  11.75     0.57      0.170       (  0.104)       0.031        0.139
142  11.83     0.60      0.180       (  0.103)       0.032        0.148
143  11.92     0.60      0.180       (  0.103)       0.032        0.148
144  12.00     0.60      0.180       (  0.102)       0.032        0.148
145  12.08     0.83      0.250       (  0.102)       0.045        0.205
146  12.17     0.83      0.250       (  0.101)       0.045        0.205
147  12.25     0.83      0.250       (  0.101)       0.045        0.205
148  12.33     0.87      0.260       (  0.100)       0.047        0.213
149  12.42     0.87      0.260       (  0.100)       0.047        0.213
150  12.50     0.87      0.260       (  0.099)       0.047        0.213
151  12.58     0.93      0.280       (  0.099)       0.050        0.230
152  12.67     0.93      0.280       (  0.098)       0.050        0.230
153  12.75     0.93      0.280       (  0.098)       0.050        0.230
154  12.83     0.97      0.290       (  0.097)       0.052        0.238
155  12.92     0.97      0.290       (  0.097)       0.052        0.238
156  13.00     0.97      0.290       (  0.096)       0.052        0.238
157  13.08     1.13      0.340       (  0.096)       0.061        0.279
158  13.17     1.13      0.340       (  0.095)       0.061        0.279
159  13.25     1.13      0.340       (  0.095)       0.061        0.279
160  13.33     1.13      0.340       (  0.094)       0.061        0.279
161  13.42     1.13      0.340       (  0.094)       0.061        0.279
162  13.50     1.13      0.340       (  0.093)       0.061        0.279
163  13.58     0.77      0.230       (  0.093)       0.041        0.189
164  13.67     0.77      0.230       (  0.092)       0.041        0.189
165  13.75     0.77      0.230       (  0.092)       0.041        0.189
166  13.83     0.77      0.230       (  0.092)       0.041        0.189
167  13.92     0.77      0.230       (  0.091)       0.041        0.189
168  14.00     0.77      0.230       (  0.091)       0.041        0.189
169  14.08     0.90      0.270       (  0.090)       0.049        0.221
170  14.17     0.90      0.270       (  0.090)       0.049        0.221
171  14.25     0.90      0.270       (  0.089)       0.049        0.221
172  14.33     0.87      0.260       (  0.089)       0.047        0.213
173  14.42     0.87      0.260       (  0.088)       0.047        0.213
174  14.50     0.87      0.260       (  0.088)       0.047        0.213
175  14.58     0.87      0.260       (  0.087)       0.047        0.213
176  14.67     0.87      0.260       (  0.087)       0.047        0.213
177  14.75     0.87      0.260       (  0.086)       0.047        0.213
178  14.83     0.83      0.250       (  0.086)       0.045        0.205
179  14.92     0.83      0.250       (  0.086)       0.045        0.205
180  15.00     0.83      0.250       (  0.085)       0.045        0.205
181  15.08     0.80      0.240       (  0.085)       0.043        0.197
182  15.17     0.80      0.240       (  0.084)       0.043        0.197
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183  15.25     0.80      0.240       (  0.084)       0.043        0.197
184  15.33     0.77      0.230       (  0.083)       0.041        0.189
185  15.42     0.77      0.230       (  0.083)       0.041        0.189
186  15.50     0.77      0.230       (  0.083)       0.041        0.189
187  15.58     0.63      0.190       (  0.082)       0.034        0.156
188  15.67     0.63      0.190       (  0.082)       0.034        0.156
189  15.75     0.63      0.190       (  0.081)       0.034        0.156
190  15.83     0.63      0.190       (  0.081)       0.034        0.156
191  15.92     0.63      0.190       (  0.080)       0.034        0.156
192  16.00     0.63      0.190       (  0.080)       0.034        0.156
193  16.08     0.13      0.040       (  0.080)       0.007        0.033
194  16.17     0.13      0.040       (  0.079)       0.007        0.033
195  16.25     0.13      0.040       (  0.079)       0.007        0.033
196  16.33     0.13      0.040       (  0.078)       0.007        0.033
197  16.42     0.13      0.040       (  0.078)       0.007        0.033
198  16.50     0.13      0.040       (  0.078)       0.007        0.033
199  16.58     0.10      0.030       (  0.077)       0.005        0.025
200  16.67     0.10      0.030       (  0.077)       0.005        0.025
201  16.75     0.10      0.030       (  0.076)       0.005        0.025
202  16.83     0.10      0.030       (  0.076)       0.005        0.025
203  16.92     0.10      0.030       (  0.076)       0.005        0.025
204  17.00     0.10      0.030       (  0.075)       0.005        0.025
205  17.08     0.17      0.050       (  0.075)       0.009        0.041
206  17.17     0.17      0.050       (  0.075)       0.009        0.041
207  17.25     0.17      0.050       (  0.074)       0.009        0.041
208  17.33     0.17      0.050       (  0.074)       0.009        0.041
209  17.42     0.17      0.050       (  0.073)       0.009        0.041
210  17.50     0.17      0.050       (  0.073)       0.009        0.041
211  17.58     0.17      0.050       (  0.073)       0.009        0.041
212  17.67     0.17      0.050       (  0.072)       0.009        0.041
213  17.75     0.17      0.050       (  0.072)       0.009        0.041
214  17.83     0.13      0.040       (  0.072)       0.007        0.033
215  17.92     0.13      0.040       (  0.071)       0.007        0.033
216  18.00     0.13      0.040       (  0.071)       0.007        0.033
217  18.08     0.13      0.040       (  0.071)       0.007        0.033
218  18.17     0.13      0.040       (  0.070)       0.007        0.033
219  18.25     0.13      0.040       (  0.070)       0.007        0.033
220  18.33     0.13      0.040       (  0.070)       0.007        0.033
221  18.42     0.13      0.040       (  0.069)       0.007        0.033
222  18.50     0.13      0.040       (  0.069)       0.007        0.033
223  18.58     0.10      0.030       (  0.069)       0.005        0.025
224  18.67     0.10      0.030       (  0.068)       0.005        0.025
225  18.75     0.10      0.030       (  0.068)       0.005        0.025
226  18.83     0.07      0.020       (  0.068)       0.004        0.016
227  18.92     0.07      0.020       (  0.067)       0.004        0.016
228  19.00     0.07      0.020       (  0.067)       0.004        0.016
229  19.08     0.10      0.030       (  0.067)       0.005        0.025
230  19.17     0.10      0.030       (  0.066)       0.005        0.025
231  19.25     0.10      0.030       (  0.066)       0.005        0.025
232  19.33     0.13      0.040       (  0.066)       0.007        0.033
233  19.42     0.13      0.040       (  0.065)       0.007        0.033
234  19.50     0.13      0.040       (  0.065)       0.007        0.033
235  19.58     0.10      0.030       (  0.065)       0.005        0.025
236  19.67     0.10      0.030       (  0.064)       0.005        0.025
237  19.75     0.10      0.030       (  0.064)       0.005        0.025
238  19.83     0.07      0.020       (  0.064)       0.004        0.016
239  19.92     0.07      0.020       (  0.064)       0.004        0.016
240  20.00     0.07      0.020       (  0.063)       0.004        0.016
241  20.08     0.10      0.030       (  0.063)       0.005        0.025
242  20.17     0.10      0.030       (  0.063)       0.005        0.025
243  20.25     0.10      0.030       (  0.062)       0.005        0.025
244  20.33     0.10      0.030       (  0.062)       0.005        0.025
245  20.42     0.10      0.030       (  0.062)       0.005        0.025
246  20.50     0.10      0.030       (  0.062)       0.005        0.025
247  20.58     0.10      0.030       (  0.061)       0.005        0.025
248  20.67     0.10      0.030       (  0.061)       0.005        0.025
249  20.75     0.10      0.030       (  0.061)       0.005        0.025
250  20.83     0.07      0.020       (  0.061)       0.004        0.016
251  20.92     0.07      0.020       (  0.060)       0.004        0.016
252  21.00     0.07      0.020       (  0.060)       0.004        0.016
253  21.08     0.10      0.030       (  0.060)       0.005        0.025
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254  21.17     0.10      0.030       (  0.060)       0.005        0.025
255  21.25     0.10      0.030       (  0.059)       0.005        0.025
256  21.33     0.07      0.020       (  0.059)       0.004        0.016
257  21.42     0.07      0.020       (  0.059)       0.004        0.016
258  21.50     0.07      0.020       (  0.059)       0.004        0.016
259  21.58     0.10      0.030       (  0.059)       0.005        0.025
260  21.67     0.10      0.030       (  0.058)       0.005        0.025
261  21.75     0.10      0.030       (  0.058)       0.005        0.025
262  21.83     0.07      0.020       (  0.058)       0.004        0.016
263  21.92     0.07      0.020       (  0.058)       0.004        0.016
264  22.00     0.07      0.020       (  0.058)       0.004        0.016
265  22.08     0.10      0.030       (  0.057)       0.005        0.025
266  22.17     0.10      0.030       (  0.057)       0.005        0.025
267  22.25     0.10      0.030       (  0.057)       0.005        0.025
268  22.33     0.07      0.020       (  0.057)       0.004        0.016
269  22.42     0.07      0.020       (  0.057)       0.004        0.016
270  22.50     0.07      0.020       (  0.057)       0.004        0.016
271  22.58     0.07      0.020       (  0.056)       0.004        0.016
272  22.67     0.07      0.020       (  0.056)       0.004        0.016
273  22.75     0.07      0.020       (  0.056)       0.004        0.016
274  22.83     0.07      0.020       (  0.056)       0.004        0.016
275  22.92     0.07      0.020       (  0.056)       0.004        0.016
276  23.00     0.07      0.020       (  0.056)       0.004        0.016
277  23.08     0.07      0.020       (  0.055)       0.004        0.016
278  23.17     0.07      0.020       (  0.055)       0.004        0.016
279  23.25     0.07      0.020       (  0.055)       0.004        0.016
280  23.33     0.07      0.020       (  0.055)       0.004        0.016
281  23.42     0.07      0.020       (  0.055)       0.004        0.016
282  23.50     0.07      0.020       (  0.055)       0.004        0.016
283  23.58     0.07      0.020       (  0.055)       0.004        0.016
284  23.67     0.07      0.020       (  0.055)       0.004        0.016
285  23.75     0.07      0.020       (  0.055)       0.004        0.016
286  23.83     0.07      0.020       (  0.055)       0.004        0.016
287  23.92     0.07      0.020       (  0.055)       0.004        0.016
288  24.00     0.07      0.020       (  0.055)       0.004        0.016
               (Loss Rate Not Used)
    Sum =     100.0                                   Sum =    24.6
      Flood volume = Effective rainfall      2.05(In)
       times area       7.2(Ac.)/[(In)/(Ft.)] =       1.2(Ac.Ft)
      Total soil loss =      0.45(In)
      Total soil loss =     0.272(Ac.Ft)
      Total rainfall =      2.50(In)
      Flood volume =       53912.9 Cubic Feet
      Total soil loss =       11834.5 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      2.037(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 -----------------------------------------------------------------------
   0+ 5       0.0006      0.08  Q         |         |         |         |
   0+10       0.0014      0.12  Q         |         |         |         |
   0+15       0.0022      0.12  Q         |         |         |         |
   0+20       0.0033      0.16  Q         |         |         |         |
   0+25       0.0046      0.18  Q         |         |         |         |
   0+30       0.0058      0.18  Q         |         |         |         |
   0+35       0.0070      0.18  Q         |         |         |         |
   0+40       0.0083      0.18  Q         |         |         |         |
   0+45       0.0095      0.18  Q         |         |         |         |
   0+50       0.0110      0.22  Q         |         |         |         |
   0+55       0.0127      0.24  Q         |         |         |         |
   1+ 0       0.0143      0.24  Q         |         |         |         |
   1+ 5       0.0157      0.20  Q         |         |         |         |
   1+10       0.0169      0.18  Q         |         |         |         |
   1+15       0.0182      0.18  Q         |         |         |         |
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1+20       0.0194      0.18  Q          |         |         |         |
1+25       0.0206      0.18  Q          |         |         |         |
1+30       0.0219      0.18  Q          |         |         |         |
1+35       0.0231      0.18  Q          |         |         |         |
1+40       0.0244      0.18  Q          |         |         |         |
1+45       0.0256      0.18  Q          |         |         |         |
1+50       0.0271      0.22  Q          |         |         |         |
1+55       0.0288      0.24  Q          |         |         |         |
2+ 0       0.0304      0.24  Q          |         |         |         |
2+ 5       0.0321      0.24  QV         |         |         |         |
2+10       0.0337      0.24  QV         |         |         |         |
2+15       0.0354      0.24  QV         |         |         |         |
2+20       0.0370      0.24  QV         |         |         |         |
2+25       0.0387      0.24  QV         |         |         |         |
2+30       0.0403      0.24  QV         |         |         |         |
2+35       0.0422      0.28  |Q         |         |         |         |
2+40       0.0443      0.30  |Q         |         |         |         |
2+45       0.0464      0.30  |Q         |         |         |         |
2+50       0.0484      0.30  |Q         |         |         |         |
2+55       0.0505      0.30  |Q         |         |         |         |
3+ 0       0.0526      0.30  |Q         |         |         |         |
3+ 5       0.0546      0.30  |Q         |         |         |         |
3+10       0.0567      0.30  |Q         |         |         |         |
3+15       0.0587      0.30  |Q         |         |         |         |
3+20       0.0608      0.30  |Q         |         |         |         |
3+25       0.0629      0.30  |QV        |         |         |         |
3+30       0.0649      0.30  |QV        |         |         |         |
3+35       0.0670      0.30  |QV        |         |         |         |
3+40       0.0691      0.30  |QV        |         |         |         |
3+45       0.0711      0.30  |QV        |         |         |         |
3+50       0.0735      0.34  |QV        |         |         |         |
3+55       0.0759      0.36  |QV        |         |         |         |
4+ 0       0.0784      0.36  |QV        |         |         |         |
4+ 5       0.0809      0.36  |QV        |         |         |         |
4+10       0.0834      0.36  |QV        |         |         |         |
4+15       0.0858      0.36  |QV        |         |         |         |
4+20       0.0886      0.40  |QV        |         |         |         |
4+25       0.0915      0.42  |QV        |         |         |         |
4+30       0.0944      0.42  |Q V       |         |         |         |
4+35       0.0973      0.42  |Q V       |         |         |         |
4+40       0.1002      0.42  |Q V       |         |         |         |
4+45       0.1030      0.42  |Q V       |         |         |         |
4+50       0.1062      0.46  |Q V       |         |         |         |
4+55       0.1095      0.48  |Q V       |         |         |         |
5+ 0       0.1128      0.48  |Q V       |         |         |         |
5+ 5       0.1155      0.40  |Q V       |         |         |         |
5+10       0.1180      0.36  |Q V       |         |         |         |
5+15       0.1205      0.36  |Q V       |         |         |         |
5+20       0.1233      0.40  |Q V       |         |         |         |
5+25       0.1261      0.42  |Q  V      |         |         |         |
5+30       0.1290      0.42  |Q  V      |         |         |         |
5+35       0.1322      0.46  |Q  V      |         |         |         |
5+40       0.1355      0.48  |Q  V      |         |         |         |
5+45       0.1388      0.48  |Q  V      |         |         |         |
5+50       0.1421      0.48  |Q  V      |         |         |         |
5+55       0.1454      0.48  |Q  V      |         |         |         |
6+ 0       0.1487      0.48  |Q  V      |         |         |         |
6+ 5       0.1523      0.52  | Q V      |         |         |         |
6+10       0.1560      0.54  | Q  V     |         |         |         |
6+15       0.1597      0.54  | Q  V     |         |         |         |
6+20       0.1634      0.54  | Q  V     |         |         |         |
6+25       0.1671      0.54  | Q  V     |         |         |         |
6+30       0.1708      0.54  | Q  V     |         |         |         |
6+35       0.1748      0.58  | Q  V     |         |         |         |
6+40       0.1790      0.60  | Q  V     |         |         |         |
6+45       0.1831      0.60  | Q  V     |         |         |         |
6+50       0.1872      0.60  | Q   V    |         |         |         |
6+55       0.1913      0.60  | Q   V    |         |         |         |
7+ 0       0.1955      0.60  | Q   V    |         |         |         |
7+ 5       0.1996      0.60  | Q   V    |         |         |         |
7+10       0.2037      0.60  | Q   V    |         |         |         |
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 7+15       0.2078       0.60  | Q   V   |         |         |         |
 7+20       0.2123       0.64  | Q   V   |         |         |         |
 7+25       0.2168       0.66  | Q    V  |         |         |         |
 7+30       0.2213       0.66  | Q    V  |         |         |         |
 7+35       0.2261       0.70  | Q    V  |         |         |         |
 7+40       0.2311       0.72  | Q    V  |         |         |         |
 7+45       0.2360       0.72  | Q    V  |         |         |         |
 7+50       0.2413       0.76  |  Q   V  |         |         |         |
 7+55       0.2466       0.78  |  Q   V  |         |         |         |
 8+ 0       0.2520       0.78  |  Q    V |         |         |         |
 8+ 5       0.2579       0.86  |  Q    V |         |         |         |
 8+10       0.2641       0.90  |  Q    V |         |         |         |
 8+15       0.2703       0.90  |  Q    V |         |         |         |
 8+20       0.2765       0.90  |  Q    V |         |         |         |
 8+25       0.2827       0.90  |  Q     V|         |         |         |
 8+30       0.2889       0.90  |  Q     V|         |         |         |
 8+35       0.2953       0.94  |  Q     V|         |         |         |
 8+40       0.3019       0.96  |  Q     V|         |         |         |
 8+45       0.3085       0.96  |  Q     V|         |         |         |
 8+50       0.3154       1.00  |  Q      V         |         |         |
 8+55       0.3224       1.02  |   Q     V         |         |         |
 9+ 0       0.3294       1.02  |   Q     V         |         |         |
 9+ 5       0.3370       1.10  |   Q     V         |         |         |
 9+10       0.3449       1.14  |   Q     |V        |         |         |
 9+15       0.3527       1.14  |   Q     |V        |         |         |
 9+20       0.3608       1.18  |   Q     |V        |         |         |
 9+25       0.3691       1.20  |   Q     |V        |         |         |
 9+30       0.3773       1.20  |   Q     | V       |         |         |
 9+35       0.3859       1.24  |   Q     | V       |         |         |
 9+40       0.3945       1.26  |    Q    | V       |         |         |
 9+45       0.4032       1.26  |    Q    |  V      |         |         |
 9+50       0.4121       1.30  |    Q    |  V      |         |         |
 9+55       0.4212       1.32  |    Q    |  V      |         |         |
10+ 0       0.4303       1.32  |    Q    |  V      |         |         |
10+ 5       0.4374       1.03  |   Q     |   V     |         |         |
10+10       0.4436       0.90  |  Q      |   V     |         |         |
10+15       0.4498       0.90  |  Q      |   V     |         |         |
10+20       0.4560       0.90  |  Q      |   V     |         |         |
10+25       0.4621       0.90  |  Q      |   V     |         |         |
10+30       0.4683       0.90  |  Q      |    V    |         |         |
10+35       0.4759       1.10  |   Q     |    V    |         |         |
10+40       0.4842       1.20  |   Q     |    V    |         |         |
10+45       0.4924       1.20  |   Q     |    V    |         |         |
10+50       0.5007       1.20  |   Q     |     V   |         |         |
10+55       0.5089       1.20  |   Q     |     V   |         |         |
11+ 0       0.5172       1.20  |   Q     |     V   |         |         |
11+ 5       0.5251       1.16  |   Q     |     V   |         |         |
11+10       0.5330       1.14  |   Q     |      V  |         |         |
11+15       0.5408       1.14  |   Q     |      V  |         |         |
11+20       0.5487       1.14  |   Q     |      V  |         |         |
11+25       0.5565       1.14  |   Q     |      V  |         |         |
11+30       0.5643       1.14  |   Q     |       V |         |         |
11+35       0.5716       1.06  |   Q     |       V |         |         |
11+40       0.5786       1.02  |   Q     |       V |         |         |
11+45       0.5856       1.02  |   Q     |       V |         |         |
11+50       0.5929       1.06  |   Q     |        V|         |         |
11+55       0.6004       1.08  |   Q     |        V|         |         |
12+ 0       0.6078       1.08  |   Q     |        V|         |         |
12+ 5       0.6172       1.36  |    Q    |        V|         |         |
12+10       0.6275       1.50  |    Q    |         V         |         |
12+15       0.6378       1.50  |    Q    |         V         |         |
12+20       0.6484       1.54  |     Q   |         V         |         |
12+25       0.6591       1.56  |     Q   |         |V        |         |
12+30       0.6699       1.56  |     Q   |         |V        |         |
12+35       0.6811       1.64  |     Q   |         | V       |         |
12+40       0.6927       1.68  |     Q   |         | V       |         |
12+45       0.7042       1.68  |     Q   |         | V       |         |
12+50       0.7161       1.72  |     Q   |         |  V      |         |
12+55       0.7280       1.74  |     Q   |         |  V      |         |
13+ 0       0.7400       1.74  |     Q   |         |  V      |         |
13+ 5       0.7534       1.94  |      Q  |         |   V     |         |
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13+10       0.7674      2.04  |       Q |         |   V     |         |
13+15       0.7814      2.04  |       Q |         |    V    |         |
13+20       0.7955      2.04  |       Q |         |    V    |         |
13+25       0.8095      2.04  |       Q |         |     V   |         |
13+30       0.8235      2.04  |       Q |         |     V   |         |
13+35       0.8344      1.59  |     Q   |         |     V   |         |
13+40       0.8439      1.38  |    Q    |         |      V  |         |
13+45       0.8534      1.38  |    Q    |         |      V  |         |
13+50       0.8629      1.38  |    Q    |         |      V  |         |
13+55       0.8724      1.38  |    Q    |         |       V |         |
14+ 0       0.8819      1.38  |    Q    |         |       V |         |
14+ 5       0.8925      1.54  |     Q   |         |       V |         |
14+10       0.9036      1.62  |     Q   |         |        V|         |
14+15       0.9148      1.62  |     Q   |         |        V|         |
14+20       0.9256      1.58  |     Q   |         |        V|         |
14+25       0.9364      1.56  |     Q   |         |         V         |
14+30       0.9471      1.56  |     Q   |         |         V         |
14+35       0.9578      1.56  |     Q   |         |         V         |
14+40       0.9685      1.56  |     Q   |         |         |V        |
14+45       0.9793      1.56  |     Q   |         |         |V        |
14+50       0.9897      1.52  |     Q   |         |         |V        |
14+55       1.0000      1.50  |    Q    |         |         | V       |
15+ 0       1.0103      1.50  |    Q    |         |         | V       |
15+ 5       1.0204      1.46  |    Q    |         |         | V       |
15+10       1.0303      1.44  |    Q    |         |         |  V      |
15+15       1.0402      1.44  |    Q    |         |         |  V      |
15+20       1.0498      1.40  |    Q    |         |         |  V      |
15+25       1.0593      1.38  |    Q    |         |         |   V     |
15+30       1.0688      1.38  |    Q    |         |         |   V     |
15+35       1.0771      1.21  |   Q     |         |         |   V     |
15+40       1.0850      1.14  |   Q     |         |         |    V    |
15+45       1.0928      1.14  |   Q     |         |         |    V    |
15+50       1.1007      1.14  |   Q     |         |         |    V    |
15+55       1.1085      1.14  |   Q     |         |         |    V    |
16+ 0       1.1163      1.14  |   Q     |         |         |     V   |
16+ 5       1.1200      0.53  | Q       |         |         |     V   |
16+10       1.1216      0.24  Q         |         |         |     V   |
16+15       1.1233      0.24  Q         |         |         |     V   |
16+20       1.1249      0.24  Q         |         |         |     V   |
16+25       1.1266      0.24  Q         |         |         |     V   |
16+30       1.1282      0.24  Q         |         |         |     V   |
16+35       1.1296      0.20  Q         |         |         |     V   |
16+40       1.1308      0.18  Q         |         |         |     V   |
16+45       1.1321      0.18  Q         |         |         |     V   |
16+50       1.1333      0.18  Q         |         |         |     V   |
16+55       1.1345      0.18  Q         |         |         |     V   |
17+ 0       1.1358      0.18  Q         |         |         |     V   |
17+ 5       1.1376      0.26  |Q        |         |         |     V   |
17+10       1.1396      0.30  |Q        |         |         |     V   |
17+15       1.1417      0.30  |Q        |         |         |     V   |
17+20       1.1438      0.30  |Q        |         |         |     V   |
17+25       1.1458      0.30  |Q        |         |         |      V  |
17+30       1.1479      0.30  |Q        |         |         |      V  |
17+35       1.1500      0.30  |Q        |         |         |      V  |
17+40       1.1520      0.30  |Q        |         |         |      V  |
17+45       1.1541      0.30  |Q        |         |         |      V  |
17+50       1.1559      0.26  |Q        |         |         |      V  |
17+55       1.1575      0.24  Q         |         |         |      V  |
18+ 0       1.1592      0.24  Q         |         |         |      V  |
18+ 5       1.1608      0.24  Q         |         |         |      V  |
18+10       1.1625      0.24  Q         |         |         |      V  |
18+15       1.1641      0.24  Q         |         |         |      V  |
18+20       1.1658      0.24  Q         |         |         |      V  |
18+25       1.1674      0.24  Q         |         |         |      V  |
18+30       1.1691      0.24  Q         |         |         |      V  |
18+35       1.1704      0.20  Q         |         |         |      V  |
18+40       1.1717      0.18  Q         |         |         |      V  |
18+45       1.1729      0.18  Q         |         |         |      V  |
18+50       1.1739      0.14  Q         |         |         |      V  |
18+55       1.1747      0.12  Q         |         |         |      V  |
19+ 0       1.1755      0.12  Q         |         |         |      V  |
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   19+ 5       1.1766      0.16  Q         |         |         |       V |
   19+10       1.1779      0.18  Q         |         |         |       V |
   19+15       1.1791      0.18  Q         |         |         |       V |
   19+20       1.1806      0.22  Q         |         |         |       V |
   19+25       1.1823      0.24  Q         |         |         |       V |
   19+30       1.1839      0.24  Q         |         |         |       V |
   19+35       1.1853      0.20  Q         |         |         |       V |
   19+40       1.1865      0.18  Q         |         |         |       V |
   19+45       1.1878      0.18  Q         |         |         |       V |
   19+50       1.1887      0.14  Q         |         |         |       V |
   19+55       1.1895      0.12  Q         |         |         |       V |
   20+ 0       1.1904      0.12  Q         |         |         |       V |
   20+ 5       1.1915      0.16  Q         |         |         |       V |
   20+10       1.1927      0.18  Q         |         |         |       V |
   20+15       1.1940      0.18  Q         |         |         |       V |
   20+20       1.1952      0.18  Q         |         |         |       V |
   20+25       1.1964      0.18  Q         |         |         |       V |
   20+30       1.1977      0.18  Q         |         |         |       V |
   20+35       1.1989      0.18  Q         |         |         |       V |
   20+40       1.2001      0.18  Q         |         |         |       V |
   20+45       1.2014      0.18  Q         |         |         |       V |
   20+50       1.2023      0.14  Q         |         |         |       V |
   20+55       1.2032      0.12  Q         |         |         |       V |
   21+ 0       1.2040      0.12  Q         |         |         |       V |
   21+ 5       1.2051      0.16  Q         |         |         |       V |
   21+10       1.2063      0.18  Q         |         |         |       V |
   21+15       1.2076      0.18  Q         |         |         |        V|
   21+20       1.2085      0.14  Q         |         |         |        V|
   21+25       1.2094      0.12  Q         |         |         |        V|
   21+30       1.2102      0.12  Q         |         |         |        V|
   21+35       1.2113      0.16  Q         |         |         |        V|
   21+40       1.2125      0.18  Q         |         |         |        V|
   21+45       1.2138      0.18  Q         |         |         |        V|
   21+50       1.2147      0.14  Q         |         |         |        V|
   21+55       1.2155      0.12  Q         |         |         |        V|
   22+ 0       1.2164      0.12  Q         |         |         |        V|
   22+ 5       1.2175      0.16  Q         |         |         |        V|
   22+10       1.2187      0.18  Q         |         |         |        V|
   22+15       1.2199      0.18  Q         |         |         |        V|
   22+20       1.2209      0.14  Q         |         |         |        V|
   22+25       1.2217      0.12  Q         |         |         |        V|
   22+30       1.2226      0.12  Q         |         |         |        V|
   22+35       1.2234      0.12  Q         |         |         |        V|
   22+40       1.2242      0.12  Q         |         |         |        V|
   22+45       1.2250      0.12  Q         |         |         |        V|
   22+50       1.2259      0.12  Q         |         |         |        V|
   22+55       1.2267      0.12  Q         |         |         |        V|
   23+ 0       1.2275      0.12  Q         |         |         |        V|
   23+ 5       1.2283      0.12  Q         |         |         |        V|
   23+10       1.2292      0.12  Q         |         |         |        V|
   23+15       1.2300      0.12  Q         |         |         |        V|
   23+20       1.2308      0.12  Q         |         |         |        V|
   23+25       1.2316      0.12  Q         |         |         |        V|
   23+30       1.2325      0.12  Q         |         |         |        V|
   23+35       1.2333      0.12  Q         |         |         |        V|
   23+40       1.2341      0.12  Q         |         |         |        V|
   23+45       1.2349      0.12  Q         |         |         |        V|
   23+50       1.2358      0.12  Q         |         |         |        V|
   23+55       1.2366      0.12  Q         |         |         |        V|
   24+ 0       1.2374      0.12  Q         |         |         |        V|
   24+ 5       1.2377      0.04  Q         |         |         |         V
-----------------------------------------------------------------------
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```
       U n i t   H y d r o g r a p h   A n a l y s i s

       Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2012, Version 8.2
               Study date  06/04/21 File: 19400p002y24hB242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6310

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
19-400
PROPOSED CONDITION
2-YEAR, 24-HOUR
AREA B
--------------------------------------------------------------------
Drainage Area =       1.00(Ac.)  =      0.002 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       1.00(Ac.)  =      0.002 Sq. Mi.
Length along longest watercourse =     208.00(Ft.)
Length along longest watercourse measured to centroid =     186.00(Ft.)
Length along longest watercourse =      0.039 Mi.
Length along longest watercourse measured to centroid =      0.035 Mi.
Difference in elevation =      7.00(Ft.)
Slope along watercourse =    177.6923 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.011 Hr.
Lag time =     0.66 Min.
25% of lag time =     0.17 Min.
40% of lag time =     0.26 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        1.00           2.50                  2.49

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        1.00           6.00                  5.98

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    2.500(In)
Area Averaged 100-Year Rainfall =    6.000(In)

Point rain (area averaged) =    2.500(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    2.500(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     0.996           69.00         0.900
 Total Area Entered =      1.00(Ac.)
```

```
       RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
       AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
       69.0  49.8      0.574     0.900        0.109       1.000      0.109
                                                          Sum (F) =   0.109
       Area averaged mean soil loss (F) (In/Hr) =  0.109
       Minimum soil loss rate ((In/Hr)) =  0.055
       (for 24 hour storm duration)
       Soil low loss rate (decimal) =   0.180
       ---------------------------------------------------------------------

