APPENDIX D

Water Quality Management Plan

PROJECT SPECIFIC WATER QUALITY MANAGEMENT PLAN (WQMP)

FOR

CANYON SPRINGS HEALTHCARE CENTER

REC Job Number 17067

July 25, 2014

Revised: June 2, 2016

July 8, 2016

August 1, 2016

RICK ENGINEERING COMPANY

RICK
ENGINEERING COMPANY
rickengineering.com

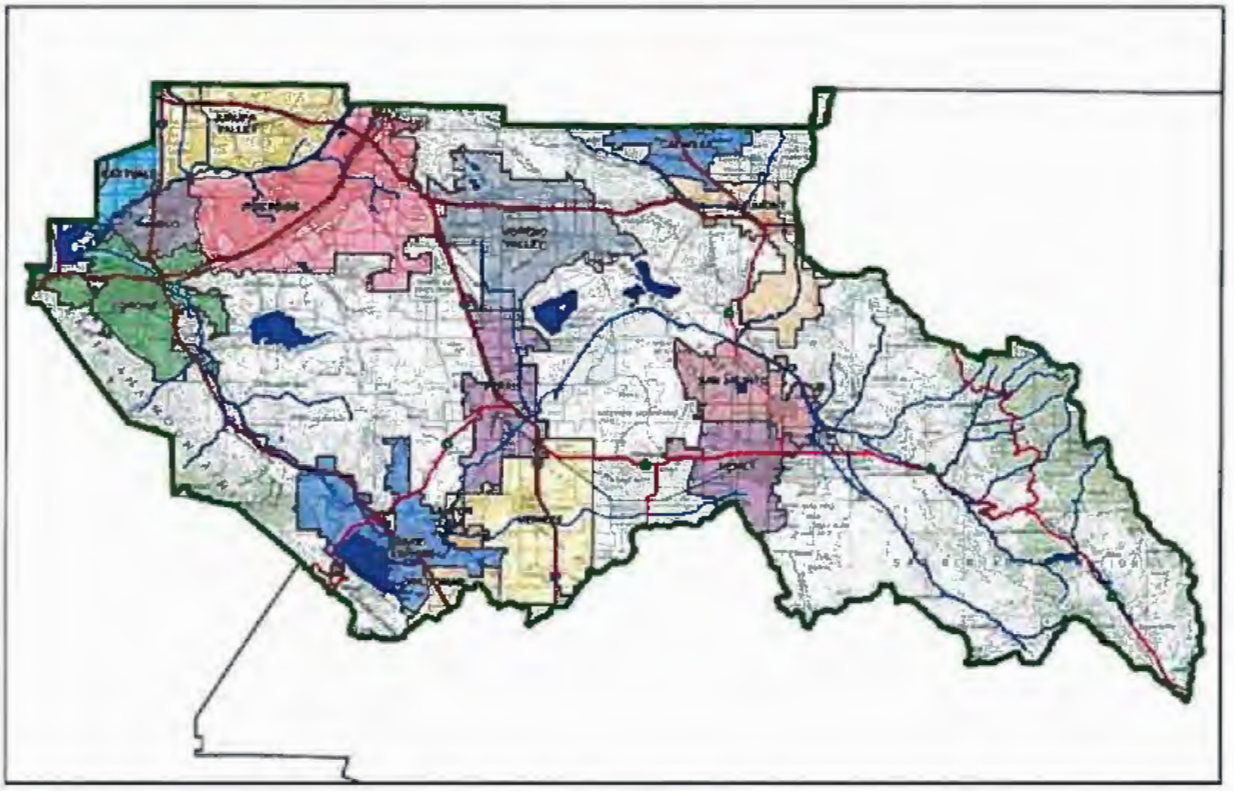
Project Specific Water Quality Management Plan

APPROVED
AUG 10 2016
DEPT. OF PUBLIC WORKS

Project Title: Canyon Springs Healthcare Center

Development No:

Design Review/Case No: P14-0294



☒ **Preliminary**
☐ **Final**

Original Date Prepared: July 25, 2014

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Prepared for Compliance with
Regional Boord Order No. **R8-2010-0033**

Prepared for:
Canyon Springs Marketplace Corporation
c/o TDA Investment Group
2025 Pioneer Court
San Mateo, California 94403
Michael Morris

Prepared by:
Rick Engineering Company
1770 Iowa Ave., Suite 100
Riverside, CA 92507
Richard O'Neill, 951-782-0707

OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for TDA Investment Group by Rick Engineering Company for the Canyon Springs Healthcare Center project.

This WQMP is intended to comply with the requirements for the City of Riverside for Design Review, Planning Case No. P14-0294 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 City of Riverside Water Quality Ordinance 14.12.315.

"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."

Paula Purcell
Owner's Signature

8/10/16
Date

Paula Purcell
Owner's Printed Name

Vice President
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."

Preparer's Signature

8/9/16
Date

Richard O'Neill
Preparer's Printed Name

Associate
Preparer's Title/Position

Preparer's Licensure

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Section A: Project and Site Information

The project site is located on the existing vacant lot at the intersection of the 60 and 215 freeways. The site will be utilized as the new Canyon Springs Healthcare Center and will be a phased project broken up into 6 different parts.

In the pre-project condition, stormwater sheet flows in a southerly direction towards an existing onsite basin. This basin currently accounts for all HCOC volume generated by phases 2 and 6.

Area 1 will be a Senior Housing area, Area 2 will be assisted living, skilled nursing facility and independent living areas, Area 3 will be a hospital; Area 4 will be medical office buildings, and Area 6 will be the surgical center.

Each phase will be treated as one overall area, with all stormwater being detained onsite.

Area 1 will utilize bioretention areas in the landscaping surrounding the parking lot and senior housing areas, with additional bioretention areas proposed to store the HCOC volume. Stormwater from the building will be conveyed via roof drains and outlet to the parking lots where it will sheet flow into the bioretention areas. Runoff from the parking and drive aisles will sheet flow and enter into the bioretention areas via curb cuts.

Area 2 will utilize bioretention areas in the central landscaped area as well as the perimeter of the parking lot. Stormwater from the building will be conveyed via roof drains and outlet to the parking lots where it will sheet flow into the bioretention areas. Runoff from the parking and drive aisles will sheet flow and enter into the bioretention areas via curb cuts.

Area 3 will utilize bioretention areas in the landscaping surrounding the hospital, with additional bioretention areas proposed to store the HCOC volume. Stormwater from the building will be conveyed via roof drains and outlet to the parking lots where it will sheet flow into the bioretention areas. Runoff from the parking and drive aisles will sheet flow and enter into the bioretention areas via curb cuts.

Area 4 will utilize bioretention areas along the perimeter of the medical office buildings, with additional bioretention areas proposed to store the HCOC volume. Stormwater from the building will be conveyed via roof drains and outlet to the parking lots where it will sheet flow into the bioretention areas. Runoff from the parking and drive aisles will sheet flow and enter into the bioretention areas via curb cuts.

Area 5 will also utilize bioretention areas along the perimeter of the parking lot, with additional bioretention areas proposed to store the HCOC volume. Stormwater from the building will be conveyed via roof drains and outlet to the parking lots where it will sheet flow into the bioretention areas. Runoff from the parking and drive aisles will sheet flow and enter into the bioretention areas via curb cuts.

Area 6 will utilize 2 areas of permeable pavers in the parking lot where runoff will sheet flow and infiltrate. Any additional runoff will be stored in the proposed bioretention swale. All stormwater will sheet flow across the parking lot and into the proposed permeable pavers.

PROJECT INFORMATION	
Type of Project:	Commercial
Ward Area:	2
Community Name:	Sycamore Canyon Business Park/Canyon Springs
Development Name:	Canyon Springs Healthcare Center
PROJECT LOCATION	
Latitude & Longitude (DMS): Lat 33°56'04"N, Long 117°17'00"W	
Project Watershed and Sub-Watershed: Santa Ana River, Riverside Hydrologic Sub-area	
APN(s): 291-450-052, 291-090-039, 291-090-040, 291-090-041, 291-440-018, 291-440-033, 291-440-036, 291-440-042, 291-440-043, 291-440-044, 291-440-045, 291-440-047, 291-440-048, 291-440-049, 291-440-050, 291-450-051, 291-450-053, 291-450-054, 291-450-055, 291-450-056, 291-450-057	
Map Book and Page No.: PM 128/091-103	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Commercial/ Parking Lot
Proposed or Potential SIC Code(s)	8011, 8051, 8059
Area of Impervious Project Footprint (SF)	1,464,831
Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement	1,464,831
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 (SF)	0
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	N/A
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)	N/A
What is the Water Quality Design Storm Depth for the project?	0.63

A.1 Maps and Site Plans

Appendix 1 includes a map of the local vicinity and existing site. In addition, WQMP Site Plan, located in Appendix 1, includes 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

Identify Receiving Waters

In order of upstream to downstream, the receiving waters that the project site is tributary to are as follows. A map of the receiving waters is included 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
Santa Ana River Reach 3	Metals and Pathogens	AGR, GWR, MUN*, RARE, REC1, REC2, SPWN, WARM, WILD	Approximately 7 miles from site. A RARE water body.
Santa Ana River Reach 2	Pathogens	GWR, AGR, REC1, REC2, RARE, MUN*, WILD, WARM	Approximately 19 miles from site. A RARE water body.
Santa Ana River Reach 1	N/A	REC1, REC2, WILD, WARM, MUN	Approximately 36 miles from site. Approximately 9.3 miles from RARE
Tidal Prism-Santa Ana River	N/A	MUN*, REC1, REC2, COMM, WILD, RARE, MAR	Approximately 42 miles from site. A RARE water body.
Pacific Ocean	N/A	N/A	Approximately 44 miles from site.

A.2 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
Other *(please list in the space below as required)*		
City of Riverside Conditional Use Permit	☒ Y	☐ N
City of Riverside Design Review	☒ Y	☐ N
City of Riverside Building Permit	☒ Y	☐ N
City of Riverside Grading Permit	☒ Y	☐ N
City of Riverside Construction 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.

Section B: Optimize Site Utilization (LID Principles)

Site Optimization

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

Yes, all existing drainage patterns have been preserved to the greatest extent possible.

Did you identify and protect existing vegetation? If so, how? If not, why?

The site has already been mass graded therefore no vegetation is existing on site. The parkway surrounding the site is currently landscaped and will be protected in place.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

No, geological studies have determined the existing infiltration rates to not be favorable for promoting infiltration.

Did you identify and minimize impervious area? If so, how? If not, why?

Yes, driveway and walkway widths have been designed at the minimum standard per the municipal ordinance.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

Yes, runoff from this site will disperse to landscaping and bio-retention areas when possible. The project will convey all overflow runoff to the existing detention basin for the Assisted Living Site and the Surgical Center.

Section C: Delineate Drainage Management Areas (DMAs)

Table C.1 DMA Classifications

Area 1

DMA Name or ID	Surface Type(s)	Area (Sq. Ft.)	DMA Type
B1-1	Ornamental Landscape	4025	(B)
B1-2	Ornamental Landscape	15093	(B)
B1-3	Ornamental Landscape	10246	(B)
B1-4	Ornamental Landscape	17001	(B)
D1-1	Roof	20982	(D)
D1-2	Roof	49280	(D)
D1-3	Roof	4920	(D)
D1-4	Concrete/Asphalt	27030	(D)
D1-5	Roof	33289	(D)
D1-6	Ornamental Landscape	53188	(D)
D1-7	Concrete/Asphalt	14455	(D)
D1-8	Ornamental Landscape	11648	(D)
D1-9	Roof	2500	(D)
D1-10	Roof	13744	(D)
D1-11	Ornamental Landscape	77622	(D)
D1-12	Concrete/Asphalt	12935	(D)
D1-13	Ornamental Landscape	18056	(D)
D1-14	Concrete/Asphalt	14968	(D)
D1-15	Ornamental Landscape	24254	(D)

BRS1-1	Ornamental Landscape	4941	(D)
BRS1-2	Ornamental Landscape	2088	(D)
BRS1-3	Ornamental Landscape	1187	(D)
BRS1-4	Ornamental Landscape	480	(D)
BRS1-5	Ornamental Landscape	1290	(D)
BRS1-6	Ornamental Landscape	974	(D)
BRS1-7	Ornamental Landscape	675	(D)
HYDRO:BRS1-1	Ornamental Landscape	6978	(D)
HYDRO:BRS1-2	Ornamental Landscape	11467	(D)

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

Area 2

DMA Name or ID	Surface Type(s)	Area (Sq. Ft.)	DMA Type
B2-1	Ornamental Landscape	14735	(B)
B2-2	Ornamental Landscape	116946	(B)
B2-3	Ornamental Landscape	2474	(B)
B2-4	Ornamental Landscape	10344	(B)
C2-1	Roof	3945	(C)
C2-2	Roof	37444	(C)
D2-1	Concrete/Asphalt	52295	(D)
D2-2	Ornamental Landscape	16132	(D)
D2-3	Roofs	29062	(D)
D2-4	Concrete/Asphalt	7715	(D)
D2-5	Concrete/Asphalt	14218	(D)
D2-6	Concrete/Asphalt	47218	(D)
D2-7	Ornamental Landscape	12828	(D)
D2-8	Ornamental Landscape	14043	(D)
D2-9	Roofs	39380	(D)
BRS2-1	Ornamental Landscape	3758	(D)
BRS2-2	Ornamental Landscape	1323	(D)
BRS2-3	Ornamental Landscape	1500	(D)
BRS2-4	Ornamental Landscape	1408	(D)

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

Area 3

DMA Name or ID	Surface Type(s)	Area (Sq. Ft.)	DMA Type
D3-1	Roofs	143612	(D)
D3-2	Concrete/Asphalt	37577	(D)
D3-3	Ornamental Landscape	39224	(D)
D3-4	Roofs	1925	(D)
D3-5	Roof	28275	(D)
D3-6	Roof	37500	(D)
D3-7	Concrete/Asphalt	40415	(D)
D3-8	Concrete/Asphalt	45827	(D)
D3-9	Concrete/Asphalt	16353	(D)
D3-10	Concrete/Asphalt	42080	(D)
D3-11	Concrete/Asphalt	37156	(D)
BRS3-1	Ornamental Landscape	5563	(D)
BRS3-2	Ornamental Landscape	1144	(D)
BRS3-3	Ornamental Landscape	2339	(D)
BRS3-4	Ornamental Landscape	1565	(D)
BRS3-5	Ornamental Landscape	4739	(D)
BRS3-6	Ornamental Landscape	7705	(D)
HYDRO: BRS3-1	Ornamental Landscape	6099	(D)

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

Area 4

DMA Name or ID	Surface Type(s)	Area (Sq. Ft.)	DMA Type
B4-1	Ornamental Landscape	3,793	(B)
B4-2	Ornamental Landscape	5,650	(B)
B4-3	Ornamental Landscape	3,850	(B)
B4-4	Ornamental Landscape	3,850	(B)
B4-5	Ornamental Landscape	13,296	(B)
D4-1	Concrete/Asphalt	13,501	(D)
D4-2	Ornamental Landscape	8,945	(D)
D4-3	Concrete/Asphalt	24,764	(D)
D4-4	Concrete/Asphalt	24,764	(D)
D4-5	Concrete/Asphalt	24,382	(D)
D4-6	Ornamental Landscape	5,830	(D)
D4-7	Roof	22,700	(D)
D4-8	Roof	22,700	(D)
D4-9	Roof	65,043	(D)
D4-10	Concrete/Asphalt	16,396	(D)
D4-11	Concrete/Asphalt	10,328	(D)
D4-13	Concrete/Asphalt	6,697	(D)
D4-14	Concrete/Asphalt	11,453	(D)
D4-15	Concrete/Asphalt	9,657	(D)
D4-16	Concrete/Asphalt	8,155	(D)
D4-17	Concrete/Asphalt	6,383	(D)
D4-18	Concrete/Asphalt	6,827	(D)
D4-19	Ornamental Landscape	20,497	(D)
BRS4-1	Ornamental Landscape	3,174	(D)

BRS4-2	Ornamental Landscape	900	(D)
BRS4-3	Ornamental Landscape	900	(D)
BRS4-4	Ornamental Landscape	1,558	(D)
BRS4-5	Ornamental Landscape	6,642	(D)
BRS4-6	Ornamental Landscape	2,818	(D)
BRS4-7	Ornamental Landscape	540	(D)
BRS4-8	Ornamental Landscape	540	(D)
BRS4-9	Ornamental Landscape	412	(D)
BRS4-10	Ornamental Landscape	706	(D)
BRS4-11	Ornamental Landscape	3,954	(D)
BRS4-12	Ornamental Landscape	632	(D)

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

Area 5

DMA Name or ID	Surface Type(s)	Area (Sq. Ft.)	DMA Type
D5-1	Concrete/Asphalt	19,843	(D)
D5-2	Concrete/Asphalt	51,185	(D)
D5-3	Concrete/Asphalt	21,605	(D)
D5-4	Roof	23,550	(D)
D5-5	Concrete/Asphalt	49,229	(D)
D5-6	Ornamental Landscape	5,878	(D)
BRS5-1	Ornamental Landscape	3,480	(D)
BRS5-2	Ornamental Landscape	1,533	(D)
BRS5-3	Ornamental Landscape	1,400	(D)

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

Area 6

DMA Name or ID	Surface Type(s)	Area (Sq. Ft.)	DMA Type
D6-1	Concrete/Asphalt	21,894	(D)
D6-2	Roof	20,160	(D)
D6-3	Ornamental Landscape	9,609	(D)
D6-4	Ornamental Landscape	6,022	(D)
D6-5	Roof	3,606	(D)
D6-6	Ornamental Landscape	21,643	(D)
D6-7	Concrete/Asphalt	11,645	(D)
D6-8	Concrete/Asphalt	64,944	(D)
D6-9	Ornamental Landscape	2,964	(D)
D6-10	Ornamental Landscape	4,364	(D)
D6-11	Ornamental Landscape	7,344	(D)
BRS6-1	Ornamental Landscape	585	(D)
PP6-1	Permeable Paving w/ Sand Filled Gap	5,313	(D)
PP6-2	Permeable Paving w/ Sand Filled Gap	9,610	(D)

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

Table C.2 Type 'B', Self-Retaining Areas

Area 1

Self-Retaining Area				Type 'C' DMAs that are draining to the Self-Retaining Area		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]
B1-1	Ornamental Landscape	4025	0.62			
B1-2	Ornamental Landscape	12718	0.62			
B1-3	Ornamental Landscape	10246	0.62			

Area 2

Self-Retaining Area				Type 'C' DMAs that are draining to the Self-Retaining Area		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]
B2-1	Ornamental Landscape	14735	0.62	C2-1	3945	0.79
B2-2	Ornamental Landscape	116946	0.62	C2-2	37444	0.82
B2-3	Ornamental Landscape	2474	0.62			0.62
B2-4	Ornamental Landscape	10344	0.62			0.62

Area 4

Self-Retaining Area				Type 'C' DMAs that are draining to the Self-Retaining Area		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]
B4-1	Ornamental Landscape	3,793	0.62			
B4-2	Ornamental Landscape	5,650	0.62			
B4-3	Ornamental Landscape	3,850	0.62			
B4-4	Ornamental Landscape	3,850	0.62			
B4-5	Ornamental Landscape	6,642	0.62			

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

Table C.3 Type 'C', Areas that Drain to Self-Retaining Areas

Area 2

DMA					Receiving Self-Retaining DMA		
DMA Name/ ID	Area (square feet)	Post-project surface type	Runoff factor	Product		Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]	DMA name /ID	[D]	[C]/[D]
C2-1	3945	Roof	1	3,945	B2-1	14735	3.735
C2-2	37444	Roof	1	37,444	B2-2	116946	3.123

Table C.4 Type 'D', Areas Draining to BMPs

Area 1

DMA Name or ID	BMP Name or ID
D1-1	BRS1-1
D1-2	BRS1-1
D1-3	BRS1-1
D1-4	BRS1-2
D1-5	BRS1-2
D1-6	BRS1-2
D1-7	BRS1-3
D1-8	BRS1-3
D1-9	BRS1-3
D1-10	BRS1-4
D1-11	BRS1-4
D1-12	BRS1-5
D1-13	BRS1-6
D1-14	BRS1-7
D1-15	BRS1-5

Area 2

DMA Name or ID	BMP Name or ID
D2-1	BRS2-1
D2-2	BRS2-1
D2-3	BRS2-2
D2-4	BRS2-3
D2-5	BRS2-2
D2-6	BRS2-4
D2-7	BRS2-4
D2-8	BRS2-3
D2-9	BRS2-3

Area 3

DMA Name or ID	BMP Name or ID
D3-1	BRS3-1
D3-2	BRS3-1
D3-3	BR53-1
D3-4	BRS3-1
D3-5	BRS3-2
D3-6	BRS3-3
D3-7	BRS3-3
D3-8	BRS3-4
D3-9	BRS3-5
D3-10	BRS3-6
D3-11	BRS3-6

Area 4

DMA Name or ID	BMP Name or ID
D4-1	BRS4-1
D4-2	BRS4-1
D4-3	BRS4-2
D4-4	BRS4-3
D4-5	BRS4-4
D4-6	BRS4-4
D4-7	BRS4-5
D4-8	BRS4-11
D4-9	BRS4-6
D4-10	BRS4-6
D4-11	BRS4-7
D4-13	BRS4-9
D4-14	BRS4-1
D4-15	BRS4-10
D4-16	BRS4-12
D4-17	BRS4-8
D4-18	BRS4-10
D4-19	BRS4-5

Area 5

DMA Name or ID	BMP Name or ID
D5-1	BRS5-1
D5-2	BRS5-1
D5-3	BRS5-3
D5-4	BRS5-3
D5-5	BRS5-2
D5-6	BRS5-2

Area 6

DMA Name or ID	BMP Name or ID
D6-1	PP6-1
D6-2	PP6-1
D6-3	PP6-1
D6-4	PP6-1
D6-5	BRS6-1
D6-6	BRS6-1
D6-7	BRS6-1
D6-8	PP6-2
D6-9	PP6-2
D6-10	PP6-2
D6-11	PP6-2

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

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 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: All DMAs affected		
...have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
...geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?	X	
Describe here: Bedrock is extremely shallow; all BMPs will have subdrains to maintain a 48-hour drawdown time		

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.

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

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5.

☐ None of the above

D.4 Feasibility Assessment Summaries

Table D.2 LID Prioritization Summary Matrix

Area 1

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
D1-1	☐	☐	☒	☐	☐
D1-2	☐	☐	☒	☐	☐
D1-3	☐	☐	☒	☐	☐
D1-4	☐	☐	☒	☐	☐
D1-5	☐	☐	☒	☐	☐
D1-6	☐	☐	☒	☐	☐
D1-7	☐	☐	☒	☐	☐
D1-8	☐	☐	☒	☐	☐
D1-9	☐	☐	☒	☐	☐
D1-10	☐	☐	☒	☐	☐
D1-11	☐	☐	☒	☐	☐
D1-12	☐	☐	☒	☐	☐
D1-13	☐	☐	☒	☐	☐
D1-14	☐	☐	☒	☐	☐
D1-15	☐	☐	☒	☐	☐

Area 2

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	5. Infiltration	6. Harvest and use	7. Bioretention	8. Biotreatment	
D2-1	☐	☐	☒	☐	☐
D2-2	☐	☐	☒	☐	☐
D2-3	☐	☐	☒	☐	☐
D2-4	☐	☐	☒	☐	☐
D2-5	☐	☐	☒	☐	☐
D2-6	☐	☐	☒	☐	☐
D2-7	☐	☐	☒	☐	☐
D2-8	☐	☐	☒	☐	☐
D2-9	☐	☐	☒	☐	☐

Area 3

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	9. Infiltration	10. Harvest and use	11. Bioretention	12. Biotreatment	
D3-1	☐	☐	☒	☐	☐
D3-2	☐	☐	☒	☐	☐
D3-3	☐	☐	☒	☐	☐
D3-4	☐	☐	☒	☐	☐
D3-5	☐	☐	☒	☐	☐
D3-6	☐	☐	☒	☐	☐
D3-7	☐	☐	☒	☐	☐
D3-8	☐	☐	☒	☐	☐
D3-9	☐	☐	☒	☐	☐
D3-10	☐	☐	☒	☐	☐
D3-11	☐	☐	☒	☐	☐

Area 4

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	13. Infiltration	14. Harvest and use	15. Bioretention	16. Biotreatment	
D4-1	☐	☐	☒	☐	☐
D4-2	☐	☐	☒	☐	☐
D4-3	☐	☐	☒	☐	☐
D4-4	☐	☐	☒	☐	☐
D4-5	☐	☐	☒	☐	☐
D4-6	☐	☐	☒	☐	☐
D4-7	☐	☐	☒	☐	☐
D4-8	☐	☐	☒	☐	☐
D4-9	☐	☐	☒	☐	☐
D4-10	☐	☐	☒	☐	☐
D4-11	☐	☐	☒	☐	☐
D4-13	☐	☐	☒	☐	☐
D4-14	☐	☐	☒	☐	☐
D4-15	☐	☐	☒	☐	☐
D4-16	☐	☐	☒	☐	☐
D4-17	☐	☐	☒	☐	☐
D4-18	☐	☐	☒	☐	☐
D4-19	☐	☐	☒	☐	☐

Area 5

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	17. Infiltration	18. Harvest and use	19. Bioretention	20. Biotreatment	
D5-1	☐	☐	☒	☐	☐
D5-2	☐	☐	☒	☐	☐
D5-3	☐	☐	☒	☐	☐
D5-4	☐	☐	☒	☐	☐
D5-5	☐	☐	☒	☐	☐
D5-6	☐	☐	☒	☐	☐

Area 6

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	21. Infiltration	22. Harvest and use	23. Bioretention	24. Biotreatment	
D6-1	☒	☐	☐	☐	☐
D6-2	☒	☐	☐	☐	☐
D6-3	☒	☐	☐	☐	☐
D6-4	☒	☐	☐	☐	☐
D6-5	☐	☐	☒	☐	☐
D6-6	☐	☐	☒	☐	☐
D6-7	☐	☐	☒	☐	☐
D6-8	☒	☐	☐	☐	☐
D6-9	☒	☐	☐	☐	☐
D6-10	☒	☐	☐	☐	☐
D6-11	☒	☐	☐	☐	☐

D.5 LID BMP Sizing

Table D.3 DCV Calculations for LID BMPs

Area 1

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS1-1/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS1-1	*4941*	*Ornamental Landscaping*	*0.1*	*0.11*	*545.8*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D1-1	*20982*	*Roofs*	*1*	*0.89*	*18715.9*			
D1-2	*49280*	*Roofs*	*1*	*0.89*	*43957.8*			
D1-3	*4920*	*Roofs*	*1*	*0.89*	*4388.6*			
	80123				67608.1	0.62	3493.1	4941

