SANDIS

June 9, 2022
Project No. 621092

Gabe Osburn
City of Santa Rosa
Acting Director – Transportation and Public Works
69 Stony Circle
Santa Rosa, CA 95401
T: 707-543-3853
E: gosburn@srcity.org

RE: 701 WILSON STREET (PULLMAN LOFTS PHASE 2)
PRELIMINARY STORMWATER LOW IMPACT DEVELOPMENT SUBMITTAL (SWLIDS)
SANTA ROSA, CA

Dear Gabe,

The below memo documents our compliance with the City of Santa Rosa Stormwater Low Impact Development Requirements for the Phase 2 portion of the Pullman Lofts project located at 701 Wilson Street in Santa Rosa.

INTRODUCTION/ PROJECT DESCRIPTION

The Pullman Lofts project is a multi-phased residential development located along Wilson Street between 8th and 9th Streets in Santa Rosa. Phase 1 of the project has been designed and permitted and is currently under construction. Phase 2 of the project intends to demolish an existing building and construct a 40-unit residential building along the Wilson/8th Street Frontages, with a fire access lane along the western edge of the site.

The Phase 2 land use and site layout differ from what was proposed in the original entitlements and permits; therefore the Phase 2 project is required to resubmit for both, and comply with current code requirements. Phase 2 is, however, still considered part of the overall original project from a stormwater calculation perspective. Because of this, Phase 2 needs to comply with the original project requirements as defined in the Final Stormwater Mitigation Plan – Pullman Lots, revised March 2021 (March 2021 report) prepared by Civil Design Consultants. The following memo refers to the March 2021 report where no changes are required and notes the specific changes when the Phase 2 design differs from what was included in the original report.

DETERMINATION WORKSHEET

- The Determination Worksheet, included in the attached March 2021 report, for the entire project site remains unchanged by the new improvements for Phase 2 of this development.

BMP SELECTION AND SIZING

- Bioretention planters are selected for Phase 2 improvements to remove pollutants and provide stormwater storage for this watershed. As shown in the attached BMP Selection Table, Phase 2 will provide two types of Priority 2 bioretention planters. The same bioretention detail (Detail 2 on Sheet 2 of the original BMP Details) from the March 2021 report will be used for Phase 2.
- The bioretention BMPs designed to treat the Phase 2 improvements are located in the attached Stormwater Management Plan, and sizing described in the attached Stormwater Calculator Results.

- The Stormwater Management Plan shows the proposed site plan, BMPs and new building ground floor. This defers from the March 2021 report which represents the Phase 2 development area as the "Historical Building Tributary". The attached Stormwater Management Plan replaces the initial stormwater strategy, which used a permeable gutter, with new bioretention planters.
- The Stormwater Calculator Results show how the Phase 2 BMPs achieve the goal of 100% Volume Capture. The results do note that "treatment only" is required for Phase 2 improvements given the total post-project impervious area is less than pre-project impervious area. However, to match the same 100% Volume Capture goal set by the March 2021 report, Phase 2 BMPs are designed to capture 100% of runoff generated by the 85th percentile 24 hour storm in the void space below the perforated underdrain.

BMP MAINTENANCE PROCEDURES

- The BMP inspection/maintenance checklist and procedures, included in the attached March 2021 report, apply to the proposed bioretention planters for the Phase 2 development.

Should you have any questions about the contents of this report, please feel free to contact me.

Regards,

SANDIS

Ron Sanzo, PE, TE, PTOE
Director of Engineering | Associate Principal

ATTACHMENTS:

- Final Storm Water Mitigation Plan Pullman Lofts_revised March 2021.pdf
- BMP Selection Table.pdf
- Stormwater Management Plan.pdf
- Stormwater Calculator Results.pdf

BMP Selection Table

	Best Management Practice (BMP)	Detail Sheet	Detail Title	Can be used with...	High Ground Water	Contamination	Slope Constraints	Achieves...	Treatment	Volume Capture	Pollution Prevention Credit	BMP in this priority selected?	Yes	No	Explanation of selection	Other notes:
Priority 2 BMPs- with subsurface drains installed above the capture volume.	Rain Garden	P2-01	Rain Garden						x	x						
	Roadside Bioretention	P2-02	Roadside Bioretinton - Flush Design Roadside						x	x			✓			
		P2-03	Roadside Bioretenion- Contiguous SW						x	x						
		P2-04	Roadside Bioretenion- Curb Opening						x	x			✓			
		P2-05	Roadside Bioretenion- No C & G						x	x			✓			
	Pervious Pavement	P2-06	Vegetated Buffer Strip						x	x			✓			
	Constructed Wetlands	N/A	N/A						x	x						

STORM WATER CALCULATOR

BMP Tributary Parameters

Project Name: **Pullman Lofts Phase 2**

BMP ID:	1
BMP Design Criteria:	~~Treatment Only~~ 100% Volume Capture
Type of BMP Design:	Priority 2: P2-05 Roadside Bioretention - No Curb AND Gutter
BMP's Physical Tributary Area:	3,786.0 ft^2
Description/Notes:	

Hydromodification Requirement: 100% Volume Capture; $V_{HYDROMOD}$

$V_{HYDROMOD}$ = 142.05 ft^3

Post development hydrologic soil type within tributary area:	B: 0.15 - 0.30 in/hr infiltration (transmission) rate
Post development ground cover description:	Urban districts - Commercial and business
CN_{POST} :	
User Composite post development CN:	93.0

BMP Sizing Tool: Hydromodification Requirement

Percent of Goal Achieved = 101.71 %

	BMP Volume Below Ground		Ponded Water Above Ground	
Porosity:	0.30			
Depth below perforated pipe if present:	3.20	ft		
Depth:			0.00	ft
Width:	3.50	ft	0.00	ft
Length:	43.00	ft	0.00	ft
Area:	0.00	ft^2	0.00	ft^2

STORM WATER CALCULATOR

BMP Tributary Parameters

Project Name: **Pullman Lofts Phase 2**

BMP ID:	2
BMP Design Criteria:	~~Treatment Only~~ 100% Volume Capture
Type of BMP Design:	Priority 2: P2-04 Roadside Bioretention - Curb Opening
BMP's Physical Tributary Area:	5,120.0 ft^2
Description/Notes:	

Hydromodification Requirement: 100% Volume Capture; $V_{HYDROMOD}$

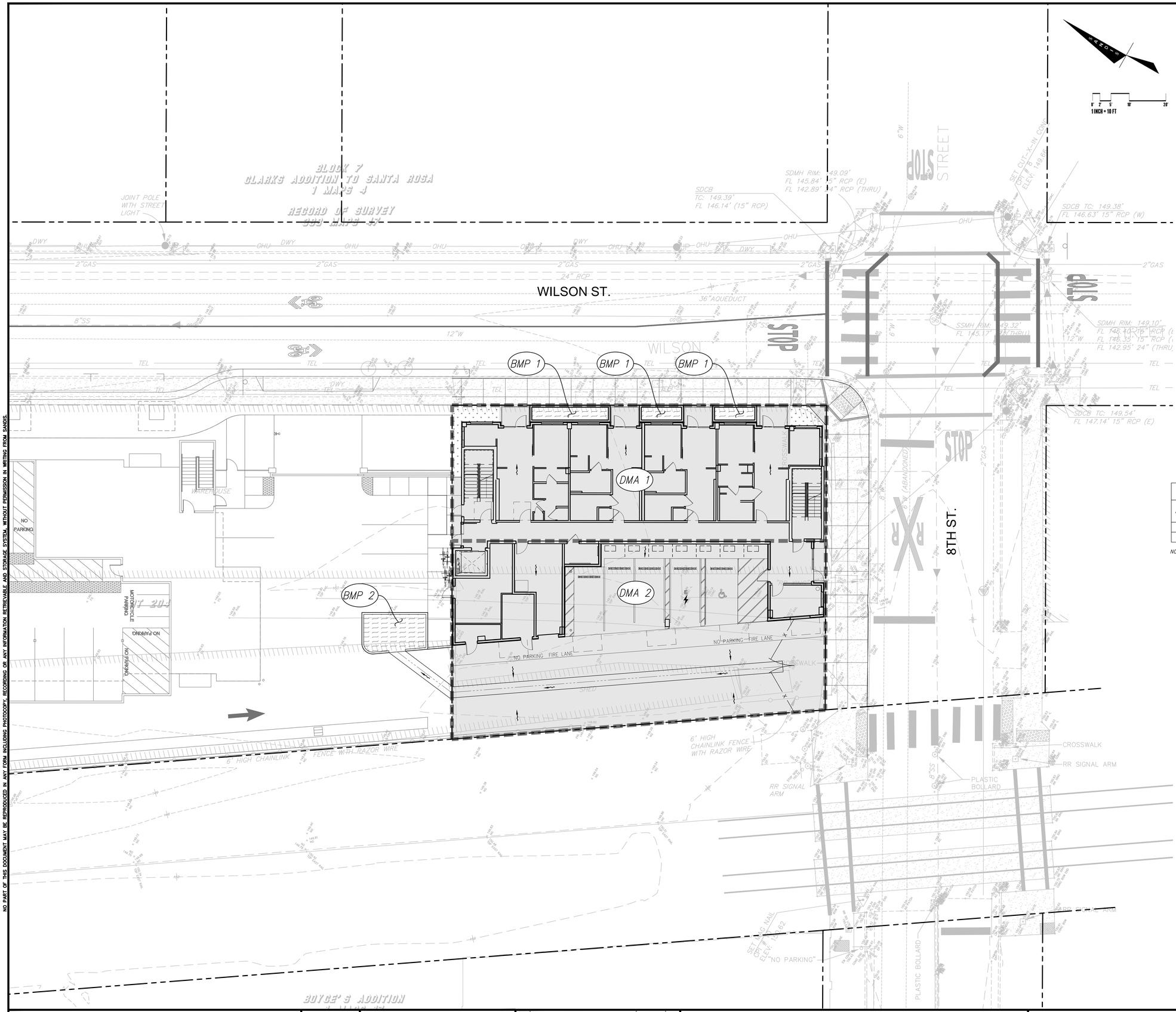
$V_{HYDROMOD}$ = 192.10 ft^3

Post development hydrologic soil type within tributary area:	B: 0.15 - 0.30 in/hr infiltration (transmission) rate
Post development ground cover description:	Urban districts - Commercial and business
CN_{POST} :	
User Composite post development CN:	93.0

BMP Sizing Tool: Hydromodification Requirement

Percent of Goal Achieved = 100.49 %

	BMP Volume Below Ground		Ponded Water Above Ground	
Porosity:	0.30			
Depth below perforated pipe if present:	3.90	ft	Depth: 0.00	ft
Width:	0.00	ft	Width: 0.00	ft
Length:	0.00	ft	Length: 0.00	ft
Area:	165.00	ft^2	Area: 0.00	ft^2



0' 2' 5' 10' 20'
1 INCH = 10 FT

STORMWATER MANAGEMENT PLAN LEGEND

- PROPOSED PERVIOUS AREA
- PROPOSED IMPERVIOUS AREA
- BIORETENTION PLANTER
- DRAINAGE AREA BOUNDARY
- FLOW LINE
- FLOW DIRECTION

STORMWATER MANAGEMENT NOTES:

1. THIS PLAN PRESENTS METHODS AND CALCULATIONS FOR COMPLYING WITH THE REQUIREMENTS OF ORDER NO. R1-2015-0030 IN ACCORDANCE WITH SANTA ROSA'S 2020 STORM WATER LOW IMPACT DEVELOPMENT TECHNICAL DESIGN MANUAL.
2. THE FOLLOWING TREATMENT MEASURES ARE PROPOSED TO REGULATE THE QUALITY AND VOLUME OF STORM WATER LEAVING THE SITE.
   - 2.1. BIORETENTION PLANTER – RUNOFF FROM ROOFTOPS AND PAVEMENT IS DIRECTED TO BIORETENTION PLANTERS TYPICALLY LOCATED NEAR BUILDINGS OR COMMON OPEN AREAS. THESE PLANTERS FUNCTION AS A SOIL AND PLANT-BASED FILTRATION SYSTEM WHICH REMOVES POLLUTANTS THROUGH PHYSICAL, BIOLOGICAL, AND CHEMICAL TREATMENT PROCESSES.

STORMWATER TREATMENT MEASURES

AREA ID	IMPERVIOUS AREA (SF)	PERVIOUS AREA (SF)	TOTAL AREA (SF)	BMP TYPE	BMP ID	BMP AREA (SF)	STRUCUTRAL SOIL DEPTH (FT)
DMA-1	3,503	233	3,786	BIORETENTION PLANTER	1	150.5	3.2
DMA-2	5,120	0	5,120	BIORETENTION PLANTER	2	165	3.9

NOTES: SEE CITY OF SANTA ROSA STORMWATER CALCULATOR RESULTS FOR FURTHER BMP SIZING INFORMATION.

SANDIS
BUILD ON. SANDIS.NET

DATE: 11-23-2021
SCALE: 1"=10'
PROJECT No.: 621092

No.	REVISION	DATE	BY
	ISSUED FOR PERMIT	04/08/22	RES

PULLMAN LOFTS - PHASE II
BUILDING C
SANTA ROSA CALIFORNIA

STORMWATER MANAGEMENT PLAN

SHEET C5.0

File: X:\P\621092\4_ENGINEERING\2_PLAN SETS\3_SHEET SET\ONSITE\C5.0 STORMWATER PLAN.dwg Date: Jun 08, 2022 - 1:30 PM

FINAL STORM WATER MITIGATION PLAN

THE PULLMAN LOFTS

OCTOBER 2018
(REVISED MARCH 2021)

CIVIL DESIGN CONSULTANTS, INC.
2200 Range Avenue, Suite 204
Santa Rosa, CA 95403
(707) 542-4820

FINAL
STORM WATER MITIGATION PLAN

FOR

THE PULLMAN LOFTS

Location

701 Wilson St
Santa Rosa, CA

APN 010-091-005

Prepared for

Phoenix Development Company
1620 Olivet Road
Santa Rosa, CA 95401

October 2018
(Revised March 2021)

Prepared by

CIVIL DESIGN CONSULTANTS, INC.
2200 RANGE AVENUE, SUITE 204
SANTA ROSA, CA 95403

14-107

CONTENTS

ATTACHMENTS

1 INTRODUCTION

The Pullman Lofts project site is within the permit boundary of the recently adopted NPDES MS4 Storm Water Permit which regulates discharges into the watershed with the intent to reduce storm water pollution and protect the water quality of our local creeks and waterways and continue to promote groundwater recharge. The City of Santa Rosa and the County of Sonoma have adopted the Storm Water Low Impact Development (LID) Technical Design Manual. This Final Storm Water Mitigation Plan (FSWMP) was developed to show compliance with its requirements.

SUSMP requirements are part of the Storm Water Management Plan that is an enforceable part of the reissued municipal storm water National Pollutant Discharge Elimination System (NPDES) permit for the City of Santa Rosa, the County of Sonoma and the Sonoma County Water Agency. Satisfying the SUSMP and the NPDES Permit will require meeting the following goals to the maximum extent practicable:

1. Prevent pollutants generated at the site from leaving the site.

2. Prevent increases in Storm Water runoff for the 85th percentile 24-hour storm.

3. Strive to maximize the amount of land left in a natural undisturbed condition.

This FSWMP will provide the following information:

- Project Description
- Pollution Prevention Measures
- Types of BMP selected to mitigate pollutants and provide volume capture.
- Responsibility for BMP maintenance
- Location and design of BMP (on project drawings)

2 PROJECT DESCRIPTION

The Pullman Lofts project site is located within the Historic Railroad Square Area in the northwest quadrant of the City of Santa Rosa. The property address is 701 Wilson Street.

The Pullman Lofts property has a total area of 1.84 acres and is contained within a single assessor parcel, APN 010-091-005. The site is primarily developed for industrial use and contains a number of warehouses and shed type structures, along with a historic building.

The project is proposed by the Phoenix Development Company as a single, non-phased project. The project proposes to construct 72 apartment units within two buildings with associated parking and site amenities on 1.63 acres, and the historic building mentioned previously with an emergency fire access on the remaining 0.21 acres. There will also be some widening of the existing public streets along the project frontage bringing the total project area to 2.04 acres.

The project will collect overland flow and route it to a series of proposed bio-retention beds and permeable pavement with volume capture before entering the underground drainage system. These pre-treatment design features shall not only remove pollutants, but also will reduce the amount of runoff by capturing and infiltrating storm water onsite. The bio-retention beds and and permeable pavement sections are proposed throughout the project site, providing treatment for each of the site tributaries. The purpose of these devices and their effect on the quality and quantity of runoff leaving the developed site will be further explained throughout this report.

The attached plan titled “FSWMP Hydrology Map” shows the proposed grading pattern for the project along with the drainage tributary areas and proposed bio-retention beds and permeable pavement sections with volume capture. Also shown on the plan are the BMP details showing volume capture designed to meet the delta volume capture goal.

3 POLLUTION PREVENTION MEASURES

The roof drains of the apartment complex will be disconnected from the storm drain system. Splash blocks will be used at roof leader locations, dissipating and directing rooftop drainage to one of the proposed vegetated swales. Drainage will then be directed to a mitered drain inlet where it can be transported via storm drain pipe to gutter flow and into one of the proposed BMP features.

A percentage of the onsite parking and gutter pan area will be constructed using permeable pavement. Additionally, this pollution prevention measure will incorporate a volume capture area beneath its limits.

The project will incorporate a robust Landscape plan including interceptor trees that will be planted throughout the common area and in tree wells along the frontage to the existing streets.

The total tributary area used for volume capture calculations has been reduced by taking credit for these measures.

