



11.6 Hydrology/Water Quality Reports

This document is designed for double-sided printing to conserve natural resources.

(D22-00016, T22-00006, GPA22-00002, RC22-00011)

CITY OF OCEANSIDE ENGINEERING DIVISION
PRIORITY DEVELOPMENT PROJECT STORM WATER QUALITY MANAGEMENT PLAN FOR NCTD Oceanside Transit Center 235 South Tremont Street
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How to Use This Template

This template, assembled by GHD Inc. on behalf of the City of Oceanside, is for the development of Storm Water Quality Management Plans (SWQMPs) for Priority Development Projects (PDPs) proposed within Oceanside, CA. It is based on requirements set forth in the Regional Water Quality Control Board's National Pollutant Discharge Elimination System MS4 Permit that covers the San Diego Region (Order No. R9-2013-0001).

All references within the template refer to the City of Oceanside BMP Design Manual dated February 2016 (Manual). Use of this template in conjunction with the Manual is intended to help a project applicant develop a SWQMP compliant with City of Oceanside and MS4 Permit requirements.

Template Date: February 16, 2016

Assembled By:



Quick Reference Guide

Item	Project Information
Project Name	NCTD Oceanside Transit Center
Application Number(s)	D22-00016, T22-00006, GPA22-00002, RC22-00011
Project Address	235 South Tremont Street
Total Parcel Area	522,720 sq. ft.
Project Description	<p>The project site located at 235 South Tremont Street consists of approximately 11.9 acres located in Oceanside, California and is enclosed within South Tremont Street, Missouri Avenue, A.T.& S.F. railroad, and Seagaze Drive (Figure 1). The 11.9 acres is comprised of public right-of-way improvements (3.3 acres) and 8.6 acres of onsite project development. The site will be developed as a transit-oriented development (TOD) with a mixed-use program generally consisting of approximately 547 residential apartment units with associated indoor and outdoor amenities, a boutique hotel with amenities, a 50,000 square feet (SF) office building for the new NCTD headquarters, a 4,000 SF replacement intermodal transportation center for train and bus travellers, a 12-bus exterior transfer center, approximately 22,000 SF of retail store front, and parking structures on each block to accommodate the needs of the proposed land use mix.</p> <p>Construction phasing of the project is not known at this time and will be determined during final engineering.</p>
Proposed Disturbed Area (includes Public Green Street improvements)	519,474 sq. ft.
Created or Replaced Impervious (includes Public Green Street improvements)	468,967 sq. ft.
Project Hydrologic Unit Watershed	<input type="checkbox"/> Santa Maria <input type="checkbox"/> San Luis Rey <input checked="" type="checkbox"/> Carlsbad
Required to implement HMP	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No



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CERTIFICATION PAGE

Project Name: NCTD Oceanside Transit Center – 235 S. Tremont St.
Permit Application Number: D22-00016, T22-00006, GPA22-00002, RC22-00011

I hereby declare that I am the Engineer in Responsible Charge of design of storm water BMPs for this project, and that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the requirements of the City of Oceanside BMP Design Manual, which is based on the requirements of San Diego Regional Water Quality Control Board Order No. R9-2013-0001 (MS4 Permit).

I have read and understand that the City has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the BMP Design Manual. I certify that this SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable source control and site design BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this SWQMP by City staff is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.

As Engineer of Work, I agree to indemnify, defend, and hold harmless the City of Oceanside, its officers, agents, and employees from any and all liability, claims, damages, or injuries to any person or property which might arise from the negligent acts, errors, or omissions of the Engineer of Work, my employees, agents or consultants.



R.C.E. 67379, EXP. 9/30/2024

Engineer of Work's Signature, PE Number & Expiration Date

Edward S. Perez, PE
Print Name

Stantec Consulting, Inc.
Company

8/9/2024
Date

Engineer's Seal:

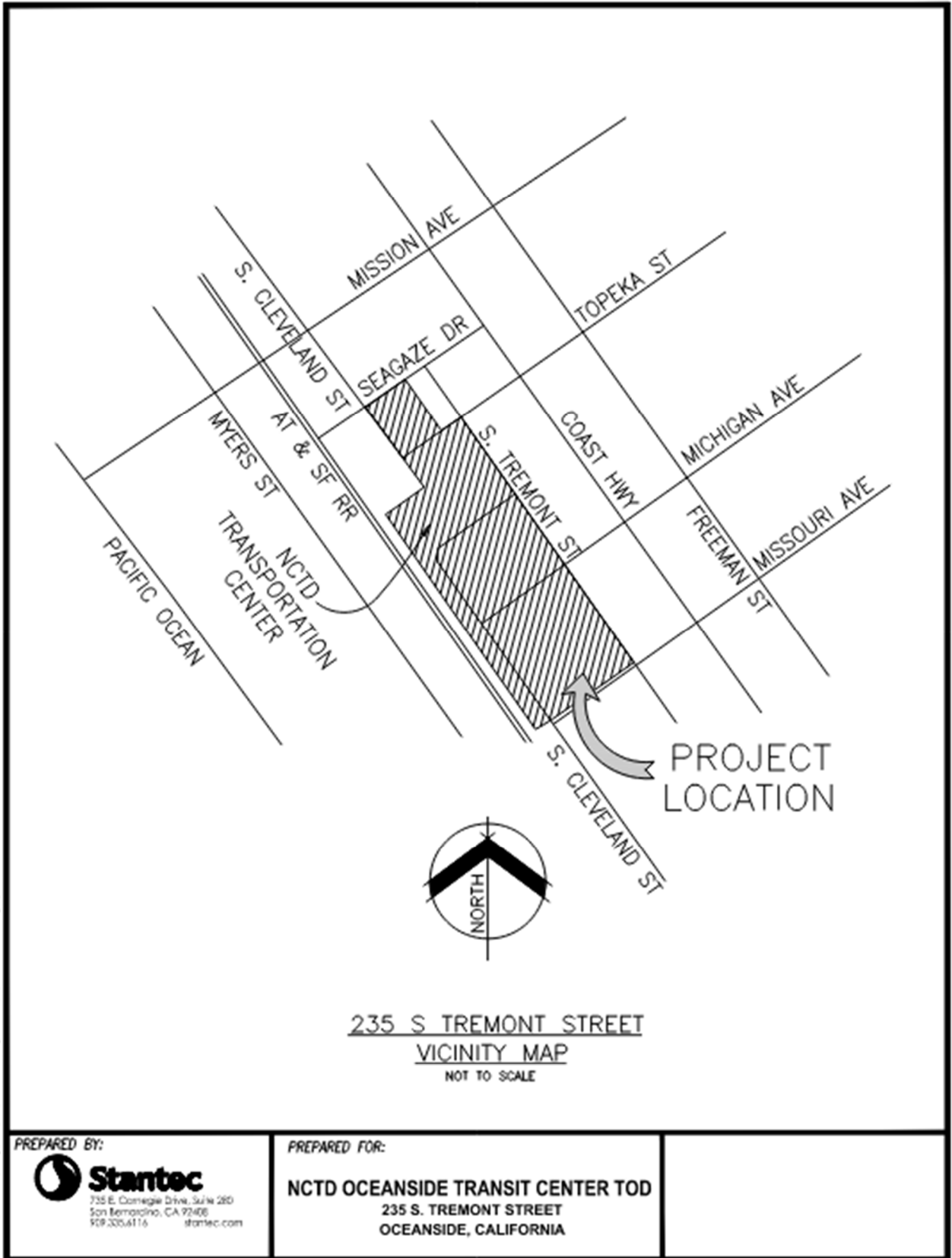


SUBMITTAL RECORD

Use this Table to keep a record of submittals of this SWQMP. Each time the SWQMP is re-submitted, provide the date and status of the project. In last column indicate changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck comments behind this page.

Submittal Number	Date	Project Status	Changes
1	08/26/2022	<input checked="" type="checkbox"/> Preliminary Design/ Planning/ CEQA <input type="checkbox"/> Final Design	Original report.
2	02/27/2023	<input checked="" type="checkbox"/> Preliminary Design/ Planning/ CEQA <input type="checkbox"/> Final Design	Revised to address City review comments.
3	10/09/2023	<input checked="" type="checkbox"/> Preliminary Design/ Planning/ CEQA <input type="checkbox"/> Final Design	Revised to address City review comments.
4	4/8/2024	<input checked="" type="checkbox"/> Preliminary Design/ Planning/ CEQA <input type="checkbox"/> Final Design	Revised to address City review comments.
5	6/17/2024	<input checked="" type="checkbox"/> Preliminary Design/ Planning/ CEQA <input type="checkbox"/> Final Design	Revised to address City review comments.
6	8/9/2024	<input checked="" type="checkbox"/> Preliminary Design/ Planning/ CEQA <input type="checkbox"/> Final Design	Revised to address City review comments.





NCTD Oceanside Transit Center (D22-00016, T22-00006, GPA22-00002, RC22-00011)
Priority Development Project - Storm Water Mitigation Plan



Applicability of Permanent, Post-Construction Storm Water BMP Requirements (Storm Water Intake Form for all Development Permit Applications)		Form I-1
Project Identification		
Project Name: NCTD Oceanside Transit – 235 South Tremont Street		
Permit Application Number: D22-00016, T22-00006, GPA22-00002, RC22-00011		Date: 8/9/2024
Determination of Requirements		
<p>The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short <u>summary</u> of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements.</p> <p>Answer each step below, starting with Step 1 and progressing through each step until reaching "Stop". Refer to the manual sections and/or separate forms referenced in each step below.</p>		
Step	Answer	Progression
Step 1: Is the project a "development project"? See Section 1.3 of the manual for guidance.	<input checked="" type="checkbox"/> Yes	Go to Step 2.
	<input type="checkbox"/> No	Stop. Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.
Discussion / justification if the project is <u>not</u> a "development project" (e.g., the project includes <i>only</i> interior remodels within an existing building):		
Step 2: Is the project a Standard Project, PDP, or exception to PDP definitions? To answer this item, see Section 1.4 of the manual <i>in its entirety</i> for guidance, AND complete Form I-2, Project Type Determination.	<input type="checkbox"/> Standard Project	Stop. Standard Project requirements apply, including Standard Project SWQMP.
	<input checked="" type="checkbox"/> PDP	PDP requirements apply, including PDP SWQMP. Go to Step 3.
	<input type="checkbox"/> Exception to PDP definitions	Stop. Standard Project requirements apply. Provide discussion and list any additional requirements below. Prepare Standard Project SWQMP.
Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:		



Step	Answer	Progression
Step 3. Is the project subject to earlier PDP requirements due to a prior lawful approval? See Section 1.10 of the manual for guidance.	<input type="checkbox"/> Yes	Consult the [City Engineer] to determine requirements. Provide discussion and identify requirements below. Go to Step 4.
	<input checked="" type="checkbox"/> No	BMP Design Manual PDP requirements apply. Go to Step 4.
Discussion / justification of prior lawful approval, and identify requirements (<i>not required if prior lawful approval does not apply</i>):		
Step 4. Do hydromodification control requirements apply? See Section 1.6 of the manual for guidance.	<input type="checkbox"/> Yes	PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6). Go to Step 5.
	<input checked="" type="checkbox"/> No	Stop. PDP structural BMPs required for pollutant control (Chapter 5) only. Provide brief discussion of exemption to hydromodification control below.
Discussion / justification if hydromodification control requirements do <u>not</u> apply: DMA A is captured by an existing storm drain system located north of the project at the intersection of Seagaze Drive and S. Cleveland Street. The storm drain system ultimately flows to a 60-inch outfall at the Pacific Ocean. DMA B connects to an existing 15" storm drain to the west that travels underneath the railroad. Flow eventually outlets directly into S. Myers Street. DMA C outlets into S. Cleveland Street via a new storm drain extension that connects to the existing system located at the intersection of Wisconsin Avenue approximately 1,400 feet from the project site. The storm drain system continues downstream in Wisconsin Avenue and discharges to an outfall in the Pacific Ocean. See Attachment 1a for DMA Exhibit. All DMAs discharge to publicly maintained hardened systems that discharge directly into the Pacific Ocean.		
Step 5. Does protection of critical coarse sediment yield areas apply? See Section 6.2 of the manual for guidance.	<input type="checkbox"/> Yes	Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2). Stop.
	<input checked="" type="checkbox"/> No	Management measures not required for protection of critical coarse sediment yield areas. Provide brief discussion below. Stop.
Discussion / justification if protection of critical coarse sediment yield areas does <u>not</u> apply: As shown in the Potential Critical Coarse Sediment Yield Areas exhibit and kmz file downloaded from the County of San Diego website, there are no areas within the project limits that would require the protection of critical coarse sediment yield areas.		



Project Type Determination Checklist		Form I-2	
Project Information			
Project Name: NCTD Oceanside Transit Center			
Permit Application Number: D22-00016, T22-00006, GPA22-00002, RC22-00011			
Project Type Determination: Standard Project or PDP			
The project is (select one): <input type="checkbox"/> New Development <input checked="" type="checkbox"/> Redevelopment			
The total proposed newly created or replaced impervious area is: 468,967 ft ² (10.8 acres)			
Is the project in any of the following categories, (a) through (f)?			
Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	(a)	New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	(b)	Redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site on an existing site of 10,000 square feet or more of impervious surfaces). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	(c)	<p>New and redevelopment projects that create 5,000 square feet or more of impervious surface (collectively over the entire project site), and support one or more of the following uses:</p> <ul style="list-style-type: none"> (i) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption SIC code 5812). (ii) Hillside development projects. This category includes development on any natural slope that is twenty-five percent or greater. (iii) Parking lots. This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce. (iv) Streets, roads, highways, freeways, and driveways. This category is defined as any paved impervious surface used for the transportation of automobiles, trucks, motorcycles, and other vehicles.