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS1-2/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS1-2	*2088*	*Ornamental Landscaping*	*0.1*	*0.11*	*230.6*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D1-4	*27030*	*Concrete or Asphalt*	*1*	*0.89*	*24110.8*			
D1-5	*33289*	*Roofs*	*1*	*0.89*	*29693.8*			
D1-6	*53188*	*Ornamental Landscaping*	*0.1*	*0.11*	*5875*			
	115595				59910.2	0.62	3095.4	3236.4

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	BRS1-3/Bioretention		
	[A]		[B]	[C]	[A] x [C]			
BRS1-3	*1187*	*Ornamental Landscaping*	*0.1*	*0.11*	*131.1*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D1-7	*14455*	*Concrete or Asphalt*	*1*	*0.89*	*12893.9*			
D1-8	*11648*	*Ornamental Landscaping*	*0.1*	*0.11*	*1286.6*			
D1-9	*2500*	*Roofs*	*1*	*0.89*	*2230*			
	29790				16541.6	0.62	854.6	1839.85

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	BRS1-4/Bioretention		
	[A]		[B]	[C]	[A] x [C]			
BRS1-4	*480*	*Ornamental Landscaping*	*0.1*	*0.11*	*53*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D1-10	*13744*	*Roofs*	*1*	*0.89*	*12259.6*			
D1-11	*7762*	*Ornamental Landscaping*	*0.1*	*0.11*	*857.4*			
	21986				13170	0.62	680.5	744

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	BRS1-5/Bioretention		
	[A]		[B]	[C]	[A] x [C]			
BRS1-5	*1290*	*Ornamental Landscaping*	*0.1*	*0.11*	*142.5*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D1-12	*12935*	*Concrete or Asphalt*	*1*	*0.89*	*11538*			
D1-15	*24254*	*Ornamental Landscaping*	*0.1*	*0.11*	*2679*			
	38479				14359.5	0.62	741.9	2000

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	BRS1-6/Bioretention		
	[A]		[B]	[C]	[A] x [C]			
BRS1-6	*974*	*Ornamental Landscaping*	*0.1*	*0.11*	*107.6*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D1-13	*18056*	*Concrete or Asphalt*	*1*	*0.89*	*16106*			
	19030				16213.6	0.62	837.7	1509

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS1-7/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS1-7	*675*	*Ornamental Landscaping*	*0.1*	*0.11*	*74.6*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D1-14	*14968*	*Concrete or Asphalt*	*1*	*0.89*	*13351.5*			
	15643				13426.1	0.62	693.7	1046

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*HYDROBRS1-1/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
HYDROBRS 1-1	*6,978*	*Ornamental Landscaping*	*0.1*	*0.11*	*770.8*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	6978				770.8	0.62	39.8	12,560

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*HYDROBRS1-2/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
HYDROBRS 1-2	*11,467*	*Ornamental Landscaping*	*0.1*	*0.11*	*1266.6*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	11467				1266.6	0.62	65.4	20641

Area 2

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS2-1/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS2-1	*3758*	*Ornamental Landscaping*	*0.1*	*0.11*	*415.1*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D2-1	*52295*	*Concrete or Asphalt*	*1*	*0.89*	*46647.1*			
D2-2	*16132*	*Ornamental Landscaping*	*0.1*	*0.11*	*1781.9*			
	72185				48844.1	0.62	2523.6	5825

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS2-2/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS2-2	*1323*	*Ornamental Landscaping*	*0.1*	*0.11*	*146.1*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D2-5	*14218*	*Concrete or Asphalt*	*1*	*0.89*	*12682.5*			
D2-3	*29062*	*Roofs*	*1*	*0.89*	*25923.3*			
	44603				38751.9	0.62	2002.2	2050

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS2-3/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS2-3	*1500*	*Ornamental Landscaping*	*0.1*	*0.11*	*165.7*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D2-4	*7715*	*Concrete or Asphalt*	*1*	*0.89*	*6881.8*			
D2-9	*39380*	*Roof*	*1*	*0.89*	*35127*			
D2-8	*14043*	*Ornamental Landscaping*	*0.1*	*0.11*	*1551.2*			
	62638				43725.7	0.62	2259.2	2325

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS2-4/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS2-4	*1408*	*Ornamental Landscaping*	*0.1*	*0.11*	*155.5*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D2-6	*47218*	*Concrete or Asphalt*	*1*	*0.89*	*42118.5*			
D2-7	*12828*	*Ornamental Landscaping*	*0.1*	*0.11*	*1417*			
	61454				43691	0.62	2257.4	3172

Area 3

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS3-1/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS3-1	*5563*	*Ornamental Landscaping*	*0.1*	*0.11*	*614.5*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D3-1	*143612*	*Roofs*	*1*	*0.89*	*128101.9*			
D3-2	*37577*	*Concrete or Asphalt*	*1*	*0.89*	*33518.7*			
D3-3	*39224*	*Ornamental Landscaping*	*0.1*	*0.11*	*4332.6*			
D3-4	*1925*	*Roofs*	*1*	*0.89*	*1717.1*			
	227901				168284.8	0.62	8694.7	10458

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS3-2/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS3-2	*1144*	*Ornamental Landscaping*	*0.1*	*0.11*	*126.4*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D3-5	*28275*	*Roofs*	*1*	*0.89*	*25221.3*			
	29419				25347.7	0.62	1309.6	1773

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS3-3/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS3-3	*2339*	*Ornamental Landscaping*	*0.1*	*0.11*	*258.4*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D3-6	*37500*	*Roofs*	*1*	*0.89*	*33450*			
D3-7	*40415*	*Concrete or Asphalt*	*1*	*0.89*	*36050.2*			
	80254				69758.6	0.62	3604.2	3625

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS3-4/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS3-4	*1565*	*Ornamental Landscaping*	*0.1*	*0.11*	*172.9*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D3-8	*45827*	*Concrete or Asphalt*	*1*	*0.89*	*40877.7*			
	47392				41050.6	0.62	2120.9	2425

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS3-5/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS3-5	*4739*	*Ornamental Landscaping*	*0.1*	*0.11*	*523.5*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D3-9	*16353*	*Concrete or Asphalt*	*1*	*0.89*	*14586.9*			
	21092				15110.4	0.62	780.7	7345

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS3-6/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS3-6	*7705*	*Ornamental Landscaping*	*0.1*	*0.11*	*851.1*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D3-10	*42080*	*Concrete or Asphalt*	*1*	*0.89*	*37535.4*			
D3-11	*37156*	*Concrete or Asphalt*	*1*	*0.89*	*33143.2*			
	86941				71529.7	0.62	3695.7	11943

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*HYDROBRS3-1/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
HYDROBRS 3-1	*6099*	*Ornamental Landscaping*	*0.1*	*0.11*	*673.7*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	6099				673.7	0.62	34.8	9453.45

Area 4

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS4-1/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS4-1	*3,174*	*Ornamental Landscaping*	*0.1*	*0.11*	*350.6*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D4-1	*13051*	*Concrete or Asphalt*	*1*	*0.89*	*11641.5*			
D4-2	*8,945*	*Ornamental Landscaping*	*0.1*	*0.11*	*988*			
D4-14	*11453*	*Concrete or Asphalt*	*1*	*0.89*	*10216.1*			
	36623				23196.2	0.62	1198.5	4949.7

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS4-2/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS4-2	*900*	*Ornamental Landscaping*	*0.1*	*0.11*	*99.4*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D4-3	*24764*	*Concrete or Asphalt*	*1*	*0.89*	*22089.5*			
	25664				22188.9	0.62	1146.4	1395

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS4-3/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS4-3	*900*	*Ornamental Landscaping*	*0.1*	*0.11*	*99.4*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D4-4	*24764*	*Concrete or Asphalt*	*1*	*0.89*	*22089.5*			
	25664				22188.9	0.62	1146.4	1395

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS4-4/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS4-4	*1558*	*Ornamental Landscaping*	*0.1*	*0.11*	*172.1*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D4-5	*24382*	*Concrete or Asphalt*	*1*	*0.89*	*21748.7*			
D4-6	*5830*	*Ornamental Landscaping*	*0.1*	*0.11*	*644*			
	31770				22564.8	0.62	1165.8	2415

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS4-5/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS4-5	*6642*	*Ornamental Landscaping*	*0.1*	*0.11*	*733.7*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D4-7	*22700*	*Roofs*	*1*	*0.89*	*20248.4*			
D4-19	*20497*	*Ornamental Landscaping*	*0.1*	*0.11*	*2264.1*			
	49839				23246.2	0.62	1201.1	11955

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS4-6/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS4-6	*2818*	*Ornamental Landscaping*	*0.1*	*0.11*	*311.3*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D4-9	*65043*	*Roofs*	*1*	*0.89*	*58018.4*			
D4-10	*16396*	*Concrete or Asphalt*	*1*	*0.89*	*14625.2*			
	84257				72954.9	0.62	3769.3	4368

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS4-7/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS4-7	*540*	*Ornamental Landscaping*	*0.1*	*0.11*	*59.6*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D4-11	*10328*	*Concrete or Asphalt*	*1*	*0.89*	*9212.6*			
	10868				9272.2	0.62	479.1	837

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BR54-8/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BR54-8	*540*	*Ornamental Landscaping*	*0.1*	*0.11*	*59.6*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D4-17	*6383*	*Concrete or Asphalt*	*1*	*0.89*	*5693.6*			
	6923				5753.2	0.62	297.2	837

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BR54-9/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BR54-9	*412*	*Ornamental Landscaping*	*0.1*	*0.11*	*45.5*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume an Plans (cubic feet)*
D4-13	*6697*	*Concrete or Asphalt*	*1*	*0.89*	*5973.7*			
	7109				6019.2	0.62	311	639

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS4-10/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS4-10	*706*	*Ornamental Landscaping*	*0.1*	*0.11*	*78*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D4-18	*6827*	*Concrete or Asphalt*	*1*	*0.89*	*6089.7*			
D4-15	*9657*	*Concrete or Asphalt*	*1*	*0.89*	*8614*			
	17190				14781.7	0.62	763.7	1094

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS4-11/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS4-11	*3954*	*Ornamental Landscaping*	*0.1*	*0.11*	*436.8*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D4-8	*22700*	*Roofs*	*1*	*0.89*	*20248.4*			
	26654				20685.2	0.62	1068.7	7117.2

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS4-12/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS4-12	*632*	*Ornamental Landscaping*	*0.1*	*0.11*	*69.8*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D4-16	*8155*	*Concrete or Asphalt*	*1*	*0.89*	*7274.3*			
	8787				7344.1	0.62	379.4	980

Area 5

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS5-1/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS5-1	*3480*	*Ornamental Landscaping*	*0.1*	*0.11*	*384.4*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D5-1	*19843*	*Concrete or Asphalt*	*1*	*0.89*	*17700*			
D5-2	*51185*	*Concrete or Asphalt*	*1*	*0.89*	*45657*			
	74508				63741.4	0.62	3293.3	5394

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS5-2/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS5-2	*1533*	*Ornamental Landscaping*	*0.1*	*0.11*	*169.3*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D5-5	*49229*	*Concrete or Asphalt*	*1*	*0.89*	*43912.3*			
D5-6	*5878*	*Ornamental Landscaping*	*0.1*	*0.11*	*649.3*			
	56640				44730.9	0.62	2311.1	2376

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS5-3/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS5-3	*1400*	*Ornamental Landscaping*	*0.1*	*0.11*	*154.6*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D5-3	*23550*	*Roofs*	*1*	*0.89*	*21006.6*			
D5-4	*21605*	*Concrete or Asphalt*	*1*	*0.89*	*19271.7*			
					40432.9	0.62	2089	2170

Area 6

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*PP6-1/Permeable Pavers*		
	[A]		[B]	[C]	[A] x [C]			
PP6-1	*5313*	*Permeable Paving Blocks w/ Sand Filled Gap*	*0.25*	*0.20*	*1052.8*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D6-1	*21894*	*Concrete or Asphalt*	*1*	*0.89*	*19529.4*			
D6-2	*20160*	*Roofs*	*1*	*0.89*	*17982.7*			
D6-3	*9609*	*Ornamental Landscaping*	*0.1*	*0.11*	*1061.04*			
D6-4	*6022*	*Ornamental Landscaping*	*0.1*	*0.11*	*665.2*			
	62998				40291.5	0.62	2081.7	2125.2

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*PP6-2/Permeable Pavers*		
	[A]		[B]	[C]	[A] x [C]			
PP6-2	*9610*	*Permeable Paving Blocks w/ Sand Filled Gap*	*0.25*	*0.20*	*1904.3*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D6-8	*64944*	*Concrete or Asphalt*	*1*	*0.89*	*57930*			
D6-9	*2964*	*Ornamental Landscaping*	*0.1*	*0.11*	*327.4*			
D6-10	*4364*	*Ornamental Landscaping*	*0.1*	*0.11*	*482*			
D6-11	*7344*	*Ornamental Landscaping*	*0.1*	*0.11*	*811.2*			
	89226				61454.9	0.62	3175.2	3844

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BRS6-1/Bioretention*		
	[A]		[B]	[C]	[A] x [C]			
BRS-1	*585*	*Ornamental Landscaping*	*0.1*	*0.11*	*64.6*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D6-5	*3606*	*Roofs*	*1*	*0.89*	*3216.6*			
D6-6	*21643*	*Ornamental Landscaping*	*0.1*	*0.11*	*2390.6*			
D6-7	*11645*	*Concrete or Asphalt*	*1*	*0.89*	*10387.3*			
	37479				16059.1	0.62	829.7	906.75

[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.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

The project does create a Hydrologic Condition of Concern, not meeting the criteria for HCOC Exemption as shown below:

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

Results included in Table F.1 below and hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

Area A: (Mitigated by extra storage in Area 1)

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration	13.2 min	12.12 min	8.2%
Volume (Cubic Feet)	0.13 ac-ft	0.985 ac-ft	86.7%

Area B: (Mitigated by extra storage in Areas 3 and 4)

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration	17.64 min	13.2 min	25.2%
Volume (Cubic Feet)	0.19 ac-ft	1.37 ac-ft	86.1%

[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 Sensitivity Maps.

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

F.2 HCOC Mitigation

As an alternative to the HCOC Exemption Criteria above, HCOC criteria is considered mitigated if the project meets one of the following conditions, as indicated:

☒ 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.

☐ d. None of the above.

AREA A: (EXTRA STORAGE IN DMA AREA 1)

Pre-Project HCOC	Post-Project HCOC	Total HCOC storage required	Total BMP Storage Proposed	BMP Storage Used by Vbmp	BMP Storage Remaining (to store HCOC)
5,662.8 ft^3	42,906.6 ft^3	37,243.8 ft^3	48,517.25 ft^3	10,502.1 ft^3	38,015.15 ft^3

AREA B: (EXTRA STORAGE IN DMA AREAS 3 AND 4)

DMA Area	Pre-Project HCOC	Post-Project HCOC	Total HCOC storage required	Total BMP Storage Proposed	BMP Storage Used by Vbmp	BMP Storage Remaining (to store HCOC)
3	---	---	---	47,022.45 ft^3	20,219.8 ft^3	26,781.85 ft^3
4	---	---	---	37,981.9 ft^3	12,926.6 ft^3	25,055.3 ft^3
Total	8,276.4 ft^3	59,677.2 ft^3	51.400.8 ft^3	78,598.35 ft^3	33,146.4 ft^3	51,837.15 ft^3

Section G: Source Control BMPs

The following table identifies the potential sources of runoff pollutants for this project and specifies how they are addressed through permanent controls and operational BMPs:

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 951.995.1200 to verify.	Maintain and periodically repaint or replace inlet markings. Provide stormwater pollution prevention information to new site owners, leases, 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."
Interior floor drains and elevator shaft sump pumps	Interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	Inspect and maintain drains to prevent blockages and overflow.
Landscape/Outdoor Pesticide Use	All final landscape plans will accomplish 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. 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/Downloads/LandscapeGardenBrochure.pdf Provide IPM information to new owners, lessees and operators
Food Service	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.

Refuse Areas	Describe how site refuse will be handled and provide supporting detail to what is shown on plans. Signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	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
Loading Docks		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
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.
Miscellaneous Drain or Wash Water or 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.	

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.

Maintenance Mechanism: Property Owners Association

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

☒ Y ☐ N

Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

Appendix 1: Maps and Site Plans

Locatian Map, WQMP Site Plan and Receiving Waters Map

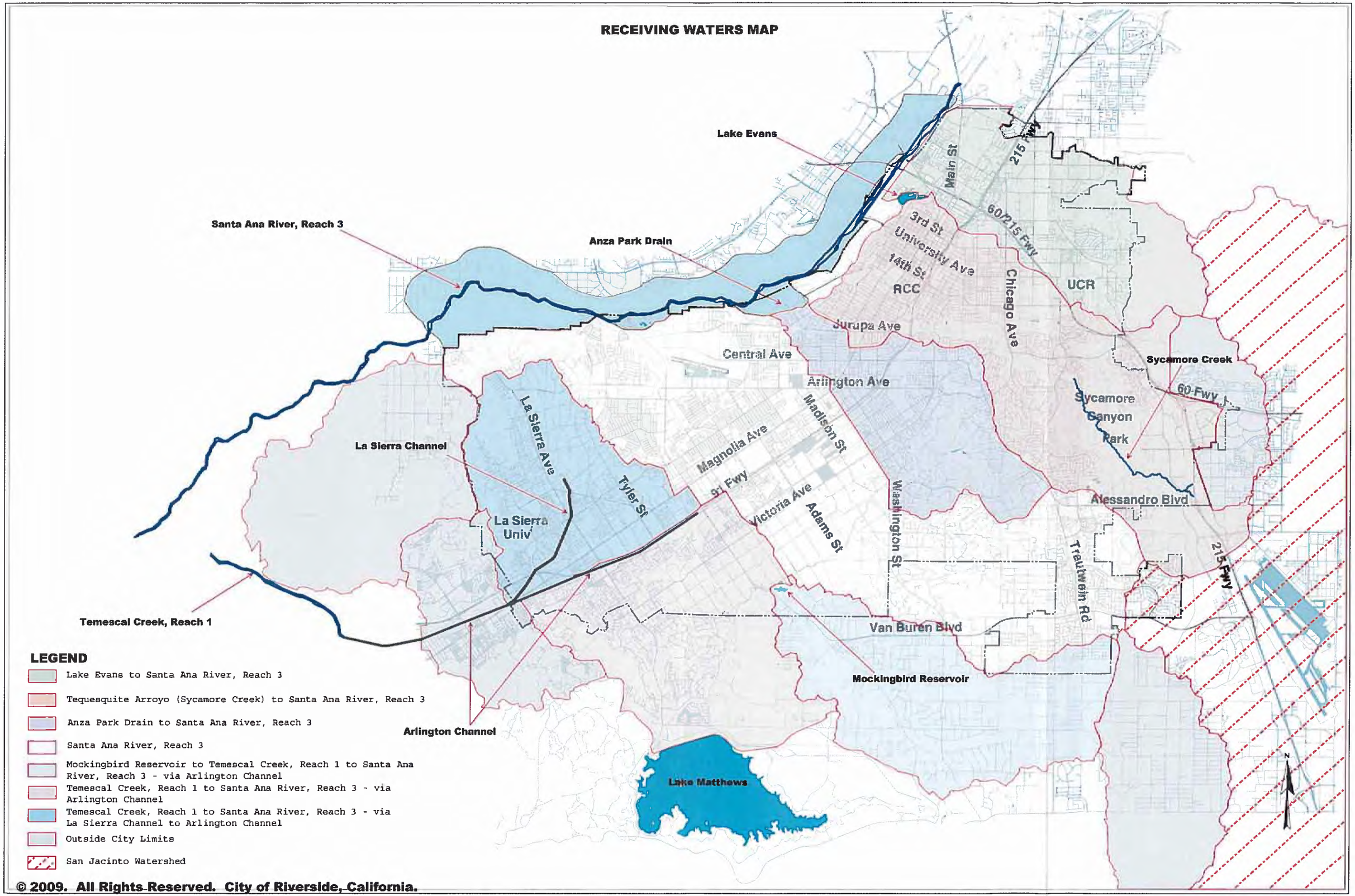
VICINITY MAP

RICK
ENGINEERING COMPANY
Riverside

1770 IOWA AVENUE - SUITE 100
RIVERSIDE, CA 92507
951.782.0707
(FAX)951.782.0723

rickengineering.com
San Diego - Orange - San Luis Obispo - Bakersfield - Sacramento - Phoenix - Tucson

RECEIVING WATERS MAP



LEGEND

- Lake Evans to Santa Ana River, Reach 3
- Tequesquite Arroyo (Sycamore Creek) to Santa Ana River, Reach 3
- Anza Park Drain to Santa Ana River, Reach 3
- Santa Ana River, Reach 3
- Mockingbird Reservoir to Temescal Creek, Reach 1 to Santa Ana River, Reach 3 - via Arlington Channel
- Temescal Creek, Reach 1 to Santa Ana River, Reach 3 - via Arlington Channel
- Temescal Creek, Reach 1 to Santa Ana River, Reach 3 - via La Sierra Channel to Arlington Channel
- Outside City Limits
- San Jacinto Watershed

Appendix 2: Construction Plans

Preliminary Grading Exhibit

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

CHJ Consultants
1355 E. Cooley Drive, Suite C, Colton, CA 92324 ◆ Phone (909) 824-7311 ◆ Fax (909) 503-1136
15345 Anacapa Road, Suite D, Victorville, CA 92392 ◆ Phone (760) 243-0506 ◆ Fax (760) 243-1225
77-564A Country Club Drive, Suite 122, Palm Desert, CA 92211 ◆ Phone (760) 772-8234 ◆ Fax (909) 503-1136

July 9, 2014

Canyon Springs Marketplace Corporation
c/o TDA Investment Group
2025 Pioneer Court
San Mateo, California 94403
Attention: Mr. Michael Morris

Job No. 14444-2

Subject: Infiltration Investigation
Canyon Springs Marketplace
Riverside, California

Dear Mr. Morris:

As requested, infiltration testing was performed for storm water infiltration at the subject site. This report presents test data and summarizes the scope of testing. The site location and test locations are shown on Enclosure "A-1". The testing includes eight tests at approximately 5 feet below existing grade.

Test Procedure

Eight double-ring infiltrometer tests were performed to evaluate the infiltration potential of the site soils. Each test pit was excavated with a rubber-tire backhoe. The tests were performed in general conformance with ASTM D3385. During the test period, the water in the inner and annular rings was maintained at a constant level using a float valve and individual water source for each ring. The volume of water added to the inner and annular rings was measured using graduated cylinders and recorded at timed intervals. The graduated cylinder corresponding to the inner ring is readable to increments of 25 milliliters.

possible compaction related to site grading and potential silting of the percolating soils. A safety factor should be determined with consideration to other factors in the storm water retention system design, particularly storm water volume estimates, and the safety factors associated with those design components.

Limitations

CHJ Consultants has striven to perform our services within the limits prescribed by our client, and in a manner consistent with the usual thoroughness and competence of reputable geotechnical engineers and engineering geologists practicing under similar circumstances. No other representation, express or implied, and no warranty or guarantee is included or intended by virtue of the services performed or reports, opinion, documents, or otherwise supplied.

This report reflects the testing conducted on the site as the site existed during the investigation, which is the subject of this report. However, changes in the conditions of a property can occur with the passage of time, due to natural processes or the works of man on this or adjacent properties. Changes in applicable or appropriate standards may also occur whether as a result of legislation, application or the broadening of knowledge. Therefore, this report is indicative of only those conditions tested at the time of the subject investigation, and the findings of this report may be invalidated fully or partially by changes outside of the control of CHJ Consultants. This report is therefore subject to review and should not be relied upon after a period of one year.

The conclusions and recommendations in this report are based upon observations performed and data collected at separate locations, and interpolation between these locations, carried out for the project and the scope of services described. It is assumed and expected that the conditions between locations observed and/or sampled are similar to those encountered at the individual locations where observation and sampling was performed. However, conditions between these locations may vary significantly. Should conditions that appear different from those described herein be encountered in the field by the client or any firm performing services for the client or the client's assign, this firm should be contacted immediately in order that we might evaluate their effect.

