Appendix H

Initial Storm Water Low Impact Development Submittal

Environmental Assessment

Permanent Fire Station 5 Rebuild Project

JOB NO. 20201497

INITIAL STORM WATER LOW IMPACT DEVELOPMENT SUBMITTAL

FOR

SANTA ROSA FIRE STATION 5

1400 FOUNTAINGROVE PARKWAY

SANTA ROSA, CA

FEBRUARY 2021

200 Fourth Street, Suite 300, Santa Rosa, CA 95401 | 707.583.8500

APPLICANT/OWNER:

CITY OF SANTA ROSA

As the Applicant/Owner, I declare that permanent storm water Best Management Practices will be installed and maintained in accordance with this document and municipal regulations.

BY: _____
JASON NUTT OR LISA WELSH
APPLICANT'S REPRESENTATIVE

CIVIL ENGINEER

This document was prepared by BKF Engineers to summarize storm water Best Management Practices proposed with this development. Storm water elements reflected in this document have been designed using sound engineering principals in general conformance with the municipality's guidelines.

PRELIMINARY

_____
REBECCA DOWER, PE
FEBRUARY 3, 2021
NO. C-80868

TABLE OF CONTENTS

GENERAL INFORMATION REGARDING THE PURPOSE OF STORM WATER BMPS

Storm water runoff Best Management Practices (BMPs) are programs, processes or engineered systems designed to reduce pollutants in storm water. Temporary Best Management Practices such as straw wattle and silt fence are used to reduce pollutants in storm water during construction while permanent storm water Best Management Practices are intended to reduce pollutants in storm water for the life of the development following construction.

Studies suggest that approximately 85% of our annual rainfall volume is produced from the predominant population of smaller storms. Therefore, in an effort to treat storm water in a cost effective manner, storm water quality management is typically designed to target these smaller events.

The Low Impact Development Technical Design Manual

The Low Impact Development (LID) Technical Design Manual is a set of guidelines established for the Santa Rosa area and unincorporated areas around Sonoma County which requires certain projects to incorporate sustainable LID strategies that encourage infiltration and minimize the introduction of pollutants into downstream receiving waters. The manual requires that a "Determination Worksheet" be prepared by the Applicant to evaluate whether or not storm water BMPs are required with each development. Developments which require BMPs that are subject to planning review through the municipality must include an "Initial Storm Water Low Impact Development Submittal". The purpose of this submittal is to:

- Summarize the existing site condition and the proposed development.
- Describe storm water BMPs being incorporated into the development.
- Demonstrate by computation that the proposed measures are appropriately sized.
- Describe maintenance and funding for the BMPs.

Developments which require BMPs are required to include a "Final Storm Water Low Impact Development Submittal" with ministerial permit submittals such as grading, building, and encroachment permits. The "Final Storm Water Low Impact Development Submittal" includes all of the elements required in the "Initial Storm Water Low Impact Development Submittal" and a maintenance agreement between the municipality and owner which assigns the responsibility for maintaining BMPs. The agreement is recorded as a covenant, runs with the land and passes with Title.

Permanent storm water Best Management Practices are categorized in the LID Technical Design Manual as being Pollution Prevention Measures, Volume Control Measures, or Treatment Control Measures which are described in the following sections of this document.

Storm Water Pollution Prevention Measures

Pollution Prevention Measures, sometimes referred to as Source Control Measures, are practices such as street sweeping which help keep pollutants from coming into contact with storm water rather than attempting to remove pollutants after they have interacted with storm water. Educational outreach programs and stenciling storm water inlets with graphics which inform people that the storm water drains to the creek are effective Pollution Prevention Measures. Trees are another effective Pollution Prevention Measure and provide several storm water management benefits. They hold water on leaves / branches and allow water to evaporate, retaining flow and dissipating the energy of runoff. Trees also reduce the amount of water coming into contact with other impervious surfaces such as parking lots, which minimizes pollution in downstream water bodies.

Our local municipalities recognize the environmental benefit to incorporating Pollution Prevention Measures into designs and allow area offset credits with the implementation of trees which intercept falling precipitation, pervious pavements which encourage infiltration and storm water discharge through landscape areas as a pre-treatment measure. The pollution prevention credits reduce the size of required Volume and Treatment Control Measures.