Form I-2 Page 2 of 2

Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	(d)	<p>New or redevelopment projects that create or replace 2,500 square feet or more of impervious surface (collectively over the entire project site), and discharging directly to an Environmentally Sensitive Area (ESA). “Discharging directly to” includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands).</p> <p><u>Note: ESAs are areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Board and SDRWQCB; State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Board and SDRWQCB; and any other equivalent environmentally sensitive areas which have been identified by the Copermitttees. See manual Section 1.4.2 for additional guidance.</u></p>
Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	(e)	<p>New development projects that support one or more of the following uses:</p> <p>(i) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following SIC codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.</p> <p>(ii) Retail gasoline outlets. This category includes retail gasoline outlets that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic of 100 or more vehicles per day.</p>
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	(f)	<p>New or redevelopment projects that result in the disturbance of one or more acres of land and are expected to generate pollutants post construction.</p> <p><i>Note: See manual Section 1.4.2 for additional guidance.</i></p>
<p>Does the project meet the definition of one or more of the PDP categories (a) through (f) listed above?</p> <p><input type="checkbox"/> No – the project is not a PDP (Standard Project).</p> <p><input checked="" type="checkbox"/> Yes – the project is a PDP.</p>			
<p>The following is for redevelopment PDPs only:</p> <p>The area of existing (pre-project) impervious area at the project site is: 440,609 ft² (A)</p> <p>The total proposed newly created or replaced impervious area is: 468,967 ft² (B)</p> <p>Percent impervious surface created or replaced (A/B)*100: [(B/A)*100] is 106 %</p> <p>The percent impervious surface created or replaced is (select one based on the above calculation):</p> <p><input type="checkbox"/> less than or equal to fifty percent (50%) – only new impervious areas are considered PDP</p> <p>OR</p> <p><input checked="" type="checkbox"/> greater than fifty percent (50%) – the entire project site is a PDP</p>			



Site Information Checklist For PDPs		Form I-3B (PDPs)
Project Summary Information		
Project Name	NCTD Oceanside Transit – 235 South Tremont Street	
Project Address	235 South Tremont Street Oceanside, CA 92054	
Assessor's Parcel Number(s)	147-350-24; 150-046-17; 150-046-01 thru 08; 150-043-01 thru 06; and 147-350-25	
Permit Application Number	D22-00016, T22-00006, GPA22-00002, RC22-00011	
Project Watershed (Hydrologic Unit)	Select One: <input type="checkbox"/> Santa Margarita 902 <input type="checkbox"/> San Luis Rey 903 <input checked="" type="checkbox"/> Carlsbad 904	
Parcel Area (total area of Assessor's Parcel(s) associated with the project)	12.0 Acres	
Area to be disturbed by the project (Includes Public Right-of-Way Improvements)	11.9 Acres	
Project Proposed Impervious Area (subset of Project Area and Public Area)	10.8 Acres	
Project Proposed Pervious Area (subset of Project Area and Public Area)	1.1 Acres	
Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Parcel Area.		

Hydrologic Unit	Hydrologic Area	Hydrologic Sub-Area
Santa Margarita 902.00	<input type="checkbox"/> Ysidora 902.10	<input type="checkbox"/> Lower Ysidora 902.11
San Luis Rey 903.00	<input type="checkbox"/> Lower San Luis 903.10	<input type="checkbox"/> Mission 903.11
		<input type="checkbox"/> Bonsall 903.12
Carlsbad 904.00	<input checked="" type="checkbox"/> Loma Alta 904.10	Not Applicable
	<input type="checkbox"/> Buena Vista Creek 904.20	<input type="checkbox"/> El Salto 904.21
		<input type="checkbox"/> Vista 904.22
<input type="checkbox"/> Agua Hedionda 4.30		<input type="checkbox"/> Los Monos 904.31



Description of Existing Site Condition and Drainage Patterns

Current Status of the Site (select all that apply):

- Existing development
- Previously graded but not built out
- Agricultural or other non-impervious use
- Vacant, undeveloped/natural

Description / Additional Information:

The existing development is a transportation hub that includes a bus transit center, train station, and office space for North County Transit District employees. The property is comprised of parking lots, landscaping, and structural buildings. In general, onsite runoff discharges away from the property at three different locations: (1) northerly at the intersection of S. Cleveland Street and Seagaze Drive, (2) westerly under the railroad tracks towards S. Myers Street, and (3) southerly at the S. Cleveland Street and Missouri Avenue intersection. There is offsite drainage that enters the site from the area east of South Tremont Street.

Existing Land Cover Includes (select all that apply):

- Vegetative Cover
- Non-Vegetated Pervious Areas
- Impervious Areas

Description / Additional Information:

The onsite walkways, parking lots, and buildings make up 85% of the total area that is impervious. The remaining 15% are pervious areas comprised of sparsely vegetated landscape.

Underlying Soil belongs to Hydrologic Soil Group (select all that apply):

- NRCS Type A
- NRCS Type B
- NRCS Type C
- NRCS Type D

Approximate Depth to Groundwater:

- Groundwater Depth < 5 feet
- 5 feet < Groundwater Depth < 10 feet
- 10 feet < Groundwater Depth < 20 feet
- Groundwater Depth > 20 feet



Description of Existing Site Topography and Drainage [How is storm water runoff conveyed from the site? At a minimum, this description should answer (1) whether existing drainage conveyance is natural or urban; (2) describe existing constructed storm water conveyance systems, if applicable; and (3) is runoff from offsite conveyed through the site? If so, describe]:

In general, onsite runoff discharges away from the property at three different locations: (1) northerly at the intersection of S. Cleveland Street and Seagaze Drive, (2) westerly under the railroad tracks towards S. Myers Street, and (3) southerly at the S. Cleveland Street and Missouri Avenue intersection. There is offsite drainage that enters the site from the area east of South Tremont Street. A more detailed description of the three tributaries and their drainage patterns is provided below.

- (1) The northerly tributary drains in a northwest direction towards the S. Cleveland Avenue and Seagaze Drive intersection as surface flow. Runoff is conveyed by gutters and streets until it is picked up by curb inlets just north of the intersection. Drainage from the existing parking structure and adjacent dead-end street are also picked up by this existing storm drain. There is approximately 3.5 acres of offsite drainage that originates in an area just east of project. The underground storm drain continues downstream and drains to a 60-inch outfall that discharges directly into the Pacific Ocean.
- (2) The middle tributary drains in a westerly direction where it is picked up by catch basins and an underground storm drain system with a portion of the tributary draining into an underground detention system comprised of parallel 36-inch pipes under South Cleveland Street. There is approximately 0.2 acres of offsite drainage that originates in an area east of South Tremont Street. The onsite system flows downstream where it is picked up by a 15-inch storm drain pipe under the railroad right-of-way. The pipe discharges directly into South Myers Street via a sidewalk underdrain. Runoff then travels south in South Myers Street and west in Tyson Street where it is picked up by a curb inlet at South Pacific Street. The existing underground storm drain continues downstream and drains to an outfall that discharges directly into the Pacific Ocean.
- (3) The southerly tributary drains in a southwesterly direction towards the South Cleveland Avenue and Missouri intersection. The onsite storm drain system is comprised of catch basins, underground storm drain pipe, and a box culvert that picks up onsite and offsite drainage. There is approximately 6.7 acres of offsite drainage that originates from an area east of South Tremont Street. The onsite system flows downstream towards the Missouri Avenue and South Cleveland Street intersection where it discharges as surface flow via a sidewalk underdrain. Runoff continues downstream to the south in South Cleveland Street until it is picked up by curb inlets just north of Wisconsin Street. The existing underground storm drain system drains to an outfall that discharges directly into the Pacific Ocean.

The onsite project area sits at a maximum elevation of approximately 61 feet in South Tremont Street to the east and then to a minimum elevation of about 49 feet at the railroad platform located at the west end of the property. Surface slopes are within a range of 0 to 6 percent.

See Attachment 5 for copy of drainage report and hydrology exhibit for the existing condition.



Description of Proposed Site Development and Drainage Patterns

Project Description / Proposed Land Use and/or Activities:

The proposed design is a mixed-used program consisting of two 5-story structures comprising of approximately 547 residential apartment units with indoor and outdoor amenities, a 6-story boutique hotel with amenities with an adjacent 5-story parking structure, 4,000 square foot replacement intermodal transportation center, a 50,000 square foot 5-story office building (relocated NCTD headquarters location), a 12-stall bus exterior transfer center, and an existing parking structure on the northwest end that will remain.

Construction phasing is not known at this time and will be determined during final engineering. It is generally understood that this preliminary SWQMP is further refined during final engineering and will need to consider implementation of structural BMPs to support each of the developed phases of the project.

List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features):

This proposed development will incorporate the following impervious features:

- Building structures (office space, residential apartments, and hotel),
- parking structures and lots,
- public and private drives,
- bus transit area, and
- courtyards.

List/describe proposed pervious features of the project (e.g., landscape areas):

There will be planting for residential amenities of the residential units and at ground level dispersed throughout the proposed development along sidewalks, streets, and plaza areas.



Does the project include grading and changes to site topography?

Yes

No

Description / Additional Information:

Changes to site topography include the following, but are not limited to:

- Relocation of bus transit station (pick-up and drop-off)
- Construction of new building structures (offices, residential apartments, hotel, and parking structures)
- Realigned roadways and walkways
- New landscape and hardscape features

Does the project include changes to site drainage (e.g., installation of new storm water conveyance systems)?

Yes

No

Description / Additional Information:

New storm-drain systems are proposed at the following locations:

- In N. Cleveland Street, located in the northerly tributary, that will connect to the existing storm drain system at the N. Cleveland Street and Seagaze Drive intersection. There is an ongoing CIP project to install new curb inlets and storm drain in Seagaze Drive. The start of construction is not known at this time, but the project will be compatible to both the existing and CIP storm drain systems.
- In Topeka Street from S. Tremont Street to the point of connection to the west with the 15" storm drain at the railroad platform.
- In S. Tremont Street and Michigan Avenue through the proposed bus transit center and in S. Cleveland Street through a new storm drain system that extends to the Wisconsin Avenue intersection.
- In the alleyway running parallel with S. Tremont Street and then south in Missouri Avenue until it connects to the new storm drain at the S. Cleveland Street and Missouri Avenue intersection.

Due to limited flow capacity in the existing 15" storm drain under the railroad, (3) underground detention basins are proposed located north and south of the new NCTD office building. See preliminary grading and drainage sheet provided in the Vesting Tentative Parcel Map. To prevent the surcharge of downstream infrastructure and minimize outflow onto S. Myers Street, the underground detention basins are designed to attenuate flows so as not to exceed the capacity of the existing 15" RCP underneath the railroad. The downstream conveyance is hard lined all the way to the discharge point into the Pacific Ocean. Therefore, hydromodification is not required.



Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply):

- Onsite storm drain inlets
- Interior floor drains and elevator shaft sump pumps
- Interior parking garages
- Need for future indoor & structural pest control
- Landscape/outdoor pesticide use
- Pools, spas, ponds, decorative fountains, and other water features
- Food service
- Refuse areas
- Industrial processes
- Outdoor storage of equipment or materials
- Vehicle and equipment cleaning
- Vehicle/equipment repair and maintenance
- Fuel dispensing areas
- Loading docks
- Fire sprinkler test water
- Miscellaneous drain or wash water
- Plazas, sidewalks, and parking lots



Identification of Receiving Water Pollutants of Concern

Describe path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable):

In general, runoff from the project site is conveyed by gutters and streets where it is picked up by catch basins and underground storm drain systems. Flows continue downstream in the underground storm drain system where it eventually outlets into the Pacific Ocean.

List any 303(d) impaired water bodies within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs for the impaired water bodies:

303(d) Impaired Water Body	Pollutant(s)/Stressor(s)	TMDLs
Northerly Cleveland Street storm drain outlets to Pacific Ocean shoreline, San Luis Rey HU, at Surfriider Way.	No 303(d) pollutants listed.	TMDL for indicator bacteria.
S. Myers Street outlets to Pacific Ocean shoreline, Loma Alta HSA, at Tyson Way.	303(d) impairment for indicator bacteria.	No TMDL.
Southerly Cleveland Street storm drain outlets to Pacific Ocean shoreline, Loma Alta HSA, at Wisconsin Street.	No 303(d) pollutants listed.	No TMDL.