                      U n i t   H y d r o g r a p h
                             VALLEY S-Curve
       --------------------------------------------------------------------
                      Unit Hydrograph Data
       ---------------------------------------------------------------------
       Unit time period   Time % of lag   Distribution   Unit Hydrograph
           (hrs)                            Graph %          (CFS)
       ---------------------------------------------------------------------
           1   0.083        754.877         80.065             0.804
           2   0.167       1509.754         19.935             0.200
                                     Sum = 100.000   Sum=       1.004
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max  |   Low         (In/Hr)
   1   0.08     0.07      0.020       (  0.193)       0.004        0.016
   2   0.17     0.07      0.020       (  0.193)       0.004        0.016
   3   0.25     0.07      0.020       (  0.192)       0.004        0.016
   4   0.33     0.10      0.030       (  0.191)       0.005        0.025
   5   0.42     0.10      0.030       (  0.190)       0.005        0.025
   6   0.50     0.10      0.030       (  0.190)       0.005        0.025
   7   0.58     0.10      0.030       (  0.189)       0.005        0.025
   8   0.67     0.10      0.030       (  0.188)       0.005        0.025
   9   0.75     0.10      0.030       (  0.187)       0.005        0.025
  10   0.83     0.13      0.040       (  0.187)       0.007        0.033
  11   0.92     0.13      0.040       (  0.186)       0.007        0.033
  12   1.00     0.13      0.040       (  0.185)       0.007        0.033
  13   1.08     0.10      0.030       (  0.184)       0.005        0.025
  14   1.17     0.10      0.030       (  0.184)       0.005        0.025
  15   1.25     0.10      0.030       (  0.183)       0.005        0.025
  16   1.33     0.10      0.030       (  0.182)       0.005        0.025
  17   1.42     0.10      0.030       (  0.182)       0.005        0.025
  18   1.50     0.10      0.030       (  0.181)       0.005        0.025
  19   1.58     0.10      0.030       (  0.180)       0.005        0.025
  20   1.67     0.10      0.030       (  0.179)       0.005        0.025
  21   1.75     0.10      0.030       (  0.179)       0.005        0.025
  22   1.83     0.13      0.040       (  0.178)       0.007        0.033
  23   1.92     0.13      0.040       (  0.177)       0.007        0.033
  24   2.00     0.13      0.040       (  0.176)       0.007        0.033
  25   2.08     0.13      0.040       (  0.176)       0.007        0.033
  26   2.17     0.13      0.040       (  0.175)       0.007        0.033
  27   2.25     0.13      0.040       (  0.174)       0.007        0.033
  28   2.33     0.13      0.040       (  0.174)       0.007        0.033
  29   2.42     0.13      0.040       (  0.173)       0.007        0.033
  30   2.50     0.13      0.040       (  0.172)       0.007        0.033
  31   2.58     0.17      0.050       (  0.172)       0.009        0.041
  32   2.67     0.17      0.050       (  0.171)       0.009        0.041
  33   2.75     0.17      0.050       (  0.170)       0.009        0.041
  34   2.83     0.17      0.050       (  0.169)       0.009        0.041
  35   2.92     0.17      0.050       (  0.169)       0.009        0.041
  36   3.00     0.17      0.050       (  0.168)       0.009        0.041
  37   3.08     0.17      0.050       (  0.167)       0.009        0.041
  38   3.17     0.17      0.050       (  0.167)       0.009        0.041
  39   3.25     0.17      0.050       (  0.166)       0.009        0.041
  40   3.33     0.17      0.050       (  0.165)       0.009        0.041
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  41    3.42      0.17      0.050        (  0.165)       0.009        0.041
  42    3.50      0.17      0.050        (  0.164)       0.009        0.041
  43    3.58      0.17      0.050        (  0.163)       0.009        0.041
  44    3.67      0.17      0.050        (  0.162)       0.009        0.041
  45    3.75      0.17      0.050        (  0.162)       0.009        0.041
  46    3.83      0.20      0.060        (  0.161)       0.011        0.049
  47    3.92      0.20      0.060        (  0.160)       0.011        0.049
  48    4.00      0.20      0.060        (  0.160)       0.011        0.049
  49    4.08      0.20      0.060        (  0.159)       0.011        0.049
  50    4.17      0.20      0.060        (  0.158)       0.011        0.049
  51    4.25      0.20      0.060        (  0.158)       0.011        0.049
  52    4.33      0.23      0.070        (  0.157)       0.013        0.057
  53    4.42      0.23      0.070        (  0.156)       0.013        0.057
  54    4.50      0.23      0.070        (  0.156)       0.013        0.057
  55    4.58      0.23      0.070        (  0.155)       0.013        0.057
  56    4.67      0.23      0.070        (  0.154)       0.013        0.057
  57    4.75      0.23      0.070        (  0.154)       0.013        0.057
  58    4.83      0.27      0.080        (  0.153)       0.014        0.066
  59    4.92      0.27      0.080        (  0.152)       0.014        0.066
  60    5.00      0.27      0.080        (  0.152)       0.014        0.066
  61    5.08      0.20      0.060        (  0.151)       0.011        0.049
  62    5.17      0.20      0.060        (  0.150)       0.011        0.049
  63    5.25      0.20      0.060        (  0.150)       0.011        0.049
  64    5.33      0.23      0.070        (  0.149)       0.013        0.057
  65    5.42      0.23      0.070        (  0.148)       0.013        0.057
  66    5.50      0.23      0.070        (  0.148)       0.013        0.057
  67    5.58      0.27      0.080        (  0.147)       0.014        0.066
  68    5.67      0.27      0.080        (  0.147)       0.014        0.066
  69    5.75      0.27      0.080        (  0.146)       0.014        0.066
  70    5.83      0.27      0.080        (  0.145)       0.014        0.066
  71    5.92      0.27      0.080        (  0.145)       0.014        0.066
  72    6.00      0.27      0.080        (  0.144)       0.014        0.066
  73    6.08      0.30      0.090        (  0.143)       0.016        0.074
  74    6.17      0.30      0.090        (  0.143)       0.016        0.074
  75    6.25      0.30      0.090        (  0.142)       0.016        0.074
  76    6.33      0.30      0.090        (  0.141)       0.016        0.074
  77    6.42      0.30      0.090        (  0.141)       0.016        0.074
  78    6.50      0.30      0.090        (  0.140)       0.016        0.074
  79    6.58      0.33      0.100        (  0.140)       0.018        0.082
  80    6.67      0.33      0.100        (  0.139)       0.018        0.082
  81    6.75      0.33      0.100        (  0.138)       0.018        0.082
  82    6.83      0.33      0.100        (  0.138)       0.018        0.082
  83    6.92      0.33      0.100        (  0.137)       0.018        0.082
  84    7.00      0.33      0.100        (  0.136)       0.018        0.082
  85    7.08      0.33      0.100        (  0.136)       0.018        0.082
  86    7.17      0.33      0.100        (  0.135)       0.018        0.082
  87    7.25      0.33      0.100        (  0.135)       0.018        0.082
  88    7.33      0.37      0.110        (  0.134)       0.020        0.090
  89    7.42      0.37      0.110        (  0.133)       0.020        0.090
  90    7.50      0.37      0.110        (  0.133)       0.020        0.090
  91    7.58      0.40      0.120        (  0.132)       0.022        0.098
  92    7.67      0.40      0.120        (  0.131)       0.022        0.098
  93    7.75      0.40      0.120        (  0.131)       0.022        0.098
  94    7.83      0.43      0.130        (  0.130)       0.023        0.107
  95    7.92      0.43      0.130        (  0.130)       0.023        0.107
  96    8.00      0.43      0.130        (  0.129)       0.023        0.107
  97    8.08      0.50      0.150        (  0.128)       0.027        0.123
  98    8.17      0.50      0.150        (  0.128)       0.027        0.123
  99    8.25      0.50      0.150        (  0.127)       0.027        0.123
 100    8.33      0.50      0.150        (  0.127)       0.027        0.123
 101    8.42      0.50      0.150        (  0.126)       0.027        0.123
 102    8.50      0.50      0.150        (  0.125)       0.027        0.123
 103    8.58      0.53      0.160        (  0.125)       0.029        0.131
 104    8.67      0.53      0.160        (  0.124)       0.029        0.131
 105    8.75      0.53      0.160        (  0.124)       0.029        0.131
 106    8.83      0.57      0.170        (  0.123)       0.031        0.139
 107    8.92      0.57      0.170        (  0.123)       0.031        0.139
 108    9.00      0.57      0.170        (  0.122)       0.031        0.139
 109    9.08      0.63      0.190        (  0.121)       0.034        0.156
 110    9.17      0.63      0.190        (  0.121)       0.034        0.156
 111    9.25      0.63      0.190        (  0.120)       0.034        0.156
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112   9.33     0.67      0.200       (  0.120)       0.036        0.164
113   9.42     0.67      0.200       (  0.119)       0.036        0.164
114   9.50     0.67      0.200       (  0.119)       0.036        0.164
115   9.58     0.70      0.210       (  0.118)       0.038        0.172
116   9.67     0.70      0.210       (  0.117)       0.038        0.172
117   9.75     0.70      0.210       (  0.117)       0.038        0.172
118   9.83     0.73      0.220       (  0.116)       0.040        0.180
119   9.92     0.73      0.220       (  0.116)       0.040        0.180
120  10.00     0.73      0.220       (  0.115)       0.040        0.180
121  10.08     0.50      0.150       (  0.115)       0.027        0.123
122  10.17     0.50      0.150       (  0.114)       0.027        0.123
123  10.25     0.50      0.150       (  0.113)       0.027        0.123
124  10.33     0.50      0.150       (  0.113)       0.027        0.123
125  10.42     0.50      0.150       (  0.112)       0.027        0.123
126  10.50     0.50      0.150       (  0.112)       0.027        0.123
127  10.58     0.67      0.200       (  0.111)       0.036        0.164
128  10.67     0.67      0.200       (  0.111)       0.036        0.164
129  10.75     0.67      0.200       (  0.110)       0.036        0.164
130  10.83     0.67      0.200       (  0.110)       0.036        0.164
131  10.92     0.67      0.200       (  0.109)       0.036        0.164
132  11.00     0.67      0.200       (  0.109)       0.036        0.164
133  11.08     0.63      0.190       (  0.108)       0.034        0.156
134  11.17     0.63      0.190       (  0.108)       0.034        0.156
135  11.25     0.63      0.190       (  0.107)       0.034        0.156
136  11.33     0.63      0.190       (  0.106)       0.034        0.156
137  11.42     0.63      0.190       (  0.106)       0.034        0.156
138  11.50     0.63      0.190       (  0.105)       0.034        0.156
139  11.58     0.57      0.170       (  0.105)       0.031        0.139
140  11.67     0.57      0.170       (  0.104)       0.031        0.139
141  11.75     0.57      0.170       (  0.104)       0.031        0.139
142  11.83     0.60      0.180       (  0.103)       0.032        0.148
143  11.92     0.60      0.180       (  0.103)       0.032        0.148
144  12.00     0.60      0.180       (  0.102)       0.032        0.148
145  12.08     0.83      0.250       (  0.102)       0.045        0.205
146  12.17     0.83      0.250       (  0.101)       0.045        0.205
147  12.25     0.83      0.250       (  0.101)       0.045        0.205
148  12.33     0.87      0.260       (  0.100)       0.047        0.213
149  12.42     0.87      0.260       (  0.100)       0.047        0.213
150  12.50     0.87      0.260       (  0.099)       0.047        0.213
151  12.58     0.93      0.280       (  0.099)       0.050        0.230
152  12.67     0.93      0.280       (  0.098)       0.050        0.230
153  12.75     0.93      0.280       (  0.098)       0.050        0.230
154  12.83     0.97      0.290       (  0.097)       0.052        0.238
155  12.92     0.97      0.290       (  0.097)       0.052        0.238
156  13.00     0.97      0.290       (  0.096)       0.052        0.238
157  13.08     1.13      0.340       (  0.096)       0.061        0.279
158  13.17     1.13      0.340       (  0.095)       0.061        0.279
159  13.25     1.13      0.340       (  0.095)       0.061        0.279
160  13.33     1.13      0.340       (  0.094)       0.061        0.279
161  13.42     1.13      0.340       (  0.094)       0.061        0.279
162  13.50     1.13      0.340       (  0.093)       0.061        0.279
163  13.58     0.77      0.230       (  0.093)       0.041        0.189
164  13.67     0.77      0.230       (  0.092)       0.041        0.189
165  13.75     0.77      0.230       (  0.092)       0.041        0.189
166  13.83     0.77      0.230       (  0.092)       0.041        0.189
167  13.92     0.77      0.230       (  0.091)       0.041        0.189
168  14.00     0.77      0.230       (  0.091)       0.041        0.189
169  14.08     0.90      0.270       (  0.090)       0.049        0.221
170  14.17     0.90      0.270       (  0.090)       0.049        0.221
171  14.25     0.90      0.270       (  0.089)       0.049        0.221
172  14.33     0.87      0.260       (  0.089)       0.047        0.213
173  14.42     0.87      0.260       (  0.088)       0.047        0.213
174  14.50     0.87      0.260       (  0.088)       0.047        0.213
175  14.58     0.87      0.260       (  0.087)       0.047        0.213
176  14.67     0.87      0.260       (  0.087)       0.047        0.213
177  14.75     0.87      0.260       (  0.086)       0.047        0.213
178  14.83     0.83      0.250       (  0.086)       0.045        0.205
179  14.92     0.83      0.250       (  0.086)       0.045        0.205
180  15.00     0.83      0.250       (  0.085)       0.045        0.205
181  15.08     0.80      0.240       (  0.085)       0.043        0.197
182  15.17     0.80      0.240       (  0.084)       0.043        0.197
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183  15.25     0.80      0.240       (  0.084)       0.043        0.197
184  15.33     0.77      0.230       (  0.083)       0.041        0.189
185  15.42     0.77      0.230       (  0.083)       0.041        0.189
186  15.50     0.77      0.230       (  0.083)       0.041        0.189
187  15.58     0.63      0.190       (  0.082)       0.034        0.156
188  15.67     0.63      0.190       (  0.082)       0.034        0.156
189  15.75     0.63      0.190       (  0.081)       0.034        0.156
190  15.83     0.63      0.190       (  0.081)       0.034        0.156
191  15.92     0.63      0.190       (  0.080)       0.034        0.156
192  16.00     0.63      0.190       (  0.080)       0.034        0.156
193  16.08     0.13      0.040       (  0.080)       0.007        0.033
194  16.17     0.13      0.040       (  0.079)       0.007        0.033
195  16.25     0.13      0.040       (  0.079)       0.007        0.033
196  16.33     0.13      0.040       (  0.078)       0.007        0.033
197  16.42     0.13      0.040       (  0.078)       0.007        0.033
198  16.50     0.13      0.040       (  0.078)       0.007        0.033
199  16.58     0.10      0.030       (  0.077)       0.005        0.025
200  16.67     0.10      0.030       (  0.077)       0.005        0.025
201  16.75     0.10      0.030       (  0.076)       0.005        0.025
202  16.83     0.10      0.030       (  0.076)       0.005        0.025
203  16.92     0.10      0.030       (  0.076)       0.005        0.025
204  17.00     0.10      0.030       (  0.075)       0.005        0.025
205  17.08     0.17      0.050       (  0.075)       0.009        0.041
206  17.17     0.17      0.050       (  0.075)       0.009        0.041
207  17.25     0.17      0.050       (  0.074)       0.009        0.041
208  17.33     0.17      0.050       (  0.074)       0.009        0.041
209  17.42     0.17      0.050       (  0.073)       0.009        0.041
210  17.50     0.17      0.050       (  0.073)       0.009        0.041
211  17.58     0.17      0.050       (  0.073)       0.009        0.041
212  17.67     0.17      0.050       (  0.072)       0.009        0.041
213  17.75     0.17      0.050       (  0.072)       0.009        0.041
214  17.83     0.13      0.040       (  0.072)       0.007        0.033
215  17.92     0.13      0.040       (  0.071)       0.007        0.033
216  18.00     0.13      0.040       (  0.071)       0.007        0.033
217  18.08     0.13      0.040       (  0.071)       0.007        0.033
218  18.17     0.13      0.040       (  0.070)       0.007        0.033
219  18.25     0.13      0.040       (  0.070)       0.007        0.033
220  18.33     0.13      0.040       (  0.070)       0.007        0.033
221  18.42     0.13      0.040       (  0.069)       0.007        0.033
222  18.50     0.13      0.040       (  0.069)       0.007        0.033
223  18.58     0.10      0.030       (  0.069)       0.005        0.025
224  18.67     0.10      0.030       (  0.068)       0.005        0.025
225  18.75     0.10      0.030       (  0.068)       0.005        0.025
226  18.83     0.07      0.020       (  0.068)       0.004        0.016
227  18.92     0.07      0.020       (  0.067)       0.004        0.016
228  19.00     0.07      0.020       (  0.067)       0.004        0.016
229  19.08     0.10      0.030       (  0.067)       0.005        0.025
230  19.17     0.10      0.030       (  0.066)       0.005        0.025
231  19.25     0.10      0.030       (  0.066)       0.005        0.025
232  19.33     0.13      0.040       (  0.066)       0.007        0.033
233  19.42     0.13      0.040       (  0.065)       0.007        0.033
234  19.50     0.13      0.040       (  0.065)       0.007        0.033
235  19.58     0.10      0.030       (  0.065)       0.005        0.025
236  19.67     0.10      0.030       (  0.064)       0.005        0.025
237  19.75     0.10      0.030       (  0.064)       0.005        0.025
238  19.83     0.07      0.020       (  0.064)       0.004        0.016
239  19.92     0.07      0.020       (  0.064)       0.004        0.016
240  20.00     0.07      0.020       (  0.063)       0.004        0.016
241  20.08     0.10      0.030       (  0.063)       0.005        0.025
242  20.17     0.10      0.030       (  0.063)       0.005        0.025
243  20.25     0.10      0.030       (  0.062)       0.005        0.025
244  20.33     0.10      0.030       (  0.062)       0.005        0.025
245  20.42     0.10      0.030       (  0.062)       0.005        0.025
246  20.50     0.10      0.030       (  0.062)       0.005        0.025
247  20.58     0.10      0.030       (  0.061)       0.005        0.025
248  20.67     0.10      0.030       (  0.061)       0.005        0.025
249  20.75     0.10      0.030       (  0.061)       0.005        0.025
250  20.83     0.07      0.020       (  0.061)       0.004        0.016
251  20.92     0.07      0.020       (  0.060)       0.004        0.016
252  21.00     0.07      0.020       (  0.060)       0.004        0.016
253  21.08     0.10      0.030       (  0.060)       0.005        0.025
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254  21.17     0.10      0.030       (  0.060)       0.005        0.025
255  21.25     0.10      0.030       (  0.059)       0.005        0.025
256  21.33     0.07      0.020       (  0.059)       0.004        0.016
257  21.42     0.07      0.020       (  0.059)       0.004        0.016
258  21.50     0.07      0.020       (  0.059)       0.004        0.016
259  21.58     0.10      0.030       (  0.059)       0.005        0.025
260  21.67     0.10      0.030       (  0.058)       0.005        0.025
261  21.75     0.10      0.030       (  0.058)       0.005        0.025
262  21.83     0.07      0.020       (  0.058)       0.004        0.016
263  21.92     0.07      0.020       (  0.058)       0.004        0.016
264  22.00     0.07      0.020       (  0.058)       0.004        0.016
265  22.08     0.10      0.030       (  0.057)       0.005        0.025
266  22.17     0.10      0.030       (  0.057)       0.005        0.025
267  22.25     0.10      0.030       (  0.057)       0.005        0.025
268  22.33     0.07      0.020       (  0.057)       0.004        0.016
269  22.42     0.07      0.020       (  0.057)       0.004        0.016
270  22.50     0.07      0.020       (  0.057)       0.004        0.016
271  22.58     0.07      0.020       (  0.056)       0.004        0.016
272  22.67     0.07      0.020       (  0.056)       0.004        0.016
273  22.75     0.07      0.020       (  0.056)       0.004        0.016
274  22.83     0.07      0.020       (  0.056)       0.004        0.016
275  22.92     0.07      0.020       (  0.056)       0.004        0.016
276  23.00     0.07      0.020       (  0.056)       0.004        0.016
277  23.08     0.07      0.020       (  0.055)       0.004        0.016
278  23.17     0.07      0.020       (  0.055)       0.004        0.016
279  23.25     0.07      0.020       (  0.055)       0.004        0.016
280  23.33     0.07      0.020       (  0.055)       0.004        0.016
281  23.42     0.07      0.020       (  0.055)       0.004        0.016
282  23.50     0.07      0.020       (  0.055)       0.004        0.016
283  23.58     0.07      0.020       (  0.055)       0.004        0.016
284  23.67     0.07      0.020       (  0.055)       0.004        0.016
285  23.75     0.07      0.020       (  0.055)       0.004        0.016
286  23.83     0.07      0.020       (  0.055)       0.004        0.016
287  23.92     0.07      0.020       (  0.055)       0.004        0.016
288  24.00     0.07      0.020       (  0.055)       0.004        0.016
               (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    24.6
      Flood volume = Effective rainfall      2.05(In)
       times area       1.0(Ac.)/[(In)/(Ft.)] =       0.2(Ac.Ft)
      Total soil loss =      0.45(In)
      Total soil loss =     0.037(Ac.Ft)
      Total rainfall =      2.50(In)
      Flood volume =        7411.7 Cubic Feet
      Total soil loss =        1627.0 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.280(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
   0+ 5       0.0001      0.01  Q         |         |         |         |
   0+10       0.0002      0.02  Q         |         |         |         |
   0+15       0.0003      0.02  Q         |         |         |         |
   0+20       0.0005      0.02  Q         |         |         |         |
   0+25       0.0006      0.02  Q         |         |         |         |
   0+30       0.0008      0.02  Q         |         |         |         |
   0+35       0.0010      0.02  Q         |         |         |         |
   0+40       0.0012      0.02  Q         |         |         |         |
   0+45       0.0013      0.02  Q         |         |         |         |
   0+50       0.0015      0.03  Q         |         |         |         |
   0+55       0.0018      0.03  Q         |         |         |         |
   1+ 0       0.0020      0.03  Q         |         |         |         |
   1+ 5       0.0022      0.03  Q         |         |         |         |
   1+10       0.0023      0.02  Q         |         |         |         |
   1+15       0.0025      0.02  Q         |         |         |         |
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1+20       0.0027      0.02  Q         |         |         |         |
1+25       0.0029      0.02  Q         |         |         |         |
1+30       0.0030      0.02  Q         |         |         |         |
1+35       0.0032      0.02  Q         |         |         |         |
1+40       0.0034      0.02  Q         |         |         |         |
1+45       0.0035      0.02  Q         |         |         |         |
1+50       0.0038      0.03  Q         |         |         |         |
1+55       0.0040      0.03  Q         |         |         |         |
2+ 0       0.0042      0.03  Q         |         |         |         |
2+ 5       0.0044      0.03  QV        |         |         |         |
2+10       0.0047      0.03  QV        |         |         |         |
2+15       0.0049      0.03  QV        |         |         |         |
2+20       0.0051      0.03  QV        |         |         |         |
2+25       0.0053      0.03  QV        |         |         |         |
2+30       0.0056      0.03  QV        |         |         |         |
2+35       0.0058      0.04  QV        |         |         |         |
2+40       0.0061      0.04  QV        |         |         |         |
2+45       0.0064      0.04  QV        |         |         |         |
2+50       0.0067      0.04  QV        |         |         |         |
2+55       0.0070      0.04  QV        |         |         |         |
3+ 0       0.0073      0.04  QV        |         |         |         |
3+ 5       0.0075      0.04  QV        |         |         |         |
3+10       0.0078      0.04  QV        |         |         |         |
3+15       0.0081      0.04  QV        |         |         |         |
3+20       0.0084      0.04  QV        |         |         |         |
3+25       0.0087      0.04  Q V       |         |         |         |
3+30       0.0090      0.04  Q V       |         |         |         |
3+35       0.0092      0.04  Q V       |         |         |         |
3+40       0.0095      0.04  Q V       |         |         |         |
3+45       0.0098      0.04  Q V       |         |         |         |
3+50       0.0101      0.05  Q V       |         |         |         |
3+55       0.0105      0.05  Q V       |         |         |         |
4+ 0       0.0108      0.05  Q V       |         |         |         |
4+ 5       0.0112      0.05  Q V       |         |         |         |
4+10       0.0115      0.05  Q V       |         |         |         |
4+15       0.0118      0.05  Q V       |         |         |         |
4+20       0.0122      0.06  Q V       |         |         |         |
4+25       0.0126      0.06  Q V       |         |         |         |
4+30       0.0130      0.06  Q  V      |         |         |         |
4+35       0.0134      0.06  Q  V      |         |         |         |
4+40       0.0138      0.06  Q  V      |         |         |         |
4+45       0.0142      0.06  Q  V      |         |         |         |
4+50       0.0147      0.06  Q  V      |         |         |         |
4+55       0.0151      0.07  Q  V      |         |         |         |
5+ 0       0.0156      0.07  Q  V      |         |         |         |
5+ 5       0.0159      0.05  Q  V      |         |         |         |
5+10       0.0163      0.05  Q  V      |         |         |         |
5+15       0.0166      0.05  Q  V      |         |         |         |
5+20       0.0170      0.06  Q  V      |         |         |         |
5+25       0.0174      0.06  Q   V     |         |         |         |
5+30       0.0178      0.06  Q   V     |         |         |         |
5+35       0.0182      0.06  Q   V     |         |         |         |
5+40       0.0187      0.07  Q   V     |         |         |         |
5+45       0.0191      0.07  Q   V     |         |         |         |
5+50       0.0196      0.07  Q   V     |         |         |         |
5+55       0.0200      0.07  Q   V     |         |         |         |
6+ 0       0.0205      0.07  Q   V     |         |         |         |
6+ 5       0.0210      0.07  Q   V     |         |         |         |
6+10       0.0215      0.07  Q    V    |         |         |         |
6+15       0.0220      0.07  Q    V    |         |         |         |
6+20       0.0225      0.07  Q    V    |         |         |         |
6+25       0.0230      0.07  Q    V    |         |         |         |
6+30       0.0235      0.07  Q    V    |         |         |         |
6+35       0.0241      0.08  Q    V    |         |         |         |
6+40       0.0247      0.08  Q    V    |         |         |         |
6+45       0.0252      0.08  Q    V    |         |         |         |
6+50       0.0258      0.08  Q     V   |         |         |         |
6+55       0.0264      0.08  Q     V   |         |         |         |
7+ 0       0.0269      0.08  Q     V   |         |         |         |
7+ 5       0.0275      0.08  Q     V   |         |         |         |
7+10       0.0281      0.08  Q     V   |         |         |         |
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 7+15       0.0286      0.08  Q     V   |         |         |         |
 7+20       0.0293      0.09  Q     V   |         |         |         |
 7+25       0.0299      0.09  Q      V  |         |         |         |
 7+30       0.0305      0.09  Q      V  |         |         |         |
 7+35       0.0312      0.10  Q      V  |         |         |         |
 7+40       0.0319      0.10  Q      V  |         |         |         |
 7+45       0.0325      0.10  Q      V  |         |         |         |
 7+50       0.0333      0.11  Q      V  |         |         |         |
 7+55       0.0340      0.11  Q      V  |         |         |         |
 8+ 0       0.0347      0.11  Q       V |         |         |         |
 8+ 5       0.0356      0.12  Q       V |         |         |         |
 8+10       0.0364      0.12  Q       V |         |         |         |
 8+15       0.0373      0.12  Q       V |         |         |         |
 8+20       0.0381      0.12  Q       V |         |         |         |
 8+25       0.0390      0.12  Q        V|         |         |         |
 8+30       0.0398      0.12  Q        V|         |         |         |
 8+35       0.0407      0.13  Q        V|         |         |         |
 8+40       0.0416      0.13  Q        V|         |         |         |
 8+45       0.0425      0.13  Q        V|         |         |         |
 8+50       0.0435      0.14  Q         V         |         |         |
 8+55       0.0444      0.14  Q         V         |         |         |
 9+ 0       0.0454      0.14  Q         V         |         |         |
 9+ 5       0.0465      0.15  Q         V         |         |         |
 9+10       0.0475      0.16  Q         |V        |         |         |
 9+15       0.0486      0.16  Q         |V        |         |         |
 9+20       0.0497      0.16  Q         |V        |         |         |
 9+25       0.0509      0.16  Q         |V        |         |         |
 9+30       0.0520      0.16  Q         | V       |         |         |
 9+35       0.0532      0.17  Q         | V       |         |         |
 9+40       0.0544      0.17  Q         | V       |         |         |
 9+45       0.0556      0.17  Q         |  V      |         |         |
 9+50       0.0568      0.18  Q         |  V      |         |         |
 9+55       0.0581      0.18  Q         |  V      |         |         |
10+ 0       0.0593      0.18  Q         |  V      |         |         |
10+ 5       0.0602      0.14  Q         |   V     |         |         |
10+10       0.0611      0.12  Q         |   V     |         |         |
10+15       0.0619      0.12  Q         |   V     |         |         |
10+20       0.0628      0.12  Q         |   V     |         |         |
10+25       0.0636      0.12  Q         |   V     |         |         |
10+30       0.0645      0.12  Q         |    V    |         |         |
10+35       0.0656      0.16  Q         |    V    |         |         |
10+40       0.0667      0.16  Q         |    V    |         |         |
10+45       0.0678      0.16  Q         |    V    |         |         |
10+50       0.0690      0.16  Q         |     V   |         |         |
10+55       0.0701      0.16  Q         |     V   |         |         |
11+ 0       0.0712      0.16  Q         |     V   |         |         |
11+ 5       0.0723      0.16  Q         |      V  |         |         |
11+10       0.0734      0.16  Q         |      V  |         |         |
11+15       0.0745      0.16  Q         |      V  |         |         |
11+20       0.0756      0.16  Q         |      V  |         |         |
11+25       0.0766      0.16  Q         |       V |         |         |
11+30       0.0777      0.16  Q         |       V |         |         |
11+35       0.0787      0.14  Q         |       V |         |         |
11+40       0.0797      0.14  Q         |       V |         |         |
11+45       0.0806      0.14  Q         |       V |         |         |
11+50       0.0816      0.15  Q         |        V|         |         |
11+55       0.0827      0.15  Q         |        V|         |         |
12+ 0       0.0837      0.15  Q         |        V|         |         |
12+ 5       0.0850      0.19  Q         |        V|         |         |
12+10       0.0864      0.21  Q         |         V         |         |
12+15       0.0879      0.21  Q         |         V         |         |
12+20       0.0893      0.21  Q         |         V         |         |
12+25       0.0908      0.21  Q         |         |V        |         |
12+30       0.0923      0.21  Q         |         |V        |         |
12+35       0.0938      0.23  Q         |         | V       |         |
12+40       0.0954      0.23  Q         |         | V       |         |
12+45       0.0970      0.23  Q         |         | V       |         |
12+50       0.0986      0.24  Q         |         |  V      |         |
12+55       0.1003      0.24  Q         |         |  V      |         |
13+ 0       0.1019      0.24  Q         |         |  V      |         |
13+ 5       0.1038      0.27  |Q        |         |   V     |         |
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13+10       0.1057      0.28  |Q        |         |   V     |         |
13+15       0.1077      0.28  |Q        |         |    V    |         |
13+20       0.1096      0.28  |Q        |         |    V    |         |
13+25       0.1115      0.28  |Q        |         |     V   |         |
13+30       0.1134      0.28  |Q        |         |     V   |         |
13+35       0.1149      0.21  Q         |         |      V  |         |
13+40       0.1162      0.19  Q         |         |      V  |         |
13+45       0.1175      0.19  Q         |         |      V  |         |
13+50       0.1188      0.19  Q         |         |      V  |         |
13+55       0.1201      0.19  Q         |         |       V |         |
14+ 0       0.1214      0.19  Q         |         |       V |         |
14+ 5       0.1229      0.22  Q         |         |       V |         |
14+10       0.1244      0.22  Q         |         |        V|         |
14+15       0.1259      0.22  Q         |         |        V|         |
14+20       0.1274      0.22  Q         |         |        V|         |
14+25       0.1289      0.21  Q         |         |         V         |
14+30       0.1304      0.21  Q         |         |         V         |
14+35       0.1319      0.21  Q         |         |         V         |
14+40       0.1333      0.21  Q         |         |         |V        |
14+45       0.1348      0.21  Q         |         |         |V        |
14+50       0.1362      0.21  Q         |         |         | V       |
14+55       0.1377      0.21  Q         |         |         | V       |
15+ 0       0.1391      0.21  Q         |         |         | V       |
15+ 5       0.1404      0.20  Q         |         |         |  V      |
15+10       0.1418      0.20  Q         |         |         |  V      |
15+15       0.1432      0.20  Q         |         |         |  V      |
15+20       0.1445      0.19  Q         |         |         |  V      |
15+25       0.1458      0.19  Q         |         |         |   V     |
15+30       0.1471      0.19  Q         |         |         |   V     |
15+35       0.1482      0.16  Q         |         |         |   V     |
15+40       0.1493      0.16  Q         |         |         |    V    |
15+45       0.1504      0.16  Q         |         |         |    V    |
15+50       0.1514      0.16  Q         |         |         |    V    |
15+55       0.1525      0.16  Q         |         |         |    V    |
16+ 0       0.1536      0.16  Q         |         |         |     V   |
16+ 5       0.1540      0.06  Q         |         |         |     V   |
16+10       0.1542      0.03  Q         |         |         |     V   |
16+15       0.1545      0.03  Q         |         |         |     V   |
16+20       0.1547      0.03  Q         |         |         |     V   |
16+25       0.1549      0.03  Q         |         |         |     V   |
16+30       0.1551      0.03  Q         |         |         |     V   |
16+35       0.1553      0.03  Q         |         |         |     V   |
16+40       0.1555      0.02  Q         |         |         |     V   |
16+45       0.1557      0.02  Q         |         |         |     V   |
16+50       0.1558      0.02  Q         |         |         |     V   |
16+55       0.1560      0.02  Q         |         |         |     V   |
17+ 0       0.1562      0.02  Q         |         |         |     V   |
17+ 5       0.1564      0.04  Q         |         |         |     V   |
17+10       0.1567      0.04  Q         |         |         |     V   |
17+15       0.1570      0.04  Q         |         |         |     V   |
17+20       0.1573      0.04  Q         |         |         |     V   |
17+25       0.1576      0.04  Q         |         |         |      V  |
17+30       0.1578      0.04  Q         |         |         |      V  |
17+35       0.1581      0.04  Q         |         |         |      V  |
17+40       0.1584      0.04  Q         |         |         |      V  |
17+45       0.1587      0.04  Q         |         |         |      V  |
17+50       0.1589      0.03  Q         |         |         |      V  |
17+55       0.1592      0.03  Q         |         |         |      V  |
18+ 0       0.1594      0.03  Q         |         |         |      V  |
18+ 5       0.1596      0.03  Q         |         |         |      V  |
18+10       0.1598      0.03  Q         |         |         |      V  |
18+15       0.1601      0.03  Q         |         |         |      V  |
18+20       0.1603      0.03  Q         |         |         |      V  |
18+25       0.1605      0.03  Q         |         |         |      V  |
18+30       0.1607      0.03  Q         |         |         |      V  |
18+35       0.1609      0.03  Q         |         |         |      V  |
18+40       0.1611      0.02  Q         |         |         |      V  |
18+45       0.1613      0.02  Q         |         |         |      V  |
18+50       0.1614      0.02  Q         |         |         |      V  |
18+55       0.1615      0.02  Q         |         |         |      V  |
19+ 0       0.1616      0.02  Q         |         |         |      V  |
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   19+ 5       0.1618      0.02  Q          |         |         |       V |
   19+10       0.1619      0.02  Q          |         |         |       V |
   19+15       0.1621      0.02  Q          |         |         |       V |
   19+20       0.1623      0.03  Q          |         |         |       V |
   19+25       0.1626      0.03  Q          |         |         |       V |
   19+30       0.1628      0.03  Q          |         |         |       V |
   19+35       0.1630      0.03  Q          |         |         |       V |
   19+40       0.1631      0.02  Q          |         |         |       V |
   19+45       0.1633      0.02  Q          |         |         |       V |
   19+50       0.1634      0.02  Q          |         |         |       V |
   19+55       0.1635      0.02  Q          |         |         |       V |
   20+ 0       0.1637      0.02  Q          |         |         |       V |
   20+ 5       0.1638      0.02  Q          |         |         |       V |
   20+10       0.1640      0.02  Q          |         |         |       V |
   20+15       0.1642      0.02  Q          |         |         |       V |
   20+20       0.1643      0.02  Q          |         |         |       V |
   20+25       0.1645      0.02  Q          |         |         |       V |
   20+30       0.1647      0.02  Q          |         |         |       V |
   20+35       0.1648      0.02  Q          |         |         |       V |
   20+40       0.1650      0.02  Q          |         |         |       V |
   20+45       0.1652      0.02  Q          |         |         |       V |
   20+50       0.1653      0.02  Q          |         |         |       V |
   20+55       0.1654      0.02  Q          |         |         |       V |
   21+ 0       0.1655      0.02  Q          |         |         |       V |
   21+ 5       0.1657      0.02  Q          |         |         |       V |
   21+10       0.1659      0.02  Q          |         |         |       V |
   21+15       0.1660      0.02  Q          |         |         |        V|
   21+20       0.1662      0.02  Q          |         |         |        V|
   21+25       0.1663      0.02  Q          |         |         |        V|
   21+30       0.1664      0.02  Q          |         |         |        V|
   21+35       0.1665      0.02  Q          |         |         |        V|
   21+40       0.1667      0.02  Q          |         |         |        V|
   21+45       0.1669      0.02  Q          |         |         |        V|
   21+50       0.1670      0.02  Q          |         |         |        V|
   21+55       0.1671      0.02  Q          |         |         |        V|
   22+ 0       0.1672      0.02  Q          |         |         |        V|
   22+ 5       0.1674      0.02  Q          |         |         |        V|
   22+10       0.1676      0.02  Q          |         |         |        V|
   22+15       0.1677      0.02  Q          |         |         |        V|
   22+20       0.1679      0.02  Q          |         |         |        V|
   22+25       0.1680      0.02  Q          |         |         |        V|
   22+30       0.1681      0.02  Q          |         |         |        V|
   22+35       0.1682      0.02  Q          |         |         |        V|
   22+40       0.1683      0.02  Q          |         |         |        V|
   22+45       0.1684      0.02  Q          |         |         |        V|
   22+50       0.1685      0.02  Q          |         |         |        V|
   22+55       0.1687      0.02  Q          |         |         |        V|
   23+ 0       0.1688      0.02  Q          |         |         |        V|
   23+ 5       0.1689      0.02  Q          |         |         |        V|
   23+10       0.1690      0.02  Q          |         |         |        V|
   23+15       0.1691      0.02  Q          |         |         |        V|
   23+20       0.1692      0.02  Q          |         |         |        V|
   23+25       0.1693      0.02  Q          |         |         |        V|
   23+30       0.1694      0.02  Q          |         |         |        V|
   23+35       0.1696      0.02  Q          |         |         |        V|
   23+40       0.1697      0.02  Q          |         |         |        V|
   23+45       0.1698      0.02  Q          |         |         |        V|
   23+50       0.1699      0.02  Q          |         |         |        V|
   23+55       0.1700      0.02  Q          |         |         |        V|
   24+ 0       0.1701      0.02  Q          |         |         |        V|
   24+ 5       0.1701      0.00  Q          |         |         |         V
-----------------------------------------------------------------------
```

```
       U n i t   H y d r o g r a p h    A n a l y s i s

       Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2012, Version 8.2
               Study date  06/04/21 File: 19400p002y24hC242.out

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------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6310

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
19-400
PROPOSED CONDITION
2-YEAR, 24-HOUR
AREA C
--------------------------------------------------------------------
Drainage Area =       0.83(Ac.)  =      0.001 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       0.83(Ac.)  =      0.001 Sq. Mi.
Length along longest watercourse =     896.00(Ft.)
Length along longest watercourse measured to centroid =     320.00(Ft.)
Length along longest watercourse =      0.170 Mi.
Length along longest watercourse measured to centroid =      0.061 Mi.
Difference in elevation =      12.80(Ft.)
Slope along watercourse =     75.4286 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.028 Hr.
Lag time =     1.67 Min.
25% of lag time =     0.42 Min.
40% of lag time =     0.67 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        0.83           2.50                   2.07

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        0.83           6.00                   4.98

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    2.500(In)
Area Averaged 100-Year Rainfall =    6.000(In)

Point rain (area averaged) =    2.500(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    2.500(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     0.830           69.00         0.900
 Total Area Entered =      0.83(Ac.)
```

```
       RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
       AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
       69.0  49.8      0.574     0.900        0.109      1.000       0.109
                                                         Sum (F) =   0.109
       Area averaged mean soil loss (F) (In/Hr) =  0.109
       Minimum soil loss rate ((In/Hr)) =  0.055
       (for 24 hour storm duration)
       Soil low loss rate (decimal) =   0.180
       ---------------------------------------------------------------------