4 TYPES OF BMP'S SELECTED TO MITIGATE POLLUTANTS AND PROVIDE VOLUME CAPTURE

Best Management Practices (BMP's) are design features that address the quality and quantity of the storm waters that flow from a development. In most cases, these BMP's are used to mitigate a development's impact on the quality of storm water by treating or cleaning the storm water. Some controls have dual treatment control measure capabilities, not only treating, but also containing a required volume of storm water. The Pullman Lofts project will implement bio-retention beds and permeable pavement to mitigate pollutants and provide volume capture for the 85th percentile 24-hour storm. Volume capture is accomplished by incorporating an area for storm water storage beneath the bio-retention beds and permeable pavement.

Bio-retention beds have been selected for this project because of their ability to remove pollutants through a variety of natural physical, biological and chemical treatment processes. These BMP's are considered a Low Impact Development (LID) device for treatment control. They have also been selected because they provide an excellent opportunity for the runoff to settle any suspended solids and remove hydrocarbons. Both of which have been identified as pollutants that can degrade the downstream receiving waters of the project. Compared to pipe networks, bio-retention beds with gravel storage areas will reduce runoff from the site and provide ground water recharge. For this project we have selected structural soil consisting of ¾ inch to 1-½ inch aggregate for the storage area which has a porosity of 30%. The structural soil will also provide an environment for landscaping to thrive. This provides the opportunity to reduce the peak flow in a basin.

Permeable pavement has been selected for this project in order to satisfy Cal Green requirements, which indicate a certain percentage of hardscape areas must be permeable. The permeable pavement section requires 12" of ¾ inch to 1-½ inch drain rock – which has a porosity of 40% – beneath a perforated pipe for structural stability.

This project meets the design goal by achieving the 100% volume capture goal.

5 RESPONSIBILITY FOR BMP MAINTENANCE

The property owner will be responsible for the surface and sub-surface oversight and maintenance of the private BMPs located on the project.

Attached is a Draft of the Declaration of Covenants Regarding Maintenance of Storm Water BMP Facilities.

FOR OFFICE USE ONLY:
Does Project require permanent storm water BMP's?

Y ◯ N ◯

Review Fee Paid?

Y ◯ N ◯

Print Form

City of Santa Rosa

DETERMINATION WORKSHEET

PURPOSE: Use this form to determine whether or not this project will need to incorporate permanent Storm Water Best Management Practices (BMP's) and submit a Standard Urban Storm Water Mitigation Plan (SUSMP).
APPLICABILITY: Requred with all entitilement application packages, improvement plans and building permit applications. Information presented on this worksheet must reflect the final development condition.

Part 1: Information

The Pullman Lofts	Phoenix Development Company
Project Name	*Applicant Name
701 Wilson Street	1620 Olivet Road
Site Address	Mailing Address
Santa Rosa / 95401	Santa Rosa / CA / 95401
City/Zip	City/State/Zip
	707-528-3631 / lorenb@phoenixdevco.com
Permit Number(s) - if applicable	Phone/Email/Fax
Civil Design Consultants, Andy Bordessa	2200 Range Avenue, Suite 204
Engineer Name	Mailing Address
Santa Rosa / CA / 95403	707-542-4820 / andy@civildesignconsultants.com
City/State/Zip	Phone/Email

Type of Application/Project:

☐ Subdivision ☐ Grading Permit ☐ Building Permit

☒ Design Review ☒ Use Permit ☐ Other _____

*Applicant is the owner or developer.

Part 2: Other Regulatory Determinations

Initial Determination:

1. Does this Project create or replace 10,000 sq ft or more of impervious surface?

☒ **YES:** Complete the remainder of this worksheet.

☐ **NO:** Continue with this worksheet.

CALGREEN:

2. Does this Project require a non-residential building permit for a newly constructed building without sleeping accomodations? [1]

☐ **YES:** this project must implement permanent Storm Water BMP's and be designed in accordance with the Storm Water Low Impact Development (LID) Technical Design Manual due to CALGreen requirements. **Skip to page 6 and sign the "acknowledgement signature section."**

☒ **NO:** Complete the remainder of the worksheet.

Section 401:

3. Does this Project require a section 401 permit? [2]

☐ Yes ☒ No

3A. if YES, are any of the following a component of this project? (Check all that apply)

☐ Disturbance of 1 acre or more of soil

☐ New Outfall

☐ Any new impervious surface

If you checked any of the boxes in section 3A, please be advised that this Project will require North Coast Regional Water Quality Control Board review and permanent Storm Water BMP's designed in accordance with the Low Impact Development (LID) Technical Design Manual. Skip to page six and sign the "acknowledgement signature section."

1. Additions, alterations, repairs and existing structures are not subject to the requirements of CALGreen. For further information on determining building permit requirements, contact the govering agency's building department.
2. A 401 permit is required from the North Coast Regional Water Quality Control Board (NCRWQCB) if any part of this project is located within or adjacent to "waters of the State" which can be a creek, drainage ditch, wetland or any seasonal waterway.For further information on determining 401 Permit requirements, contact the North Coast Regional Water Quality Control Board.

PART 3: Exemptions

1. Is this a ***routine maintenance activity*** [3] that is being conducted to maintain original line and grade, hydraulic capacity, and original purpose of facility such as resurfacing existing roads and parking lots?
Yes ☐ No ☒

2. Is this an ***emergency redevelopment activity***[4] required to protect public health and safety?
Yes ☐ No ☒

3. Is this a project undertaken solely to install or reinstall ***public utilities*** (such as sewer or water lines) that does not include any additional street or road development or development activities?
Yes ☐ No ☒

4. Is this a ***reconstruction project***, undertaken by a ***public agency***[5], of street or roads remaining within the original footprint and less than 48 feet wide?
Yes ☐ N o ☒

5. Is this a stand alone pedestrian pathway, trail or off street bike lane?
Yes ☐ No ☒

Did you answer "YES" to any of the above questions in Part 3?

☐ **YES: Stop.** This project is exempt and will not need to incorporate permanent storm water Best Management Practices. **Please go to Page 6 and complete the exemption signature section.**

☒ **NO:** Proceed to Part 4 below to see if this project will need to incorporate permanent Storm Water BMP's.

Part 4: Project Triggers

Projects that Trigger Requirements:
Please answer the following questions to determine whether this project requires permanent Storm Water BMP's and the submittal of a SUSMP.

1. Does this ***development or redevelopment project*** create or replace a combined total of 1.0 acres or more of impervious surface[6]? Yes ☒ No ☐

---

3 "***Routine Maintenance Activity***"- This exemption includes activities such as overlays and/or resurfacing of existing roads or parking lots as well as trenching and patching activities and reroofing activities.

4 "***Emergency Redevelopment"-*** The Regional Water Quality Control Board must agree that the activities are needed to protect public health and safety to qualify for this exemption.

5 "***Reconstruction***" is defined as work that replaces surfaces down to subgrade. Street width is measured from face-of-curb to face-of-curb. Overlays, resurfacing, trenching, and patching are considered maintenance activities and are exempt.

6 "***Impervious Surface***" is defined as an area that has been modified to reduce storm water runoff capture and percolation into underlying soils. Such surfaces include rooftops, walkways, and parking areas. Permeable pavementsshall be considered impervious for this section if they have subdrains to preclude infiltration into underlying soils.

2. Does this project create or replace a combined total or 10,000 ft² or more of ***impervious street, roads, highways, or freeway construction or reconstruction?*** Yes ☒ No ☐

3. Does this project include ***four or more new homes***? Yes ☒ No ☐

4. Is this project an ***industrial park***[7] creating or replacing a combined total of 10,000 ft² or more of impervious surface[6]? Yes ☐ No ☒

5. Is this project a ***Commercial strip mall***[8] creating or replacing a combined total of 10,000 ft² or more of impervious surface[6]? Yes ☐ No ☒

6. Is this project a **retail gasoline outlet** creating or replacing a combined total of 10,000 ft² of more or impervious surface[6]? Yes ☐ No ☒

7. Is this project a **restaurant** creating or replacing a combined total of 10,000 ft² or more of impervious surface[6]? Yes ☐ No ☒

8. Is this project a **parking lot** (not included as part of a project type listed above) creating or replacing a combined total of 10,000 ft² or more or impervious surface or with 25 or more parking spaces? Yes ☐ No ☒

9. Is this project an **automotive service facility** creating or replacing a combined total of 10,000 ft² or more or impervious surface[6]? Yes ☐ No ☒

Did you answer "YES" to any of the above questions in Part 4?

☒ **YES**: The project must implement permanent Storm Water BMP's and be designed in accordance with the Storm Water LID Technical Design Manual. Please complete the remainder of this worksheet. sign under the "Acknowledgment Section" on page 6.

☐ **NO: Stop**. The project will **not** need to incorporate permanent Storm Water BMP's. Please continue to Page 6 and complete the exemption signature section.

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7 "***Industrial Park***" is defined as industrial facility or building and associated impervious surface on a site zoned or planned to allow industrial or commercial development (planning for mixed-use residential, industrial or commercial development and redevelopment is included).

8 "***Commercial Strip Mall***" is defined as commercial facility or impervious surface on a site zoned or planned to allow commercial or industrial use (planning for mixed-use residential, industrial or commercial development and redevelopment is included) with street access and onsite parking.

Part 5: Project Description

1. Total Project area: 89,023 Square feet or 2.04 acres.

2. Existing land use(s): (check all that apply)

☐ Commercial ☒ Industrial ☐ Residential ☐ Public Other

Description of buildings, significant site features , etc.:

The site currently contains several warehouse/barn type structures, including a historic building that will remain and be converted into a retail outlet. The site also includes a gravel parking lot, rail road tracks, and a residential lot on the north side.

3. Existing impervious surface area: 59,913 square feet or 1.37 acres.

4. Proposed Land Use (s): (check all that apply)

☐ Commercial ☐ Industrial ☒ Residential ☐ Public Other

Description of buildings, significant site features, etc.:

The proposed site will contain an apartment complex with associated parking and site amenities. Public streets will be slightly widened along the project frontage. A new parking lot is also proposed to serve the existing historic building, which will be renovated to support a retail outlet.

Determination Worksheet

Acknowledgment Signature Section:

As the property owner or developer, I understand that this project is required to implement permanent Storm Water Best Management Practices and the submittal of a SUSMP. Any unknown responses must be resolved to determine if the project is subject to these requirements.

Signature of Property Owner or Developer

9-15-15

Date

Exemption Signature Section:

As the property owner or developer, I understand that this project as currently designed does not require permanent Storm Water BMP's nor the submital of a SUSMP. I understand that redesign may require submittal of a new Determination Worksheet and may require permananet Storm Water BMP's .

Signature of Property Owner or Developer

Date

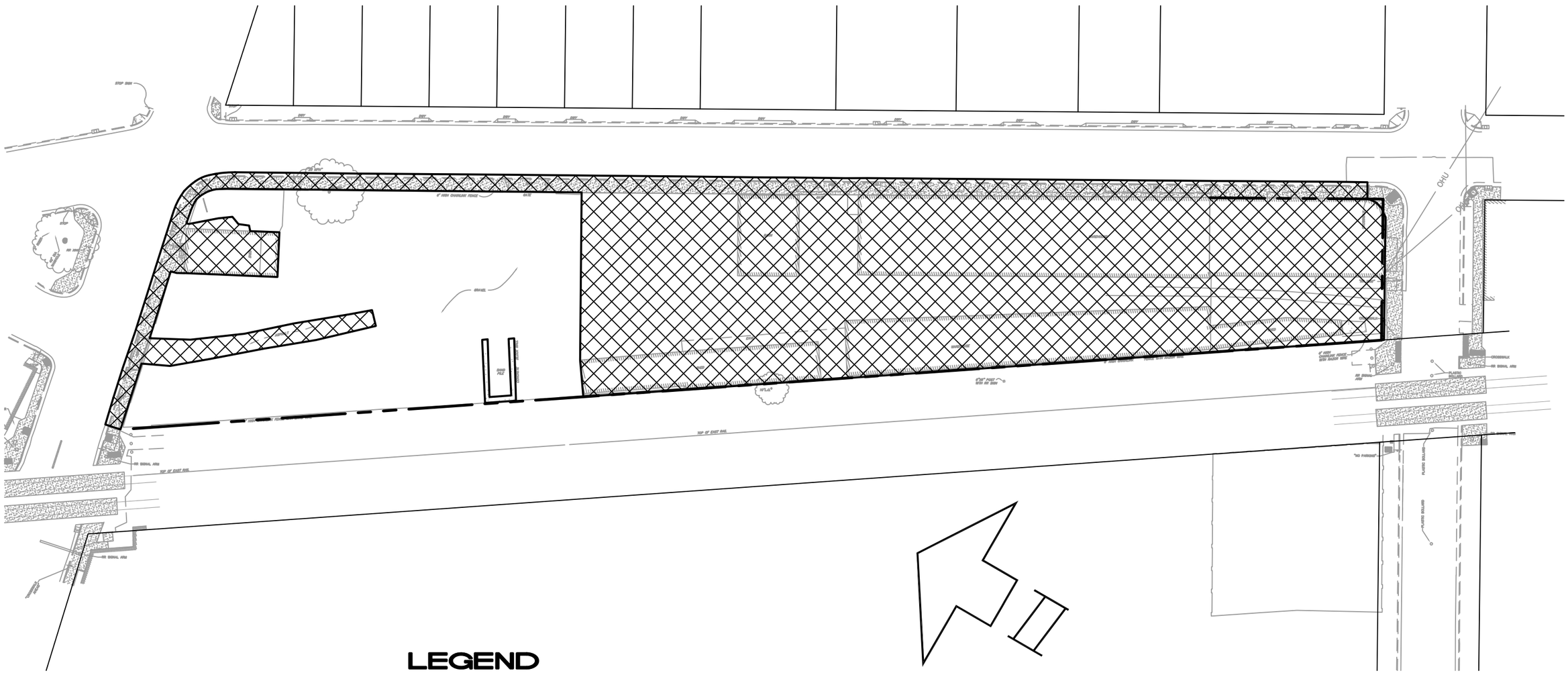
Implementation Requirements: *All calculations shall be completed using the "Storm Water Calculator" available at: www.srcity.org/stormwaterLID*

Design Goal: Capture (infiltration and/or reuse) of 100% of the volume of runoff generated by the 85th percentile 24 hour storm event, as calculated using the "Urban Hydrology for Small Watersheds" TR-55 Manual. 100% volume capture is the ideal condition and if achieved satisfies all requirements so that no additional treatment is required and pages 2 and 3 of this calculator do not need to be completed. This is a retention requirement.

Design Requirements: If the Design Goal of 100% volume capture is not achieved; then both Requirement 1-100% Treatment AND Requirement 2- Volume Capture must be achieved.

Requirement 1: Treatment of 100% of the flow generated by the 85th percentile 24 hour storm event, as calculated using the Rational Method and a know intensity of 0.20 inches per hour.

Requirement 2: Capture (infiltration and/or reuse) of the increase in volume of storm water due to development generated by the 85th percentile 24 hour storm event, as calculated using the "Urban Hydrology for Small Watersheds" TR-55 Manual. This is a retention requirement.



TOTAL AREA = 2.04 AC (89,023 SF)

IMPERVIOUS AREA = 1.37 AC (59,913 SF)

PERVIOUS AREA = 0.67 AC (29,110 SF)

LEGEND

PRE-PROJECT IMPERVIOUS AREAS

0 60 120

SCALE: 1" = 60'

CIVIL DESIGN CONSULTANTS, INC.
2200 Range Avenue, Suite 204
Santa Rosa, CA 95403
(707) 542-4820

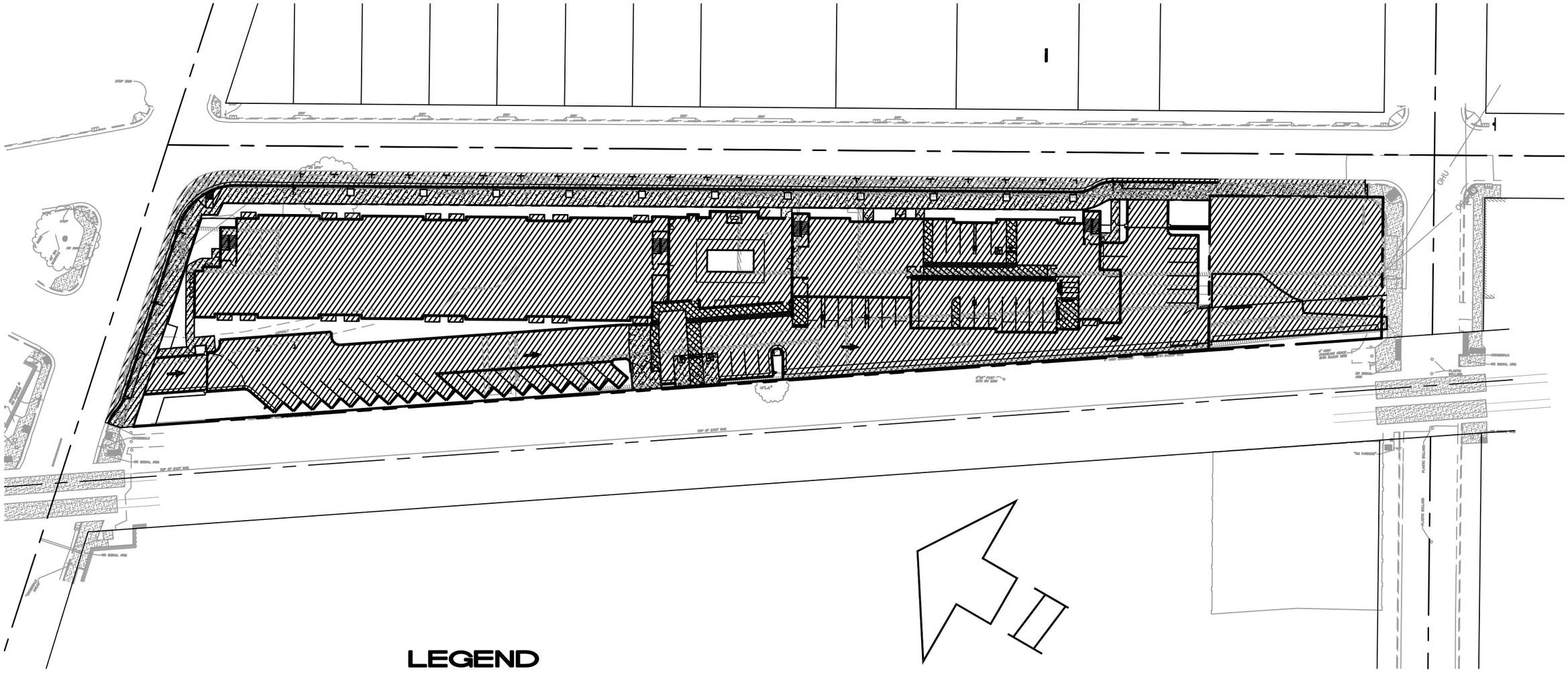
PRE-PROJECT IMPERVIOUS AREA
THE PULLMAN LOFTS

SANTA ROSA, CALIFORNIA

SEPTEMBER 2018

JOB NO. 14-107

SHEET NO. 1 OF 1 SHEET



TOTAL AREA = 2.04 AC (89,023 SF)