Storm Water Volume Control Measures

Increasing the amount of impervious surface area with the development of bare land generally increases the rate at which storm water flows across a site. While the impact of increasing the impervious area for a single site is often insignificant, the cumulative impact of increasing the impervious area for multiple sites may have an adverse effect on downstream facilities, because the cumulative increase has the potential to increase runoff causing downstream erosion and sediment load in the storm water conveyance system.

In order to minimize downstream erosion and protect stream habitat, the Storm Water LID Technical Design Manual prioritizes BMPs and requires that the designer first consider measures which capture storm water runoff from impervious surfaces and encourage infiltration. If this is impractical, then BMPs may be proposed which capture the difference in storm water runoff between the predevelopment and post development conditions, provided that all water discharged from impervious surfaces for the selected rainfall event is treated. Developments in areas subject to contaminated soil or high ground water are discouraged from integrating measures which infiltrate storm water, but they are required to incorporate alternative designs which harvest storm water and treat runoff from impervious surfaces. If volume control measures are not feasible at the project site, then the municipality will consider offset projects at a different location which accomplish this requirement. In some situations, payment of an offset cost may be allowed. Redevelopment projects which propose to decrease the amount of impervious surface are not required to integrate volume control measures, because decreasing the amount of impervious surface generally decreases the amount of storm water runoff.

Storm Water Treatment Control Measures

Treatment Control BMPs are engineered systems that are designed to remove pollutants from storm water and are often categorized as being landscape-based or mechanical. These types of BMPs are required whenever a development proposes to infiltrate less water than is discharged from new or redeveloped impervious surfaces during the target storm event.

Landscape-based treatment controls are required by most municipalities and include measures such as vegetated swales and bioretention systems. Mechanical treatment controls such as subsurface vaults that filter storm water through sand or engineered media are generally only allowed when used in conjunction with other landscape based BMPs.

PROJECT DESCRIPTION

The Permanent Fire Station 5 Rebuild proposes to replace Fire Station 5 formerly located at 2201 Newgate Court, that was destroyed during the October 2017 Tubbs Fire. This new Fire Station 5 is to be relocated at 1400 Fountaingrove Parkway, in the City of Santa Rosa, and is expected to be a roughly 10,750 square feet essential services structure. The project site is approximately 2 acres of oak studded grass land in a hillside neighborhood located at the corner of Fountaingrove Parkway and Stagecoach Road.

The site has minor existing improvements consisting of an existing unpaved road and some site drainage features and utility installations.

The existing drainage pattern consists of storm water runoff collection from Fountaingrove Parkway and the hillside to the South of the project site being routed through a surface drainage feature that borders the project site to the east and collects to the North East in a storm drain conduit system that is routed under Stagecoach Road. The addition of impervious areas to the undeveloped land is what triggered the requirement for this Storm Water Low Impact Development Submittal.

Permanent storm water Best Management Practices are required with this development because it disturbs more than 1-acre and creates more than 10,000 square footage of impervious surface.

STORM WATER BMPS SELECTED FOR THIS SITE

Temporary, pollution prevention and permanent storm water Best Management Practices have been designed to minimize the introduction of pollutants into downstream water bodies.

Temporary Measures

An "Erosion and Sediment Control Plan" will be prepared and included with the construction drawings requiring the contractor to implement temporary storm water BMPs. The contractor will be required to use filter fabric, gravel bags, straw wattles or similar measures to collect sediment and filter water before allowing its discharge to downstream facilities. This drawing will also require that disturbed areas be seeded to help stabilize un-vegetated areas. Since the overall project is anticipated to disturb more than 1-acre with construction, a Storm Water Pollution Prevention Submittal will be prepared which more precisely identifies temporary storm water BMPs required during different phases of construction.

Pollution Prevention Measures

As part of this project, storm water inlets will be stenciled with graphics which identify that the inlets drain to the creek. Irrigation systems will be designed to minimize overspray.

Pollution Prevention Credits

As was discussed earlier in this report, the LID Technical Design Manual allows area offset credits with the implementation of certain Pollution Prevention Measures. Several new trees will be planted with this development creating an opportunity to intercept precipitation falling on impervious surfaces beneath them. Area reduction credits were used when assessing the size of BMP areas with the initial submittal.

Permanent Volume Control Measures

The Storm Water LID Technical Design Manual requires that measures be incorporated into each site which capture storm water runoff from impervious surfaces and encourage infiltration for the life of the development following construction. The low percolation rate of Sonoma County soils does make infiltration a challenging objective. The LID manual acknowledges this, suggesting that designs incorporate engineered media and similar mechanisms which create void space to store water and allow infiltration over time.