                      U n i t  H y d r o g r a p h
                             VALLEY S-Curve
       --------------------------------------------------------------------
                      Unit Hydrograph Data
       ---------------------------------------------------------------------
       Unit time period   Time % of lag   Distribution   Unit Hydrograph
           (hrs)                           Graph %           (CFS)
       ---------------------------------------------------------------------
           1   0.083        299.651         56.644            0.474
           2   0.167        599.302         37.148            0.311
           3   0.250        898.953          6.208            0.052
                                     Sum = 100.000   Sum=       0.836
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max     |    Low         (In/Hr)
   1   0.08     0.07      0.020           (  0.193)      0.004        0.016
   2   0.17     0.07      0.020           (  0.193)      0.004        0.016
   3   0.25     0.07      0.020           (  0.192)      0.004        0.016
   4   0.33     0.10      0.030           (  0.191)      0.005        0.025
   5   0.42     0.10      0.030           (  0.190)      0.005        0.025
   6   0.50     0.10      0.030           (  0.190)      0.005        0.025
   7   0.58     0.10      0.030           (  0.189)      0.005        0.025
   8   0.67     0.10      0.030           (  0.188)      0.005        0.025
   9   0.75     0.10      0.030           (  0.187)      0.005        0.025
  10   0.83     0.13      0.040           (  0.187)      0.007        0.033
  11   0.92     0.13      0.040           (  0.186)      0.007        0.033
  12   1.00     0.13      0.040           (  0.185)      0.007        0.033
  13   1.08     0.10      0.030           (  0.184)      0.005        0.025
  14   1.17     0.10      0.030           (  0.184)      0.005        0.025
  15   1.25     0.10      0.030           (  0.183)      0.005        0.025
  16   1.33     0.10      0.030           (  0.182)      0.005        0.025
  17   1.42     0.10      0.030           (  0.182)      0.005        0.025
  18   1.50     0.10      0.030           (  0.181)      0.005        0.025
  19   1.58     0.10      0.030           (  0.180)      0.005        0.025
  20   1.67     0.10      0.030           (  0.179)      0.005        0.025
  21   1.75     0.10      0.030           (  0.179)      0.005        0.025
  22   1.83     0.13      0.040           (  0.178)      0.007        0.033
  23   1.92     0.13      0.040           (  0.177)      0.007        0.033
  24   2.00     0.13      0.040           (  0.176)      0.007        0.033
  25   2.08     0.13      0.040           (  0.176)      0.007        0.033
  26   2.17     0.13      0.040           (  0.175)      0.007        0.033
  27   2.25     0.13      0.040           (  0.174)      0.007        0.033
  28   2.33     0.13      0.040           (  0.174)      0.007        0.033
  29   2.42     0.13      0.040           (  0.173)      0.007        0.033
  30   2.50     0.13      0.040           (  0.172)      0.007        0.033
  31   2.58     0.17      0.050           (  0.172)      0.009        0.041
  32   2.67     0.17      0.050           (  0.171)      0.009        0.041
  33   2.75     0.17      0.050           (  0.170)      0.009        0.041
  34   2.83     0.17      0.050           (  0.169)      0.009        0.041
  35   2.92     0.17      0.050           (  0.169)      0.009        0.041
  36   3.00     0.17      0.050           (  0.168)      0.009        0.041
  37   3.08     0.17      0.050           (  0.167)      0.009        0.041
  38   3.17     0.17      0.050           (  0.167)      0.009        0.041
  39   3.25     0.17      0.050           (  0.166)      0.009        0.041
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  40   3.33     0.17      0.050       (  0.165)       0.009        0.041
  41   3.42     0.17      0.050       (  0.165)       0.009        0.041
  42   3.50     0.17      0.050       (  0.164)       0.009        0.041
  43   3.58     0.17      0.050       (  0.163)       0.009        0.041
  44   3.67     0.17      0.050       (  0.162)       0.009        0.041
  45   3.75     0.17      0.050       (  0.162)       0.009        0.041
  46   3.83     0.20      0.060       (  0.161)       0.011        0.049
  47   3.92     0.20      0.060       (  0.160)       0.011        0.049
  48   4.00     0.20      0.060       (  0.160)       0.011        0.049
  49   4.08     0.20      0.060       (  0.159)       0.011        0.049
  50   4.17     0.20      0.060       (  0.158)       0.011        0.049
  51   4.25     0.20      0.060       (  0.158)       0.011        0.049
  52   4.33     0.23      0.070       (  0.157)       0.013        0.057
  53   4.42     0.23      0.070       (  0.156)       0.013        0.057
  54   4.50     0.23      0.070       (  0.156)       0.013        0.057
  55   4.58     0.23      0.070       (  0.155)       0.013        0.057
  56   4.67     0.23      0.070       (  0.154)       0.013        0.057
  57   4.75     0.23      0.070       (  0.154)       0.013        0.057
  58   4.83     0.27      0.080       (  0.153)       0.014        0.066
  59   4.92     0.27      0.080       (  0.152)       0.014        0.066
  60   5.00     0.27      0.080       (  0.152)       0.014        0.066
  61   5.08     0.20      0.060       (  0.151)       0.011        0.049
  62   5.17     0.20      0.060       (  0.150)       0.011        0.049
  63   5.25     0.20      0.060       (  0.150)       0.011        0.049
  64   5.33     0.23      0.070       (  0.149)       0.013        0.057
  65   5.42     0.23      0.070       (  0.148)       0.013        0.057
  66   5.50     0.23      0.070       (  0.148)       0.013        0.057
  67   5.58     0.27      0.080       (  0.147)       0.014        0.066
  68   5.67     0.27      0.080       (  0.147)       0.014        0.066
  69   5.75     0.27      0.080       (  0.146)       0.014        0.066
  70   5.83     0.27      0.080       (  0.145)       0.014        0.066
  71   5.92     0.27      0.080       (  0.145)       0.014        0.066
  72   6.00     0.27      0.080       (  0.144)       0.014        0.066
  73   6.08     0.30      0.090       (  0.143)       0.016        0.074
  74   6.17     0.30      0.090       (  0.143)       0.016        0.074
  75   6.25     0.30      0.090       (  0.142)       0.016        0.074
  76   6.33     0.30      0.090       (  0.141)       0.016        0.074
  77   6.42     0.30      0.090       (  0.141)       0.016        0.074
  78   6.50     0.30      0.090       (  0.140)       0.016        0.074
  79   6.58     0.33      0.100       (  0.140)       0.018        0.082
  80   6.67     0.33      0.100       (  0.139)       0.018        0.082
  81   6.75     0.33      0.100       (  0.138)       0.018        0.082
  82   6.83     0.33      0.100       (  0.138)       0.018        0.082
  83   6.92     0.33      0.100       (  0.137)       0.018        0.082
  84   7.00     0.33      0.100       (  0.136)       0.018        0.082
  85   7.08     0.33      0.100       (  0.136)       0.018        0.082
  86   7.17     0.33      0.100       (  0.135)       0.018        0.082
  87   7.25     0.33      0.100       (  0.135)       0.018        0.082
  88   7.33     0.37      0.110       (  0.134)       0.020        0.090
  89   7.42     0.37      0.110       (  0.133)       0.020        0.090
  90   7.50     0.37      0.110       (  0.133)       0.020        0.090
  91   7.58     0.40      0.120       (  0.132)       0.022        0.098
  92   7.67     0.40      0.120       (  0.131)       0.022        0.098
  93   7.75     0.40      0.120       (  0.131)       0.022        0.098
  94   7.83     0.43      0.130       (  0.130)       0.023        0.107
  95   7.92     0.43      0.130       (  0.130)       0.023        0.107
  96   8.00     0.43      0.130       (  0.129)       0.023        0.107
  97   8.08     0.50      0.150       (  0.128)       0.027        0.123
  98   8.17     0.50      0.150       (  0.128)       0.027        0.123
  99   8.25     0.50      0.150       (  0.127)       0.027        0.123
 100   8.33     0.50      0.150       (  0.127)       0.027        0.123
 101   8.42     0.50      0.150       (  0.126)       0.027        0.123
 102   8.50     0.50      0.150       (  0.125)       0.027        0.123
 103   8.58     0.53      0.160       (  0.125)       0.029        0.131
 104   8.67     0.53      0.160       (  0.124)       0.029        0.131
 105   8.75     0.53      0.160       (  0.124)       0.029        0.131
 106   8.83     0.57      0.170       (  0.123)       0.031        0.139
 107   8.92     0.57      0.170       (  0.123)       0.031        0.139
 108   9.00     0.57      0.170       (  0.122)       0.031        0.139
 109   9.08     0.63      0.190       (  0.121)       0.034        0.156
 110   9.17     0.63      0.190       (  0.121)       0.034        0.156
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111   9.25     0.63      0.190       (  0.120)       0.034         0.156
112   9.33     0.67      0.200       (  0.120)       0.036         0.164
113   9.42     0.67      0.200       (  0.119)       0.036         0.164
114   9.50     0.67      0.200       (  0.119)       0.036         0.164
115   9.58     0.70      0.210       (  0.118)       0.038         0.172
116   9.67     0.70      0.210       (  0.117)       0.038         0.172
117   9.75     0.70      0.210       (  0.117)       0.038         0.172
118   9.83     0.73      0.220       (  0.116)       0.040         0.180
119   9.92     0.73      0.220       (  0.116)       0.040         0.180
120  10.00     0.73      0.220       (  0.115)       0.040         0.180
121  10.08     0.50      0.150       (  0.115)       0.027         0.123
122  10.17     0.50      0.150       (  0.114)       0.027         0.123
123  10.25     0.50      0.150       (  0.113)       0.027         0.123
124  10.33     0.50      0.150       (  0.113)       0.027         0.123
125  10.42     0.50      0.150       (  0.112)       0.027         0.123
126  10.50     0.50      0.150       (  0.112)       0.027         0.123
127  10.58     0.67      0.200       (  0.111)       0.036         0.164
128  10.67     0.67      0.200       (  0.111)       0.036         0.164
129  10.75     0.67      0.200       (  0.110)       0.036         0.164
130  10.83     0.67      0.200       (  0.110)       0.036         0.164
131  10.92     0.67      0.200       (  0.109)       0.036         0.164
132  11.00     0.67      0.200       (  0.109)       0.036         0.164
133  11.08     0.63      0.190       (  0.108)       0.034         0.156
134  11.17     0.63      0.190       (  0.108)       0.034         0.156
135  11.25     0.63      0.190       (  0.107)       0.034         0.156
136  11.33     0.63      0.190       (  0.106)       0.034         0.156
137  11.42     0.63      0.190       (  0.106)       0.034         0.156
138  11.50     0.63      0.190       (  0.105)       0.034         0.156
139  11.58     0.57      0.170       (  0.105)       0.031         0.139
140  11.67     0.57      0.170       (  0.104)       0.031         0.139
141  11.75     0.57      0.170       (  0.104)       0.031         0.139
142  11.83     0.60      0.180       (  0.103)       0.032         0.148
143  11.92     0.60      0.180       (  0.103)       0.032         0.148
144  12.00     0.60      0.180       (  0.102)       0.032         0.148
145  12.08     0.83      0.250       (  0.102)       0.045         0.205
146  12.17     0.83      0.250       (  0.101)       0.045         0.205
147  12.25     0.83      0.250       (  0.101)       0.045         0.205
148  12.33     0.87      0.260       (  0.100)       0.047         0.213
149  12.42     0.87      0.260       (  0.100)       0.047         0.213
150  12.50     0.87      0.260       (  0.099)       0.047         0.213
151  12.58     0.93      0.280       (  0.099)       0.050         0.230
152  12.67     0.93      0.280       (  0.098)       0.050         0.230
153  12.75     0.93      0.280       (  0.098)       0.050         0.230
154  12.83     0.97      0.290       (  0.097)       0.052         0.238
155  12.92     0.97      0.290       (  0.097)       0.052         0.238
156  13.00     0.97      0.290       (  0.096)       0.052         0.238
157  13.08     1.13      0.340       (  0.096)       0.061         0.279
158  13.17     1.13      0.340       (  0.095)       0.061         0.279
159  13.25     1.13      0.340       (  0.095)       0.061         0.279
160  13.33     1.13      0.340       (  0.094)       0.061         0.279
161  13.42     1.13      0.340       (  0.094)       0.061         0.279
162  13.50     1.13      0.340       (  0.093)       0.061         0.279
163  13.58     0.77      0.230       (  0.093)       0.041         0.189
164  13.67     0.77      0.230       (  0.092)       0.041         0.189
165  13.75     0.77      0.230       (  0.092)       0.041         0.189
166  13.83     0.77      0.230       (  0.092)       0.041         0.189
167  13.92     0.77      0.230       (  0.091)       0.041         0.189
168  14.00     0.77      0.230       (  0.091)       0.041         0.189
169  14.08     0.90      0.270       (  0.090)       0.049         0.221
170  14.17     0.90      0.270       (  0.090)       0.049         0.221
171  14.25     0.90      0.270       (  0.089)       0.049         0.221
172  14.33     0.87      0.260       (  0.089)       0.047         0.213
173  14.42     0.87      0.260       (  0.088)       0.047         0.213
174  14.50     0.87      0.260       (  0.088)       0.047         0.213
175  14.58     0.87      0.260       (  0.087)       0.047         0.213
176  14.67     0.87      0.260       (  0.087)       0.047         0.213
177  14.75     0.87      0.260       (  0.086)       0.047         0.213
178  14.83     0.83      0.250       (  0.086)       0.045         0.205
179  14.92     0.83      0.250       (  0.086)       0.045         0.205
180  15.00     0.83      0.250       (  0.085)       0.045         0.205
181  15.08     0.80      0.240       (  0.085)       0.043         0.197
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182  15.17     0.80      0.240       (  0.084)       0.043        0.197
183  15.25     0.80      0.240       (  0.084)       0.043        0.197
184  15.33     0.77      0.230       (  0.083)       0.041        0.189
185  15.42     0.77      0.230       (  0.083)       0.041        0.189
186  15.50     0.77      0.230       (  0.083)       0.041        0.189
187  15.58     0.63      0.190       (  0.082)       0.034        0.156
188  15.67     0.63      0.190       (  0.082)       0.034        0.156
189  15.75     0.63      0.190       (  0.081)       0.034        0.156
190  15.83     0.63      0.190       (  0.081)       0.034        0.156
191  15.92     0.63      0.190       (  0.080)       0.034        0.156
192  16.00     0.63      0.190       (  0.080)       0.034        0.156
193  16.08     0.13      0.040       (  0.080)       0.007        0.033
194  16.17     0.13      0.040       (  0.079)       0.007        0.033
195  16.25     0.13      0.040       (  0.079)       0.007        0.033
196  16.33     0.13      0.040       (  0.078)       0.007        0.033
197  16.42     0.13      0.040       (  0.078)       0.007        0.033
198  16.50     0.13      0.040       (  0.078)       0.007        0.033
199  16.58     0.10      0.030       (  0.077)       0.005        0.025
200  16.67     0.10      0.030       (  0.077)       0.005        0.025
201  16.75     0.10      0.030       (  0.076)       0.005        0.025
202  16.83     0.10      0.030       (  0.076)       0.005        0.025
203  16.92     0.10      0.030       (  0.076)       0.005        0.025
204  17.00     0.10      0.030       (  0.075)       0.005        0.025
205  17.08     0.17      0.050       (  0.075)       0.009        0.041
206  17.17     0.17      0.050       (  0.075)       0.009        0.041
207  17.25     0.17      0.050       (  0.074)       0.009        0.041
208  17.33     0.17      0.050       (  0.074)       0.009        0.041
209  17.42     0.17      0.050       (  0.073)       0.009        0.041
210  17.50     0.17      0.050       (  0.073)       0.009        0.041
211  17.58     0.17      0.050       (  0.073)       0.009        0.041
212  17.67     0.17      0.050       (  0.072)       0.009        0.041
213  17.75     0.17      0.050       (  0.072)       0.009        0.041
214  17.83     0.13      0.040       (  0.072)       0.007        0.033
215  17.92     0.13      0.040       (  0.071)       0.007        0.033
216  18.00     0.13      0.040       (  0.071)       0.007        0.033
217  18.08     0.13      0.040       (  0.071)       0.007        0.033
218  18.17     0.13      0.040       (  0.070)       0.007        0.033
219  18.25     0.13      0.040       (  0.070)       0.007        0.033
220  18.33     0.13      0.040       (  0.070)       0.007        0.033
221  18.42     0.13      0.040       (  0.069)       0.007        0.033
222  18.50     0.13      0.040       (  0.069)       0.007        0.033
223  18.58     0.10      0.030       (  0.069)       0.005        0.025
224  18.67     0.10      0.030       (  0.068)       0.005        0.025
225  18.75     0.10      0.030       (  0.068)       0.005        0.025
226  18.83     0.07      0.020       (  0.068)       0.004        0.016
227  18.92     0.07      0.020       (  0.067)       0.004        0.016
228  19.00     0.07      0.020       (  0.067)       0.004        0.016
229  19.08     0.10      0.030       (  0.067)       0.005        0.025
230  19.17     0.10      0.030       (  0.066)       0.005        0.025
231  19.25     0.10      0.030       (  0.066)       0.005        0.025
232  19.33     0.13      0.040       (  0.066)       0.007        0.033
233  19.42     0.13      0.040       (  0.065)       0.007        0.033
234  19.50     0.13      0.040       (  0.065)       0.007        0.033
235  19.58     0.10      0.030       (  0.065)       0.005        0.025
236  19.67     0.10      0.030       (  0.064)       0.005        0.025
237  19.75     0.10      0.030       (  0.064)       0.005        0.025
238  19.83     0.07      0.020       (  0.064)       0.004        0.016
239  19.92     0.07      0.020       (  0.064)       0.004        0.016
240  20.00     0.07      0.020       (  0.063)       0.004        0.016
241  20.08     0.10      0.030       (  0.063)       0.005        0.025
242  20.17     0.10      0.030       (  0.063)       0.005        0.025
243  20.25     0.10      0.030       (  0.062)       0.005        0.025
244  20.33     0.10      0.030       (  0.062)       0.005        0.025
245  20.42     0.10      0.030       (  0.062)       0.005        0.025
246  20.50     0.10      0.030       (  0.062)       0.005        0.025
247  20.58     0.10      0.030       (  0.061)       0.005        0.025
248  20.67     0.10      0.030       (  0.061)       0.005        0.025
249  20.75     0.10      0.030       (  0.061)       0.005        0.025
250  20.83     0.07      0.020       (  0.061)       0.004        0.016
251  20.92     0.07      0.020       (  0.060)       0.004        0.016
252  21.00     0.07      0.020       (  0.060)       0.004        0.016
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253  21.08     0.10      0.030       (  0.060)       0.005        0.025
254  21.17     0.10      0.030       (  0.060)       0.005        0.025
255  21.25     0.10      0.030       (  0.059)       0.005        0.025
256  21.33     0.07      0.020       (  0.059)       0.004        0.016
257  21.42     0.07      0.020       (  0.059)       0.004        0.016
258  21.50     0.07      0.020       (  0.059)       0.004        0.016
259  21.58     0.10      0.030       (  0.059)       0.005        0.025
260  21.67     0.10      0.030       (  0.058)       0.005        0.025
261  21.75     0.10      0.030       (  0.058)       0.005        0.025
262  21.83     0.07      0.020       (  0.058)       0.004        0.016
263  21.92     0.07      0.020       (  0.058)       0.004        0.016
264  22.00     0.07      0.020       (  0.058)       0.004        0.016
265  22.08     0.10      0.030       (  0.057)       0.005        0.025
266  22.17     0.10      0.030       (  0.057)       0.005        0.025
267  22.25     0.10      0.030       (  0.057)       0.005        0.025
268  22.33     0.07      0.020       (  0.057)       0.004        0.016
269  22.42     0.07      0.020       (  0.057)       0.004        0.016
270  22.50     0.07      0.020       (  0.057)       0.004        0.016
271  22.58     0.07      0.020       (  0.056)       0.004        0.016
272  22.67     0.07      0.020       (  0.056)       0.004        0.016
273  22.75     0.07      0.020       (  0.056)       0.004        0.016
274  22.83     0.07      0.020       (  0.056)       0.004        0.016
275  22.92     0.07      0.020       (  0.056)       0.004        0.016
276  23.00     0.07      0.020       (  0.056)       0.004        0.016
277  23.08     0.07      0.020       (  0.055)       0.004        0.016
278  23.17     0.07      0.020       (  0.055)       0.004        0.016
279  23.25     0.07      0.020       (  0.055)       0.004        0.016
280  23.33     0.07      0.020       (  0.055)       0.004        0.016
281  23.42     0.07      0.020       (  0.055)       0.004        0.016
282  23.50     0.07      0.020       (  0.055)       0.004        0.016
283  23.58     0.07      0.020       (  0.055)       0.004        0.016
284  23.67     0.07      0.020       (  0.055)       0.004        0.016
285  23.75     0.07      0.020       (  0.055)       0.004        0.016
286  23.83     0.07      0.020       (  0.055)       0.004        0.016
287  23.92     0.07      0.020       (  0.055)       0.004        0.016
288  24.00     0.07      0.020       (  0.055)       0.004        0.016
              (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    24.6
      Flood volume = Effective rainfall      2.05(In)
       times area       0.8(Ac.)/[(In)/(Ft.)] =       0.1(Ac.Ft)
      Total soil loss =      0.45(In)
      Total soil loss =     0.031(Ac.Ft)
      Total rainfall =      2.50(In)
      Flood volume =        6176.4 Cubic Feet
      Total soil loss =        1355.8 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.233(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 -----------------------------------------------------------------------
   0+ 5       0.0001      0.01  Q         |         |         |         |
   0+10       0.0001      0.01  Q         |         |         |         |
   0+15       0.0002      0.01  Q         |         |         |         |
   0+20       0.0004      0.02  Q         |         |         |         |
   0+25       0.0005      0.02  Q         |         |         |         |
   0+30       0.0006      0.02  Q         |         |         |         |
   0+35       0.0008      0.02  Q         |         |         |         |
   0+40       0.0009      0.02  Q         |         |         |         |
   0+45       0.0011      0.02  Q         |         |         |         |
   0+50       0.0012      0.02  Q         |         |         |         |
   0+55       0.0014      0.03  Q         |         |         |         |
   1+ 0       0.0016      0.03  Q         |         |         |         |
   1+ 5       0.0018      0.02  Q         |         |         |         |
   1+10       0.0019      0.02  Q         |         |         |         |
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1+15       0.0021      0.02  Q         |         |         |         |
1+20       0.0022      0.02  Q         |         |         |         |
1+25       0.0023      0.02  Q         |         |         |         |
1+30       0.0025      0.02  Q         |         |         |         |
1+35       0.0026      0.02  Q         |         |         |         |
1+40       0.0028      0.02  Q         |         |         |         |
1+45       0.0029      0.02  Q         |         |         |         |
1+50       0.0031      0.02  Q         |         |         |         |
1+55       0.0033      0.03  Q         |         |         |         |
2+ 0       0.0035      0.03  Q         |         |         |         |
2+ 5       0.0036      0.03  QV        |         |         |         |
2+10       0.0038      0.03  QV        |         |         |         |
2+15       0.0040      0.03  QV        |         |         |         |
2+20       0.0042      0.03  QV        |         |         |         |
2+25       0.0044      0.03  QV        |         |         |         |
2+30       0.0046      0.03  QV        |         |         |         |
2+35       0.0048      0.03  QV        |         |         |         |
2+40       0.0050      0.03  QV        |         |         |         |
2+45       0.0053      0.03  QV        |         |         |         |
2+50       0.0055      0.03  QV        |         |         |         |
2+55       0.0057      0.03  QV        |         |         |         |
3+ 0       0.0060      0.03  QV        |         |         |         |
3+ 5       0.0062      0.03  QV        |         |         |         |
3+10       0.0065      0.03  QV        |         |         |         |
3+15       0.0067      0.03  QV        |         |         |         |
3+20       0.0069      0.03  QV        |         |         |         |
3+25       0.0072      0.03  Q V       |         |         |         |
3+30       0.0074      0.03  Q V       |         |         |         |
3+35       0.0076      0.03  Q V       |         |         |         |
3+40       0.0079      0.03  Q V       |         |         |         |
3+45       0.0081      0.03  Q V       |         |         |         |
3+50       0.0084      0.04  Q V       |         |         |         |
3+55       0.0087      0.04  Q V       |         |         |         |
4+ 0       0.0089      0.04  Q V       |         |         |         |
4+ 5       0.0092      0.04  Q V       |         |         |         |
4+10       0.0095      0.04  Q V       |         |         |         |
4+15       0.0098      0.04  Q V       |         |         |         |
4+20       0.0101      0.05  Q V       |         |         |         |
4+25       0.0104      0.05  Q V       |         |         |         |
4+30       0.0108      0.05  Q  V      |         |         |         |
4+35       0.0111      0.05  Q  V      |         |         |         |
4+40       0.0114      0.05  Q  V      |         |         |         |
4+45       0.0117      0.05  Q  V      |         |         |         |
4+50       0.0121      0.05  Q  V      |         |         |         |
4+55       0.0125      0.05  Q  V      |         |         |         |
5+ 0       0.0129      0.05  Q  V      |         |         |         |
5+ 5       0.0132      0.05  Q  V      |         |         |         |
5+10       0.0135      0.04  Q  V      |         |         |         |
5+15       0.0138      0.04  Q  V      |         |         |         |
5+20       0.0141      0.05  Q  V      |         |         |         |
5+25       0.0144      0.05  Q   V     |         |         |         |
5+30       0.0147      0.05  Q   V     |         |         |         |
5+35       0.0151      0.05  Q   V     |         |         |         |
5+40       0.0155      0.05  Q   V     |         |         |         |
5+45       0.0158      0.05  Q   V     |         |         |         |
5+50       0.0162      0.05  Q   V     |         |         |         |
5+55       0.0166      0.05  Q   V     |         |         |         |
6+ 0       0.0170      0.05  Q   V     |         |         |         |
6+ 5       0.0174      0.06  Q   V     |         |         |         |
6+10       0.0178      0.06  Q    V    |         |         |         |
6+15       0.0182      0.06  Q    V    |         |         |         |
6+20       0.0186      0.06  Q    V    |         |         |         |
6+25       0.0191      0.06  Q    V    |         |         |         |
6+30       0.0195      0.06  Q    V    |         |         |         |
6+35       0.0200      0.07  Q    V    |         |         |         |
6+40       0.0204      0.07  Q    V    |         |         |         |
6+45       0.0209      0.07  Q    V    |         |         |         |
6+50       0.0214      0.07  Q     V   |         |         |         |
6+55       0.0218      0.07  Q     V   |         |         |         |
7+ 0       0.0223      0.07  Q     V   |         |         |         |
7+ 5       0.0228      0.07  Q     V   |         |         |         |
```

```
 7+10       0.0233      0.07  Q     V   |         |         |         |
 7+15       0.0237      0.07  Q     V   |         |         |         |
 7+20       0.0242      0.07  Q     V   |         |         |         |
 7+25       0.0247      0.08  Q     V   |         |         |         |
 7+30       0.0253      0.08  Q      V  |         |         |         |
 7+35       0.0258      0.08  Q      V  |         |         |         |
 7+40       0.0264      0.08  Q      V  |         |         |         |
 7+45       0.0269      0.08  Q      V  |         |         |         |
 7+50       0.0275      0.09  Q      V  |         |         |         |
 7+55       0.0281      0.09  Q      V  |         |         |         |
 8+ 0       0.0288      0.09  Q       V |         |         |         |
 8+ 5       0.0294      0.10  Q       V |         |         |         |
 8+10       0.0301      0.10  Q       V |         |         |         |
 8+15       0.0308      0.10  Q       V |         |         |         |
 8+20       0.0316      0.10  Q       V |         |         |         |
 8+25       0.0323      0.10  Q        V|         |         |         |
 8+30       0.0330      0.10  Q        V|         |         |         |
 8+35       0.0337      0.11  Q        V|         |         |         |
 8+40       0.0345      0.11  Q        V|         |         |         |
 8+45       0.0352      0.11  Q        V|         |         |         |
 8+50       0.0360      0.11  Q         V         |         |         |
 8+55       0.0368      0.12  Q         V         |         |         |
 9+ 0       0.0376      0.12  Q         V         |         |         |
 9+ 5       0.0385      0.12  Q         V         |         |         |
 9+10       0.0394      0.13  Q         |V        |         |         |
 9+15       0.0402      0.13  Q         |V        |         |         |
 9+20       0.0412      0.13  Q         |V        |         |         |
 9+25       0.0421      0.14  Q         |V        |         |         |
 9+30       0.0431      0.14  Q         | V       |         |         |
 9+35       0.0440      0.14  Q         | V       |         |         |
 9+40       0.0450      0.14  Q         | V       |         |         |
 9+45       0.0460      0.14  Q         | V       |         |         |
 9+50       0.0470      0.15  Q         |  V      |         |         |
 9+55       0.0481      0.15  Q         |  V      |         |         |
10+ 0       0.0491      0.15  Q         |  V      |         |         |
10+ 5       0.0500      0.12  Q         |   V     |         |         |
10+10       0.0507      0.11  Q         |   V     |         |         |
10+15       0.0514      0.10  Q         |   V     |         |         |
10+20       0.0521      0.10  Q         |   V     |         |         |
10+25       0.0528      0.10  Q         |   V     |         |         |
10+30       0.0535      0.10  Q         |    V    |         |         |
10+35       0.0544      0.12  Q         |    V    |         |         |
10+40       0.0553      0.14  Q         |    V    |         |         |
10+45       0.0562      0.14  Q         |    V    |         |         |
10+50       0.0572      0.14  Q         |     V   |         |         |
10+55       0.0581      0.14  Q         |     V   |         |         |
11+ 0       0.0591      0.14  Q         |     V   |         |         |
11+ 5       0.0600      0.13  Q         |     V   |         |         |
11+10       0.0609      0.13  Q         |      V  |         |         |
11+15       0.0618      0.13  Q         |      V  |         |         |
11+20       0.0627      0.13  Q         |      V  |         |         |
11+25       0.0636      0.13  Q         |      V  |         |         |
11+30       0.0645      0.13  Q         |       V |         |         |
11+35       0.0653      0.12  Q         |       V |         |         |
11+40       0.0661      0.12  Q         |       V |         |         |
11+45       0.0670      0.12  Q         |       V |         |         |
11+50       0.0678      0.12  Q         |        V|         |         |
11+55       0.0686      0.12  Q         |        V|         |         |
12+ 0       0.0695      0.12  Q         |        V|         |         |
12+ 5       0.0705      0.15  Q         |        V|         |         |
12+10       0.0717      0.17  Q         |         V         |         |
12+15       0.0729      0.17  Q         |         V         |         |
12+20       0.0741      0.18  Q         |         V         |         |
12+25       0.0753      0.18  Q         |         |V        |         |
12+30       0.0765      0.18  Q         |         |V        |         |
12+35       0.0778      0.19  Q         |         |V        |         |
12+40       0.0791      0.19  Q         |         | V       |         |
12+45       0.0804      0.19  Q         |         | V       |         |
12+50       0.0818      0.20  Q         |         |  V      |         |
12+55       0.0832      0.20  Q         |         |  V      |         |
13+ 0       0.0845      0.20  Q         |         |  V      |         |
```

```
13+ 5       0.0860      0.22  Q         |         |   V     |         |
13+10       0.0876      0.23  Q         |         |   V     |         |
13+15       0.0892      0.23  Q         |         |    V    |         |
13+20       0.0908      0.23  Q         |         |    V    |         |
13+25       0.0925      0.23  Q         |         |     V   |         |
13+30       0.0941      0.23  Q         |         |     V   |         |
13+35       0.0954      0.19  Q         |         |     V   |         |
13+40       0.0965      0.16  Q         |         |      V  |         |
13+45       0.0976      0.16  Q         |         |      V  |         |
13+50       0.0987      0.16  Q         |         |      V  |         |
13+55       0.0998      0.16  Q         |         |       V |         |
14+ 0       0.1008      0.16  Q         |         |       V |         |
14+ 5       0.1020      0.17  Q         |         |       V |         |
14+10       0.1033      0.18  Q         |         |        V|         |
14+15       0.1046      0.19  Q         |         |        V|         |
14+20       0.1058      0.18  Q         |         |        V|         |
14+25       0.1071      0.18  Q         |         |         V         |
14+30       0.1083      0.18  Q         |         |         V         |
14+35       0.1095      0.18  Q         |         |         V         |
14+40       0.1107      0.18  Q         |         |         |V        |
14+45       0.1120      0.18  Q         |         |         |V        |
14+50       0.1132      0.17  Q         |         |         |V        |
14+55       0.1144      0.17  Q         |         |         | V       |
15+ 0       0.1155      0.17  Q         |         |         | V       |
15+ 5       0.1167      0.17  Q         |         |         | V       |
15+10       0.1178      0.17  Q         |         |         |  V      |
15+15       0.1190      0.16  Q         |         |         |  V      |
15+20       0.1201      0.16  Q         |         |         |  V      |
15+25       0.1212      0.16  Q         |         |         |   V     |
15+30       0.1223      0.16  Q         |         |         |   V     |
15+35       0.1232      0.14  Q         |         |         |   V     |
15+40       0.1241      0.13  Q         |         |         |    V    |
15+45       0.1250      0.13  Q         |         |         |    V    |
15+50       0.1259      0.13  Q         |         |         |    V    |
15+55       0.1268      0.13  Q         |         |         |    V    |
16+ 0       0.1277      0.13  Q         |         |         |     V   |
16+ 5       0.1282      0.07  Q         |         |         |     V   |
16+10       0.1285      0.03  Q         |         |         |     V   |
16+15       0.1287      0.03  Q         |         |         |     V   |
16+20       0.1288      0.03  Q         |         |         |     V   |
16+25       0.1290      0.03  Q         |         |         |     V   |
16+30       0.1292      0.03  Q         |         |         |     V   |
16+35       0.1294      0.02  Q         |         |         |     V   |
16+40       0.1295      0.02  Q         |         |         |     V   |
16+45       0.1297      0.02  Q         |         |         |     V   |
16+50       0.1298      0.02  Q         |         |         |     V   |
16+55       0.1300      0.02  Q         |         |         |     V   |
17+ 0       0.1301      0.02  Q         |         |         |     V   |
17+ 5       0.1303      0.03  Q         |         |         |     V   |
17+10       0.1305      0.03  Q         |         |         |     V   |
17+15       0.1308      0.03  Q         |         |         |     V   |
17+20       0.1310      0.03  Q         |         |         |     V   |
17+25       0.1312      0.03  Q         |         |         |      V  |
17+30       0.1315      0.03  Q         |         |         |      V  |
17+35       0.1317      0.03  Q         |         |         |      V  |
17+40       0.1319      0.03  Q         |         |         |      V  |
17+45       0.1322      0.03  Q         |         |         |      V  |
17+50       0.1324      0.03  Q         |         |         |      V  |
17+55       0.1326      0.03  Q         |         |         |      V  |
18+ 0       0.1328      0.03  Q         |         |         |      V  |
18+ 5       0.1330      0.03  Q         |         |         |      V  |
18+10       0.1331      0.03  Q         |         |         |      V  |
18+15       0.1333      0.03  Q         |         |         |      V  |
18+20       0.1335      0.03  Q         |         |         |      V  |
18+25       0.1337      0.03  Q         |         |         |      V  |
18+30       0.1339      0.03  Q         |         |         |      V  |
18+35       0.1341      0.02  Q         |         |         |      V  |
18+40       0.1342      0.02  Q         |         |         |      V  |
18+45       0.1343      0.02  Q         |         |         |      V  |
18+50       0.1345      0.02  Q         |         |         |      V  |
18+55       0.1346      0.01  Q         |         |         |      V  |
```

```
   19+ 0       0.1347      0.01  Q          |         |         |     V   |
   19+ 5       0.1348      0.02  Q          |         |         |       V |
   19+10       0.1349      0.02  Q          |         |         |       V |
   19+15       0.1351      0.02  Q          |         |         |       V |
   19+20       0.1352      0.02  Q          |         |         |       V |
   19+25       0.1354      0.03  Q          |         |         |       V |
   19+30       0.1356      0.03  Q          |         |         |       V |
   19+35       0.1358      0.02  Q          |         |         |       V |
   19+40       0.1359      0.02  Q          |         |         |       V |
   19+45       0.1360      0.02  Q          |         |         |       V |
   19+50       0.1362      0.02  Q          |         |         |       V |
   19+55       0.1363      0.01  Q          |         |         |       V |
   20+ 0       0.1364      0.01  Q          |         |         |       V |
   20+ 5       0.1365      0.02  Q          |         |         |       V |
   20+10       0.1366      0.02  Q          |         |         |       V |
   20+15       0.1368      0.02  Q          |         |         |       V |
   20+20       0.1369      0.02  Q          |         |         |       V |
   20+25       0.1370      0.02  Q          |         |         |       V |
   20+30       0.1372      0.02  Q          |         |         |       V |
   20+35       0.1373      0.02  Q          |         |         |       V |
   20+40       0.1375      0.02  Q          |         |         |       V |
   20+45       0.1376      0.02  Q          |         |         |       V |
   20+50       0.1377      0.02  Q          |         |         |       V |
   20+55       0.1378      0.01  Q          |         |         |       V |
   21+ 0       0.1379      0.01  Q          |         |         |       V |
   21+ 5       0.1380      0.02  Q          |         |         |       V |
   21+10       0.1382      0.02  Q          |         |         |       V |
   21+15       0.1383      0.02  Q          |         |         |        V|
   21+20       0.1384      0.02  Q          |         |         |        V|
   21+25       0.1385      0.01  Q          |         |         |        V|
   21+30       0.1386      0.01  Q          |         |         |        V|
   21+35       0.1387      0.02  Q          |         |         |        V|
   21+40       0.1389      0.02  Q          |         |         |        V|
   21+45       0.1390      0.02  Q          |         |         |        V|
   21+50       0.1391      0.02  Q          |         |         |        V|
   21+55       0.1392      0.01  Q          |         |         |        V|
   22+ 0       0.1393      0.01  Q          |         |         |        V|
   22+ 5       0.1395      0.02  Q          |         |         |        V|
   22+10       0.1396      0.02  Q          |         |         |        V|
   22+15       0.1397      0.02  Q          |         |         |        V|
   22+20       0.1399      0.02  Q          |         |         |        V|
   22+25       0.1399      0.01  Q          |         |         |        V|
   22+30       0.1400      0.01  Q          |         |         |        V|
   22+35       0.1401      0.01  Q          |         |         |        V|
   22+40       0.1402      0.01  Q          |         |         |        V|
   22+45       0.1403      0.01  Q          |         |         |        V|
   22+50       0.1404      0.01  Q          |         |         |        V|
   22+55       0.1405      0.01  Q          |         |         |        V|
   23+ 0       0.1406      0.01  Q          |         |         |        V|
   23+ 5       0.1407      0.01  Q          |         |         |        V|
   23+10       0.1408      0.01  Q          |         |         |        V|
   23+15       0.1409      0.01  Q          |         |         |        V|
   23+20       0.1410      0.01  Q          |         |         |        V|
   23+25       0.1411      0.01  Q          |         |         |        V|
   23+30       0.1412      0.01  Q          |         |         |        V|
   23+35       0.1413      0.01  Q          |         |         |        V|
   23+40       0.1414      0.01  Q          |         |         |        V|
   23+45       0.1415      0.01  Q          |         |         |        V|
   23+50       0.1416      0.01  Q          |         |         |        V|
   23+55       0.1417      0.01  Q          |         |         |        V|
   24+ 0       0.1417      0.01  Q          |         |         |        V|
   24+ 5       0.1418      0.01  Q          |         |         |        V|
   24+10       0.1418      0.00  Q          |         |         |        V|
-----------------------------------------------------------------------
```

```
       U n i t   H y d r o g r a p h   A n a l y s i s

       Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2012, Version 8.2
               Study date  06/04/21 File: 19400p100y24hA24100.out

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------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6310

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
19-400
PROPOSED CONDITION
100-YEAR, 24-HOUR
AREA A
--------------------------------------------------------------------
Drainage Area =       7.25(Ac.)  =      0.011 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       7.25(Ac.)  =      0.011 Sq. Mi.
Length along longest watercourse =     352.00(Ft.)
Length along longest watercourse measured to centroid =     351.00(Ft.)
Length along longest watercourse =      0.067 Mi.
Length along longest watercourse measured to centroid =      0.066 Mi.
Difference in elevation =       7.50(Ft.)
Slope along watercourse =    112.5000 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.019 Hr.
Lag time =     1.12 Min.
25% of lag time =     0.28 Min.
40% of lag time =     0.45 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        7.25           2.50                 18.11

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        7.25           6.00                 43.47

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    2.500(In)
Area Averaged 100-Year Rainfall =    6.000(In)

Point rain (area averaged) =    6.000(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    6.000(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     7.245           69.00         0.900
 Total Area Entered =      7.25(Ac.)
```

```
          RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
          AMC2 AMC-3     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
          69.0  84.4      0.194     0.900        0.037       1.000      0.037
                                                             Sum (F) =   0.037
          Area averaged mean soil loss (F) (In/Hr) =  0.037
          Minimum soil loss rate ((In/Hr)) =  0.018
          (for 24 hour storm duration)
          Soil low loss rate (decimal) =   0.180
          ---------------------------------------------------------------------

                         U n i t  H y d r o g r a p h
                                VALLEY S-Curve
          --------------------------------------------------------------------
                         Unit Hydrograph Data
          ---------------------------------------------------------------------
          Unit time period   Time % of lag   Distribution   Unit Hydrograph
              (hrs)                            Graph %           (CFS)
          ---------------------------------------------------------------------
              1   0.083        445.178         67.961            4.962
              2   0.167        890.357         32.039            2.339
                                           Sum = 100.000   Sum=       7.302
   -----------------------------------------------------------------------


    The following loss rate calculations reflect use of the minimum calculated loss
    rate subtracted from the Storm Rain to produce the maximum Effective Rain value

     Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
          (Hr.)  Percent   (In/Hr)         Max    |   Low        (In/Hr)
       1  0.08     0.07      0.048       (  0.065)       0.009         0.039
       2  0.17     0.07      0.048       (  0.065)       0.009         0.039
       3  0.25     0.07      0.048       (  0.065)       0.009         0.039
       4  0.33     0.10      0.072       (  0.065)       0.013         0.059
       5  0.42     0.10      0.072       (  0.064)       0.013         0.059
       6  0.50     0.10      0.072       (  0.064)       0.013         0.059
       7  0.58     0.10      0.072       (  0.064)       0.013         0.059
       8  0.67     0.10      0.072       (  0.064)       0.013         0.059
       9  0.75     0.10      0.072       (  0.063)       0.013         0.059
      10  0.83     0.13      0.096       (  0.063)       0.017         0.079
      11  0.92     0.13      0.096       (  0.063)       0.017         0.079
      12  1.00     0.13      0.096       (  0.063)       0.017         0.079
      13  1.08     0.10      0.072       (  0.062)       0.013         0.059
      14  1.17     0.10      0.072       (  0.062)       0.013         0.059
      15  1.25     0.10      0.072       (  0.062)       0.013         0.059
      16  1.33     0.10      0.072       (  0.062)       0.013         0.059
      17  1.42     0.10      0.072       (  0.061)       0.013         0.059
      18  1.50     0.10      0.072       (  0.061)       0.013         0.059
      19  1.58     0.10      0.072       (  0.061)       0.013         0.059
      20  1.67     0.10      0.072       (  0.061)       0.013         0.059
      21  1.75     0.10      0.072       (  0.060)       0.013         0.059
      22  1.83     0.13      0.096       (  0.060)       0.017         0.079
      23  1.92     0.13      0.096       (  0.060)       0.017         0.079
      24  2.00     0.13      0.096       (  0.060)       0.017         0.079
      25  2.08     0.13      0.096       (  0.059)       0.017         0.079
      26  2.17     0.13      0.096       (  0.059)       0.017         0.079
      27  2.25     0.13      0.096       (  0.059)       0.017         0.079
      28  2.33     0.13      0.096       (  0.059)       0.017         0.079
      29  2.42     0.13      0.096       (  0.058)       0.017         0.079
      30  2.50     0.13      0.096       (  0.058)       0.017         0.079
      31  2.58     0.17      0.120       (  0.058)       0.022         0.098
      32  2.67     0.17      0.120       (  0.058)       0.022         0.098
      33  2.75     0.17      0.120       (  0.057)       0.022         0.098
      34  2.83     0.17      0.120       (  0.057)       0.022         0.098
      35  2.92     0.17      0.120       (  0.057)       0.022         0.098
      36  3.00     0.17      0.120       (  0.057)       0.022         0.098
      37  3.08     0.17      0.120       (  0.057)       0.022         0.098
      38  3.17     0.17      0.120       (  0.056)       0.022         0.098
      39  3.25     0.17      0.120       (  0.056)       0.022         0.098
      40  3.33     0.17      0.120       (  0.056)       0.022         0.098
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  41   3.42     0.17      0.120       (  0.056)       0.022        0.098
  42   3.50     0.17      0.120       (  0.055)       0.022        0.098
  43   3.58     0.17      0.120       (  0.055)       0.022        0.098
  44   3.67     0.17      0.120       (  0.055)       0.022        0.098
  45   3.75     0.17      0.120       (  0.055)       0.022        0.098
  46   3.83     0.20      0.144       (  0.054)       0.026        0.118
  47   3.92     0.20      0.144       (  0.054)       0.026        0.118
  48   4.00     0.20      0.144       (  0.054)       0.026        0.118
  49   4.08     0.20      0.144       (  0.054)       0.026        0.118
  50   4.17     0.20      0.144       (  0.054)       0.026        0.118
  51   4.25     0.20      0.144       (  0.053)       0.026        0.118
  52   4.33     0.23      0.168       (  0.053)       0.030        0.138
  53   4.42     0.23      0.168       (  0.053)       0.030        0.138
  54   4.50     0.23      0.168       (  0.053)       0.030        0.138
  55   4.58     0.23      0.168       (  0.052)       0.030        0.138
  56   4.67     0.23      0.168       (  0.052)       0.030        0.138
  57   4.75     0.23      0.168       (  0.052)       0.030        0.138
  58   4.83     0.27      0.192       (  0.052)       0.035        0.157
  59   4.92     0.27      0.192       (  0.051)       0.035        0.157
  60   5.00     0.27      0.192       (  0.051)       0.035        0.157
  61   5.08     0.20      0.144       (  0.051)       0.026        0.118
  62   5.17     0.20      0.144       (  0.051)       0.026        0.118
  63   5.25     0.20      0.144       (  0.051)       0.026        0.118
  64   5.33     0.23      0.168       (  0.050)       0.030        0.138
  65   5.42     0.23      0.168       (  0.050)       0.030        0.138
  66   5.50     0.23      0.168       (  0.050)       0.030        0.138
  67   5.58     0.27      0.192       (  0.050)       0.035        0.157
  68   5.67     0.27      0.192       (  0.049)       0.035        0.157
  69   5.75     0.27      0.192       (  0.049)       0.035        0.157
  70   5.83     0.27      0.192       (  0.049)       0.035        0.157
  71   5.92     0.27      0.192       (  0.049)       0.035        0.157
  72   6.00     0.27      0.192       (  0.049)       0.035        0.157
  73   6.08     0.30      0.216       (  0.048)       0.039        0.177
  74   6.17     0.30      0.216       (  0.048)       0.039        0.177
  75   6.25     0.30      0.216       (  0.048)       0.039        0.177
  76   6.33     0.30      0.216       (  0.048)       0.039        0.177
  77   6.42     0.30      0.216       (  0.048)       0.039        0.177
  78   6.50     0.30      0.216       (  0.047)       0.039        0.177
  79   6.58     0.33      0.240       (  0.047)       0.043        0.197
  80   6.67     0.33      0.240       (  0.047)       0.043        0.197
  81   6.75     0.33      0.240       (  0.047)       0.043        0.197
  82   6.83     0.33      0.240       (  0.046)       0.043        0.197
  83   6.92     0.33      0.240       (  0.046)       0.043        0.197
  84   7.00     0.33      0.240       (  0.046)       0.043        0.197
  85   7.08     0.33      0.240       (  0.046)       0.043        0.197
  86   7.17     0.33      0.240       (  0.046)       0.043        0.197
  87   7.25     0.33      0.240       (  0.045)       0.043        0.197
  88   7.33     0.37      0.264          0.045    (  0.048)        0.219
  89   7.42     0.37      0.264          0.045    (  0.048)        0.219
  90   7.50     0.37      0.264          0.045    (  0.048)        0.219
  91   7.58     0.40      0.288          0.045    (  0.052)        0.243
  92   7.67     0.40      0.288          0.044    (  0.052)        0.244
  93   7.75     0.40      0.288          0.044    (  0.052)        0.244
  94   7.83     0.43      0.312          0.044    (  0.056)        0.268
  95   7.92     0.43      0.312          0.044    (  0.056)        0.268
  96   8.00     0.43      0.312          0.044    (  0.056)        0.268
  97   8.08     0.50      0.360          0.043    (  0.065)        0.317
  98   8.17     0.50      0.360          0.043    (  0.065)        0.317
  99   8.25     0.50      0.360          0.043    (  0.065)        0.317
 100   8.33     0.50      0.360          0.043    (  0.065)        0.317
 101   8.42     0.50      0.360          0.043    (  0.065)        0.317
 102   8.50     0.50      0.360          0.042    (  0.065)        0.318
 103   8.58     0.53      0.384          0.042    (  0.069)        0.342
 104   8.67     0.53      0.384          0.042    (  0.069)        0.342
 105   8.75     0.53      0.384          0.042    (  0.069)        0.342
 106   8.83     0.57      0.408          0.042    (  0.073)        0.366
 107   8.92     0.57      0.408          0.041    (  0.073)        0.367
 108   9.00     0.57      0.408          0.041    (  0.073)        0.367
 109   9.08     0.63      0.456          0.041    (  0.082)        0.415
 110   9.17     0.63      0.456          0.041    (  0.082)        0.415
 111   9.25     0.63      0.456          0.041    (  0.082)        0.415
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112   9.33     0.67      0.480          0.040     (  0.086)        0.440
113   9.42     0.67      0.480          0.040     (  0.086)        0.440
114   9.50     0.67      0.480          0.040     (  0.086)        0.440
115   9.58     0.70      0.504          0.040     (  0.091)        0.464
116   9.67     0.70      0.504          0.040     (  0.091)        0.464
117   9.75     0.70      0.504          0.039     (  0.091)        0.465
118   9.83     0.73      0.528          0.039     (  0.095)        0.489
119   9.92     0.73      0.528          0.039     (  0.095)        0.489
120  10.00     0.73      0.528          0.039     (  0.095)        0.489
121  10.08     0.50      0.360          0.039     (  0.065)        0.321
122  10.17     0.50      0.360          0.039     (  0.065)        0.321
123  10.25     0.50      0.360          0.038     (  0.065)        0.322
124  10.33     0.50      0.360          0.038     (  0.065)        0.322
125  10.42     0.50      0.360          0.038     (  0.065)        0.322
126  10.50     0.50      0.360          0.038     (  0.065)        0.322
127  10.58     0.67      0.480          0.038     (  0.086)        0.442
128  10.67     0.67      0.480          0.037     (  0.086)        0.443
129  10.75     0.67      0.480          0.037     (  0.086)        0.443
130  10.83     0.67      0.480          0.037     (  0.086)        0.443
131  10.92     0.67      0.480          0.037     (  0.086)        0.443
132  11.00     0.67      0.480          0.037     (  0.086)        0.443
133  11.08     0.63      0.456          0.036     (  0.082)        0.419
134  11.17     0.63      0.456          0.036     (  0.082)        0.420
135  11.25     0.63      0.456          0.036     (  0.082)        0.420
136  11.33     0.63      0.456          0.036     (  0.082)        0.420
137  11.42     0.63      0.456          0.036     (  0.082)        0.420
138  11.50     0.63      0.456          0.036     (  0.082)        0.420
139  11.58     0.57      0.408          0.035     (  0.073)        0.373
140  11.67     0.57      0.408          0.035     (  0.073)        0.373
141  11.75     0.57      0.408          0.035     (  0.073)        0.373
142  11.83     0.60      0.432          0.035     (  0.078)        0.397
143  11.92     0.60      0.432          0.035     (  0.078)        0.397
144  12.00     0.60      0.432          0.035     (  0.078)        0.397
145  12.08     0.83      0.600          0.034     (  0.108)        0.566
146  12.17     0.83      0.600          0.034     (  0.108)        0.566
147  12.25     0.83      0.600          0.034     (  0.108)        0.566
148  12.33     0.87      0.624          0.034     (  0.112)        0.590
149  12.42     0.87      0.624          0.034     (  0.112)        0.590
150  12.50     0.87      0.624          0.034     (  0.112)        0.590
151  12.58     0.93      0.672          0.033     (  0.121)        0.639
152  12.67     0.93      0.672          0.033     (  0.121)        0.639
153  12.75     0.93      0.672          0.033     (  0.121)        0.639
154  12.83     0.97      0.696          0.033     (  0.125)        0.663
155  12.92     0.97      0.696          0.033     (  0.125)        0.663
156  13.00     0.97      0.696          0.033     (  0.125)        0.663
157  13.08     1.13      0.816          0.032     (  0.147)        0.784
158  13.17     1.13      0.816          0.032     (  0.147)        0.784
159  13.25     1.13      0.816          0.032     (  0.147)        0.784
160  13.33     1.13      0.816          0.032     (  0.147)        0.784
161  13.42     1.13      0.816          0.032     (  0.147)        0.784
162  13.50     1.13      0.816          0.032     (  0.147)        0.784
163  13.58     0.77      0.552          0.031     (  0.099)        0.521
164  13.67     0.77      0.552          0.031     (  0.099)        0.521
165  13.75     0.77      0.552          0.031     (  0.099)        0.521
166  13.83     0.77      0.552          0.031     (  0.099)        0.521
167  13.92     0.77      0.552          0.031     (  0.099)        0.521
168  14.00     0.77      0.552          0.031     (  0.099)        0.521
169  14.08     0.90      0.648          0.030     (  0.117)        0.618
170  14.17     0.90      0.648          0.030     (  0.117)        0.618
171  14.25     0.90      0.648          0.030     (  0.117)        0.618
172  14.33     0.87      0.624          0.030     (  0.112)        0.594
173  14.42     0.87      0.624          0.030     (  0.112)        0.594
174  14.50     0.87      0.624          0.030     (  0.112)        0.594
175  14.58     0.87      0.624          0.030     (  0.112)        0.594
176  14.67     0.87      0.624          0.029     (  0.112)        0.595
177  14.75     0.87      0.624          0.029     (  0.112)        0.595
178  14.83     0.83      0.600          0.029     (  0.108)        0.571
179  14.92     0.83      0.600          0.029     (  0.108)        0.571
180  15.00     0.83      0.600          0.029     (  0.108)        0.571
181  15.08     0.80      0.576          0.029     (  0.104)        0.547
182  15.17     0.80      0.576          0.028     (  0.104)        0.548
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183  15.25     0.80      0.576          0.028    (  0.104)        0.548
184  15.33     0.77      0.552          0.028    (  0.099)        0.524
185  15.42     0.77      0.552          0.028    (  0.099)        0.524
186  15.50     0.77      0.552          0.028    (  0.099)        0.524
187  15.58     0.63      0.456          0.028    (  0.082)        0.428
188  15.67     0.63      0.456          0.028    (  0.082)        0.428
189  15.75     0.63      0.456          0.027    (  0.082)        0.429
190  15.83     0.63      0.456          0.027    (  0.082)        0.429
191  15.92     0.63      0.456          0.027    (  0.082)        0.429
192  16.00     0.63      0.456          0.027    (  0.082)        0.429
193  16.08     0.13      0.096       (  0.027)       0.017        0.079
194  16.17     0.13      0.096       (  0.027)       0.017        0.079
195  16.25     0.13      0.096       (  0.027)       0.017        0.079
196  16.33     0.13      0.096       (  0.026)       0.017        0.079
197  16.42     0.13      0.096       (  0.026)       0.017        0.079
198  16.50     0.13      0.096       (  0.026)       0.017        0.079
199  16.58     0.10      0.072       (  0.026)       0.013        0.059
200  16.67     0.10      0.072       (  0.026)       0.013        0.059
201  16.75     0.10      0.072       (  0.026)       0.013        0.059
202  16.83     0.10      0.072       (  0.026)       0.013        0.059
203  16.92     0.10      0.072       (  0.026)       0.013        0.059
204  17.00     0.10      0.072       (  0.025)       0.013        0.059
205  17.08     0.17      0.120       (  0.025)       0.022        0.098
206  17.17     0.17      0.120       (  0.025)       0.022        0.098
207  17.25     0.17      0.120       (  0.025)       0.022        0.098
208  17.33     0.17      0.120       (  0.025)       0.022        0.098
209  17.42     0.17      0.120       (  0.025)       0.022        0.098
210  17.50     0.17      0.120       (  0.025)       0.022        0.098
211  17.58     0.17      0.120       (  0.025)       0.022        0.098
212  17.67     0.17      0.120       (  0.024)       0.022        0.098
213  17.75     0.17      0.120       (  0.024)       0.022        0.098
214  17.83     0.13      0.096       (  0.024)       0.017        0.079
215  17.92     0.13      0.096       (  0.024)       0.017        0.079
216  18.00     0.13      0.096       (  0.024)       0.017        0.079
217  18.08     0.13      0.096       (  0.024)       0.017        0.079
218  18.17     0.13      0.096       (  0.024)       0.017        0.079
219  18.25     0.13      0.096       (  0.024)       0.017        0.079
220  18.33     0.13      0.096       (  0.023)       0.017        0.079
221  18.42     0.13      0.096       (  0.023)       0.017        0.079
222  18.50     0.13      0.096       (  0.023)       0.017        0.079
223  18.58     0.10      0.072       (  0.023)       0.013        0.059
224  18.67     0.10      0.072       (  0.023)       0.013        0.059
225  18.75     0.10      0.072       (  0.023)       0.013        0.059
226  18.83     0.07      0.048       (  0.023)       0.009        0.039
227  18.92     0.07      0.048       (  0.023)       0.009        0.039
228  19.00     0.07      0.048       (  0.023)       0.009        0.039
229  19.08     0.10      0.072       (  0.022)       0.013        0.059
230  19.17     0.10      0.072       (  0.022)       0.013        0.059
231  19.25     0.10      0.072       (  0.022)       0.013        0.059
232  19.33     0.13      0.096       (  0.022)       0.017        0.079
233  19.42     0.13      0.096       (  0.022)       0.017        0.079
234  19.50     0.13      0.096       (  0.022)       0.017        0.079
235  19.58     0.10      0.072       (  0.022)       0.013        0.059
236  19.67     0.10      0.072       (  0.022)       0.013        0.059
237  19.75     0.10      0.072       (  0.022)       0.013        0.059
238  19.83     0.07      0.048       (  0.022)       0.009        0.039
239  19.92     0.07      0.048       (  0.021)       0.009        0.039
240  20.00     0.07      0.048       (  0.021)       0.009        0.039
241  20.08     0.10      0.072       (  0.021)       0.013        0.059
242  20.17     0.10      0.072       (  0.021)       0.013        0.059
243  20.25     0.10      0.072       (  0.021)       0.013        0.059
244  20.33     0.10      0.072       (  0.021)       0.013        0.059
245  20.42     0.10      0.072       (  0.021)       0.013        0.059
246  20.50     0.10      0.072       (  0.021)       0.013        0.059
247  20.58     0.10      0.072       (  0.021)       0.013        0.059
248  20.67     0.10      0.072       (  0.021)       0.013        0.059
249  20.75     0.10      0.072       (  0.021)       0.013        0.059
250  20.83     0.07      0.048       (  0.020)       0.009        0.039
251  20.92     0.07      0.048       (  0.020)       0.009        0.039
252  21.00     0.07      0.048       (  0.020)       0.009        0.039
253  21.08     0.10      0.072       (  0.020)       0.013        0.059
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254  21.17     0.10      0.072       (  0.020)       0.013        0.059
255  21.25     0.10      0.072       (  0.020)       0.013        0.059
256  21.33     0.07      0.048       (  0.020)       0.009        0.039
257  21.42     0.07      0.048       (  0.020)       0.009        0.039
258  21.50     0.07      0.048       (  0.020)       0.009        0.039
259  21.58     0.10      0.072       (  0.020)       0.013        0.059
260  21.67     0.10      0.072       (  0.020)       0.013        0.059
261  21.75     0.10      0.072       (  0.020)       0.013        0.059
262  21.83     0.07      0.048       (  0.020)       0.009        0.039
263  21.92     0.07      0.048       (  0.020)       0.009        0.039
264  22.00     0.07      0.048       (  0.019)       0.009        0.039
265  22.08     0.10      0.072       (  0.019)       0.013        0.059
266  22.17     0.10      0.072       (  0.019)       0.013        0.059
267  22.25     0.10      0.072       (  0.019)       0.013        0.059
268  22.33     0.07      0.048       (  0.019)       0.009        0.039
269  22.42     0.07      0.048       (  0.019)       0.009        0.039
270  22.50     0.07      0.048       (  0.019)       0.009        0.039
271  22.58     0.07      0.048       (  0.019)       0.009        0.039
272  22.67     0.07      0.048       (  0.019)       0.009        0.039
273  22.75     0.07      0.048       (  0.019)       0.009        0.039
274  22.83     0.07      0.048       (  0.019)       0.009        0.039
275  22.92     0.07      0.048       (  0.019)       0.009        0.039
276  23.00     0.07      0.048       (  0.019)       0.009        0.039
277  23.08     0.07      0.048       (  0.019)       0.009        0.039
278  23.17     0.07      0.048       (  0.019)       0.009        0.039
279  23.25     0.07      0.048       (  0.019)       0.009        0.039
280  23.33     0.07      0.048       (  0.019)       0.009        0.039
281  23.42     0.07      0.048       (  0.019)       0.009        0.039
282  23.50     0.07      0.048       (  0.019)       0.009        0.039
283  23.58     0.07      0.048       (  0.019)       0.009        0.039
284  23.67     0.07      0.048       (  0.018)       0.009        0.039
285  23.75     0.07      0.048       (  0.018)       0.009        0.039
286  23.83     0.07      0.048       (  0.018)       0.009        0.039
287  23.92     0.07      0.048       (  0.018)       0.009        0.039
288  24.00     0.07      0.048       (  0.018)       0.009        0.039
               (Loss Rate Not Used)
    Sum =     100.0                                   Sum =    64.8
       Flood volume = Effective rainfall      5.40(In)
        times area       7.2(Ac.)/[(In)/(Ft.)] =       3.3(Ac.Ft)
       Total soil loss =      0.60(In)
       Total soil loss =     0.361(Ac.Ft)
       Total rainfall =      6.00(In)
       Flood volume =      142086.3 Cubic Feet
       Total soil loss =       15707.6 Cubic Feet
       --------------------------------------------------------------------
        Peak flow rate of this hydrograph =      5.730(CFS)
       --------------------------------------------------------------------
       ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                           24 - H O U R    S T O R M
                      R u n o f f      H y d r o g r a p h
       --------------------------------------------------------------------
                   Hydrograph in   5   Minute intervals ((CFS))

       --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 -----------------------------------------------------------------------
   0+ 5       0.0013      0.20  Q         |         |         |         |
   0+10       0.0033      0.29  VQ        |         |         |         |
   0+15       0.0053      0.29  VQ        |         |         |         |
   0+20       0.0080      0.39  VQ        |         |         |         |
   0+25       0.0109      0.43  VQ        |         |         |         |
   0+30       0.0139      0.43  VQ        |         |         |         |
   0+35       0.0169      0.43  VQ        |         |         |         |
   0+40       0.0198      0.43  VQ        |         |         |         |
   0+45       0.0228      0.43  VQ        |         |         |         |
   0+50       0.0265      0.53  V Q       |         |         |         |
   0+55       0.0304      0.58  V Q       |         |         |         |
   1+ 0       0.0344      0.58  V Q       |         |         |         |
   1+ 5       0.0377      0.48  VQ        |         |         |         |
   1+10       0.0406      0.43  VQ        |         |         |         |
   1+15       0.0436      0.43  VQ        |         |         |         |
```

```
1+20       0.0466      0.43  VQ        |         |         |         |
1+25       0.0495      0.43  VQ        |         |         |         |
1+30       0.0525      0.43  VQ        |         |         |         |
1+35       0.0555      0.43  VQ        |         |         |         |
1+40       0.0585      0.43  VQ        |         |         |         |
1+45       0.0614      0.43  VQ        |         |         |         |
1+50       0.0651      0.53  V Q       |         |         |         |
1+55       0.0690      0.58  V Q       |         |         |         |
2+ 0       0.0730      0.58  V Q       |         |         |         |
2+ 5       0.0770      0.58  V Q       |         |         |         |
2+10       0.0809      0.58  V Q       |         |         |         |
2+15       0.0849      0.58  |VQ       |         |         |         |
2+20       0.0888      0.58  |VQ       |         |         |         |
2+25       0.0928      0.58  |VQ       |         |         |         |
2+30       0.0968      0.58  |VQ       |         |         |         |
2+35       0.1014      0.67  |VQ       |         |         |         |
2+40       0.1063      0.72  |VQ       |         |         |         |
2+45       0.1113      0.72  |VQ       |         |         |         |
2+50       0.1162      0.72  |VQ       |         |         |         |
2+55       0.1212      0.72  |VQ       |         |         |         |
3+ 0       0.1261      0.72  |VQ       |         |         |         |
3+ 5       0.1311      0.72  |VQ       |         |         |         |
3+10       0.1360      0.72  |VQ       |         |         |         |
3+15       0.1410      0.72  |VQ       |         |         |         |
3+20       0.1459      0.72  |VQ       |         |         |         |
3+25       0.1509      0.72  |VQ       |         |         |         |
3+30       0.1558      0.72  |VQ       |         |         |         |
3+35       0.1608      0.72  |VQ       |         |         |         |
3+40       0.1657      0.72  | Q       |         |         |         |
3+45       0.1707      0.72  | Q       |         |         |         |
3+50       0.1763      0.82  | VQ      |         |         |         |
3+55       0.1823      0.86  | VQ      |         |         |         |
4+ 0       0.1882      0.86  | VQ      |         |         |         |
4+ 5       0.1941      0.86  | VQ      |         |         |         |
4+10       0.2001      0.86  | VQ      |         |         |         |
4+15       0.2060      0.86  | VQ      |         |         |         |
4+20       0.2126      0.96  | VQ      |         |         |         |
4+25       0.2196      1.01  | V Q     |         |         |         |
4+30       0.2265      1.01  | V Q     |         |         |         |
4+35       0.2334      1.01  | V Q     |         |         |         |
4+40       0.2404      1.01  | V Q     |         |         |         |
4+45       0.2473      1.01  |  VQ     |         |         |         |
4+50       0.2549      1.10  |  VQ     |         |         |         |
4+55       0.2628      1.15  |  VQ     |         |         |         |
5+ 0       0.2707      1.15  |  VQ     |         |         |         |
5+ 5       0.2773      0.95  |  Q      |         |         |         |
5+10       0.2833      0.86  |  Q      |         |         |         |
5+15       0.2892      0.86  |  Q      |         |         |         |
5+20       0.2958      0.96  |  Q      |         |         |         |
5+25       0.3027      1.01  |  VQ     |         |         |         |
5+30       0.3097      1.01  |  VQ     |         |         |         |
5+35       0.3173      1.10  |  VQ     |         |         |         |
5+40       0.3252      1.15  |  VQ     |         |         |         |
5+45       0.3331      1.15  |   Q     |         |         |         |
5+50       0.3410      1.15  |   Q     |         |         |         |
5+55       0.3490      1.15  |   Q     |         |         |         |
6+ 0       0.3569      1.15  |   Q     |         |         |         |
6+ 5       0.3655      1.25  |   Q     |         |         |         |
6+10       0.3744      1.29  |   VQ    |         |         |         |
6+15       0.3833      1.29  |   VQ    |         |         |         |
6+20       0.3922      1.29  |   VQ    |         |         |         |
6+25       0.4011      1.29  |   VQ    |         |         |         |
6+30       0.4100      1.29  |    Q    |         |         |         |
6+35       0.4196      1.39  |    Q    |         |         |         |
6+40       0.4295      1.44  |    Q    |         |         |         |
6+45       0.4394      1.44  |    Q    |         |         |         |
6+50       0.4493      1.44  |    Q    |         |         |         |
6+55       0.4592      1.44  |    Q    |         |         |         |
7+ 0       0.4691      1.44  |    Q    |         |         |         |
7+ 5       0.4790      1.44  |    Q    |         |         |         |
7+10       0.4889      1.44  |    Q    |         |         |         |
```

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 7+15       0.4988      1.44  |    QV   |         |         |         |
 7+20       0.5095      1.55  |     Q   |         |         |         |
 7+25       0.5205      1.60  |     Q   |         |         |         |
 7+30       0.5315      1.60  |     Q   |         |         |         |
 7+35       0.5434      1.72  |     Q   |         |         |         |
 7+40       0.5556      1.78  |     VQ  |         |         |         |
 7+45       0.5679      1.78  |     VQ  |         |         |         |
 7+50       0.5810      1.90  |      Q  |         |         |         |
 7+55       0.5945      1.96  |      Q  |         |         |         |
 8+ 0       0.6080      1.96  |      Q  |         |         |         |
 8+ 5       0.6231      2.20  |      VQ |         |         |         |
 8+10       0.6391      2.31  |      V Q|         |         |         |
 8+15       0.6550      2.32  |       VQ|         |         |         |
 8+20       0.6710      2.32  |       VQ|         |         |         |
 8+25       0.6869      2.32  |       VQ|         |         |         |
 8+30       0.7029      2.32  |       VQ|         |         |         |
 8+35       0.7197      2.44  |       VQ|         |         |         |
 8+40       0.7369      2.50  |        Q|         |         |         |
 8+45       0.7541      2.50  |        Q|         |         |         |
 8+50       0.7722      2.62  |        VQ         |         |         |
 8+55       0.7906      2.68  |        VQ         |         |         |
 9+ 0       0.8091      2.68  |        VQ         |         |         |
 9+ 5       0.8292      2.92  |         VQ        |         |         |
 9+10       0.8501      3.03  |         V Q       |         |         |
 9+15       0.8710      3.03  |         V Q       |         |         |
 9+20       0.8927      3.15  |         V Q       |         |         |
 9+25       0.9148      3.21  |         |VQ       |         |         |
 9+30       0.9369      3.21  |         |VQ       |         |         |
 9+35       0.9599      3.33  |         |V Q      |         |         |
 9+40       0.9833      3.39  |         | VQ      |         |         |
 9+45       1.0066      3.39  |         | VQ      |         |         |
 9+50       1.0308      3.51  |         | V Q     |         |         |
 9+55       1.0554      3.57  |         | V Q     |         |         |
10+ 0       1.0800      3.57  |         |  VQ     |         |         |
10+ 5       1.0989      2.74  |         Q  V      |         |         |
10+10       1.1151      2.35  |        Q|  V      |         |         |
10+15       1.1312      2.35  |        Q|  V      |         |         |
10+20       1.1474      2.35  |        Q|   V     |         |         |
10+25       1.1636      2.35  |        Q|   V     |         |         |
10+30       1.1798      2.35  |        Q|   V     |         |         |
10+35       1.2002      2.95  |         |Q  V     |         |         |
10+40       1.2224      3.23  |         | Q V     |         |         |
10+45       1.2447      3.23  |         | Q  V    |         |         |
10+50       1.2670      3.24  |         | Q  V    |         |         |
10+55       1.2893      3.24  |         | Q  V    |         |         |
11+ 0       1.3116      3.24  |         | Q   V   |         |         |
11+ 5       1.3331      3.12  |         | Q   V   |         |         |
11+10       1.3542      3.07  |         | Q   V   |         |         |
11+15       1.3753      3.07  |         | Q   V   |         |         |
11+20       1.3964      3.07  |         | Q    V  |         |         |
11+25       1.4176      3.07  |         | Q    V  |         |         |
11+30       1.4387      3.07  |         | Q    V  |         |         |
11+35       1.4582      2.83  |         |Q     V  |         |         |
11+40       1.4770      2.72  |         Q       V |         |         |
11+45       1.4958      2.72  |         Q       V |         |         |
11+50       1.5153      2.84  |         |Q      V |         |         |
11+55       1.5353      2.90  |         |Q      V |         |         |
12+ 0       1.5553      2.90  |         |Q       V|         |         |
12+ 5       1.5811      3.74  |         |   Q    V|         |         |
12+10       1.6095      4.13  |         |     Q  V|         |         |
12+15       1.6380      4.13  |         |     Q   V         |         |
12+20       1.6673      4.25  |         |      Q  V         |         |
12+25       1.6970      4.31  |         |      Q  V         |         |
12+30       1.7267      4.31  |         |      Q  |V        |         |
12+35       1.7581      4.55  |         |       Q |V        |         |
12+40       1.7902      4.67  |         |       Q |V        |         |
12+45       1.8223      4.67  |         |       Q | V       |         |
12+50       1.8553      4.79  |         |        Q| V       |         |
12+55       1.8887      4.85  |         |        Q|  V      |         |
13+ 0       1.9221      4.85  |         |        Q|  V      |         |
13+ 5       1.9596      5.44  |         |         |Q  V     |         |
```

```
13+10       1.9990      5.73  |         |         | Q V     |         |
13+15       2.0384      5.73  |         |         | Q V     |         |
13+20       2.0779      5.73  |         |         | Q  V    |         |
13+25       2.1173      5.73  |         |         | Q  V    |         |
13+30       2.1568      5.73  |         |         | Q   V   |         |
13+35       2.1872      4.42  |         |      Q  |     V   |         |
13+40       2.2134      3.80  |         |    Q    |      V  |         |
13+45       2.2396      3.81  |         |    Q    |      V  |         |
13+50       2.2659      3.81  |         |    Q    |      V  |         |
13+55       2.2921      3.81  |         |    Q    |       V |         |
14+ 0       2.3183      3.81  |         |    Q    |       V |         |
14+ 5       2.3478      4.29  |         |      Q  |       V |         |
14+10       2.3789      4.51  |         |       Q |        V|         |
14+15       2.4100      4.51  |         |       Q |        V|         |
14+20       2.4403      4.40  |         |      Q  |        V|         |
14+25       2.4702      4.34  |         |      Q  |         V         |
14+30       2.5001      4.34  |         |      Q  |         V         |
14+35       2.5300      4.34  |         |      Q  |         |V        |
14+40       2.5599      4.34  |         |      Q  |         |V        |
14+45       2.5898      4.34  |         |      Q  |         |V        |
14+50       2.6189      4.23  |         |     Q   |         | V       |
14+55       2.6476      4.17  |         |     Q   |         | V       |
15+ 0       2.6764      4.17  |         |     Q   |         | V       |
15+ 5       2.7043      4.05  |         |     Q   |         |  V      |
15+10       2.7318      4.00  |         |    Q    |         |  V      |
15+15       2.7594      4.00  |         |     Q   |         |  V      |
15+20       2.7861      3.88  |         |    Q    |         |   V     |
15+25       2.8125      3.83  |         |    Q    |         |   V     |
15+30       2.8389      3.83  |         |    Q    |         |   V     |
15+35       2.8620      3.35  |         |  Q      |         |    V    |
15+40       2.8835      3.13  |         | Q       |         |    V    |
15+45       2.9051      3.13  |         | Q       |         |    V    |
15+50       2.9266      3.13  |         | Q       |         |    V    |
15+55       2.9482      3.13  |         | Q       |         |     V   |
16+ 0       2.9698      3.13  |         | Q       |         |     V   |
16+ 5       2.9794      1.39  |    Q    |         |         |     V   |
16+10       2.9833      0.58  | Q       |         |         |     V   |
16+15       2.9873      0.58  | Q       |         |         |     V   |
16+20       2.9913      0.58  | Q       |         |         |     V   |
16+25       2.9952      0.58  | Q       |         |         |     V   |
16+30       2.9992      0.58  | Q       |         |         |     V   |
16+35       3.0025      0.48  |Q        |         |         |     V   |
16+40       3.0054      0.43  |Q        |         |         |     V   |
16+45       3.0084      0.43  |Q        |         |         |     V   |
16+50       3.0114      0.43  |Q        |         |         |     V   |
16+55       3.0144      0.43  |Q        |         |         |     V   |
17+ 0       3.0173      0.43  |Q        |         |         |      V  |
17+ 5       3.0216      0.63  | Q       |         |         |      V  |
17+10       3.0266      0.72  | Q       |         |         |      V  |
17+15       3.0315      0.72  | Q       |         |         |      V  |
17+20       3.0365      0.72  | Q       |         |         |      V  |
17+25       3.0414      0.72  | Q       |         |         |      V  |
17+30       3.0464      0.72  | Q       |         |         |      V  |
17+35       3.0513      0.72  | Q       |         |         |      V  |
17+40       3.0563      0.72  | Q       |         |         |      V  |
17+45       3.0612      0.72  | Q       |         |         |      V  |
17+50       3.0655      0.62  | Q       |         |         |      V  |
17+55       3.0695      0.58  | Q       |         |         |      V  |
18+ 0       3.0734      0.58  | Q       |         |         |      V  |
18+ 5       3.0774      0.58  | Q       |         |         |      V  |
18+10       3.0814      0.58  | Q       |         |         |      V  |
18+15       3.0853      0.58  | Q       |         |         |      V  |
18+20       3.0893      0.58  | Q       |         |         |      V  |
18+25       3.0933      0.58  | Q       |         |         |      V  |
18+30       3.0972      0.58  | Q       |         |         |      V  |
18+35       3.1005      0.48  |Q        |         |         |       V |
18+40       3.1035      0.43  |Q        |         |         |       V |
18+45       3.1064      0.43  |Q        |         |         |       V |
18+50       3.1087      0.33  |Q        |         |         |       V |
18+55       3.1107      0.29  |Q        |         |         |       V |
19+ 0       3.1127      0.29  |Q        |         |         |       V |
```

```
   19+ 5       3.1154      0.39  |Q        |         |         |       V |
   19+10       3.1183      0.43  |Q        |         |         |       V |
   19+15       3.1213      0.43  |Q        |         |         |       V |
   19+20       3.1249      0.53  | Q       |         |         |       V |
   19+25       3.1289      0.58  | Q       |         |         |       V |
   19+30       3.1329      0.58  | Q       |         |         |       V |
   19+35       3.1361      0.48  |Q        |         |         |       V |
   19+40       3.1391      0.43  |Q        |         |         |       V |
   19+45       3.1421      0.43  |Q        |         |         |       V |
   19+50       3.1444      0.33  |Q        |         |         |       V |
   19+55       3.1464      0.29  |Q        |         |         |       V |
   20+ 0       3.1483      0.29  |Q        |         |         |       V |
   20+ 5       3.1510      0.39  |Q        |         |         |       V |
   20+10       3.1540      0.43  |Q        |         |         |       V |
   20+15       3.1569      0.43  |Q        |         |         |       V |
   20+20       3.1599      0.43  |Q        |         |         |       V |
   20+25       3.1629      0.43  |Q        |         |         |       V |
   20+30       3.1658      0.43  |Q        |         |         |       V |
   20+35       3.1688      0.43  |Q        |         |         |       V |
   20+40       3.1718      0.43  |Q        |         |         |       V |
   20+45       3.1748      0.43  |Q        |         |         |       V |
   20+50       3.1771      0.33  |Q        |         |         |       V |
   20+55       3.1790      0.29  |Q        |         |         |       V |
   21+ 0       3.1810      0.29  |Q        |         |         |        V|
   21+ 5       3.1837      0.39  |Q        |         |         |        V|
   21+10       3.1866      0.43  |Q        |         |         |        V|
   21+15       3.1896      0.43  |Q        |         |         |        V|
   21+20       3.1919      0.33  |Q        |         |         |        V|
   21+25       3.1939      0.29  |Q        |         |         |        V|
   21+30       3.1959      0.29  |Q        |         |         |        V|
   21+35       3.1985      0.39  |Q        |         |         |        V|
   21+40       3.2015      0.43  |Q        |         |         |        V|
   21+45       3.2045      0.43  |Q        |         |         |        V|
   21+50       3.2068      0.33  |Q        |         |         |        V|
   21+55       3.2087      0.29  |Q        |         |         |        V|
   22+ 0       3.2107      0.29  |Q        |         |         |        V|
   22+ 5       3.2134      0.39  |Q        |         |         |        V|
   22+10       3.2163      0.43  |Q        |         |         |        V|
   22+15       3.2193      0.43  |Q        |         |         |        V|
   22+20       3.2216      0.33  |Q        |         |         |        V|
   22+25       3.2236      0.29  |Q        |         |         |        V|
   22+30       3.2256      0.29  |Q        |         |         |        V|
   22+35       3.2276      0.29  |Q        |         |         |        V|
   22+40       3.2295      0.29  |Q        |         |         |        V|
   22+45       3.2315      0.29  |Q        |         |         |        V|
   22+50       3.2335      0.29  |Q        |         |         |        V|
   22+55       3.2355      0.29  |Q        |         |         |        V|
   23+ 0       3.2375      0.29  |Q        |         |         |        V|
   23+ 5       3.2394      0.29  |Q        |         |         |        V|
   23+10       3.2414      0.29  |Q        |         |         |        V|
   23+15       3.2434      0.29  |Q        |         |         |        V|
   23+20       3.2454      0.29  |Q        |         |         |        V|
   23+25       3.2474      0.29  |Q        |         |         |        V|
   23+30       3.2493      0.29  |Q        |         |         |        V|
   23+35       3.2513      0.29  |Q        |         |         |        V|
   23+40       3.2533      0.29  |Q        |         |         |        V|
   23+45       3.2553      0.29  |Q        |         |         |        V|
   23+50       3.2573      0.29  |Q        |         |         |        V|
   23+55       3.2592      0.29  |Q        |         |         |        V|
   24+ 0       3.2612      0.29  |Q        |         |         |        V|
   24+ 5       3.2619      0.09  Q         |         |         |         V
-----------------------------------------------------------------------
```

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       U n i t   H y d r o g r a p h   A n a l y s i s

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               Study date  06/04/21 File: 19400p100y24hB24100.out


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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6310

----------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



----------------------------------------------------------------------
19-400
PROPOSED CONDITION
100-YEAR, 24-HOUR
AREA B
---------------------------------------------------------------------
Drainage Area =       1.00(Ac.)  =      0.002 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       1.00(Ac.)  =      0.002 Sq. Mi.
Length along longest watercourse =     208.00(Ft.)
Length along longest watercourse measured to centroid =     186.00(Ft.)
Length along longest watercourse =      0.039 Mi.
Length along longest watercourse measured to centroid =      0.035 Mi.
Difference in elevation =       7.00(Ft.)
Slope along watercourse =    177.6923 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.011 Hr.
Lag time =     0.66 Min.
25% of lag time =     0.17 Min.
40% of lag time =     0.26 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        1.00           2.50                  2.49

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        1.00           6.00                  5.98

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    2.500(In)
Area Averaged 100-Year Rainfall =    6.000(In)

Point rain (area averaged) =    6.000(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    6.000(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     0.996           69.00         0.900
 Total Area Entered =      1.00(Ac.)
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        RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
        AMC2 AMC-3     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
        69.0  84.4      0.194     0.900        0.037       1.000      0.037
                                                         Sum (F) =   0.037
        Area averaged mean soil loss (F) (In/Hr) =  0.037
        Minimum soil loss rate ((In/Hr)) =  0.018
        (for 24 hour storm duration)
        Soil low loss rate (decimal) =   0.180
        ---------------------------------------------------------------------