IMPERVIOUS AREA = 1.79 AC (77,905 SF)

PERVIOUS AREA = 0.25 AC (11,118 SF)

LEGEND

POST–PROJECT IMPERVIOUS AREAS

0 60 120

SCALE: 1" = 60'

CIVIL DESIGN CONSULTANTS, INC.
2200 Range Avenue, Suite 204
Santa Rosa, CA 95403
(707) 542-4820

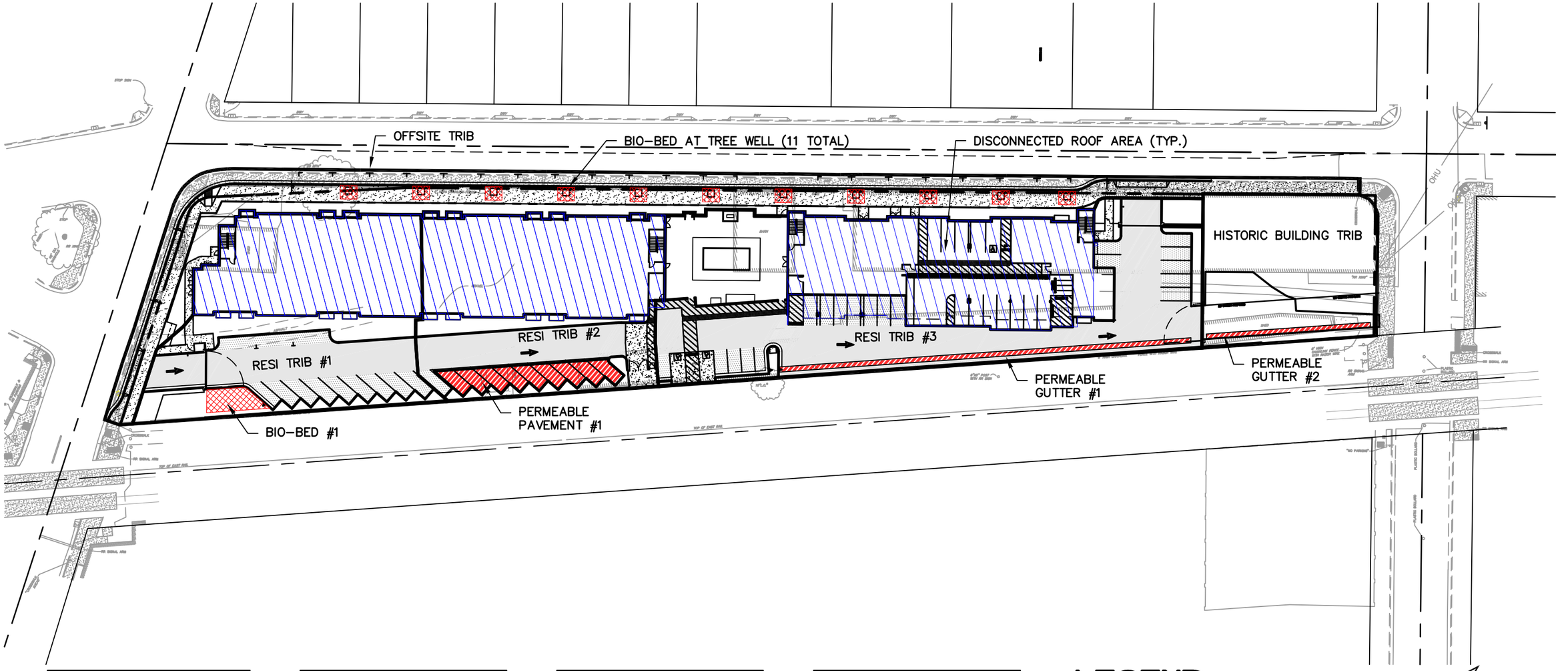
POST–PROJECT IMPERVIOUS AREA
THE PULLMAN LOFTS

SANTA ROSA, CALIFORNIA

MARCH 2021

JOB NO. 14–107

SHEET NO. 1 OF 1 SHEET



VOLUME CAPTURE RESIDENTIAL #1	
VOLUME CAPTURE	AREA (SF)
BIO-BED #1	408

VOLUME CAPTURE RESIDENTIAL #2	
VOLUME CAPTURE	AREA (SF)
PERMEABLE PAVEMENT #1	1,352

VOLUME CAPTURE RESIDENTIAL #3	
VOLUME CAPTURE	AREA (SF)
PERMEABLE GUTTER #1	736
TOTAL	736

VOLUME CAPTURE HISTORIC BUILDING	
VOLUME CAPTURE	AREA (SF)
PERMEABLE GUTTER #2	293
TOTAL	293

(x⅓)

VOLUME CAPTURE OFFSITE	
VOLUME CAPTURE	AREA (SF)
TREE WELL	80
TOTAL	880

(x11)

LEGEND

- BIO-RETENTION BED
- PERMEABLE PAVEMENT / GUTTER PAN
- DISCONNECTED ROOF AREA
- TRIBUTARY BOUNDARY

0 60 120

SCALE: 1" = 60'

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Santa Rosa, CA 95403
(707) 542-4820

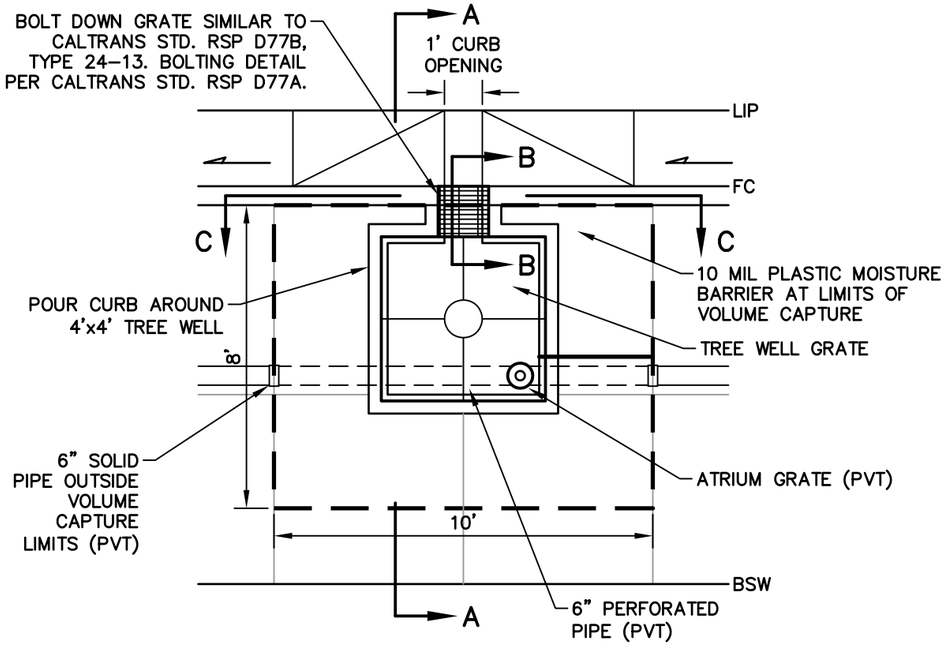
FSWMP HYDROLOGY MAP
THE PULLMAN LOFTS

SANTA ROSA, CALIFORNIA

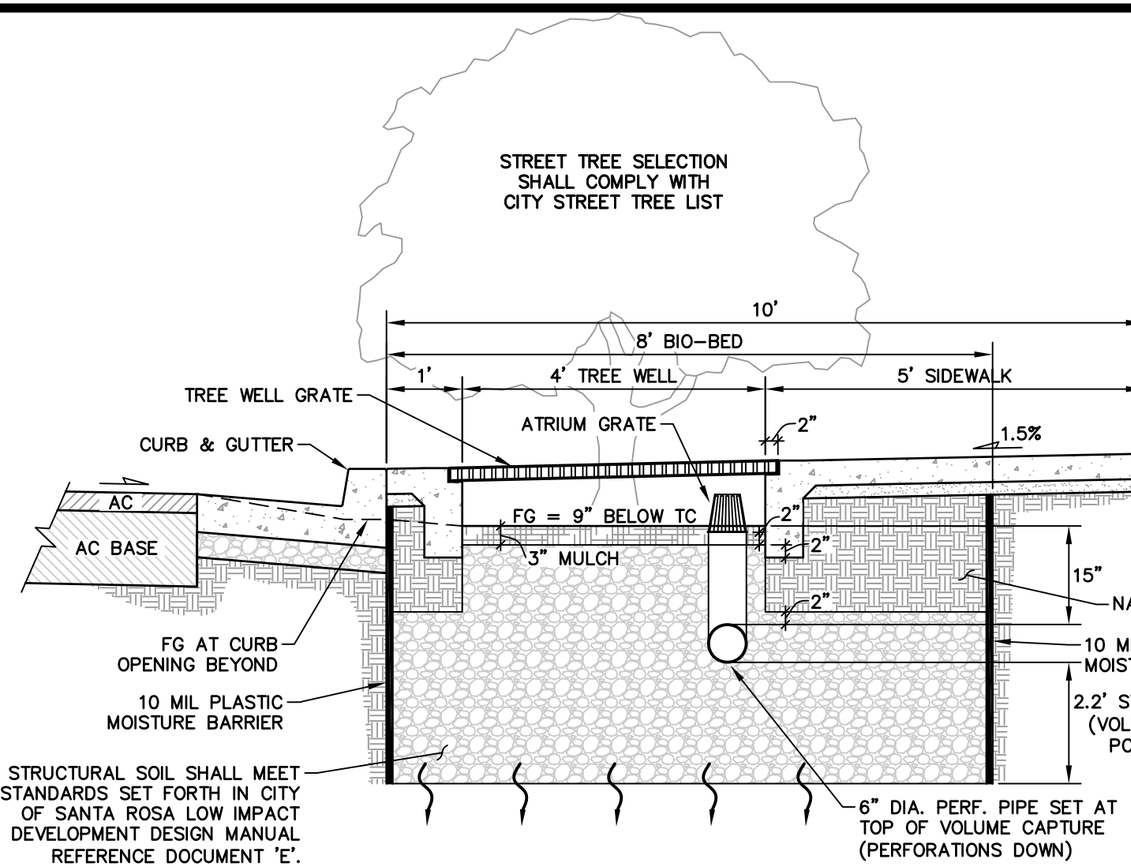
MARCH 2021

JOB NO. 14-107

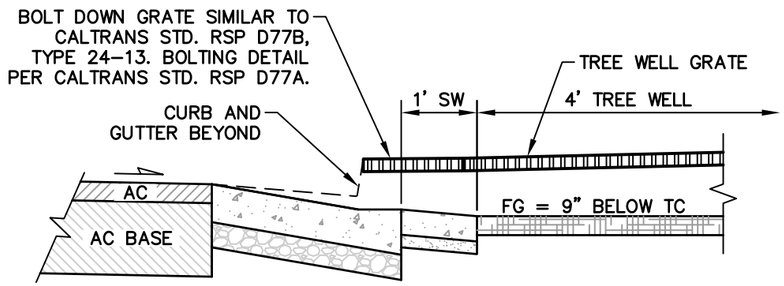
SHEET NO. 1 OF 1 SHEET



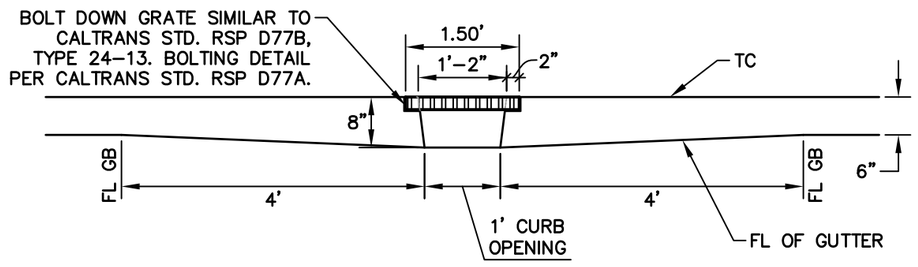
PLAN



SECTION A – A



SECTION B – B



SECTION C – C

1 TREE WELL WITH VOLUME CAPTURE DETAIL

NO SCALE

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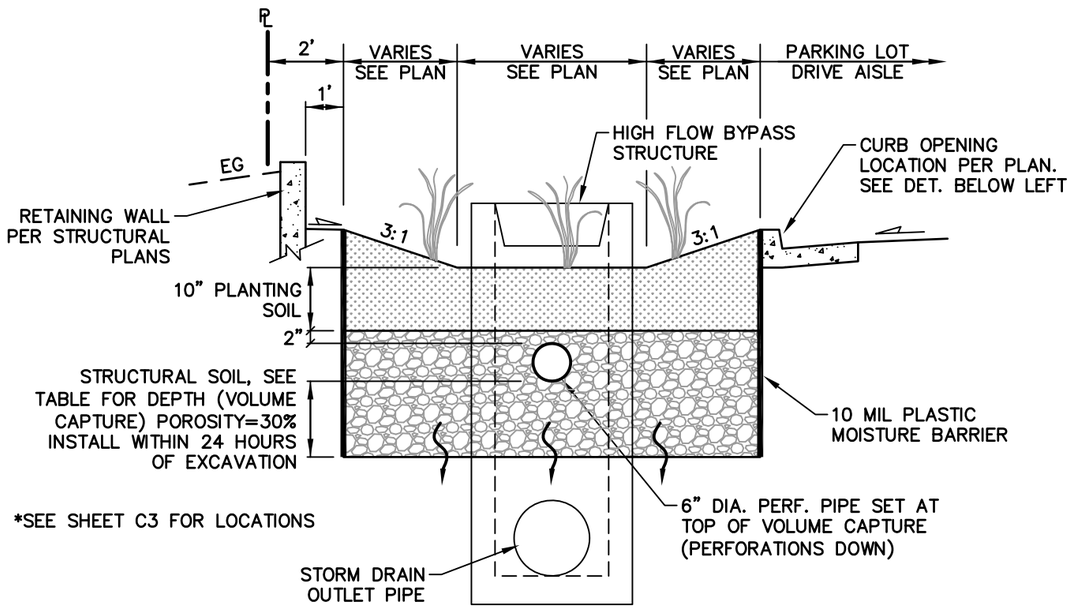
BMP DETAILS
THE PULLMAN LOFTS
SANTA ROSA, CALIFORNIA
MARCH 2021

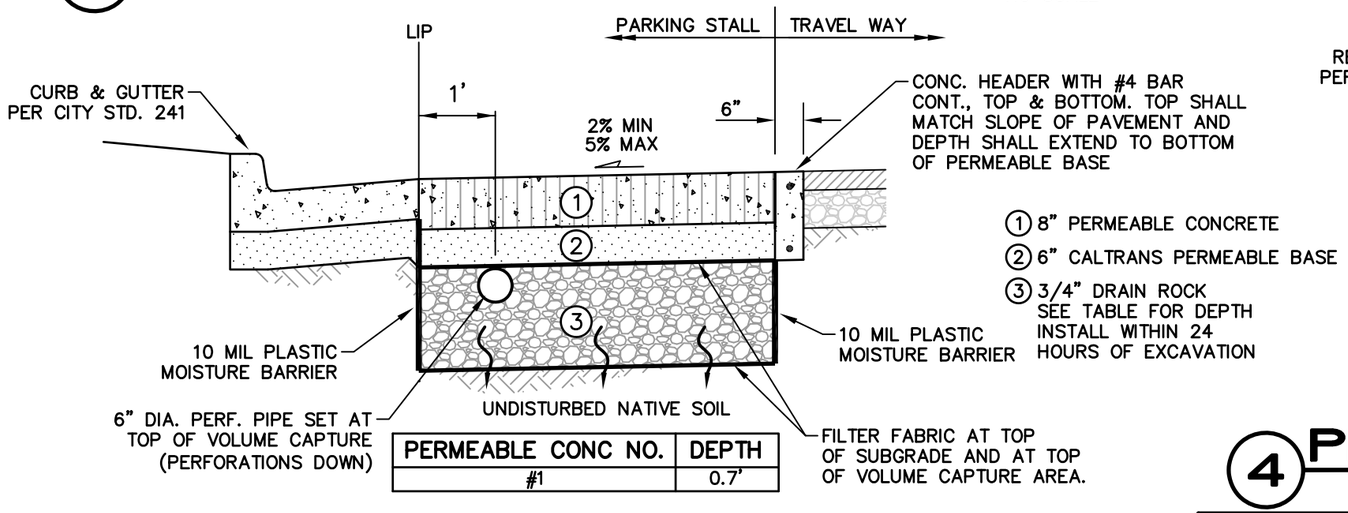
JOB NO. 14–107
SHEET NO. 1 OF 2 SHEET



BIO-BED NO.	DEPTH
#1	4.0'