Google earth feet 2000 meters 700

CHJ Consultants

ENCLOSURE "A-1"
JOB NO. 14444-2
PREPARED FOR: CANYON SPRINGS MARKET CORPORATION

Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Post Site Use

(Not Applicable)

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 1: BIORETENTION: BRS1-1

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} = 0.62 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)
BRS1-1	4941	Ornamental Landscaping	0.1	0.11	545.8			
D1-1	20982	Roofs	1	0.89	18715.9			
D1-2	49280	Roofs	1	0.89	43957.8			
D1-3	4920	Roofs	1	0.89	4388.6			
	80123	Total			67608.1	0.62	3493.1	4941

Notes:

The remaining 1,447.9 cubic feet of storage available will go towards storing the 37,243.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID: BRS1-1	Legend:	Required Entries / Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 1.84 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 3,493 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 1,980 ft^2

Proposed Surface Area — A= 4,941 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 1: BIORETENTION: BRS1-2

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}= 0.62 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)
BRS1-2	2088	Ornamental Landscaping	0.1	0.11	230.6			
D1-4	27030	Concrete or Asphalt	1	0.89	24110.8			
D1-5	33289	Roofs	1	0.89	29693.8			
D1-6	53188	Ornamental Landscaping	0.1	0.11	5875			
	115595	Total			59910.2	0.62	3095.4	3236.4

Notes:

The remaining 141 cubic feet of storage available will go towards storing the 37,243.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID BRS1-2	Legend:	Required Entries / Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 2.65 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 3,095 ft^3

Type of Bioretention Facility Design

- (●) Side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 1,754 ft^2

Proposed Surface Area — A = 2,088 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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: REC — Date: 7/12/2016

Designed by: EVB — Case No:

Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 1: BIORETENTION: BRS1-3

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} = 0.62 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)
BRS1-3	1187	Ornamental Landscaping	0.1	0.11	131.1			
D1-7	14455	Concrete or Asphalt	1	0.89	12893.9			
D1-8	11648	Ornamental Landscaping	0.1	0.11	1286.6			
D1-9	2500	Roofs	1	0.89	2230			
	29790	Total			16541.6	0.62	854.6	1839.85

Notes:

The remaining 985.25 cubic feet of storage available will go towards storing the 37,243.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID BRS1-3	Legend:	Required Entries / Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 0.684 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 855 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 485 ft^2

Proposed Surface Area — A= 1,187 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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 REC — Date 7/12/2016

Designed by EVB — Case No

Company Project Number/Name — Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID AREA 1: BIORETENTION: BRS1-4

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}= 0.62 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 Imperious 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)*
BRS1-4	480	Ornamental Landscaping	0.1	0.11	53			
D1-10	13744	Roofs	1	0.89	12259.6			
D1-11	7762	Ornamental Landscaping	0.1	0.11	857.4			
	21986	*Total*			13170	0.62	680.5	744

Notes:

The remaining 63.5 cubic feet of storage available will go towards storing the 37,243.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID BRS1-4	Legend:	Required Entries / Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.505	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	681	ft^3

Type of Bioretention Facility Design

- (●) Side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	20.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.77	ft
Minimum Surface Area, A_m $A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$	A_M =	386	ft^2
Proposed Surface Area	A=	480	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		0	%
6" Check Dam Spacing		0	feet
Describe Vegetation:			

Notes:

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 1: BIORETENTION: BRS1-5

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} = 0.62 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)
BRS1-5	1290	Ornamental Landscaping	0.1	0.11	142.5			
D1-12	12935	Concrete or Asphalt	1	0.89	11538			
D1-15	24254	Ornamental Landscaping	0.1	0.11	2679			
	38479	Total			14359.5	0.62	741.9	2000

Notes:

The remaining 1,258.1 cubic feet of storage available will go towards storing the 37,243.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID: BRS1-5	Legend:	Required Entries / Calculated Cells
Company Name: REC		Date: 7/12/2016	
Designed by: EVB		County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T = 0.883	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP} = 742	ft^3

Type of Bioretention Facility Design

- (●) Side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S = 3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T = 20.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E = 1.77	ft
Minimum Surface Area, A_m $A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M = 421	ft^2
Proposed Surface Area	A= 1,290	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z = 4	:1
Diameter of Underdrain	6	inches
Longitudinal Slope of Site (3% maximum)	0	%
6" Check Dam Spacing	0	feet
Describe Vegetation:		

Notes:

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 1: BIORETENTION: BRS1-6

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} = 0.62 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)
BRS1-6	974	Ornamental Landscaping	0.1	0.11	107.6			
D1-13	18056	Concrete or Asphalt	1	0.89	16106			
	19030	Total			16213.6	0.62	837.7	1509

Notes:

The remaining 671.3 cubic feet of storage available will go towards storing the 37,243.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID: BRS1-6	Legend:	Required Entries / Calculated Cells
Company Name: REC		Date: 7/12/2016	
Designed by: EVB		County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 0.44 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 838 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 475 ft^2

Proposed Surface Area — A = 974 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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 REC — Date 7/12/2016

Designed by EVB — Case No

Company Project Number/Name — Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID AREA 1: BIORETENTION: BRS1-7

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}= 0.62 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)*
BRS1-7	*675*	*Ornamental Landscaping*	*0.1*	*0.11*	*74.6*			
D1-14	*14968*	*Concrete or Asphalt*	*1*	*0.89*	*13351.5*			
	15643	*Total*			13426.1	0.62	693.7	1046

Notes:

The remaining 352.3 cubic feet of storage available will go towards storing the 37,243.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID: BRS1-7	Legend:	Required Entries / Calculated Cells
Company Name: REC		Date: 7/12/2016	
Designed by: EVB		County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 0.36 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 694 ft^3

Type of Bioretention Facility Design

(◉) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 394 ft^2

Proposed Surface Area — A= 675 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 1: BIORETENTION: HCOC: BRS1-1

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} = 0.62 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)
HYDR: BRS1-1	6978	Ornamental Landscaping	0.1	0.11	770.8			
	6978	Total			770.8	0.62	39.8	12560

Notes:

The remaining 12,520.2 cubic feet of storage available will go towards storing the 37,243.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID HCOC:BRS1-1	Legend:	Required Entries
			Calculated Cells

Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.16	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	40	ft^3

Type of Bioretention Facility Design

(◉) Side slopes required (parallel to parking spaces or adjacent to walkways)

(○) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	20.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.77	ft
Minimum Surface Area, A_m $A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$	A_M =	23	ft^2
Proposed Surface Area	A=	6,978	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		0	%
6" Check Dam Spacing		0	feet
Describe Vegetation:			

Notes:

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 1: BIORETENTION: HCOC: BRS1-2

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} = 0.62 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)
HYDRO: BRS1-2	11467	Ornamental Landscaping	0.1	0.11	1266.6			
	11467	Total			1266.6	0.62	65.4	20641

Notes:

The remaining 20,575.6 cubic feet of storage available will go towards storing the 37,243.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID HCOC:BRS1-2	Legend:	Required Entries / Calculated Cells
Company Name: REC		Date: 7/12/2016	
Designed by: EVB		County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.26	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	65	ft^3

Type of Bioretention Facility Design

- (●) Side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	20.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.77	ft
Minimum Surface Area, A_m $A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$	A_M =	38	ft^2
Proposed Surface Area	A=	11,467	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		0	%
6" Check Dam Spacing		0	feet
Describe Vegetation:			

Notes:

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 2: BIORETENTION: BRS2-1

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} = 0.62 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)
BRS2-1	3758	Ornamental Landscaping	0.1	0.11	415.1			
D2-1	52295	Concrete or Asphalt	1	0.89	46647.1			
D2-2	16132	Ornamental Landscaping	0.1	0.11	1781.9			
	72185	Total			48844.1	0.62	2523.6	5825

Notes:

Bioretention Facility - Design Procedure	BMP ID: BRS2-1	Legend:	Required Entries / Calculated Cells
Company Name: REC		Date: 7/12/2016	
Designed by: EVB		County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 1.66 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 2,524 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 1,430 ft^2

Proposed Surface Area — A= 3,758 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 2: BIORETENTION: BRS2-2

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} = 0.62 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)
BRS2-2	1323	Ornamental Landscaping	0.1	0.11	146.1			
D2-5	14218	Concrete or Asphalt	1	0.89	12682.5			
D2-3	29062	Roofs	1	0.89	25923.3			
	44603	Total			38751.9	0.62	2002.2	2050

Notes:

Bioretention Facility - Design Procedure	BMP ID BRS2-2	Legend:	Required Entries / Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 1.02 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 2,002 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 1,135 ft^2

Proposed Surface Area — A= 1,323 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 2: BIORETENTION: BRS2-3

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} = 0.62 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)
BRS2-3	1500	Ornamental Landscaping	0.1	0.11	165.7			
D2-4	7715	Concrete or Asphalt	1	0.89	6881.8			
D2-9	39380	Roofs	1	0.89	35127			
D2-8	14043	Ornamental Landscaping	0.1	0.11	1551.2			
	62638	Total			43725.7	0.62	2259.2	2325

Notes:

Bioretention Facility - Design Procedure	BMP ID BRS2-3	Legend:	Required Entries / Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T =	1.44	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP} =	2,259	ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	20.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.77	ft
Minimum Surface Area, A_m $A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$	A_M =	1,280	ft^2
Proposed Surface Area	A=	1,500	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		0	%
6" Check Dam Spacing		0	feet
Describe Vegetation:			

Notes:

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 2: BIORETENTION: BRS2-4

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}= 0.62 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)
BRS2-4	1408	Ornamental Landscaping	0.1	0.11	155.5			
D2-6	47218	Concrete or Asphalt	1	0.89	42118.5			
D2-7	12828	Ornamental Landscaping	0.1	0.11	1417			
	61454	Total			43691	0.62	2257.4	3172

Notes:

Bioretention Facility - Design Procedure	BMP ID: BRS2-4	Legend:	Required Entries / Calculated Cells
Company Name: REC		Date: 7/12/2016	
Designed by: EVB		County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T= 1.41	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}= 2,257	ft^3

Type of Bioretention Facility Design

- (●) Side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S = 3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T = 20.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E = 1.77	ft
Minimum Surface Area, A_m $A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$	A_M = 1,279	ft^2
Proposed Surface Area	A= 1,408	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z = 4	:1
Diameter of Underdrain	6	inches
Longitudinal Slope of Site (3% maximum)	0	%
6" Check Dam Spacing	0	feet
Describe Vegetation:		

Notes:

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: REC
Designed by: EVB
Company Project Number/Name: Canyon Springs Healthcare Center
Date: 7/12/2016
Case No:

BMP Identification

BMP NAME / ID: AREA 3: BIORETENTION: BRS3-1

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} = 0.62 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)
BRS3-1	5563	Ornamental Landscaping	0.1	0.11	614.5			
D3-1	143612	Roofs	1	0.89	128101.9			
D3-2	37577	Concrete or Asphalt	1	0.89	33518.7			
D3-3	39224	Ornamental Landscaping	0.1	0.11	4332.6			
D3-4	1925	Roofs	1	0.89	1717.1			
	227901	Total			168284.8	0.62	8694.7	10458

Notes:

The remaining 1,763.3 cubic feet of storage available will go towards storing the 51,400.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID BRS3-1	Legend:	Required Entries / Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T =	5.15	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP} =	8,674	ft^3

Type of Bioretention Facility Design

- (●) Side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	20.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.77	ft
Minimum Surface Area, A_m $A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$	A_M =	4,915	ft^2
Proposed Surface Area	A=	5,563	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		0	%
6" Check Dam Spacing		0	feet
Describe Vegetation:			

Notes:

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 3: BIORETENTION: BRS3-2

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}= 0.62 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)
BRS3-2	1144	Ornamental Landscaping	0.1	0.11	126.4			
D3-5	28275	Roofs	1	0.89	25221.3			
	29419	Total			25347.7	0.62	1309.6	1773

Notes:

The remaining 463.4 cubic feet of storage available will go towards storing the 51,400.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID: BRS3-2	Legend:	Required Entries / Calculated Cells
Company Name: REC		Date: 7/12/2016	
Designed by: EVB		County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 0.67 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 1,310 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 742 ft^2

Proposed Surface Area — A= 1,144 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 3: BIORETENTION: BRS3-3

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}= 0.62 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)
BRS3-3	2339	Ornamental Landscaping	0.1	0.11	258.4			
D3-6	37500	Roofs	1	0.89	33450			
D3-7	40415	Concrete or Asphalt	1	0.89	36050.2			
	80254	Total			69758.6	0.62	3604.2	3625

Notes:

The remaining 20.8 cubic feet of storage available will go towards storing the 51,400.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID BRS3-3	Legend:	Required Entries
			Calculated Cells

Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	1.84	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	3,604	ft^3

Type of Bioretention Facility Design

- (●) Side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	20.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.77	ft
Minimum Surface Area, A_m $A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$	A_M =	2,043	ft^2
Proposed Surface Area	A=	2,339	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		0	%
6" Check Dam Spacing		0	feet

Describe Vegetation:

Notes:

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: REC
Designed by: EVB
Company Project Number/Name: Canyon Springs Healthcare Center
Date: 7/12/2016
Case No:

BMP Identification

BMP NAME / ID: AREA 3: BIORETENTION: BRS3-4

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} = 0.62 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)
BRS3-4	1565	Ornamental Landscaping	0.1	0.11	172.9			
D3-8	45827	Concrete or Asphalt	1	0.89	40877.7			
	47392	Total			41050.6	0.62	2120.9	2425

Notes:

The remaining 304.1 cubic feet of storage available will go towards storing the 51,400.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID BRS3-4	Legend:	Required Entries / Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 1.08 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 2,121 ft³

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 1,202 ft²

Proposed Surface Area — A = 1,565 ft²

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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: REC
Designed by: EVB
Company Project Number/Name: Canyon Springs Healthcare Center
Date: 7/12/2016
Case No:

BMP Identification

BMP NAME / ID: AREA 3: BIORETENTION: BRS3-5

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} = 0.62 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)
BRS3-5	4739	Ornamental Landscaping	0.1	0.11	523.5			
D3-9	16353	Concrete or Asphalt	1	0.89	14586.9			
	21092	Total			15110.4	0.62	780.7	7345

Notes:

The remaining 6,546.3 cubic feet of storage available will go towards storing the 51,400.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID BRS3-5	Legend:	Required Entries / Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 0.48 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 781 ft^3

Type of Bioretention Facility Design

(◉) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 443 ft^2

Proposed Surface Area — A= 4,739 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 incbes

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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 REC — Date 7/12/2016

Designed by EVB — Case No

Company Project Number/Name — Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID AREA 3: BIORETENTION: BRS3-6

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}= 0.62 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)
BRS3-6	7705	Ornamental Landscaping	0.1	0.11	851.1			
D3-10	42080	Concrete or Asphalt	1	0.89	37535.4			
D3-11	37156	Concrete or Asphalt	1	0.89	33143.2			
	86941	Total			71529.7	0.62	3695.7	11943

Notes:

The remaining 8,247.3 cubic feet of storage available will go towards storing the 51,400.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID BRS3-6	Legend:	Required Entries / Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 1.9 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 3,696 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 fr

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 2,094 ft^2

Proposed Surface Area — A= 7,705 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 3: BIORETENTION: HCOC: BRS3-1

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}= 0.62 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)
HYDRO: BRS3-1	6099	Ornamental Landscaping	0.1	0.11	673.7			
	6099	Total			673.7	0.62	34.8	9453.45

Notes:

The remaining 9,418.65 cubic feet of storage available will go towards storing the 51,400.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID HCOC: BRS3-1	Legend:	Required Entries / Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 0.22 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 35 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 12.5 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.74 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 20 ft^2

Proposed Surface Area — A = 6,099 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 4: BIORETENTION: BRS4-1

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} = 0.62 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 Imperious 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)
BRS4-1	3174	Ornamental Landscaping	0.1	0.11	350.6			
D4-1	13051	Concrete or Asphalt	1	0.89	11641.5			
D4-2	8945	Ornamental Landscaping	0.1	0.11	988			
D4-14	11453	Concrete or Asphalt	1	0.89	10216.1			
	36623	Total			23196.2	0.62	1198.5	4949.7

Notes:

The remaining 3,751.2 cubic feet of storage available will go towards storing the 51,400.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID BRS4-1	Legend:	Required Entries / Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 0.84 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 1,199 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 680 ft^2

Proposed Surface Area — A= 3,174 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 4: BIORETENTION: BRS4-2

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} = 0.62 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)
BRS4-2	900	Ornamental Landscaping	0.1	0.11	99.4			
D4-3	24764	Concrete or Asphalt	1	0.89	22089.5			
	25664	Total			22188.9	0.62	1146.4	1395

Notes:

The remaining 248.6 cubic feet of storage available will go towards storing the 51,400.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID BRS4-2	Legend:	Required Entries / Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 0.589 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 1,146 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 650 ft^2

Proposed Surface Area — A= 900 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 4: BIORETENTION: BRS4-3

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} = 0.62 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)
BRS4-3	900	Ornamental Landscaping	0.1	0.11	99.4			
D4-4	24764	Concrete or Asphalt	1	0.89	22089.5			
	25664	Total			22188.9	0.62	1146.4	1395

Notes:

The remaining 248.6 cubic feet of storage available will go towards storing the 51,400.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID BRS4-3	Legend:	Required Entries / Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 0.589 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 1,146 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 650 ft^2

Proposed Surface Area — A= 900 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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: REC
Designed by: EVB
Company Project Number/Name: Canyon Springs Healthcare Center
Date: 7/12/2016
Case No:

BMP Identification

BMP NAME / ID: AREA 4: BIORETENTION: BRS4-4

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}= 0.62 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)
BRS4-4	1558	Ornamental Landscaping	0.1	0.11	172.1			
D4-5	24382	Concrete or Asphalt	1	0.89	21748.7			
D4-6	5830	Ornamental Landscaping	0.1	0.11	644			
	31770	Total			22564.8	0.62	1165.8	2415

Notes:

The remaining 1,249.2 cubic feet of storage available will go towards storing the 51,400.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID BRS4-4	Legend:	Required Entries / Calculated Cells

Company Name: REC — Date: 7/12/2016

Designed by: EVB — County/City Case No.:

Design Volume

Enter the area tributary to this feature — A_T = 0.729 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 1,166 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 661 ft^2

Proposed Surface Area — A= 1,558 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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: REC
Designed by: EVB
Company Project Number/Name: Canyon Springs Healthcare Center
Date: 7/12/2016
Case No:

BMP Identification

BMP NAME / ID: AREA 4: BIORETENTION: BRS4-6

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} = 0.62 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)
BRS4-6	2818	Ornamental Landscaping	0.1	0.11	311.3			
D4-9	65043	Roofs	1	0.89	58018.4			
D4-10	16396	Concrete or Asphalt	1	0.89	14625.2			
	84257	Total			72954.9	0.62	3769.3	4368

Notes:

The remaining 598.7 cubic feet of storage available will go towards storing the 51,400.8 cubic feet of HCOC volume.

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: REC
Designed by: EVB
Company Project Number/Name: Canyon Springs Healthcare Center
Date: 7/12/2016
Case No:

BMP Identification

BMP NAME / ID: AREA 4: BIORETENTION: BRS4-7

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} = 0.62 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)
BRS4-7	540	Ornamental Landscaping	0.1	0.11	59.6			
D4-11	10328	Concrete or Asphalt	1	0.89	9212.6			
	10868	Total			9272.2	0.62	479.1	837

Notes:

The remaining 357.9 cubic feet of storage available will go towards storing the 51,400.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID: BRS4-7	Legend:	Required Entries / Calculated Cells
Company Name: REC		Date: 7/12/2016	
Designed by: EVB		County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T = 0.249	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP} = 479	ft^3

Type of Bioretention Facility Design

- (●) Side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S = 3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T = 20.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E = 1.77	ft
Minimum Surface Area, A_m $A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$	A_M = 272	ft^2
Proposed Surface Area	A = 540	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z = 4	:1
Diameter of Underdrain	6	inches
Longitudinal Slope of Site (3% maximum)	0	%
6" Check Dam Spacing	0	feet
Describe Vegetation:		

Notes:

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: REC
Designed by: EVB
Company Project Number/Name: Canyon Springs Healthcare Center
Date: 7/12/2016
Case No:

BMP Identification

BMP NAME / ID: AREA 4: BIORETENTION: BRS4-8

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} = 0.62 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)
BRS4-8	540	Ornamental Landscaping	0.1	0.11	59.6			
D4-17	6383	Concrete or Asphalt	1	0.89	5693.6			
	6923	Total			5753.2	0.62	297.2	837

Notes:

The remaining 539.8 cubic feet of storage available will go towards storing the 51,400.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID BRS4-8	Legend:	Required Entries
			Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T= 0.158	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}= 297	ft^3

Type of Bioretention Facility Design

- (●) Side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S = 3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T = 20.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E = 1.77	ft
Minimum Surface Area, A_m $A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$	A_M = 169	ft^2
Proposed Surface Area	A= 540	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z = 4	:1
Diameter of Underdrain	6	inches
Longitudinal Slope of Site (3% maximum)	0	%
6" Check Dam Spacing	0	feet
Describe Vegetation:		

Notes:

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 4: BIORETENTION: BRS4-9

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} = 0.62 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)
BRS4-9	412	Ornamental Landscaping	0.1	0.11	45.5			
D4-13	6697	Concrete or Asphalt	1	0.89	5973.7			
	7109	Total			6019.2	0.62	311	639

Notes:

The remaining 328 cubic feet of storage available will go towards storing the 51,400.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID BRS4-9	Legend:	Required Entries / Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 0.16 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 311 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 177 ft^2

Proposed Surface Area — A = 412 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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 REC | Date 7/12/2016
Designed by EVB | Case No
Company Project Number/Name Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID AREA 4: BIORETENTION: BRS4-10

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}= 0.62 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)
BRS4-10	706	Ornamental Landscaping	0.1	0.11	78			
D4-18	6827	Concrete or Asphalt	1	0.89	6089.7			
D4-15	9657	Concrete or Asphalt	1	0.89	8614			
	17190	Total			14781.7	0.62	763.7	1094

Notes:

The remaining 330.3 cubic feet of storage available will go towards storing the 51,400.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID BRS4-10	Legend:	Required Entries / Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 0.326 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 764 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 433 ft^2

Proposed Surface Area — A= 706 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 4: BIORETENTION: BRS4-11

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} = 0.62 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)
BRS4-11	3954	Ornamental Landscaping	0.1	0.11	436.8			
D4-8	22700	Roofs	1	0.89	20248.4			
	26654	Total			20685.2	0.62	1068.7	7117.2

Notes:

The remaining 6,048.5 cubic feet of storage available will go towards storing the 51,400.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID BRS4-11	Legend:	Required Entries / Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 0.612 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 1,069 ft^3

Type of Bioretention Facility Design

- (●) Side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 606 ft^2

Proposed Surface Area — A= 3,954 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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: REC Date: 7/12/2016

Designed by: EVB Case No:

Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 4: BIORETENTION: BRS4-12

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} = 0.62 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)
BRS4-12	632	Ornamental Landscaping	0.1	0.11	69.8			
D4-16	8155	Concrete or Asphalt	1	0.89	7274.3			
	8787	Total			7344.1	0.62	379.4	980

Notes:

The remaining 600.6 cubic feet of storage available will go towards storing the 51,400.8 cubic feet of HCOC volume.

Bioretention Facility - Design Procedure	BMP ID BRS4-12	Legend:	Required Entries / Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 0.2 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 379 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 215 ft^2

Proposed Surface Area — A = 632 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 5: BIORETENTION: BRS5-1

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} = 0.62 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)
BRS5-1	3480	Ornamental Landscaping	0.1	0.11	384.4			
DS-1	19843	Concrete or Asphalt	1	0.89	17700			
DS-2	51185	Concrete or Asphalt	1	0.89	45657			
	74508	Total			63741.4	0.62	3293.3	5394

Notes:

Bioretention Facility - Design Procedure	BMP ID: BRS5-1	Legend:	Required Entries / Calculated Cells
Company Name: REC		Date: 7/12/2016	
Designed by: EVB		County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 1.71 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 3,293 ft³

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 1,866 ft²

Proposed Surface Area — A= 3,480 ft²

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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: REC
Designed by: EVB
Company Project Number/Name: Canyon Springs Healthcare Center
Date: 7/12/2016
Case No:

BMP Identification

BMP NAME / ID: AREA 5: BIORETENTION: BRS5-2

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} = 0.62 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)
BRS5-2	1533	Ornamental Landscaping	0.1	0.11	169.3			
D5-5	49229	Concrete or Asphalt	1	0.89	43912.3			
D5-6	5878	Ornamental Landscaping	0.1	0.11	649.3			
	56640	Total			44730.9	0.62	2311.1	2376

Notes:

Bioretention Facility - Design Procedure	BMP ID: BRS5-2	Legend:	Required Entries / Calculated Cells
Company Name: REC		Date: 7/12/2016	
Designed by: EVB		County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 1.3 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 2,311 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 1,310 ft^2

Proposed Surface Area — A = 1,533 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

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: REC
Designed by: EVB
Company Project Number/Name: Canyon Springs Healthcare Center
Date: 7/12/2016
Case No:

BMP Identification

BMP NAME / ID: AREA 5: BIORETENTION: BRS5-3

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} = 0.62 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)
BRS5-3	1400	Ornamental Landscaping	0.1	0.11	154.6			
D5-3	23550	Roofs	1	0.89	21006.6			
D5-4	21605	Concrete or Asphalt	1	0.89	19271.7			
	46555	Total			40432.9	0.62	2089	2170

Notes:

Bioretention Facility - Design Procedure	BMP ID BRS5-3	Legend:	Required Entries / Calculated Cells
Company Name: REC			Date: 7/12/2016
Designed by: EVB			County/City Case No.:

Design Volume

Enter the area tributary to this feature	A_T =	0.107	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP} =	2,089	ft^3

Type of Bioretention Facility Design

- (●) Side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	20.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.77	ft
Minimum Surface Area, A_m $A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$	A_M =	1,184	ft^2
Proposed Surface Area	A=	1,400	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		0	%
6" Check Dam Spacing		0	feet
Describe Vegetation:			

Notes:

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: REC
Designed by: EVB
Company Project Number/Name: Canyon Springs Healthcare Center
Date: 7/12/2016
Case No:

BMP Identification

BMP NAME / ID: AREA 6: PERMEABLE PAVERS: PP6-1

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} = 0.62 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)
PP6-1	5313	Permeable Paving Blocks w/ Sand Filled Gap	0.25	0.20	1052.8			
D6-1	21894	Concrete or Asphalt	1	0.89	19529.4			
D6-2	20160	Roofs	1	0.89	17982.7			
D6-3	9609	Ornamental Landscaping	0.1	0.11	1061.4			
D6-4	6022	Ornamental Landscaping	0.1	0.11	665.2			
	62998	Total			40291.5	0.62	2081.7	2125.2

Notes:

Permeable Pavement - Design Procedure	BMP ID PP6-1	Legend:	Required Entries / Calculated Cells
Company Name: REC			Date: 4/28/2016
Designed by: EVB			County/City Case No.:

Design Volume

Enter the area tributary to this feature — A_T = 1.44 acres

Enter V_{BMP} determines from Section 2.1 of this Handbook — V_{BMP} = 2,082 ft³

Permeable Pavement Surface Area

Reservoir Layer Depth, b_{TH} — b_{TH} = 12 inches

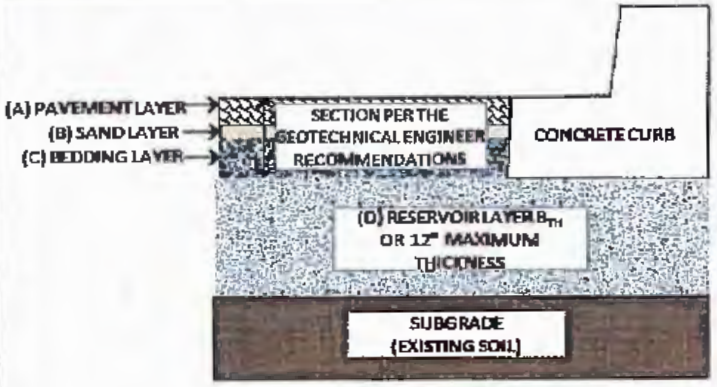
Minimum Surface Area Required, A_S

$$A_{S\,(ft)} = \frac{V_{BMP}\,(ft^3)}{(0.4 \times b_{TH}\,(in)) / 12(in/ft)}$$

A_S = 5,204 ft²

Proposed Surface Area = 5,313 ft²

Permeable Pavement Cross Section



Per the Geotechnical Engineer's Recommendations	(A)		in
	(B)		in
	(C)		in
Reservoir Layer	(D)	12	in
Total Permeable Pavemeut Section			in
Slope of Permeable Pavement			%

Sediment Control Provided? (Use pulldown)

Geotechnical report attached? (Use pulldown)

Describe Surrounding Vegetatinn:

Notes:

If the permeable pavement has been designed correctly, there should be no error messages on the spreadsheet.