Identification of Project Site Pollutants*

***Identification of project site pollutants is only required if flow-thru treatment BMPs are implemented onsite in lieu of retention or biofiltration BMPs (note the project must also participate in an alternative compliance program unless prior lawful approval to meet earlier PDP requirements is demonstrated)**

Identify pollutants expected from the project site based on all proposed use(s) of the site (see manual Appendix B.6):

Pollutant	Not Applicable to the Project Site	Expected from the Project Site	Also a Receiving Water Pollutant of Concern
Sediment	see above * <input checked="" type="checkbox"/>		
Nutrients	see above * <input checked="" type="checkbox"/>		
Heavy Metals	see above * <input checked="" type="checkbox"/>		
Organic Compounds	see above * <input checked="" type="checkbox"/>		
Trash & Debris	see above * <input checked="" type="checkbox"/>		
Oxygen Demanding Substances	see above * <input checked="" type="checkbox"/>		
Oil & Grease	see above * <input checked="" type="checkbox"/>		
Bacteria & Viruses	see above * <input checked="" type="checkbox"/>		
Pesticides	see above * <input checked="" type="checkbox"/>		

Note: Nutrients shall be addressed as a Pollutant of Concern (POC) for projects located in the Loma Alta Hydrologic Area.



Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6 of the manual)?

- Yes, hydromodification management flow control structural BMPs required.
- No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.
- No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.
- No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA for the watershed in which the project resides.

Description / Additional Information (to be provided if a 'No' answer has been selected above):

DMAs A1-A10 and E1-E3 are conveyed by an existing storm drain system located north of the project at the intersection of Seagaze Drive and N. Cleveland Street. The storm drain system ultimately flows to a 60-inch outfall at the Pacific Ocean.

DMAs B1-B4, B6, E4-E7, E9, E10, and D1-D11 are conveyed by an existing 15” storm drain to the west that travels underneath the railroad. Flow outlets directly into S. Myers Street where it is conveyed by gutter and street until it is picked up by an existing inlet at the intersection of Tyson Street and S. Pacific Street intersection. The storm drain ultimately flows to an outfall at the Pacific Ocean.

DMAs B5, E8, E11-E16, and C1-C11 discharge into S. Cleveland Street via a new storm drain extension that connects to the existing system at the Wisconsin intersection. The storm drain system continues downstream and discharges to an outfall in the Pacific Ocean.

See Attachment 1a for DMA Exhibit.

All DMAs discharge to publicly maintained hardened systems that discharge directly into the Pacific Ocean.



Critical Coarse Sediment Yield Areas*

***This Section only required if hydromodification management requirements apply**

Based on the maps provided within the WMAA, do potential critical coarse sediment yield areas exist within the project drainage boundaries?

Yes

No, no critical coarse sediment yield areas to be protected based on WMAA maps

If yes, have any of the optional analyses presented in Section 6.2 of the manual been performed?

6.2.1 Verification of GLUs Onsite

6.2.2 Downstream Systems Sensitivity to Coarse Sediment

6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite

No optional analyses performed, the project will avoid critical coarse sediment yield areas identified based on WMAA maps

If optional analyses were performed, what is the final result?

No critical coarse sediment yield areas to be protected based on verification of GLUs onsite.

Critical coarse sediment yield areas exist but additional analysis has determined that protection is not required. Documentation attached in Attachment 8 of the SWQMP.

Critical coarse sediment yield areas exist and require protection. The project will implement management measures described in Sections 6.2.4 and 6.2.5 as applicable, and the areas are identified on the SWQMP Exhibit.

Discussion / Additional Information:

N/A – Refer to Form I-1 Page 2 of 2.



Flow Control for Post-Project Runoff*

***This Section only required if hydromodification management requirements apply**

List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project's HMP Exhibit.

N/A

Has a geomorphic assessment been performed for the receiving channel(s)?

- No, the low flow threshold is 0.1Q2 (default low flow threshold)
- Yes, the result is the low flow threshold is 0.1Q2
- Yes, the result is the low flow threshold is 0.3Q2
- Yes, the result is the low flow threshold is 0.5Q2

If a geomorphic assessment has been performed, provide title, date, and preparer:

Discussion / Additional Information: (optional)

N/A



Other Site Requirements and Constraints

When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements.

Hydromodification is not required since the downstream conveyance is hard lined all the way to the discharge point into the Pacific Ocean. The proposed underground vaults are for the detention of flows, so as not to surcharge the existing 15-inch RCP under the railroad.

Optional Additional Information or Continuation of Previous Sections As Needed

Please note that this preliminary SWQMP presents the ultimate build-out condition and that a Final SWQMP, concurrent to each phase, will be prepared at such time as engineering permits are processed at a later date.

Construction phasing is not known at this time and will be determined during final engineering. The project will provide appropriate post-construction BMPs to adequately support each phase of the project.



Source Control BMP Checklist for All Development Projects (Standard Projects and PDPs)	Form I-4
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Project Identification

Project Name: NCTD Oceanside Transit Center
Permit Application Number: D22-00016, T22-00006, GPA22-00002, RC22-00011

Source Control BMPs

All development projects must implement source control BMPs SC-1 through SC-6 where applicable and feasible. See Chapter 4 and Appendix E of the manual for information to implement source control BMPs shown in this checklist.

Answer each category below pursuant to the following.

- "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification may be provided.

Source Control Requirement	Implemented?		
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SC-1 Prevention of Illicit Discharges into the MS4	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
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Discussion / justification if SC-1 not implemented:

Drainage design shall comply with City storm drain and water quality standards. Inspection of the facilities shall be conducted regularly to avoid illicit connections and discharges.

SC-2 Storm Drain Stenciling or Signage	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
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Discussion / justification if SC-2 not implemented:

Placards will be installed at each catch basin to state no dumping allowed and that the system drains to the ocean.

SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
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Discussion / justification if SC-3 not implemented:

Material storage areas are not proposed for project.



Source Control Requirement	Implemented?		
SC-4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Discussion / justification if SC-4 not implemented: Outdoor work areas are not proposed for project.			
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Discussion / justification if SC-5 not implemented: Proper covers will be provided to help protect trash storage areas to avoid contamination of runoff and eliminate dispersion of trash and debris.			



SC-6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)	Implemented?		
Onsite storm drain inlets	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Interior floor drains and elevator shaft sump pumps	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Interior parking garages	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Need for future indoor & structural pest control	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Landscape/outdoor pesticide use	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Pools, spas, ponds, decorative fountains, and other water features	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Food service	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Refuse area	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Industrial processes	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Outdoor storage of equipment or materials	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Vehicle and equipment cleaning	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Vehicle/equipment repair and maintenance	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Fuel dispensing areas	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Loading docks	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Fire sprinkler test water	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Miscellaneous drain or wash water	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Plazas, sidewalks, and parking lots	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
<p>Discussion / justification if SC-6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for <u>all</u> "No" answers shown above.</p> <p>Various items checked "yes" above will be assessed and/or inspected with proper protection provided to avoid discharge of pollutants into the storm drain system. This may include inlet protection, diversion of flows to acceptable conveyance system, monitoring of pest control and pesticide use, and the cleanup of spilled trash and debris. See following 12 pages for Appendix E: BMP Design Fact Sheets checklist.</p>			



If These Sources Will Be on the Project Site ...	... Then Your SWQMP Shall Consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
<input checked="" type="checkbox"/> A. Onsite storm drain inlets <input type="checkbox"/> Not Applicable	<input checked="" type="checkbox"/> Locations of inlets.	<input checked="" type="checkbox"/> Mark all inlets with the words “No Dumping! Flows to Bay” or similar.	<input checked="" type="checkbox"/> Maintain and periodically repair or replace inlet markings. <input checked="" type="checkbox"/> Provide storm water pollution prevention information to new site owners, lessees, or operators. <input checked="" type="checkbox"/> See applicable operational BMPs in Fact Sheet SC-44, “Drainage System Maintenance,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com . <input checked="" type="checkbox"/> Include the following in lease agreements: “Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains.”

If These Sources Will Be on the Project Site ...	... Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
<input checked="" type="checkbox"/> B. Interior floor drains and elevator shaft sump pumps <input type="checkbox"/> Not Applicable		<input checked="" type="checkbox"/> State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	<input checked="" type="checkbox"/> Inspect and maintain drains to prevent blockages and overflow.
<input checked="" type="checkbox"/> C. Interior parking garages <input type="checkbox"/> Not Applicable		<input checked="" type="checkbox"/> State that parking garage floor drains will be plumbed to the sanitary sewer.	<input checked="" type="checkbox"/> Inspect and maintain drains to prevent blockages and overflow.
<input checked="" type="checkbox"/> D1. Need for future indoor & structural pest control <input type="checkbox"/> Not Applicable		<input checked="" type="checkbox"/> Note building design features that discourage entry of pests.	<input checked="" type="checkbox"/> Provide Integrated Pest Management information to owners, lessees, and operators.

If These Sources Will Be on the Project Site ...	... Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
<p><input checked="" type="checkbox"/> D2. Landscape/Outdoor Pesticide Use</p> <p><input type="checkbox"/> Not Applicable</p>	<p><input checked="" type="checkbox"/> Show locations of existing trees or areas of shrubs and ground cover to be undisturbed and retained.</p> <p><input checked="" type="checkbox"/> Show self-retaining landscape areas, if any.</p> <p><input checked="" type="checkbox"/> Show storm water treatment facilities.</p>	<p>State that final landscape plans will accomplish all of the following.</p> <p><input checked="" type="checkbox"/> Preserve existing drought tolerant trees, shrubs, and ground cover to the maximum extent possible.</p> <p><input checked="" type="checkbox"/> Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to storm water pollution.</p> <p><input checked="" type="checkbox"/> Where landscaped areas are used to retain or detain storm water, specify plants that are tolerant of periodic saturated soil conditions.</p> <p><input checked="" type="checkbox"/> Consider using pest-resistant plants, especially adjacent to hardscape.</p> <p><input checked="" type="checkbox"/> To ensure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.</p>	<p><input checked="" type="checkbox"/> Maintain landscaping using minimum or no pesticides.</p> <p><input checked="" type="checkbox"/> See applicable operational BMPs in Fact Sheet SC-41, “Building and Grounds Maintenance,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.</p> <p><input checked="" type="checkbox"/> Provide IPM information to new owners, lessees and operators.</p>

If These Sources Will Be on the Project Site ...	... Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
<p><input checked="" type="checkbox"/> E. Pools, spas, ponds, decorative fountains, and other water features.</p> <p><input type="checkbox"/> Not Applicable</p>	<p><input checked="" type="checkbox"/> Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet.</p>	<p><input checked="" type="checkbox"/> If the City requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to City requirements.</p>	<p><input checked="" type="checkbox"/> See applicable operational BMPs in Fact Sheet SC-72, “Fountain and Pool Maintenance,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.</p>
<p><input checked="" type="checkbox"/> F. Food service</p> <p><input type="checkbox"/> Not Applicable</p>	<p><input checked="" type="checkbox"/> For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment.</p> <p><input checked="" type="checkbox"/> On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.</p>	<p><input checked="" type="checkbox"/> Describe the location and features of the designated cleaning area.</p> <p><input checked="" type="checkbox"/> Describe the items to be cleaned in this facility and how it has been sized to ensure that the largest items can be accommodated.</p>	

If These Sources Will Be on the Project Site ...	... Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
<p><input checked="" type="checkbox"/> G. Refuse areas</p> <p><input type="checkbox"/> Not Applicable</p>	<p><input checked="" type="checkbox"/> Show where site refuse and recycled materials will be handled and stored for pickup. See City requirements for sizes and other details of refuse areas.</p> <p><input checked="" type="checkbox"/> If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run- on and show locations of berms to prevent runoff from the area. Also show how the designated area will be protected from wind dispersal.</p> <p><input checked="" type="checkbox"/> Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.</p>	<p><input checked="" type="checkbox"/> State how site refuse will be handled and provide supporting detail to what is shown on plans.</p> <p><input checked="" type="checkbox"/> State that signs will be posted on or near dumpsters with the words “Do not dump hazardous materials here” or similar.</p>	<p><input checked="" type="checkbox"/> State how the following will be implemented:</p> <p>Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post “no hazardous materials” signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on- site. See Fact Sheet SC-34, “Waste Handling and Disposal” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.</p>

If These Sources Will Be on the Project Site ...	... Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative Table and Narrative
<input type="checkbox"/> H. Industrial processes. <input type="checkbox"/> Not Applicable	<input type="checkbox"/> Show process area.	<input type="checkbox"/> If industrial processes are to be located onsite, state: “All process activities to be performed indoors. No processes to drain to exterior or to storm drain system.”	<input type="checkbox"/> See Fact Sheet SC-10, “Non-Stormwater Discharges” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com .
<input type="checkbox"/> I. Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.) <input type="checkbox"/> Not Applicable	<input type="checkbox"/> Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or runoff from area and protected from wind dispersal. <input type="checkbox"/> Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. <input type="checkbox"/> Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	<input type="checkbox"/> Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of local Hazardous Materials Programs for: <ul style="list-style-type: none"> ▪ Hazardous Waste Generation ▪ Hazardous Materials Release Response and Inventory ▪ California Accidental Release Prevention Program ▪ Aboveground Storage Tank ▪ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ▪ Underground Storage Tank 	<input type="checkbox"/> See the Fact Sheets SC-31, “Outdoor Liquid Container Storage” and SC-33, “Outdoor Storage of Raw Materials” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com .