2 BIORETENTION DETAIL

NO SCALE

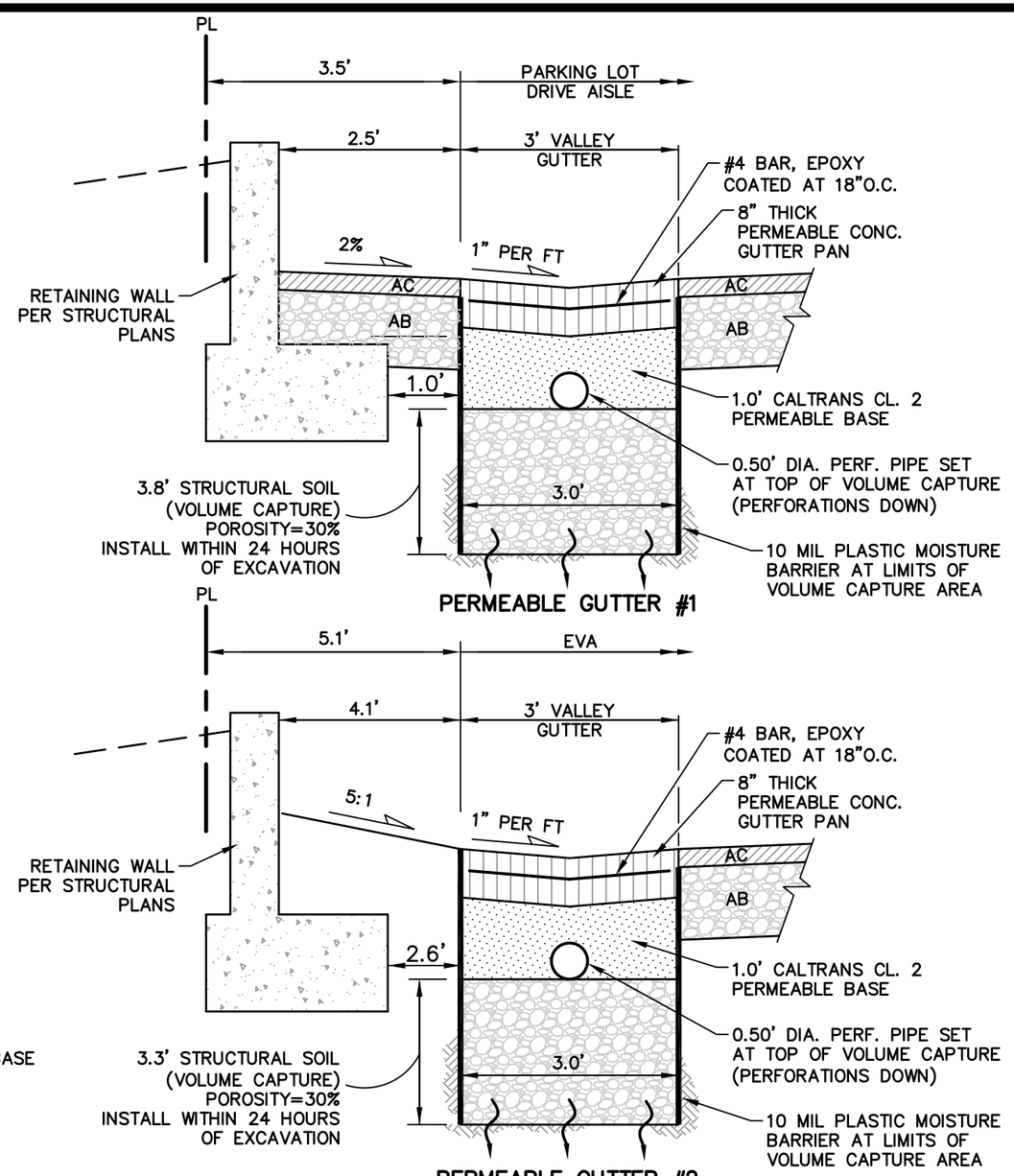


① 8" PERMEABLE CONCRETE
② 6" CALTRANS PERMEABLE BASE
③ 3/4" DRAIN ROCK SEE TABLE FOR DEPTH INSTALL WITHIN 24 HOURS OF EXCAVATION

PERMEABLE CONC NO.	DEPTH
#1	0.7'

3 PERMEABLE CONCRETE PARKING

NO SCALE



4 PERMEABLE GUTTER

NO SCALE

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BMP DETAILS
THE PULLMAN LOFTS
SANTA ROSA, CALIFORNIA
MARCH 2021

JOB NO. 14-107
SHEET NO. 2
OF 2 SHEET

STORM WATER CALCULATOR*

***For example only, go to www.srcity.org/stormwaterlid for the latest version of the calculator**

Project:	The Pullman Lofts
Address/Location:	701 Wilson St
Designer:	Matt Lawton
Date:	March 30, 2021
Inlet Number/Tributary Area/BMP:	Offsite Tributary

NOTE: In order for this calculator to function properly **macros must be enabled**.

Physical Tributary Area that drains to Inlet/BMP = **18,679** ft²

This portion of the Storm water Calculator is designed to account for pollution prevention measures implemented on site. Additional information and description of these measures can be found in the Fact Sheets in Appendix F and in Chapter 4 of the narrative.

Disconnected Roof Drains [1]

Input:

Select disconnection condition: **Runoff is directed across landscape; Width of area: 5' to 9'**
Condition Factor = **0.25**

Method 1: Based on the total rooftop drainage area - to be used if rooftop information is known.

Input:

Enter amount of rooftop area that drain to disconnected downspouts = **0** ft²
Rooftop Area Factor = **0.00** Rooftop Area Factor= (Total Rooftop Disconnected Area/Tributary Area)

Solution:

Area reduction = (Physical Tributary Area x Conditional Factor x Rooftop Area Factor)

(18,679 x 0.25 x 0.00) = **0.00** ft² **Rooftop Drainage Area Reduction**

Method 2: Based on density (units per acre) - to be used if rooftop information is unknown.

Input:

Enter percent of rooftop area to be disconnected from downspouts: **0** %

Select Density: **3-4** Units per Acre
Density Reduction Factor= **0.19**

NOTE:
Either Method 1 (rooftop area) or Method 2 (density) can be used. Providing input for both methods will cause an error. If rooftop area information is available, Method 1 should be used.

Solution:

Area reduction = (Physical Tributary Area x Conditional Factor x Percent Disconnected x Density Factor)

(18,679 x 0.25 x 0.00 x 0.19) = **0.00** ft² **Density Reduction**

[1] *See "Impervious Area Disconnection" Fact Sheet in Appendix E for further details.*

[2] See "Interceptor Trees" Fact Sheet in Appendix E for further details and see "Plant and Tree List" in Appendix G for approved trees.

[3] See "Vegetated Buffer Strip" and "Bovine Terrace" Fact Sheets in Appendix E for further details.

[4] *Total area reductions due to pollution Prevention Measures cannot exceed 50% of the physical Tributary Area.*

[5] *Per the "Urban Hydrology For Small Watersheds" TR-55 manual.*

[6] *Q in feet of depth as defined by the "Urban Hydrology For Small Watersheds" TR-55 Manual.*

[7] *From Sonoma County Water Agency Flood Control Design Criteria.*

[8] *Hydrologic soil type based of infiltration rate of native soil as defined by "Urban Hydrology For Small Watersheds" TR-55 Manual.*

[9] *Composite CN calculated per "Worksheet 2 Part 1 of the Urban Hydrology For Small Watersheds" TR-55 manual.*

[10] From "Using Site Design to Meet Development Standards For Storm water Quality" by the Bay Area Storm water Management Agencies Association (BASMAA).

Paved Area Disconnection [1]

Paved Area Type (select from drop down list): Not Directly-connected Paved Area
Multiplier = 1

Enter area of alternatively designed paved area: 0 ft^2

Area Reduction = 0.00 ft^2

INSTRUCTIONS:
Calculates the area reduction credit for driveways designed to minimize runoff. Enter type and area of alternate design.

Interceptor Trees [2]

Number of new ***Evergreen Trees*** that qualify as interceptor trees= 0 **New Evergreen Trees**

Area Reduction due to new Evergreen Trees= 0 ft^2 (200 ft^2/tree)

Number of new ***Deciduous Trees*** that qualify as interceptor trees= 11 **New Deciduous Trees**

Area Reduction due to new Deciduous Trees= 1,100 ft^2 (100 ft^2/tree)

Enter square footage of qualifying **existing tree canopy** = 0 **Existing Tree Canopy**

Allowed reduction credit for existing tree canopy= 0 ft^2 Allowed credit for existing tree canopy = 50 % of actual canopy square footage

Area Reduction = 1,100 ft^2 = Sum of areas managed by evergreen + deciduous + existing canopy

NOTE:
Total Interceptor Area Reduction is limited to 50% of the physical tributary area.

INSTRUCTIONS:
Calculates the area reductions credit due to interceptor trees. Includes both new and existing trees. Enter the number of new deciduous and evergreen trees and the canopy area of existing trees.

Buffer Strips & Bovine Terraces [3]

Enter area draining to a Buffer Strip or Bovine Terrace = 0 ft^2

Buffer Factor = 0.7

Solution:

Area Reduction = (Area draining to Buffer Strip or Bovine Terrace) x (Buffer Factor) =

Area Reduction = 0.00 ft^2

INSTRUCTIONS:
Calculates the area reduction credit due to buffer strips and/or bovine terraces. Runoff Must be direct to these features as sheet flow. Enter the area draining to these features.

Revised Tributary Area due to Pollution Prevention Measures

Physical Tributary Area =	18,679	ft^2
Tributary Area Reduction due to Pollution Prevention Measures[4] =	1,100.00	ft^2
Reduced Tributary Area to be used for Calculations =	17,579	ft^2

This worksheet calculates the quantity of storm water that needs to be addressed (captured and/or treated) to comply with the NPDES Storm Water Permit issued to the City of Santa Rosa and County of Sonoma by the North Coast Regional Water Quality Control Board.

Design Goal: 100% Volume Capture

Capture (infiltration and/or reuse) of 100% of the volume of runoff generated by the 85th percentile 24 hour storm event.

Formulas:

$$S = \frac{1000}{CN} - 10$$

Where:
S= Potential maximum retention after runoff (in)[5]
CN= Curve Number [5]

$$Q = \frac{[(P*K)-(0.2*S)]^2}{[(P*K)+(0.8*S)]} \times \frac{1ft}{12"}$$

Where:
Q= Runoff depth (ft) [6]
P= Precipitation (in) = **0.92**
K= Seasonal Precipitation Factor [7]

0.92 inches in the Santa Rosa area, based on local historical data.

$V = (Q)(A_r)$

Where:
V= Volume of Storm Water to be Retained (ft^3)
A_r= Reduced Tributary Area including credit for Pollution Prevention Measures (ft^2)

Input: (Pick data from drop down lists or enter calculated values)

A_r =	17,579	ft^2
K [7] =	1.00	

Drop down Lists

Select post development hydrologic soil type within tributary area[8] = **B: 0.15 - 0.30 in/hr infiltration (transmission) rate**

Select post development ground cover description [5] = **Urban districts - Commercial and business**

CN_{POST} =	92
OR: Composite post development CN [9] =	93

NOTE:
Entering a calculated composite CN will override selections made from the pull down menu above. Calculation worksheet should be used for all composite calculations and included with submittal.

Solution:

Volume of storm water - Post Development

S_{POST}= 0.75269 in

$$S_{POST} = \frac{1000}{93} - 10$$

Where:
S_{POST}= Post development potential maximum retention after runoff (in).

Q_{POST}= 0.03251 ft

$$Q_{POST} = \frac{[(0.92 * 1.00)-(0.2 * 0.75)]^2}{[(0.92 * 1.00)+(0.8 * 0.75)]} \times \frac{1ft}{12in}$$

Q_{POST}= *Q in feet of depth as defined by the "Urban Hydrology For Small Watersheds" TR-55 Manual.*

V_{GOAL}= 571.49 ft^3

$V_{GOAL} = (0.03251)(17,579)$

V_{GOAL}= Post Development Volume of Storm Water to be Retained (ft^3)

INSTRUCTIONS:
This Design Goal of 100% Capture is the ideal condition and if achieved satisfies all requirements so that no additional treatment is required and pages 4 and 5 of this calculator do not need to be completed.

NOTE:
If the Design Goal of 100% Capture is not achieved, 100% Treatment AND Volume Capture must be achieved and both pages 4 and 5 of this calculator need to be completed.

LID BMP Sizing Tool: 100% Volume Capture Goal; V_{GOAL}

NOTE:
LID Sizing Tool only applicable for volume based BMPs. Not required if site requires treatment only.

INSTRUCTIONS:
The 100% volume capture sizing tool helps the designer appropriately size a LID BMP to achieve the design goal of 100% volume capture of the post development condition. Enter the percent porosity of the specified soil and depth below perforated pipe (if present). The width and length entries will need to be interactively adjusted until "Percent of Goal" equals 100%.

Formulas:

$V_{LID\ GOAL}=((V_{GOAL}))/(P)$ = **1904.98** ft^3

$A_{LID\ GOAL}=(W)(L)$ = **880.00** ft^2

Where:
$V_{LID\ GOAL}$ = Required volume of soil in LID BMP.
$A_{LID\ GOAL}$ = Footprint of LID BMP area for a given depth (below perforated pipe if present).

V_{GOAL} = **571** ft^3

$$\text{Percent of Goal Achieved} = \frac{(D)(A_{LID\ GOAL})}{V_{LID\ GOAL}} \times 100$$

Where:
P= Porosity (enter as a decimal)
D= Depth below perforated pipe if present (in decimal feet)
W= Width (in decimal feet)
L= Length (in decimal feet)

Input:

P =	0.3		as a decimal
D =	2.2	ft	Below perforated pipe if present
W =	1.0	ft	
L =	880.0	ft	

Solution:

Percent of Goal Achieved = **101.63** **%** = [(2.2 x 880) / 1,905] x 100

STORM WATER CALCULATOR*

***For example only, go to www.srcity.org/stormwaterlid for the latest version of the calculator**

Project:	The Pullman Lofts
Address/Location:	701 Wilson St
Designer:	Matt Lawton
Date:	March 30, 2021
Inlet Number/Tributary Area/BMP:	Residential Tributary #1

NOTE: In order for this calculator to function properly **macros must be enabled**.

Physical Tributary Area that drains to Inlet/BMP = **16,802** ft²

This portion of the Storm water Calculator is designed to account for pollution prevention measures implemented on site. Additional information and description of these measures can be found in the Fact Sheets in Appendix F and in Chapter 4 of the narrative.

Disconnected Roof Drains [1]

Input:

Select disconnection condition: **Runoff is directed across landscape; Width of area: 5' to 9'**
Condition Factor = **0.25**

Method 1: Based on the total rooftop drainage area - to be used if rooftop information is known.

Input:

Enter amount of rooftop area that drain to disconnected downspouts = **8,132** ft²
Rooftop Area Factor = **0.48** Rooftop Area Factor= (Total Rooftop Disconnected Area/Tributary Area)

Solution:

Area reduction = (Physical Tributary Area x Conditional Factor x Rooftop Area Factor)

(16,802 x 0.25 x 0.48) = **2033.00** ft² **Rooftop Drainage Area Reduction**

Method 2: Based on density (units per acre) - to be used if rooftop information is unknown.

Input:

Enter percent of rooftop area to be disconnected from downspouts: **0** %

Select Density: **3-4** Units per Acre
Density Reduction Factor= **0.19**

Solution:

Area reduction = (Physical Tributary Area x Conditional Factor x Percent Disconnected x Density Factor)

(16,802 x 0.25 x 0.00 x 0.19) = **0.00** ft² **Density Reduction**

NOTE:
Either Method 1 (rooftop area) or Method 2 (density) can be used. Providing input for both methods will cause an error. If rooftop area information is available, Method 1 should be used.

[1] *See "Impervious Area Disconnection" Fact Sheet in Appendix E for further details.*

[2] See "Interceptor Trees" Fact Sheet in Appendix E for further details and see "Plant and Tree List" in Appendix G for approved trees.

[3] See "Vegetated Buffer Strip" and "Bovine Terrace" Fact Sheets in Appendix E for further details.

[4] *Total area reductions due to pollution Prevention Measures cannot exceed 50% of the physical Tributary Area.*

[5] *Per the "Urban Hydrology For Small Watersheds" TR-55 manual.*

[6] *Q in feet of depth as defined by the "Urban Hydrology For Small Watersheds" TR-55 Manual.*

[7] *From Sonoma County Water Agency Flood Control Design Criteria.*

[8] *Hydrologic soil type based of infiltration rate of native soil as defined by "Urban Hydrology For Small Watersheds" TR-55 Manual.*

[9] *Composite CN calculated per "Worksheet 2 Part 1 of the Urban Hydrology For Small Watersheds" TR-55 manual.*

[10] From "Using Site Design to Meet Development Standards For Storm water Quality" by the Bay Area Storm water Management Agencies Association (BASMAA).

Paved Area Disconnection [1]

Paved Area Type (select from drop down list): **Porous Pavement**

Multiplier = 1

Enter area of alternatively designed paved area: 0 ft^2

Area Reduction = 0.00 ft^2

INSTRUCTIONS:
Calculates the area reduction credit for driveways designed to minimize runoff. Enter type and area of alternate design.