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 6: PERMEABLE PAVERS: PP6-2

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}= 0.62 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)
PP6-2	9610	Permeable Paving Blocks w/ Sand Filled Gap	0.25	0.20	1904.3			
D6-8	64944	Concrete or Asphalt	1	0.89	57930			
D6-9	2964	Ornamental Landscaping	0.1	0.11	327.4			
D6-10	4364	Ornamental Landscaping	0.1	0.11	482			
D6-11	7344	Ornamental Landscaping	0.1	0.11	811.2			
	89226	Total			61454.9	0.62	3175.2	3844

Notes:

Permeable Pavement - Design Procedure	BMP ID	Legend:	Required Entries
	PPC-3		Calculated Cells

Company Name: REC — Date: 7/12/2016

Designed by: EVB — County/City Case No.:

Design Volume

Enter the area tributary to this feature — A_T = 2.04 acres

Enter V_{BMP} determines from Section 2.1 of this Handbook — V_{BMP} = 3,175 ft³

Permeable Pavement Surface Area

Reservoir Layer Depth, b_{TH} — b_{TH} = 12 inches

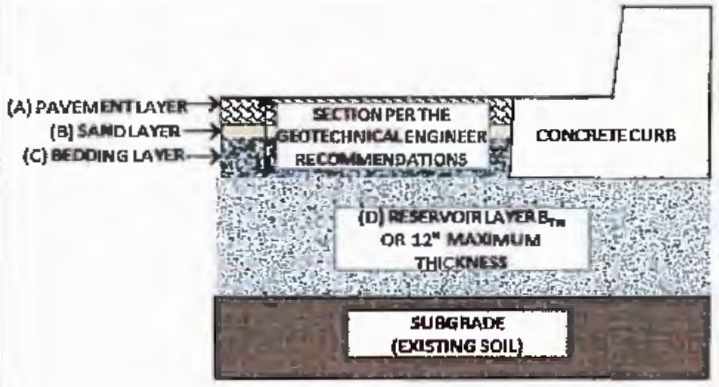
Minimum Surface Area Required, A_S

$$A_{S\,(ft)} = \frac{V_{BMP}\,(ft^3)}{(0.4 \times b_{TH}\,(in)) / 12(in/ft)}$$

A_S = 7,938 ft²

Proposed Surface Area = 9,610 ft²

Permeable Pavement Cross Section



Per the Geotechnical	(A)		in
Engineer's	(B)		in
Recommendations	(C)		in
Reservoir Layer	(D)	12	in
Total Permeable Pavement Section			in
Slope of Permeable Pavement			%

Sediment Control Provided? (Use pulldown)

Geotechnical report attached? (Use pulldown)

Describe Surrounding Vegetation:

Notes:

If the permeable pavement has been designed correctly, there should be no error messages on the spreadsheet.

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: REC
Date: 7/12/2016
Designed by: EVB
Case No:
Company Project Number/Name: Canyon Springs Healthcare Center

BMP Identification

BMP NAME / ID: AREA 6: BIORETENTION: BRS6-1

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} = 0.62 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)
BRS6-1	585	Ornamental Landscaping	0.1	0.11	64.6			
D6-5	3606	Roofs	1	0.89	3216.6			
D6-6	21643	Ornamental Landscaping	0.1	0.11	2390.6			
D6-7	11645	Concrete or Asphalt	1	0.89	10387.3			
	37479	Total			16059.1	0.62	829.7	906.75

Notes:

Bioretention section: 0.25" ponding; 3' soil; 1' gravel

Bioretention Facility - Design Procedure	BMP ID BRS6-1	Legend:	Required Entries / Calculated Cells
Company Name:	REC	Date:	7/12/2016
Designed by:	EVB	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 0.86 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 830 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 20.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 471 ft^2

Proposed Surface Area — A = 585 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

R 07 W | R 06 W | R 05 W | R 04 W | R 03 W | R 02 W | R 01 W | R 01 E | R 02 E | R 03 E | R 04 E | R 05 E

T 01 S
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S

SITE

0.85 MiraLoma
0.61 RiversideNorth
0.68 PigeonPass
0.54 RiversideSouth
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.50 LakeMathews
0.68 PerrisReservoir
0.70 SanJacintoNWS
0.87 VistaGrandeGS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.70 ElsinoreNWS
1.11 ElGarisoStation
0.90 HurkeyCreek
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley

Santa Ana River Watershed
Santa Margarita Watershed

N

Rain Gage Locations

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Isohyetal Map for the 85th Percentile 24 hour Storm Event

July 2011

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

LEGEND

WATERSHED

WATERSHED DRAINS TO EXIST. BASIN HCOC EXEMPT

DRAINAGE PATH

SCALE: 1" = 150'

150 0 150 300

CANYON SPRINGS HEALTHCARE CENTER

HYDROMODIFICATION EXHIBIT

RICK ENGINEERING COMPANY
1770 IOWA AVENUE SUITE 100
RIVERSIDE, CA 92507
951 782.0777
FAX 951 782.0723
rickeng.com
Riverside San Diego Orange San Luis Obispo Bakersfield Sacramento Phoenix Tucson

G:\17067\WaterResources\WaterQuality\17067wqmp02.dgn

PLOT DATE: 03-JUN-2016 JN 17067

WinTR-20 Printed Page File Beginning of Input Data List
TR20.inp

WinTR-20: Version 1.10 0 0 0.05
Canyon Springs HCC
ARea A

SUB-AREA:
Area A Outlet .0225 70. (22)

STREAM REACH:

STORM ANALYSIS:
2-Yr 1.6 Type II 2

STRUCTURE RATING:

GLOBAL OUTPUT:
2 0.05 YYYYN YYYYNN

(0.109 (in)/12)x14.4(ac)
0.13 ac-ft

WinTR-20 Printed Page File End of Input Data List

Canyon Springs HCC
ARea A

Name of printed page file:
TR20.out

STORM 2-Yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Area A	0.023		(0.109)		12.11	0.75	33.49

Line Start Time (hr)	Flow Values @ time increment of 0.014 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
11.960	0.07	0.12	0.18	0.25	0.34	0.43	0.52
12.057	0.60	0.67	0.72	0.75	0.75	0.75	0.73
12.154	0.70	0.67	0.63	0.60	0.57	0.54	0.52
12.252	0.51	0.49	0.48	0.47	0.46	0.45	0.44
12.349	0.43	0.42	0.42	0.41	0.40	0.40	0.39
12.446	0.38	0.38	0.37	0.36	0.36	0.35	0.35
12.543	0.34	0.33	0.33	0.32	0.31	0.31	0.30
12.641	0.30	0.29	0.29	0.29	0.28	0.28	0.28
12.738	0.27	0.27	0.27	0.27	0.27	0.26	0.26
12.835	0.26	0.26	0.26	0.26	0.25	0.25	0.25
12.933	0.25	0.25	0.25	0.24	0.24	0.24	0.24
13.030	0.24	0.24	0.24	0.23	0.23	0.23	0.23
13.127	0.23	0.23	0.22	0.22	0.22	0.22	0.22
13.224	0.22	0.22	0.22	0.22	0.22	0.21	0.21
13.322	0.21	0.21	0.21	0.21	0.21	0.21	0.21
13.419	0.21	0.20	0.20	0.20	0.20	0.20	0.20
13.516	0.20	0.20	0.20	0.20	0.19	0.19	0.19
13.613	0.19	0.19	0.19	0.19	0.19	0.19	0.19
13.711	0.19	0.18	0.18	0.18	0.18	0.18	0.18
13.808	0.18	0.18	0.18	0.18	0.18	0.18	0.17

13.905	0.17	0.17	0.17	0.17	0.17	0.17	0.17
14.002	0.17	0.17	0.17	0.17	0.16	0.16	0.16
14.100	0.16	0.16	0.16	0.16	0.16	0.16	0.16
14.197	0.16	0.16	0.16	0.16	0.16	0.16	0.16
14.294	0.16	0.16	0.16	0.16	0.15	0.15	0.15
14.391	0.15	0.15	0.15	0.15	0.15	0.15	0.15
14.489	0.15	0.15	0.15	0.15	0.15	0.15	0.15
14.586	0.15	0.15	0.15	0.15	0.15	0.15	0.15
14.683	0.15	0.15	0.15	0.15	0.15	0.15	0.15
14.781	0.15	0.15	0.15	0.15	0.15	0.15	0.15
14.878	0.15	0.15	0.15	0.15	0.14	0.14	0.14
14.975	0.14	0.14	0.14	0.14	0.14	0.14	0.14
15.072	0.14	0.14	0.14	0.14	0.14	0.14	0.14
15.170	0.14	0.14	0.14	0.14	0.14	0.14	0.14
15.267	0.14	0.14	0.14	0.14	0.14	0.14	0.14
15.364	0.14	0.14	0.14	0.13	0.13	0.13	0.13
15.461	0.13	0.13	0.13	0.13	0.13	0.13	0.13
15.559	0.13	0.13	0.13	0.13	0.13	0.13	0.13
15.656	0.13	0.13	0.13	0.13	0.13	0.13	0.13
15.753	0.13	0.13	0.13	0.13	0.12	0.12	0.12

Canyon Springs HCC
ARea A

Line Start Time (hr)	Flow Values @ time increment of 0.014 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
15.850	0.12	0.12	0.12	0.12	0.12	0.12	0.12
15.948	0.12	0.12	0.12	0.12	0.12	0.12	0.12
16.045	0.12	0.12	0.12	0.12	0.12	0.12	0.12
16.142	0.12	0.12	0.12	0.12	0.12	0.12	0.11
16.239	0.11	0.11	0.11	0.11	0.11	0.11	0.11
16.337	0.11	0.11	0.11	0.11	0.11	0.11	0.11
16.434	0.11	0.11	0.11	0.11	0.11	0.11	0.11
16.531	0.11	0.11	0.11	0.11	0.11	0.11	0.11
16.629	0.11	0.11	0.11	0.11	0.11	0.11	0.11
16.726	0.11	0.11	0.11	0.11	0.11	0.11	0.11
16.823	0.11	0.11	0.11	0.11	0.11	0.11	0.11
16.920	0.11	0.11	0.11	0.11	0.11	0.11	0.11
17.018	0.11	0.11	0.11	0.11	0.11	0.11	0.11
17.115	0.11	0.11	0.11	0.11	0.11	0.11	0.11
17.212	0.11	0.11	0.11	0.11	0.11	0.11	0.11
17.309	0.11	0.11	0.11	0.11	0.11	0.11	0.11
17.407	0.11	0.11	0.11	0.11	0.11	0.11	0.10
17.504	0.10	0.10	0.10	0.10	0.10	0.10	0.10
17.601	0.10	0.10	0.10	0.10	0.10	0.10	0.10
17.698	0.10	0.10	0.10	0.10	0.10	0.10	0.10
17.796	0.10	0.10	0.10	0.10	0.10	0.10	0.10
17.893	0.10	0.10	0.10	0.10	0.10	0.10	0.10
17.990	0.10	0.10	0.10	0.10	0.10	0.10	0.10
18.087	0.10	0.10	0.10	0.10	0.10	0.10	0.10
18.185	0.10	0.10	0.10	0.10	0.10	0.10	0.10
18.282	0.10	0.10	0.10	0.10	0.10	0.10	0.10
18.379	0.10	0.10	0.10	0.10	0.10	0.10	0.10
18.477	0.10	0.10	0.10	0.10	0.09	0.09	0.09
18.574	0.09	0.09	0.09	0.09	0.09	0.09	0.09
18.671	0.09	0.09	0.09	0.09	0.09	0.09	0.09
18.768	0.09	0.09	0.09	0.09	0.09	0.09	0.09
18.866	0.09	0.09	0.09	0.09	0.09	0.09	0.09
18.963	0.09	0.09	0.09	0.09	0.09	0.09	0.09

19.060	0.09	0.09	0.09	0.09	0.09	0.09	0.09
19.157	0.09	0.09	0.09	0.09	0.09	0.09	0.09
19.255	0.09	0.09	0.09	0.09	0.09	0.09	0.09
19.352	0.09	0.09	0.09	0.09	0.09	0.08	0.08
19.449	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.546	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.644	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.741	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.838	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.935	0.08	0.08	0.08	0.08	0.08	0.08	0.08
20.033	0.08	0.08	0.08	0.08	0.08	0.08	0.08
20.130	0.08	0.08	0.08	0.08	0.08	0.08	0.08
20.227	0.08	0.08	0.08	0.08	0.08	0.08	0.08
20.325	0.08	0.08	0.08	0.08	0.08	0.08	0.08
20.422	0.08	0.08	0.08	0.08	0.08	0.08	0.08
20.519	0.08	0.08	0.08	0.08	0.08	0.08	0.08
20.616	0.08	0.08	0.08	0.08	0.08	0.08	0.08
20.714	0.08	0.08	0.08	0.08	0.08	0.08	0.08

Line Start Time (hr)	Flow Values @ time increment of 0.014 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
20.811	0.08	0.08	0.08	0.08	0.07	0.07	0.07
20.908	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.005	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.103	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.200	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.297	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.394	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.492	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.589	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.686	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.783	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.881	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.978	0.07	0.07	0.07	0.07	0.07	0.07	0.07
22.075	0.07	0.07	0.07	0.07	0.07	0.07	0.07
22.173	0.07	0.07	0.07	0.07	0.07	0.07	0.07
22.270	0.07	0.07	0.07	0.07	0.07	0.07	0.07
22.367	0.07	0.07	0.07	0.07	0.07	0.07	0.07
22.464	0.07	0.07	0.07	0.07	0.07	0.07	0.07
22.562	0.07	0.07	0.07	0.07	0.07	0.07	0.07
22.659	0.07	0.07	0.07	0.07	0.07	0.07	0.07
22.756	0.07	0.07	0.07	0.07	0.07	0.07	0.07
22.853	0.07	0.07	0.07	0.07	0.07	0.07	0.07
22.951	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.048	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.145	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.242	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.340	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.437	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.534	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.631	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.729	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.826	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.923	0.07	0.07	0.07	0.07	0.07	0.07	0.07
24.021	0.07	0.07	0.07	0.07	0.06	0.06	0.05

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
OUTLET	0.023		0.109		12.11	0.75	33.49

Line Start Time (hr)	Flow Values @ time increment of 0.014 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
11.960	0.07	0.12	0.18	0.25	0.34	0.43	0.52
12.057	0.60	0.67	0.72	0.75	0.75	0.75	0.73
12.154	0.70	0.67	0.63	0.60	0.57	0.54	0.52
12.252	0.51	0.49	0.48	0.47	0.46	0.45	0.44
12.349	0.43	0.42	0.42	0.41	0.40	0.40	0.39
12.446	0.38	0.38	0.37	0.36	0.36	0.35	0.35

Line Start Time (hr)	Flow Values @ time increment of 0.014 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
12.543	0.34	0.33	0.33	0.32	0.31	0.31	0.30
12.641	0.30	0.29	0.29	0.29	0.28	0.28	0.28
12.738	0.27	0.27	0.27	0.27	0.27	0.26	0.26
12.835	0.26	0.26	0.26	0.26	0.25	0.25	0.25
12.933	0.25	0.25	0.25	0.24	0.24	0.24	0.24
13.030	0.24	0.24	0.24	0.23	0.23	0.23	0.23
13.127	0.23	0.23	0.22	0.22	0.22	0.22	0.22
13.224	0.22	0.22	0.22	0.22	0.22	0.21	0.21
13.322	0.21	0.21	0.21	0.21	0.21	0.21	0.21
13.419	0.21	0.20	0.20	0.20	0.20	0.20	0.20
13.516	0.20	0.20	0.20	0.20	0.19	0.19	0.19
13.613	0.19	0.19	0.19	0.19	0.19	0.19	0.19
13.711	0.19	0.18	0.18	0.18	0.18	0.18	0.18
13.808	0.18	0.18	0.18	0.18	0.18	0.18	0.17
13.905	0.17	0.17	0.17	0.17	0.17	0.17	0.17
14.002	0.17	0.17	0.17	0.17	0.16	0.16	0.16
14.100	0.16	0.16	0.16	0.16	0.16	0.16	0.16
14.197	0.16	0.16	0.16	0.16	0.16	0.16	0.16
14.294	0.16	0.16	0.16	0.16	0.15	0.15	0.15
14.391	0.15	0.15	0.15	0.15	0.15	0.15	0.15
14.489	0.15	0.15	0.15	0.15	0.15	0.15	0.15
14.586	0.15	0.15	0.15	0.15	0.15	0.15	0.15
14.683	0.15	0.15	0.15	0.15	0.15	0.15	0.15
14.781	0.15	0.15	0.15	0.15	0.15	0.15	0.15
14.878	0.15	0.15	0.15	0.15	0.14	0.14	0.14
14.975	0.14	0.14	0.14	0.14	0.14	0.14	0.14
15.072	0.14	0.14	0.14	0.14	0.14	0.14	0.14
15.170	0.14	0.14	0.14	0.14	0.14	0.14	0.14
15.267	0.14	0.14	0.14	0.14	0.14	0.14	0.14
15.364	0.14	0.14	0.14	0.13	0.13	0.13	0.13
15.461	0.13	0.13	0.13	0.13	0.13	0.13	0.13
15.559	0.13	0.13	0.13	0.13	0.13	0.13	0.13
15.656	0.13	0.13	0.13	0.13	0.13	0.13	0.13
15.753	0.13	0.13	0.13	0.13	0.12	0.12	0.12
15.850	0.12	0.12	0.12	0.12	0.12	0.12	0.12
15.948	0.12	0.12	0.12	0.12	0.12	0.12	0.12
16.045	0.12	0.12	0.12	0.12	0.12	0.12	0.12

16.142	0.12	0.12	0.12	0.12	0.12	0.12	0.11
16.239	0.11	0.11	0.11	0.11	0.11	0.11	0.11
16.337	0.11	0.11	0.11	0.11	0.11	0.11	0.11
16.434	0.11	0.11	0.11	0.11	0.11	0.11	0.11
16.531	0.11	0.11	0.11	0.11	0.11	0.11	0.11
16.629	0.11	0.11	0.11	0.11	0.11	0.11	0.11
16.726	0.11	0.11	0.11	0.11	0.11	0.11	0.11
16.823	0.11	0.11	0.11	0.11	0.11	0.11	0.11
16.920	0.11	0.11	0.11	0.11	0.11	0.11	0.11
17.018	0.11	0.11	0.11	0.11	0.11	0.11	0.11
17.115	0.11	0.11	0.11	0.11	0.11	0.11	0.11
17.212	0.11	0.11	0.11	0.11	0.11	0.11	0.11
17.309	0.11	0.11	0.11	0.11	0.11	0.11	0.11
17.407	0.11	0.11	0.11	0.11	0.11	0.11	0.10

Line Start Time (hr)	Flow Values @ time increment of 0.014 hr (cfs)						
17.504	0.10	0.10	0.10	0.10	0.10	0.10	0.10
17.601	0.10	0.10	0.10	0.10	0.10	0.10	0.10
17.698	0.10	0.10	0.10	0.10	0.10	0.10	0.10
17.796	0.10	0.10	0.10	0.10	0.10	0.10	0.10
17.893	0.10	0.10	0.10	0.10	0.10	0.10	0.10
17.990	0.10	0.10	0.10	0.10	0.10	0.10	0.10
18.087	0.10	0.10	0.10	0.10	0.10	0.10	0.10
18.185	0.10	0.10	0.10	0.10	0.10	0.10	0.10
18.282	0.10	0.10	0.10	0.10	0.10	0.10	0.10
18.379	0.10	0.10	0.10	0.10	0.10	0.10	0.10
18.477	0.10	0.10	0.10	0.10	0.09	0.09	0.09
18.574	0.09	0.09	0.09	0.09	0.09	0.09	0.09
18.671	0.09	0.09	0.09	0.09	0.09	0.09	0.09
18.768	0.09	0.09	0.09	0.09	0.09	0.09	0.09
18.866	0.09	0.09	0.09	0.09	0.09	0.09	0.09
18.963	0.09	0.09	0.09	0.09	0.09	0.09	0.09
19.060	0.09	0.09	0.09	0.09	0.09	0.09	0.09
19.157	0.09	0.09	0.09	0.09	0.09	0.09	0.09
19.255	0.09	0.09	0.09	0.09	0.09	0.09	0.09
19.352	0.09	0.09	0.09	0.09	0.09	0.08	0.08
19.449	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.546	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.644	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.741	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.838	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.935	0.08	0.08	0.08	0.08	0.08	0.08	0.08
20.033	0.08	0.08	0.08	0.08	0.08	0.08	0.08
20.130	0.08	0.08	0.08	0.08	0.08	0.08	0.08
20.227	0.08	0.08	0.08	0.08	0.08	0.08	0.08
20.325	0.08	0.08	0.08	0.08	0.08	0.08	0.08
20.422	0.08	0.08	0.08	0.08	0.08	0.08	0.08
20.519	0.08	0.08	0.08	0.08	0.08	0.08	0.08
20.616	0.08	0.08	0.08	0.08	0.08	0.08	0.08
20.714	0.08	0.08	0.08	0.08	0.08	0.08	0.08
20.811	0.08	0.08	0.08	0.08	0.07	0.07	0.07
20.908	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.005	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.103	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.200	0.07	0.07	0.07	0.07	0.07	0.07	0.07

21.297	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.394	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.492	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.589	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.686	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.783	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.881	0.07	0.07	0.07	0.07	0.07	0.07	0.07
21.978	0.07	0.07	0.07	0.07	0.07	0.07	0.07
22.075	0.07	0.07	0.07	0.07	0.07	0.07	0.07
22.173	0.07	0.07	0.07	0.07	0.07	0.07	0.07
22.270	0.07	0.07	0.07	0.07	0.07	0.07	0.07
22.367	0.07	0.07	0.07	0.07	0.07	0.07	0.07

Canyon Springs HCC
ARea A

Line Start Time (hr)	Flow Values @ time increment of 0.014 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
22.464	0.07	0.07	0.07	0.07	0.07	0.07	0.07
22.562	0.07	0.07	0.07	0.07	0.07	0.07	0.07
22.659	0.07	0.07	0.07	0.07	0.07	0.07	0.07
22.756	0.07	0.07	0.07	0.07	0.07	0.07	0.07
22.853	0.07	0.07	0.07	0.07	0.07	0.07	0.07
22.951	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.048	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.145	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.242	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.340	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.437	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.534	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.631	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.729	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.826	0.07	0.07	0.07	0.07	0.07	0.07	0.07
23.923	0.07	0.07	0.07	0.07	0.07	0.07	0.07
24.021	0.07	0.07	0.07	0.07	0.06	0.06	0.05

Canyon Springs HCC
ARea A

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 2-Yr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)
Area A	0.023		0.75				
OUTLET	0.023		0.75				

WinTR-20 Printed Page File Beginning of Input Data List
TR20.inp

WinTR-20: Version 1.10 0 0 0.05
Canyon Springs HCC
ARea A post project

SUB-AREA:
Area A Outlet .0225 91. .202

STREAM REACH:

STORM ANALYSIS:
2-Yr 1.6 Type II 2

STRUCTURE RATING:

GLOBAL OUTPUT:
2 0.05 YYYYN YYYYNN

(0.821 (in)/12)x14.4(ac)
0.985 ac-ft

WinTR-20 Printed Page File End of Input Data List

Canyon Springs HCC
ARea A post project

Name of printed page file:
TR20.out

STORM 2-Yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Area A	0.023		0.821		12.01	15.71	698.33

Line Start Time (hr)	Flow Values @ time increment of 0.013 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
9.128	0.05	0.05	0.05	0.05	0.05	0.06	0.06
9.217	0.06	0.06	0.06	0.06	0.06	0.06	0.06
9.307	0.06	0.06	0.06	0.07	0.07	0.07	0.07
9.396	0.07	0.07	0.07	0.07	0.07	0.07	0.07
9.485	0.08	0.08	0.08	0.08	0.08	0.08	0.08
9.575	0.08	0.08	0.08	0.08	0.09	0.09	0.09
9.664	0.09	0.09	0.09	0.09	0.09	0.09	0.10
9.753	0.10	0.10	0.10	0.10	0.10	0.11	0.11
9.843	0.11	0.11	0.11	0.11	0.11	0.12	0.12
9.932	0.12	0.12	0.12	0.12	0.13	0.13	0.13
10.021	0.13	0.13	0.14	0.14	0.14	0.14	0.14
10.111	0.14	0.15	0.15	0.15	0.15	0.16	0.16
10.200	0.16	0.16	0.16	0.17	0.17	0.17	0.17
10.289	0.18	0.18	0.18	0.18	0.19	0.19	0.19
10.378	0.20	0.20	0.20	0.20	0.21	0.21	0.21
10.468	0.22	0.22	0.22	0.22	0.23	0.23	0.23
10.557	0.24	0.24	0.24	0.25	0.25	0.25	0.26
10.646	0.26	0.27	0.27	0.27	0.28	0.28	0.29
10.736	0.29	0.30	0.30	0.31	0.31	0.32	0.32
10.825	0.32	0.33	0.33	0.34	0.34	0.35	0.36

10.914	0.36	0.37	0.37	0.38	0.38	0.39	0.39
11.004	0.40	0.41	0.41	0.42	0.42	0.43	0.44
11.093	0.45	0.45	0.46	0.47	0.48	0.49	0.50
11.182	0.50	0.52	0.53	0.54	0.55	0.56	0.57
11.271	0.58	0.59	0.61	0.62	0.63	0.64	0.66
11.361	0.67	0.68	0.70	0.71	0.73	0.74	0.75
11.450	0.77	0.78	0.80	0.81	0.83	0.85	0.87
11.539	0.90	0.94	0.99	1.06	1.14	1.23	1.33
11.629	1.45	1.59	1.74	1.92	2.12	2.35	2.60
11.718	2.86	3.14	3.44	3.77	4.13	4.52	4.94
11.807	5.38	5.86	6.38	6.95	7.61	8.35	9.20
11.897	10.11	11.05	11.97	12.86	13.66	14.35	14.91
11.986	15.32	15.58	15.71	15.70	15.55	15.25	14.80
12.075	14.16	13.37	12.49	11.56	10.62	9.69	8.81
12.165	7.98	7.23	6.56	6.00	5.53	5.13	4.78
12.254	4.48	4.22	3.98	3.78	3.59	3.43	3.29
12.343	3.16	3.04	2.94	2.84	2.75	2.66	2.58
12.432	2.51	2.44	2.37	2.30	2.24	2.18	2.12
12.522	2.06	2.01	1.96	1.91	1.87	1.82	1.78
12.611	1.74	1.70	1.67	1.64	1.61	1.58	1.56