If These Sources Will Be on the Project Site ...	... Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
<ul style="list-style-type: none"> <input type="checkbox"/> J. Vehicle and Equipment Cleaning <input type="checkbox"/> Not Applicable 	<ul style="list-style-type: none"> <input type="checkbox"/> Show on drawings as appropriate: <ul style="list-style-type: none"> (1) Commercial/industrial facilities having vehicle /equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses. (2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited onsite and hoses are provided with an automatic shut-off to discourage such use). (3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. (4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed. 	<ul style="list-style-type: none"> <input type="checkbox"/> If a car wash area is not provided, describe measures taken to discourage onsite car washing and explain how these will be enforced. 	<p>Describe operational measures to implement the following (if applicable):</p> <ul style="list-style-type: none"> <input type="checkbox"/> Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system. <input type="checkbox"/> Car dealerships and similar may rinse cars with water only. <input type="checkbox"/> See Fact Sheet SC-21, “Vehicle and Equipment Cleaning,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

If These Sources Will Be on the Project Site ...	... Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
<ul style="list-style-type: none"> <input type="checkbox"/> K. Vehicle/Equipment Repair and Maintenance <input type="checkbox"/> Not Applicable 	<ul style="list-style-type: none"> <input type="checkbox"/> Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to protect from rainfall, run-on runoff, and wind dispersal. <input type="checkbox"/> Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas. <input type="checkbox"/> Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained. 	<ul style="list-style-type: none"> <input type="checkbox"/> State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. <input type="checkbox"/> State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency’s requirements. <input type="checkbox"/> State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency’s requirements. 	<p>In the report, note that all of the following restrictions apply to use the site:</p> <ul style="list-style-type: none"> <input type="checkbox"/> No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains. <input type="checkbox"/> No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately. <input type="checkbox"/> No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.

If These Sources Will Be on the Project Site ...	... Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
<ul style="list-style-type: none"> <input type="checkbox"/> L. Fuel Dispensing Areas <input type="checkbox"/> Not Applicable 	<ul style="list-style-type: none"> <input type="checkbox"/> Fueling areas¹ shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are (1) graded at the minimum slope necessary to prevent ponding; and (2) separated from the rest of the site by a grade break that prevents run-on of storm water to the MEP. <input type="checkbox"/> Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover’s minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area¹.] The canopy [or cover] shall not drain onto the fueling area. 		<ul style="list-style-type: none"> <input type="checkbox"/> The property owner shall dry sweep the fueling area routinely. <input type="checkbox"/> See the Business Guide Sheet, “Automotive Service—Service Stations” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.

1. The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

If These Sources Will Be on the Project Site ...	... Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
<p>M. Loading Docks</p> <p><input type="checkbox"/> Not Applicable</p>	<p><input checked="" type="checkbox"/> Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct storm water away from the loading area. Water from loading dock areas should be drained to the sanitary sewer where feasible. Direct connections to storm drains from depressed loading docks are prohibited.</p> <p><input checked="" type="checkbox"/> Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation.</p> <p><input checked="" type="checkbox"/> Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.</p>		<p><input checked="" type="checkbox"/> Move loaded and unloaded items indoors as soon as possible.</p> <p><input checked="" type="checkbox"/> See Fact Sheet SC-30, “Outdoor Loading and Unloading,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.</p>

If These Sources Will Be on the Project Site ...	... Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls— Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
<ul style="list-style-type: none"> <input checked="" type="checkbox"/> N. Fire Sprinkler Test Water <input type="checkbox"/> Not Applicable 		<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Provide a means to drain fire sprinkler test water to the sanitary sewer. 	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> See the note in Fact Sheet SC-41, “Building and Grounds Maintenance,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.
<ul style="list-style-type: none"> <input type="checkbox"/> O. Miscellaneous Drain or Wash Water <input checked="" type="checkbox"/> Boiler drain lines <input type="checkbox"/> Condensate drain lines <input type="checkbox"/> Rooftop equipment <input type="checkbox"/> Drainage sumps <input checked="" type="checkbox"/> Roofing, gutters, and trim <input type="checkbox"/> Not Applicable 		<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. <input type="checkbox"/> Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. <input type="checkbox"/> Rooftop mounted equipment with potential to produce pollutants shall be roofed and/or have secondary containment. <input type="checkbox"/> Any drainage sumps onsite shall feature a sediment sump to reduce the quantity of sediment in pumped water. <input checked="" type="checkbox"/> Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff. 	

If These Sources Will Be on the Project Site ...	... Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
<input checked="" type="checkbox"/> P. Plazas, sidewalks, and parking lots. <input type="checkbox"/> Not Applicable			<input checked="" type="checkbox"/> Plazas, sidewalks, and parking lots shall be swept regularly to prevent the accumulation of litter and debris. Debris from pressure washing shall be collected to prevent entry into the storm drain system. Washwater containing any cleaning agent or degreaser shall be collected and discharged to the sanitary sewer and not discharged to a storm drain.

Site Design BMP Checklist for All Development Projects (Standard Projects and PDPs)		Form I-5	
Project Identification			
Project Name: NCTD Oceanside Transit Center			
Permit Application Number: D22-00016, T22-00006, GPA22-00002, RC22-00011			
Site Design BMPs			
All development projects must implement site design BMPs SD-1 through SD-8 where applicable and feasible. See Chapter 4 and Appendix E of the manual for information to implement site design BMPs shown in this checklist.			
Answer each category below pursuant to the following.			
<ul style="list-style-type: none"> • "Yes" means the project will implement the site design BMP as described in Chapter 4 and/or Appendix E of the manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification may be provided. 			
Site Design Requirement		Applied?	
SD-1 Maintain Natural Drainage Pathways and Hydrologic Features	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Discussion / justification if SD-1 not implemented:			
The existing development does not have any natural drainage pathways. All of the proposed tributaries will drain to new storm drain facilities.			
SD-2 Conserve Natural Areas, Soils, and Vegetation	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Discussion / justification if SD-2 not implemented:			
The existing development does not have natural areas. The entire limits of the project will be regraded.			
SD-3 Minimize Impervious Area	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Discussion / justification if SD-3 not implemented:			
This redevelopment will install minimum roadway and walkway widths at all possible to minimize impervious areas. To be detailed further at engineering phase.			
SD-4 Minimize Soil Compaction	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
Discussion / justification if SD-4 not implemented:			
The entire limits of the project will be regraded and recompacted.			



Site Design Requirement	Applied?		
SD-5 Impervious Area Dispersion	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Discussion / justification if SD-5 not implemented: To the maximum extent practicable, drainage areas will be dispersed into planter areas. To be detailed further in engineering phase.			
SD-6 Runoff Collection	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Discussion / justification if SD-6 not implemented: Tree wells are also used to capture and treat runoff from the public right-of-way.			
SD-7 Landscaping with Native or Drought Tolerant Species	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Discussion / justification if SD-7 not implemented: Proposed plants shall be native and drought tolerant species.			
SD-8 Harvesting and Using Precipitation	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
Discussion / justification if SD-8 not implemented: The site is expected to connect to the City's new recycled water line in Tremont to provide long term irrigation service for the project's life cycle.			



Summary of PDP Structural BMPs	Form I-6 (PDPs)
Project Identification	
Project Name: NCTD Oceanside Transit Center	
Permit Application Number: D22-00016, T22-00006, GPA22-00002, RC22-00011	
PDP Structural BMPs	
<p>All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the manual). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s).</p> <p>PDP structural BMPs must be verified by the local jurisdiction at the completion of construction. This may include requiring the project owner or project owner's representative to certify construction of the structural BMPs (see Section 1.12 of the manual). PDP structural BMPs must be maintained into perpetuity, and the local jurisdiction must confirm the maintenance (see Section 7 of the manual).</p> <p>Use this form to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (page 3 of this form) for each structural BMP within the project (copy the BMP summary information page as many times as needed to provide summary information for each individual structural BMP).</p>	
<p>Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate.</p> <p>Design Capture Volumes are presented in Attachment 1b. The determination of the project's water quality treatment follows the BMP hierarchy with preference to retain stormwater runoff to the maximum extent practicable. Based on the project's geotechnical study, retention and infiltration is NOT feasible and so a combination of standard and proprietary biofiltration BMPs are of choice. The project-scale retention volume required is 18,275 CF with the project-sale retention volume provided being 3678 CF.</p> <p>The subareas for DMA A include the hotel, alley, and pedestrian walkway next to the existing parking structure. The water quality treatment approach is to direct rooftops to raised biofiltration BMP planters located on upper-level floors. Ground-level areas will be treated by in-ground biofiltration BMP planters. These BMP facilities capture and treat the DCV. The amenity deck will be treated by a biofiltration proprietary unit (Modular Wetland System) that is flow based and will treat for the calculated water treatment flow rate.</p> <p>Runoff from DMAs B, C and D will be treated in a similar manner. Runoff from rooftops will drain to raised biofiltration BMP planters located on upper-level floors. Ground-level areas will be treated by in-ground biofiltration BMP planters. These BMP facilities capture and treat the DCV. Amenity decks and top floor of parking structures will be treated by biofiltration proprietary units (Modular Wetland System) that are flow based and will treat for the calculated water treatment flow rate.</p> <p>Runoff from DMA E include areas of the public right-of-way and are directed to tree wells (green street BMPs) and in-ground biofiltration planters. These BMP facilities capture and treat the DCV for these areas.</p> <p>Proposed BMPs are shown on the WQMP DMA Exhibit and are sized to meet water quality treatment requirements. A more detailed description is provided in the following pages.</p>	



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Structural BMP ID Nos. **A7, A8, A9, and A10**

Construction Plan Sheet No.: **WQMP DMA EXHIBIT & SHEET C9 OF VTM**

Type of structural BMP:

- Retention by harvest and use (HU-1)
- Retention by infiltration basin (INF-1)
- Retention by bioretention (INF-2)
- Retention by permeable pavement (INF-3)
- Partial retention by biofiltration with partial retention (PR-1)
- Biofiltration (BF-1)
- Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- Detention pond or vault for hydromodification management
- Other (describe in discussion section below)

Purpose:

- Pollutant control only
- Hydromodification control only
- Combined pollutant control and hydromodification control
- Pre-treatment/forebay for another structural BMP
- Other (describe in discussion section below)

Who will certify construction of this BMP?

Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the manual)

To be determined in final engineering.

Who will be the final owner of this BMP?

North County Transit District

Who will maintain this BMP into perpetuity?

North County Transit District

What is the funding mechanism for maintenance?

North County Transit District



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Discussion (as needed):

Runoff from walkways and alley of the private property are directed to in-ground biofiltration planters for the treatment of the Design Capture Volumes.

See BMP details provided in Attachment 4.



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Structural BMP ID Nos. **A2, A3, A4, and A5**

Construction Plan Sheet No.: **WQMP DMA EXHIBIT, SHT C9 OF VTM**

Type of structural BMP:

- Retention by harvest and use (HU-1)
- Retention by infiltration basin (INF-1)
- Retention by bioretention (INF-2)
- Retention by permeable pavement (INF-3)
- Partial retention by biofiltration with partial retention (PR-1)
- Biofiltration (BF-1)
- Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- Detention pond or vault for hydromodification management
- Other (describe in discussion section below)

Purpose:

- Pollutant control only
- Hydromodification control only
- Combined pollutant control and hydromodification control
- Pre-treatment/forebay for another structural BMP
- Other (describe in discussion section below)

Who will certify construction of this BMP?
Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the manual)

To be determined in final engineering.

Who will be the final owner of this BMP?

North County Transit District

Who will maintain this BMP into perpetuity?

North County Transit District

What is the funding mechanism for maintenance?

North County Transit District



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Discussion (as needed):

Runoff from the rooftops are directed to raised biofiltration planters located on the amenity deck and balconies for the treatment of the Design Capture Volumes.

See BMP details provided in Attachment 4.



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Structural BMP ID No. **A6**

Construction Plan Sheet No.: **WQMP DMA EXHIBIT, SHT C9 OF VTM**

Type of structural BMP:

- Retention by harvest and use (HU-1)
- Retention by infiltration basin (INF-1)
- Retention by bioretention (INF-2)
- Retention by permeable pavement (INF-3)
- Partial retention by biofiltration with partial retention (PR-1)
- Biofiltration (BF-1)
- Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- Detention pond or vault for hydromodification management
- Other (describe in discussion section below)

Purpose:

- Pollutant control only
- Hydromodification control only
- Combined pollutant control and hydromodification control
- Pre-treatment/forebay for another structural BMP
- Other (describe in discussion section below)

Who will certify construction of this BMP?
Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the manual)

To be determined in final engineering.

Who will be the final owner of this BMP?

North County Transit District

Who will maintain this BMP into perpetuity?

North County Transit District

What is the funding mechanism for maintenance?

North County Transit District



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Discussion (as needed):

Runoff from the amenity deck and valet drop off are directed to a biofiltration proprietary unit for the treatment of the Design Capture Volumes. The unit uses a flow-based design and is classified as a “proprietary biofiltration” (BF-3). The unit is a vault-underground type located in the valet drop area.

See BMP details provided in Attachment 4.



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Structural BMP ID No. **B1, B2, B3, B4, and B5**

Construction Plan Sheet No.: **WQMP DMA EXHIBIT & SHEET C9 & C10 OF VTM**

Type of structural BMP:

- Retention by harvest and use (HU-1)
- Retention by infiltration basin (INF-1)
- Retention by bioretention (INF-2)
- Retention by permeable pavement (INF-3)
- Partial retention by biofiltration with partial retention (PR-1)
- Biofiltration (BF-1)
- Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- Detention pond or vault for hydromodification management
- Other (describe in discussion section below)

Purpose:

- Pollutant control only
- Hydromodification control only
- Combined pollutant control and hydromodification control
- Pre-treatment/forebay for another structural BMP
- Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the manual)	To be determined in final engineering.
Who will be the final owner of this BMP?	North County Transit District
Who will maintain this BMP into perpetuity?	North County Transit District
What is the funding mechanism for maintenance?	North County Transit District



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Discussion (as needed):

Runoff from the rooftops are directed to raised biofiltration planters located on the amenity deck for the treatment of the Design Capture Volumes.