Interceptor Trees [2]

Number of new ***Evergreen Trees*** that qualify as interceptor trees= 0 **New Evergreen Trees**

Area Reduction due to new Evergreen Trees= 0 ft^2 (200 ft^2/tree)

Number of new ***Deciduous Trees*** that qualify as interceptor trees= 0 **New Deciduous Trees**

Area Reduction due to new Deciduous Trees= 0 ft^2 (100 ft^2/tree)

Enter square footage of qualifying **existing tree canopy** = 0 **Existing Tree Canopy**

Allowed reduction credit for existing tree canopy= 0 ft^2 Allowed credit for existing tree canopy = 50 % of actual canopy square footage

Area Reduction = 0 ft^2 = Sum of areas managed by evergreen + deciduous + existing canopy

NOTE:
Total Interceptor Area Reduction is limited to 50% of the physical tributary area.

INSTRUCTIONS:
Calculates the area reductions credit due to interceptor trees. Includes both new and existing trees. Enter the number of new deciduous and evergreen trees and the canopy area of existing trees.

Buffer Strips & Bovine Terraces [3]

Enter area draining to a Buffer Strip or Bovine Terrace = 0 ft^2

Buffer Factor = 0.7

Solution:

Area Reduction = (Area draining to Buffer Strip or Bovine Terrace) x (Buffer Factor) =

Area Reduction = 0.00 ft^2

INSTRUCTIONS:
Calculates the area reduction credit due to buffer strips and/or bovine terraces. Runoff Must be direct to these features as sheet flow. Enter the area draining to these features.

Revised Tributary Area due to Pollution Prevention Measures

Physical Tributary Area =	16,802	ft²
Tributary Area Reduction due to Pollution Prevention Measures[4] =	2,033.00	ft²
Reduced Tributary Area to be used for Calculations =	14,769	ft²

This worksheet calculates the quantity of storm water that needs to be addressed (captured and/or treated) to comply with the NPDES Storm Water Permit issued to the City of Santa Rosa and County of Sonoma by the North Coast Regional Water Quality Control Board.

Design Goal: 100% Volume Capture

Capture (infiltration and/or reuse) of 100% of the volume of runoff generated by the 85th percentile 24 hour storm event.

Formulas:

$$S = \frac{1000}{CN} - 10$$

Where:
S= Potential maximum retention after runoff (in)[5]
CN= Curve Number [5]

$$Q = \frac{[(P*K)-(0.2*S)]^2}{[(P*K)+(0.8*S)]} \times \frac{1ft}{12"}$$

Where:
Q= Runoff depth (ft) [6]
P= Precipitation (in) = **0.92**
K= Seasonal Precipitation Factor [7]

0.92 inches in the Santa Rosa area, based on local historical data.

$$V = (Q)(A_r)$$

Where:
V= Volume of Storm Water to be Retained (ft³)
A_r= Reduced Tributary Area including credit for Pollution Prevention Measures (ft²)

Input: (Pick data from drop down lists or enter calculated values)

A_r =	14,769	ft²
K [7] =	1.00	

Drop down Lists

Select post development hydrologic soil type within tributary area[8] =	B: 0.15 - 0.30 in/hr infiltration (transmission) rate
Select post development ground cover description [5] =	Urban districts - Commercial and business

CN_{POST} =	92
OR: Composite post development CN [9] =	93

NOTE:
Entering a calculated composite CN will override selections made from the pull down menu above. Calculation worksheet should be used for all composite calculations and included with submittal.

Solution:

Volume of storm water - Post Development

S_{POST}= 0.75269 in

$$S_{POST} = \frac{1000}{93} - 10$$

Where:
S_{POST}= Post development potential maximum retention after runoff (in).

Q_{POST}= 0.03251 ft

$$Q_{POST} = \frac{[(0.92 * 1.00)-(0.2 * 0.75)]^2}{[(0.92 * 1.00)+(0.8 * 0.75)]} \times \frac{1ft}{12in}$$

Q_{POST}= *Q in feet of depth as defined by the "Urban Hydrology For Small Watersheds" TR-55 Manual.*

V_{GOAL}= 480.14 ft³

$$V_{GOAL} = (0.03251)(14,769)$$

V_{GOAL}= Post Development Volume of Storm Water to be Retained (ft³)

INSTRUCTIONS:
This Design Goal of 100% Capture is the ideal condition and if achieved satisfies all requirements so that no additional treatment is required and pages 4 and 5 of this calculator do not need to be completed.

NOTE:
If the Design Goal of 100% Capture is not achieved, 100% Treatment AND Volume Capture must be achieved and both pages 4 and 5 of this calculator need to be completed.

LID BMP Sizing Tool: 100% Volume Capture Goal: V_{GOAL}

NOTE:
LID Sizing Tool only applicable for volume based BMPs. Not required if site requires treatment only.

INSTRUCTIONS:
The 100% volume capture sizing tool helps the designer appropriately size a LID BMP to achieve the design goal of 100% volume capture of the post development condition. Enter the percent porosity of the specified soil and depth below perforated pipe (if present). The width and length entries will need to be interactively adjusted until "Percent of Goal" equals 100%.

Formulas:

$V_{LID\ GOAL}=((V_{GOAL}))/(P)$ = **1600.47** ft^3

$A_{LID\ GOAL}=(W)(L)$ = **408.00** ft^2

Where:
$V_{LID\ GOAL}$ = Required volume of soil in LID BMP.
$A_{LID\ GOAL}$ = Footprint of LID BMP area for a given depth (below perforated pipe if present).

V_{GOAL} = **480** ft^3

$$\text{Percent of Goal Achieved} = \frac{(D)(A_{LID\ GOAL})}{V_{LID\ GOAL}} \times 100$$

Where:
P= Porosity (enter as a decimal)
D= Depth below perforated pipe if present (in decimal feet)
W= Width (in decimal feet)
L= Length (in decimal feet)

Input:

P =	0.3		as a decimal
D =	4.0	ft	Below perforated pipe if present
W =	1.0	ft	
L =	408.0	ft	

Solution:

Percent of Goal Achieved = **101.97** **%** = [(4.0 x 408) / 1,600] x 100

STORM WATER CALCULATOR*

***For example only, go to www.srcity.org/stormwaterlid for the latest version of the calculator**

Project:	The Pullman Lofts
Address/Location:	701 Wilson St
Designer:	Matt Lawton
Date:	March 30, 2021
Inlet Number/Tributary Area/BMP:	Residential Tributary #2

NOTE: In order for this calculator to function properly **macros must be enabled**.

Physical Tributary Area that drains to Inlet/BMP = **15,072** ft²

This portion of the Storm water Calculator is designed to account for pollution prevention measures implemented on site. Additional information and description of these measures can be found in the Fact Sheets in Appendix F and in Chapter 4 of the narrative.

Disconnected Roof Drains [1]

Input:

Select disconnection condition: **Runoff is directed across landscape; Width of area: 5' to 9'**
Condition Factor = **0.25**

Method 1: Based on the total rooftop drainage area - to be used if rooftop information is known.

Input:

Enter amount of rooftop area that drain to disconnected downspouts = **9,381** ft²
Rooftop Area Factor = **0.62** Rooftop Area Factor= (Total Rooftop Disconnected Area/Tributary Area)

Solution:

Area reduction = (Physical Tributary Area x Conditional Factor x Rooftop Area Factor)

(15,072 x 0.25 x 0.62) = **2345.25** ft² **Rooftop Drainage Area Reduction**

Method 2: Based on density (units per acre) - to be used if rooftop information is unknown.

Input:

Enter percent of rooftop area to be disconnected from downspouts: **0** %

Select Density: **3-4** Units per Acre
Density Reduction Factor= **0.19**

NOTE:
Either Method 1 (rooftop area) or Method 2 (density) can be used. Providing input for both methods will cause an error. If rooftop area information is available, Method 1 should be used.

Solution:

Area reduction = (Physical Tributary Area x Conditional Factor x Percent Disconnected x Density Factor)

(15,072 x 0.25 x 0.00 x 0.19) = **0.00** ft² **Density Reduction**

[1] *See "Impervious Area Disconnection" Fact Sheet in Appendix E for further details.*

[2] See "Interceptor Trees" Fact Sheet in Appendix E for further details and see "Plant and Tree List" in Appendix G for approved trees.

[3] See "Vegetated Buffer Strip" and "Bovine Terrace" Fact Sheets in Appendix E for further details.

[4] *Total area reductions due to pollution Prevention Measures cannot exceed 50% of the physical Tributary Area.*

[5] *Per the "Urban Hydrology For Small Watersheds" TR-55 manual.*

[6] *Q in feet of depth as defined by the "Urban Hydrology For Small Watersheds" TR-55 Manual.*

[7] *From Sonoma County Water Agency Flood Control Design Criteria.*

[8] *Hydrologic soil type based of infiltration rate of native soil as defined by "Urban Hydrology For Small Watersheds" TR-55 Manual.*

[9] *Composite CN calculated per "Worksheet 2 Part 1 of the Urban Hydrology For Small Watersheds" TR-55 manual.*

[10] From "Using Site Design to Meet Development Standards For Storm water Quality" by the Bay Area Storm water Management Agencies Association (BASMAA).

Paved Area Disconnection [1]

Paved Area Type (select from drop down list): **Porous Pavement**

Multiplier = 1

Enter area of alternatively designed paved area: 1,352 ft^2

Area Reduction = 1352.00 ft^2

INSTRUCTIONS:
Calculates the area reduction credit for driveways designed to minimize runoff. Enter type and area of alternate design.

Interceptor Trees [2]

Number of new ***Evergreen Trees*** that qualify as interceptor trees= 0 **New Evergreen Trees**

Area Reduction due to new Evergreen Trees= 0 ft^2 (200 ft^2/tree)

Number of new ***Deciduous Trees*** that qualify as interceptor trees= 0 **New Deciduous Trees**

Area Reduction due to new Deciduous Trees= 0 ft^2 (100 ft^2/tree)

Enter square footage of qualifying **existing tree canopy** = 0 **Existing Tree Canopy**

Allowed reduction credit for existing tree canopy= 0 ft^2 Allowed credit for existing tree canopy = 50 % of actual canopy square footage

Area Reduction = 0 ft^2 = Sum of areas managed by evergreen + deciduous + existing canopy

NOTE:
Total Interceptor Area Reduction is limited to 50% of the physical tributary area.

INSTRUCTIONS:
Calculates the area reductions credit due to interceptor trees. Includes both new and existing trees. Enter the number of new deciduous and evergreen trees and the canopy area of existing trees.

Buffer Strips & Bovine Terraces [3]

Enter area draining to a Buffer Strip or Bovine Terrace = 0 ft^2

Buffer Factor = 0.7

Solution:

Area Reduction = (Area draining to Buffer Strip or Bovine Terrace) x (Buffer Factor) =

Area Reduction = 0.00 ft^2

INSTRUCTIONS:
Calculates the area reduction credit due to buffer strips and/or bovine terraces. Runoff Must be direct to these features as sheet flow. Enter the area draining to these features.

Revised Tributary Area due to Pollution Prevention Measures

Physical Tributary Area =	15,072	ft^2
Tributary Area Reduction due to Pollution Prevention Measures[4] =	3,697.25	ft^2
Reduced Tributary Area to be used for Calculations =	11,375	ft^2

This worksheet calculates the quantity of storm water that needs to be addressed (captured and/or treated) to comply with the NPDES Storm Water Permit issued to the City of Santa Rosa and County of Sonoma by the North Coast Regional Water Quality Control Board.

Design Goal: 100% Volume Capture

Capture (infiltration and/or reuse) of 100% of the volume of runoff generated by the 85th percentile 24 hour storm event.

Formulas:

$$S = \frac{1000}{CN} - 10$$

Where:
S= Potential maximum retention after runoff (in)[5]
CN= Curve Number [5]

$$Q = \frac{[(P*K)-(0.2*S)]^2}{[(P*K)+(0.8*S)]} \times \frac{1ft}{12"}$$

Where:
Q= Runoff depth (ft) [6]
P= Precipitation (in) = **0.92**
K= Seasonal Precipitation Factor [7]

0.92 inches in the Santa Rosa area, based on local historical data.

$$V = (Q)(A_r)$$

Where:
V= Volume of Storm Water to be Retained (ft^3)
A_r= Reduced Tributary Area including credit for Pollution Prevention Measures (ft^2)

Input: (Pick data from drop down lists or enter calculated values)

A_r =	11,375	ft^2
K [7] =	1.00	

Drop down Lists

Select post development hydrologic soil type within tributary area[8] =	B: 0.15 - 0.30 in/hr infiltration (transmission) rate
Select post development ground cover description [5] =	Urban districts - Commercial and business

CN_{POST} =	92
OR: Composite post development CN [9] =	93

NOTE:
Entering a calculated composite CN will override selections made from the pull down menu above. Calculation worksheet should be used for all composite calculations and included with submittal.

Solution:

Volume of storm water - Post Development

S_{POST}= 0.75269 in

$$S_{POST} = \frac{1000}{93} - 10$$

Where:
S_{POST}= Post development potential maximum retention after runoff (in).

Q_{POST}= 0.03251 ft

$$Q_{POST} = \frac{[(0.92 * 1.00)-(0.2 * 0.75)]^2}{[(0.92 * 1.00)+(0.8 * 0.75)]} \times \frac{1ft}{12in}$$

Q_{POST}= *Q in feet of depth as defined by the "Urban Hydrology For Small Watersheds" TR-55 Manual.*

V_{GOAL}= 369.80 ft^3

$$V_{GOAL} = (0.03251)(11,375)$$

V_{GOAL}= Post Development Volume of Storm Water to be Retained (ft^3)

INSTRUCTIONS:
This Design Goal of 100% Capture is the ideal condition and if achieved satisfies all requirements so that no additional treatment is required and pages 4 and 5 of this calculator do not need to be completed.

NOTE:
If the Design Goal of 100% Capture is not achieved, 100% Treatment AND Volume Capture must be achieved and both pages 4 and 5 of this calculator need to be completed.

LID BMP Sizing Tool: 100% Volume Capture Goal: V_{GOAL}

NOTE:
LID Sizing Tool only applicable for volume based BMPs. Not required if site requires treatment only.

INSTRUCTIONS:
The 100% volume capture sizing tool helps the designer appropriately size a LID BMP to achieve the design goal of 100% volume capture of the post development condition. Enter the percent porosity of the specified soil and depth below perforated pipe (if present). The width and length entries will need to be interactively adjusted until "Percent of Goal" equals 100%.

Formulas:

$V_{LID\ GOAL}=((V_{GOAL}))/(P)$ = **924.50** ft^3

$A_{LID\ GOAL}=(W)(L)$ = **1352.00** ft^2

Where:
$V_{LID\ GOAL}$ = Required volume of soil in LID BMP.
$A_{LID\ GOAL}$ = Footprint of LID BMP area for a given depth (below perforated pipe if present).

V_{GOAL} = **370** ft^3

$$\text{Percent of Goal Achieved} = \frac{(D)(A_{LID\ GOAL})}{V_{LID\ GOAL}} \times 100$$

Where:
P= Porosity (enter as a decimal)
D= Depth below perforated pipe if present (in decimal feet)
W= Width (in decimal feet)
L= Length (in decimal feet)

Input:

P =	0.4		as a decimal
D =	0.7	ft	Below perforated pipe if present
W =	1.0	ft	
L =	1,352.0	ft	

Solution:

Percent of Goal Achieved = **102.37** **%**

= [(0.7 x 1,352) / 925] x 100

STORM WATER CALCULATOR*

***For example only, go to www.srcity.org/stormwaterlid for the latest version of the calculator**

Project:	The Pullman Lofts
Address/Location:	701 Wilson St
Designer:	Matt Lawton
Date:	March 30, 2021
Inlet Number/Tributary Area/BMP:	Residential Tributary #3

NOTE: In order for this calculator to function properly **macros must be enabled**.

Physical Tributary Area that drains to Inlet/BMP = **29,450** ft²

This portion of the Storm water Calculator is designed to account for pollution prevention measures implemented on site. Additional information and description of these measures can be found in the Fact Sheets in Appendix F and in Chapter 4 of the narrative.

Disconnected Roof Drains [1]

Input:

Select disconnection condition: **Runoff is directed across landscape; Width of area: 5' to 9'**
Condition Factor = **0.25**

Method 1: Based on the total rooftop drainage area - to be used if rooftop information is known.

Input:

Enter amount of rooftop area that drain to disconnected downspouts = **12,083** ft²
Rooftop Area Factor = **0.41** Rooftop Area Factor= (Total Rooftop Disconnected Area/Tributary Area)

Solution:

Area reduction = (Physical Tributary Area x Conditional Factor x Rooftop Area Factor)

(29,450 x 0.25 x 0.41) = **3020.75** ft² **Rooftop Drainage Area Reduction**

Method 2: Based on density (units per acre) - to be used if rooftop information is unknown.

Input:

Enter percent of rooftop area to be disconnected from downspouts: **0** %

Select Density: **3-4** Units per Acre
Density Reduction Factor= **0.19**

Solution:

Area reduction = (Physical Tributary Area x Conditional Factor x Percent Disconnected x Density Factor)

(29,450 x 0.25 x 0.00 x 0.19) = **0.00** ft² **Density Reduction**

NOTE:
Either Method 1 (rooftop area) or Method 2 (density) can be used. Providing input for both methods will cause an error. If rooftop area information is available, Method 1 should be used.

[1] *See "Impervious Area Disconnection" Fact Sheet in Appendix E for further details.*

[2] See "Interceptor Trees" Fact Sheet in Appendix E for further details and see "Plant and Tree List" in Appendix G for approved trees.

[3] See "Vegetated Buffer Strip" and "Bovine Terrace" Fact Sheets in Appendix E for further details.