Canyon Springs HCC
ARea A post project

Line Start Time (hr)	Flow Values @ time increment of 0.013 hr (cfs)						
12.700	1.54	1.52	1.50	1.48	1.46	1.45	1.43
12.790	1.42	1.40	1.39	1.38	1.37	1.35	1.34
12.879	1.33	1.32	1.30	1.29	1.28	1.27	1.26
12.968	1.25	1.24	1.22	1.21	1.20	1.19	1.18
13.058	1.17	1.16	1.15	1.14	1.13	1.12	1.11
13.147	1.10	1.09	1.09	1.08	1.07	1.06	1.06
13.236	1.05	1.04	1.04	1.03	1.02	1.02	1.01
13.326	1.00	1.00	0.99	0.98	0.98	0.97	0.97
13.415	0.96	0.95	0.95	0.94	0.94	0.93	0.92
13.504	0.92	0.91	0.90	0.90	0.89	0.89	0.88
13.593	0.88	0.87	0.86	0.86	0.85	0.85	0.84
13.683	0.84	0.83	0.83	0.82	0.82	0.81	0.81
13.772	0.80	0.80	0.80	0.79	0.79	0.78	0.78
13.861	0.77	0.77	0.76	0.76	0.76	0.75	0.75
13.951	0.74	0.74	0.73	0.73	0.72	0.72	0.72
14.040	0.71	0.71	0.70	0.70	0.70	0.69	0.69
14.129	0.69	0.68	0.68	0.68	0.67	0.67	0.67
14.219	0.67	0.66	0.66	0.66	0.66	0.66	0.65
14.308	0.65	0.65	0.65	0.65	0.65	0.65	0.64
14.397	0.64	0.64	0.64	0.64	0.64	0.63	0.63
14.486	0.63	0.63	0.63	0.63	0.63	0.62	0.62
14.576	0.62	0.62	0.62	0.62	0.61	0.61	0.61
14.665	0.61	0.61	0.61	0.61	0.60	0.60	0.60
14.754	0.60	0.60	0.60	0.59	0.59	0.59	0.59
14.844	0.59	0.59	0.59	0.58	0.58	0.58	0.58
14.933	0.58	0.58	0.57	0.57	0.57	0.57	0.57
15.022	0.57	0.57	0.56	0.56	0.56	0.56	0.56
15.112	0.56	0.55	0.55	0.55	0.55	0.55	0.55
15.201	0.55	0.54	0.54	0.54	0.54	0.54	0.54
15.290	0.53	0.53	0.53	0.53	0.53	0.53	0.53
15.380	0.52	0.52	0.52	0.52	0.52	0.52	0.51
15.469	0.51	0.51	0.51	0.51	0.51	0.50	0.50
15.558	0.50	0.50	0.50	0.50	0.49	0.49	0.49

15.647	0.49	0.49	0.49	0.49	0.48	0.48	0.48
15.737	0.48	0.48	0.48	0.47	0.47	0.47	0.47
15.826	0.47	0.47	0.46	0.46	0.46	0.46	0.46
15.915	0.46	0.46	0.45	0.45	0.45	0.45	0.45
16.005	0.45	0.44	0.44	0.44	0.44	0.44	0.44
16.094	0.43	0.43	0.43	0.43	0.43	0.43	0.43
16.183	0.43	0.43	0.43	0.42	0.42	0.42	0.42
16.273	0.42	0.42	0.42	0.42	0.42	0.42	0.42
16.362	0.42	0.42	0.42	0.42	0.42	0.41	0.41
16.451	0.41	0.41	0.41	0.41	0.41	0.41	0.41
16.541	0.41	0.41	0.41	0.41	0.41	0.41	0.41
16.630	0.41	0.41	0.40	0.40	0.40	0.40	0.40
16.719	0.40	0.40	0.40	0.40	0.40	0.40	0.40
16.808	0.40	0.40	0.40	0.40	0.40	0.40	0.39
16.898	0.39	0.39	0.39	0.39	0.39	0.39	0.39
16.987	0.39	0.39	0.39	0.39	0.39	0.39	0.39
17.076	0.39	0.39	0.39	0.38	0.38	0.38	0.38
17.166	0.38	0.38	0.38	0.38	0.38	0.38	0.38

Line Start Time (hr)	Flow Values @ time increment of 0.013 hr (cfs)						
17.255	0.38	0.38	0.38	0.38	0.38	0.38	0.38
17.344	0.37	0.37	0.37	0.37	0.37	0.37	0.37
17.434	0.37	0.37	0.37	0.37	0.37	0.37	0.37
17.523	0.37	0.37	0.37	0.37	0.36	0.36	0.36
17.612	0.36	0.36	0.36	0.36	0.36	0.36	0.36
17.701	0.36	0.36	0.36	0.36	0.36	0.36	0.36
17.791	0.35	0.35	0.35	0.35	0.35	0.35	0.35
17.880	0.35	0.35	0.35	0.35	0.35	0.35	0.35
17.969	0.35	0.35	0.35	0.35	0.34	0.34	0.34
18.059	0.34	0.34	0.34	0.34	0.34	0.34	0.34
18.148	0.34	0.34	0.34	0.34	0.34	0.34	0.34
18.237	0.33	0.33	0.33	0.33	0.33	0.33	0.33
18.327	0.33	0.33	0.33	0.33	0.33	0.33	0.33
18.416	0.33	0.33	0.33	0.33	0.32	0.32	0.32
18.505	0.32	0.32	0.32	0.32	0.32	0.32	0.32
18.595	0.32	0.32	0.32	0.32	0.32	0.32	0.32
18.684	0.31	0.31	0.31	0.31	0.31	0.31	0.31
18.773	0.31	0.31	0.31	0.31	0.31	0.31	0.31
18.862	0.31	0.31	0.31	0.30	0.30	0.30	0.30
18.952	0.30	0.30	0.30	0.30	0.30	0.30	0.30
19.041	0.30	0.30	0.30	0.30	0.30	0.30	0.29
19.130	0.29	0.29	0.29	0.29	0.29	0.29	0.29
19.220	0.29	0.29	0.29	0.29	0.29	0.29	0.29
19.309	0.29	0.29	0.28	0.28	0.28	0.28	0.28
19.398	0.28	0.28	0.28	0.28	0.28	0.28	0.28
19.488	0.28	0.28	0.28	0.28	0.28	0.28	0.27
19.577	0.27	0.27	0.27	0.27	0.27	0.27	0.27
19.666	0.27	0.27	0.27	0.27	0.27	0.27	0.27
19.755	0.27	0.27	0.26	0.26	0.26	0.26	0.26
19.845	0.26	0.26	0.26	0.26	0.26	0.26	0.26
19.934	0.26	0.26	0.26	0.26	0.25	0.25	0.25
20.023	0.25	0.25	0.25	0.25	0.25	0.25	0.25
20.113	0.25	0.25	0.25	0.25	0.25	0.25	0.25
20.202	0.25	0.25	0.25	0.25	0.25	0.25	0.25
20.291	0.25	0.25	0.25	0.25	0.25	0.25	0.25

20.381	0.25	0.24	0.24	0.24	0.24	0.24	0.24
20.470	0.24	0.24	0.24	0.24	0.24	0.24	0.24
20.559	0.24	0.24	0.24	0.24	0.24	0.24	0.24
20.649	0.24	0.24	0.24	0.24	0.24	0.24	0.24
20.738	0.24	0.24	0.24	0.24	0.24	0.24	0.24
20.827	0.24	0.24	0.24	0.24	0.24	0.24	0.24
20.916	0.24	0.24	0.24	0.24	0.24	0.24	0.24
21.006	0.24	0.24	0.24	0.24	0.24	0.24	0.24
21.095	0.24	0.24	0.24	0.24	0.24	0.24	0.24
21.184	0.24	0.24	0.24	0.24	0.24	0.24	0.24
21.274	0.24	0.24	0.24	0.24	0.24	0.24	0.24
21.363	0.24	0.24	0.24	0.24	0.24	0.24	0.24
21.452	0.24	0.24	0.24	0.24	0.24	0.24	0.24
21.542	0.24	0.23	0.23	0.23	0.23	0.23	0.23
21.631	0.23	0.23	0.23	0.23	0.23	0.23	0.23
21.720	0.23	0.23	0.23	0.23	0.23	0.23	0.23

Canyon Springs HCC
ARea A post project

Line Start Time (hr)	Flow Values @ time increment of 0.013 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
21.810	0.23	0.23	0.23	0.23	0.23	0.23	0.23
21.899	0.23	0.23	0.23	0.23	0.23	0.23	0.23
21.988	0.23	0.23	0.23	0.23	0.23	0.23	0.23
22.077	0.23	0.23	0.23	0.23	0.23	0.23	0.23
22.167	0.23	0.23	0.23	0.23	0.23	0.23	0.23
22.256	0.23	0.23	0.23	0.23	0.23	0.23	0.23
22.345	0.23	0.23	0.23	0.23	0.23	0.23	0.23
22.435	0.23	0.23	0.23	0.23	0.23	0.23	0.23
22.524	0.23	0.23	0.23	0.23	0.23	0.23	0.23
22.613	0.23	0.23	0.23	0.23	0.23	0.22	0.22
22.703	0.22	0.22	0.22	0.22	0.22	0.22	0.22
22.792	0.22	0.22	0.22	0.22	0.22	0.22	0.22
22.881	0.22	0.22	0.22	0.22	0.22	0.22	0.22
22.970	0.22	0.22	0.22	0.22	0.22	0.22	0.22
23.060	0.22	0.22	0.22	0.22	0.22	0.22	0.22
23.149	0.22	0.22	0.22	0.22	0.22	0.22	0.22
23.238	0.22	0.22	0.22	0.22	0.22	0.22	0.22
23.328	0.22	0.22	0.22	0.22	0.22	0.22	0.22
23.417	0.22	0.22	0.22	0.22	0.22	0.22	0.22
23.506	0.22	0.22	0.22	0.22	0.22	0.22	0.22
23.596	0.22	0.22	0.22	0.22	0.22	0.22	0.22
23.685	0.22	0.22	0.22	0.22	0.22	0.22	0.22
23.774	0.22	0.22	0.22	0.21	0.21	0.21	0.21
23.864	0.21	0.21	0.21	0.21	0.21	0.21	0.21
23.953	0.21	0.21	0.21	0.21	0.21	0.21	0.21
24.042	0.21	0.20	0.19	0.18	0.17	0.15	0.14
24.131	0.12	0.10	0.09	0.08	0.06	0.05	

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
OUTLET	0.023		0.821		12.01	15.71	698.33

Line Start Time (hr)	Flow Values @ time increment of 0.013 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)

9.128	0.05	0.05	0.05	0.05	0.05	0.06	0.06
9.217	0.06	0.06	0.06	0.06	0.06	0.06	0.06
9.307	0.06	0.06	0.06	0.07	0.07	0.07	0.07
9.396	0.07	0.07	0.07	0.07	0.07	0.07	0.07
9.485	0.08	0.08	0.08	0.08	0.08	0.08	0.08
9.575	0.08	0.08	0.08	0.08	0.09	0.09	0.09
9.664	0.09	0.09	0.09	0.09	0.09	0.09	0.10
9.753	0.10	0.10	0.10	0.10	0.10	0.11	0.11
9.843	0.11	0.11	0.11	0.11	0.11	0.12	0.12
9.932	0.12	0.12	0.12	0.12	0.13	0.13	0.13
10.021	0.13	0.13	0.14	0.14	0.14	0.14	0.14
10.111	0.14	0.15	0.15	0.15	0.15	0.16	0.16
10.200	0.16	0.16	0.16	0.17	0.17	0.17	0.17

Line Start Time (hr)	Flow Values @ time increment of 0.013 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
10.289	0.18	0.18	0.18	0.18	0.19	0.19	0.19
10.378	0.20	0.20	0.20	0.20	0.21	0.21	0.21
10.468	0.22	0.22	0.22	0.22	0.23	0.23	0.23
10.557	0.24	0.24	0.24	0.25	0.25	0.25	0.26
10.646	0.26	0.27	0.27	0.27	0.28	0.28	0.29
10.736	0.29	0.30	0.30	0.31	0.31	0.32	0.32
10.825	0.32	0.33	0.33	0.34	0.34	0.35	0.36
10.914	0.36	0.37	0.37	0.38	0.38	0.39	0.39
11.004	0.40	0.41	0.41	0.42	0.42	0.43	0.44
11.093	0.45	0.45	0.46	0.47	0.48	0.49	0.50
11.182	0.50	0.52	0.53	0.54	0.55	0.56	0.57
11.271	0.58	0.59	0.61	0.62	0.63	0.64	0.66
11.361	0.67	0.68	0.70	0.71	0.73	0.74	0.75
11.450	0.77	0.78	0.80	0.81	0.83	0.85	0.87
11.539	0.90	0.94	0.99	1.06	1.14	1.23	1.33
11.629	1.45	1.59	1.74	1.92	2.12	2.35	2.60
11.718	2.86	3.14	3.44	3.77	4.13	4.52	4.94
11.807	5.38	5.86	6.38	6.95	7.61	8.35	9.20
11.897	10.11	11.05	11.97	12.86	13.66	14.35	14.91
11.986	15.32	15.58	15.71	15.70	15.55	15.25	14.80
12.075	14.16	13.37	12.49	11.56	10.62	9.69	8.81
12.165	7.98	7.23	6.56	6.00	5.53	5.13	4.78
12.254	4.48	4.22	3.98	3.78	3.59	3.43	3.29
12.343	3.16	3.04	2.94	2.84	2.75	2.66	2.58
12.432	2.51	2.44	2.37	2.30	2.24	2.18	2.12
12.522	2.06	2.01	1.96	1.91	1.87	1.82	1.78
12.611	1.74	1.70	1.67	1.64	1.61	1.58	1.56
12.700	1.54	1.52	1.50	1.48	1.46	1.45	1.43
12.790	1.42	1.40	1.39	1.38	1.37	1.35	1.34
12.879	1.33	1.32	1.30	1.29	1.28	1.27	1.26
12.968	1.25	1.24	1.22	1.21	1.20	1.19	1.18
13.058	1.17	1.16	1.15	1.14	1.13	1.12	1.11
13.147	1.10	1.09	1.09	1.08	1.07	1.06	1.06
13.236	1.05	1.04	1.04	1.03	1.02	1.02	1.01
13.326	1.00	1.00	0.99	0.98	0.98	0.97	0.97
13.415	0.96	0.95	0.95	0.94	0.94	0.93	0.92
13.504	0.92	0.91	0.90	0.90	0.89	0.89	0.88
13.593	0.88	0.87	0.86	0.86	0.85	0.85	0.84
13.683	0.84	0.83	0.83	0.82	0.82	0.81	0.81

13.772	0.80	0.80	0.80	0.79	0.79	0.78	0.78
13.861	0.77	0.77	0.76	0.76	0.76	0.75	0.75
13.951	0.74	0.74	0.73	0.73	0.72	0.72	0.72
14.040	0.71	0.71	0.70	0.70	0.70	0.69	0.69
14.129	0.69	0.68	0.68	0.68	0.67	0.67	0.67
14.219	0.67	0.66	0.66	0.66	0.66	0.66	0.65
14.308	0.65	0.65	0.65	0.65	0.65	0.65	0.64
14.397	0.64	0.64	0.64	0.64	0.64	0.63	0.63
14.486	0.63	0.63	0.63	0.63	0.63	0.62	0.62
14.576	0.62	0.62	0.62	0.62	0.61	0.61	0.61
14.665	0.61	0.61	0.61	0.61	0.60	0.60	0.60
14.754	0.60	0.60	0.60	0.59	0.59	0.59	0.59

Line Start Time (hr)	Flow Values @ time increment of 0.013 hr (cfs)						
14.844	0.59	0.59	0.59	0.58	0.58	0.58	0.58
14.933	0.58	0.58	0.57	0.57	0.57	0.57	0.57
15.022	0.57	0.57	0.56	0.56	0.56	0.56	0.56
15.112	0.56	0.55	0.55	0.55	0.55	0.55	0.55
15.201	0.55	0.54	0.54	0.54	0.54	0.54	0.54
15.290	0.53	0.53	0.53	0.53	0.53	0.53	0.53
15.380	0.52	0.52	0.52	0.52	0.52	0.52	0.51
15.469	0.51	0.51	0.51	0.51	0.51	0.50	0.50
15.558	0.50	0.50	0.50	0.50	0.49	0.49	0.49
15.647	0.49	0.49	0.49	0.49	0.48	0.48	0.48
15.737	0.48	0.48	0.48	0.47	0.47	0.47	0.47
15.826	0.47	0.47	0.46	0.46	0.46	0.46	0.46
15.915	0.46	0.46	0.45	0.45	0.45	0.45	0.45
16.005	0.45	0.44	0.44	0.44	0.44	0.44	0.44
16.094	0.43	0.43	0.43	0.43	0.43	0.43	0.43
16.183	0.43	0.43	0.43	0.42	0.42	0.42	0.42
16.273	0.42	0.42	0.42	0.42	0.42	0.42	0.42
16.362	0.42	0.42	0.42	0.42	0.42	0.41	0.41
16.451	0.41	0.41	0.41	0.41	0.41	0.41	0.41
16.541	0.41	0.41	0.41	0.41	0.41	0.41	0.41
16.630	0.41	0.41	0.40	0.40	0.40	0.40	0.40
16.719	0.40	0.40	0.40	0.40	0.40	0.40	0.40
16.808	0.40	0.40	0.40	0.40	0.40	0.40	0.39
16.898	0.39	0.39	0.39	0.39	0.39	0.39	0.39
16.987	0.39	0.39	0.39	0.39	0.39	0.39	0.39
17.076	0.39	0.39	0.39	0.38	0.38	0.38	0.38
17.166	0.38	0.38	0.38	0.38	0.38	0.38	0.38
17.255	0.38	0.38	0.38	0.38	0.38	0.38	0.38
17.344	0.37	0.37	0.37	0.37	0.37	0.37	0.37
17.434	0.37	0.37	0.37	0.37	0.37	0.37	0.37
17.523	0.37	0.37	0.37	0.37	0.36	0.36	0.36
17.612	0.36	0.36	0.36	0.36	0.36	0.36	0.36
17.701	0.36	0.36	0.36	0.36	0.36	0.36	0.36
17.791	0.35	0.35	0.35	0.35	0.35	0.35	0.35
17.880	0.35	0.35	0.35	0.35	0.35	0.35	0.35
17.969	0.35	0.35	0.35	0.35	0.34	0.34	0.34
18.059	0.34	0.34	0.34	0.34	0.34	0.34	0.34
18.148	0.34	0.34	0.34	0.34	0.34	0.34	0.34
18.237	0.33	0.33	0.33	0.33	0.33	0.33	0.33
18.327	0.33	0.33	0.33	0.33	0.33	0.33	0.33
18.416	0.33	0.33	0.33	0.33	0.32	0.32	0.32

18.505	0.32	0.32	0.32	0.32	0.32	0.32	0.32
18.595	0.32	0.32	0.32	0.32	0.32	0.32	0.32
18.684	0.31	0.31	0.31	0.31	0.31	0.31	0.31
18.773	0.31	0.31	0.31	0.31	0.31	0.31	0.31
18.862	0.31	0.31	0.31	0.30	0.30	0.30	0.30
18.952	0.30	0.30	0.30	0.30	0.30	0.30	0.30
19.041	0.30	0.30	0.30	0.30	0.30	0.30	0.29
19.130	0.29	0.29	0.29	0.29	0.29	0.29	0.29
19.220	0.29	0.29	0.29	0.29	0.29	0.29	0.29
19.309	0.29	0.29	0.28	0.28	0.28	0.28	0.28

Line Start Time (hr)	Flow Values @ time increment of 0.013 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
19.398	0.28	0.28	0.28	0.28	0.28	0.28	0.28
19.488	0.28	0.28	0.28	0.28	0.28	0.28	0.27
19.577	0.27	0.27	0.27	0.27	0.27	0.27	0.27
19.666	0.27	0.27	0.27	0.27	0.27	0.27	0.27
19.755	0.27	0.27	0.26	0.26	0.26	0.26	0.26
19.845	0.26	0.26	0.26	0.26	0.26	0.26	0.26
19.934	0.26	0.26	0.26	0.26	0.25	0.25	0.25
20.023	0.25	0.25	0.25	0.25	0.25	0.25	0.25
20.113	0.25	0.25	0.25	0.25	0.25	0.25	0.25
20.202	0.25	0.25	0.25	0.25	0.25	0.25	0.25
20.291	0.25	0.25	0.25	0.25	0.25	0.25	0.25
20.381	0.25	0.24	0.24	0.24	0.24	0.24	0.24
20.470	0.24	0.24	0.24	0.24	0.24	0.24	0.24
20.559	0.24	0.24	0.24	0.24	0.24	0.24	0.24
20.649	0.24	0.24	0.24	0.24	0.24	0.24	0.24
20.738	0.24	0.24	0.24	0.24	0.24	0.24	0.24
20.827	0.24	0.24	0.24	0.24	0.24	0.24	0.24
20.916	0.24	0.24	0.24	0.24	0.24	0.24	0.24
21.006	0.24	0.24	0.24	0.24	0.24	0.24	0.24
21.095	0.24	0.24	0.24	0.24	0.24	0.24	0.24
21.184	0.24	0.24	0.24	0.24	0.24	0.24	0.24
21.274	0.24	0.24	0.24	0.24	0.24	0.24	0.24
21.363	0.24	0.24	0.24	0.24	0.24	0.24	0.24
21.452	0.24	0.24	0.24	0.24	0.24	0.24	0.24
21.542	0.24	0.23	0.23	0.23	0.23	0.23	0.23
21.631	0.23	0.23	0.23	0.23	0.23	0.23	0.23
21.720	0.23	0.23	0.23	0.23	0.23	0.23	0.23
21.810	0.23	0.23	0.23	0.23	0.23	0.23	0.23
21.899	0.23	0.23	0.23	0.23	0.23	0.23	0.23
21.988	0.23	0.23	0.23	0.23	0.23	0.23	0.23
22.077	0.23	0.23	0.23	0.23	0.23	0.23	0.23
22.167	0.23	0.23	0.23	0.23	0.23	0.23	0.23
22.256	0.23	0.23	0.23	0.23	0.23	0.23	0.23
22.345	0.23	0.23	0.23	0.23	0.23	0.23	0.23
22.435	0.23	0.23	0.23	0.23	0.23	0.23	0.23
22.524	0.23	0.23	0.23	0.23	0.23	0.23	0.23
22.613	0.23	0.23	0.23	0.23	0.23	0.22	0.22
22.703	0.22	0.22	0.22	0.22	0.22	0.22	0.22
22.792	0.22	0.22	0.22	0.22	0.22	0.22	0.22
22.881	0.22	0.22	0.22	0.22	0.22	0.22	0.22
22.970	0.22	0.22	0.22	0.22	0.22	0.22	0.22
23.060	0.22	0.22	0.22	0.22	0.22	0.22	0.22
23.149	0.22	0.22	0.22	0.22	0.22	0.22	0.22

23.238	0.22	0.22	0.22	0.22	0.22	0.22	0.22
23.328	0.22	0.22	0.22	0.22	0.22	0.22	0.22
23.417	0.22	0.22	0.22	0.22	0.22	0.22	0.22
23.506	0.22	0.22	0.22	0.22	0.22	0.22	0.22
23.596	0.22	0.22	0.22	0.22	0.22	0.22	0.22
23.685	0.22	0.22	0.22	0.22	0.22	0.22	0.22
23.774	0.22	0.22	0.22	0.21	0.21	0.21	0.21
23.864	0.21	0.21	0.21	0.21	0.21	0.21	0.21

Canyon Springs HCC
ARea A post project

Line Start Time (hr)	Flow Values @ time increment of 0.013 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
23.953	0.21	0.21	0.21	0.21	0.21	0.21	0.21
24.042	0.21	0.20	0.19	0.18	0.17	0.15	0.14
24.131	0.12	0.10	0.09	0.08	0.06	0.05	

Canyon Springs HCC
ARea A post project

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 2-Yr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)
Area A	0.023		15.71				
OUTLET	0.023		15.71				

WinTR-20 Printed Page File Beginning of Input Data List
TR20.inp

WinTR-20: Version 1.10 0 0 0.05
Canyon Springs HCC
ARea B Pre project 2 yr 24 hr

tc (hr)

SUB-AREA:
Area A Outlet .03375 70. .294

STREAM REACH:

STORM ANALYSIS:
2-Yr 1.6 Type II 2

STRUCTURE RATING:

GLOBAL OUTPUT:
2 0.05 YYYYN YYYYNN

(0.109(in)/12)x21.6(ac)
0.19 ac-ft

WinTR-20 Printed Page File End of Input Data List

Canyon Springs HCC
ARea B Pre project 2 yr 24 hr

Name of printed page file:
TR20.out

STORM 2-Yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Area A	0.034		0.109		12.17	0.95	28.05

Line Start Time (hr)	Flow Values @ time increment of 0.019 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
11.969	0.07	0.13	0.21	0.32	0.43	0.55	0.67
12.099	0.78	0.86	0.91	0.94	0.95	0.94	0.92
12.229	0.88	0.85	0.81	0.78	0.75	0.73	0.71
12.359	0.69	0.67	0.66	0.64	0.63	0.62	0.60
12.489	0.59	0.58	0.56	0.55	0.54	0.52	0.51
12.619	0.50	0.49	0.48	0.47	0.46	0.45	0.44
12.749	0.43	0.43	0.42	0.42	0.41	0.41	0.40
12.879	0.40	0.39	0.39	0.39	0.38	0.38	0.38
13.009	0.37	0.37	0.37	0.36	0.36	0.36	0.35
13.139	0.35	0.35	0.34	0.34	0.34	0.34	0.33
13.269	0.33	0.33	0.33	0.32	0.32	0.32	0.32
13.399	0.32	0.31	0.31	0.31	0.31	0.31	0.30
13.529	0.30	0.30	0.30	0.30	0.29	0.29	0.29
13.659	0.29	0.29	0.29	0.28	0.28	0.28	0.28
13.789	0.28	0.27	0.27	0.27	0.27	0.27	0.27
13.919	0.26	0.26	0.26	0.26	0.26	0.26	0.25
14.049	0.25	0.25	0.25	0.25	0.25	0.25	0.24
14.179	0.24	0.24	0.24	0.24	0.24	0.24	0.24
14.309	0.24	0.24	0.23	0.23	0.23	0.23	0.23
14.439	0.23	0.23	0.23	0.23	0.23	0.23	0.23

14.569	0.23	0.23	0.23	0.23	0.23	0.23	0.23
14.699	0.23	0.22	0.22	0.22	0.22	0.22	0.22
14.829	0.22	0.22	0.22	0.22	0.22	0.22	0.22
14.959	0.22	0.22	0.22	0.22	0.22	0.22	0.21
15.089	0.21	0.21	0.21	0.21	0.21	0.21	0.21
15.219	0.21	0.21	0.21	0.21	0.21	0.21	0.21
15.349	0.21	0.21	0.20	0.20	0.20	0.20	0.20
15.479	0.20	0.20	0.20	0.20	0.20	0.20	0.20
15.609	0.20	0.20	0.20	0.19	0.19	0.19	0.19
15.739	0.19	0.19	0.19	0.19	0.19	0.19	0.19
15.869	0.19	0.19	0.19	0.18	0.18	0.18	0.18
15.999	0.18	0.18	0.18	0.18	0.18	0.18	0.18
16.129	0.18	0.18	0.18	0.17	0.17	0.17	0.17
16.259	0.17	0.17	0.17	0.17	0.17	0.17	0.17
16.389	0.17	0.17	0.17	0.17	0.17	0.17	0.17
16.519	0.17	0.17	0.17	0.17	0.17	0.17	0.17
16.649	0.17	0.17	0.17	0.17	0.17	0.17	0.17
16.779	0.17	0.17	0.17	0.17	0.17	0.17	0.17
16.909	0.17	0.16	0.16	0.16	0.16	0.16	0.16
17.039	0.16	0.16	0.16	0.16	0.16	0.16	0.16