See BMP details provided in Attachment 4.



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Structural BMP ID No. **B6**

Construction Plan Sheet No.: **WQMP DMA EXHIBIT & SHEET C9 OF VTM**

Type of structural BMP:

- Retention by harvest and use (HU-1)
- Retention by infiltration basin (INF-1)
- Retention by bioretention (INF-2)
- Retention by permeable pavement (INF-3)
- Partial retention by biofiltration with partial retention (PR-1)
- Biofiltration (BF-1)
- Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- Detention pond or vault for hydromodification management
- Other (describe in discussion section below)

Purpose:

- Pollutant control only
- Hydromodification control only
- Combined pollutant control and hydromodification control
- Pre-treatment/forebay for another structural BMP
- Other (describe in discussion section below)

Who will certify construction of this BMP?
Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the manual)

To be determined in final engineering.

Who will be the final owner of this BMP?

North County Transit District

Who will maintain this BMP into perpetuity?

North County Transit District

What is the funding mechanism for maintenance?

North County Transit District



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Discussion (as needed):

Runoff from the amenity deck is directed to a biofiltration proprietary unit for the treatment of the Design Capture Volumes. The unit uses a flow-based design and is classified as a “proprietary biofiltration” (BF-3). The unit is an open-top type located in the planter area in front of the building.

See BMP details provided in Attachment 4.



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Structural BMP ID Nos. **C1, C2, C4, C5, C6, C7, and C8**

Construction Plan Sheet No.: **WQMP DMA EXHIBIT & SHEET C10 OF VTM**

Type of structural BMP:

- Retention by harvest and use (HU-1)
- Retention by infiltration basin (INF-1)
- Retention by bioretention (INF-2)
- Retention by permeable pavement (INF-3)
- Partial retention by biofiltration with partial retention (PR-1)
- Biofiltration (BF-1)
- Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- Detention pond or vault for hydromodification management
- Other (describe in discussion section below)

Purpose:

- Pollutant control only
- Hydromodification control only
- Combined pollutant control and hydromodification control
- Pre-treatment/forebay for another structural BMP
- Other (describe in discussion section below)

Who will certify construction of this BMP?

Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the manual)

To be determined in final engineering.

Who will be the final owner of this BMP?

North County Transit District

Who will maintain this BMP into perpetuity?

North County Transit District

What is the funding mechanism for maintenance?

North County Transit District



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Discussion (as needed):

Runoff from the rooftops are directed to raised biofiltration planters located on the amenity deck for the treatment of the Design Capture Volumes.

See BMP details provided in Attachment 4.



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Structural BMP ID No. **C3 and C11**

Construction Plan Sheet No.: **WQMP DMA EXHIBIT & SHEET C10 OF VTM**

Type of structural BMP:

- Retention by harvest and use (HU-1)
- Retention by infiltration basin (INF-1)
- Retention by bioretention (INF-2)
- Retention by permeable pavement (INF-3)
- Partial retention by biofiltration with partial retention (PR-1)
- Biofiltration (BF-1)
- Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- Detention pond or vault for hydromodification management
- Other (describe in discussion section below)

Purpose:

- Pollutant control only
- Hydromodification control only
- Combined pollutant control and hydromodification control
- Pre-treatment/forebay for another structural BMP
- Other (describe in discussion section below)

Who will certify construction of this BMP?
Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the manual)

To be determined in final engineering.

Who will be the final owner of this BMP?

North County Transit District

Who will maintain this BMP into perpetuity?

North County Transit District

What is the funding mechanism for maintenance?

North County Transit District



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Discussion (as needed):

Runoff from the amenity deck is directed to two separate biofiltration proprietary units for the treatment of the Design Capture Volumes. The units use a flow-based design and is classified as a “proprietary biofiltration” (BF-3). The units are an open-top type located in the planter areas in front of the building.

See BMP details provided in Attachment 4.



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Structural BMP ID Nos. **C9 and C10**

Construction Plan Sheet No.: **WQMP DMA EXHIBIT & SHEET C10 OF VTM**

Type of structural BMP:

- Retention by harvest and use (HU-1)
- Retention by infiltration basin (INF-1)
- Retention by bioretention (INF-2)
- Retention by permeable pavement (INF-3)
- Partial retention by biofiltration with partial retention (PR-1)
- Biofiltration (BF-1)
- Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- Detention pond or vault for hydromodification management
- Other (describe in discussion section below)

Purpose:

- Pollutant control only
- Hydromodification control only
- Combined pollutant control and hydromodification control
- Pre-treatment/forebay for another structural BMP
- Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the manual)	To be determined in final engineering.
Who will be the final owner of this BMP?	North County Transit District
Who will maintain this BMP into perpetuity?	North County Transit District
What is the funding mechanism for maintenance?	North County Transit District



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Discussion (as needed):

Runoff from walkways, alley, and bus terminal of the private property are directed to in-ground biofiltration planters for the treatment of the Design Capture Volumes.

See BMP details provided in Attachment 4.



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Structural BMP ID No. **D1 and D11**

Construction Plan Sheet No.: **WQMP DMA EXHIBIT & SHEET C9 OF VTM**

Type of structural BMP:

- Retention by harvest and use (HU-1)
- Retention by infiltration basin (INF-1)
- Retention by bioretention (INF-2)
- Retention by permeable pavement (INF-3)
- Partial retention by biofiltration with partial retention (PR-1)
- Biofiltration (BF-1)
- Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- Detention pond or vault for hydromodification management
- Other (describe in discussion section below)

Purpose:

- Pollutant control only
- Hydromodification control only
- Combined pollutant control and hydromodification control
- Pre-treatment/forebay for another structural BMP
- Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the manual)	To be determined in final engineering.
Who will be the final owner of this BMP?	North County Transit District
Who will maintain this BMP into perpetuity?	North County Transit District
What is the funding mechanism for maintenance?	North County Transit District



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Discussion (as needed):

Runoff from the top floor of the existing parking structure and new parking structure next to the hotel are directed to two separate biofiltration proprietary units for the treatment of the Design Capture Volumes. The units use a flow-based design and are classified as a “proprietary biofiltration” (BF-3). Both are open-top type located in planter areas. One of the units is located just outside the southeast corner of the existing parking structure. The other is located just outside the southeast corner of the new office building.

See BMP details provided in Attachment 4.



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Structural BMP ID Nos. **D2, D3, D4, D5, D6, D7, D8, D9, and D10**

Construction Plan Sheet No.: **WQMP DMA EXHIBIT; SHEET C9 & C10 OF VTM**

Type of structural BMP:

- Retention by harvest and use (HU-1)
- Retention by infiltration basin (INF-1)
- Retention by bioretention (INF-2)
- Retention by permeable pavement (INF-3)
- Partial retention by biofiltration with partial retention (PR-1)
- Biofiltration (BF-1)
- Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- Detention pond or vault for hydromodification management
- Other (describe in discussion section below)

Purpose:

- Pollutant control only
- Hydromodification control only
- Combined pollutant control and hydromodification control
- Pre-treatment/forebay for another structural BMP
- Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the manual)	To be determined in final engineering.
Who will be the final owner of this BMP?	North County Transit District
Who will maintain this BMP into perpetuity?	North County Transit District
What is the funding mechanism for maintenance?	North County Transit District



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Discussion (as needed):

Runoff from building rooftops, walkways, and plazas are directed to in-ground biofiltration planters for the treatment of the Design Capture Volumes.

See BMP details provided in Attachment 4.





City of Oceanside
 300 N Coast Highway
 Oceanside, CA 92054

Permanent BMP Construction

February
 2016

Self Certification Form

Date Prepared: Click here to enter text.	Project No.: Click here to enter text.
Project Applicant: Click here to enter text.	Phone: Click here to enter text.
Project Address: Click here to enter text.	
Project Engineer: Click here to enter text.	Phone: Click here to enter text.

The purpose of this form is to verify that the site improvements for the project, identified above, have been constructed in conformance with the approved Storm Water Quality Management Plan (SWQMP) documents and drawings.

This form must be completed by the engineer and installing contractor and submitted prior to final inspection of the construction permit. Completion and submittal of this form is required for all new development and redevelopment projects in order to comply with the City's Storm Water ordinances and NDPES Permit Order No. R9-2013-0001. Final inspection for occupancy and/or release of grading or public improvement bonds may be delayed if this form is not submitted and approved by the City of Oceanside.

ENGINEER'S CERTIFICATION:

As the professional in responsible charge for the design of the above project, I certify that I have inspected all constructed Low Impact Development (LID) site design, source control and treatment control BMP's required per the approved SWQMP and Construction Permit No. [Click here to enter text.](#); and that said BMP's have been constructed in compliance with the approved plans and all applicable specifications, permits, ordinances and Order No. R9-2013-0001 of the San Diego Regional Water Quality Control Board.

I understand that this BMP certification statement does not constitute an operation and maintenance verification.

Signature: _____



Date of Signature: _ [Click here to enter text.](#) _

Printed Name: _ [Click here to enter text.](#) _

Title: _ [Click here to enter text.](#) _

Phone No. _ [Click here to enter text.](#) _

Engineer's Stamp

CONTRACTOR'S CERTIFICATION:

As the professional in responsible charge for construction of the above project, I certify that all constructed Low Impact Development (LID) site design, source control and treatment control BMP's required per the approved SWQMP and Construction Permit No. [Click here to enter text.](#); have been constructed in compliance with the approved plans and all applicable specifications, permits, and ordinances.

I understand that this BMP certification statement does not constitute an operation and maintenance verification.

Signature: _____

Date of Signature: _ [Click here to enter text.](#) _

Printed Name: _ [Click here to enter text.](#) _

Title: _ [Click here to enter text.](#) _

Phone No. _ [Click here to enter text.](#) _



ATTACHMENT 1
BACKUP FOR PDP POLLUTANT CONTROL BMPS



Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	<input checked="" type="checkbox"/> Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	<input checked="" type="checkbox"/> Included on DMA Exhibit in Attachment 1a <input checked="" type="checkbox"/> Included as Attachment 1b, separate from DMA Exhibit
Attachment 1c	Design Capture Volume Worksheet	<input checked="" type="checkbox"/> Included
Attachment 1d	Form I-7, Harvest and Use Feasibility Screening Checklist (Required unless the entire project will use infiltration BMPs) Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7.	<input checked="" type="checkbox"/> Included <input type="checkbox"/> Not included because the entire project will use infiltration BMPs
Attachment 1e	Form I-8, Categorization of Infiltration Feasibility Condition (Required unless the project will use harvest and use BMPs) Refer to Appendices C and D of the BMP Design Manual to complete Form I-8.	<input checked="" type="checkbox"/> Included <input type="checkbox"/> Not included because the entire project will use harvest and use BMPs
Attachment 1f	Pollutant Control BMP Design Worksheets / Calculations (Required) Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines	<input checked="" type="checkbox"/> Included



ATTACHMENT 1a
DMA EXHIBIT

Use this checklist to ensure the required information has been included on the DMA Exhibit:

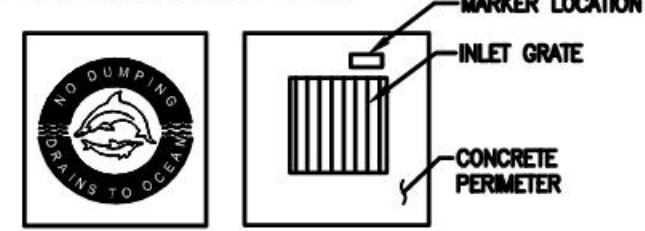
The DMA Exhibit must identify:

- Underlying hydrologic soil group
- Approximate depth to groundwater
- Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- Critical coarse sediment yield areas to be protected
- Existing topography and impervious areas
- Existing and proposed site drainage network and connections to drainage offsite
- Proposed grading
- Proposed impervious features
- Proposed design features and surface treatments used to minimize imperviousness
- Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
- Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Form I-3B)
- Structural BMPs (identify location, type of BMP, and size/detail)