                       U n i t  H y d r o g r a p h
                              VALLEY S-Curve
        --------------------------------------------------------------------
                       Unit Hydrograph Data
        ---------------------------------------------------------------------
        Unit time period   Time % of lag  Distribution   Unit Hydrograph
            (hrs)                            Graph %          (CFS)
        ---------------------------------------------------------------------
            1   0.083        754.877         80.065            0.804
            2   0.167       1509.754         19.935            0.200
                                       Sum = 100.000   Sum=       1.004
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   |   Low         (In/Hr)
   1   0.08     0.07      0.048       (  0.065)       0.009        0.039
   2   0.17     0.07      0.048       (  0.065)       0.009        0.039
   3   0.25     0.07      0.048       (  0.065)       0.009        0.039
   4   0.33     0.10      0.072       (  0.065)       0.013        0.059
   5   0.42     0.10      0.072       (  0.064)       0.013        0.059
   6   0.50     0.10      0.072       (  0.064)       0.013        0.059
   7   0.58     0.10      0.072       (  0.064)       0.013        0.059
   8   0.67     0.10      0.072       (  0.064)       0.013        0.059
   9   0.75     0.10      0.072       (  0.063)       0.013        0.059
  10   0.83     0.13      0.096       (  0.063)       0.017        0.079
  11   0.92     0.13      0.096       (  0.063)       0.017        0.079
  12   1.00     0.13      0.096       (  0.063)       0.017        0.079
  13   1.08     0.10      0.072       (  0.062)       0.013        0.059
  14   1.17     0.10      0.072       (  0.062)       0.013        0.059
  15   1.25     0.10      0.072       (  0.062)       0.013        0.059
  16   1.33     0.10      0.072       (  0.062)       0.013        0.059
  17   1.42     0.10      0.072       (  0.061)       0.013        0.059
  18   1.50     0.10      0.072       (  0.061)       0.013        0.059
  19   1.58     0.10      0.072       (  0.061)       0.013        0.059
  20   1.67     0.10      0.072       (  0.061)       0.013        0.059
  21   1.75     0.10      0.072       (  0.060)       0.013        0.059
  22   1.83     0.13      0.096       (  0.060)       0.017        0.079
  23   1.92     0.13      0.096       (  0.060)       0.017        0.079
  24   2.00     0.13      0.096       (  0.060)       0.017        0.079
  25   2.08     0.13      0.096       (  0.059)       0.017        0.079
  26   2.17     0.13      0.096       (  0.059)       0.017        0.079
  27   2.25     0.13      0.096       (  0.059)       0.017        0.079
  28   2.33     0.13      0.096       (  0.059)       0.017        0.079
  29   2.42     0.13      0.096       (  0.058)       0.017        0.079
  30   2.50     0.13      0.096       (  0.058)       0.017        0.079
  31   2.58     0.17      0.120       (  0.058)       0.022        0.098
  32   2.67     0.17      0.120       (  0.058)       0.022        0.098
  33   2.75     0.17      0.120       (  0.057)       0.022        0.098
  34   2.83     0.17      0.120       (  0.057)       0.022        0.098
  35   2.92     0.17      0.120       (  0.057)       0.022        0.098
  36   3.00     0.17      0.120       (  0.057)       0.022        0.098
  37   3.08     0.17      0.120       (  0.057)       0.022        0.098
  38   3.17     0.17      0.120       (  0.056)       0.022        0.098
  39   3.25     0.17      0.120       (  0.056)       0.022        0.098
  40   3.33     0.17      0.120       (  0.056)       0.022        0.098
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  41   3.42     0.17     0.120      (  0.056)      0.022       0.098
  42   3.50     0.17     0.120      (  0.055)      0.022       0.098
  43   3.58     0.17     0.120      (  0.055)      0.022       0.098
  44   3.67     0.17     0.120      (  0.055)      0.022       0.098
  45   3.75     0.17     0.120      (  0.055)      0.022       0.098
  46   3.83     0.20     0.144      (  0.054)      0.026       0.118
  47   3.92     0.20     0.144      (  0.054)      0.026       0.118
  48   4.00     0.20     0.144      (  0.054)      0.026       0.118
  49   4.08     0.20     0.144      (  0.054)      0.026       0.118
  50   4.17     0.20     0.144      (  0.054)      0.026       0.118
  51   4.25     0.20     0.144      (  0.053)      0.026       0.118
  52   4.33     0.23     0.168      (  0.053)      0.030       0.138
  53   4.42     0.23     0.168      (  0.053)      0.030       0.138
  54   4.50     0.23     0.168      (  0.053)      0.030       0.138
  55   4.58     0.23     0.168      (  0.052)      0.030       0.138
  56   4.67     0.23     0.168      (  0.052)      0.030       0.138
  57   4.75     0.23     0.168      (  0.052)      0.030       0.138
  58   4.83     0.27     0.192      (  0.052)      0.035       0.157
  59   4.92     0.27     0.192      (  0.051)      0.035       0.157
  60   5.00     0.27     0.192      (  0.051)      0.035       0.157
  61   5.08     0.20     0.144      (  0.051)      0.026       0.118
  62   5.17     0.20     0.144      (  0.051)      0.026       0.118
  63   5.25     0.20     0.144      (  0.051)      0.026       0.118
  64   5.33     0.23     0.168      (  0.050)      0.030       0.138
  65   5.42     0.23     0.168      (  0.050)      0.030       0.138
  66   5.50     0.23     0.168      (  0.050)      0.030       0.138
  67   5.58     0.27     0.192      (  0.050)      0.035       0.157
  68   5.67     0.27     0.192      (  0.049)      0.035       0.157
  69   5.75     0.27     0.192      (  0.049)      0.035       0.157
  70   5.83     0.27     0.192      (  0.049)      0.035       0.157
  71   5.92     0.27     0.192      (  0.049)      0.035       0.157
  72   6.00     0.27     0.192      (  0.049)      0.035       0.157
  73   6.08     0.30     0.216      (  0.048)      0.039       0.177
  74   6.17     0.30     0.216      (  0.048)      0.039       0.177
  75   6.25     0.30     0.216      (  0.048)      0.039       0.177
  76   6.33     0.30     0.216      (  0.048)      0.039       0.177
  77   6.42     0.30     0.216      (  0.048)      0.039       0.177
  78   6.50     0.30     0.216      (  0.047)      0.039       0.177
  79   6.58     0.33     0.240      (  0.047)      0.043       0.197
  80   6.67     0.33     0.240      (  0.047)      0.043       0.197
  81   6.75     0.33     0.240      (  0.047)      0.043       0.197
  82   6.83     0.33     0.240      (  0.046)      0.043       0.197
  83   6.92     0.33     0.240      (  0.046)      0.043       0.197
  84   7.00     0.33     0.240      (  0.046)      0.043       0.197
  85   7.08     0.33     0.240      (  0.046)      0.043       0.197
  86   7.17     0.33     0.240      (  0.046)      0.043       0.197
  87   7.25     0.33     0.240      (  0.045)      0.043       0.197
  88   7.33     0.37     0.264         0.045    (  0.048)      0.219
  89   7.42     0.37     0.264         0.045    (  0.048)      0.219
  90   7.50     0.37     0.264         0.045    (  0.048)      0.219
  91   7.58     0.40     0.288         0.045    (  0.052)      0.243
  92   7.67     0.40     0.288         0.044    (  0.052)      0.244
  93   7.75     0.40     0.288         0.044    (  0.052)      0.244
  94   7.83     0.43     0.312         0.044    (  0.056)      0.268
  95   7.92     0.43     0.312         0.044    (  0.056)      0.268
  96   8.00     0.43     0.312         0.044    (  0.056)      0.268
  97   8.08     0.50     0.360         0.043    (  0.065)      0.317
  98   8.17     0.50     0.360         0.043    (  0.065)      0.317
  99   8.25     0.50     0.360         0.043    (  0.065)      0.317
 100   8.33     0.50     0.360         0.043    (  0.065)      0.317
 101   8.42     0.50     0.360         0.043    (  0.065)      0.317
 102   8.50     0.50     0.360         0.042    (  0.065)      0.318
 103   8.58     0.53     0.384         0.042    (  0.069)      0.342
 104   8.67     0.53     0.384         0.042    (  0.069)      0.342
 105   8.75     0.53     0.384         0.042    (  0.069)      0.342
 106   8.83     0.57     0.408         0.042    (  0.073)      0.366
 107   8.92     0.57     0.408         0.041    (  0.073)      0.367
 108   9.00     0.57     0.408         0.041    (  0.073)      0.367
 109   9.08     0.63     0.456         0.041    (  0.082)      0.415
 110   9.17     0.63     0.456         0.041    (  0.082)      0.415
 111   9.25     0.63     0.456         0.041    (  0.082)      0.415
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112   9.33     0.67     0.480         0.040    (  0.086)        0.440
113   9.42     0.67     0.480         0.040    (  0.086)        0.440
114   9.50     0.67     0.480         0.040    (  0.086)        0.440
115   9.58     0.70     0.504         0.040    (  0.091)        0.464
116   9.67     0.70     0.504         0.040    (  0.091)        0.464
117   9.75     0.70     0.504         0.039    (  0.091)        0.465
118   9.83     0.73     0.528         0.039    (  0.095)        0.489
119   9.92     0.73     0.528         0.039    (  0.095)        0.489
120  10.00     0.73     0.528         0.039    (  0.095)        0.489
121  10.08     0.50     0.360         0.039    (  0.065)        0.321
122  10.17     0.50     0.360         0.039    (  0.065)        0.321
123  10.25     0.50     0.360         0.038    (  0.065)        0.322
124  10.33     0.50     0.360         0.038    (  0.065)        0.322
125  10.42     0.50     0.360         0.038    (  0.065)        0.322
126  10.50     0.50     0.360         0.038    (  0.065)        0.322
127  10.58     0.67     0.480         0.038    (  0.086)        0.442
128  10.67     0.67     0.480         0.037    (  0.086)        0.443
129  10.75     0.67     0.480         0.037    (  0.086)        0.443
130  10.83     0.67     0.480         0.037    (  0.086)        0.443
131  10.92     0.67     0.480         0.037    (  0.086)        0.443
132  11.00     0.67     0.480         0.037    (  0.086)        0.443
133  11.08     0.63     0.456         0.036    (  0.082)        0.420
134  11.17     0.63     0.456         0.036    (  0.082)        0.420
135  11.25     0.63     0.456         0.036    (  0.082)        0.420
136  11.33     0.63     0.456         0.036    (  0.082)        0.420
137  11.42     0.63     0.456         0.036    (  0.082)        0.420
138  11.50     0.63     0.456         0.036    (  0.082)        0.420
139  11.58     0.57     0.408         0.035    (  0.073)        0.373
140  11.67     0.57     0.408         0.035    (  0.073)        0.373
141  11.75     0.57     0.408         0.035    (  0.073)        0.373
142  11.83     0.60     0.432         0.035    (  0.078)        0.397
143  11.92     0.60     0.432         0.035    (  0.078)        0.397
144  12.00     0.60     0.432         0.035    (  0.078)        0.397
145  12.08     0.83     0.600         0.034    (  0.108)        0.566
146  12.17     0.83     0.600         0.034    (  0.108)        0.566
147  12.25     0.83     0.600         0.034    (  0.108)        0.566
148  12.33     0.87     0.624         0.034    (  0.112)        0.590
149  12.42     0.87     0.624         0.034    (  0.112)        0.590
150  12.50     0.87     0.624         0.034    (  0.112)        0.590
151  12.58     0.93     0.672         0.033    (  0.121)        0.639
152  12.67     0.93     0.672         0.033    (  0.121)        0.639
153  12.75     0.93     0.672         0.033    (  0.121)        0.639
154  12.83     0.97     0.696         0.033    (  0.125)        0.663
155  12.92     0.97     0.696         0.033    (  0.125)        0.663
156  13.00     0.97     0.696         0.033    (  0.125)        0.663
157  13.08     1.13     0.816         0.032    (  0.147)        0.784
158  13.17     1.13     0.816         0.032    (  0.147)        0.784
159  13.25     1.13     0.816         0.032    (  0.147)        0.784
160  13.33     1.13     0.816         0.032    (  0.147)        0.784
161  13.42     1.13     0.816         0.032    (  0.147)        0.784
162  13.50     1.13     0.816         0.032    (  0.147)        0.784
163  13.58     0.77     0.552         0.031    (  0.099)        0.521
164  13.67     0.77     0.552         0.031    (  0.099)        0.521
165  13.75     0.77     0.552         0.031    (  0.099)        0.521
166  13.83     0.77     0.552         0.031    (  0.099)        0.521
167  13.92     0.77     0.552         0.031    (  0.099)        0.521
168  14.00     0.77     0.552         0.031    (  0.099)        0.521
169  14.08     0.90     0.648         0.030    (  0.117)        0.618
170  14.17     0.90     0.648         0.030    (  0.117)        0.618
171  14.25     0.90     0.648         0.030    (  0.117)        0.618
172  14.33     0.87     0.624         0.030    (  0.112)        0.594
173  14.42     0.87     0.624         0.030    (  0.112)        0.594
174  14.50     0.87     0.624         0.030    (  0.112)        0.594
175  14.58     0.87     0.624         0.030    (  0.112)        0.594
176  14.67     0.87     0.624         0.029    (  0.112)        0.595
177  14.75     0.87     0.624         0.029    (  0.112)        0.595
178  14.83     0.83     0.600         0.029    (  0.108)        0.571
179  14.92     0.83     0.600         0.029    (  0.108)        0.571
180  15.00     0.83     0.600         0.029    (  0.108)        0.571
181  15.08     0.80     0.576         0.029    (  0.104)        0.547
182  15.17     0.80     0.576         0.028    (  0.104)        0.548
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183  15.25     0.80      0.576          0.028    (  0.104)        0.548
184  15.33     0.77      0.552          0.028    (  0.099)        0.524
185  15.42     0.77      0.552          0.028    (  0.099)        0.524
186  15.50     0.77      0.552          0.028    (  0.099)        0.524
187  15.58     0.63      0.456          0.028    (  0.082)        0.428
188  15.67     0.63      0.456          0.028    (  0.082)        0.428
189  15.75     0.63      0.456          0.027    (  0.082)        0.429
190  15.83     0.63      0.456          0.027    (  0.082)        0.429
191  15.92     0.63      0.456          0.027    (  0.082)        0.429
192  16.00     0.63      0.456          0.027    (  0.082)        0.429
193  16.08     0.13      0.096       (  0.027)      0.017        0.079
194  16.17     0.13      0.096       (  0.027)      0.017        0.079
195  16.25     0.13      0.096       (  0.027)      0.017        0.079
196  16.33     0.13      0.096       (  0.026)      0.017        0.079
197  16.42     0.13      0.096       (  0.026)      0.017        0.079
198  16.50     0.13      0.096       (  0.026)      0.017        0.079
199  16.58     0.10      0.072       (  0.026)      0.013        0.059
200  16.67     0.10      0.072       (  0.026)      0.013        0.059
201  16.75     0.10      0.072       (  0.026)      0.013        0.059
202  16.83     0.10      0.072       (  0.026)      0.013        0.059
203  16.92     0.10      0.072       (  0.026)      0.013        0.059
204  17.00     0.10      0.072       (  0.025)      0.013        0.059
205  17.08     0.17      0.120       (  0.025)      0.022        0.098
206  17.17     0.17      0.120       (  0.025)      0.022        0.098
207  17.25     0.17      0.120       (  0.025)      0.022        0.098
208  17.33     0.17      0.120       (  0.025)      0.022        0.098
209  17.42     0.17      0.120       (  0.025)      0.022        0.098
210  17.50     0.17      0.120       (  0.025)      0.022        0.098
211  17.58     0.17      0.120       (  0.025)      0.022        0.098
212  17.67     0.17      0.120       (  0.024)      0.022        0.098
213  17.75     0.17      0.120       (  0.024)      0.022        0.098
214  17.83     0.13      0.096       (  0.024)      0.017        0.079
215  17.92     0.13      0.096       (  0.024)      0.017        0.079
216  18.00     0.13      0.096       (  0.024)      0.017        0.079
217  18.08     0.13      0.096       (  0.024)      0.017        0.079
218  18.17     0.13      0.096       (  0.024)      0.017        0.079
219  18.25     0.13      0.096       (  0.024)      0.017        0.079
220  18.33     0.13      0.096       (  0.023)      0.017        0.079
221  18.42     0.13      0.096       (  0.023)      0.017        0.079
222  18.50     0.13      0.096       (  0.023)      0.017        0.079
223  18.58     0.10      0.072       (  0.023)      0.013        0.059
224  18.67     0.10      0.072       (  0.023)      0.013        0.059
225  18.75     0.10      0.072       (  0.023)      0.013        0.059
226  18.83     0.07      0.048       (  0.023)      0.009        0.039
227  18.92     0.07      0.048       (  0.023)      0.009        0.039
228  19.00     0.07      0.048       (  0.023)      0.009        0.039
229  19.08     0.10      0.072       (  0.022)      0.013        0.059
230  19.17     0.10      0.072       (  0.022)      0.013        0.059
231  19.25     0.10      0.072       (  0.022)      0.013        0.059
232  19.33     0.13      0.096       (  0.022)      0.017        0.079
233  19.42     0.13      0.096       (  0.022)      0.017        0.079
234  19.50     0.13      0.096       (  0.022)      0.017        0.079
235  19.58     0.10      0.072       (  0.022)      0.013        0.059
236  19.67     0.10      0.072       (  0.022)      0.013        0.059
237  19.75     0.10      0.072       (  0.022)      0.013        0.059
238  19.83     0.07      0.048       (  0.022)      0.009        0.039
239  19.92     0.07      0.048       (  0.021)      0.009        0.039
240  20.00     0.07      0.048       (  0.021)      0.009        0.039
241  20.08     0.10      0.072       (  0.021)      0.013        0.059
242  20.17     0.10      0.072       (  0.021)      0.013        0.059
243  20.25     0.10      0.072       (  0.021)      0.013        0.059
244  20.33     0.10      0.072       (  0.021)      0.013        0.059
245  20.42     0.10      0.072       (  0.021)      0.013        0.059
246  20.50     0.10      0.072       (  0.021)      0.013        0.059
247  20.58     0.10      0.072       (  0.021)      0.013        0.059
248  20.67     0.10      0.072       (  0.021)      0.013        0.059
249  20.75     0.10      0.072       (  0.021)      0.013        0.059
250  20.83     0.07      0.048       (  0.020)      0.009        0.039
251  20.92     0.07      0.048       (  0.020)      0.009        0.039
252  21.00     0.07      0.048       (  0.020)      0.009        0.039
253  21.08     0.10      0.072       (  0.020)      0.013        0.059
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254  21.17     0.10      0.072       (  0.020)       0.013        0.059
255  21.25     0.10      0.072       (  0.020)       0.013        0.059
256  21.33     0.07      0.048       (  0.020)       0.009        0.039
257  21.42     0.07      0.048       (  0.020)       0.009        0.039
258  21.50     0.07      0.048       (  0.020)       0.009        0.039
259  21.58     0.10      0.072       (  0.020)       0.013        0.059
260  21.67     0.10      0.072       (  0.020)       0.013        0.059
261  21.75     0.10      0.072       (  0.020)       0.013        0.059
262  21.83     0.07      0.048       (  0.020)       0.009        0.039
263  21.92     0.07      0.048       (  0.020)       0.009        0.039
264  22.00     0.07      0.048       (  0.019)       0.009        0.039
265  22.08     0.10      0.072       (  0.019)       0.013        0.059
266  22.17     0.10      0.072       (  0.019)       0.013        0.059
267  22.25     0.10      0.072       (  0.019)       0.013        0.059
268  22.33     0.07      0.048       (  0.019)       0.009        0.039
269  22.42     0.07      0.048       (  0.019)       0.009        0.039
270  22.50     0.07      0.048       (  0.019)       0.009        0.039
271  22.58     0.07      0.048       (  0.019)       0.009        0.039
272  22.67     0.07      0.048       (  0.019)       0.009        0.039
273  22.75     0.07      0.048       (  0.019)       0.009        0.039
274  22.83     0.07      0.048       (  0.019)       0.009        0.039
275  22.92     0.07      0.048       (  0.019)       0.009        0.039
276  23.00     0.07      0.048       (  0.019)       0.009        0.039
277  23.08     0.07      0.048       (  0.019)       0.009        0.039
278  23.17     0.07      0.048       (  0.019)       0.009        0.039
279  23.25     0.07      0.048       (  0.019)       0.009        0.039
280  23.33     0.07      0.048       (  0.019)       0.009        0.039
281  23.42     0.07      0.048       (  0.019)       0.009        0.039
282  23.50     0.07      0.048       (  0.019)       0.009        0.039
283  23.58     0.07      0.048       (  0.019)       0.009        0.039
284  23.67     0.07      0.048       (  0.018)       0.009        0.039
285  23.75     0.07      0.048       (  0.018)       0.009        0.039
286  23.83     0.07      0.048       (  0.018)       0.009        0.039
287  23.92     0.07      0.048       (  0.018)       0.009        0.039
288  24.00     0.07      0.048       (  0.018)       0.009        0.039
               (Loss Rate Not Used)
    Sum =     100.0                                   Sum =    64.8
      Flood volume = Effective rainfall      5.40(In)
       times area       1.0(Ac.)/[(In)/(Ft.)] =       0.4(Ac.Ft)
      Total soil loss =      0.60(In)
      Total soil loss =     0.050(Ac.Ft)
      Total rainfall =      6.00(In)
      Flood volume =       19533.4 Cubic Feet
      Total soil loss =        2159.4 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.788(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        24 - H O U R   S T O R M
                   R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
   0+ 5       0.0002      0.03  Q        |         |         |         |
   0+10       0.0005      0.04  Q        |         |         |         |
   0+15       0.0008      0.04  Q        |         |         |         |
   0+20       0.0011      0.06  Q        |         |         |         |
   0+25       0.0016      0.06  Q        |         |         |         |
   0+30       0.0020      0.06  Q        |         |         |         |
   0+35       0.0024      0.06  Q        |         |         |         |
   0+40       0.0028      0.06  Q        |         |         |         |
   0+45       0.0032      0.06  Q        |         |         |         |
   0+50       0.0037      0.08  Q        |         |         |         |
   0+55       0.0042      0.08  Q        |         |         |         |
   1+ 0       0.0048      0.08  Q        |         |         |         |
   1+ 5       0.0052      0.06  Q        |         |         |         |
   1+10       0.0056      0.06  Q        |         |         |         |
   1+15       0.0060      0.06  Q        |         |         |         |
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1+20       0.0065      0.06  Q         |         |         |         |
1+25       0.0069      0.06  Q         |         |         |         |
1+30       0.0073      0.06  Q         |         |         |         |
1+35       0.0077      0.06  Q         |         |         |         |
1+40       0.0081      0.06  Q         |         |         |         |
1+45       0.0085      0.06  Q         |         |         |         |
1+50       0.0090      0.08  Q         |         |         |         |
1+55       0.0096      0.08  Q         |         |         |         |
2+ 0       0.0101      0.08  Q         |         |         |         |
2+ 5       0.0106      0.08  Q         |         |         |         |
2+10       0.0112      0.08  Q         |         |         |         |
2+15       0.0117      0.08  QV        |         |         |         |
2+20       0.0123      0.08  QV        |         |         |         |
2+25       0.0128      0.08  QV        |         |         |         |
2+30       0.0134      0.08  QV        |         |         |         |
2+35       0.0140      0.09  QV        |         |         |         |
2+40       0.0147      0.10  QV        |         |         |         |
2+45       0.0154      0.10  QV        |         |         |         |
2+50       0.0161      0.10  QV        |         |         |         |
2+55       0.0167      0.10  QV        |         |         |         |
3+ 0       0.0174      0.10  QV        |         |         |         |
3+ 5       0.0181      0.10  QV        |         |         |         |
3+10       0.0188      0.10  QV        |         |         |         |
3+15       0.0195      0.10  QV        |         |         |         |
3+20       0.0201      0.10  QV        |         |         |         |
3+25       0.0208      0.10  QV        |         |         |         |
3+30       0.0215      0.10  QV        |         |         |         |
3+35       0.0222      0.10  QV        |         |         |         |
3+40       0.0229      0.10  Q V       |         |         |         |
3+45       0.0235      0.10  Q V       |         |         |         |
3+50       0.0243      0.11  Q V       |         |         |         |
3+55       0.0252      0.12  Q V       |         |         |         |
4+ 0       0.0260      0.12  Q V       |         |         |         |
4+ 5       0.0268      0.12  Q V       |         |         |         |
4+10       0.0276      0.12  Q V       |         |         |         |
4+15       0.0284      0.12  Q V       |         |         |         |
4+20       0.0293      0.13  Q V       |         |         |         |
4+25       0.0303      0.14  Q V       |         |         |         |
4+30       0.0313      0.14  Q V       |         |         |         |
4+35       0.0322      0.14  Q V       |         |         |         |
4+40       0.0332      0.14  Q V       |         |         |         |
4+45       0.0341      0.14  Q  V      |         |         |         |
4+50       0.0352      0.15  Q  V      |         |         |         |
4+55       0.0363      0.16  Q  V      |         |         |         |
5+ 0       0.0374      0.16  Q  V      |         |         |         |
5+ 5       0.0382      0.13  Q  V      |         |         |         |
5+10       0.0390      0.12  Q  V      |         |         |         |
5+15       0.0399      0.12  Q  V      |         |         |         |
5+20       0.0408      0.13  Q  V      |         |         |         |
5+25       0.0417      0.14  Q  V      |         |         |         |
5+30       0.0427      0.14  Q  V      |         |         |         |
5+35       0.0437      0.15  Q  V      |         |         |         |
5+40       0.0448      0.16  Q  V      |         |         |         |
5+45       0.0459      0.16  Q   V     |         |         |         |
5+50       0.0470      0.16  Q   V     |         |         |         |
5+55       0.0481      0.16  Q   V     |         |         |         |
6+ 0       0.0492      0.16  Q   V     |         |         |         |
6+ 5       0.0504      0.17  Q   V     |         |         |         |
6+10       0.0516      0.18  Q   V     |         |         |         |
6+15       0.0528      0.18  Q   V     |         |         |         |
6+20       0.0541      0.18  Q   V     |         |         |         |
6+25       0.0553      0.18  Q   V     |         |         |         |
6+30       0.0565      0.18  Q    V    |         |         |         |
6+35       0.0579      0.19  Q    V    |         |         |         |
6+40       0.0592      0.20  Q    V    |         |         |         |
6+45       0.0606      0.20  Q    V    |         |         |         |
6+50       0.0619      0.20  Q    V    |         |         |         |
6+55       0.0633      0.20  Q    V    |         |         |         |
7+ 0       0.0647      0.20  Q    V    |         |         |         |
7+ 5       0.0660      0.20  Q    V    |         |         |         |
7+10       0.0674      0.20  Q     V   |         |         |         |
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 7+15       0.0687      0.20  Q     V   |         |         |         |
 7+20       0.0702      0.22  Q     V   |         |         |         |
 7+25       0.0717      0.22  Q     V   |         |         |         |
 7+30       0.0733      0.22  Q     V   |         |         |         |
 7+35       0.0749      0.24  Q     V   |         |         |         |
 7+40       0.0766      0.24  Q     V   |         |         |         |
 7+45       0.0783      0.24  Q     V   |         |         |         |
 7+50       0.0801      0.26  |Q     V  |         |         |         |
 7+55       0.0820      0.27  |Q     V  |         |         |         |
 8+ 0       0.0838      0.27  |Q     V  |         |         |         |
 8+ 5       0.0859      0.31  |Q     V  |         |         |         |
 8+10       0.0881      0.32  |Q     V  |         |         |         |
 8+15       0.0903      0.32  |Q      V |         |         |         |
 8+20       0.0925      0.32  |Q      V |         |         |         |
 8+25       0.0947      0.32  |Q      V |         |         |         |
 8+30       0.0969      0.32  |Q      V |         |         |         |
 8+35       0.0992      0.34  |Q      V |         |         |         |
 8+40       0.1016      0.34  |Q       V|         |         |         |
 8+45       0.1040      0.34  |Q       V|         |         |         |
 8+50       0.1065      0.36  |Q       V|         |         |         |
 8+55       0.1090      0.37  |Q       V|         |         |         |
 9+ 0       0.1115      0.37  |Q       V|         |         |         |
 9+ 5       0.1143      0.41  |Q        V         |         |         |
 9+10       0.1172      0.42  |Q        V         |         |         |
 9+15       0.1201      0.42  |Q        V         |         |         |
 9+20       0.1231      0.44  |Q        V         |         |         |
 9+25       0.1261      0.44  |Q        |V        |         |         |
 9+30       0.1292      0.44  |Q        |V        |         |         |
 9+35       0.1324      0.46  |Q        |V        |         |         |
 9+40       0.1356      0.47  |Q        | V       |         |         |
 9+45       0.1388      0.47  |Q        | V       |         |         |
 9+50       0.1421      0.49  |Q        | V       |         |         |
 9+55       0.1455      0.49  |Q        | V       |         |         |
10+ 0       0.1489      0.49  |Q        |  V      |         |         |
10+ 5       0.1513      0.36  |Q        |  V      |         |         |
10+10       0.1536      0.32  |Q        |  V      |         |         |
10+15       0.1558      0.32  |Q        |  V      |         |         |
10+20       0.1580      0.32  |Q        |   V     |         |         |
10+25       0.1602      0.32  |Q        |   V     |         |         |
10+30       0.1625      0.32  |Q        |   V     |         |         |
10+35       0.1654      0.42  |Q        |   V     |         |         |
10+40       0.1684      0.44  |Q        |    V    |         |         |
10+45       0.1715      0.44  |Q        |    V    |         |         |
10+50       0.1746      0.44  |Q        |    V    |         |         |
10+55       0.1776      0.45  |Q        |    V    |         |         |
11+ 0       0.1807      0.45  |Q        |     V   |         |         |
11+ 5       0.1836      0.43  |Q        |     V   |         |         |
11+10       0.1865      0.42  |Q        |     V   |         |         |
11+15       0.1894      0.42  |Q        |     V   |         |         |
11+20       0.1923      0.42  |Q        |      V  |         |         |
11+25       0.1952      0.42  |Q        |      V  |         |         |
11+30       0.1981      0.42  |Q        |      V  |         |         |
11+35       0.2008      0.38  |Q        |      V  |         |         |
11+40       0.2034      0.37  |Q        |       V |         |         |
11+45       0.2059      0.37  |Q        |       V |         |         |
11+50       0.2087      0.39  |Q        |       V |         |         |
11+55       0.2114      0.40  |Q        |       V |         |         |
12+ 0       0.2142      0.40  |Q        |        V|         |         |
12+ 5       0.2178      0.53  | Q       |        V|         |         |
12+10       0.2217      0.57  | Q       |        V|         |         |
12+15       0.2257      0.57  | Q       |         V         |         |
12+20       0.2297      0.59  | Q       |         V         |         |
12+25       0.2338      0.59  | Q       |         V         |         |
12+30       0.2379      0.59  | Q       |         |V        |         |
12+35       0.2422      0.63  | Q       |         |V        |         |
12+40       0.2466      0.64  | Q       |         | V       |         |
12+45       0.2511      0.64  | Q       |         | V       |         |
12+50       0.2556      0.66  | Q       |         | V       |         |
12+55       0.2602      0.67  | Q       |         |  V      |         |
13+ 0       0.2648      0.67  | Q       |         |  V      |         |
13+ 5       0.2700      0.76  |  Q      |         |   V     |         |
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13+10       0.2755      0.79  |  Q      |         |   V     |         |
13+15       0.2809      0.79  |  Q      |         |    V    |         |
13+20       0.2863      0.79  |  Q      |         |    V    |         |
13+25       0.2917      0.79  |  Q      |         |     V   |         |
13+30       0.2972      0.79  |  Q      |         |     V   |         |
13+35       0.3011      0.58  | Q       |         |     V   |         |
13+40       0.3047      0.52  | Q       |         |      V  |         |
13+45       0.3083      0.52  | Q       |         |      V  |         |
13+50       0.3119      0.52  | Q       |         |      V  |         |
13+55       0.3155      0.52  | Q       |         |       V |         |
14+ 0       0.3191      0.52  | Q       |         |       V |         |
14+ 5       0.3233      0.60  | Q       |         |       V |         |
14+10       0.3276      0.62  | Q       |         |        V|         |
14+15       0.3318      0.62  | Q       |         |        V|         |
14+20       0.3360      0.60  | Q       |         |        V|         |
14+25       0.3401      0.60  | Q       |         |         V         |
14+30       0.3442      0.60  | Q       |         |         V         |
14+35       0.3483      0.60  | Q       |         |         |V        |
14+40       0.3524      0.60  | Q       |         |         |V        |
14+45       0.3565      0.60  | Q       |         |         |V        |
14+50       0.3605      0.58  | Q       |         |         | V       |
14+55       0.3645      0.57  | Q       |         |         | V       |
15+ 0       0.3684      0.57  | Q       |         |         | V       |
15+ 5       0.3722      0.55  | Q       |         |         |  V      |
15+10       0.3760      0.55  | Q       |         |         |  V      |
15+15       0.3798      0.55  | Q       |         |         |  V      |
15+20       0.3835      0.53  | Q       |         |         |   V     |
15+25       0.3871      0.53  | Q       |         |         |   V     |
15+30       0.3907      0.53  | Q       |         |         |   V     |
15+35       0.3938      0.45  |Q        |         |         |    V    |
15+40       0.3968      0.43  |Q        |         |         |    V    |
15+45       0.3997      0.43  |Q        |         |         |    V    |
15+50       0.4027      0.43  |Q        |         |         |    V    |
15+55       0.4057      0.43  |Q        |         |         |     V   |
16+ 0       0.4086      0.43  |Q        |         |         |     V   |
16+ 5       0.4097      0.15  Q         |         |         |     V   |
16+10       0.4102      0.08  Q         |         |         |     V   |
16+15       0.4107      0.08  Q         |         |         |     V   |
16+20       0.4113      0.08  Q         |         |         |     V   |
16+25       0.4118      0.08  Q         |         |         |     V   |
16+30       0.4124      0.08  Q         |         |         |     V   |
16+35       0.4128      0.06  Q         |         |         |     V   |
16+40       0.4132      0.06  Q         |         |         |     V   |
16+45       0.4136      0.06  Q         |         |         |     V   |
16+50       0.4140      0.06  Q         |         |         |     V   |
16+55       0.4145      0.06  Q         |         |         |     V   |
17+ 0       0.4149      0.06  Q         |         |         |      V  |
17+ 5       0.4155      0.09  Q         |         |         |      V  |
17+10       0.4162      0.10  Q         |         |         |      V  |
17+15       0.4168      0.10  Q         |         |         |      V  |
17+20       0.4175      0.10  Q         |         |         |      V  |
17+25       0.4182      0.10  Q         |         |         |      V  |
17+30       0.4189      0.10  Q         |         |         |      V  |
17+35       0.4196      0.10  Q         |         |         |      V  |
17+40       0.4202      0.10  Q         |         |         |      V  |
17+45       0.4209      0.10  Q         |         |         |      V  |
17+50       0.4215      0.08  Q         |         |         |      V  |
17+55       0.4220      0.08  Q         |         |         |      V  |
18+ 0       0.4226      0.08  Q         |         |         |      V  |
18+ 5       0.4231      0.08  Q         |         |         |      V  |
18+10       0.4237      0.08  Q         |         |         |      V  |
18+15       0.4242      0.08  Q         |         |         |      V  |
18+20       0.4248      0.08  Q         |         |         |      V  |
18+25       0.4253      0.08  Q         |         |         |      V  |
18+30       0.4259      0.08  Q         |         |         |      V  |
18+35       0.4263      0.06  Q         |         |         |       V |
18+40       0.4267      0.06  Q         |         |         |       V |
18+45       0.4271      0.06  Q         |         |         |       V |
18+50       0.4274      0.04  Q         |         |         |       V |
18+55       0.4277      0.04  Q         |         |         |       V |
19+ 0       0.4280      0.04  Q         |         |         |       V |
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   19+ 5       0.4283      0.06  Q         |         |         |       V |
   19+10       0.4287      0.06  Q         |         |         |       V |
   19+15       0.4292      0.06  Q         |         |         |       V |
   19+20       0.4297      0.08  Q         |         |         |       V |
   19+25       0.4302      0.08  Q         |         |         |       V |
   19+30       0.4308      0.08  Q         |         |         |       V |
   19+35       0.4312      0.06  Q         |         |         |       V |
   19+40       0.4316      0.06  Q         |         |         |       V |
   19+45       0.4320      0.06  Q         |         |         |       V |
   19+50       0.4323      0.04  Q         |         |         |       V |
   19+55       0.4326      0.04  Q         |         |         |       V |
   20+ 0       0.4329      0.04  Q         |         |         |       V |
   20+ 5       0.4332      0.06  Q         |         |         |       V |
   20+10       0.4336      0.06  Q         |         |         |       V |
   20+15       0.4341      0.06  Q         |         |         |       V |
   20+20       0.4345      0.06  Q         |         |         |       V |
   20+25       0.4349      0.06  Q         |         |         |       V |
   20+30       0.4353      0.06  Q         |         |         |       V |
   20+35       0.4357      0.06  Q         |         |         |       V |
   20+40       0.4361      0.06  Q         |         |         |       V |
   20+45       0.4365      0.06  Q         |         |         |       V |
   20+50       0.4368      0.04  Q         |         |         |       V |
   20+55       0.4371      0.04  Q         |         |         |       V |
   21+ 0       0.4373      0.04  Q         |         |         |        V|
   21+ 5       0.4377      0.06  Q         |         |         |        V|
   21+10       0.4381      0.06  Q         |         |         |        V|
   21+15       0.4385      0.06  Q         |         |         |        V|
   21+20       0.4388      0.04  Q         |         |         |        V|
   21+25       0.4391      0.04  Q         |         |         |        V|
   21+30       0.4394      0.04  Q         |         |         |        V|
   21+35       0.4398      0.06  Q         |         |         |        V|
   21+40       0.4402      0.06  Q         |         |         |        V|
   21+45       0.4406      0.06  Q         |         |         |        V|
   21+50       0.4409      0.04  Q         |         |         |        V|
   21+55       0.4412      0.04  Q         |         |         |        V|
   22+ 0       0.4414      0.04  Q         |         |         |        V|
   22+ 5       0.4418      0.06  Q         |         |         |        V|
   22+10       0.4422      0.06  Q         |         |         |        V|
   22+15       0.4426      0.06  Q         |         |         |        V|
   22+20       0.4429      0.04  Q         |         |         |        V|
   22+25       0.4432      0.04  Q         |         |         |        V|
   22+30       0.4435      0.04  Q         |         |         |        V|
   22+35       0.4437      0.04  Q         |         |         |        V|
   22+40       0.4440      0.04  Q         |         |         |        V|
   22+45       0.4443      0.04  Q         |         |         |        V|
   22+50       0.4446      0.04  Q         |         |         |        V|
   22+55       0.4448      0.04  Q         |         |         |        V|
   23+ 0       0.4451      0.04  Q         |         |         |        V|
   23+ 5       0.4454      0.04  Q         |         |         |        V|
   23+10       0.4456      0.04  Q         |         |         |        V|
   23+15       0.4459      0.04  Q         |         |         |        V|
   23+20       0.4462      0.04  Q         |         |         |        V|
   23+25       0.4465      0.04  Q         |         |         |        V|
   23+30       0.4467      0.04  Q         |         |         |        V|
   23+35       0.4470      0.04  Q         |         |         |        V|
   23+40       0.4473      0.04  Q         |         |         |        V|
   23+45       0.4476      0.04  Q         |         |         |        V|
   23+50       0.4478      0.04  Q         |         |         |        V|
   23+55       0.4481      0.04  Q         |         |         |        V|
   24+ 0       0.4484      0.04  Q         |         |         |        V|
   24+ 5       0.4484      0.01  Q         |         |         |          V
-----------------------------------------------------------------------
```

```
        U n i t   H y d r o g r a p h   A n a l y s i s

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               Study date  06/04/21 File: 19400p100y24hC24100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6310

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
19-400
PROPOSED CONDITION
100-YEAR, 24-HOUR
AREA C
--------------------------------------------------------------------
Drainage Area =       0.83(Ac.)  =      0.001 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       0.83(Ac.)  =      0.001 Sq. Mi.
Length along longest watercourse =     896.00(Ft.)
Length along longest watercourse measured to centroid =     320.00(Ft.)
Length along longest watercourse =      0.170 Mi.
Length along longest watercourse measured to centroid =      0.061 Mi.
Difference in elevation =      12.80(Ft.)
Slope along watercourse =     75.4286 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.028 Hr.
Lag time =     1.67 Min.
25% of lag time =     0.42 Min.
40% of lag time =     0.67 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        0.83           2.50                  2.07