Canyon Springs HCC
AREa B Pre project 2 yr 24 hr

Line Start Time (hr)	Flow values @ time increment of 0.019 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
17.169	0.16	0.16	0.16	0.16	0.16	0.16	0.16
17.299	0.16	0.16	0.16	0.16	0.16	0.16	0.16
17.429	0.16	0.16	0.16	0.16	0.16	0.16	0.16
17.558	0.16	0.16	0.16	0.16	0.16	0.16	0.16
17.688	0.16	0.16	0.16	0.15	0.15	0.15	0.15
17.818	0.15	0.15	0.15	0.15	0.15	0.15	0.15
17.948	0.15	0.15	0.15	0.15	0.15	0.15	0.15
18.078	0.15	0.15	0.15	0.15	0.15	0.15	0.15
18.208	0.15	0.15	0.15	0.15	0.15	0.15	0.15
18.338	0.15	0.15	0.15	0.15	0.15	0.14	0.14
18.468	0.14	0.14	0.14	0.14	0.14	0.14	0.14
18.598	0.14	0.14	0.14	0.14	0.14	0.14	0.14
18.728	0.14	0.14	0.14	0.14	0.14	0.14	0.14
18.858	0.14	0.14	0.14	0.14	0.14	0.14	0.14
18.988	0.14	0.14	0.14	0.13	0.13	0.13	0.13
19.118	0.13	0.13	0.13	0.13	0.13	0.13	0.13
19.248	0.13	0.13	0.13	0.13	0.13	0.13	0.13
19.378	0.13	0.13	0.13	0.13	0.13	0.13	0.13
19.508	0.13	0.13	0.13	0.13	0.13	0.13	0.12
19.638	0.12	0.12	0.12	0.12	0.12	0.12	0.12
19.768	0.12	0.12	0.12	0.12	0.12	0.12	0.12
19.898	0.12	0.12	0.12	0.12	0.12	0.12	0.12
20.028	0.12	0.12	0.12	0.12	0.12	0.12	0.12
20.158	0.12	0.12	0.11	0.11	0.11	0.11	0.11
20.288	0.11	0.11	0.11	0.11	0.11	0.11	0.11
20.418	0.11	0.11	0.11	0.11	0.11	0.11	0.11
20.548	0.11	0.11	0.11	0.11	0.11	0.11	0.11
20.678	0.11	0.11	0.11	0.11	0.11	0.11	0.11
20.808	0.11	0.11	0.11	0.11	0.11	0.11	0.11
20.938	0.11	0.11	0.11	0.11	0.11	0.11	0.11
21.068	0.11	0.11	0.11	0.11	0.11	0.11	0.11
21.198	0.11	0.11	0.11	0.11	0.11	0.11	0.11
21.328	0.11	0.11	0.11	0.11	0.11	0.11	0.11

21.458	0.11	0.11	0.11	0.11	0.11	0.11	0.11
21.588	0.11	0.11	0.11	0.11	0.11	0.11	0.11
21.718	0.11	0.11	0.11	0.11	0.11	0.11	0.11
21.848	0.11	0.11	0.11	0.11	0.11	0.11	0.11
21.978	0.11	0.11	0.11	0.11	0.11	0.11	0.11
22.108	0.11	0.11	0.11	0.11	0.11	0.11	0.11
22.238	0.11	0.11	0.11	0.11	0.11	0.11	0.11
22.368	0.11	0.11	0.11	0.11	0.11	0.11	0.11
22.498	0.11	0.11	0.11	0.11	0.11	0.11	0.11
22.628	0.11	0.11	0.11	0.11	0.11	0.11	0.11
22.758	0.11	0.11	0.11	0.11	0.11	0.11	0.11
22.888	0.11	0.11	0.11	0.11	0.11	0.11	0.11
23.018	0.11	0.11	0.11	0.11	0.11	0.11	0.11
23.148	0.11	0.11	0.11	0.11	0.11	0.11	0.11
23.278	0.11	0.11	0.11	0.11	0.11	0.11	0.11
23.408	0.11	0.11	0.11	0.11	0.11	0.11	0.11
23.538	0.11	0.11	0.11	0.11	0.11	0.11	0.11
23.667	0.11	0.11	0.11	0.11	0.11	0.11	0.11

Canyon Springs HCC
ARea B Pre project 2 yr 24 hr

Line Start Time (hr)	Flow Values @ time increment of 0.019 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
23.797	0.11	0.11	0.11	0.11	0.11	0.11	0.11
23.927	0.11	0.11	0.11	0.11	0.11	0.11	0.10
24.057	0.10	0.10	0.10	0.09	0.08	0.08	0.07
24.187	0.06	0.05					

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
OUTLET	0.034		0.109		12.17	0.95	28.05

Line Start Time (hr)	Flow Values @ time increment of 0.019 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
11.969	0.07	0.13	0.21	0.32	0.43	0.55	0.67
12.099	0.78	0.86	0.91	0.94	0.95	0.94	0.92
12.229	0.88	0.85	0.81	0.78	0.75	0.73	0.71
12.359	0.69	0.67	0.66	0.64	0.63	0.62	0.60
12.489	0.59	0.58	0.56	0.55	0.54	0.52	0.51
12.619	0.50	0.49	0.48	0.47	0.46	0.45	0.44
12.749	0.43	0.43	0.42	0.42	0.41	0.41	0.40
12.879	0.40	0.39	0.39	0.39	0.38	0.38	0.38
13.009	0.37	0.37	0.37	0.36	0.36	0.36	0.35
13.139	0.35	0.35	0.34	0.34	0.34	0.34	0.33
13.269	0.33	0.33	0.33	0.32	0.32	0.32	0.32
13.399	0.32	0.31	0.31	0.31	0.31	0.31	0.30
13.529	0.30	0.30	0.30	0.30	0.29	0.29	0.29
13.659	0.29	0.29	0.29	0.28	0.28	0.28	0.28
13.789	0.28	0.27	0.27	0.27	0.27	0.27	0.27
13.919	0.26	0.26	0.26	0.26	0.26	0.26	0.25
14.049	0.25	0.25	0.25	0.25	0.25	0.25	0.24
14.179	0.24	0.24	0.24	0.24	0.24	0.24	0.24
14.309	0.24	0.24	0.23	0.23	0.23	0.23	0.23
14.439	0.23	0.23	0.23	0.23	0.23	0.23	0.23

14.569	0.23	0.23	0.23	0.23	0.23	0.23	0.23
14.699	0.23	0.22	0.22	0.22	0.22	0.22	0.22
14.829	0.22	0.22	0.22	0.22	0.22	0.22	0.22
14.959	0.22	0.22	0.22	0.22	0.22	0.22	0.21
15.089	0.21	0.21	0.21	0.21	0.21	0.21	0.21
15.219	0.21	0.21	0.21	0.21	0.21	0.21	0.21
15.349	0.21	0.21	0.20	0.20	0.20	0.20	0.20
15.479	0.20	0.20	0.20	0.20	0.20	0.20	0.20
15.609	0.20	0.20	0.20	0.19	0.19	0.19	0.19
15.739	0.19	0.19	0.19	0.19	0.19	0.19	0.19
15.869	0.19	0.19	0.19	0.18	0.18	0.18	0.18
15.999	0.18	0.18	0.18	0.18	0.18	0.18	0.18
16.129	0.18	0.18	0.18	0.17	0.17	0.17	0.17
16.259	0.17	0.17	0.17	0.17	0.17	0.17	0.17
16.389	0.17	0.17	0.17	0.17	0.17	0.17	0.17
16.519	0.17	0.17	0.17	0.17	0.17	0.17	0.17

Line Start Time (hr)	Flow Values @ time increment of 0.019 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
16.649	0.17	0.17	0.17	0.17	0.17	0.17	0.17
16.779	0.17	0.17	0.17	0.17	0.17	0.17	0.17
16.909	0.17	0.16	0.16	0.16	0.16	0.16	0.16
17.039	0.16	0.16	0.16	0.16	0.16	0.16	0.16
17.169	0.16	0.16	0.16	0.16	0.16	0.16	0.16
17.299	0.16	0.16	0.16	0.16	0.16	0.16	0.16
17.429	0.16	0.16	0.16	0.16	0.16	0.16	0.16
17.558	0.16	0.16	0.16	0.16	0.16	0.16	0.16
17.688	0.16	0.16	0.16	0.15	0.15	0.15	0.15
17.818	0.15	0.15	0.15	0.15	0.15	0.15	0.15
17.948	0.15	0.15	0.15	0.15	0.15	0.15	0.15
18.078	0.15	0.15	0.15	0.15	0.15	0.15	0.15
18.208	0.15	0.15	0.15	0.15	0.15	0.15	0.15
18.338	0.15	0.15	0.15	0.15	0.15	0.14	0.14
18.468	0.14	0.14	0.14	0.14	0.14	0.14	0.14
18.598	0.14	0.14	0.14	0.14	0.14	0.14	0.14
18.728	0.14	0.14	0.14	0.14	0.14	0.14	0.14
18.858	0.14	0.14	0.14	0.14	0.14	0.14	0.14
18.988	0.14	0.14	0.14	0.13	0.13	0.13	0.13
19.118	0.13	0.13	0.13	0.13	0.13	0.13	0.13
19.248	0.13	0.13	0.13	0.13	0.13	0.13	0.13
19.378	0.13	0.13	0.13	0.13	0.13	0.13	0.13
19.508	0.13	0.13	0.13	0.13	0.13	0.13	0.12
19.638	0.12	0.12	0.12	0.12	0.12	0.12	0.12
19.768	0.12	0.12	0.12	0.12	0.12	0.12	0.12
19.898	0.12	0.12	0.12	0.12	0.12	0.12	0.12
20.028	0.12	0.12	0.12	0.12	0.12	0.12	0.12
20.158	0.12	0.12	0.11	0.11	0.11	0.11	0.11
20.288	0.11	0.11	0.11	0.11	0.11	0.11	0.11
20.418	0.11	0.11	0.11	0.11	0.11	0.11	0.11
20.548	0.11	0.11	0.11	0.11	0.11	0.11	0.11
20.678	0.11	0.11	0.11	0.11	0.11	0.11	0.11
20.808	0.11	0.11	0.11	0.11	0.11	0.11	0.11
20.938	0.11	0.11	0.11	0.11	0.11	0.11	0.11
21.068	0.11	0.11	0.11	0.11	0.11	0.11	0.11
21.198	0.11	0.11	0.11	0.11	0.11	0.11	0.11
21.328	0.11	0.11	0.11	0.11	0.11	0.11	0.11

21.458	0.11	0.11	0.11	0.11	0.11	0.11	0.11
21.588	0.11	0.11	0.11	0.11	0.11	0.11	0.11
21.718	0.11	0.11	0.11	0.11	0.11	0.11	0.11
21.848	0.11	0.11	0.11	0.11	0.11	0.11	0.11
21.978	0.11	0.11	0.11	0.11	0.11	0.11	0.11
22.108	0.11	0.11	0.11	0.11	0.11	0.11	0.11
22.238	0.11	0.11	0.11	0.11	0.11	0.11	0.11
22.368	0.11	0.11	0.11	0.11	0.11	0.11	0.11
22.498	0.11	0.11	0.11	0.11	0.11	0.11	0.11
22.628	0.11	0.11	0.11	0.11	0.11	0.11	0.11
22.758	0.11	0.11	0.11	0.11	0.11	0.11	0.11
22.888	0.11	0.11	0.11	0.11	0.11	0.11	0.11
23.018	0.11	0.11	0.11	0.11	0.11	0.11	0.11
23.148	0.11	0.11	0.11	0.11	0.11	0.11	0.11

Canyon Springs HCC
ARea B Pre project 2 yr 24 hr

Line Start Time (hr)	Flow Values @ time increment of 0.019 hr (cfs)						
23.278	0.11	0.11	0.11	0.11	0.11	0.11	0.11
23.408	0.11	0.11	0.11	0.11	0.11	0.11	0.11
23.538	0.11	0.11	0.11	0.11	0.11	0.11	0.11
23.667	0.11	0.11	0.11	0.11	0.11	0.11	0.11
23.797	0.11	0.11	0.11	0.11	0.11	0.11	0.11
23.927	0.11	0.11	0.11	0.11	0.11	0.11	0.10
24.057	0.10	0.10	0.10	0.09	0.08	0.08	0.07
24.187	0.06	0.05					

Canyon Springs HCC
AREa B Pre project 2 yr 24 hr

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 2-Yr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)
Area A	0.034		0.95				
OUTLET	0.034		0.95				

WinTR-20 Printed Page File Beginning of Input Data List
TR20.inp

WinTR-20: Version 1.10 0 0 0.05
Canyon Springs HCC
ARea B post 2yr 24Hr

SUB-AREA:
Area A Outlet .03375 90. .22

tc (hr)

STREAM REACH:

STORM ANALYSIS:
2-Yr 1.6 Type II 2

STRUCTURE RATING:

GLOBAL OUTPUT:
2 0.05 YYYYN YYYYNN

(0.762(in)/12)x21.6=
1.37 ac-ft

WinTR-20 Printed Page File End of Input Data List

Canyon Springs HCC
ARea B post 2yr 24Hr

Name of printed page file:
TR20.out

STORM 2-Yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Area A	0.034		0.762		12.03	21.35	632.58

Line Start Time (hr)	Flow Values @ time increment of 0.014 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
9.430	0.05	0.05	0.05	0.05	0.06	0.06	0.06
9.527	0.06	0.06	0.06	0.06	0.07	0.07	0.07
9.624	0.07	0.07	0.07	0.07	0.08	0.08	0.08
9.722	0.08	0.08	0.08	0.09	0.09	0.09	0.09
9.819	0.09	0.10	0.10	0.10	0.10	0.11	0.11
9.916	0.11	0.11	0.11	0.12	0.12	0.12	0.12
10.014	0.13	0.13	0.13	0.13	0.14	0.14	0.14
10.111	0.14	0.15	0.15	0.15	0.16	0.16	0.16
10.208	0.16	0.17	0.17	0.17	0.18	0.18	0.18
10.305	0.19	0.19	0.20	0.20	0.20	0.21	0.21
10.403	0.21	0.22	0.22	0.23	0.23	0.23	0.24
10.500	0.24	0.25	0.25	0.26	0.26	0.26	0.27
10.597	0.27	0.28	0.28	0.29	0.29	0.30	0.31
10.694	0.31	0.32	0.32	0.33	0.34	0.34	0.35
10.792	0.36	0.36	0.37	0.38	0.38	0.39	0.40
10.889	0.40	0.41	0.42	0.43	0.43	0.44	0.45
10.986	0.46	0.47	0.48	0.48	0.49	0.50	0.51
11.083	0.52	0.53	0.54	0.55	0.56	0.58	0.59
11.181	0.60	0.62	0.63	0.65	0.66	0.68	0.69
11.278	0.71	0.73	0.74	0.76	0.78	0.80	0.82

11.375	0.84	0.86	0.88	0.90	0.92	0.94	0.96
11.472	0.98	1.00	1.02	1.05	1.08	1.12	1.17
11.570	1.24	1.33	1.44	1.56	1.71	1.88	2.07
11.667	2.30	2.57	2.87	3.20	3.56	3.96	4.39
11.764	4.86	5.38	5.95	6.57	7.24	7.98	8.80
11.862	9.73	10.80	12.00	13.32	14.68	16.01	17.28
11.959	18.43	19.42	20.21	20.82	21.21	21.35	21.26
12.056	20.94	20.36	19.50	18.42	17.20	15.92	14.62
12.153	13.34	12.13	11.00	9.96	9.05	8.29	7.65
12.251	7.10	6.63	6.21	5.84	5.52	5.23	4.98
12.348	4.75	4.55	4.37	4.20	4.04	3.90	3.77
12.445	3.65	3.54	3.43	3.32	3.21	3.11	3.02
12.542	2.94	2.85	2.77	2.70	2.63	2.56	2.49
12.640	2.44	2.38	2.34	2.29	2.25	2.22	2.18
12.737	2.15	2.13	2.10	2.07	2.05	2.03	2.00
12.834	1.98	1.96	1.94	1.92	1.91	1.89	1.87
12.931	1.85	1.83	1.81	1.80	1.78	1.76	1.74
13.029	1.72	1.71	1.69	1.68	1.66	1.64	1.63
13.126	1.61	1.60	1.58	1.57	1.56	1.55	1.53
13.223	1.52	1.51	1.50	1.49	1.48	1.47	1.46

Canyon Springs HCC
ARea B post 2yr 24Hr

Line Start Time (hr)	Flow Values @ time increment of 0.014 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
13.320	1.45	1.44	1.43	1.42	1.41	1.40	1.39
13.418	1.38	1.37	1.36	1.35	1.34	1.33	1.32
13.515	1.31	1.31	1.30	1.29	1.28	1.27	1.26
13.612	1.25	1.24	1.23	1.23	1.22	1.21	1.20
13.710	1.19	1.19	1.18	1.17	1.16	1.16	1.15
13.807	1.14	1.14	1.13	1.12	1.12	1.11	1.10
13.904	1.09	1.09	1.08	1.07	1.07	1.06	1.05
14.001	1.05	1.04	1.03	1.03	1.02	1.01	1.01
14.099	1.00	1.00	0.99	0.99	0.98	0.98	0.97
14.196	0.97	0.96	0.96	0.96	0.95	0.95	0.95
14.293	0.94	0.94	0.94	0.94	0.93	0.93	0.93
14.390	0.93	0.92	0.92	0.92	0.92	0.91	0.91
14.488	0.91	0.91	0.90	0.90	0.90	0.90	0.89
14.585	0.89	0.89	0.89	0.89	0.88	0.88	0.88
14.682	0.88	0.87	0.87	0.87	0.87	0.86	0.86
14.779	0.86	0.86	0.85	0.85	0.85	0.85	0.84
14.877	0.84	0.84	0.84	0.84	0.83	0.83	0.83
14.974	0.83	0.82	0.82	0.82	0.82	0.81	0.81
15.071	0.81	0.81	0.80	0.80	0.80	0.80	0.79
15.168	0.79	0.79	0.79	0.78	0.78	0.78	0.78
15.266	0.78	0.77	0.77	0.77	0.77	0.76	0.76
15.363	0.76	0.76	0.75	0.75	0.75	0.75	0.74
15.460	0.74	0.74	0.74	0.73	0.73	0.73	0.73
15.558	0.72	0.72	0.72	0.72	0.71	0.71	0.71
15.655	0.71	0.70	0.70	0.70	0.70	0.69	0.69
15.752	0.69	0.69	0.68	0.68	0.68	0.68	0.67
15.849	0.67	0.67	0.67	0.66	0.66	0.66	0.66
15.947	0.65	0.65	0.65	0.65	0.64	0.64	0.64
16.044	0.64	0.63	0.63	0.63	0.63	0.63	0.62
16.141	0.62	0.62	0.62	0.62	0.62	0.61	0.61
16.238	0.61	0.61	0.61	0.61	0.61	0.61	0.61
16.336	0.60	0.60	0.60	0.60	0.60	0.60	0.60
16.433	0.60	0.60	0.60	0.60	0.59	0.59	0.59

16.530	0.59	0.59	0.59	0.59	0.59	0.59	0.59
16.627	0.59	0.59	0.58	0.58	0.58	0.58	0.58
16.725	0.58	0.58	0.58	0.58	0.58	0.58	0.57
16.822	0.57	0.57	0.57	0.57	0.57	0.57	0.57
16.919	0.57	0.57	0.57	0.57	0.56	0.56	0.56
17.016	0.56	0.56	0.56	0.56	0.56	0.56	0.56
17.114	0.56	0.55	0.55	0.55	0.55	0.55	0.55
17.211	0.55	0.55	0.55	0.55	0.55	0.55	0.54
17.308	0.54	0.54	0.54	0.54	0.54	0.54	0.54
17.406	0.54	0.54	0.54	0.53	0.53	0.53	0.53
17.503	0.53	0.53	0.53	0.53	0.53	0.53	0.53
17.600	0.53	0.52	0.52	0.52	0.52	0.52	0.52
17.697	0.52	0.52	0.52	0.52	0.52	0.51	0.51
17.795	0.51	0.51	0.51	0.51	0.51	0.51	0.51
17.892	0.51	0.51	0.50	0.50	0.50	0.50	0.50
17.989	0.50	0.50	0.50	0.50	0.50	0.50	0.49
18.086	0.49	0.49	0.49	0.49	0.49	0.49	0.49
18.184	0.49	0.49	0.49	0.49	0.48	0.48	0.48

Canyon Springs HCC
ARea B post 2yr 24Hr

Line Start Time (hr)	Flow Values @ time increment of 0.014 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
18.281	0.48	0.48	0.48	0.48	0.48	0.48	0.48
18.378	0.48	0.47	0.47	0.47	0.47	0.47	0.47
18.475	0.47	0.47	0.47	0.47	0.47	0.46	0.46
18.573	0.46	0.46	0.46	0.46	0.46	0.46	0.46
18.670	0.46	0.46	0.45	0.45	0.45	0.45	0.45
18.767	0.45	0.45	0.45	0.45	0.45	0.45	0.44
18.864	0.44	0.44	0.44	0.44	0.44	0.44	0.44
18.962	0.44	0.44	0.44	0.43	0.43	0.43	0.43
19.059	0.43	0.43	0.43	0.43	0.43	0.43	0.43
19.156	0.42	0.42	0.42	0.42	0.42	0.42	0.42
19.254	0.42	0.42	0.42	0.42	0.41	0.41	0.41
19.351	0.41	0.41	0.41	0.41	0.41	0.41	0.41
19.448	0.41	0.40	0.40	0.40	0.40	0.40	0.40
19.545	0.40	0.40	0.40	0.40	0.40	0.39	0.39
19.643	0.39	0.39	0.39	0.39	0.39	0.39	0.39
19.740	0.39	0.38	0.38	0.38	0.38	0.38	0.38
19.837	0.38	0.38	0.38	0.38	0.38	0.37	0.37
19.934	0.37	0.37	0.37	0.37	0.37	0.37	0.37
20.032	0.37	0.37	0.36	0.36	0.36	0.36	0.36
20.129	0.36	0.36	0.36	0.36	0.36	0.36	0.36
20.226	0.36	0.36	0.36	0.36	0.36	0.36	0.36
20.323	0.36	0.36	0.36	0.35	0.35	0.35	0.35
20.421	0.35	0.35	0.35	0.35	0.35	0.35	0.35
20.518	0.35	0.35	0.35	0.35	0.35	0.35	0.35
20.615	0.35	0.35	0.35	0.35	0.35	0.35	0.35
20.712	0.35	0.35	0.35	0.35	0.35	0.35	0.35
20.810	0.35	0.35	0.35	0.35	0.35	0.35	0.35
20.907	0.35	0.35	0.35	0.35	0.35	0.35	0.35
21.004	0.35	0.35	0.35	0.35	0.35	0.35	0.35
21.102	0.35	0.35	0.35	0.35	0.35	0.34	0.34
21.199	0.34	0.34	0.34	0.34	0.34	0.34	0.34
21.296	0.34	0.34	0.34	0.34	0.34	0.34	0.34
21.393	0.34	0.34	0.34	0.34	0.34	0.34	0.34
21.491	0.34	0.34	0.34	0.34	0.34	0.34	0.34
21.588	0.34	0.34	0.34	0.34	0.34	0.34	0.34

21.685	0.34	0.34	0.34	0.34	0.34	0.34	0.34
21.782	0.34	0.34	0.34	0.34	0.34	0.34	0.34
21.880	0.34	0.34	0.34	0.34	0.34	0.34	0.34
21.977	0.33	0.33	0.33	0.33	0.33	0.33	0.33
22.074	0.33	0.33	0.33	0.33	0.33	0.33	0.33
22.171	0.33	0.33	0.33	0.33	0.33	0.33	0.33
22.269	0.33	0.33	0.33	0.33	0.33	0.33	0.33
22.366	0.33	0.33	0.33	0.33	0.33	0.33	0.33
22.463	0.33	0.33	0.33	0.33	0.33	0.33	0.33
22.560	0.33	0.33	0.33	0.33	0.33	0.33	0.33
22.658	0.33	0.33	0.33	0.33	0.33	0.33	0.33
22.755	0.33	0.32	0.32	0.32	0.32	0.32	0.32
22.852	0.32	0.32	0.32	0.32	0.32	0.32	0.32
22.950	0.32	0.32	0.32	0.32	0.32	0.32	0.32
23.047	0.32	0.32	0.32	0.32	0.32	0.32	0.32
23.144	0.32	0.32	0.32	0.32	0.32	0.32	0.32

Canyon Springs HCC
ARea B post 2yr 24Hr

Line Start Time (hr)	Flow Values @ time increment of 0.014 hr (cfs)						
23.241	0.32	0.32	0.32	0.32	0.32	0.32	0.32
23.339	0.32	0.32	0.32	0.32	0.32	0.32	0.32
23.436	0.32	0.32	0.32	0.32	0.32	0.32	0.32
23.533	0.32	0.32	0.31	0.31	0.31	0.31	0.31
23.630	0.31	0.31	0.31	0.31	0.31	0.31	0.31
23.728	0.31	0.31	0.31	0.31	0.31	0.31	0.31
23.825	0.31	0.31	0.31	0.31	0.31	0.31	0.31
23.922	0.31	0.31	0.31	0.31	0.31	0.31	0.31
24.019	0.31	0.30	0.30	0.29	0.28	0.26	0.24
24.117	0.22	0.19	0.17	0.15	0.13	0.11	0.09
24.214	0.08	0.07	0.06				

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
OUTLET	0.034		0.762		12.03	21.35	632.58

Line Start Time (hr)	Flow Values @ time increment of 0.014 hr (cfs)						
9.430	0.05	0.05	0.05	0.05	0.06	0.06	0.06
9.527	0.06	0.06	0.06	0.06	0.07	0.07	0.07
9.624	0.07	0.07	0.07	0.07	0.08	0.08	0.08
9.722	0.08	0.08	0.08	0.09	0.09	0.09	0.09
9.819	0.09	0.10	0.10	0.10	0.10	0.11	0.11
9.916	0.11	0.11	0.11	0.12	0.12	0.12	0.12
10.014	0.13	0.13	0.13	0.13	0.14	0.14	0.14
10.111	0.14	0.15	0.15	0.15	0.16	0.16	0.16
10.208	0.16	0.17	0.17	0.17	0.18	0.18	0.18
10.305	0.19	0.19	0.20	0.20	0.20	0.21	0.21
10.403	0.21	0.22	0.22	0.23	0.23	0.23	0.24
10.500	0.24	0.25	0.25	0.26	0.26	0.26	0.27
10.597	0.27	0.28	0.28	0.29	0.29	0.30	0.31
10.694	0.31	0.32	0.32	0.33	0.34	0.34	0.35
10.792	0.36	0.36	0.37	0.38	0.38	0.39	0.40