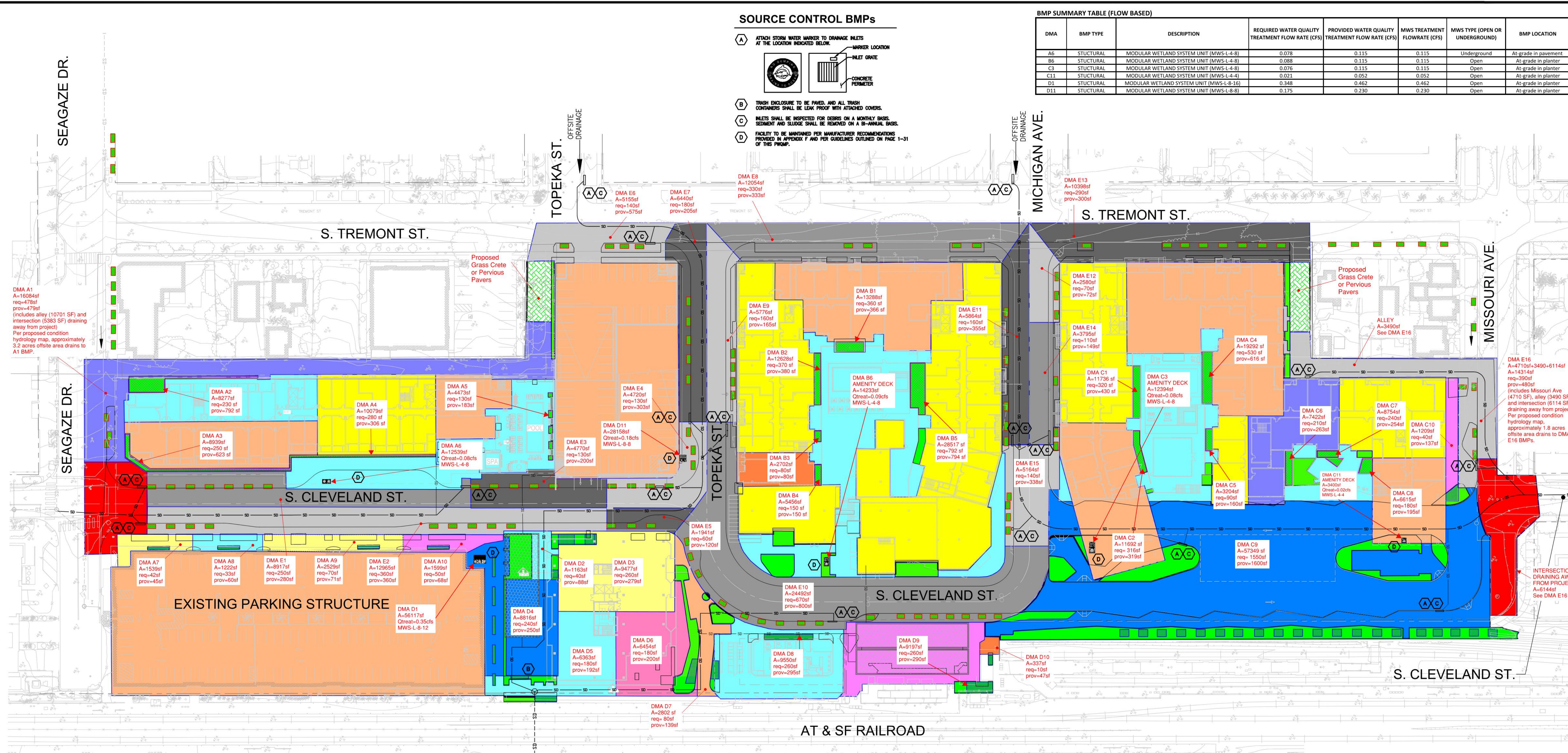
SOURCE CONTROL BMPs

- A** ATTACH STORM WATER MARKER TO DRAINAGE INLETS AT THE LOCATION INDICATED BELOW.
- B** TRASH ENCLOSURE TO BE PAVED, AND ALL TRASH CONTAINERS SHALL BE LEAK PROOF WITH ATTACHED COVERS.
- C** INLETS SHALL BE INSPECTED FOR DEBRIS ON A MONTHLY BASIS. SEDIMENT AND SLUDGE SHALL BE REMOVED ON A 6-MONTH BASIS.
- D** FACILITY TO BE MAINTAINED PER MANUFACTURER'S RECOMMENDATIONS PROVIDED IN APPENDIX F AND PER GUIDELINES OUTLINED ON PAGE 1-31 OF THIS PUMP.



BMP SUMMARY TABLE (FLOW BASED)

DMA	BMP TYPE	DESCRIPTION	REQUIRED WATER QUALITY TREATMENT FLOW RATE (CFS)	PROVIDED WATER QUALITY TREATMENT FLOW RATE (CFS)	MWS TREATMENT FLOW RATE (CFS)	MWS TYPE (OPEN OR UNDERGROUND)	BMP LOCATION
A6	STRUCTURAL	MODULAR WETLAND SYSTEM UNIT (MWS-L-4-8)	0.078	0.115	0.115	Underground	At-grade in pavement
B6	STRUCTURAL	MODULAR WETLAND SYSTEM UNIT (MWS-L-4-8)	0.088	0.115	0.115	Open	At-grade in planter
C3	STRUCTURAL	MODULAR WETLAND SYSTEM UNIT (MWS-L-4-8)	0.076	0.115	0.115	Open	At-grade in planter
C11	STRUCTURAL	MODULAR WETLAND SYSTEM UNIT (MWS-L-4-4)	0.021	0.052	0.052	Open	At-grade in planter
D1	STRUCTURAL	MODULAR WETLAND SYSTEM UNIT (MWS-L-8-16)	0.348	0.462	0.462	Open	At-grade in planter
D11	STRUCTURAL	MODULAR WETLAND SYSTEM UNIT (MWS-L-8-8)	0.175	0.230	0.230	Open	At-grade in planter



BMP SUMMARY TABLE (VOLUME BASED)

DMA ID	BMP TYPE	DESCRIPTION	DMA AREA (SF)	REQUIRED SURFACE AREA (SF)	PROVIDED SURFACE AREA (SF)	NEW OR RETROFITTED LANDSCAPE	VERTICAL WALL OR SIDE-SLOPED	SURFACE OR PIPED TO BMP
A1	GREEN STREET	TREE WELLS	16084	478	479	NEW	VERTICAL WALL	SURFACE
A2	STRUCTURAL	BIOFILTRATION PLANTER	8277	230	792	NEW	VERTICAL WALL	PIPED
A3	STRUCTURAL	BIOFILTRATION PLANTER	8939	250	263	NEW	VERTICAL WALL	PIPED
A4	STRUCTURAL	BIOFILTRATION PLANTER	10079	280	306	NEW	VERTICAL WALL	PIPED
A5	STRUCTURAL	BIOFILTRATION PLANTER	4473	130	183	NEW	VERTICAL WALL	PIPED
A7	STRUCTURAL	BIOFILTRATION PLANTER	1539	42	45	RETROFIT	VERTICAL WALL	SURFACE
A8	STRUCTURAL	BIOFILTRATION PLANTER	1222	33	60	RETROFIT	VERTICAL WALL	SURFACE
A9	STRUCTURAL	BIOFILTRATION PLANTER	2529	70	71	RETROFIT	VERTICAL WALL	SURFACE
A10	STRUCTURAL	BIOFILTRATION PLANTER	1599	50	68	RETROFIT	VERTICAL WALL	SURFACE
B1	STRUCTURAL	BIOFILTRATION PLANTER	13288	360	366	NEW	VERTICAL WALL	PIPED
B2	STRUCTURAL	BIOFILTRATION PLANTER	12628	370	380	NEW	VERTICAL WALL	PIPED
B3	STRUCTURAL	BIOFILTRATION PLANTER	2702	80	80	NEW	VERTICAL WALL	PIPED
B4	STRUCTURAL	BIOFILTRATION PLANTER	5456	150	150	NEW	VERTICAL WALL	PIPED
B5	STRUCTURAL	BIOFILTRATION PLANTER	28517	792	794	NEW	VERTICAL WALL	PIPED
C1	STRUCTURAL	BIOFILTRATION PLANTER	11736	320	430	NEW	VERTICAL WALL	PIPED
C2	STRUCTURAL	BIOFILTRATION PLANTER	11692	316	319	NEW	VERTICAL WALL	PIPED
C4	STRUCTURAL	BIOFILTRATION PLANTER	19292	530	616	NEW	VERTICAL WALL	PIPED
C5	STRUCTURAL	BIOFILTRATION PLANTER	3204	90	160	NEW	VERTICAL WALL	PIPED
C6	STRUCTURAL	BIOFILTRATION PLANTER	7422	210	263	NEW	VERTICAL WALL	PIPED
C7	STRUCTURAL	BIOFILTRATION PLANTER	8754	240	254	NEW	VERTICAL WALL	PIPED
C8	STRUCTURAL	BIOFILTRATION PLANTER	6615	180	195	NEW	VERTICAL WALL	PIPED
C9	STRUCTURAL	BIOFILTRATION PLANTER	57349	1550	1600	NEW	VERTICAL WALL	SURFACE
C10	STRUCTURAL	BIOFILTRATION PLANTER	1209	40	162	NEW	VERTICAL WALL	SURFACE

BMP SUMMARY TABLE (VOLUME BASED)

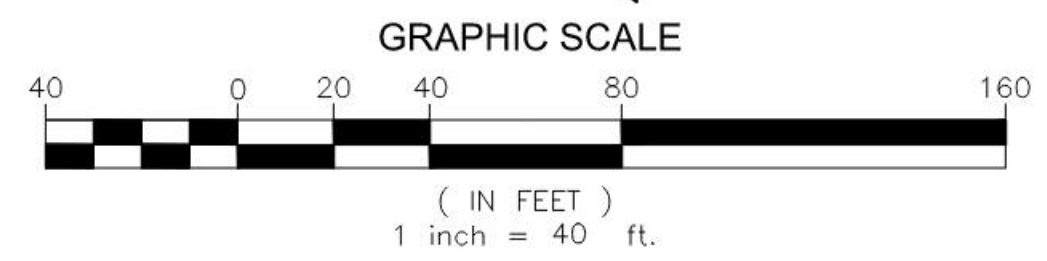
DMA	BMP TYPE	DESCRIPTION	DMA AREA (SF)	REQUIRED SURFACE AREA (SF)	PROVIDED SURFACE AREA (SF)	NEW OR RETROFITTED LANDSCAPE	VERTICAL WALL OR SIDE-SLOPED BMP	SURFACE OR PIPED TO BMP
D2	STRUCTURAL	BIOFILTRATION PLANTER	1163	40	242	NEW	VERTICAL WALL	SURFACE
D3	STRUCTURAL	BIOFILTRATION PLANTER	9477	260	522	NEW	VERTICAL WALL	PIPED
D4	STRUCTURAL	BIOFILTRATION PLANTER	8816	240	242	NEW	VERTICAL WALL	SURFACE
D5	STRUCTURAL	BIOFILTRATION PLANTER	6363	180	325	NEW	VERTICAL WALL	SURFACE/PIPED
D6	STRUCTURAL	BIOFILTRATION PLANTER	6454	180	370	NEW	VERTICAL WALL	PIPED
D7	STRUCTURAL	BIOFILTRATION PLANTER	2802	80	118	NEW	VERTICAL WALL	SURFACE
D8	STRUCTURAL	BIOFILTRATION PLANTER	9550	260	295	NEW	VERTICAL WALL	SURFACE/PIPED
D9	STRUCTURAL	BIOFILTRATION PLANTER	9197	250	290	NEW	VERTICAL WALL	SURFACE
D10	STRUCTURAL	BIOFILTRATION PLANTER	337	10	47	NEW	VERTICAL WALL	PIPED
E1	GREEN STREET	TREE WELLS	8917	250	280	NEW	VERTICAL WALL	SURFACE
E2	GREEN STREET	TREE WELLS	12965	360	360	NEW	VERTICAL WALL	SURFACE
E3	GREEN STREET	TREE WELLS	4770	130	200	NEW	VERTICAL WALL	SURFACE
E4	GREEN STREET	TREE WELLS	4720	130	303	NEW	VERTICAL WALL	SURFACE
E5	GREEN STREET	TREE WELLS	1941	60	120	NEW	VERTICAL WALL	SURFACE
E6	GREEN STREET	TREE WELLS	5155	140	575	NEW	VERTICAL WALL	SURFACE
E7	GREEN STREET	TREE WELLS	6440	180	205	NEW	VERTICAL WALL	SURFACE
E8	GREEN STREET	TREE WELLS	12054	330	333	NEW	VERTICAL WALL	SURFACE
E9	GREEN STREET	TREE WELLS	5776	160	165	NEW	VERTICAL WALL	SURFACE
E10	GREEN STREET	TREE WELLS	24492	670	800	NEW	VERTICAL WALL	SURFACE
E11	GREEN STREET	TREE WELLS	5864	160	355	NEW	VERTICAL WALL	SURFACE
E12	GREEN STREET	TREE WELLS	2580	70	72	NEW	VERTICAL WALL	SURFACE
E13	GREEN STREET	TREE WELLS	10398	290	300	NEW	VERTICAL WALL	SURFACE
E14	GREEN STREET	TREE WELLS	3795	110	149	NEW	VERTICAL WALL	SURFACE
E15	GREEN STREET	TREE WELLS	5164	140	338	NEW	VERTICAL WALL	SURFACE
E16	GREEN STREET	TREE WELLS	14314	390	480	NEW	VERTICAL WALL	SURFACE

LEGEND

- DMA BOUNDARY
- PERVIOUS LANDSCAPE
- IN GROUND BIO FILTRATION PLANTER
- RAISED BIO FILTRATION PLANTER
- PROPRIETARY BIO FILTRATION UNIT
- TREE WELL
- PROPOSED CURB INLET WITH PLACARD
- RIGHT OF WAY BOUNDARY
- PROJECT BOUNDARY
- LIMITS OF DRAINAGE BOUNDARY

- NOTES:**
- HYDROLOGIC SOIL GROUP IS TYPE A.
 - APPROXIMATE GROUNDWATER DEPTH IS GREATER THAN 20 FT.
 - PROPOSED STORM DRAIN SHALL BE MONITORED AND INSPECTED TO AVOID ILLEGIT DISCHARGES.
 - TRASH STORAGE AREAS AND RECEPTACLES WILL HAVE COVERS TO AVOID CONTAMINATION OF RUNOFF AND ELIMINATE DISPERSION OF TRASH AND DEBRIS.
 - ROOF PLANS NOT AVAILABLE AT THIS STAGE OF THE PROJECT AND ENGINEERING JUDGEMENT WAS USED TO DELINEATE ROOF DRAIN MANAGEMENT AREAS. REFINEMENT OF DRAINAGE MANAGEMENT AREAS WILL BE COMPLETED DURING THE ENGINEERING PHASE.