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        0.83           6.00                  4.98

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    2.500(In)
Area Averaged 100-Year Rainfall =    6.000(In)

Point rain (area averaged) =     6.000(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    6.000(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     0.830           69.00         0.900
 Total Area Entered =      0.83(Ac.)
```

```
            RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
            AMC2 AMC-3     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
            69.0  84.4      0.194     0.900        0.037       1.000      0.037
                                                               Sum (F) =   0.037
            Area averaged mean soil loss (F) (In/Hr) =  0.037
            Minimum soil loss rate ((In/Hr)) =  0.018
            (for 24 hour storm duration)
            Soil low loss rate (decimal) =   0.180
            ---------------------------------------------------------------------

                           U n i t  H y d r o g r a p h
                                  VALLEY S-Curve
            --------------------------------------------------------------------
                           Unit Hydrograph Data
            ---------------------------------------------------------------------
            Unit time period   Time % of lag  Distribution   Unit Hydrograph
                (hrs)                            Graph %           (CFS)
            ---------------------------------------------------------------------
                1   0.083        299.651         56.644             0.474
                2   0.167        599.302         37.148             0.311
                3   0.250        898.953          6.208             0.052
                                          Sum = 100.000   Sum=       0.836
     -----------------------------------------------------------------------


      The following loss rate calculations reflect use of the minimum calculated loss
      rate subtracted from the Storm Rain to produce the maximum Effective Rain value

       Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
            (Hr.)  Percent   (In/Hr)          Max    |    Low         (In/Hr)
         1  0.08      0.07      0.048        (  0.065)       0.009         0.039
         2  0.17      0.07      0.048        (  0.065)       0.009         0.039
         3  0.25      0.07      0.048        (  0.065)       0.009         0.039
         4  0.33      0.10      0.072        (  0.065)       0.013         0.059
         5  0.42      0.10      0.072        (  0.064)       0.013         0.059
         6  0.50      0.10      0.072        (  0.064)       0.013         0.059
         7  0.58      0.10      0.072        (  0.064)       0.013         0.059
         8  0.67      0.10      0.072        (  0.064)       0.013         0.059
         9  0.75      0.10      0.072        (  0.063)       0.013         0.059
        10  0.83      0.13      0.096        (  0.063)       0.017         0.079
        11  0.92      0.13      0.096        (  0.063)       0.017         0.079
        12  1.00      0.13      0.096        (  0.063)       0.017         0.079
        13  1.08      0.10      0.072        (  0.062)       0.013         0.059
        14  1.17      0.10      0.072        (  0.062)       0.013         0.059
        15  1.25      0.10      0.072        (  0.062)       0.013         0.059
        16  1.33      0.10      0.072        (  0.062)       0.013         0.059
        17  1.42      0.10      0.072        (  0.061)       0.013         0.059
        18  1.50      0.10      0.072        (  0.061)       0.013         0.059
        19  1.58      0.10      0.072        (  0.061)       0.013         0.059
        20  1.67      0.10      0.072        (  0.061)       0.013         0.059
        21  1.75      0.10      0.072        (  0.060)       0.013         0.059
        22  1.83      0.13      0.096        (  0.060)       0.017         0.079
        23  1.92      0.13      0.096        (  0.060)       0.017         0.079
        24  2.00      0.13      0.096        (  0.060)       0.017         0.079
        25  2.08      0.13      0.096        (  0.059)       0.017         0.079
        26  2.17      0.13      0.096        (  0.059)       0.017         0.079
        27  2.25      0.13      0.096        (  0.059)       0.017         0.079
        28  2.33      0.13      0.096        (  0.059)       0.017         0.079
        29  2.42      0.13      0.096        (  0.058)       0.017         0.079
        30  2.50      0.13      0.096        (  0.058)       0.017         0.079
        31  2.58      0.17      0.120        (  0.058)       0.022         0.098
        32  2.67      0.17      0.120        (  0.058)       0.022         0.098
        33  2.75      0.17      0.120        (  0.057)       0.022         0.098
        34  2.83      0.17      0.120        (  0.057)       0.022         0.098
        35  2.92      0.17      0.120        (  0.057)       0.022         0.098
        36  3.00      0.17      0.120        (  0.057)       0.022         0.098
        37  3.08      0.17      0.120        (  0.057)       0.022         0.098
        38  3.17      0.17      0.120        (  0.056)       0.022         0.098
        39  3.25      0.17      0.120        (  0.056)       0.022         0.098
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  40   3.33     0.17      0.120       (  0.056)       0.022        0.098
  41   3.42     0.17      0.120       (  0.056)       0.022        0.098
  42   3.50     0.17      0.120       (  0.055)       0.022        0.098
  43   3.58     0.17      0.120       (  0.055)       0.022        0.098
  44   3.67     0.17      0.120       (  0.055)       0.022        0.098
  45   3.75     0.17      0.120       (  0.055)       0.022        0.098
  46   3.83     0.20      0.144       (  0.054)       0.026        0.118
  47   3.92     0.20      0.144       (  0.054)       0.026        0.118
  48   4.00     0.20      0.144       (  0.054)       0.026        0.118
  49   4.08     0.20      0.144       (  0.054)       0.026        0.118
  50   4.17     0.20      0.144       (  0.054)       0.026        0.118
  51   4.25     0.20      0.144       (  0.053)       0.026        0.118
  52   4.33     0.23      0.168       (  0.053)       0.030        0.138
  53   4.42     0.23      0.168       (  0.053)       0.030        0.138
  54   4.50     0.23      0.168       (  0.053)       0.030        0.138
  55   4.58     0.23      0.168       (  0.052)       0.030        0.138
  56   4.67     0.23      0.168       (  0.052)       0.030        0.138
  57   4.75     0.23      0.168       (  0.052)       0.030        0.138
  58   4.83     0.27      0.192       (  0.052)       0.035        0.157
  59   4.92     0.27      0.192       (  0.051)       0.035        0.157
  60   5.00     0.27      0.192       (  0.051)       0.035        0.157
  61   5.08     0.20      0.144       (  0.051)       0.026        0.118
  62   5.17     0.20      0.144       (  0.051)       0.026        0.118
  63   5.25     0.20      0.144       (  0.051)       0.026        0.118
  64   5.33     0.23      0.168       (  0.050)       0.030        0.138
  65   5.42     0.23      0.168       (  0.050)       0.030        0.138
  66   5.50     0.23      0.168       (  0.050)       0.030        0.138
  67   5.58     0.27      0.192       (  0.050)       0.035        0.157
  68   5.67     0.27      0.192       (  0.049)       0.035        0.157
  69   5.75     0.27      0.192       (  0.049)       0.035        0.157
  70   5.83     0.27      0.192       (  0.049)       0.035        0.157
  71   5.92     0.27      0.192       (  0.049)       0.035        0.157
  72   6.00     0.27      0.192       (  0.049)       0.035        0.157
  73   6.08     0.30      0.216       (  0.048)       0.039        0.177
  74   6.17     0.30      0.216       (  0.048)       0.039        0.177
  75   6.25     0.30      0.216       (  0.048)       0.039        0.177
  76   6.33     0.30      0.216       (  0.048)       0.039        0.177
  77   6.42     0.30      0.216       (  0.048)       0.039        0.177
  78   6.50     0.30      0.216       (  0.047)       0.039        0.177
  79   6.58     0.33      0.240       (  0.047)       0.043        0.197
  80   6.67     0.33      0.240       (  0.047)       0.043        0.197
  81   6.75     0.33      0.240       (  0.047)       0.043        0.197
  82   6.83     0.33      0.240       (  0.046)       0.043        0.197
  83   6.92     0.33      0.240       (  0.046)       0.043        0.197
  84   7.00     0.33      0.240       (  0.046)       0.043        0.197
  85   7.08     0.33      0.240       (  0.046)       0.043        0.197
  86   7.17     0.33      0.240       (  0.046)       0.043        0.197
  87   7.25     0.33      0.240       (  0.045)       0.043        0.197
  88   7.33     0.37      0.264          0.045    (  0.048)        0.219
  89   7.42     0.37      0.264          0.045    (  0.048)        0.219
  90   7.50     0.37      0.264          0.045    (  0.048)        0.219
  91   7.58     0.40      0.288          0.045    (  0.052)        0.243
  92   7.67     0.40      0.288          0.044    (  0.052)        0.244
  93   7.75     0.40      0.288          0.044    (  0.052)        0.244
  94   7.83     0.43      0.312          0.044    (  0.056)        0.268
  95   7.92     0.43      0.312          0.044    (  0.056)        0.268
  96   8.00     0.43      0.312          0.044    (  0.056)        0.268
  97   8.08     0.50      0.360          0.043    (  0.065)        0.317
  98   8.17     0.50      0.360          0.043    (  0.065)        0.317
  99   8.25     0.50      0.360          0.043    (  0.065)        0.317
 100   8.33     0.50      0.360          0.043    (  0.065)        0.317
 101   8.42     0.50      0.360          0.043    (  0.065)        0.317
 102   8.50     0.50      0.360          0.042    (  0.065)        0.318
 103   8.58     0.53      0.384          0.042    (  0.069)        0.342
 104   8.67     0.53      0.384          0.042    (  0.069)        0.342
 105   8.75     0.53      0.384          0.042    (  0.069)        0.342
 106   8.83     0.57      0.408          0.042    (  0.073)        0.366
 107   8.92     0.57      0.408          0.041    (  0.073)        0.367
 108   9.00     0.57      0.408          0.041    (  0.073)        0.367
 109   9.08     0.63      0.456          0.041    (  0.082)        0.415
 110   9.17     0.63      0.456          0.041    (  0.082)        0.415
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111   9.25     0.63      0.456          0.041    (  0.082)        0.415
112   9.33     0.67      0.480          0.040    (  0.086)        0.440
113   9.42     0.67      0.480          0.040    (  0.086)        0.440
114   9.50     0.67      0.480          0.040    (  0.086)        0.440
115   9.58     0.70      0.504          0.040    (  0.091)        0.464
116   9.67     0.70      0.504          0.040    (  0.091)        0.464
117   9.75     0.70      0.504          0.039    (  0.091)        0.465
118   9.83     0.73      0.528          0.039    (  0.095)        0.489
119   9.92     0.73      0.528          0.039    (  0.095)        0.489
120  10.00     0.73      0.528          0.039    (  0.095)        0.489
121  10.08     0.50      0.360          0.039    (  0.065)        0.321
122  10.17     0.50      0.360          0.039    (  0.065)        0.321
123  10.25     0.50      0.360          0.038    (  0.065)        0.322
124  10.33     0.50      0.360          0.038    (  0.065)        0.322
125  10.42     0.50      0.360          0.038    (  0.065)        0.322
126  10.50     0.50      0.360          0.038    (  0.065)        0.322
127  10.58     0.67      0.480          0.038    (  0.086)        0.442
128  10.67     0.67      0.480          0.037    (  0.086)        0.443
129  10.75     0.67      0.480          0.037    (  0.086)        0.443
130  10.83     0.67      0.480          0.037    (  0.086)        0.443
131  10.92     0.67      0.480          0.037    (  0.086)        0.443
132  11.00     0.67      0.480          0.037    (  0.086)        0.443
133  11.08     0.63      0.456          0.036    (  0.082)        0.420
134  11.17     0.63      0.456          0.036    (  0.082)        0.420
135  11.25     0.63      0.456          0.036    (  0.082)        0.420
136  11.33     0.63      0.456          0.036    (  0.082)        0.420
137  11.42     0.63      0.456          0.036    (  0.082)        0.420
138  11.50     0.63      0.456          0.036    (  0.082)        0.420
139  11.58     0.57      0.408          0.035    (  0.073)        0.373
140  11.67     0.57      0.408          0.035    (  0.073)        0.373
141  11.75     0.57      0.408          0.035    (  0.073)        0.373
142  11.83     0.60      0.432          0.035    (  0.078)        0.397
143  11.92     0.60      0.432          0.035    (  0.078)        0.397
144  12.00     0.60      0.432          0.035    (  0.078)        0.397
145  12.08     0.83      0.600          0.034    (  0.108)        0.566
146  12.17     0.83      0.600          0.034    (  0.108)        0.566
147  12.25     0.83      0.600          0.034    (  0.108)        0.566
148  12.33     0.87      0.624          0.034    (  0.112)        0.590
149  12.42     0.87      0.624          0.034    (  0.112)        0.590
150  12.50     0.87      0.624          0.034    (  0.112)        0.590
151  12.58     0.93      0.672          0.033    (  0.121)        0.639
152  12.67     0.93      0.672          0.033    (  0.121)        0.639
153  12.75     0.93      0.672          0.033    (  0.121)        0.639
154  12.83     0.97      0.696          0.033    (  0.125)        0.663
155  12.92     0.97      0.696          0.033    (  0.125)        0.663
156  13.00     0.97      0.696          0.033    (  0.125)        0.663
157  13.08     1.13      0.816          0.032    (  0.147)        0.784
158  13.17     1.13      0.816          0.032    (  0.147)        0.784
159  13.25     1.13      0.816          0.032    (  0.147)        0.784
160  13.33     1.13      0.816          0.032    (  0.147)        0.784
161  13.42     1.13      0.816          0.032    (  0.147)        0.784
162  13.50     1.13      0.816          0.032    (  0.147)        0.784
163  13.58     0.77      0.552          0.031    (  0.099)        0.521
164  13.67     0.77      0.552          0.031    (  0.099)        0.521
165  13.75     0.77      0.552          0.031    (  0.099)        0.521
166  13.83     0.77      0.552          0.031    (  0.099)        0.521
167  13.92     0.77      0.552          0.031    (  0.099)        0.521
168  14.00     0.77      0.552          0.031    (  0.099)        0.521
169  14.08     0.90      0.648          0.030    (  0.117)        0.618
170  14.17     0.90      0.648          0.030    (  0.117)        0.618
171  14.25     0.90      0.648          0.030    (  0.117)        0.618
172  14.33     0.87      0.624          0.030    (  0.112)        0.594
173  14.42     0.87      0.624          0.030    (  0.112)        0.594
174  14.50     0.87      0.624          0.030    (  0.112)        0.594
175  14.58     0.87      0.624          0.030    (  0.112)        0.594
176  14.67     0.87      0.624          0.029    (  0.112)        0.595
177  14.75     0.87      0.624          0.029    (  0.112)        0.595
178  14.83     0.83      0.600          0.029    (  0.108)        0.571
179  14.92     0.83      0.600          0.029    (  0.108)        0.571
180  15.00     0.83      0.600          0.029    (  0.108)        0.571
181  15.08     0.80      0.576          0.029    (  0.104)        0.547
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```
182  15.17     0.80      0.576         0.028    (  0.104)        0.548
183  15.25     0.80      0.576         0.028    (  0.104)        0.548
184  15.33     0.77      0.552         0.028    (  0.099)        0.524
185  15.42     0.77      0.552         0.028    (  0.099)        0.524
186  15.50     0.77      0.552         0.028    (  0.099)        0.524
187  15.58     0.63      0.456         0.028    (  0.082)        0.428
188  15.67     0.63      0.456         0.028    (  0.082)        0.428
189  15.75     0.63      0.456         0.027    (  0.082)        0.429
190  15.83     0.63      0.456         0.027    (  0.082)        0.429
191  15.92     0.63      0.456         0.027    (  0.082)        0.429
192  16.00     0.63      0.456         0.027    (  0.082)        0.429
193  16.08     0.13      0.096      (  0.027)       0.017        0.079
194  16.17     0.13      0.096      (  0.027)       0.017        0.079
195  16.25     0.13      0.096      (  0.027)       0.017        0.079
196  16.33     0.13      0.096      (  0.026)       0.017        0.079
197  16.42     0.13      0.096      (  0.026)       0.017        0.079
198  16.50     0.13      0.096      (  0.026)       0.017        0.079
199  16.58     0.10      0.072      (  0.026)       0.013        0.059
200  16.67     0.10      0.072      (  0.026)       0.013        0.059
201  16.75     0.10      0.072      (  0.026)       0.013        0.059
202  16.83     0.10      0.072      (  0.026)       0.013        0.059
203  16.92     0.10      0.072      (  0.026)       0.013        0.059
204  17.00     0.10      0.072      (  0.025)       0.013        0.059
205  17.08     0.17      0.120      (  0.025)       0.022        0.098
206  17.17     0.17      0.120      (  0.025)       0.022        0.098
207  17.25     0.17      0.120      (  0.025)       0.022        0.098
208  17.33     0.17      0.120      (  0.025)       0.022        0.098
209  17.42     0.17      0.120      (  0.025)       0.022        0.098
210  17.50     0.17      0.120      (  0.025)       0.022        0.098
211  17.58     0.17      0.120      (  0.025)       0.022        0.098
212  17.67     0.17      0.120      (  0.024)       0.022        0.098
213  17.75     0.17      0.120      (  0.024)       0.022        0.098
214  17.83     0.13      0.096      (  0.024)       0.017        0.079
215  17.92     0.13      0.096      (  0.024)       0.017        0.079
216  18.00     0.13      0.096      (  0.024)       0.017        0.079
217  18.08     0.13      0.096      (  0.024)       0.017        0.079
218  18.17     0.13      0.096      (  0.024)       0.017        0.079
219  18.25     0.13      0.096      (  0.024)       0.017        0.079
220  18.33     0.13      0.096      (  0.023)       0.017        0.079
221  18.42     0.13      0.096      (  0.023)       0.017        0.079
222  18.50     0.13      0.096      (  0.023)       0.017        0.079
223  18.58     0.10      0.072      (  0.023)       0.013        0.059
224  18.67     0.10      0.072      (  0.023)       0.013        0.059
225  18.75     0.10      0.072      (  0.023)       0.013        0.059
226  18.83     0.07      0.048      (  0.023)       0.009        0.039
227  18.92     0.07      0.048      (  0.023)       0.009        0.039
228  19.00     0.07      0.048      (  0.023)       0.009        0.039
229  19.08     0.10      0.072      (  0.022)       0.013        0.059
230  19.17     0.10      0.072      (  0.022)       0.013        0.059
231  19.25     0.10      0.072      (  0.022)       0.013        0.059
232  19.33     0.13      0.096      (  0.022)       0.017        0.079
233  19.42     0.13      0.096      (  0.022)       0.017        0.079
234  19.50     0.13      0.096      (  0.022)       0.017        0.079
235  19.58     0.10      0.072      (  0.022)       0.013        0.059
236  19.67     0.10      0.072      (  0.022)       0.013        0.059
237  19.75     0.10      0.072      (  0.022)       0.013        0.059
238  19.83     0.07      0.048      (  0.022)       0.009        0.039
239  19.92     0.07      0.048      (  0.021)       0.009        0.039
240  20.00     0.07      0.048      (  0.021)       0.009        0.039
241  20.08     0.10      0.072      (  0.021)       0.013        0.059
242  20.17     0.10      0.072      (  0.021)       0.013        0.059
243  20.25     0.10      0.072      (  0.021)       0.013        0.059
244  20.33     0.10      0.072      (  0.021)       0.013        0.059
245  20.42     0.10      0.072      (  0.021)       0.013        0.059
246  20.50     0.10      0.072      (  0.021)       0.013        0.059
247  20.58     0.10      0.072      (  0.021)       0.013        0.059
248  20.67     0.10      0.072      (  0.021)       0.013        0.059
249  20.75     0.10      0.072      (  0.021)       0.013        0.059
250  20.83     0.07      0.048      (  0.020)       0.009        0.039
251  20.92     0.07      0.048      (  0.020)       0.009        0.039
252  21.00     0.07      0.048      (  0.020)       0.009        0.039
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253  21.08     0.10      0.072       (  0.020)       0.013        0.059
254  21.17     0.10      0.072       (  0.020)       0.013        0.059
255  21.25     0.10      0.072       (  0.020)       0.013        0.059
256  21.33     0.07      0.048       (  0.020)       0.009        0.039
257  21.42     0.07      0.048       (  0.020)       0.009        0.039
258  21.50     0.07      0.048       (  0.020)       0.009        0.039
259  21.58     0.10      0.072       (  0.020)       0.013        0.059
260  21.67     0.10      0.072       (  0.020)       0.013        0.059
261  21.75     0.10      0.072       (  0.020)       0.013        0.059
262  21.83     0.07      0.048       (  0.020)       0.009        0.039
263  21.92     0.07      0.048       (  0.020)       0.009        0.039
264  22.00     0.07      0.048       (  0.019)       0.009        0.039
265  22.08     0.10      0.072       (  0.019)       0.013        0.059
266  22.17     0.10      0.072       (  0.019)       0.013        0.059
267  22.25     0.10      0.072       (  0.019)       0.013        0.059
268  22.33     0.07      0.048       (  0.019)       0.009        0.039
269  22.42     0.07      0.048       (  0.019)       0.009        0.039
270  22.50     0.07      0.048       (  0.019)       0.009        0.039
271  22.58     0.07      0.048       (  0.019)       0.009        0.039
272  22.67     0.07      0.048       (  0.019)       0.009        0.039
273  22.75     0.07      0.048       (  0.019)       0.009        0.039
274  22.83     0.07      0.048       (  0.019)       0.009        0.039
275  22.92     0.07      0.048       (  0.019)       0.009        0.039
276  23.00     0.07      0.048       (  0.019)       0.009        0.039
277  23.08     0.07      0.048       (  0.019)       0.009        0.039
278  23.17     0.07      0.048       (  0.019)       0.009        0.039
279  23.25     0.07      0.048       (  0.019)       0.009        0.039
280  23.33     0.07      0.048       (  0.019)       0.009        0.039
281  23.42     0.07      0.048       (  0.019)       0.009        0.039
282  23.50     0.07      0.048       (  0.019)       0.009        0.039
283  23.58     0.07      0.048       (  0.019)       0.009        0.039
284  23.67     0.07      0.048       (  0.018)       0.009        0.039
285  23.75     0.07      0.048       (  0.018)       0.009        0.039
286  23.83     0.07      0.048       (  0.018)       0.009        0.039
287  23.92     0.07      0.048       (  0.018)       0.009        0.039
288  24.00     0.07      0.048       (  0.018)       0.009        0.039
               (Loss Rate Not Used)
    Sum =     100.0                                      Sum =    64.8
      Flood volume = Effective rainfall      5.40(In)
       times area       0.8(Ac.)/[(In)/(Ft.)] =       0.4(Ac.Ft)
      Total soil loss =      0.60(In)
      Total soil loss =     0.041(Ac.Ft)
      Total rainfall =      6.00(In)
      Flood volume =       16277.9 Cubic Feet
      Total soil loss =        1799.5 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.656(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
 Time(h+m)  Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
----------------------------------------------------------------------
   0+ 5       0.0001      0.02  Q         |         |         |         |
   0+10       0.0003      0.03  Q         |         |         |         |
   0+15       0.0006      0.03  Q         |         |         |         |
   0+20       0.0009      0.04  Q         |         |         |         |
   0+25       0.0012      0.05  Q         |         |         |         |
   0+30       0.0015      0.05  Q         |         |         |         |
   0+35       0.0019      0.05  Q         |         |         |         |
   0+40       0.0022      0.05  Q         |         |         |         |
   0+45       0.0026      0.05  Q         |         |         |         |
   0+50       0.0030      0.06  Q         |         |         |         |
   0+55       0.0034      0.06  Q         |         |         |         |
   1+ 0       0.0039      0.07  Q         |         |         |         |
   1+ 5       0.0042      0.06  Q         |         |         |         |
   1+10       0.0046      0.05  Q         |         |         |         |
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1+15       0.0049      0.05  Q          |         |         |         |
1+20       0.0053      0.05  Q          |         |         |         |
1+25       0.0056      0.05  Q          |         |         |         |
1+30       0.0060      0.05  Q          |         |         |         |
1+35       0.0063      0.05  Q          |         |         |         |
1+40       0.0066      0.05  Q          |         |         |         |
1+45       0.0070      0.05  Q          |         |         |         |
1+50       0.0074      0.06  Q          |         |         |         |
1+55       0.0078      0.06  Q          |         |         |         |
2+ 0       0.0083      0.07  Q          |         |         |         |
2+ 5       0.0087      0.07  Q          |         |         |         |
2+10       0.0092      0.07  Q          |         |         |         |
2+15       0.0096      0.07  QV         |         |         |         |
2+20       0.0101      0.07  QV         |         |         |         |
2+25       0.0106      0.07  QV         |         |         |         |
2+30       0.0110      0.07  QV         |         |         |         |
2+35       0.0115      0.08  QV         |         |         |         |
2+40       0.0121      0.08  QV         |         |         |         |
2+45       0.0127      0.08  QV         |         |         |         |
2+50       0.0132      0.08  QV         |         |         |         |
2+55       0.0138      0.08  QV         |         |         |         |
3+ 0       0.0144      0.08  QV         |         |         |         |
3+ 5       0.0149      0.08  QV         |         |         |         |
3+10       0.0155      0.08  QV         |         |         |         |
3+15       0.0161      0.08  QV         |         |         |         |
3+20       0.0166      0.08  QV         |         |         |         |
3+25       0.0172      0.08  QV         |         |         |         |
3+30       0.0178      0.08  QV         |         |         |         |
3+35       0.0183      0.08  QV         |         |         |         |
3+40       0.0189      0.08  Q V        |         |         |         |
3+45       0.0195      0.08  Q V        |         |         |         |
3+50       0.0201      0.09  Q V        |         |         |         |
3+55       0.0208      0.10  Q V        |         |         |         |
4+ 0       0.0214      0.10  Q V        |         |         |         |
4+ 5       0.0221      0.10  Q V        |         |         |         |
4+10       0.0228      0.10  Q V        |         |         |         |
4+15       0.0235      0.10  Q V        |         |         |         |
4+20       0.0242      0.11  Q V        |         |         |         |
4+25       0.0250      0.11  Q V        |         |         |         |
4+30       0.0258      0.12  Q V        |         |         |         |
4+35       0.0266      0.12  Q V        |         |         |         |
4+40       0.0274      0.12  Q V        |         |         |         |
4+45       0.0282      0.12  Q  V       |         |         |         |
4+50       0.0290      0.12  Q  V       |         |         |         |
4+55       0.0300      0.13  Q  V       |         |         |         |
5+ 0       0.0309      0.13  Q  V       |         |         |         |
5+ 5       0.0316      0.11  Q  V       |         |         |         |
5+10       0.0323      0.10  Q  V       |         |         |         |
5+15       0.0330      0.10  Q  V       |         |         |         |
5+20       0.0338      0.11  Q  V       |         |         |         |
5+25       0.0345      0.11  Q  V       |         |         |         |
5+30       0.0353      0.12  Q  V       |         |         |         |
5+35       0.0362      0.12  Q  V       |         |         |         |
5+40       0.0371      0.13  Q  V       |         |         |         |
5+45       0.0380      0.13  Q   V      |         |         |         |
5+50       0.0389      0.13  Q   V      |         |         |         |
5+55       0.0398      0.13  Q   V      |         |         |         |
6+ 0       0.0407      0.13  Q   V      |         |         |         |
6+ 5       0.0417      0.14  Q   V      |         |         |         |
6+10       0.0427      0.15  Q   V      |         |         |         |
6+15       0.0437      0.15  Q   V      |         |         |         |
6+20       0.0448      0.15  Q   V      |         |         |         |
6+25       0.0458      0.15  Q   V      |         |         |         |
6+30       0.0468      0.15  Q    V     |         |         |         |
6+35       0.0479      0.16  Q    V     |         |         |         |
6+40       0.0490      0.16  Q    V     |         |         |         |
6+45       0.0501      0.16  Q    V     |         |         |         |
6+50       0.0513      0.16  Q    V     |         |         |         |
6+55       0.0524      0.16  Q    V     |         |         |         |
7+ 0       0.0535      0.16  Q    V     |         |         |         |
7+ 5       0.0547      0.16  Q    V     |         |         |         |
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 7+10       0.0558      0.16  Q    V    |         |         |         |
 7+15       0.0569      0.16  Q     V   |         |         |         |
 7+20       0.0582      0.18  Q     V   |         |         |         |
 7+25       0.0594      0.18  Q     V   |         |         |         |
 7+30       0.0607      0.18  Q     V   |         |         |         |
 7+35       0.0620      0.19  Q     V   |         |         |         |
 7+40       0.0634      0.20  Q     V   |         |         |         |
 7+45       0.0648      0.20  Q     V   |         |         |         |
 7+50       0.0663      0.22  Q      V  |         |         |         |
 7+55       0.0678      0.22  Q      V  |         |         |         |
 8+ 0       0.0694      0.22  Q      V  |         |         |         |
 8+ 5       0.0711      0.25  Q      V  |         |         |         |
 8+10       0.0729      0.26  |Q     V  |         |         |         |
 8+15       0.0747      0.27  |Q     V  |         |         |         |
 8+20       0.0765      0.27  |Q      V |         |         |         |
 8+25       0.0784      0.27  |Q      V |         |         |         |
 8+30       0.0802      0.27  |Q      V |         |         |         |
 8+35       0.0821      0.28  |Q      V |         |         |         |
 8+40       0.0841      0.28  |Q      V |         |         |         |
 8+45       0.0861      0.29  |Q       V|         |         |         |
 8+50       0.0881      0.30  |Q       V|         |         |         |
 8+55       0.0902      0.31  |Q       V|         |         |         |
 9+ 0       0.0923      0.31  |Q       V|         |         |         |
 9+ 5       0.0946      0.33  |Q        V         |         |         |
 9+10       0.0970      0.34  |Q        V         |         |         |
 9+15       0.0994      0.35  |Q        V         |         |         |
 9+20       0.1018      0.36  |Q        V         |         |         |
 9+25       0.1044      0.37  |Q        |V        |         |         |
 9+30       0.1069      0.37  |Q        |V        |         |         |
 9+35       0.1095      0.38  |Q        |V        |         |         |
 9+40       0.1122      0.39  |Q        | V       |         |         |
 9+45       0.1149      0.39  |Q        | V       |         |         |
 9+50       0.1176      0.40  |Q        | V       |         |         |
 9+55       0.1204      0.41  |Q        | V       |         |         |
10+ 0       0.1232      0.41  |Q        |  V      |         |         |
10+ 5       0.1255      0.33  |Q        |  V      |         |         |
10+10       0.1274      0.28  |Q        |  V      |         |         |
10+15       0.1293      0.27  |Q        |  V      |         |         |
10+20       0.1311      0.27  |Q        |   V     |         |         |
10+25       0.1330      0.27  |Q        |   V     |         |         |
10+30       0.1348      0.27  |Q        |   V     |         |         |
10+35       0.1371      0.33  |Q        |   V     |         |         |
10+40       0.1396      0.36  |Q        |   V     |         |         |
10+45       0.1422      0.37  |Q        |    V    |         |         |
10+50       0.1447      0.37  |Q        |    V    |         |         |
10+55       0.1473      0.37  |Q        |    V    |         |         |
11+ 0       0.1498      0.37  |Q        |     V   |         |         |
11+ 5       0.1523      0.36  |Q        |     V   |         |         |
11+10       0.1547      0.35  |Q        |     V   |         |         |
11+15       0.1571      0.35  |Q        |     V   |         |         |
11+20       0.1596      0.35  |Q        |      V  |         |         |
11+25       0.1620      0.35  |Q        |      V  |         |         |
11+30       0.1644      0.35  |Q        |      V  |         |         |
11+35       0.1667      0.33  |Q        |      V  |         |         |
11+40       0.1688      0.31  |Q        |       V |         |         |
11+45       0.1710      0.31  |Q        |       V |         |         |
11+50       0.1732      0.32  |Q        |       V |         |         |
11+55       0.1755      0.33  |Q        |       V |         |         |
12+ 0       0.1778      0.33  |Q        |        V|         |         |
12+ 5       0.1806      0.41  |Q        |        V|         |         |
12+10       0.1838      0.46  |Q        |        V|         |         |
12+15       0.1871      0.47  |Q        |         V         |         |
12+20       0.1904      0.49  |Q        |         V         |         |
12+25       0.1938      0.49  |Q        |         V         |         |
12+30       0.1972      0.49  |Q        |         |V        |         |
12+35       0.2008      0.52  | Q       |         |V        |         |
12+40       0.2044      0.53  | Q       |         |V        |         |
12+45       0.2081      0.53  | Q       |         | V       |         |
12+50       0.2119      0.55  | Q       |         | V       |         |
12+55       0.2157      0.55  | Q       |         |  V      |         |
13+ 0       0.2195      0.56  | Q       |         |  V      |         |
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13+ 5       0.2237      0.61  | Q       |         |  V      |         |
13+10       0.2282      0.65  | Q       |         |   V     |         |
13+15       0.2327      0.66  | Q       |         |   V     |         |
13+20       0.2373      0.66  | Q       |         |    V    |         |
13+25       0.2418      0.66  | Q       |         |    V    |         |
13+30       0.2463      0.66  | Q       |         |     V   |         |