10.889	0.40	0.41	0.42	0.43	0.43	0.44	0.45
10.986	0.46	0.47	0.48	0.48	0.49	0.50	0.51
11.083	0.52	0.53	0.54	0.55	0.56	0.58	0.59
11.181	0.60	0.62	0.63	0.65	0.66	0.68	0.69
11.278	0.71	0.73	0.74	0.76	0.78	0.80	0.82
11.375	0.84	0.86	0.88	0.90	0.92	0.94	0.96
11.472	0.98	1.00	1.02	1.05	1.08	1.12	1.17
11.570	1.24	1.33	1.44	1.56	1.71	1.88	2.07
11.667	2.30	2.57	2.87	3.20	3.56	3.96	4.39
11.764	4.86	5.38	5.95	6.57	7.24	7.98	8.80
11.862	9.73	10.80	12.00	13.32	14.68	16.01	17.28
11.959	18.43	19.42	20.21	20.82	21.21	21.35	21.26
12.056	20.94	20.36	19.50	18.42	17.20	15.92	14.62
12.153	13.34	12.13	11.00	9.96	9.05	8.29	7.65

Canyon Springs HCC
ARea B post 2yr 24Hr

Line Start Time (hr)	Flow Values @ time increment of 0.014 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
12.251	7.10	6.63	6.21	5.84	5.52	5.23	4.98
12.348	4.75	4.55	4.37	4.20	4.04	3.90	3.77
12.445	3.65	3.54	3.43	3.32	3.21	3.11	3.02
12.542	2.94	2.85	2.77	2.70	2.63	2.56	2.49
12.640	2.44	2.38	2.34	2.29	2.25	2.22	2.18
12.737	2.15	2.13	2.10	2.07	2.05	2.03	2.00
12.834	1.98	1.96	1.94	1.92	1.91	1.89	1.87
12.931	1.85	1.83	1.81	1.80	1.78	1.76	1.74
13.029	1.72	1.71	1.69	1.68	1.66	1.64	1.63
13.126	1.61	1.60	1.58	1.57	1.56	1.55	1.53
13.223	1.52	1.51	1.50	1.49	1.48	1.47	1.46
13.320	1.45	1.44	1.43	1.42	1.41	1.40	1.39
13.418	1.38	1.37	1.36	1.35	1.34	1.33	1.32
13.515	1.31	1.31	1.30	1.29	1.28	1.27	1.26
13.612	1.25	1.24	1.23	1.23	1.22	1.21	1.20
13.710	1.19	1.19	1.18	1.17	1.16	1.16	1.15
13.807	1.14	1.14	1.13	1.12	1.12	1.11	1.10
13.904	1.09	1.09	1.08	1.07	1.07	1.06	1.05
14.001	1.05	1.04	1.03	1.03	1.02	1.01	1.01
14.099	1.00	1.00	0.99	0.99	0.98	0.98	0.97
14.196	0.97	0.96	0.96	0.96	0.95	0.95	0.95
14.293	0.94	0.94	0.94	0.94	0.93	0.93	0.93
14.390	0.93	0.92	0.92	0.92	0.92	0.91	0.91
14.488	0.91	0.91	0.90	0.90	0.90	0.90	0.89
14.585	0.89	0.89	0.89	0.89	0.88	0.88	0.88
14.682	0.88	0.87	0.87	0.87	0.87	0.86	0.86
14.779	0.86	0.86	0.85	0.85	0.85	0.85	0.84
14.877	0.84	0.84	0.84	0.84	0.83	0.83	0.83
14.974	0.83	0.82	0.82	0.82	0.82	0.81	0.81
15.071	0.81	0.81	0.80	0.80	0.80	0.80	0.79
15.168	0.79	0.79	0.79	0.78	0.78	0.78	0.78
15.266	0.78	0.77	0.77	0.77	0.77	0.76	0.76
15.363	0.76	0.76	0.75	0.75	0.75	0.75	0.74
15.460	0.74	0.74	0.74	0.73	0.73	0.73	0.73
15.558	0.72	0.72	0.72	0.72	0.71	0.71	0.71
15.655	0.71	0.70	0.70	0.70	0.70	0.69	0.69
15.752	0.69	0.69	0.68	0.68	0.68	0.68	0.67
15.849	0.67	0.67	0.67	0.66	0.66	0.66	0.66
15.947	0.65	0.65	0.65	0.65	0.64	0.64	0.64

16.044	0.64	0.63	0.63	0.63	0.63	0.63	0.62
16.141	0.62	0.62	0.62	0.62	0.62	0.61	0.61
16.238	0.61	0.61	0.61	0.61	0.61	0.61	0.61
16.336	0.60	0.60	0.60	0.60	0.60	0.60	0.60
16.433	0.60	0.60	0.60	0.60	0.59	0.59	0.59
16.530	0.59	0.59	0.59	0.59	0.59	0.59	0.59
16.627	0.59	0.59	0.58	0.58	0.58	0.58	0.58
16.725	0.58	0.58	0.58	0.58	0.58	0.58	0.57
16.822	0.57	0.57	0.57	0.57	0.57	0.57	0.57
16.919	0.57	0.57	0.57	0.57	0.56	0.56	0.56
17.016	0.56	0.56	0.56	0.56	0.56	0.56	0.56
17.114	0.56	0.55	0.55	0.55	0.55	0.55	0.55

Canyon Springs HCC
ARea B post 2yr 24Hr

Line Start Time (hr)	Flow Values @ time increment of 0.014 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
17.211	0.55	0.55	0.55	0.55	0.55	0.55	0.54
17.308	0.54	0.54	0.54	0.54	0.54	0.54	0.54
17.406	0.54	0.54	0.54	0.53	0.53	0.53	0.53
17.503	0.53	0.53	0.53	0.53	0.53	0.53	0.53
17.600	0.53	0.52	0.52	0.52	0.52	0.52	0.52
17.697	0.52	0.52	0.52	0.52	0.52	0.51	0.51
17.795	0.51	0.51	0.51	0.51	0.51	0.51	0.51
17.892	0.51	0.51	0.50	0.50	0.50	0.50	0.50
17.989	0.50	0.50	0.50	0.50	0.50	0.50	0.49
18.086	0.49	0.49	0.49	0.49	0.49	0.49	0.49
18.184	0.49	0.49	0.49	0.49	0.48	0.48	0.48
18.281	0.48	0.48	0.48	0.48	0.48	0.48	0.48
18.378	0.48	0.47	0.47	0.47	0.47	0.47	0.47
18.475	0.47	0.47	0.47	0.47	0.47	0.46	0.46
18.573	0.46	0.46	0.46	0.46	0.46	0.46	0.46
18.670	0.46	0.46	0.45	0.45	0.45	0.45	0.45
18.767	0.45	0.45	0.45	0.45	0.45	0.45	0.44
18.864	0.44	0.44	0.44	0.44	0.44	0.44	0.44
18.962	0.44	0.44	0.44	0.43	0.43	0.43	0.43
19.059	0.43	0.43	0.43	0.43	0.43	0.43	0.43
19.156	0.42	0.42	0.42	0.42	0.42	0.42	0.42
19.254	0.42	0.42	0.42	0.42	0.41	0.41	0.41
19.351	0.41	0.41	0.41	0.41	0.41	0.41	0.41
19.448	0.41	0.40	0.40	0.40	0.40	0.40	0.40
19.545	0.40	0.40	0.40	0.40	0.40	0.39	0.39
19.643	0.39	0.39	0.39	0.39	0.39	0.39	0.39
19.740	0.39	0.38	0.38	0.38	0.38	0.38	0.38
19.837	0.38	0.38	0.38	0.38	0.38	0.37	0.37
19.934	0.37	0.37	0.37	0.37	0.37	0.37	0.37
20.032	0.37	0.37	0.36	0.36	0.36	0.36	0.36
20.129	0.36	0.36	0.36	0.36	0.36	0.36	0.36
20.226	0.36	0.36	0.36	0.36	0.36	0.36	0.36
20.323	0.36	0.36	0.36	0.35	0.35	0.35	0.35
20.421	0.35	0.35	0.35	0.35	0.35	0.35	0.35
20.518	0.35	0.35	0.35	0.35	0.35	0.35	0.35
20.615	0.35	0.35	0.35	0.35	0.35	0.35	0.35
20.712	0.35	0.35	0.35	0.35	0.35	0.35	0.35
20.810	0.35	0.35	0.35	0.35	0.35	0.35	0.35
20.907	0.35	0.35	0.35	0.35	0.35	0.35	0.35
21.004	0.35	0.35	0.35	0.35	0.35	0.35	0.35
21.102	0.35	0.35	0.35	0.35	0.35	0.34	0.34

21.199	0.34	0.34	0.34	0.34	0.34	0.34	0.34
21.296	0.34	0.34	0.34	0.34	0.34	0.34	0.34
21.393	0.34	0.34	0.34	0.34	0.34	0.34	0.34
21.491	0.34	0.34	0.34	0.34	0.34	0.34	0.34
21.588	0.34	0.34	0.34	0.34	0.34	0.34	0.34
21.685	0.34	0.34	0.34	0.34	0.34	0.34	0.34
21.782	0.34	0.34	0.34	0.34	0.34	0.34	0.34
21.880	0.34	0.34	0.34	0.34	0.34	0.34	0.34
21.977	0.33	0.33	0.33	0.33	0.33	0.33	0.33
22.074	0.33	0.33	0.33	0.33	0.33	0.33	0.33

Canyon Springs HCC
ARea B post 2yr 24Hr

Line Start Time (hr)	Flow Values @ time increment of 0.014 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
22.171	0.33	0.33	0.33	0.33	0.33	0.33	0.33
22.269	0.33	0.33	0.33	0.33	0.33	0.33	0.33
22.366	0.33	0.33	0.33	0.33	0.33	0.33	0.33
22.463	0.33	0.33	0.33	0.33	0.33	0.33	0.33
22.560	0.33	0.33	0.33	0.33	0.33	0.33	0.33
22.658	0.33	0.33	0.33	0.33	0.33	0.33	0.33
22.755	0.33	0.32	0.32	0.32	0.32	0.32	0.32
22.852	0.32	0.32	0.32	0.32	0.32	0.32	0.32
22.950	0.32	0.32	0.32	0.32	0.32	0.32	0.32
23.047	0.32	0.32	0.32	0.32	0.32	0.32	0.32
23.144	0.32	0.32	0.32	0.32	0.32	0.32	0.32
23.241	0.32	0.32	0.32	0.32	0.32	0.32	0.32
23.339	0.32	0.32	0.32	0.32	0.32	0.32	0.32
23.436	0.32	0.32	0.32	0.32	0.32	0.32	0.32
23.533	0.32	0.32	0.31	0.31	0.31	0.31	0.31
23.630	0.31	0.31	0.31	0.31	0.31	0.31	0.31
23.728	0.31	0.31	0.31	0.31	0.31	0.31	0.31
23.825	0.31	0.31	0.31	0.31	0.31	0.31	0.31
23.922	0.31	0.31	0.31	0.31	0.31	0.31	0.31
24.019	0.31	0.30	0.30	0.29	0.28	0.26	0.24
24.117	0.22	0.19	0.17	0.15	0.13	0.11	0.09
24.214	0.08	0.07	0.06				

Canyon Springs HCC
ARea B post 2yr 24Hr

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 2-Yr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)
Area A	0.034		21.35				
OUTLET	0.034		21.35				

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

STORMWATER POLLUTANT SOURCES / SOURCE CONTROL CHECKLIST

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included 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

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included 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/Downloads/LandscapeGardenBrochure.pdf ☐ Provide IPM information to new owners, lessees and operators.

STORMWATER POLLUTANT SOURCES / SOURCE CONTROL CHECKLIST

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included 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

STORMWATER POLLUTANT SOURCES / SOURCE CONTROL CHECKLIST

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included 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/

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included 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 therequirements 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/haz mat /	☐ 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

STORMWATER POLLUTANT SOURCES / SOURCE CONTROL CHECKLIST

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included 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 boses are provided with an automatic shutoff 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.

STORMWATER POLLUTANT SOURCES / SOURCE CONTROL CHECKLIST

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included 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 he ohtained 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 oo asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled lluid will be in an area of secondary cootainment. 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/

STORMWATER POLLUTANT SOURCES / SOURCE CONTROL CHECKLIST

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included 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.] 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

[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

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included 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

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included 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

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included 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

Operation and Maintenance Responsibility for Treatment Control BMPs

BMP	Operation and Maintenance Activities	BMP Start Date	Frequency	Parties Responsible For Maintenance and Funding
On-site Storm Drain	Inspect storm drain and curb outlet systems and repair/replace if needed.	At the completion of project	The systems shall be monitored yearly and cleaned not later than October 15 each year.	PROPERTY OWNERS ASSOCIATION (POA)
Landscaping and Irrigation	Inspect landscaping and irrigation systems and repair/replace if needed.	At the completion of project	The landscaping and irrigation systems shall be monitored monthly.	
Trash Receptacles	Inspect refuse areas and repair/replace if needed.	At the completion of project	The refuse areas shall be monitored daily.	
Education of Property Owners	Educational materials are included in this WQMP Attachment D. The owner shall distribute additional copies of handouts.	At the move in of the tenants	The educational material provided should be reviewed yearly as well as when there is a change in ownership.	
Activity Restrictions	Any activity that may affect surrounding areas or the downstream receiving waters (such as car washes or leaving trash bin lids open) is strictly prohibited.	At the completion of project	Trash areas shall be checked before and after a major storm event. As well as on a monthly basis to reduce debris.	
Employee Training/ Education Program	Educational materials are included in this WQMP Attachment D. The owner shall distribute additional copies of handouts.	When employees are hired	The educational material provided shall be included in an employees training and reviewed quarterly.	
Street Sweeping	A street sweeper shall clean the privately maintained streets and parking areas to reduce debris.	At the completion of project	A street sweeper shall clean the privately maintained streets and parking areas monthly and before any known storm event.	

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

3.5 Bioretention Facility

Type of BMP	LID – Bioretention
Treatment Mechanisms	Infiltration, Evapotranspiration, Evaporation, Biofiltration
Maximum Drainage Area	This BMP is intended to be integrated into a project's landscaped area in a distributed manner. Typically, contributing drainage areas to Bioretention Facilities range from less than 1 acre to a maximum of around 10 acres.
Other Names	Rain Garden, Bioretention Cell, Bioretention Basin, Biofiltration Basin, Landscaped Filter Basin, Porous Landscape Detention

Description

Bioretention Facilities are shallow, vegetated basins underlain by an engineered soil media. Healthy plant and biological activity in the root zone maintain and renew the macro-pore space in the soil and maximize plant uptake of pollutants and runoff. This keeps the Best Management Practice (BMP) from becoming clogged and allows more of the soil column to function as both a sponge (retaining water) and a highly effective and self-maintaining biofilter. In most cases, the bottom of a Bioretention Facility is unlined, which also provides an opportunity for infiltration to the extent the underlying onsite soil can accommodate. When the infiltration rate of the underlying soil is exceeded, fully biotreated flows are discharged via underdrains. Bioretention Facilities therefore will inherently achieve the maximum feasible level of infiltration and evapotranspiration and achieve the minimum feasible (but highly biotreated) discharge to the storm drain system.

Siting Considerations

These facilities work best when they are designed in a relatively level area. Unlike other BMPs, Bioretention Facilities can be used in smaller landscaped spaces on the site, such as:

- ✓ Parking islands
- ✓ Medians
- ✓ Site entrances

Landscaped areas on the site (such as may otherwise be required through minimum landscaping ordinances), can often be designed as Bioretention Facilities. This can be accomplished by:

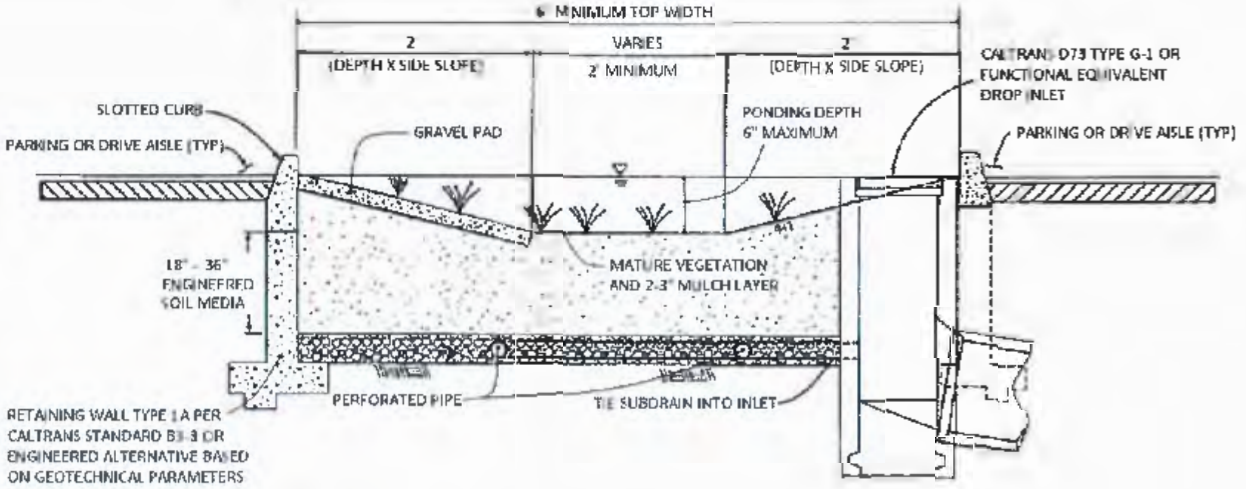
- *Depressing* landscaped areas below adjacent impervious surfaces, rather than elevating those areas
- Grading the site to direct runoff from those impervious surfaces *into* the Bioretention Facility, rather than away from the landscaping
- Sizing and designing the depressed landscaped area as a Bioretention Facility as described in this Fact Sheet

Bioretention Facilities should however not be used downstream of areas where large amounts of sediment can clog the system. Placing a Bioretention Facility at the toe of a steep slope should also be avoided due to the potential for clogging the engineered soil media with erosion from the slope, as well as the potential for damaging the vegetation.

Design and Sizing Criteria

The recommended cross section necessary for a Bioretention Facility includes:

- Vegetated area
- 18' minimum depth of engineered soil media
- 12' minimum gravel layer depth with 6' perforated pipes (added flow control features such as orifice plates may be required to mitigate for HCOC conditions)



While the 18-inch minimum engineered soil media depth can be used in some cases, it is recommended to use 24 inches or a preferred 36 inches to provide an adequate root zone for the chosen plant palate. Such a design also provides for improved removal effectiveness for nutrients. The recommended ponding depth inside of a Bioretention Facility is 6 inches; measured from the flat bottom surface to the top of the water surface as shown in Figure 1.

Because this BMP is filled with an engineered soil media, pore space in the soil and gravel layer is assumed to provide storage volume. However, several considerations must be noted:

- Surcharge storage above the soil surface (6 inches) is important to assure that design flows do not bypass the BMP when runoff exceeds the soil's absorption rate.
- In cases where the Bioretention Facility contains engineered soil media deeper than 36 inches, the pore space within the engineered soil media can only be counted to the 36-inch depth.
- A maximum of 30 percent pore space can be used for the soil media whereas a maximum of 40 percent pore space can be use for the gravel layer.

Figure 1: Standard Layout for a Bioretention Facility

Engineered Soil Media Requirements

The engineered soil media shall be comprised of 85 percent mineral component and 15 percent organic component, by volume, drum mixed prior to placement. The mineral component shall be a Class A sandy loam topsoil that meets the range specified in Table 1 below. The organic component shall be nitrogen stabilized compost[1], such that nitrogen does not leach from the media.

Table 1: Mineral Component Range Requirements

Percent Range	Component
70-80	Sand
15-20	Silt
5-10	Clay

The trip ticket, or certificate of compliance, shall be made available to the inspector to prove the engineered mix meets this specification.

Vegetation Requirements

Vegetative cover is important to minimize erosion and ensure that treatment occurs in the Bioretention Facility. The area should be designed for at least 70 percent mature coverage throughout the Bioretention Facility. To prevent the BMP from being used as walkways, Bioretention Facilities shall be planted with a combination of small trees, densely planted shrubs, and natural grasses. Grasses shall be native or ornamental; preferably ones that do not need to be mowed. The application of fertilizers and pesticides should be minimal. To maintain oxygen levels for the vegetation and promote biodegradation, it is important that vegetation not be completely submerged for any extended period of time. Therefore, a maximum of 6 inches of ponded water shall be used in the design to ensure that plants within the Bioretention Facility remain healthy.

A 2 to 3-inch layer of standard shredded aged hardwood mulch shall be placed as the top layer inside the Bioretention Facility. The 6-inch ponding depth shown in Figure 1 above shall be measured from the top surface of the 2 to 3-inch mulch layer.

Curb Cuts

To allow water to flow into the Bioretention Facility, 1-foot-wide (minimum) curb cuts should be placed approximately every 10 feet around the perimeter of the Bioretention Facility. Figure 2 shows a curb cut in a Bioretention Facility. Curb cut flow lines must be at or above the V_{BMP} water surface level.

[1] For more information on compost, visit the US Composting Council website at: http://compostingcouncil.org/

Figure 2: Curb Cut located in a Bioretention Facility

To reduce erosion, a gravel pad shall be placed at each inlet point to the Bioretention Facility. The gravel should be 1- to 1.5-inch diameter in size. The gravel should overlap the curb cut opening a minimum of 6 inches. The gravel pad inside the Bioretention Facility should be flush with the finished surface at the curb cut and extend to the bottom of the slope.

In addition, place an apron of stone or concrete, a foot square or larger, inside each inlet to prevent vegetation from growing up and blocking the inlet. See Figure 3

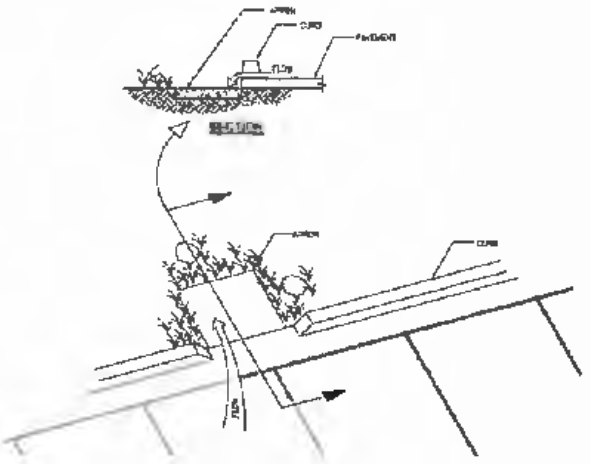


Figure 3: Apron located in a Bioretention Facility

Terracing the Landscaped Filter Basin

It is recommended that Bioretention Facilities be level. In the event the facility site slopes and lacks proper design, water would fill the lowest point of the BMP and then discharge from the basin without being treated. To ensure that the water will be held within the Bioretention Facility on sloped sites, the BMP must be terraced with nonporous check dams to provide the required storage and treatment capacity.

The terraced version of this BMP shall be used on non-flat sites with no more than a 3 percent slope. The surcharge depth cannot exceed 0.5 feet, and side slopes shall not exceed 4:1. Table 2 below shows the spacing of the check dams, and slopes shall be rounded up (i.e., 2.5 percent slope shall use 10' spacing for check dams).

Table 2: Check Dam Spacing

6" Check Dam Spacing	
Slope	**Spacing**
1%	*25'*
2%	*15'*
3%	*10'*

Roof Runoff

Roof downspouts may be directed towards Bioretention Facilities. However, the downspouts must discharge onto a concrete splash block to protect the Bioretention Facility from erosion.

Retaining Walls

It is recommended that Retaining Wall Type 1A, per Caltrans Standard B3-3 or equivalent, be constructed around the entire perimeter of the Bioretention Facility. This practice will protect the sides of the Bioretention Facility from collapsing during construction and maintenance or from high service loads adjacent to the BMP. Where such service loads would not exist adjacent to the BMP, an engineered alternative may be used if signed by a licensed civil engineer.

Side Slope Requirements

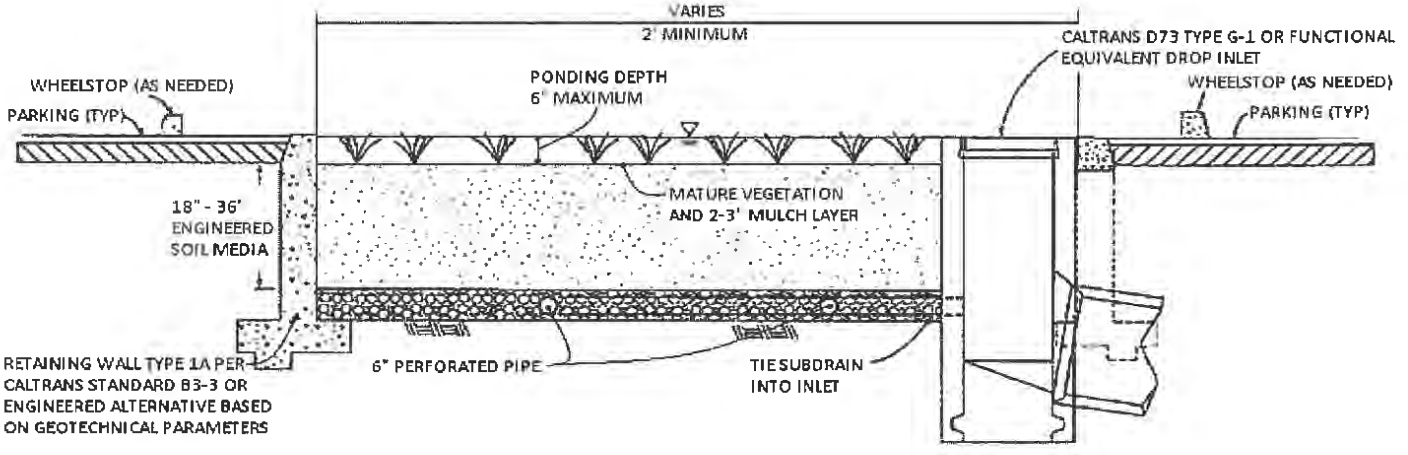
Bioretention Facilities Requiring Side Slopes

The design should assure that the Bioretention Facility does not present a tripping hazard. Bioretention Facilities proposed near pedestrian areas, such as areas parallel to parking spaces or along a walkway, must have a gentle slope to the bottom of the facility. Side slopes inside of a Bioretention Facility shall be 4:1. A typical cross section for the Bioretention Facility is shown in Figure 1.

Bioretention Facilities Not Requiring Side Slopes

Where cars park perpendicular to the Bioretention Facility, side slopes are not required. A 6-inch maximum drop may be used, and the Bioretention Facility must be planted with trees and shrubs to prevent pedestrian access. In this case, a curb is not placed around the Bioretention Facility,

but wheel stops shall be used to prevent vehicles from entering the Bioretention Facility, as shown in Figure 4.