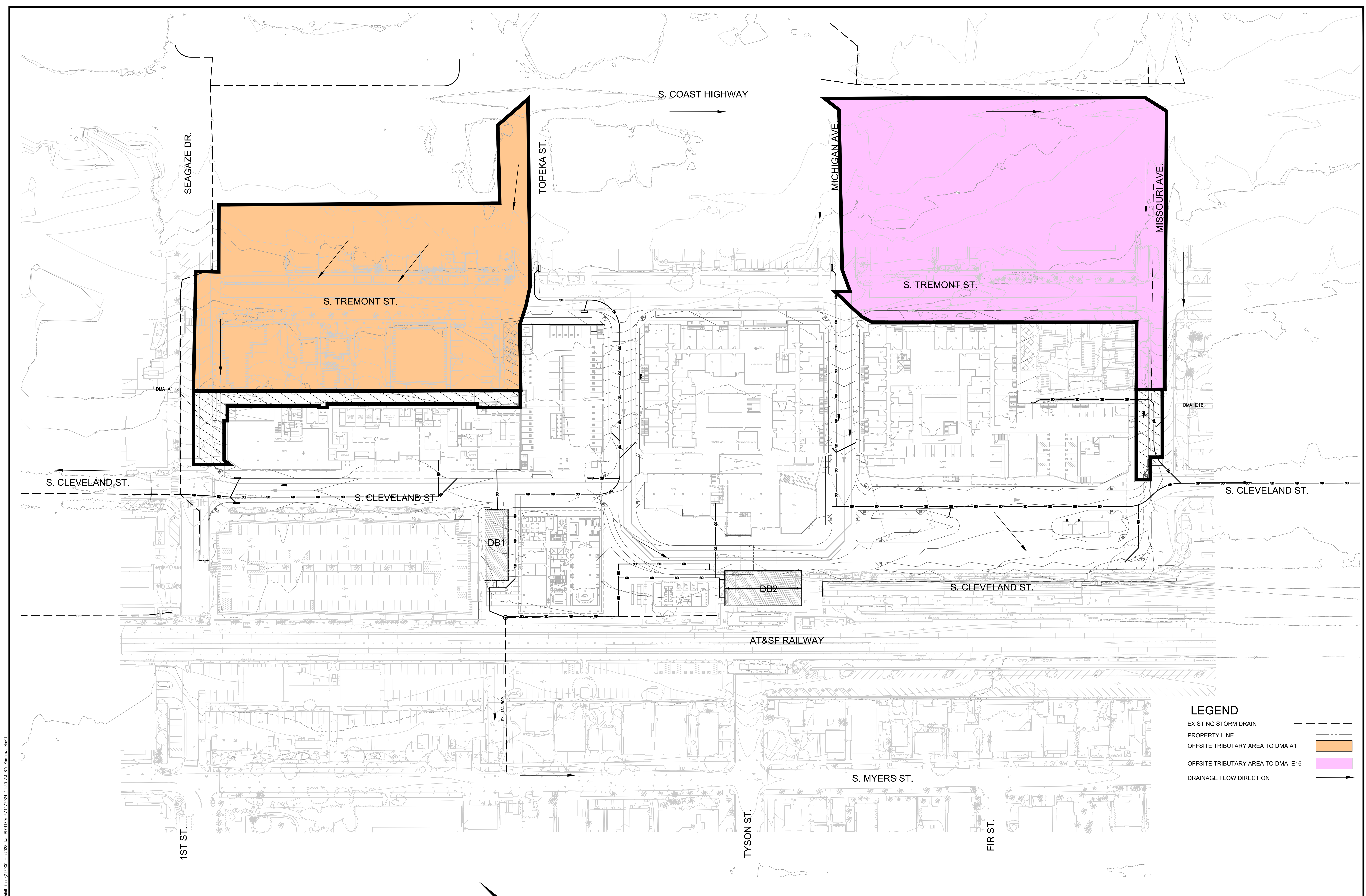
- S-BMP Structural BMP
- LID-BMP Low Impact Development BMP
- SSD-BMP Significant Site Design BMP
- GI-BMP Green Infrastructure BMP



NCTD OCEANSIDE TRANSIT CENTER
235 S. TREMONT AVENUE
WQMP DMA EXHIBIT
CITY OF OCEANSIDE, CALIFORNIA

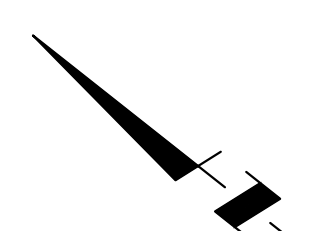
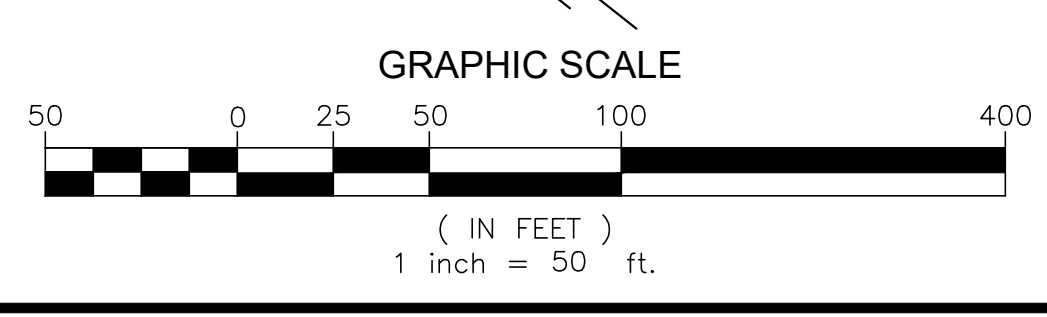
PROJECT NO.
2042 577600

SHEET
1 OF 1



LEGEND

EXISTING STORM DRAIN	---
PROPERTY LINE	---
OFFSITE TRIBUTARY AREA TO DMA A1	
OFFSITE TRIBUTARY AREA TO DMA E16	
DRAINAGE FLOW DIRECTION	→



Stantec	Toll Brothers APARTMENT LIVING	NCTD OCEANSIDE TRANSIT CENTER TOD 235 S. TREMONT AVENUE	PROJECT NO. 2042217900
		OFFSITE AREA TRIBUTARY TO DMA A1 & E16	SHEET 1 OF 1

DRAWING: c:\3042217900\external\plan\3042217900-20240614.dwg PLOTTED: 6/14/2024 11:30 AM BY: Rommel, Noad

JUNE 14, 2024

ATTACHMENT 1b
TABULAR SUMMARY OF DMAs

Placeholder – **Tabular Summary of DMAs (if separate from DMA Exhibit)**

Leave placeholder intact if not applicable.

Not Applicable – Tabular Summary included on DMA Exhibit



BMP SUMMARY TABLE (VOLUME BASED)

DMA ID	BMP TYPE	DESCRIPTION	DMA AREA (SF)	REQUIRED SURFACE AREA (SF)	PROVIDED SURFACE AREA (SF)	NEW OR RETROFITTED LANDSCAPE	VERTICAL WALL OR SIDE-SLOPED	SURFACE OR PIPED TO BMP
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BMP SUMMARY TABLE (VOLUME BASED)

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E16	GREEN STREET	TREE WELLS	14314	390	480	NEW	VERTICAL WALL	SURFACE

BMP SUMMARY TABLE (FLOW BASED)

DMA	BMP TYPE	DESCRIPTION	REQUIRED WATER QUALITY TREATMENT FLOW RATE (CFS)	PROVIDED WATER QUALITY TREATMENT FLOW RATE (CFS)	MWS TREATMENT FLOWRATE (CFS)	MWS TYPE (OPEN OR UNDERGROUND)	BMP LOCATION
A6	STUCTURAL	MODULAR WETLAND SYSTEM UNIT (MWS-L-4-8)	0.078	0.115	0.115	Underground	At-grade in pavement
B6	STUCTURAL	MODULAR WETLAND SYSTEM UNIT (MWS-L-4-8)	0.088	0.115	0.115	Open	At-grade in planter
C3	STUCTURAL	MODULAR WETLAND SYSTEM UNIT (MWS-L-4-8)	0.076	0.115	0.115	Open	At-grade in planter
C11	STUCTURAL	MODULAR WETLAND SYSTEM UNIT (MWS-L-4-4)	0.021	0.052	0.052	Open	At-grade in planter
D1	STUCTURAL	MODULAR WETLAND SYSTEM UNIT (MWS-L-8-16)	0.348	0.462	0.462	Open	At-grade in planter
D11	STUCTURAL	MODULAR WETLAND SYSTEM UNIT (MWS-L-8-8)	0.175	0.230	0.230	Open	At-grade in planter

ATTACHMENT 1c
DESIGN CAPTURE VOLUME WORKSHEETS



Automated Worksheet B.1: Calculation of Design Capture Volume (V2.0)

Category	#	Description	<i>i</i>	<i>ii</i>	<i>iii</i>	<i>iv</i>	<i>v</i>	<i>vi</i>	<i>vii</i>	<i>viii</i>	<i>ix</i>	<i>x</i>	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	unitless
	2	85th Percentile 24-hr Storm Depth	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	inches
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	16,084	8,277	8,939	10,079	4,473	12,539	1,539	1,222	2,529	1,599	sq-ft
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)											sq-ft
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	No	No	No	No	No	No	No	No	yes/no
	11	Impervious Surfaces Directed to Dispersion Area per SD-B (Ci=0.90)											sq-ft
	12	Semi-Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft
	13	Engineered Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.10)											sq-ft
	14	Natural Type A Soil Serving as Dispersion Area per SD-B (Ci=0.10)											sq-ft
	15	Natural Type B Soil Serving as Dispersion Area per SD-B (Ci=0.14)											sq-ft
	16	Natural Type C Soil Serving as Dispersion Area per SD-B (Ci=0.23)											sq-ft
	17	Natural Type D Soil Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft
	18	Number of Tree Wells Proposed per SD-A											#
	19	Average Mature Tree Canopy Diameter											ft
	20	Number of Rain Barrels Proposed per SD-E											#
21	Average Rain Barrel Size											gal	
Initial Runoff Factor Calculation	22	Total Tributary Area	16,084	8,277	8,939	10,079	4,473	12,539	1,539	1,222	2,529	1,599	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	26	Initial Design Capture Volume	712	366	396	446	198	555	68	54	112	71	cubic-feet
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
Tree & Barrel Adjustments	32	Design Capture Volume After Dispersion Techniques	712	366	396	446	198	555	68	54	112	71	cubic-feet
	33	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	36	Final Effective Tributary Area	14,476	7,449	8,045	9,071	4,026	11,285	1,385	1,100	2,276	1,439	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	0	0	0	0	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	712	366	396	446	198	555	68	54	112	71	cubic-feet
No Warning Messages													

Automated Worksheet B.2: Retention Requirements (V2.0)

Category	#	Description	<i>i</i>	<i>ii</i>	<i>iii</i>	<i>iv</i>	<i>v</i>	<i>vi</i>	<i>vii</i>	<i>viii</i>	<i>ix</i>	<i>x</i>	Units
Basic Analysis	1	Drainage Basin ID or Name	Λ1	Λ2	Λ3	Λ4	Λ5	Λ6	Λ7	Λ8	Λ9	Λ10	unitless
	2	85th Percentile Rainfall Depth	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	inches
	3	Predominant NRCS Soil Type Within BMP Location	A	A	A	A	A	A	A	A	A	A	unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	unitless
	5	Nature of Restriction	Other	Other	Other	Other	Other	Other	Other	Other	Other	Other	unitless
	6	Do Minimum Retention Requirements Apply to this Project?	No	No	No	No	No	No	No	No	No	No	yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No	No	No	No	No	No	No	No	No	No	yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	percentage
	12	Fraction of DCV Requiring Retention	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	13	Required Retention Volume	0	0	0	0	0	0	0	0	0	0	cubic-feet

Attention!
 -Retention requirements have been omitted in these calculations. Such an omission is only be acceptable for Green Street projects or projects that submit supplemental calculations demonstrating retention requirements are satisfied at the project-level.

Automated Worksheet B.3: BMP Performance (V2.0)

* PROPRIETARY BIOFILTRATION UNIT. SEE WATER QUALITY TREATMENT FLOW RATE TABLE.