[4] *Total area reductions due to pollution Prevention Measures cannot exceed 50% of the physical Tributary Area.*

[5] *Per the "Urban Hydrology For Small Watersheds" TR-55 manual.*

[6] *Q in feet of depth as defined by the "Urban Hydrology For Small Watersheds" TR-55 Manual.*

[7] *From Sonoma County Water Agency Flood Control Design Criteria.*

[8] *Hydrologic soil type based of infiltration rate of native soil as defined by "Urban Hydrology For Small Watersheds" TR-55 Manual.*

[9] *Composite CN calculated per "Worksheet 2 Part 1 of the Urban Hydrology For Small Watersheds" TR-55 manual.*

[10] From "Using Site Design to Meet Development Standards For Storm water Quality" by the Bay Area Storm water Management Agencies Association (BASMAA).

Paved Area Disconnection [1]

Paved Area Type (select from drop down list): **Porous Pavement**

Multiplier = 1

Enter area of alternatively designed paved area: 736 ft^2

Area Reduction = 736.00 ft^2

INSTRUCTIONS:
Calculates the area reduction credit for driveways designed to minimize runoff. Enter type and area of alternate design.

Interceptor Trees [2]

Number of new ***Evergreen Trees*** that qualify as interceptor trees= 0 **New Evergreen Trees**

Area Reduction due to new Evergreen Trees= 0 ft^2 (200 ft^2/tree)

Number of new ***Deciduous Trees*** that qualify as interceptor trees= 0 **New Deciduous Trees**

Area Reduction due to new Deciduous Trees= 0 ft^2 (100 ft^2/tree)

Enter square footage of qualifying **existing tree canopy** = 0 **Existing Tree Canopy**

Allowed reduction credit for existing tree canopy= 0 ft^2 Allowed credit for existing tree canopy = 50 % of actual canopy square footage

Area Reduction = 0 ft^2 = Sum of areas managed by evergreen + deciduous + existing canopy

NOTE:
Total Interceptor Area Reduction is limited to 50% of the physical tributary area.

INSTRUCTIONS:
Calculates the area reductions credit due to interceptor trees. Includes both new and existing trees. Enter the number of new deciduous and evergreen trees and the canopy area of existing trees.

Buffer Strips & Bovine Terraces [3]

Enter area draining to a Buffer Strip or Bovine Terrace = 0 ft^2

Buffer Factor = 0.7

Solution:

Area Reduction = (Area draining to Buffer Strip or Bovine Terrace) x (Buffer Factor) =

Area Reduction = 0.00 ft^2

INSTRUCTIONS:
Calculates the area reduction credit due to buffer strips and/or bovine terraces. Runoff Must be direct to these features as sheet flow. Enter the area draining to these features.

Revised Tributary Area due to Pollution Prevention Measures

Physical Tributary Area =	29,450	ft^2
Tributary Area Reduction due to Pollution Prevention Measures[4] =	3,756.75	ft^2
Reduced Tributary Area to be used for Calculations =	25,693	ft^2

This worksheet calculates the quantity of storm water that needs to be addressed (captured and/or treated) to comply with the NPDES Storm Water Permit issued to the City of Santa Rosa and County of Sonoma by the North Coast Regional Water Quality Control Board.

Design Goal: 100% Volume Capture

Capture (infiltration and/or reuse) of 100% of the volume of runoff generated by the 85th percentile 24 hour storm event.

Formulas:

$$S = \frac{1000}{CN} - 10$$

Where:
S= Potential maximum retention after runoff (in)[5]
CN= Curve Number [5]

$$Q = \frac{[(P*K)-(0.2*S)]^2}{[(P*K)+(0.8*S)]} \times \frac{1ft}{12"}$$

Where:
Q= Runoff depth (ft) [6]
P= Precipitation (in) = **0.92**
K= Seasonal Precipitation Factor [7]

0.92 inches in the Santa Rosa area, based on local historical data.

$$V = (Q)(A_r)$$

Where:
V= Volume of Storm Water to be Retained (ft^3)
A_r= Reduced Tributary Area including credit for Pollution Prevention Measures (ft^2)

Input: (Pick data from drop down lists or enter calculated values)

A_r =	25,693	ft^2
K [7] =	1.00	

Drop down Lists

Select post development hydrologic soil type within tributary area[8] =	B: 0.15 - 0.30 in/hr infiltration (transmission) rate
Select post development ground cover description [5] =	Urban districts - Commercial and business

CN_{POST} =	92
OR: Composite post development CN [9] =	93

NOTE:
Entering a calculated composite CN will override selections made from the pull down menu above. Calculation worksheet should be used for all composite calculations and included with submittal.

Solution:

Volume of storm water - Post Development

S_{POST}= 0.75269 in

$$S_{POST} = \frac{1000}{93} - 10$$

Where:
S_{POST}= Post development potential maximum retention after runoff (in).

Q_{POST}= 0.03251 ft

$$Q_{POST} = \frac{[(0.92 * 1.00)-(0.2 * 0.75)]^2}{[(0.92 * 1.00)+(0.8 * 0.75)]} \times \frac{1ft}{12in}$$

Q_{POST}= *Q in feet of depth as defined by the "Urban Hydrology For Small Watersheds" TR-55 Manual.*

V_{GOAL}= 835.28 ft^3

$$V_{GOAL} = (0.03251)(25,693)$$

V_{GOAL}= Post Development Volume of Storm Water to be Retained (ft^3)

INSTRUCTIONS:
This Design Goal of 100% Capture is the ideal condition and if achieved satisfies all requirements so that no additional treatment is required and pages 4 and 5 of this calculator do not need to be completed.

NOTE:
If the Design Goal of 100% Capture is not achieved, 100% Treatment AND Volume Capture must be achieved and both pages 4 and 5 of this calculator need to be completed.

LID BMP Sizing Tool: 100% Volume Capture Goal: V_{GOAL}

NOTE:
LID Sizing Tool only applicable for volume based BMPs. Not required if site requires treatment only.

INSTRUCTIONS:
The 100% volume capture sizing tool helps the designer appropriately size a LID BMP to achieve the design goal of 100% volume capture of the post development condition. Enter the percent porosity of the specified soil and depth below perforated pipe (if present). The width and length entries will need to be interactively adjusted until "Percent of Goal" equals 100%.

Formulas:

$V_{LID\ GOAL}=((V_{GOAL}))/(P)$ = **2784.26** ft^3

$A_{LID\ GOAL}=(W)(L)$ = **736.00** ft^2

Where:
$V_{LID\ GOAL}$ = Required volume of soil in LID BMP.
$A_{LID\ GOAL}$ = Footprint of LID BMP area for a given depth (below perforated pipe if present).

V_{GOAL} = 835 ft^3

$$\text{Percent of Goal Achieved} = \frac{(D)(A_{LID\ GOAL})}{V_{LID\ GOAL}} \times 100$$

Where:
P= Porosity (enter as a decimal)
D= Depth below perforated pipe if present (in decimal feet)
W= Width (in decimal feet)
L= Length (in decimal feet)

Input:

P =	0.3	as a decimal
D =	3.8 ft	Below perforated pipe if present
W =	1.0 ft	
L =	736.0 ft	

Solution:

Percent of Goal Achieved = 100.45 %

= [(3.8 x 736) / 2,784] x 100

STORM WATER CALCULATOR*

***For example only, go to www.srcity.org/stormwaterlid for the latest version of the calculator**

Project:	The Pullman Lofts
Address/Location:	701 Wilson St
Designer:	Matt Lawton
Date:	March 30, 2021
Inlet Number/Tributary Area/BMP:	Historic Building Tributary

NOTE: In order for this calculator to function properly **macros must be enabled**.

Physical Tributary Area that drains to Inlet/BMP = **9,019** ft²

This portion of the Storm water Calculator is designed to account for pollution prevention measures implemented on site. Additional information and description of these measures can be found in the Fact Sheets in Appendix F and in Chapter 4 of the narrative.

Disconnected Roof Drains [1]

Input:

Select disconnection condition: **Runoff is directed across landscape; Width of area: 5' to 9'**
Condition Factor = **0.25**

Method 1: Based on the total rooftop drainage area - to be used if rooftop information is known.

Input:

Enter amount of rooftop area that drain to disconnected downspouts = **0** ft²
Rooftop Area Factor = **0.00** Rooftop Area Factor= (Total Rooftop Disconnected Area/Tributary Area)

Solution:

Area reduction = (Physical Tributary Area x Conditional Factor x Rooftop Area Factor)

(9,019 x 0.25 x 0.00) = **0.00** ft² **Rooftop Drainage Area Reduction**

Method 2: Based on density (units per acre) - to be used if rooftop information is unknown.

Input:

Enter percent of rooftop area to be disconnected from downspouts: **0** %

Select Density: **3-4** Units per Acre
Density Reduction Factor= **0.19**

NOTE:
Either Method 1 (rooftop area) or Method 2 (density) can be used. Providing input for both methods will cause an error. If rooftop area information is available, Method 1 should be used.

Solution:

Area reduction = (Physical Tributary Area x Conditional Factor x Percent Disconnected x Density Factor)

(9,019 x 0.25 x 0.00 x 0.19) = **0.00** ft² **Density Reduction**

[1] *See "Impervious Area Disconnection" Fact Sheet in Appendix E for further details.*

[2] See "Interceptor Trees" Fact Sheet in Appendix E for further details and see "Plant and Tree List" in Appendix G for approved trees.

[3] See "Vegetated Buffer Strip" and "Bovine Terrace" Fact Sheets in Appendix E for further details.

[4] *Total area reductions due to pollution Prevention Measures cannot exceed 50% of the physical Tributary Area.*

[5] *Per the "Urban Hydrology For Small Watersheds" TR-55 manual.*

[6] *Q in feet of depth as defined by the "Urban Hydrology For Small Watersheds" TR-55 Manual.*

[7] *From Sonoma County Water Agency Flood Control Design Criteria.*

[8] *Hydrologic soil type based of infiltration rate of native soil as defined by "Urban Hydrology For Small Watersheds" TR-55 Manual.*

[9] *Composite CN calculated per "Worksheet 2 Part 1 of the Urban Hydrology For Small Watersheds" TR-55 manual.*

[10] From "Using Site Design to Meet Development Standards For Storm water Quality" by the Bay Area Storm water Management Agencies Association (BASMAA).

Paved Area Disconnection [1]

Paved Area Type (select from drop down list): **Porous Pavement**

Multiplier = 1

Enter area of alternatively designed paved area: 293 ft^2

Area Reduction = 293.00 ft^2

INSTRUCTIONS:
Calculates the area reduction credit for driveways designed to minimize runoff. Enter type and area of alternate design.

Interceptor Trees [2]

Number of new ***Evergreen Trees*** that qualify as interceptor trees= 0 **New Evergreen Trees**

Area Reduction due to new Evergreen Trees= 0 ft^2 (200 ft^2/tree)

Number of new ***Deciduous Trees*** that qualify as interceptor trees= 0 **New Deciduous Trees**

Area Reduction due to new Deciduous Trees= 0 ft^2 (100 ft^2/tree)

Enter square footage of qualifying **existing tree canopy** = 0 **Existing Tree Canopy**

Allowed reduction credit for existing tree canopy= 0 ft^2 Allowed credit for existing tree canopy = 50 % of actual canopy square footage

Area Reduction = 0 ft^2 = Sum of areas managed by evergreen + deciduous + existing canopy

NOTE:
Total Interceptor Area Reduction is limited to 50% of the physical tributary area.

INSTRUCTIONS:
Calculates the area reductions credit due to interceptor trees. Includes both new and existing trees. Enter the number of new deciduous and evergreen trees and the canopy area of existing trees.

Buffer Strips & Bovine Terraces [3]

Enter area draining to a Buffer Strip or Bovine Terrace = 0 ft^2

Buffer Factor = 0.7

Solution:

Area Reduction = (Area draining to Buffer Strip or Bovine Terrace) x (Buffer Factor) =

Area Reduction = 0.00 ft^2

INSTRUCTIONS:
Calculates the area reduction credit due to buffer strips and/or bovine terraces. Runoff Must be direct to these features as sheet flow. Enter the area draining to these features.

Revised Tributary Area due to Pollution Prevention Measures

Physical Tributary Area =	9,019	ft^2
Tributary Area Reduction due to Pollution Prevention Measures[4] =	293.00	ft^2
Reduced Tributary Area to be used for Calculations =	8,726	ft^2

This worksheet calculates the quantity of storm water that needs to be addressed (captured and/or treated) to comply with the NPDES Storm Water Permit issued to the City of Santa Rosa and County of Sonoma by the North Coast Regional Water Quality Control Board.

Design Goal: 100% Volume Capture

Capture (infiltration and/or reuse) of 100% of the volume of runoff generated by the 85th percentile 24 hour storm event.

Formulas:

$$S = \frac{1000}{CN} - 10$$

Where:
S= Potential maximum retention after runoff (in)[5]
CN= Curve Number [5]

$$Q = \frac{[(P*K)-(0.2*S)]^2}{[(P*K)+(0.8*S)]} \times \frac{1ft}{12"}$$

Where:
Q= Runoff depth (ft) [6]
P= Precipitation (in) = **0.92**
K= Seasonal Precipitation Factor [7]

0.92 inches in the Santa Rosa area, based on local historical data.

$V = (Q)(A_r)$

Where:
V= Volume of Storm Water to be Retained (ft^3)
A_r= Reduced Tributary Area including credit for Pollution Prevention Measures (ft^2)

Input: (Pick data from drop down lists or enter calculated values)

A_r =	8,726	ft^2
K [7] =	1.00	

Drop down Lists

Select post development hydrologic soil type within tributary area[8] = **B: 0.15 - 0.30 in/hr infiltration (transmission) rate**

Select post development ground cover description [5] = **Urban districts - Commercial and business**

CN_{POST} =	92
OR: Composite post development CN [9] =	93

NOTE:
Entering a calculated composite CN will override selections made from the pull down menu above. Calculation worksheet should be used for all composite calculations and included with submittal.

Solution:

Volume of storm water - Post Development

S_{POST}= 0.75269 in

$$S_{POST} = \frac{1000}{93} - 10$$

Where:
S_{POST}= Post development potential maximum retention after runoff (in).

Q_{POST}= 0.03251 ft

$$Q_{POST} = \frac{[(0.92 * 1.00)-(0.2 * 0.75)]^2}{[(0.92 * 1.00)+(0.8 * 0.75)]} \times \frac{1ft}{12in}$$

Q_{POST}= *Q in feet of depth as defined by the "Urban Hydrology For Small Watersheds" TR-55 Manual.*

V_{GOAL}= 283.68 ft^3

$V_{GOAL} = (0.03251)(8,726)$

V_{GOAL}= Post Development Volume of Storm Water to be Retained (ft^3)

INSTRUCTIONS:
This Design Goal of 100% Capture is the ideal condition and if achieved satisfies all requirements so that no additional treatment is required and pages 4 and 5 of this calculator do not need to be completed.

NOTE:
If the Design Goal of 100% Capture is not achieved, 100% Treatment AND Volume Capture must be achieved and both pages 4 and 5 of this calculator need to be completed.

LID BMP Sizing Tool: 100% Volume Capture Goal; V_{GOAL}

NOTE:
LID Sizing Tool only applicable for volume based BMPs. Not required if site requires treatment only.

INSTRUCTIONS:
The 100% volume capture sizing tool helps the designer appropriately size a LID BMP to achieve the design goal of 100% volume capture of the post development condition. Enter the percent porosity of the specified soil and depth below perforated pipe (if present). The width and length entries will need to be interactively adjusted until "Percent of Goal" equals 100%.

Formulas:

$V_{LID\ GOAL}=((V_{GOAL}))/(P)$ = **945.61** ft^3

$A_{LID\ GOAL}=(W)(L)$ = **293.00** ft^2

Where:
$V_{LID\ GOAL}$ = Required volume of soil in LID BMP.
$A_{LID\ GOAL}$ = Footprint of LID BMP area for a given depth (below perforated pipe if present).