Planter Boxes

Bioretention Facilities can also be placed above ground as planter boxes. Planter boxes must have a minimum width of 2 feet, a maximum surcharge depth of 6 inches, and no side slopes are necessary. Planter boxes must be constructed so as to ensure that the top surface of the engineered soil media will remain level. This option may be constructed of concrete, brick, stone or other stable materials that will not warp or bend. Chemically treated wood or galvanized steel, which has the ability to contaminate stormwater, should not be used. Planter boxes must be lined with an impermeable liner on all sides, including the bottom. Due to the impermeable liner, the inside bottom of the planter box shall be designed and constructed with a cross fall, directing treated flows within the subdrain layer toward the point where subdrain exits the planter box, and subdrains shall be oriented with drain holes oriented down. These provisions will help avoid excessive stagnant water within the gravel underdrain layer. Similar to the in-ground Bioretention Facility versions, this BMP benefits from healthy plants and biological activity in the root zone. Planter boxes should be planted with appropriately selected vegetation.

Figure 5: Planter Box
Source: LA Team Effort

Overflow

An overflow route is needed in the Bioretention Facility design to bypass stored runoff from storm events larger than V_{BMP} or in the event of facility or subdrain clogging. Overflow systems must connect to an acceptable discharge point, such as a downstream conveyance system as shown in Figure 1 and Figure 4. The inlet to the overflow structure shall be elevated inside the Bioretention Facility to be flush with the ponding surface for the design capture volume (V_{BMP}) as shown in Figure 4. This will allow the design capture volume to be fully treated by the Bioretention Facility, and for larger events to safely be conveyed to downstream systems. The overflow inlet shall **not** be located in the entrance of a Bioretention Facility, as shown in Figure 6.

Underdrain Gravel and Pipes

An underdrain gravel layer and pipes shall be provided in accordance with Appendix B – Underdrains.

Figure 6: Incorrect Placement of an Overflow Inlet.

Inspection and Maintenance Schedule

The Bioretention Facility area shall be inspected for erosion, dead vegetation, soggy soils, or standing water. The use of fertilizers and pesticides on the plants inside the Bioretention Facility should be minimized.

Schedule	Activity
Ongoing	• Keep adjacent landscape areas maintained. Remove clippings from landscape maintenance activities. • Remove trash and debris • Replace damaged grass and/or plants • Replace surface mulch layer as needed to maintain a 2-3 inch soil cover.
After storm events	• Inspect areas for ponding
Annually	• Inspect/clean inlets and outlets

Bioretention Facility Design Procedure

1) Enter the area tributary, A_T, to the Bioretention Facility.

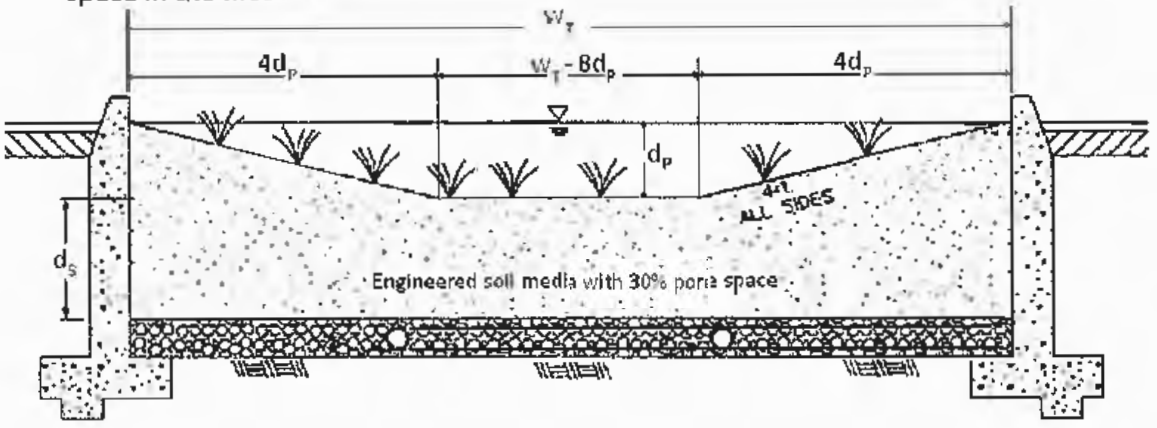
2) Enter the Design Volume, V_{BMP}, determined from Section 2.1 of this Handbook.

3) Select the type of design used. There are two types of Bioretention Facility designs: the standard design used for most project sites that include side slopes, and the modified design used when the BMP is located perpendicular to the parking spaces or with planter boxes that do not use side slopes.

4) Enter the depth of the engineered soil media, d_S. The minimum depth for the engineered soil media can be 18' in limited cases, but it is recommended to use 24' or a preferred 36' to provide an adequate root zone for the chosen plant palette. Engineered soil media deeper than 36' will only get credit for the pore space in the first 36'.

5) Enter the top width of the Bioretention Facility.

6) Calculate the total effective depth, d_E, within the Bioretention Facility. The maximum allowable pore space of the soil media is 30% while the maximum allowable pore space for the gravel layer is 40%. Gravel layer deeper than 12' will only get credit for the pore space in the first 12'.



a. For the design with side slopes the following equation shall be used to determine the total effective depth. Where, d_P is the depth of ponding within the basin.

$$d_E(\text{ft}) = \frac{0.3 \times \left[\left(w_T(\text{ft}) \times d_S(\text{ft})\right) + 4\left(d_P(\text{ft})\right)^2\right] + 0.4 \times 1(\text{ft}) + d_P(\text{ft})\left[4d_P(\text{ft}) + \left(w_T(\text{ft}) - 8d_P(\text{ft})\right)\right]}{w_T(\text{ft})}$$

This above equation can be simplified if the maximum ponding depth of 0.5' is used. The equation below is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(\text{ft}) = (0.3 \times d_S(\text{ft}) + 0.4 \times 1(\text{ft})) - \left(\frac{0.7\ (\text{ft}^2)}{w_T(\text{ft})}\right) + 0.5(\text{ft})$$

b. For the design without side slopes the following equation shall be used to determine the total effective depth:

$$d_E(\text{ft}) = d_P(\text{ft}) + [(0.3) \times d_S(\text{ft}) + (0.4) \times 1(\text{ft})]$$

The equation below, using the maximum ponding depth of 0.5', is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(\text{ft}) = 0.5\ (\text{ft}) + [(0.3) \times d_S(\text{ft}) + (0.4) \times 1(\text{ft})]$$

7) Calculate the minimum surface area, A_M, required for the Bioretention Facility. This does not include the curb surrounding the Bioretention Facility or side slopes.

$$A_M(\text{ft}^2) = \frac{V_{BMP}(\text{ft}^3)}{d_E\ (\text{ft})}$$

8) Enter the proposed surface area. This area shall not be less than the minimum required surface area.

9) Verify that side slopes are no steeper than 4:1 in the standard design, and are not required in the modified design.

10) Provide the diameter, minimum 6 inches, of the perforated underdrain used in the Bioretention Facility. See Appendix B for specific information regarding perforated pipes.

11) Provide the slope of the site around the Bioretention Facility, if used. The maximum slope is 3 percent for a standard design.

12) Provide the check dam spacing, if the site around the Bioretention Facility is sloped.

13) Describe the vegetation used within the Bioretention Facility.

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3.3 Permeable Pavement

Type of BMP	LID - Infiltration
Treatment Mechanisms	Infiltration, Evaporation
Maximum Drainage Area	10 acres
Other Names	porous pavement, pervious concrete, pervious asphalt, pervious gravel pavement, cobblestone block, modular block, modular pavement

Description

Permeable pavements can be either pervious asphalt and concrete surfaces, or permeable modular block. Unlike traditional pavements that are impermeable, permeable pavements reduce the volume and peak of stormwater runoff as well as mitigate pollutants from stormwater runoff, provided that the underlying soils can accept infiltration. Permeable pavement surfaces work best when they are designed to be flat or with gentle slopes. This factsheet discusses criteria that apply to infiltration designs.

The permeable surface is placed on top of a reservoir layer that holds the water quality stormwater volume, V_{BMP}. The water infiltrates from the reservoir layer into the native subsoil. Tests must be performed according to the Infiltration Testing Section in Appendix A to be able to use this design procedure.

In some circumstances, permeable pavement may be implemented on a project as a source control feature. Where implemented as a source control feature (sometimes referred to as a 'self-retaining' area), the pavement is not considered a 'BMP' that would be required to be designed and sized per this manual. Where permeable pavement receives runoff from adjacent tributary areas, the permeable pavement *may* be considered a BMP that must be sized according to this manual. Consult the Engineering Authority and the WQMP for any applicable requirements for designing and sizing permeable pavement installations.

Siting Considerations

The WQMP applicable to the project location should be consulted, as it may include criteria for determining the applicability of this and other Infiltration-based BMPs to the project.

Permeable pavements can be used in the same manner as concrete or asphalt in low traffic parking lots, playgrounds, walkways, bike trails, and sports courts. Most types of permeable pavement can be designed to meet Americans with Disabilities Act (ADA) requirements. Permeable pavements **should not** be used in the following conditions:

- ⊘ Downstream of erodible areas
- ⊘ Downstream of areas with a high likelihood of pollutant spills
- ⊘ Industrial or high vehicular traffic areas (25,000 or greater average daily traffic)
- ⊘ Areas where geotechnical concerns, such as soils with low infiltration rates, would preclude the use of this BMP.

Sites with Impermeable Fire Lanes

Oftentimes, Fire Departments do not allow alternative pavement types including permeable pavement. They require traditional impermeable surfaces for fire lanes. In this situation, it is acceptable to use an impermeable surface for the fire lane drive aisles and permeable pavement for the remainder of the parking lot.

Where impermeable fire lanes are used in the design, the impermeable surface must slope towards the permeable pavement, and the base layers shall remain continuous underneath the two pavement types, as shown in Figure 1. This continuous reservoir layer helps to maintain infiltration throughout the pervious pavement site, and can still be considered as part of the total required storage area.

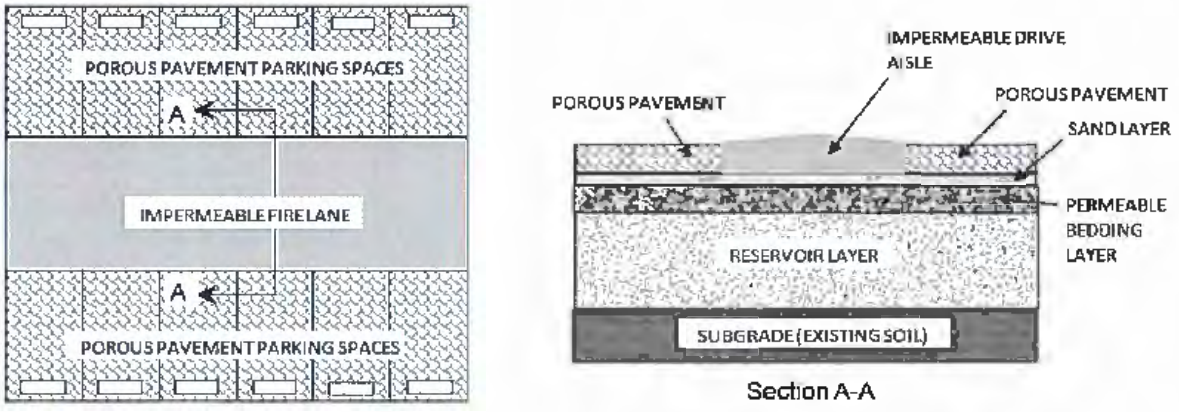

Figure 1: Impermeable Fire Lanes

Also, while a seal coat treatment may be used on the impermeable fire land, traditional seal coat treatments **shall not** be used on permeable pavement.

Setbacks

Always consult your geotechnical engineer for site specific recommendations regarding setbacks for permeable pavement. Recommended setbacks are needed to protect buildings, walls, onsite wells, streams and tanks.

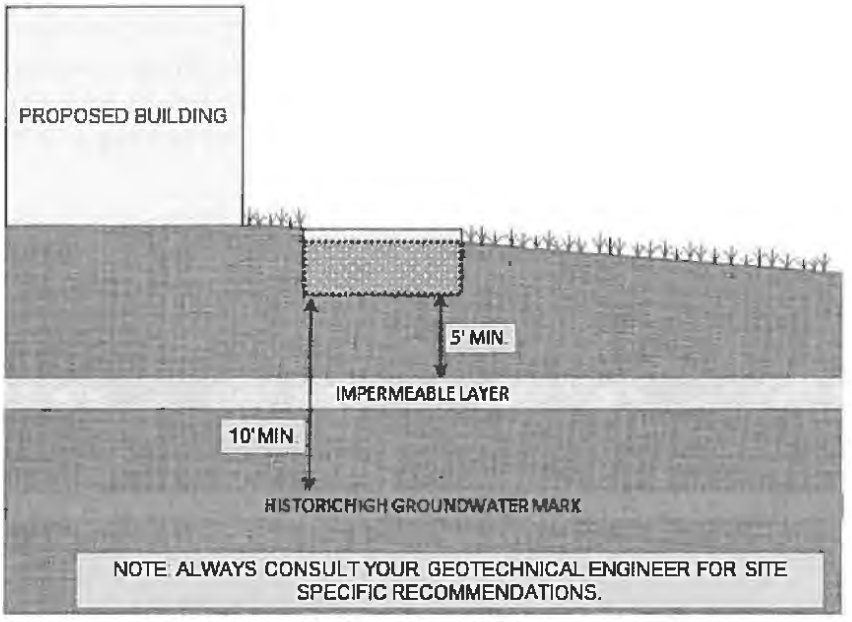

Figure 2: Permeable Pavement Setback Requirements

A minimum vertical separation of 10 feet is required from the bottom of the reservoir layer to the historic high groundwater mark, see Figure 2. A minimum vertical separation of 5 feet is required from the bottom of the reservoir layer to any impermeable layer in the soil. If the historic high groundwater mark is less than 10 feet below the reservoir layer section, or less than 5 feet from an impermeable layer, the infiltration design is not feasible.

Design and Sizing Criteria

To ensure that the pavement structural section is not compromised, a 24-hour drawdown time is utilized for this BMP instead of the longer drawdown time used for most volume based BMPs.

Reservoir Layer Considerations

Even with proper maintenance, sediment will begin to clog the soil below the permeable pavement. Since the soil cannot be scarified or replaced, this will result in slower infiltration rates over the life of the permeable pavement. Therefore, the reservoir layer is limited to a maximum of 12 inches in depth to ensure that over the life of the BMP, the reservoir layer will drain in an adequate time.

***Note**: All permeable pavement BMP installations (not including Permeable Pavement as a source control BMP i.e. a self-retaining area) must be tested by the geotechnical engineer to ensure that the soils drain at a minimum allowable rate to ensure drainage.. See the Infiltration Testing Section of this manual for specific details for the required testing and applied factors of safety.*

Sloping Permeable Pavement

Ideally permeable pavement would be level, however most sites will have a mild slope. If the tributary drainage area is too steep, the water may be flowing too fast when it approaches the permeable pavement, which may cause water to pass over the pavement instead of percolating and entering the reservoir layer. If the maximum slopes shown in Table 1 are complied with, it should address these concerns.

Table 1: Design Parameters for Permeable Pavement

Design Parameter	Permeable Pavement
Maximum slope of permeable pavement	3%
Maximum contributing area slope	5%

Regardless of the slope of the pavement surface design, the bottom of the reservoir layers **shall be flat and level** as shown in Figure 3. The design shown ensures that the water quality volume will be contained in the reservoir layer. A terraced design utilizing non-permeable check dams may be a useful option when the depth of gravel becomes too great as shown in Figure 3.

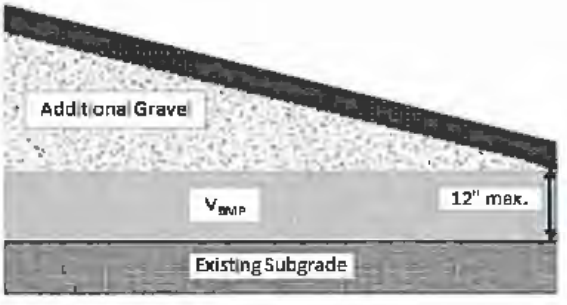

Figure 3: Sloped Cross Sections for Permeable Pavement

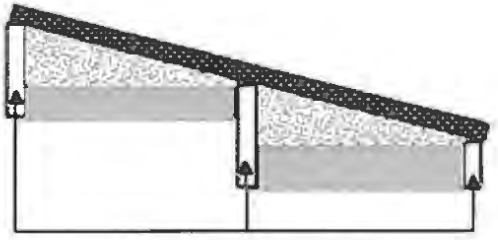

Figure 4: Permeable Pavement with Non-permeable Check Dams

In Figure 4, the bottom of the gravel reservoir layer is incorrectly sloped parallel to the pavement surface. Water would only be allowed to pond up to the lowest point of the BMP. Additional flows would simply discharge from the pavement. Since only a portion of the gravel layer can store water, this design would result in insufficient capacity. This is not acceptable.

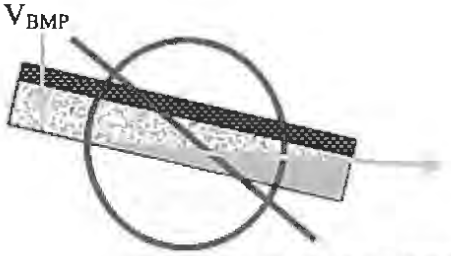

Figure 5: Incorrect Sloping of Permeable Pavement

To assure that the subgrade will empty within the 24 hour drawdown time, it is important that the maximum depth of 12 inches for the reservoir layer discussed in the design procedure is not exceeded. The value should be measured from the lowest elevation of the slope (Figure 4).

Minimum Surface Area

The minimum surface area required, A_S, is calculated by dividing the water quality volume, V_{BMP}, by the depth of water stored in the reservoir layer. The depth of water is found by multiplying the void ratio of the reservoir aggregate by the depth of the layer, b_{TH}. The void ratio of the reservoir aggregate is typically 40%; the maximum reservoir layer depth is 12".

Sediment Control

A pretreatment BMP should be used for sediment control. This pretreatment BMP will reduce the amount of sediment that enters the system and reduce clogging. The pretreatment BMP will also help to spread runoff flows, which allows the system to infiltrate more evenly. The pretreatment BMP must discharge to the surface of the pavement and not the subgrade. Grass swales may also be used as part of a treatment train with permeable pavements.

Liners and Filter Fabric

Always consult your geotechnical engineer for site specific recommendations regarding liners and filter fabrics. Filter fabric may be used around the edges of the permeable pavement; this will help keep fine sediments from entering the system. Unless recommended for the site, impermeable liners are not to be used below the subdrain gravel layer.

Overflow

An overflow route is needed in the permeable pavement design to bypass storm flows larger than the V_{BMP} or in the event of clogging. Overflow systems must connect to an acceptable discharge point such as a downstream conveyance system.

Roof Runoff

Permeable pavement can be used to treat roof runoff. However, the runoff cannot be discharged beneath the surface of the pavement directly into the subgrade, as shown in Figure 6. Instead the pipe should empty on the surface of the permeable pavement as shown in Figure 7. A filter on the drainpipe should be used to help reduce the amount of sediment that enters the permeable pavement.

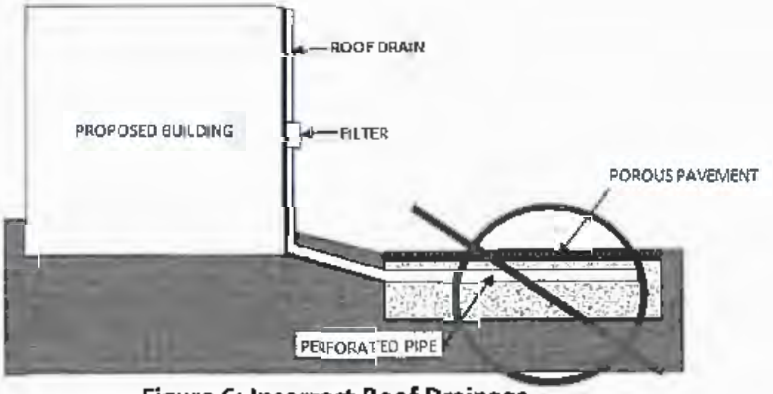

Figure 6: Incorrect Roof Drainage

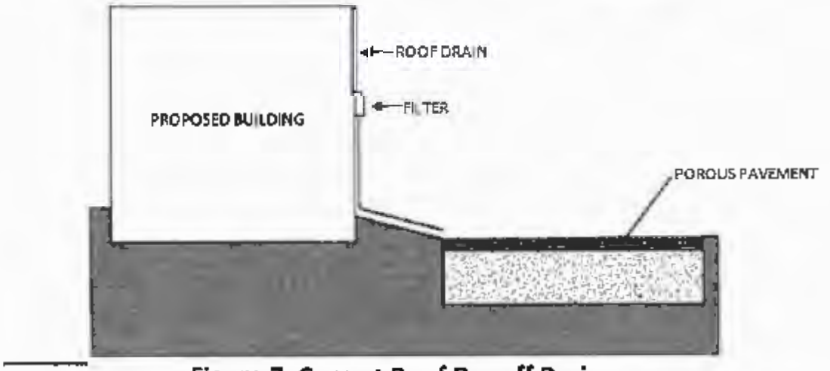

Figure 7: Correct Roof Runoff Drainage

Infiltration

Refer to the Infiltration Testing Section (Appendix A) in this manual for recommendations on testing for this BMP.

Pavement Section

The cross section necessary for infiltration design of permeable pavement includes:

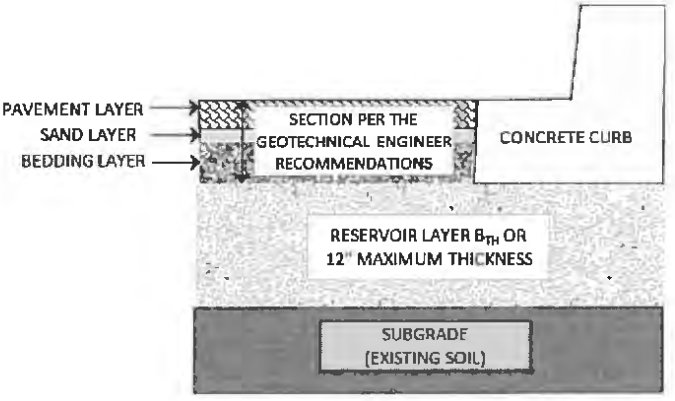

Figure 8: Infiltration Cross Section

- The thickness of the layers of permeable pavement, sand and bedding layers depends on whether it is permeable modular block or pervious pavement. A licensed geotechnical or civil engineer is required to determine the thickness of these upper layers appropriate for the pavement type and expected traffic loads.
- A 12" maximum reservoir layer consisting of AASHTO #57 gravel vibrated in place or equivalent with a minimum of 40% void ratio.

Inspection and Maintenance Schedule –Modular Block

Schedule	Activity
Ongoing	• Keep adjacent landscape areas maintained. Remove clippings from landscape maintenance activities. • Remove trash and debris
Utility Trenching and other pavement repairs	• Remove and reset modular blocks, structural section and reservoir layer as needed. Replace damaged blocks in-kind. • Do not pave repaired areas with impermeable surfaces.
After storm events	• Inspect areas for ponding
2-3 times per year	• Sweep to reduce the chance of clogging
As needed	• Sand between pavers may need to be replaced if infiltration capacity is lost

Inspection and Maintenance Schedule –Pervious Concrete/Asphalt

Schedule	Activity
Ongoing	• Keep adjacent landscape areas maintained. Remove clippings from landscape maintenance activities. • Remove trash and debris
Utility Trenching other pavement repairs	• Replace structural section and reservoir layer in kind. • Re-pave using pervious concrete/asphalt. Do not pave repaired areas with impermeable surfaces.
After storm events	• Inspect areas for ponding
2-3 times per year	• Vacuum the permeable pavement to reduce the chance of clogging
As needed	• Remove and replace damaged or destroyed permeable pavement

Design Procedure Permeable Pavement

1. Enter the Tributary Area, A_T.

2. Enter the Design Volume, V_{BMP}, determined from Section 2.1 of this Handbook.

3. Enter the reservoir layer depth, b_{TH} for the proposed permeable pavement. The reservoir layer maximum depth is 12 inches.

4. Calculate the Minimum Surface Area, A_S, required.

$$A_S(\text{ft}) = \frac{V_{BMP}\ (\text{ft}^3)}{(0.4 \times b_{TH}\ (\text{in}))/12(\text{in/ft})}$$

   Where, the porosity of the gravel in the reservoir layer is assumed to be 40%.

5. Enter the proposed surface area and ensure that this is equal to or greater than the minimum surface area required.

6. Enter the dimensions, per the geotechnical engineer's recommendations, for the pavement cross section. The cross section includes a pavement layer, usually a sand layer and a permeable bedding layer. Then add this to the maximum thickness of the reservoir layer to find the total thickness of the BMP.

7. Enter the slope of the top of the permeable pavement. The maximum slope is 3%.

8. Enter whether sediment control was provided.

9. Enter whether the geotechnical approach is attached.

10. Describe the surfaces surrounding the permeable pavement. It is preferred that a vegetation buffer is used around the permeable pavement.
11. Check to ensure that vertical setbacks are met. There should be a minimum of 10 feet between the bottom of the BMP and the top of the high groundwater table, and a minimum of 5 feet between the reservoir layer the top of the impermeable layer.

Reference Materials Used to Develop this Fact Sheet:

Adams, Michelle C. "Porous Asphalt Pavement with Recharge Beds: 20 Years and Still Working." Stormwater Magazine May-June 2003.

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Urbonas, Ben R. Stormwater Sand Filter Sizing and Design: A Unit Operations Approach. Denver: Urban Drainage and Flood Control District, 2002.

PERMEABLE PAVEMENT BMP FACT SHEET

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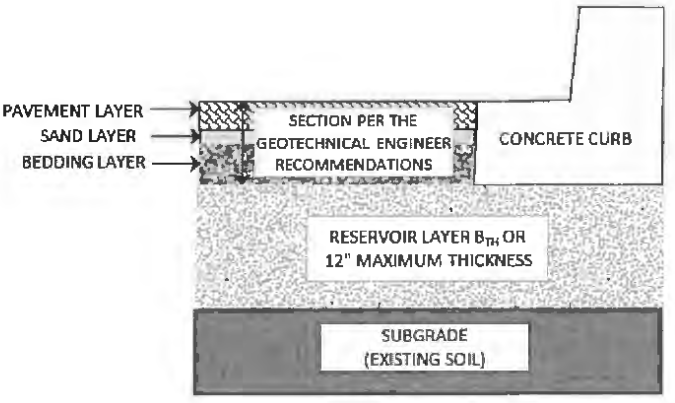

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