13+35       0.2500      0.53  | Q       |         |     V   |         |
13+40       0.2531      0.45  |Q        |         |      V  |         |
13+45       0.2561      0.44  |Q        |         |      V  |         |
13+50       0.2591      0.44  |Q        |         |      V  |         |
13+55       0.2621      0.44  |Q        |         |       V |         |
14+ 0       0.2651      0.44  |Q        |         |       V |         |
14+ 5       0.2684      0.48  |Q        |         |       V |         |
14+10       0.2719      0.51  | Q       |         |        V|         |
14+15       0.2755      0.52  | Q       |         |        V|         |
14+20       0.2790      0.51  | Q       |         |        V|         |
14+25       0.2824      0.50  |Q        |         |         V         |
14+30       0.2858      0.50  |Q        |         |         V         |
14+35       0.2892      0.50  |Q        |         |         V         |
14+40       0.2927      0.50  |Q        |         |         |V        |
14+45       0.2961      0.50  |Q        |         |         |V        |
14+50       0.2994      0.49  |Q        |         |         | V       |
14+55       0.3027      0.48  |Q        |         |         | V       |
15+ 0       0.3060      0.48  |Q        |         |         | V       |
15+ 5       0.3093      0.47  |Q        |         |         |  V      |
15+10       0.3124      0.46  |Q        |         |         |  V      |
15+15       0.3156      0.46  |Q        |         |         |  V      |
15+20       0.3187      0.45  |Q        |         |         |   V     |
15+25       0.3217      0.44  |Q        |         |         |   V     |
15+30       0.3247      0.44  |Q        |         |         |   V     |
15+35       0.3274      0.39  |Q        |         |         |    V    |
15+40       0.3299      0.36  |Q        |         |         |    V    |
15+45       0.3324      0.36  |Q        |         |         |    V    |
15+50       0.3349      0.36  |Q        |         |         |    V    |
15+55       0.3373      0.36  |Q        |         |         |     V   |
16+ 0       0.3398      0.36  |Q        |         |         |     V   |
16+ 5       0.3411      0.19  Q         |         |         |     V   |
16+10       0.3417      0.08  Q         |         |         |     V   |
16+15       0.3422      0.07  Q         |         |         |     V   |
16+20       0.3426      0.07  Q         |         |         |     V   |
16+25       0.3431      0.07  Q         |         |         |     V   |
16+30       0.3435      0.07  Q         |         |         |     V   |
16+35       0.3439      0.06  Q         |         |         |     V   |
16+40       0.3443      0.05  Q         |         |         |     V   |
16+45       0.3446      0.05  Q         |         |         |     V   |
16+50       0.3449      0.05  Q         |         |         |     V   |
16+55       0.3453      0.05  Q         |         |         |     V   |
17+ 0       0.3456      0.05  Q         |         |         |     V   |
17+ 5       0.3461      0.07  Q         |         |         |      V  |
17+10       0.3466      0.08  Q         |         |         |      V  |
17+15       0.3472      0.08  Q         |         |         |      V  |
17+20       0.3478      0.08  Q         |         |         |      V  |
17+25       0.3483      0.08  Q         |         |         |      V  |
17+30       0.3489      0.08  Q         |         |         |      V  |
17+35       0.3495      0.08  Q         |         |         |      V  |
17+40       0.3500      0.08  Q         |         |         |      V  |
17+45       0.3506      0.08  Q         |         |         |      V  |
17+50       0.3511      0.07  Q         |         |         |      V  |
17+55       0.3516      0.07  Q         |         |         |      V  |
18+ 0       0.3520      0.07  Q         |         |         |      V  |
18+ 5       0.3525      0.07  Q         |         |         |      V  |
18+10       0.3529      0.07  Q         |         |         |      V  |
18+15       0.3534      0.07  Q         |         |         |      V  |
18+20       0.3538      0.07  Q         |         |         |      V  |
18+25       0.3543      0.07  Q         |         |         |      V  |
18+30       0.3547      0.07  Q         |         |         |      V  |
18+35       0.3551      0.06  Q         |         |         |       V |
18+40       0.3555      0.05  Q         |         |         |       V |
18+45       0.3558      0.05  Q         |         |         |       V |
18+50       0.3561      0.04  Q         |         |         |       V |
18+55       0.3563      0.03  Q         |         |         |       V |
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   19+ 0       0.3566      0.03  Q         |         |         |       V |
   19+ 5       0.3569      0.04  Q         |         |         |       V |
   19+10       0.3572      0.05  Q         |         |         |       V |
   19+15       0.3575      0.05  Q         |         |         |       V |
   19+20       0.3579      0.06  Q         |         |         |       V |
   19+25       0.3584      0.06  Q         |         |         |       V |
   19+30       0.3588      0.07  Q         |         |         |       V |
   19+35       0.3592      0.06  Q         |         |         |       V |
   19+40       0.3596      0.05  Q         |         |         |       V |
   19+45       0.3599      0.05  Q         |         |         |       V |
   19+50       0.3602      0.04  Q         |         |         |       V |
   19+55       0.3604      0.03  Q         |         |         |       V |
   20+ 0       0.3606      0.03  Q         |         |         |       V |
   20+ 5       0.3609      0.04  Q         |         |         |       V |
   20+10       0.3613      0.05  Q         |         |         |       V |
   20+15       0.3616      0.05  Q         |         |         |       V |
   20+20       0.3619      0.05  Q         |         |         |       V |
   20+25       0.3623      0.05  Q         |         |         |       V |
   20+30       0.3626      0.05  Q         |         |         |       V |
   20+35       0.3630      0.05  Q         |         |         |       V |
   20+40       0.3633      0.05  Q         |         |         |       V |
   20+45       0.3637      0.05  Q         |         |         |       V |
   20+50       0.3639      0.04  Q         |         |         |       V |
   20+55       0.3642      0.03  Q         |         |         |       V |
   21+ 0       0.3644      0.03  Q         |         |         |        V|
   21+ 5       0.3647      0.04  Q         |         |         |        V|
   21+10       0.3650      0.05  Q         |         |         |        V|
   21+15       0.3654      0.05  Q         |         |         |        V|
   21+20       0.3656      0.04  Q         |         |         |        V|
   21+25       0.3659      0.03  Q         |         |         |        V|
   21+30       0.3661      0.03  Q         |         |         |        V|
   21+35       0.3664      0.04  Q         |         |         |        V|
   21+40       0.3667      0.05  Q         |         |         |        V|
   21+45       0.3671      0.05  Q         |         |         |        V|
   21+50       0.3673      0.04  Q         |         |         |        V|
   21+55       0.3676      0.03  Q         |         |         |        V|
   22+ 0       0.3678      0.03  Q         |         |         |        V|
   22+ 5       0.3681      0.04  Q         |         |         |        V|
   22+10       0.3684      0.05  Q         |         |         |        V|
   22+15       0.3688      0.05  Q         |         |         |        V|
   22+20       0.3690      0.04  Q         |         |         |        V|
   22+25       0.3693      0.03  Q         |         |         |        V|
   22+30       0.3695      0.03  Q         |         |         |        V|
   22+35       0.3697      0.03  Q         |         |         |        V|
   22+40       0.3699      0.03  Q         |         |         |        V|
   22+45       0.3702      0.03  Q         |         |         |        V|
   22+50       0.3704      0.03  Q         |         |         |        V|
   22+55       0.3706      0.03  Q         |         |         |        V|
   23+ 0       0.3709      0.03  Q         |         |         |        V|
   23+ 5       0.3711      0.03  Q         |         |         |        V|
   23+10       0.3713      0.03  Q         |         |         |        V|
   23+15       0.3715      0.03  Q         |         |         |        V|
   23+20       0.3718      0.03  Q         |         |         |        V|
   23+25       0.3720      0.03  Q         |         |         |        V|
   23+30       0.3722      0.03  Q         |         |         |        V|
   23+35       0.3724      0.03  Q         |         |         |        V|
   23+40       0.3727      0.03  Q         |         |         |        V|
   23+45       0.3729      0.03  Q         |         |         |        V|
   23+50       0.3731      0.03  Q         |         |         |        V|
   23+55       0.3733      0.03  Q         |         |         |        V|
   24+ 0       0.3736      0.03  Q         |         |         |        V|
   24+ 5       0.3737      0.01  Q         |         |         |        V|
   24+10       0.3737      0.00  Q         |         |         |         V
-----------------------------------------------------------------------
```

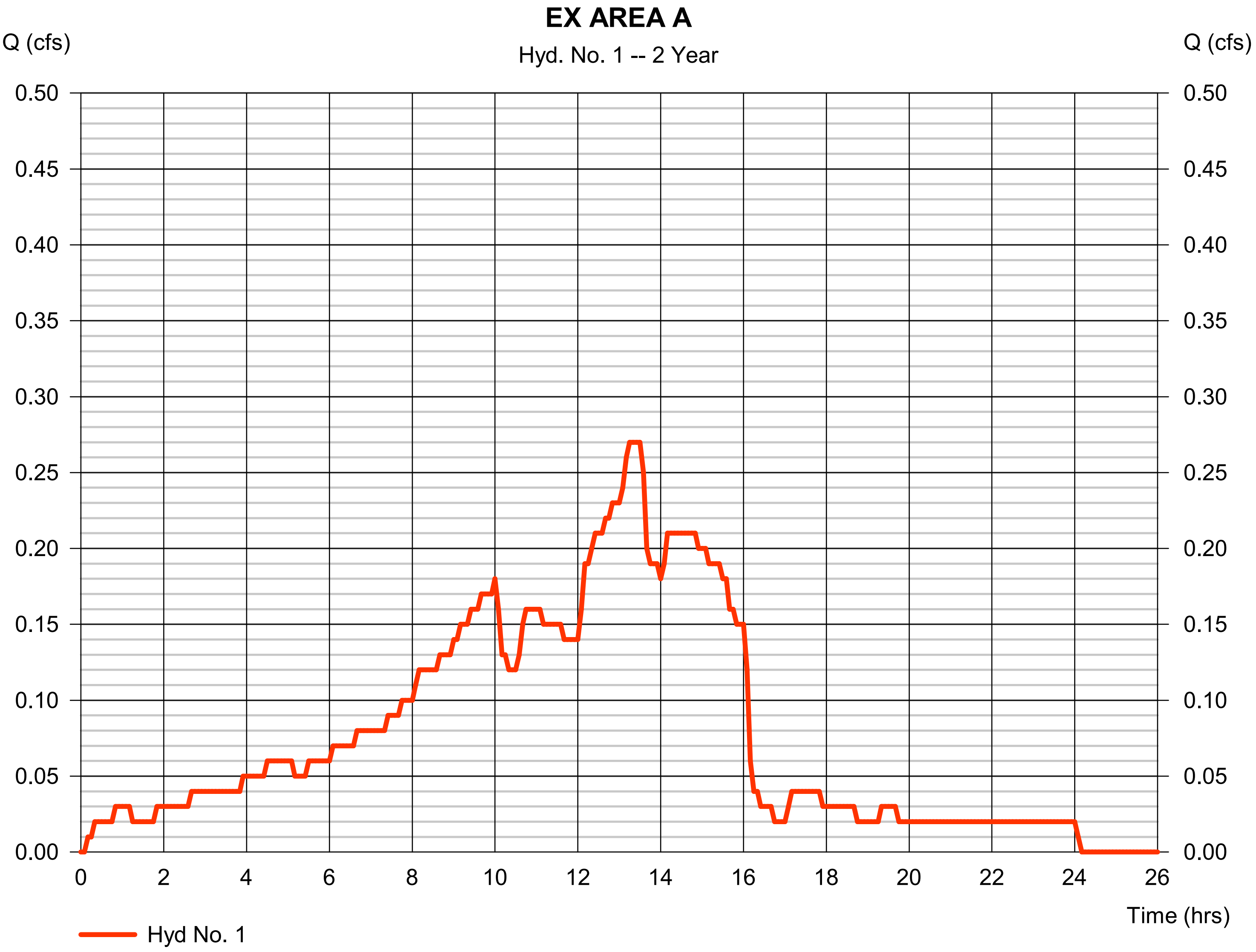
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Friday, 06 / 4 / 2021

Hyd. No. 1

EX AREA A

Hydrograph type = Manual
Storm frequency = 2 yrs
Time interval = 5 min
Peak discharge = 0.270 cfs
Time to peak = 13.25 hrs
Hyd. volume = 7,191 cuft



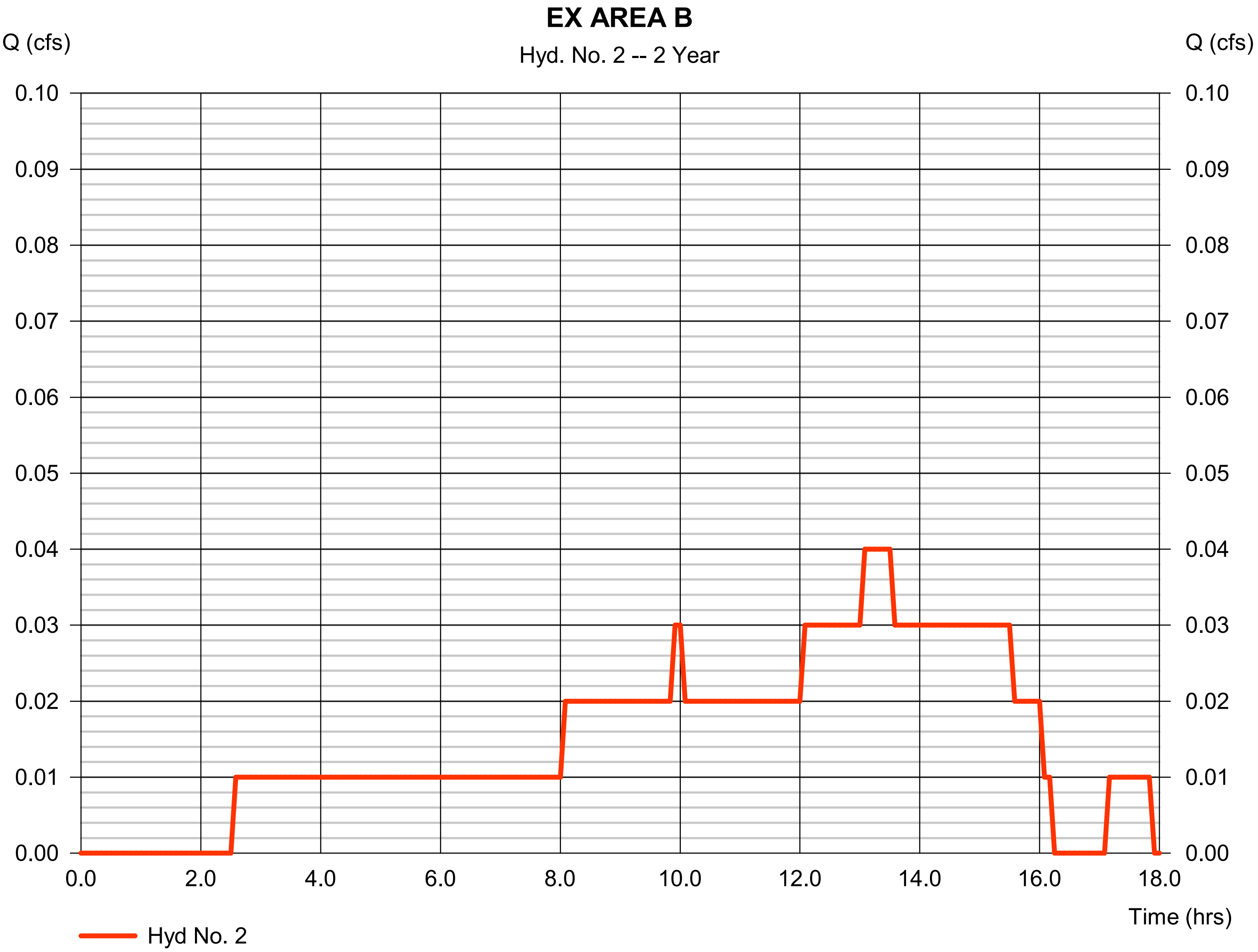
Hydrograph Report

Hyd. No. 2

EX AREA B

Hydrograph type = Manual
Storm frequency = 2 yrs
Time interval = 5 min

Peak discharge = 0.040 cfs
Time to peak = 13.08 hrs
Hyd. volume = 957 cuft

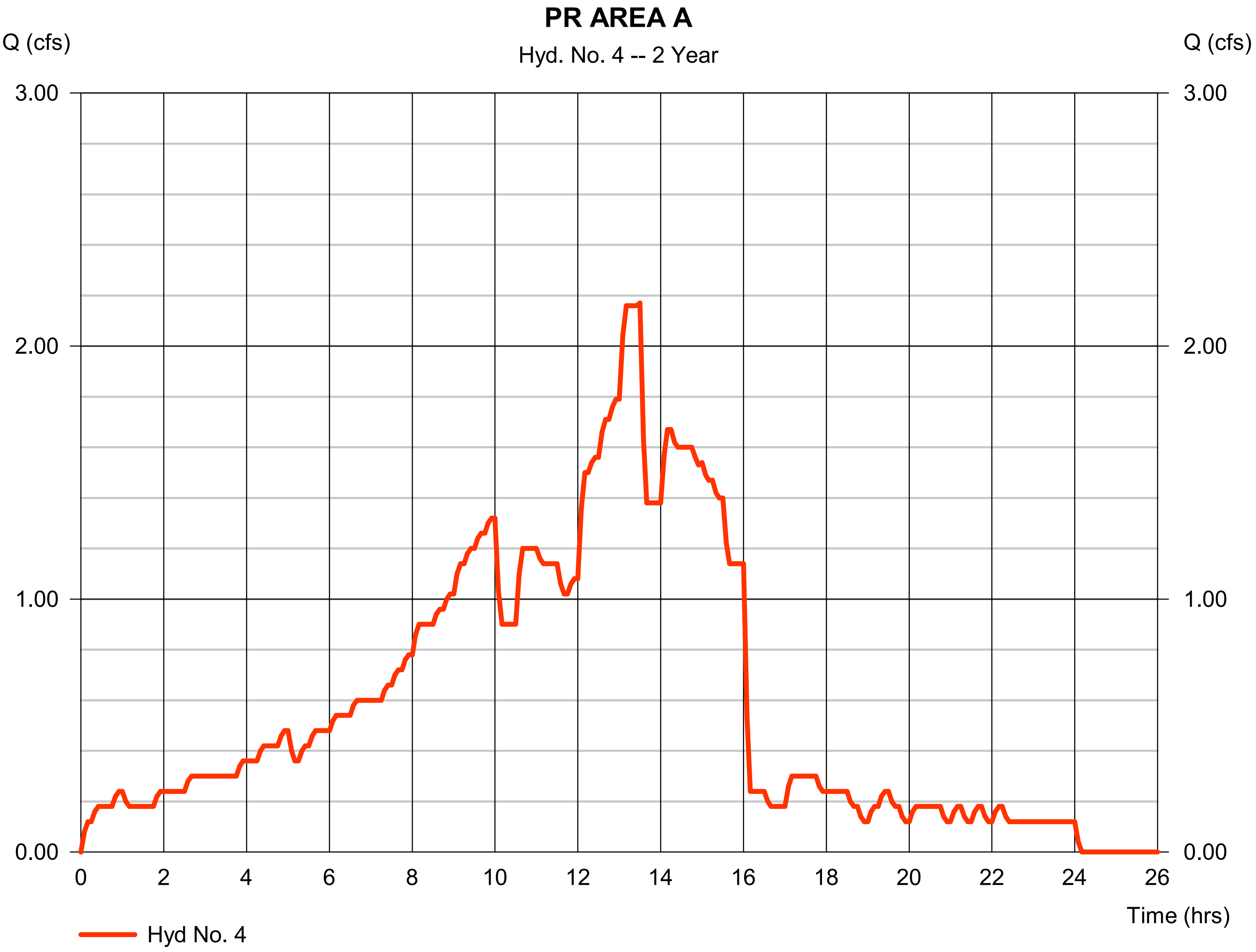


Hydrograph Report

Hyd. No. 4

PR AREA A

Hydrograph type	= Manual	Peak discharge	= 2.170 cfs
Storm frequency	= 2 yrs	Time to peak	= 13.50 hrs
Time interval	= 5 min	Hyd. volume	= 54,471 cuft



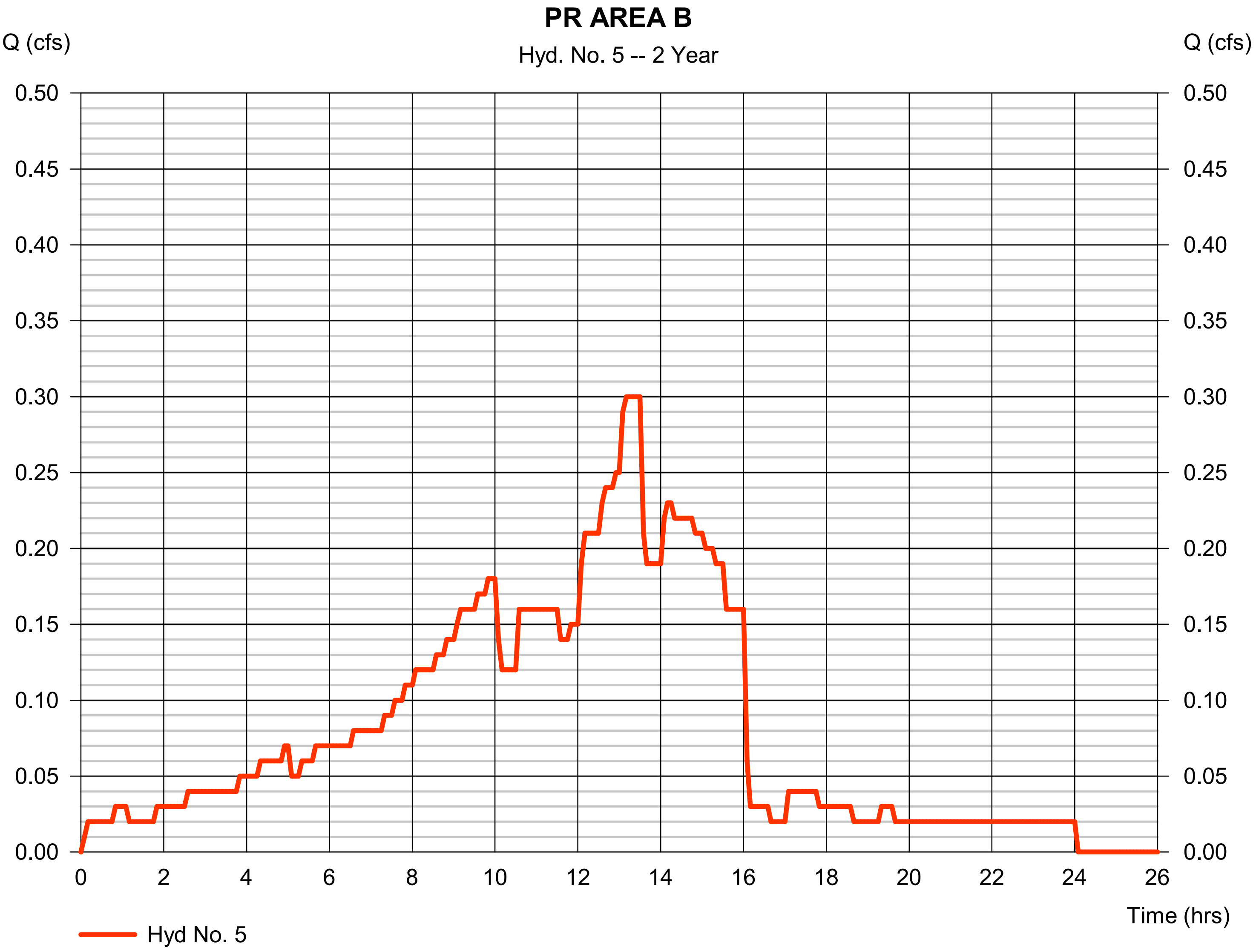
Hydrograph Report

Hyd. No. 5

PR AREA B

Hydrograph type = Manual
Storm frequency = 2 yrs
Time interval = 5 min

Peak discharge = 0.300 cfs
Time to peak = 13.17 hrs
Hyd. volume = 7,428 cuft

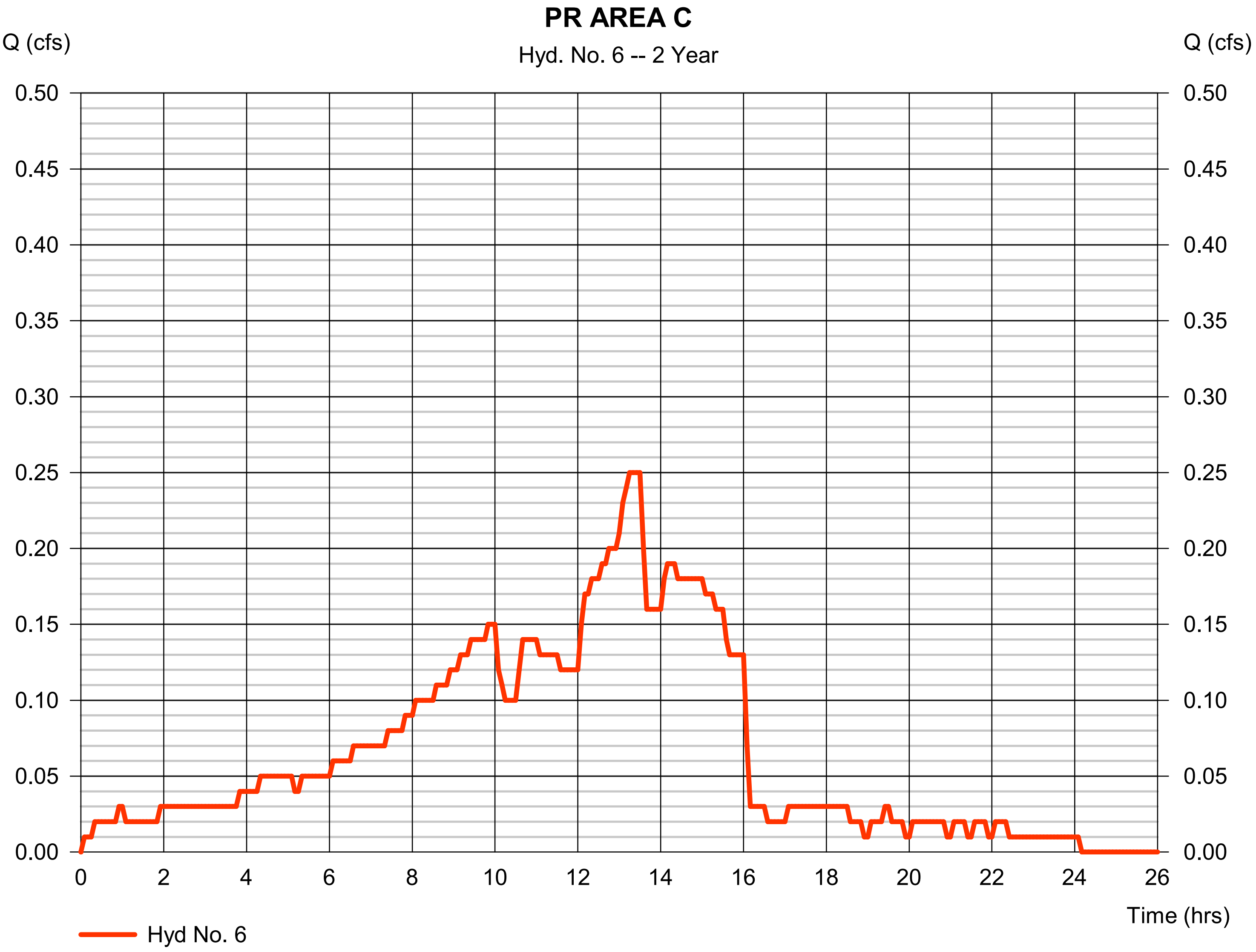


Hydrograph Report

Hyd. No. 6

PR AREA C

Hydrograph type	= Manual	Peak discharge	= 0.250 cfs
Storm frequency	= 2 yrs	Time to peak	= 13.25 hrs
Time interval	= 5 min	Hyd. volume	= 6,180 cuft



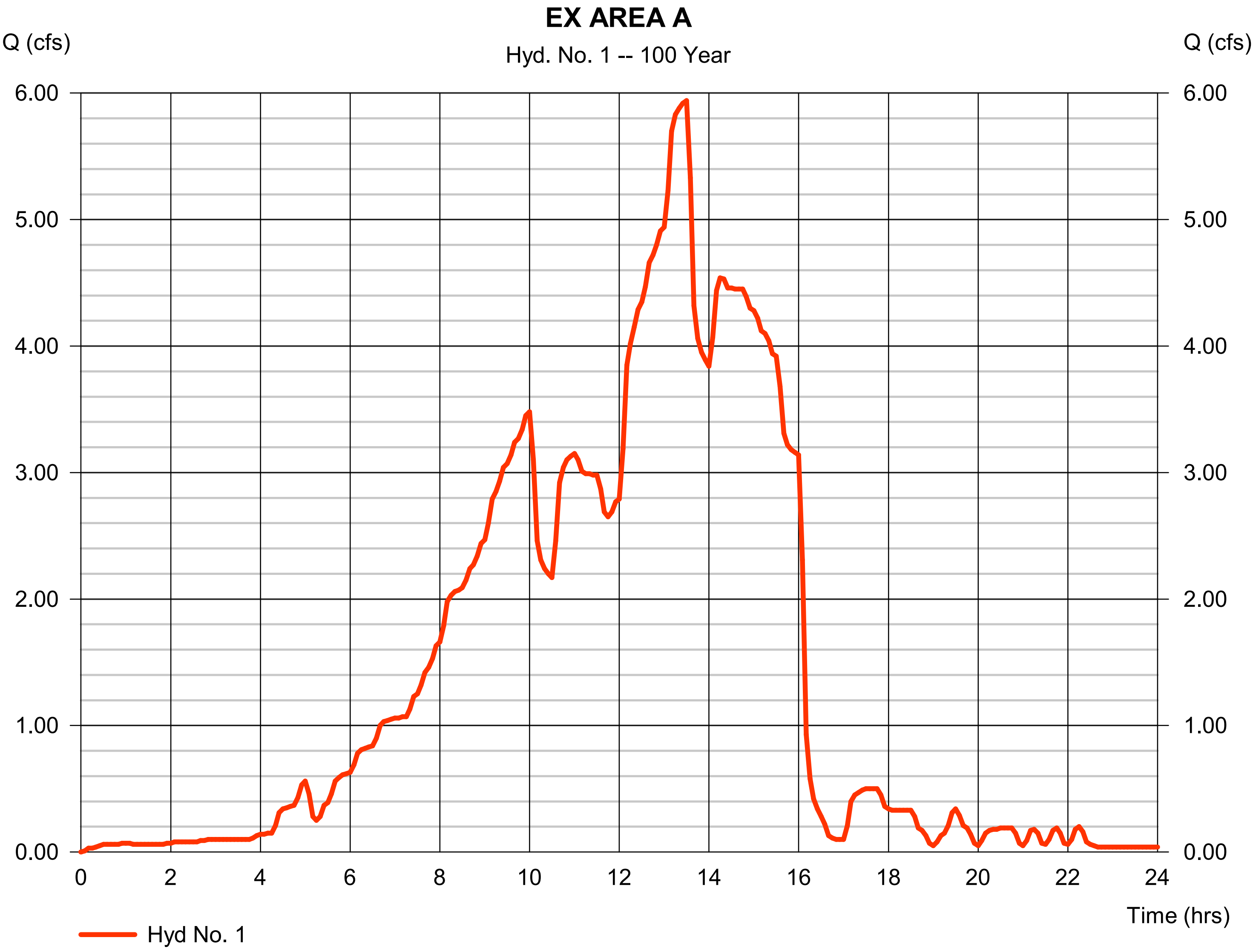
Hydrograph Report

Hyd. No. 1

EX AREA A

Hydrograph type = Manual
Storm frequency = 100 yrs
Time interval = 5 min

Peak discharge = 5.940 cfs
Time to peak = 13.50 hrs
Hyd. volume = 119,820 cuft

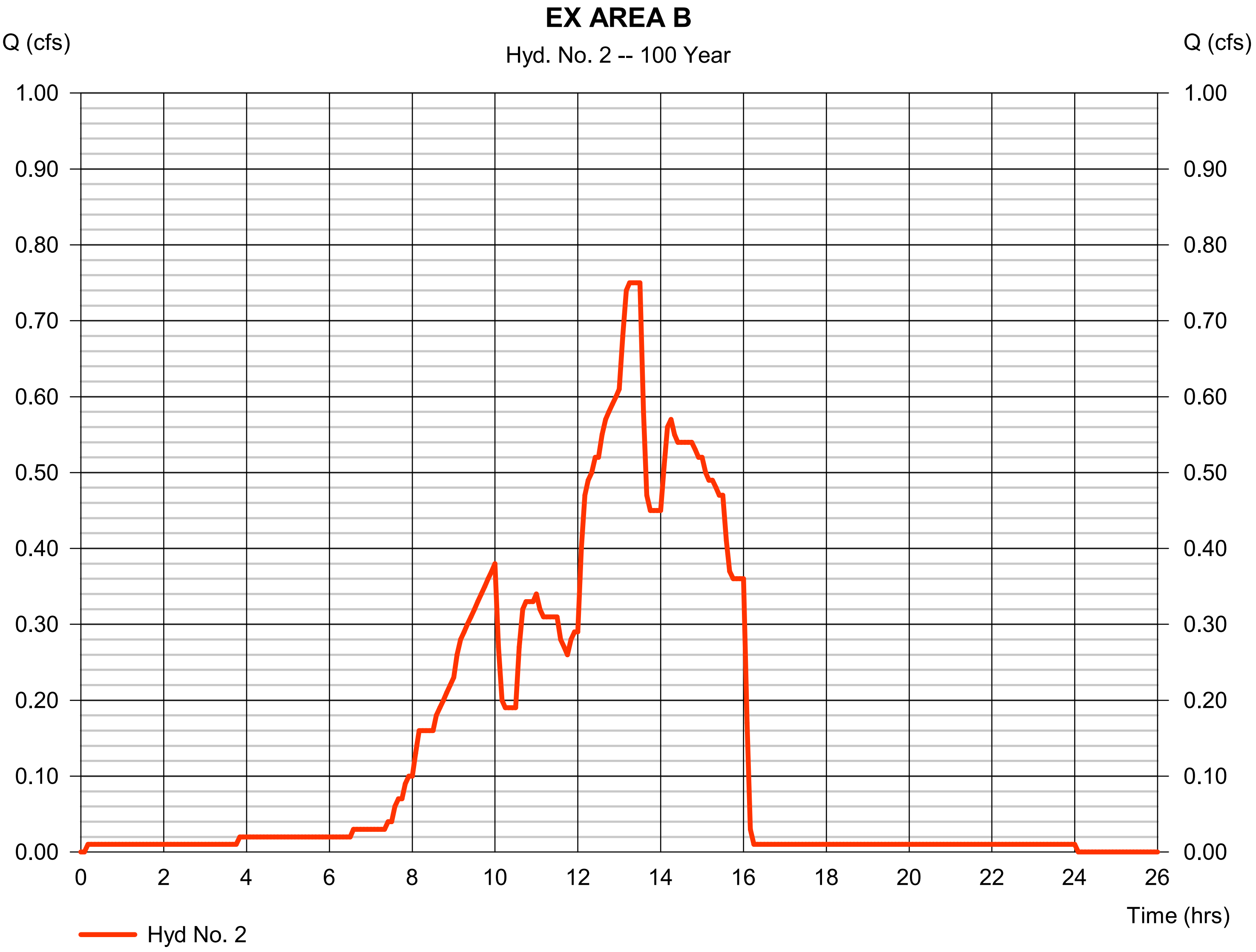


Hydrograph Report

Hyd. No. 2

EX AREA B

Hydrograph type	= Manual	Peak discharge	= 0.750 cfs
Storm frequency	= 100 yrs	Time to peak	= 13.25 hrs
Time interval	= 5 min	Hyd. volume	= 12,330 cuft



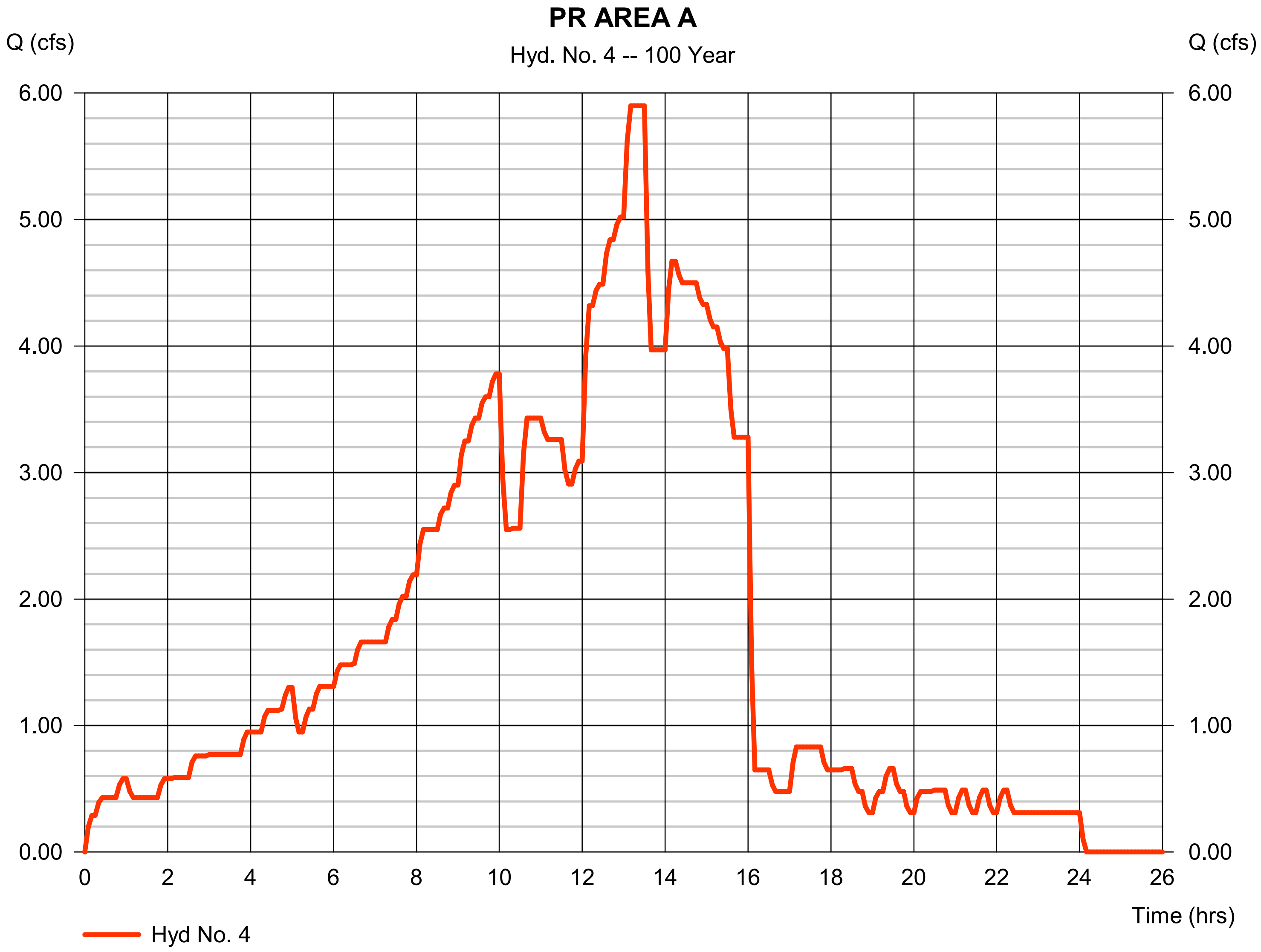
Hydrograph Report

Hyd. No. 4

PR AREA A

Hydrograph type = Manual
Storm frequency = 100 yrs
Time interval = 5 min

Peak discharge = 5.900 cfs
Time to peak = 13.17 hrs
Hyd. volume = 151,719 cuft

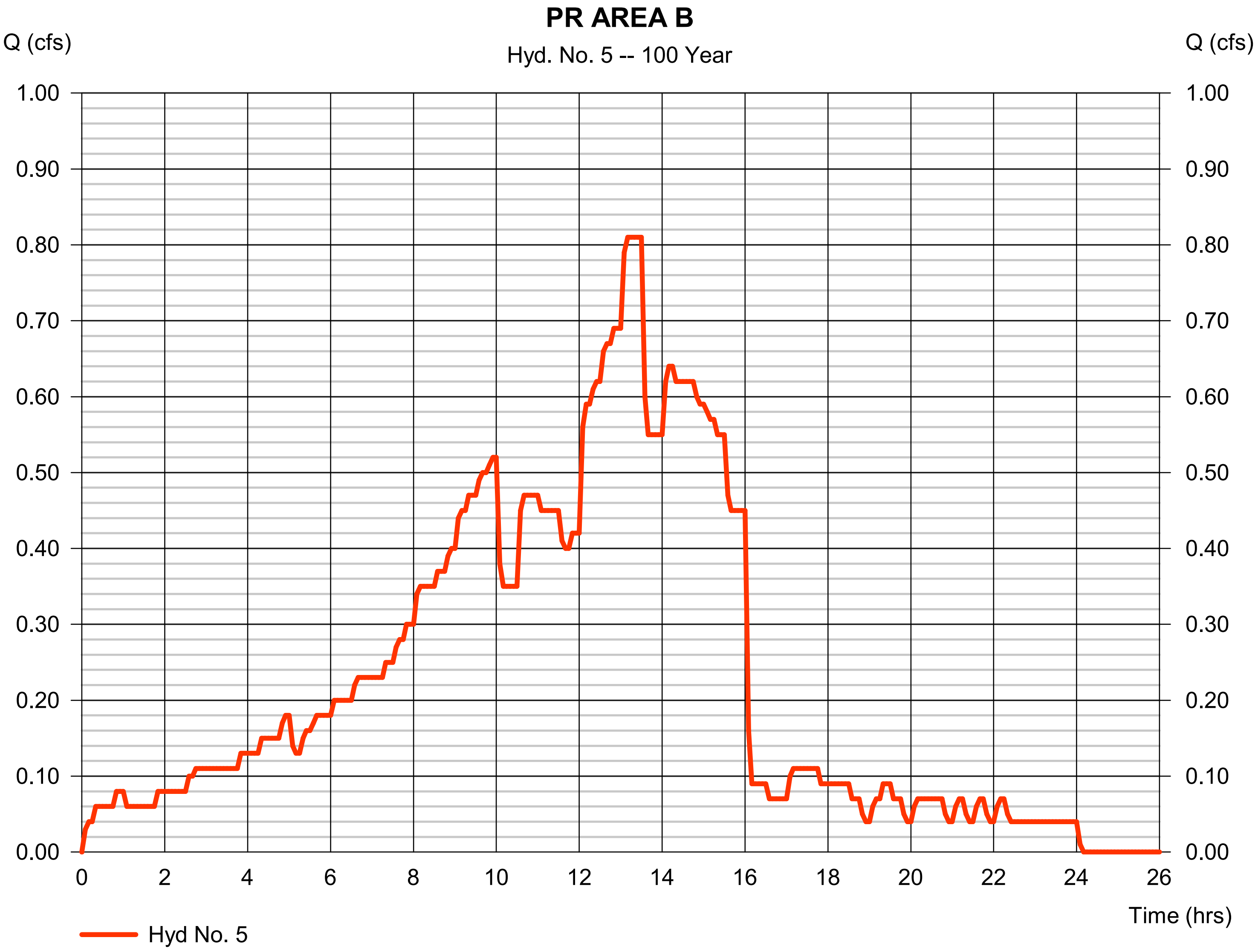


Hydrograph Report

Hyd. No. 5

PR AREA B

Hydrograph type	= Manual	Peak discharge	= 0.810 cfs
Storm frequency	= 100 yrs	Time to peak	= 13.17 hrs
Time interval	= 5 min	Hyd. volume	= 20,865 cuft



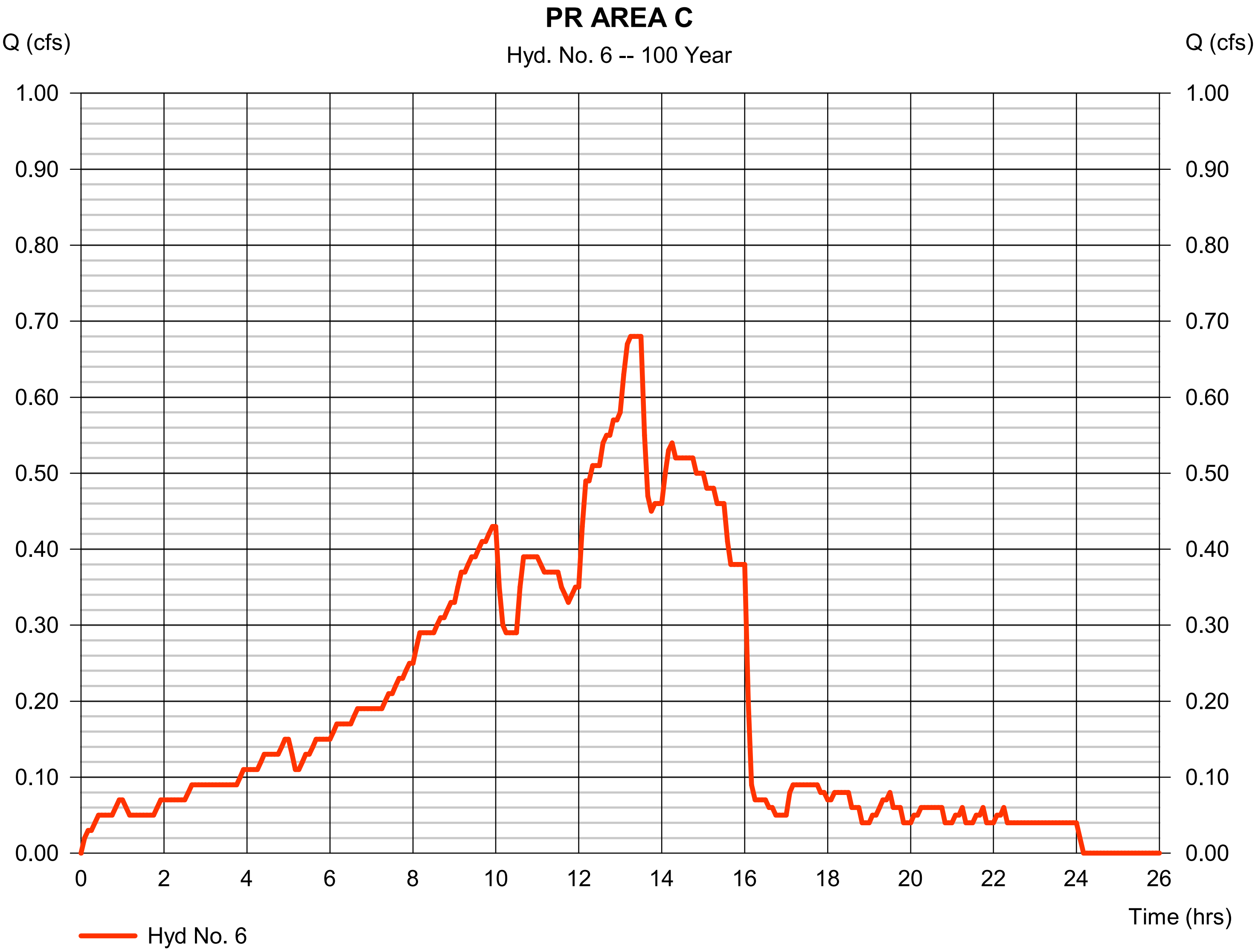
Hydrograph Report

Hyd. No. 6

PR AREA C

Hydrograph type = Manual
Storm frequency = 100 yrs
Time interval = 5 min

Peak discharge = 0.680 cfs
Time to peak = 13.25 hrs
Hyd. volume = 17,421 cuft



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 06 / 9 / 2021

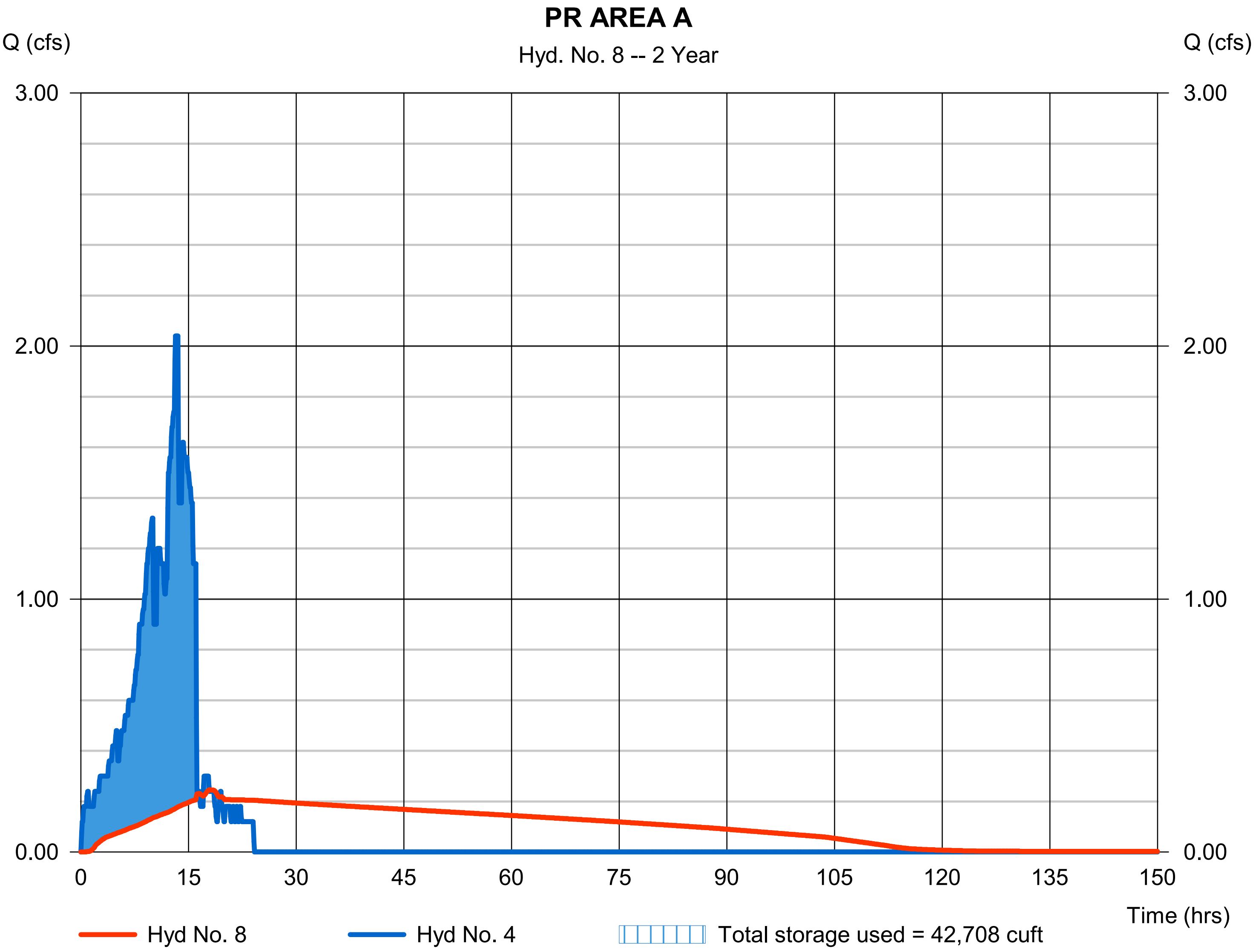
Hyd. No. 8

PR AREA A

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Time interval = 5 min
Inflow hyd. No. = 4 - PR AREA A
Reservoir name = DET-A

Peak discharge = 0.246 cfs
Time to peak = 17.92 hrs
Hyd. volume = 53,644 cuft
Max. Elevation = 104.03 ft
Max. Storage = 42,708 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - DET-A

Pond Data

UG Chambers -Invert elev. = 100.00 ft, Rise x Span = 5.00 x 5.00 ft, Barrel Len = 2520.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	n/a	0	0
0.50	100.50	n/a	2,576	2,576
1.00	101.00	n/a	4,475	7,051
1.50	101.50	n/a	5,442	12,493
2.00	102.00	n/a	5,994	18,488
2.50	102.50	n/a	6,263	24,751
3.00	103.00	n/a	6,263	31,013
3.50	103.50	n/a	5,993	37,006
4.00	104.00	n/a	5,440	42,446
4.50	104.50	n/a	4,472	46,918
5.00	105.00	n/a	2,572	49,490

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 2.25	Inactive	Inactive	Inactive
Span (in)	= 2.25	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 100.00	0.00	0.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 0.01	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 1.75	Inactive	Inactive	Inactive
Crest El. (ft)	= 104.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.50	2,576	100.50	0.06 oc	---	---	---	0.00	---	---	---	---	---	0.059
1.00	7,051	101.00	0.10 oc	---	---	---	0.00	---	---	---	---	---	0.096
1.50	12,493	101.50	0.12 oc	---	---	---	0.00	---	---	---	---	---	0.121
2.00	18,488	102.00	0.14 oc	---	---	---	0.00	---	---	---	---	---	0.143
2.50	24,751	102.50	0.16 oc	---	---	---	0.00	---	---	---	---	---	0.161
3.00	31,013	103.00	0.18 oc	---	---	---	0.00	---	---	---	---	---	0.178
3.50	37,006	103.50	0.19 oc	---	---	---	0.00	---	---	---	---	---	0.193
4.00	42,446	104.00	0.21 oc	---	---	---	0.00	---	---	---	---	---	0.207
4.50	46,918	104.50	0.22 oc	---	---	---	2.06	---	---	---	---	---	2.280
5.00	49,490	105.00	0.23 oc	---	---	---	5.83	---	---	---	---	---	6.060

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 06 / 9 / 2021

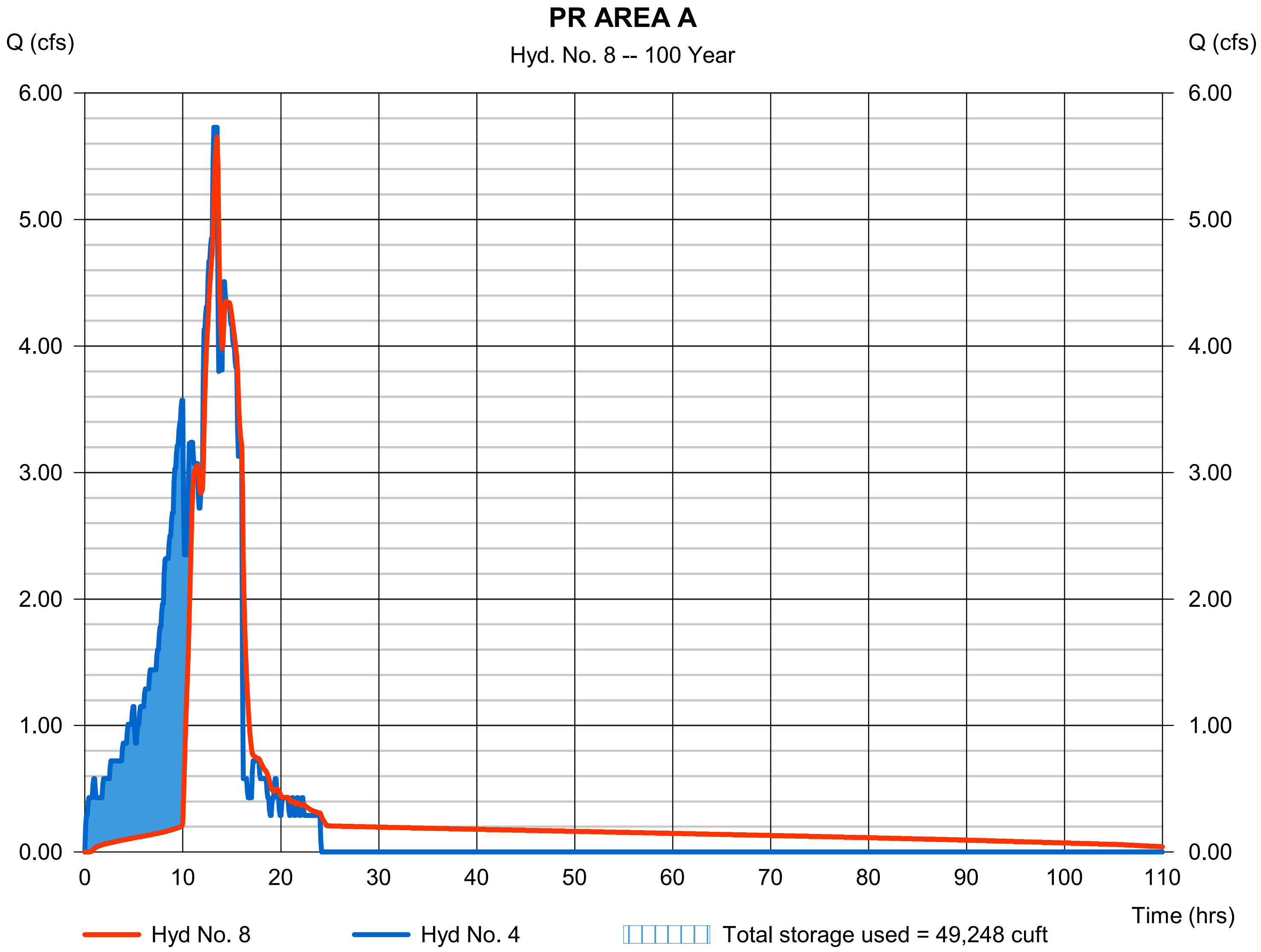
Hyd. No. 8

PR AREA A

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 5 min
Inflow hyd. No. = 4 - PR AREA A
Reservoir name = DET-A

Peak discharge = 5.654 cfs
Time to peak = 13.50 hrs
Hyd. volume = 141,787 cuft
Max. Elevation = 104.95 ft
Max. Storage = 49,248 cuft

Storage Indication method used.



Hydrograph Report

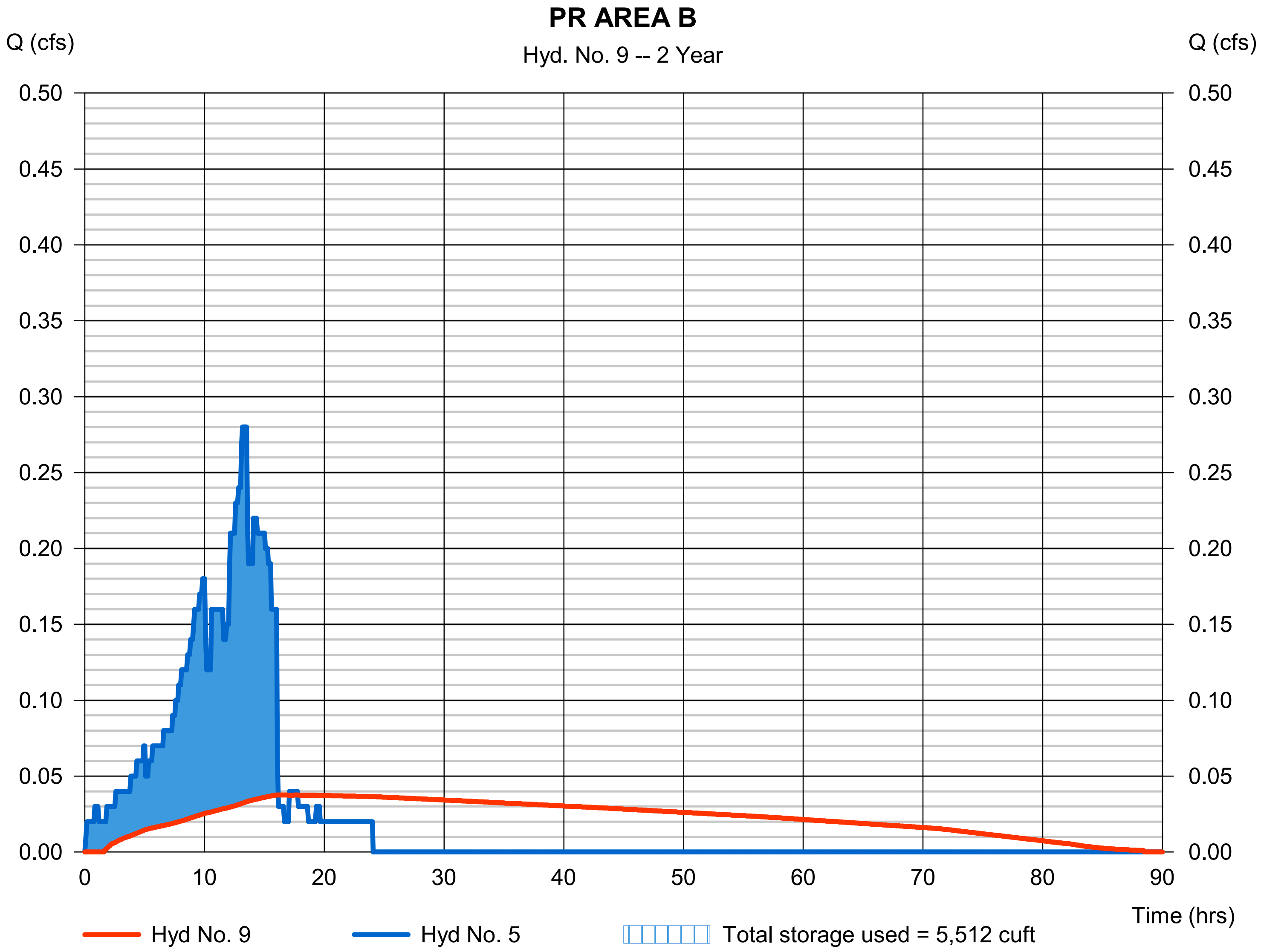
Hyd. No. 9

PR AREA B

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Time interval = 5 min
Inflow hyd. No. = 5 - PR AREA B
Reservoir name = DET-B

Peak discharge = 0.038 cfs
Time to peak = 16.17 hrs
Hyd. volume = 7,239 cuft
Max. Elevation = 102.45 ft
Max. Storage = 5,512 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - DET-B

Pond Data

UG Chambers -Invert elev. = 100.00 ft, Rise x Span = 5.00 x 5.00 ft, Barrel Len = 575.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	n/a	0	0
0.50	100.50	n/a	588	588
1.00	101.00	n/a	1,021	1,609
1.50	101.50	n/a	1,242	2,851
2.00	102.00	n/a	1,368	4,218
2.50	102.50	n/a	1,429	5,647
3.00	103.00	n/a	1,429	7,076
3.50	103.50	n/a	1,367	8,444
4.00	104.00	n/a	1,241	9,685
4.50	104.50	n/a	1,020	10,705
5.00	105.00	n/a	587	11,292

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 1.25	Inactive	Inactive	Inactive
Span (in)	= 1.25	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 100.00	0.00	0.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 0.01	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.75	Inactive	Inactive	0.00
Crest El. (ft)	= 104.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.50	588	100.50	0.02 oc	---	---	---	0.00	---	---	---	---	---	0.015
1.00	1,609	101.00	0.02 oc	---	---	---	0.00	---	---	---	---	---	0.023
1.50	2,851	101.50	0.03 oc	---	---	---	0.00	---	---	---	---	---	0.029
2.00	4,218	102.00	0.03 oc	---	---	---	0.00	---	---	---	---	---	0.034
2.50	5,647	102.50	0.04 oc	---	---	---	0.00	---	---	---	---	---	0.038
3.00	7,076	103.00	0.04 oc	---	---	---	0.00	---	---	---	---	---	0.042
3.50	8,444	103.50	0.05 oc	---	---	---	0.00	---	---	---	---	---	0.045
4.00	9,685	104.00	0.05 oc	---	---	---	0.00	---	---	---	---	---	0.048
4.50	10,705	104.50	0.05 oc	---	---	---	0.88	---	---	---	---	---	0.934
5.00	11,292	105.00	0.05 oc	---	---	---	2.50	---	---	---	---	---	2.552

Hydrograph Report

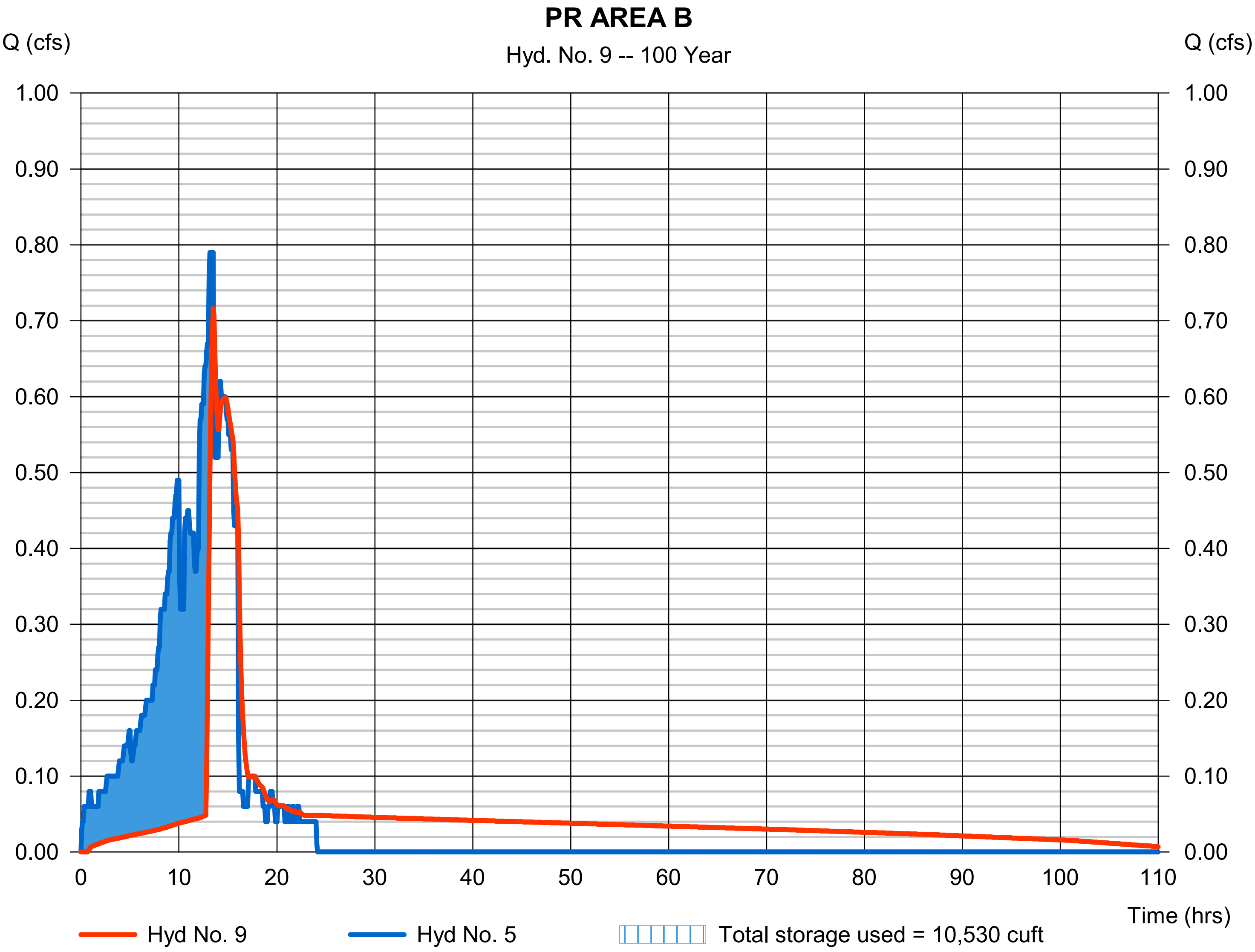
Hyd. No. 9

PR AREA B

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 5 min
Inflow hyd. No. = 5 - PR AREA B
Reservoir name = DET-B

Peak discharge = 0.716 cfs
Time to peak = 13.50 hrs
Hyd. volume = 19,446 cuft
Max. Elevation = 104.41 ft
Max. Storage = 10,530 cuft

Storage Indication method used.



Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions in Section G of the WQMP Template):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in your WQMP. Use the format shown in Table G.1on page 23 of this WQMP Template. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☒ A. **On-site storm drain inlets**	☒ **Locations of inlets.**	☒ **Mark all inlets with the words “Only Rain Down the Storm Drain” or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.**	☒ **Maintain and periodically repaint or replace inlet markings.** ☒ **Provide stormwater pollution prevention information to new site owners, lessees, or operators.** ☒ **See applicable operational BMPs in Fact Sheet SC-44, “Drainage System Maintenance,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** ☒ **Include the following in lease agreements: “Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains.”**
☒ B. **Interior floor drains and elevator shaft sump pumps**		☒ **State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.**	☒ **Inspect and maintain drains to prevent blockages and overflow.**
☐ C. **Interior parking garages**		☐ **State that parking garage floor drains will be plumbed to the sanitary sewer.**	☐ **Inspect and maintain drains to prevent blockages and overflow.**

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ D1. **Need for future indoor & structural pest control**		☐ **Note building design features that discourage entry of pests.**	☐ **Provide Integrated Pest Management information to owners, lessees, and operators.**
☒ D2. **Landscape/ Outdoor Pesticide Use**	☐ **Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained.** ☐ **Show self-retaining landscape areas, if any.** ☒ **Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)**	**State that final landscape plans will accomplish all of the following.** ☐ **Preserve existing native trees, shrubs, and ground cover to the maximum extent possible.** ☒ **Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.** ☐ **Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.** ☒ **Consider using pest-resistant plants, especially adjacent to hardscape.** ☒ **To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.**	☒ **Maintain landscaping using minimum or no pesticides.** ☒ **See applicable operational BMPs in "What you should know for…..Landscape and Gardening"** at http://rcflood.org/stormwater/**Error! Hyperlink reference not valid.** ☒ **Provide IPM information to new owners, lessees and operators.**

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ E. **Pools, spas, ponds, decorative fountains, and other water features.**	☐ **Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)**	**If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.**	☐ **See applicable operational BMPs in** "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
☐ F. **Food service**	☐ **For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment.** ☐ **On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.**	☐ **Describe the location and features of the designated cleaning area.** ☐ **Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.**	☐ **See the brochure, "**The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/ **Provide this brochure to new site owners, lessees, and operators.**
☒ G. **Refuse areas**	☒ **Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas.** ☒ **If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area.** ☐ **Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.**	☒ **State how site refuse will be handled and provide supporting detail to what is shown on plans.** ☒ **State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.**	☒ **State how the following will be implemented:** **Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ H. **Industrial processes.**	☐ **Show process area.**	☐ **If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."**	☐ **See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** See the brochure "Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities" at http://rcflood.org/stormwater/

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ I. **Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)**	☐ **Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area.** ☐ **Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults.** ☐ **Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.**	**Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains.** **Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for:** ▪ **Hazardous Waste Generation** ▪ **Hazardous Materials Release Response and Inventory** ▪ **California Accidental Release (CalARP)** ▪ **Aboveground Storage Tank** ▪ **Uniform Fire Code Article 80 Section 103(b) & (c) 1991** ▪ **Underground Storage Tank** **www.cchealth.org/groups/hazmat/**	☐ **See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☒ J. **Vehicle and Equipment Cleaning**	☒ **Show on drawings as appropriate:** **(1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses.** **(2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use).** **(3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer.** **(4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.**	☐ **If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.**	**Describe operational measures to implement the following (if applicable):** ☒ **Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system.** Refer to “Outdoor Cleaning Activities and Professional Mobile Service Providers” for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/ ☐**Car dealerships and similar may rinse cars with water only.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ K. **Vehicle/Equipment Repair and Maintenance**	☐ **Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater.** ☐ **Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas.** ☐ **Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.**	☐ **State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area.** ☐ **State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.** ☐ **State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.**	**In the Stormwater Control Plan, note that all of the following restrictions apply to use the site:** ☐ **No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains.** ☐ **No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately.** ☐ **No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.** Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations". Brochure can be found at http://rcflood.org/stormwater/ Refer to Outdoor Cleaning Activities and Professional Mobile Service Providers for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☒ L. **Fuel Dispensing Areas**	☒ **Fueling areas[6] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable.** ☒ **Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.**		☒ **The property owner shall dry sweep the fueling area routinely.** ☒ **See the Fact Sheet SD-30 , "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

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[6] **The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.**

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☒ M. **Loading Docks**	☒ **Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer.** ☒ **Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation.** ☒ **Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.**		☒ **Move loaded and unloaded items indoors as soon as possible.** ☒ **See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☒ N. **Fire Sprinkler Test Water**		☐ **Provide a means to drain fire sprinkler test water to the sanitary sewer.**	☐ **See the note in Fact Sheet SC-41, “Building and Grounds Maintenance,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**
O. **Miscellaneous Drain or Wash Water or Other Sources** ☐ **Boiler drain lines** ☒ **Condensate drain lines** ☒ **Rooftop equipment** ☐ **Drainage sumps** ☒ **Roofing, gutters, and trim.** ☐ **Other sources**		☐ **Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system.** ☒ **Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system.** ☒ **Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment.** ☐ **Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water.** ☐ ☒ **Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.** **Include controls for other sources as specified by local reviewer.**	

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☒ P. **Plazas, sidewalks, and parking lots.**			☒ **Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.**

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

<u>To be provided in the Final WQMP</u>.
O&M Plan must comply with Chapter 5 of the Riverside County WQMP Guidance Document, at a minimum.

GENERAL SPECIFICATIONS FOR MAINTENANCE OF *FLO-GARD+PLUS*® CATCH BASIN INSERT FILTERS

SCOPE:

Federal, State and Local Clean Water Act regulations and those of insurance carriers require that stormwater filtration systems be maintained and serviced on a recurring basis. The intent of the regulations is to ensure that the systems, on a continuing basis, efficiently remove pollutants from stormwater runoff thereby preventing pollution of the nation's water resources. These specifications apply to the FloGard+Plus® Catch Basin Insert Filter.

RECOMMENDED FREQUENCY OF SERVICE:

Drainage Protection Systems (DPS) recommends that installed Flo-Gard+Plus® Catch Basin Insert Filters be serviced on a recurring basis. Ultimately, the frequency depends on the amount of runoff, pollutant loading and interference from debris (leaves, vegetation, cans, paper, etc.); however, it is recommended that each installation be serviced a minimum of three times per year, with a change of filter medium once per year. DPS technicians are available to do an on-site evaluation, upon request.

RECOMMENDED TIMING OF SERVICE:

DPS guidelines for the timing of service are as follows:

1. For areas with a definite rainy season: Prior to, during and following the rainy season.
2. For areas subject to year-round rainfall: On a recurring basis (at least three times per year).
3. For areas with winter snow and summer rain: Prior to and just after the snow season and during the summer rain season.
4. For installed devices not subject to the elements (washracks, parking garages, etc.): On a recurring basis (no less than three times per years).

SERVICE PROCEDURES:

1. The catch basin grate shall be removed and set to one side. The catch basin shall be visually inspected for defects and possible illegal dumping. If illegal dumping has occurred, the proper authorities and property owner representative shall be notified as soon as practicable.
2. Using an industrial vacuum, the collected materials shall be removed from the liner. (Note: DPS uses a truck-mounted vacuum for servicing Flo-Gard+Plus® catch basin inserts.)
3. When all of the collected materials have been removed, the filter medium pouches shall be removed by unsnapping the tether from the D-ring and set to one side. The filter liner, gaskets, stainless steel frame and mounting brackets, etc. shall be inspected for continued serviceability. Minor damage or defects found shall be corrected on-the-spot and a notation made on the Maintenance Record. More extensive deficiencies that affect the efficiency of the filter (torn liner, etc.), if approved by the customer representative, will be corrected and an invoice submitted to the representative along with the Maintenance Record.
4. The filter medium pouches shall be inspected for defects and continued serviceability and replaced as necessary and the pouch tethers re-attached to the liner's D-ring. See below.
5. The grate shall be replaced.

REPLACEMENT AND DISPOSAL OF EXPOSED FILTER MEDIUM AND COLLECTED DEBRIS

The frequency of filter medium pouch exchange will be in accordance with the existing DPS-Customer Maintenance Contract. DPS recommends that the medium be changed at least once per year. During the appropriate service, or if so determined by the service technician during a non-scheduled service, the filter medium pouches will be replaced with new pouches. Once the exposed pouches and debris have been removed, DPS has possession and must dispose of it in accordance with local, state and federal agency requirements.

DPS also has the capability of servicing all manner of catch basin inserts and catch basins without inserts, underground oil/water separators, stormwater interceptors and other such devices. All DPS personnel are highly qualified technicians and are confined space trained and certified. Call us at (888) 950-8826 for further information and assistance.

Bio Clean
A Forterra Company

Modular Wetlands® Linear

A Stormwater Biofiltration Solution

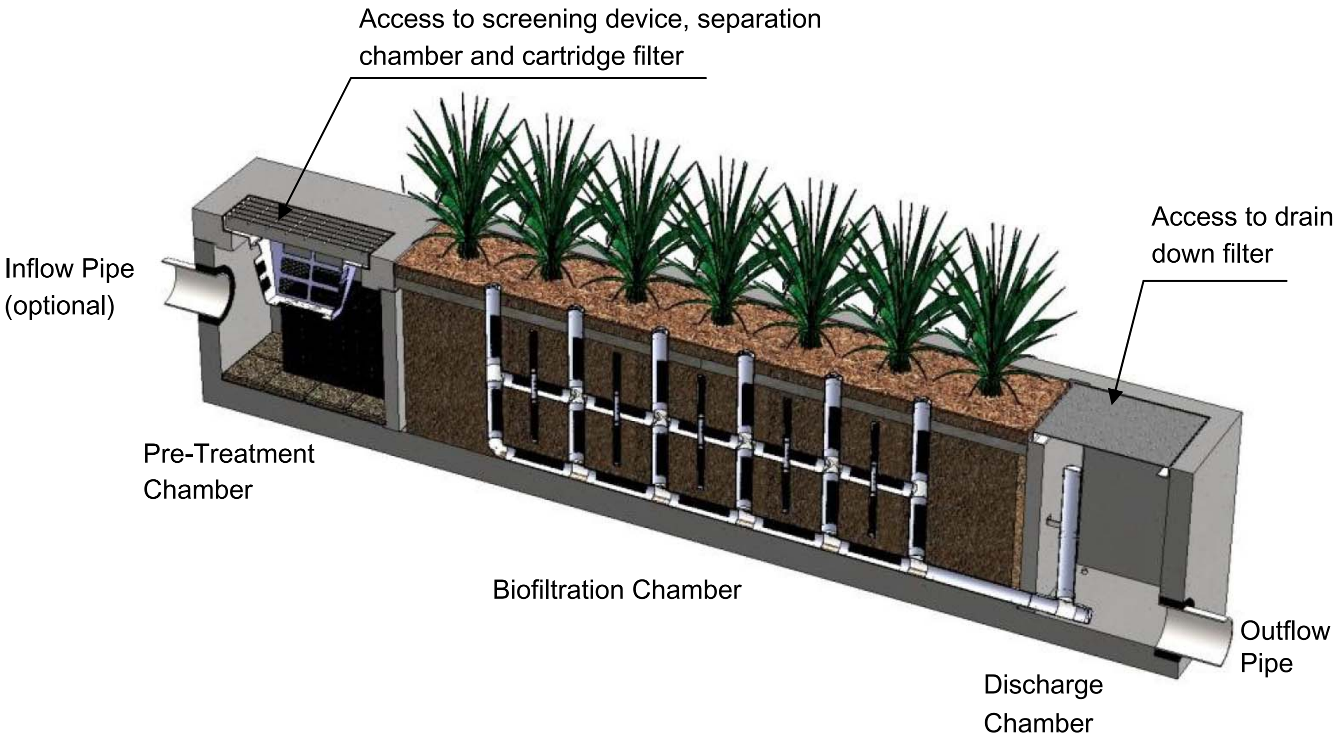
OPERATION & MAINTENANCE MANUAL

Maintenance Guidelines for Modular Wetlands 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.

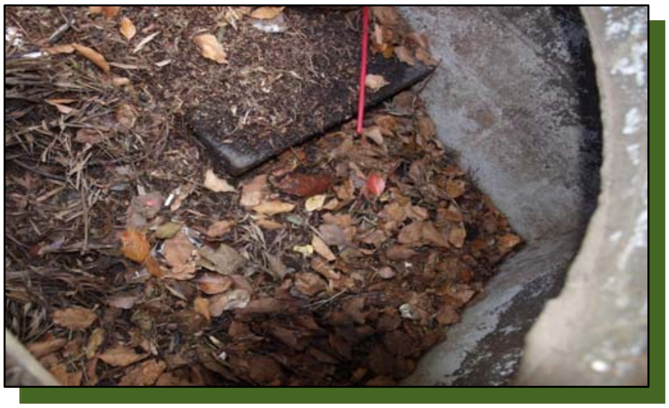
5. No fertilizer shall be used in the Biofiltration Chamber.

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.

Maintenance Procedure Illustration

Screening Device

The screening device is located directly under the manhole or grate over the Pre-Treatment Chamber. It's mounted directly underneath for easy access and cleaning. Device can be cleaned by hand or with a vacuum truck.

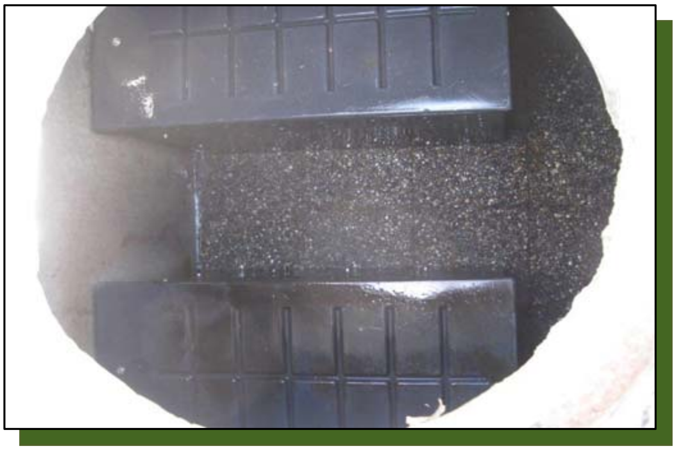


Separation Chamber

The separation chamber is located directly beneath the screening device. It can be quickly cleaned using a vacuum truck or by hand. A pressure washer is useful to assist in the cleaning process.

Cartridge Filters

The cartridge filters are located in the Pre-Treatment chamber connected to the wall adjacent to the biofiltration chamber. The cartridges have removable tops to access the individual media filters. Once the cartridge is open media can be easily removed and replaced by hand or a vacuum truck.



Drain Down Filter

The drain down filter is located in the Discharge Chamber. The drain filter unlocks from the wall mount and hinges up. Remove filter block and replace with new block.

Trim Vegetation

Vegetation should be maintained in the same manner as surrounding vegetation and trimmed as needed. No fertilizer shall be used on the plants. Irrigation per the recommendation of the manufacturer and or landscape architect. Different types of vegetation requires different amounts of irrigation.

Bio Clean
A Forterra Company

Inspection Report
Modular Wetlands Linear

Project Name ______________________________

Project Address ______________________________ (city) (Zip Code)

Owner / Management Company ______________________________

Contact ______________________ Phone ( ) –

Inspector Name ______________________ Date ____/____/______ Time __________ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition ______________________ Additional Notes ______________________

For Office Use Only
(Reviewed By)
(Date) Office personnel to complete section to the left.

Inspection Checklist

Modular Wetland System Type (Curb, Grate or UG Vault): __________ Size (22', 14' or etc.): __________

Structural Integrity:	**Yes**	**No**	**Comments**
Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)?			
Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly?			
Working Condition:			
Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit?			
Is there standing water in inappropriate areas after a dry period?			
Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system?			
Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes, specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber.			Depth:
Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber?			Chamber:
Any signs of improper functioning in the discharge chamber? Note issues in comments section.			
Other Inspection Items:			
Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)?			
Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below.			
Is there a septic or foul odor coming from inside the system?			

Waste:	**Yes**	**No**
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

Recommended Maintenance	
No Cleaning Needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes: ______________________________

____

____

Bio Clean
A Forterra Company

Cleaning and Maintenance Report
Modular Wetlands Linear

Project Name ______________________________

Project Address ______________________________ (city) (Zip Code)

Owner / Management Company ______________________________

Contact ______________________________ Phone (   )   –

Inspector Name ______________________________ Date ____/____/______ Time __________ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition ______________________________ Additional Notes ______________________________

For Office Use Only
(Reviewed By)
(Date) Office personnel to complete section to the left.

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Total Debris Accumulation	Condition of Media 25/50/75/100 (will be changed @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:	MWS Catch Basins						
		MWS Sedimentation Basin						
		Media Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

Comments:

5796 Armada Drive #250, Carlsbad, CA | 855.566.3938 | stormwater@forterrabp.com | www.biocleanenvironmental.com

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

To be provided in the Final WQMP