V_{GOAL} = **284** ft^3

$$\text{Percent of Goal Achieved} = \frac{(D)(A_{LID\ GOAL})}{V_{LID\ GOAL}} \times 100$$

Where:
P= Porosity (enter as a decimal)
D= Depth below perforated pipe if present (in decimal feet)
W= Width (in decimal feet)
L= Length (in decimal feet)

Input:

P =	0.3		as a decimal
D =	3.3	ft	Below perforated pipe if present
W =	1.0	ft	
L =	293.0	ft	

Solution:

Percent of Goal Achieved = **102.25** **%** = [(3.3 x 293) / 946] x 100

Worksheet 2: Runoff curve number and runoff

Project	By	Date
THE PULLMAN LOFTS	ML	3/30/21
Location	Checked	Date
TOTAL SITE	AB	3/30/21

Check One: ☐ Present ☒ Developed

1. Runoff curve number

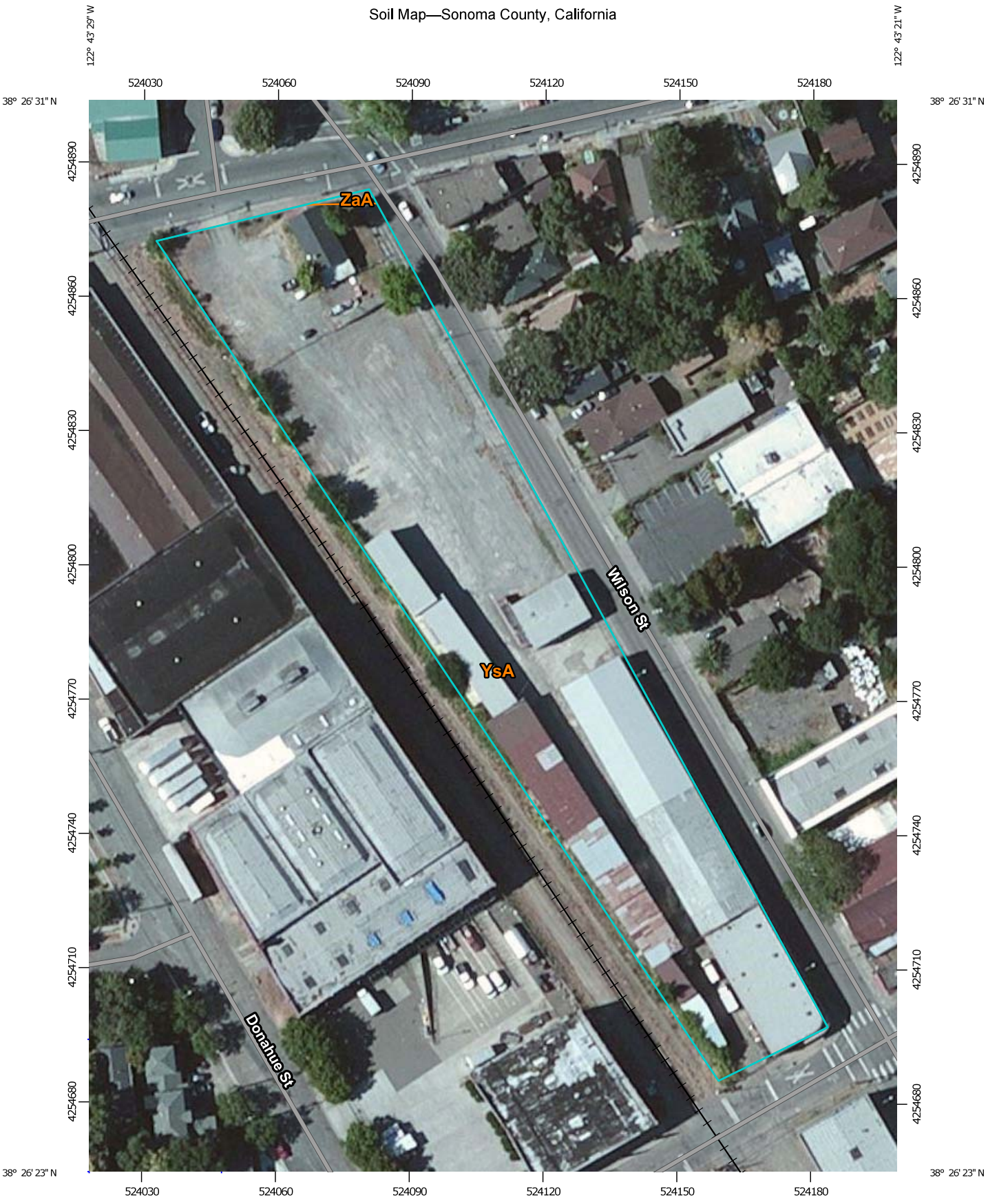
Soil Name and hydrologic group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area □acres □sf □%	Product of CN x area
B	ROOF, PARKING LOT, HARDSCAPE	98			1.790	175.42
B	LANDSCAPE	61			0.250	15.25
					2.04	190.67

1/ Use only one CN source per line

Totals ▶

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{190.67}{2.04}$

Use CN ▶ **93**



Map Scale: 1:1,170 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Sonoma County, California
Survey Area Data: Version 8, Sep 25, 2014

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

Date(s) aerial images were photographed: Aug 14, 2011—Aug 15, 2011

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

Map Unit Legend

Sonoma County, California (CA097)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
YsA	Yolo silt loam, 0 to 2 percent slopes	2.0	99.7%
ZaA	Zamora silty clay loam, 0 to 2 percent slopes	0.0	0.3%
Totals for Area of Interest		**2.0**	**100.0%**

Sonoma County, California

YsA—Yolo silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hfkw
Elevation: 30 to 400 feet
Mean annual precipitation: 16 to 22 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 240 to 260 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Yolo and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Yolo

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: B

Minor Components

Unnamed

Percent of map unit: 15 percent

Data Source Information

Soil Survey Area: Sonoma County, California
Survey Area Data: Version 8, Sep 25, 2014

BMP Selection Table

	Best Management Practice (BMP)	Detail Sheet	Detail Title	Can be used with...	High Ground Water	Contamination	Slope Constraints	Achieves...	Treatment	Volume Capture	Pollution Prevention Credit	BMP in priority selected?	Yes	No	Explanation of selection	Other notes:
Universal LID Features- to be considered on all projects.	Living Roof	N/A	N/A		x	x	x		x	x						
	Rainwater Harvesting	N/A	N/A		x	x	x			x						
	Interceptor Trees	N/A	N/A		x	x	x				x		✓			
	Vegetated Buffer Strip	UN-01	Vegetated Buffer Strip								x					
	Bovine Terrace	UN-02	Bovine Terrace		x						x					
	Impervious Area Disconnection	N/A	N/A		x	x	x				x		✓			

BMP Selection Table

	Best Management Practice (BMP)	Detail Sheet	Detail Title	Can be used with...	High Ground Water	Contamination	Slope Constraints	Achieves...	Treatment	Volume Capture	Pollution Prevention Credit	BMP in this priority selected?	Yes	No	Explanation of selection	Other notes:
Priority 2 BMPs- with subsurface drains installed above the capture volume.	Rain Garden	P2-01	Rain Garden						x	x						
	Roadside Bioretention	P2-02	Roadside Bioretinton - Flush Design Roadside						x	x			✓			
		P2-03	Roadside Bioretenion- Contiguous SW						x	x						
		P2-04	Roadside Bioretenion- Curb Opening						x	x						
		P2-05	Roadside Bioretenion- No C & G						x	x						
	Pervious Pavement	P2-06	Vegetated Buffer Strip						x	x			✓			
	Constructed Wetlands	N/A	N/A						x	x						

PLANTER STRIP BIORETENTION- CHECKLIST

Planter Strip Bioretention
Inspection and Maintenance Checklist
(aka: Street Rain Garden, Roadside Bioretention, Bioretention Cell)

Date of Inspection: _____
Inspector(s): _____
BMP ID #: _____
Property Owner: _____

Location Description: _____

Type of Inspection: ☐ Pre-rainy Season (PRS) ☐ Rainy Season (RS) ☐ After-rainy Season (ARS)

This Inspection and Maintenance Checklist is to be used in conjunction with its corresponding LID Factsheet and Maintenance Plan. Please review these documents before performing the field inspection.

Inspection Category	When to Inspect	Maintenance Issue	Is the Issue Present?	Require Maintenance	**Comments** (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)
Drainage	RS	Is there standing or pooling of water in the Bioretention area after 3 days of dry weather? Is water not draining into catch basin from the overflow pipe during a high intensity storm? *		• Check perforated pipe outlet for obstruction or damage. * • Flush perforated pipe to remove obstructions/sediment. * • Remove and replace the first few inches of topsoil. • Remove soil and inspect perforated pipe. Repair or replace perforated pipe, replace with new soil and regrade.	
	PRS RS ARS	Is there sediment visible in the gutter?		• In dry weather, use a mechanical sweeper or a Vactor truck to clean gutter pan.	
	RS	Is there water flowing in the pervious concrete gutter section during a low intensity storm? *		• In wet weather, use a Vactor truck to clean gutter pan.	

* If perforated pipe is present.

PLANTER STRIP BIORETENTION- CHECKLIST

Inspection Category	When to Inspect	Maintenance Issue	Is the Issue Present?	Require Maintenance	**Comments** (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)
Erosion	RS ARS	Is there under cutting or washouts along the sidewalks and/or curbs abutting the planter strip?		• Fill in eroded areas and regrade.	
	RS ARS	Is there channelization (gully) forming along the length of the planter area?		• Fill in eroded areas and regrade.	
	RS ARS	Is there accumulation of sediment (sand, dirt, mud) in the planter?		• Remove sediment and check the grading. Add replacement soil and/or mulch.	
	PRS RS ARS	Is the mulch unevenly distributed in the planter area?		• Redistribute and add additional mulch if needed. • Regrade planter area.	
	PRS RS ARS	Are there voids or deep holes present? Is there sediment present in the catch basin and in the overflow pipe?		• Check the perforated pipe for damage.*	
	PRS RS ARS	Is there evidence of animal activity such as holes or dirt mounds from digging or borrowing?		• Repair and fill in damage areas. • Rodent control activities must be in accordance with applicable laws and do not affect any protected species.	

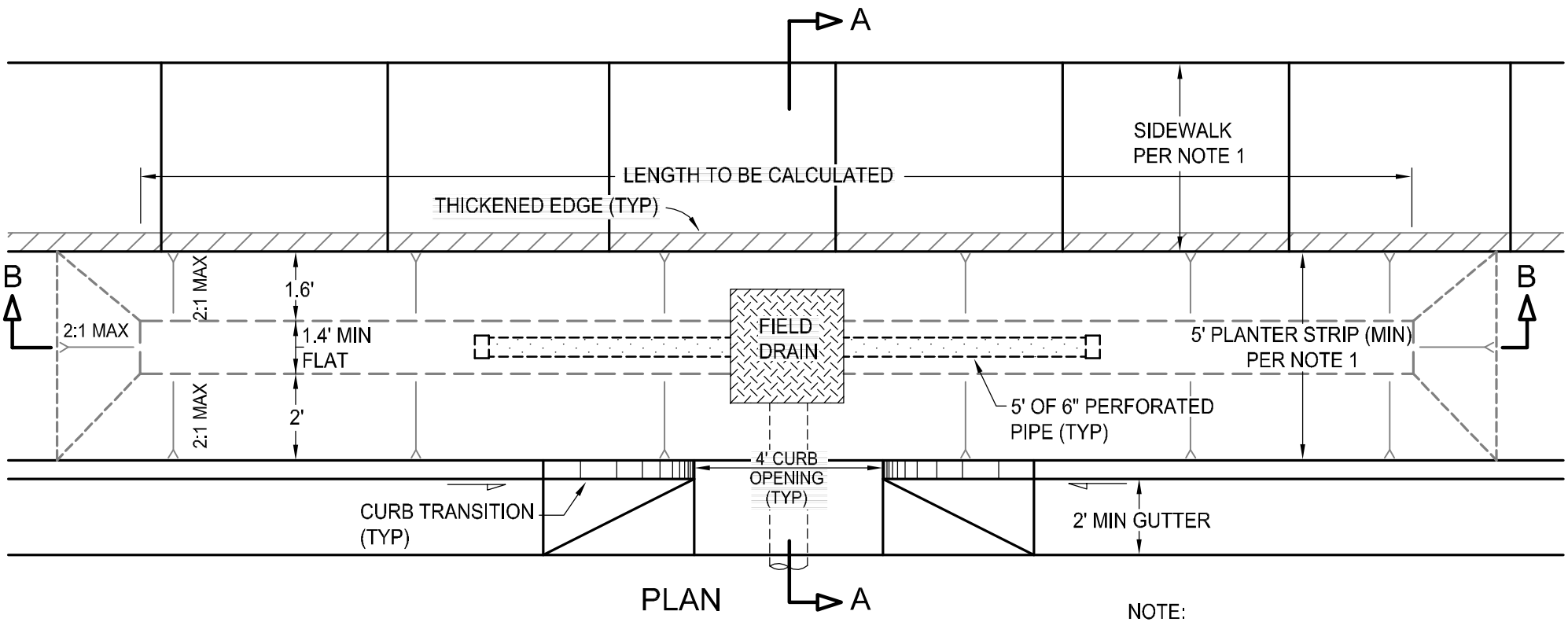
* If perforated pipe is present.

PLANTER STRIP BIORETENTION- CHECKLIST

Inspection Category	When to Inspect	Maintenance Issue	Is the Issue Present?	Require Maintenance	**Comments** (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)
Vegetation	PRS RS ARS	Is the vegetation clogging the inlet flow areas?		• Trim and/or remove the excess vegetation.	
	PRS RS ARS	Is the mulch distributed evenly throughout the planter area?		• Redistribute and add additional mulch if needed. • Regrade planter area.	
	PRS RS ARS	Are there dead or dry plants/weeds? Is the vegetation over grown?		• Remove dead and/or dry vegetation. Replace as needed. • Remove or trim any vegetation that is causing a visual barrier, trip, and or obstruction hazard.	

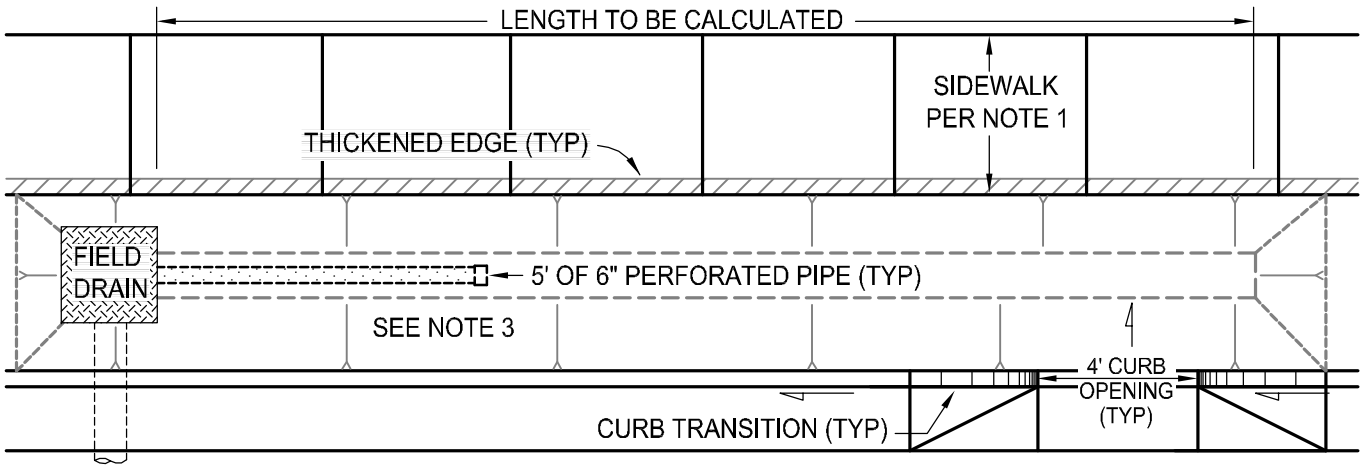
PLANTER STRIP BIORETENTION- CHECKLIST

Inspection Category	When to Inspect	Maintenance Issue	Is the Issue Present?	Require Maintenance	**Comments** (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)
BMP General	PRS RS ARS	Is there debris/trash in the planter area?		• Remove all trash and debris.	
	PRS RS ARS	Is graffiti present?		• Remove all graffiti from the area.	
	PRS RS ARS	Are there missing or disturbed aesthetics features?		• Replace and/or reposition aesthetics features to original placement. • Placement should not disrupt flow characteristics/design.	
	PRS RS ARS	Is the vegetation irrigation functional?		• Repaired broken missing spray/drip emitters. • Reposition and/or adjust to eliminate over spray and/or over watering.	
	PRS RS ARS	Are the aesthetic features firmly secured in placed?		• Repair and/or replace loose or damage features.	
	PRS RS ARS	Check for damage sidewalk, curb, gutter, and catch basin including uplift and settling.		• Remove and replace damaged areas.	



PLAN

TYPE A - CURB OPENING AT LOW POINT



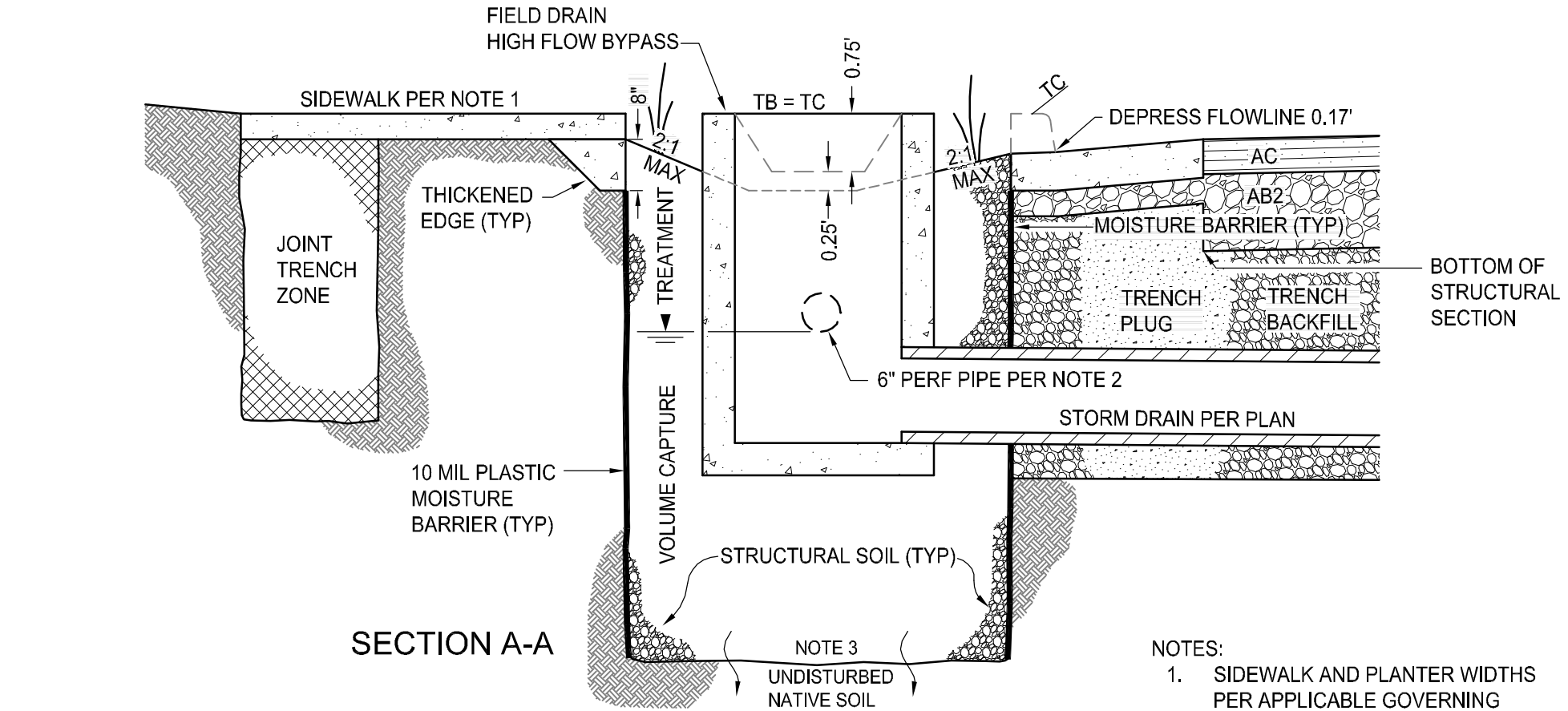
TYPE B -CURB OPENING ALONG A SLOPE

NOTE:

1. SIDEWALK AND PLANTER WIDTHS PER APPLICABLE MUNICIPAL STANDARDS (TYP).
2. TOP OF 6" PERFORATED PIPE TO BE SET 6" BELOW ROAD STRUCTURAL SECTION.
3. TYPE A MINIMUM DIMENSIONS AND GRADES APPLY TO TYPE B.
4. BIORETENTION AREA PLANTS TO BE SELECTED FROM APPROVED PLANT LIST.