Bioretention Areas containing porous engineered media will be incorporated into the site to capture the post development storm water runoff during light precipitation events and encourage infiltration. The

Bioretention Areas have been equipped with overflow drains to minimize inundation on paved surfaces during larger storm events.

A Landscape Architect will be retained to recommend attractive water efficient landscaping best suited on the surface of the volume capture area. An exhibit has been included in the body of this report which reflects the proposed geometry and location of each Bioretention Area.

The Soil Conservation Service, known today as the Natural Resource Conservation Service (NRCS), developed a process to estimate storm water runoff and compute storm water volumes for reservoirs in small watersheds. This process is based on a soil designation relating to how well the underlying soil drains and a curve number which reflects the runoff condition. The LID manual developed by the City of Santa Rosa and County of Sonoma suggests that this method be used when determining the volume of water which should be stored for the 85th percentile storm (defined in the Santa Rosa and Sonoma County areas as generating approximately 1.0-inches of precipitation) in order to emulate the predevelopment condition.

The Natural Resources Conservation Service (NRCS) online web soil survey report states the groundwater depth is anticipated to be greater than 80 inches below the existing ground surface.

The on-site soils are characterized by the NRCS online web soil survey as “clayey loam” and classified in the hydrologic soil group “D”, which typically have an infiltration rate of 0 to 0.05 in/hr. Soil Group “D” is anticipated to infiltrate the underlying soil very slowly over time in accordance with the objectives of the LID Technical Design Manual.

Computations have been prepared to size each Bioretention Area using the municipality’s storm water calculator to assess the post development storm water runoff volume. The Civil drawings recommend that Structural Soil having a porosity of at least 30% be used to achieve the required capture volume. Computations may be observed in the Appendix of this document and reflect that the void space in the proposed measures exceeds the required storm water capture volume.

MAINTENANCE OF THE SELECTED PERMANENT STORM WATER BMPs

Maintenance of permanent storm water Best Management Practices is essential to ensure that the BMPs continue to function effectively and that they do not become a nuisance. An exhibit has been included in the body of this report which identifies the locations of the permanent storm water BMPs referred to in this report which will require inspection and maintenance. It is the responsibility of the Applicant/Owner to ensure that permanent storm water BMPs are installed and maintained in accordance with municipal policy unless this responsibility is legally transferred.

The Regional Water Quality Control Board requires the legally responsible party to inspect and maintain permanent storm water BMPs at least once a year. A sample inspection and reporting template has been included in the Appendix of this document for reference. Reports which document maintenance activities should be completed when maintenance is performed and kept on file for a period of at least five years. These reports shall be made available to City staff and the Regional Water Quality Control Board staff upon request.

The maintenance of permanent storm water Best Management Practices will be performed by the property owner and includes things such as pruning, weeding, mowing, trash/sediment removal, and the inspection/replacement of plants and media. The LID Technical Design Manual requires that the owner enter into a signed agreement and that this agreement be recorded as a perpetual covenant which runs with the land. A draft maintenance agreement has been included in the Appendix of this document for reference.

Every site requires some level of maintenance such as sweeping, restriping, pavement replacement, irrigation repair and replanting. The following inspection and maintenance activities are additional measures which may be necessary with this development as a result of the required permanent storm water BMPs:

- Drainage inlets will be stenciled with verbiage or a graphic which suggests that the storm water system drains to a creek. Stenciling should be refreshed every 5 years. If the BMP has been removed or has experienced significant fading, then the BMP should be replaced.

- The surface of volume capture areas should be inspected on a quarterly basis, and following larger storm events for signs of erosion, damage, foreign debris and sediment accumulation. The BMP should be repaired to maintain its character and function in substantial conformance with the original design.

- Additional information has been included in the Appendix of this report which describes the function and recommended maintenance of measures proposed in this report.

Although the proposed BMPs are anticipated to provide effective treatment for more than 10-years, their life will depend on the quality of water draining to them and how well these areas are maintained. BMP maintenance and replacement should be conducted as required to ensure that their character and function are in substantial conformance with the original design.

Approximate anticipated average annual costs are summarized below to assist the Owner(s) in budgeting for BMP inspection and maintenance activities. The costs reported are predicated on these activities being conducted while performing other routine maintenance which would ordinarily be performed on site.

Approximate Average Annual Inspection and Maintenance Costs

Inspections and Associated Paperwork	$2,400
Stenciling Inlets	$85
Sediment Removal/Erosion Repair	$1,100
Bioretention Area Replacement	$1,400

APPENDIX 'A'

SITE EXHIBIT

THE NATIONAL RESOURCES CONSERVATION SERVICE ONLINE WEB SOIL SERVICE REPORTS THAT GROUND WATER IS EXPECTED TO BE ENCOUNTERED AT ELEVATIONS GREATER THAN 10-FEET BELOW THE EXISTING GROUND SURFACE. THE SOIL WAS CHARACTERIZED AS A "CLAYEY LOAM" WHICH IS TYPICALLY CLASSIFIED AS BELONGING IN HYDROLOGIC GROUP "D" AND HAVING AN INFILTRATION RATE OF APPROXIMATELY 0 TO 0.05 IN/HR.

BASED ON THE FLOOD CONTROL DESIGN CRITERIA OF THE SONOMA COUNTY FLOOD WATER AGENCY, MEAN SEASONAL PRECIPITATION OF THE PROJECT SITE IS APPROXIMATELY 35.0 INCHES PER YEAR AND A K-VALUE OF 1.17.

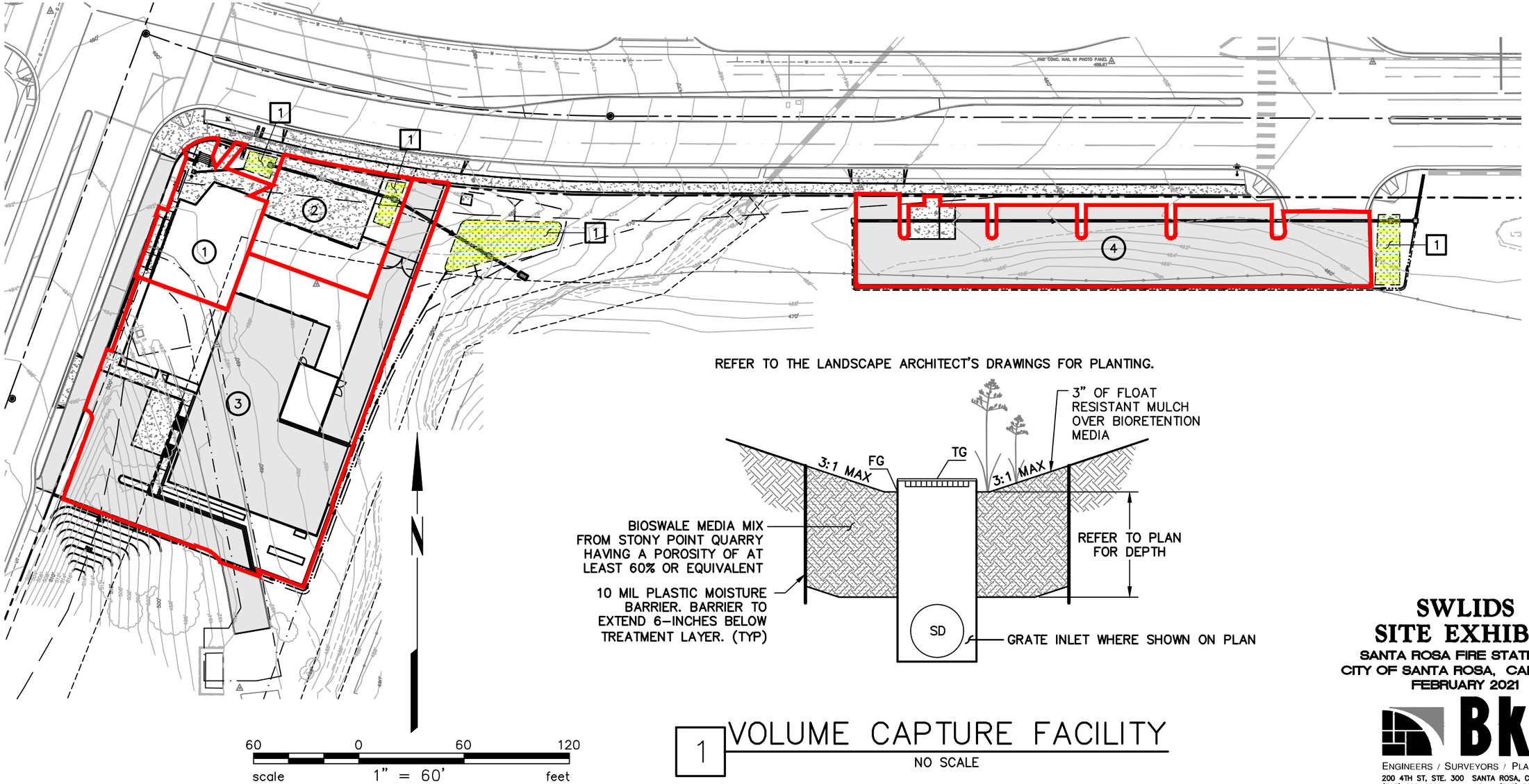
TRIBUTARY AREAS

AREA NO.	CN VALUE	SIZE (SQ. FT)
1	95	4,295
2	95	4,875
3	95	24,675
4	95	13,580

SYMBOLS & LEGEND

EXISTING / PROPOSED

- VALVE
- FIRE DEPARTMENT CONNECTION
- FIRE HYDRANT
- TREE
- PROPERTY LINE
- BUILDING SETBACK
- CENTERLINE
- FLOW LINE
- STORM DRAIN
- ASPHALT CONCRETE
- CONCRETE
- DETECTABLE WARNING SURFACE
- VOLUME CAPTURE FACILITY



REFER TO THE LANDSCAPE ARCHITECT'S DRAWINGS FOR PLANTING.

1 VOLUME CAPTURE FACILITY

NO SCALE

SWLIDS
SITE EXHIBIT
SANTA ROSA FIRE STATION #5
CITY OF SANTA ROSA, CALIFORNIA
FEBRUARY 2021

BkF
ENGINEERS / SURVEYORS / PLANNERS
200 4TH ST. STE. 300 SANTA ROSA, CA 95401
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JOB NO. 20201497

SHEET 1 OF 1 SHEETS

Plot Jan 29, 2021 at 12:12pm

201497_EXHB.dwg

APPENDIX ‘B’

VOLUME CAPTURE CALCULATIONS

STORM WATER CALCULATOR

LID BMP Summary Page & Site Global Values