Not to Scale

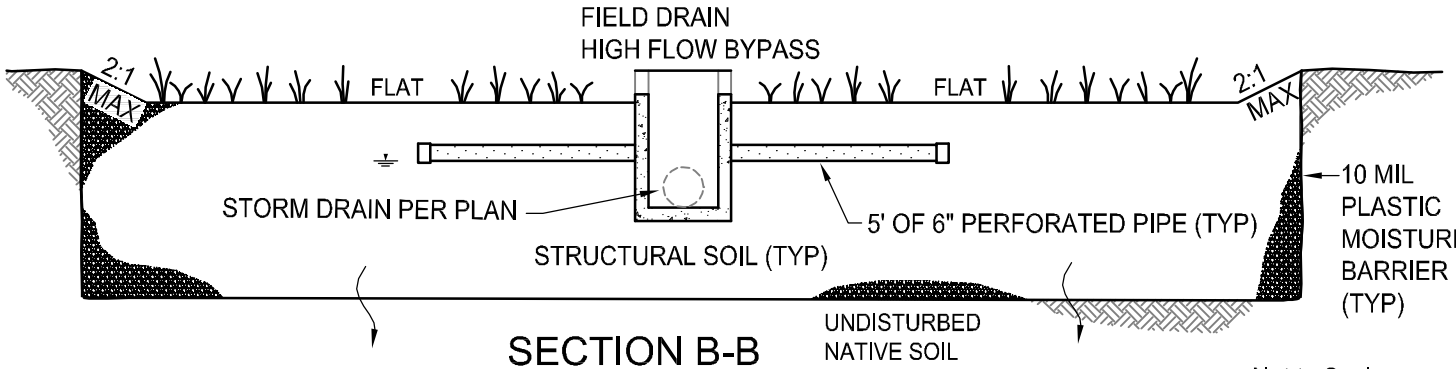
PRIORITY 2 ROADSIDE BIORETENTION - CURB OPENING		
SCALE: *NONE*	DATE: *05/10/11*	
DWN. *DIT* CHK. *HH*	SHEET 1 of 2	P2–04



SECTION A-A

NOTES:

1. SIDEWALK AND PLANTER WIDTHS PER APPLICABLE GOVERNING AGENCY STANDARDS (TYP).
2. TOP OF 6" PERFORATED PIPE TO BE SET 6" BELOW BOTTOM OF ROAD STRUCTURAL SECTION.
3. BOTTOM OPEN TO ALLOW INFILTRATION INTO NATIVE SOIL.



SECTION B-B

Not to Scale

PRIORITY 2
ROADSIDE BIORETENTION
- CURB OPENING
SECTION A-A & B-B

SCALE: *NONE*	DATE: *05/10/11*	
DWN. *DIT* CHK. *HH*	SHEET 2 of 2	P2–04

POROUS PAVEMENT- CHECKLIST

Porous Pavement
Inspection and Maintenance Checklist
(aka: Unit Pavers, Porous Concrete)

Date of Inspection: _____
Inspector(s): _____
BMP ID #: _____
Property Owner: _____

Location Description: _____
Type of Inspection: ☐ Pre-rainy Season (PRS) ☐ Rainy Season (RS) ☐ After-rainy Season (ARS)
This Inspection and Maintenance Checklist is to be used in conjunction with its corresponding LID Factsheet and Maintenance Plan. Please review these documents before performing the field inspection.

Inspection Category	When to Inspect	Maintenance Issue	Is the Issue Present?	Require Maintenance	Comments (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)
Drainage	RS	Is there standing or pooling of water?		• Check perforated pipe outlet for obstruction or damage. * • Flush perforated pipe to remove obstructions/sediment. * • Repair or replace perforated pipe, replace with new soil and regrade. • Subsurface layers may need cleaning and/or replacing. • In dry weather, use a mechanical sweeper or a vactor truck to vacuum clean surface area. • In wet weather, use a vactor truck to vacuum clean surface area.	
		Is there visible water flowing over the surface of the pervious concrete/pavers during a low intensity storm?			
	PRS RS ARS	Is there sediment visible on the surface of the pervious concrete/pavers?		• In dry weather, use a mechanical sweeper or a vactor truck to vacuum clean surface area.	

* If perforated pipe is present.

POROUS PAVEMENT- CHECKLIST

Inspection Category	When to Inspect	Maintenance Issue	Is the Issue Present?	Require Maintenance	**Comments** (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)
Erosion	RS ARS	Is there under cutting or washouts along the sidewalks and/or curbs abutting a planter strip?		• Fill in eroded areas and regrade.	
	PRS RS ARS	Are there cracks, uplifts, slumps, missing pavers, and/or pot holes present? Is there sediment present in the catch basin and in the overflow pipe?		• Check perforated pipe outlet for damage. * • Repair or replace perforated pipe, replace with new soil and regrade.* • Subsurface layers may need cleaning and/or replacing. • Replace or repair damaged areas.	

* If perforated pipe is present.

POROUS PAVEMENT- CHECKLIST

Inspection Category	When to Inspect	Maintenance Issue	Is the Issue Present?	Require Maintenance	**Comments** (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)
Vegetation	PRS RS ARS	Is the vegetation clogging the inlet flow areas?		• Trim and/or remove the excess vegetation.	
	PRS RS ARS	Is there vegetation growing in the cracks, stress lines, and/or abutment areas?		• Remove vegetation. • In dry weather, use a mechanical sweeper or a vactor truck to vacuum clean surface area. • In wet weather, use a vactor truck to vacuum clean surface area.	
	PRS RS ARS	Is algae present?		• In dry weather, use a mechanical sweeper or a vactor truck to vacuum clean surface area. • In wet weather, use a vactor truck to vacuum clean surface area.	

POROUS PAVEMENT- CHECKLIST

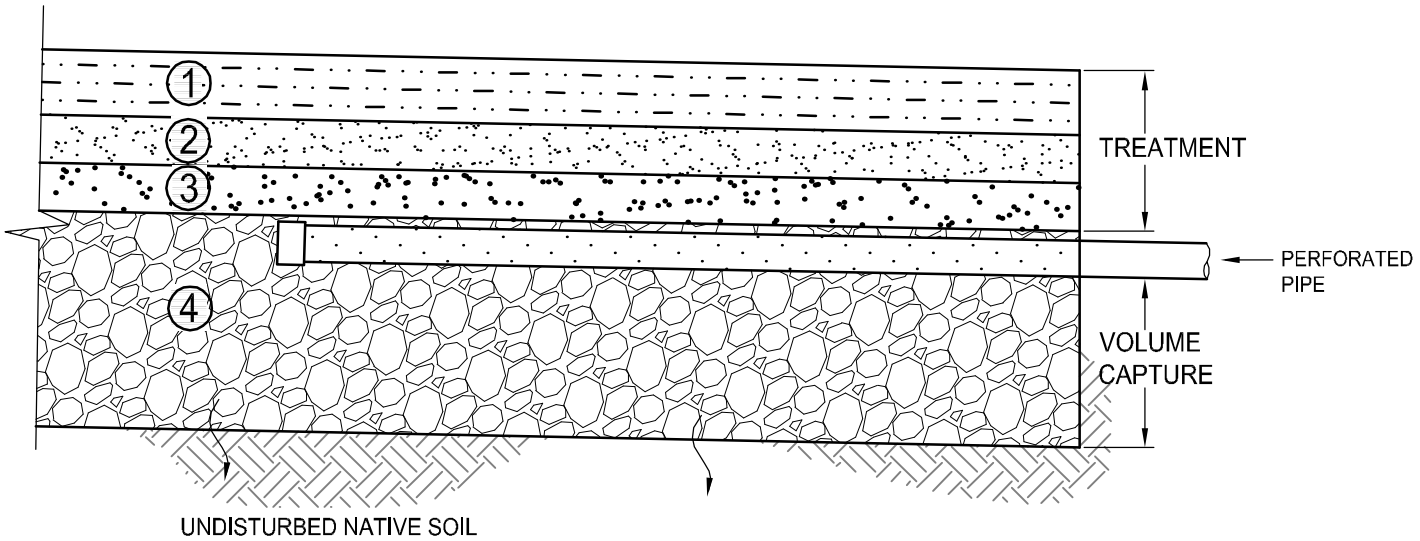
Inspection Category	When to Inspect	Maintenance Issue	Is the Issue Present?	Require Maintenance	**Comments** (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)
BMP General	PRS RS ARS	Is there debris/trash area?		• Remove all trash and debris.	
	PRS RS ARS	Is there gum or other material stuck to the pervious surface?		• In dry weather, use a mechanical sweeper or a vactor truck to vacuum clean surface area. • In wet weather, use a vactor truck to vacuum clean surface area.	
	PRS RS ARS	Is graffiti present?		• Remove all graffiti from the area.	
	PRS RS ARS	Are there missing or disturbed aesthetics features?		• Replace and/or reposition aesthetics features to original placement. • Placement should not disrupt flow characteristics/design.	
	PRS RS ARS	Are the aesthetic features firmly secured in placed?		• Repair and/or replace loose or damaged features.	
	PRS RS ARS	Check for damage sidewalk, curb, gutter, and catch basin including uplift and settling.		• Remove and replace damaged areas.	

① PERMEABLE PAVEMENT OR SURFACE PER GOVERNING AGENCY STANDARDS

② SAND LAYER (FINE SAND)

③ TRANSITION LAYER (COARSE SAND) AS NEEDED FOR CONVEYANCE AND TREATMENT

④ STRUCTURAL SOIL OR DRAIN ROCK



Not to Scale

PRIORITY 2 PERMEABLE PAVEMENT		
SCALE: *NONE*	DATE: *05/10/11*	
DWN. *DIT* CHK. *HH*		P2–06

RECORDING REQUESTED BY
AND WHEN RECORDED MAIL TO: _____

City of Santa Rosa- Utilities Department
Storm Water & Creeks Section- Supervising Engineer
69 Stony Circle
Santa Rosa CA 95401

Project/Property: Pullman Lofts - 701 Wilson Street
APN(s): 010-091-005

Santa Rosa, California

DECLARATION OF COVENANTS REGARDING MAINTENANCE OF STORM WATER BMP FACILITIES

This Declaration of Covenants Regarding Maintenance of Storm Water BMP Facilities ("Agreement") is made on this _____ day of _____, 20___, by _____ ("Landowner") _____ [if business entity, ADD type].

RECITALS

A. Landowner is the fee simple owner of certain real property located in the City of Santa Rosa ("City"), Sonoma County, California, [INSERT lot numbers, and development description; APN numbers] and more fully described in Exhibit A to this Agreement ("Property").

B. The City's National Pollutant Discharge Elimination System ("NPDES") Municipal Separate Storm Sewer System ("MS4") Permit, Order number R1-2009-0050, issued by the North Coast Regional Water Quality Control Board, requires the City to implement and enforce specific requirements for the construction and maintenance of onsite storm water management facilities/best management practices (collectively, "BMP") for development, redevelopment, and other applicable projects with the goal of mitigating impacts to storm water quality and runoff volume discharges into the MS4.

C. Provisions of Chapter 17-12 and other applicable sections of the Santa Rosa City Code shall apply to the construction, inspection and maintenance of BMP facilities and the enforcement of MS4 Permit requirements.

D. On _____, _____ [INSERT DATE and WHO (City Engineer OR Chief Building Official)] approved Landowner's [Improvement Plans OR Building Permit Site Plan] ("Plan") _____ [INSERT Plan or Permit Number] and a Final Standard Urban Stormwater Mitigation Plan ("SUSMP") for the Property which include provisions for the construction and maintenance of BMP facilities on the Property (the "BMP Facilities") by Landowner. The BMP Facilities required under the SUSMP may include both built and landscaping features. The _____ [Plan, SUSMP,] may be inspected at the City of Santa Rosa, Department of Utilities, Storm Water & Creeks Section, 69 Stony Circle upon appointment.

E. The ____ [Plan, SUSMP] requires that Landowner enter into this Agreement.

AGREEMENT

NOW, THEREFORE, in consideration of the foregoing recitals, Landowner hereby covenants, agrees and declares as follows:

1. Landowner shall, at its sole cost and expense, construct, inspect, and maintain the BMP Facilities in accordance with the Plan and the SUSMP.

2. In the event Landowner fails to maintain the BMP Facilities in good working condition as solely determined by the City, the City may enter upon the Property and take whatever steps it deems reasonably necessary to maintain and/or make in good working condition, such BMP Facilities. It is expressly understood that the City is under no obligation to maintain or repair the BMP Facilities, and in no event shall this Agreement be construed to impose such an obligation on the City.

3. In the event that the City performs work of any nature, or expends any funds in the performance of such work for labor, use of equipment, supplies, materials, or the like, due to failure of the Landowner to perform its maintenance obligations under this Agreement, as solely determined by City, Landowner shall reimburse the City within 60 days of receipt of notice for all costs incurred by the City to undertake such work. Costs shall include, but are not limited to, the actual cost of construction, maintenance and/or repair, and administrative costs directly related to such work.

4. Any violation of the Plan or SUSMP by Landowner shall be deemed a public nuisance under Chapter 1-30 of the Santa Rosa City Code and City shall be entitled to the remedies available to it under Chapter 1-30 in addition to those available to it under Chapter 17-12. The remedies identified herein shall be in addition to and cumulative of all other remedies, criminal or civil, which may be pursued by the City.

5. Landowner shall indemnify, defend and hold harmless the City and its employees, officials, and agents, from and against any liability, (including liability for claims, suits, actions, arbitration proceedings, administrative proceedings, regulatory proceedings, losses, expenses or costs of any kind, whether actual, alleged or threatened, interest, defense costs, and expert witness fees), where the same relates to, or arises out of, the construction, presence, existence, inspection, or maintenance of BMP Facilities on the Property or the performance of this Agreement by Landowner, its officers, employees, agents, contractors or sub-contractors, excepting only that resulting from the sole, active negligence or intentional misconduct of the City, its employees, officials, or agents. This indemnification obligation is not limited in any way by any limitation on the amount or type of damages or compensation payable to or for the Landowner or its agents under workers' compensation acts, disability benefits acts or other employees' benefits acts. If any judgment or claim against the City, its officials, agents, or employees, shall be entered, Landowner shall pay all cost and expenses in connection therewith.

6. If any provisions of this Agreement shall be held to be invalid, illegal or unenforceable, the validity, legality and enforceability of the remaining provisions shall not in any way be affected or impaired thereby.

7. This Agreement shall be governed according to the laws of the State of California. The parties hereto agree that the forum for the adjudication of any dispute related to this Agreement shall be brought exclusively and solely in Sonoma County, California.

8. Landowner shall not assign this Agreement to a third party without the express prior written consent of the City, provided that such consent will not be unreasonably withheld and that such consent shall not be required for Landowner to sell or lease the property to a third party.

9. Landowner binds itself, its partners, successors, legal representatives and assigns to the City, and to the partners, successors, legal representatives and assigns of the City with respect to all promises and agreements contained herein.

10. This Agreement shall be recorded by Landowner, and shall: a) constitute a "covenant running with the land;" b) be binding upon Landowner and Landowner's successors, heirs, and assigns in perpetuity; and, 3) benefit the City of Santa Rosa, its successors, and assigns. Any breach of this Agreement shall render Landowner or Landowner's heirs, successors or assigns liable pursuant to the provisions of the Santa Rosa City Code.

11. Any notice, submittal or communication required or permitted to be served on Landowner or City may be served by personal delivery to the person or the office of the person identified below. Service may also be made by mail, by placing first-class

postage, and addressed as indicated below, and depositing in the United States mail to:

City Representative:

City of Santa Rosa
Utilities Department
Storm Water & Creeks Section
Supervising Engineer
69 Stony Circle
Santa Rosa CA 95401

Landowner or Landowner Representative:

Name: _____
Address: _____
_____
_____
_____

Executed as of the day and year first above stated.

LANDOWNER:

Name:_____

Signatures of Authorized Persons:

By: _____

Print Name:_____

Title: _____

By: _____

Print Name:_____

Title: _____

ATTACHMENTS:
Exhibit A- Property Description
Notary Acknowledgment