Project Information:

Project Name:	Santa Rosa Fire Station #5
Address/Location:	Fountaingrove Parkway, Santa Rosa, CA
Designer:	BTL
Date:	11/10/2020

Site Information:

Mean Seasonal Precipitation (MSP) of Project Site:	35.00	(inches)
K=MSP/3(K=	1.17	
Impervious area - pre development:	0.0	ft^2
Impervious area - post development:	0.0	ft^2

Based upon the pre and post development impervious area, the post construction BMP requirement is:

Treatment Only

Summary of Saved BMP Results:

		Tributary Area		Requirements		BMP Design Results						
							Hydromodification Control		Flow Base Treatment		Delta Volume Capture	
	BMP ID:	Tributary Area (ft^2.)	Runoff Reduction Measures (Y/N)	Type of Requirement Met	Type of BMP Design	Percent Achieved	Required $V_{Hydromod}$ (ft^3)	Achieved (ft^3)	Required Q Treatment (cfs)	Achieved (ft^3)	Required Vdelta (ft^3)	Achieved (ft^3)
1	IMP 1	4,295	No	Hydromod Volume Capture	Priority 2: P2-04 Roadside Bioretention - Curb Opening	102.7	254.0493	261.0000				
2	IMP 2	4,875	No	Hydromod Volume Capture	Priority 2: P2-04 Roadside Bioretention - Curb Opening	105.1	288.3563	303.0000				
3	IMP 3	24,675	No	Hydromod Volume Capture	Priority 2: P2-04 Roadside Bioretention - Curb Opening	102.2	1459.5300	1492.0000				
4	IMP 4	13,580	No	Hydromod Volume Capture	Priority 2: P2-04 Roadside Bioretention - Curb Opening	101.8	803.2570	818.0000				
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STORM WATER CALCULATOR

BMP Tributary Parameters

Project Name: **Santa Rosa Fire Station #5**

BMP ID:	IMP 1
BMP Design Criteria:	Treatment Only
Type of BMP Design:	Priority 2: P2-04 Roadside Bioretention - Curb Opening
BMP's Physical Tributary Area:	4,295.0 ft^2
Description/Notes:	

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

$V_{HYDROMOD}$ = 254.05 ft^3

Post development hydrologic soil type within tributary area:	D: 0 - 0.05 in/hr infiltration (transmission) rate
Post development ground cover description:	Urban districts - Commercial and business
CN_{POST} :	95
User Composite post development CN:	0.0

BMP Sizing Tool: Hydromodification Requirement

Percent of Goal Achieved = 102.74 %

	BMP Volume Below Ground		Ponded Water Above Ground	
Porosity:	0.30			
Depth below perforated pipe if present:	2.00	ft		
Depth:			0.50	ft
Width:	0.00	ft	0.00	ft
Length:	0.00	ft	0.00	ft
Area:	185.00	ft^2	300.00	ft^2

STORM WATER CALCULATOR

BMP Tributary Parameters

Project Name: **Santa Rosa Fire Station #5**

BMP ID:	IMP 2
BMP Design Criteria:	Treatment Only
Type of BMP Design:	Priority 2: P2-04 Roadside Bioretention - Curb Opening
BMP's Physical Tributary Area:	4,875.0 ft^2
Description/Notes:	

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

$V_{HYDROMOD}$ = 288.36 ft^3

Post development hydrologic soil type within tributary area:	D: 0 - 0.05 in/hr infiltration (transmission) rate
Post development ground cover description:	Urban districts - Commercial and business
CN_{POST} :	95
User Composite post development CN:	0.0

BMP Sizing Tool: Hydromodification Requirement

Percent of Goal Achieved = 105.08 %

	BMP Volume Below Ground		Ponded Water Above Ground	
Porosity:	0.30			
Depth below perforated pipe if present:	2.00	ft		
Depth:			0.50	ft
Width:	0.00	ft	0.00	ft
Length:	0.00	ft	0.00	ft
Area:	255.00	ft^2	300.00	ft^2

STORM WATER CALCULATOR

BMP Tributary Parameters

Project Name: **Santa Rosa Fire Station #5**

BMP ID:	IMP 3
BMP Design Criteria:	Treatment Only
Type of BMP Design:	Priority 2: P2-04 Roadside Bioretention - Curb Opening
BMP's Physical Tributary Area:	24,675.0 ft^2
Description/Notes:	

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

$V_{HYDROMOD}$ = 1,459.53 ft^3

Post development hydrologic soil type within tributary area:	D: 0 - 0.05 in/hr infiltration (transmission) rate
Post development ground cover description:	Urban districts - Commercial and business
CN_{POST} :	95
User Composite post development CN:	0.0

BMP Sizing Tool: Hydromodification Requirement

Percent of Goal Achieved = 102.16 %

	BMP Volume Below Ground		Ponded Water Above Ground	
Porosity:	0.30			
Depth below perforated pipe if present:	2.00	ft		
Depth:			0.50	ft
Width:	0.00	ft	0.00	ft
Length:	0.00	ft	0.00	ft
Area:	1,235.00	ft^2	1,500.00	ft^2

STORM WATER CALCULATOR

BMP Tributary Parameters

Project Name: **Santa Rosa Fire Station #5**

BMP ID:	IMP 4
BMP Design Criteria:	Treatment Only
Type of BMP Design:	Priority 2: P2-04 Roadside Bioretention - Curb Opening
BMP's Physical Tributary Area:	13,580.0 ft^2
Description/Notes:	

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

$V_{HYDROMOD}$ = 803.26 ft^3

Post development hydrologic soil type within tributary area:	D: 0 - 0.05 in/hr infiltration (transmission) rate
Post development ground cover description:	Urban districts - Commercial and business
CN_{POST} :	95
User Composite post development CN:	0.0

BMP Sizing Tool: Hydromodification Requirement

Percent of Goal Achieved = 101.84 %

	BMP Volume Below Ground		Ponded Water Above Ground	
Porosity:	0.30			
Depth below perforated pipe if present:	3.00	ft		
Depth:			0.50	ft
Width:	0.00	ft	0.00	ft
Length:	0.00	ft	0.00	ft
Area:	520.00	ft^2	700.00	ft^2

APPENDIX 'C'

DETERMINATION WORKSHEET

SUSMP SUBMITTAL GUIDE CHECKLIST

BMP SELECTION TABLES

APPENDIX ‘D’

BIORETENTION AREA FACT SHEET

APPENDIX ‘E’

SAMPLE STORM WATER QUALITY FEATURE MAINTENANCE CHECKLIST

APPENDIX ‘F’

DRAFT MAINTENANCE DECLARATION