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units	
BMP Inputs	1	Drainage Basin ID or Name	A1	A2	A3	A4	A5	A6*	A7	A8	A9	A10	sq-ft	
	2	Design Infiltration Rate Recommended	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	in/hr	
	3	Design Capture Volume Tributary to BMP	712	366	396	446	198	555	68	54	112	71	cubic-feet	
	4	Is BMP Vegetated or Unvegetated?	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	unitless	
	5	Is BMP Impermeably Lined or Unlined?	Lined	Lined	Lined	Lined	Lined	Lined	Lined	Lined	Lined	Lined	unitless	
	6	Does BMP Have an Underdrain?	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	unitless	
	7	Does BMP Utilize Standard or Specialized Media?	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	unitless	
	8	Provided Surface Area	478	230	250	280	130	340	42	33	70	50	sq-ft	
	9	Provided Surface Ponding Depth	6	6	6	6	6	6	6	6	6	6	inches	
	10	Provided Soil Media Thickness	24	24	24	24	24	24	24	24	24	24	inches	
	11	Provided Gravel Thickness (Total Thickness)	12	12	12	12	12	12	12	12	12	12	inches	
	12	Underdrain Offset	3	3	3	3	3	3	3	3	3	3	inches	
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	inches	
	14	Specialized Soil Media Filtration Rate											in/hr	
	15	Specialized Soil Media Pore Space for Retention											unitless	
	16	Specialized Soil Media Pore Space for Biofiltration											unitless	
	17	Specialized Gravel Media Pore Space											unitless	
Retention Calculations	18	Volume Infiltrated Over 6 Hour Storm	0	0	0	0	0	0	0	0	0	0	cubic-feet	
	19	Ponding Pore Space Available for Retention	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless	
	20	Soil Media Pore Space Available for Retention	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	unitless	
	21	Gravel Pore Space Available for Retention (Above Underdrain)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless	
	22	Gravel Pore Space Available for Retention (Below Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless	
	23	Effective Retention Depth	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	inches	
	24	Fraction of DCV Retained (Independent of Drawdown Time)	0.13	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.13	0.14	ratio	
	25	Calculated Retention Storage Drawdown Time	120	120	120	120	120	120	120	120	120	120	hours	
	26	Efficacy of Retention Processes	0.15	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.15	0.16	ratio	
Biofiltration Calculations	27	Volume Retained by BMP (Considering Drawdown Time)	107	55	60	67	30	78	10	8	17	11	cubic-feet	
	28	Design Capture Volume Remaining for Biofiltration	605	311	336	379	168	477	58	46	95	60	cubic-feet	
	29	Max Hydromod Flow Rate through Underdrain	1.6375	1.6375	1.6375	1.6375	1.6375	1.6375	1.6375	1.6375	1.6375	1.6375	cfs	
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	147.99	307.57	282.96	252.64	544.16	208.06	1,684.30	2,143.65	1,010.58	1,414.81	in/hr	
	31	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr	
	32	Soil Media Filtration Rate to be used for Sizing	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr	
	33	Depth Biofiltered Over 6 Hour Storm	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	inches	
	34	Ponding Pore Space Available for Biofiltration	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	unitless	
	35	Soil Media Pore Space Available for Biofiltration	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	unitless	
	36	Gravel Pore Space Available for Biofiltration (Above Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless	
	37	Effective Depth of Biofiltration Storage	14.40	14.40	14.40	14.40	14.40	14.40	14.40	14.40	14.40	14.40	inches	
Result	38	Drawdown Time for Surface Ponding	1	1	1	1	1	1	1	1	1	1	hours	
	39	Drawdown Time for Effective Biofiltration Depth	3	3	3	3	3	3	3	3	3	3	hours	
	40	Total Depth Biofiltered	44.40	44.40	44.40	44.40	44.40	44.40	44.40	44.40	44.40	44.40	inches	
	41	Option 1 - Biofilter 1.50 DCV: Target Volume	907	466	504	568	252	715	88	70	143	89	cubic-feet	
	42	Option 1 - Provided Biofiltration Volume	907	466	504	568	252	715	88	70	143	89	cubic-feet	
	43	Option 2 - Store 0.75 DCV: Target Volume	453	233	252	284	126	358	44	35	71	45	cubic-feet	
	44	Option 2 - Provided Storage Volume	453	233	252	284	126	358	44	35	71	45	cubic-feet	
	45	Portion of Biofiltration Performance Standard Satisfied	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio	
	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
48	Deficit of Effectively Treated Stormwater	0	0	0	0	0	0	0	0	0	0	0	cubic-feet	

No Warning Messages

Automated Worksheet B.1: Calculation of Design Capture Volume (V2.0)

Category	#	Description	<i>i</i>	<i>ii</i>	<i>iii</i>	<i>iv</i>	<i>v</i>	<i>vi</i>	<i>vii</i>	<i>viii</i>	<i>ix</i>	<i>x</i>	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	B1	B2	B3	B4	B5	B6					unitless
	2	85th Percentile 24-hr Storm Depth	0.59	0.59	0.59	0.59	0.59	0.59					inches
	3	Impervious Surfaces <u>Not Directed to Dispersion Area</u> (C=0.90)	13,288	12,628	2,702	5,456	28,517	14,233					sq-ft
	4	Semi-Pervious Surfaces <u>Not Serving as Dispersion Area</u> (C=0.30)											sq-ft
	5	Engineered Pervious Surfaces <u>Not Serving as Dispersion Area</u> (C=0.10)											sq-ft
	6	Natural Type A Soil <u>Not Serving as Dispersion Area</u> (C=0.10)											sq-ft
	7	Natural Type B Soil <u>Not Serving as Dispersion Area</u> (C=0.14)											sq-ft
	8	Natural Type C Soil <u>Not Serving as Dispersion Area</u> (C=0.23)											sq-ft
	9	Natural Type D Soil <u>Not Serving as Dispersion Area</u> (C=0.30)											sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	No	No	No	No					yes/no
	11	Impervious Surfaces Directed to Dispersion Area per SD-B (Ci=0.90)	0	0	0	0	0						sq-ft
	12	Semi-Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft
	13	Engineered Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.10)											sq-ft
	14	Natural Type A Soil Serving as Dispersion Area per SD-B (Ci=0.10)											sq-ft
	15	Natural Type B Soil Serving as Dispersion Area per SD-B (Ci=0.14)											sq-ft
	16	Natural Type C Soil Serving as Dispersion Area per SD-B (Ci=0.23)											sq-ft
	17	Natural Type D Soil Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft
	18	Number of Tree Wells Proposed per SD-A											#
	19	Average Mature Tree Canopy Diameter											ft
	20	Number of Rain Barrels Proposed per SD-E											#
21	Average Rain Barrel Size											gal	
Initial Runoff Factor Calculation	22	Total Tributary Area	13,288	12,628	2,702	5,456	28,517	14,233	0	0	0	0	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.90	0.90	0.90	0.90	0.90	0.90	0.00	0.00	0.00	0.00	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.00	0.00	0.00	0.00	unitless
	26	Initial Design Capture Volume	588	559	120	241	1,262	630	0	0	0	0	cubic-feet
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.90	0.90	0.90	0.90	0.90	0.90	n/a	n/a	n/a	n/a	unitless
Tree & Barrel Adjustments	32	Design Capture Volume After Dispersion Techniques	588	559	120	241	1,262	630	0	0	0	0	cubic-feet
	33	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.00	0.00	0.00	0.00	unitless
	36	Final Effective Tributary Area	11,959	11,365	2,432	4,910	25,665	12,810	0	0	0	0	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	0	0	0	0	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	588	559	120	241	1,262	630	0	0	0	0	cubic-feet
No Warning Messages													

Automated Worksheet B.2: Retention Requirements (V2.0)

Category	#	Description	<i>i</i>	<i>ii</i>	<i>iii</i>	<i>iv</i>	<i>v</i>	<i>vi</i>	<i>vii</i>	<i>viii</i>	<i>ix</i>	<i>x</i>	Units
Basic Analysis	1	Drainage Basin ID or Name	B1	B2	B3	B4	B5	B6	-	-	-	-	unitless
	2	85th Percentile Rainfall Depth	0.59	0.59	0.59	0.59	0.59	0.59	-	-	-	-	inches
	3	Predominant NRCS Soil Type Within BMP Location	A	A	A	A	A	A					unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted					unitless
	5	Nature of Restriction	Other	Other	Other	Other	Other	Other					unitless
	6	Do Minimum Retention Requirements Apply to this Project?	No	No	No	No	No	No					yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No	No	No	No	No	No					yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	Yes	Yes	Yes	Yes	Yes	Yes					yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer	0.200	0.200	0.200	0.200	0.200	0.200					in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	percentage
	12	Fraction of DCV Requiring Retention	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	ratio
	13	Required Retention Volume	0	0	0	0	0	0	-	-	-	-	cubic-feet

Attention!
 -Retention requirements have been omitted in these calculations. Such an omission is only be acceptable for Green Street projects or projects that submit supplemental calculations demonstrating retention requirements are satisfied at the project-level.

Automated Worksheet B.3: BMP Performance (V2.0)

* PROPRIETARY BIOFILTRATION UNIT. SEE WATER QUALITY TREATMENT FLOW RATE TABLE.

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units	
BMP Inputs	1	Drainage Basin ID or Name	B1	B2	B3	B4	B5	B6*	-	-	-	-	sq-ft	
	2	Design Infiltration Rate Recommended	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	in/hr	
	3	Design Capture Volume Tributary to BMP	588	559	120	241	1,262	630	-	-	-	-	cubic-feet	
	4	Is BMP Vegetated or Unvegetated?	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	-	-	-	-	unitless	
	5	Is BMP Impermeably Lined or Unlined?	Lined	Lined	Lined	Lined	Lined	Lined	-	-	-	-	unitless	
	6	Does BMP Have an Underdrain?	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	-	-	-	-	unitless	
	7	Does BMP Utilize Standard or Specialized Media?	Standard	Standard	Standard	Standard	Standard	Standard	-	-	-	-	unitless	
	8	Provided Surface Area	360	370	80	150	792	792	-	-	-	-	sq-ft	
	9	Provided Surface Ponding Depth	6	6	6	6	6	6	-	-	-	-	inches	
	10	Provided Soil Media Thickness	24	24	24	24	24	24	-	-	-	-	inches	
	11	Provided Gravel Thickness (Total Thickness)	12	12	12	12	12	12	-	-	-	-	inches	
	12	Underdrain Offset	3	3	3	3	3	3	-	-	-	-	inches	
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	6.00	6.00	6.00	6.00	6.00	6.00	-	-	-	-	inches	
	14	Specialized Soil Media Filtration Rate											in/hr	
	15	Specialized Soil Media Pore Space for Retention											unitless	
	16	Specialized Soil Media Pore Space for Biofiltration											unitless	
	17	Specialized Gravel Media Pore Space											unitless	
Retention Calculations	18	Volume Infiltrated Over 6 Hour Storm	0	0	0	0	0	0	0	0	0	0	cubic-feet	
	19	Ponding Pore Space Available for Retention	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	unitless	
	20	Soil Media Pore Space Available for Retention	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	unitless	
	21	Gravel Pore Space Available for Retention (Above Underdrain)	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.40	0.40	0.40	unitless	
	22	Gravel Pore Space Available for Retention (Below Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless	
	23	Effective Retention Depth	2.40	2.40	2.40	2.40	2.40	2.40	0.00	0.00	0.00	0.00	inches	
	24	Fraction of DCV Retained (Independent of Drawdown Time)	0.12	0.13	0.13	0.12	0.13	0.25	0.00	0.00	0.00	0.00	ratio	
	25	Calculated Retention Storage Drawdown Time	120	120	120	120	120	120	0	0	0	0	hours	
	26	Efficacy of Retention Processes	0.14	0.15	0.15	0.14	0.15	0.26	0.00	0.00	0.00	0.00	ratio	
	27	Volume Retained by BMP (Considering Drawdown Time)	83	84	18	34	190	166	0	0	0	0	cubic-feet	
Biofiltration Calculations	28	Design Capture Volume Remaining for Biofiltration	505	475	102	207	1,072	464	0	0	0	0	cubic-feet	
	29	Max Hydromod Flow Rate through Underdrain	1.6375	1.6375	1.6375	1.6375	1.6375	1.6375	0.0000	0.0000	0.0000	0.0000	cfs	
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	196.50	191.19	884.26	471.60	89.32	89.32	0.00	0.00	0.00	0.00	in/hr	
	31	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr	
	32	Soil Media Filtration Rate to be used for Sizing	5.00	5.00	5.00	5.00	5.00	5.00	0.00	0.00	0.00	0.00	in/hr	
	33	Depth Biofiltered Over 6 Hour Storm	30.00	30.00	30.00	30.00	30.00	30.00	0.00	0.00	0.00	0.00	inches	
	34	Ponding Pore Space Available for Biofiltration	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	unitless	
	35	Soil Media Pore Space Available for Biofiltration	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	unitless	
	36	Gravel Pore Space Available for Biofiltration (Above Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless	
	37	Effective Depth of Biofiltration Storage	14.40	14.40	14.40	14.40	14.40	14.40	0.00	0.00	0.00	0.00	inches	
Result	38	Drawdown Time for Surface Ponding	1	1	1	1	1	1	0	0	0	0	hours	
	39	Drawdown Time for Effective Biofiltration Depth	3	3	3	3	3	3	0	0	0	0	hours	
	40	Total Depth Biofiltered	44.40	44.40	44.40	44.40	44.40	44.40	0.00	0.00	0.00	0.00	inches	
	41	Option 1 - Biofilter 1.50 DCV: Target Volume	758	712	153	311	1,607	696	0	0	0	0	cubic-feet	
	42	Option 1 - Provided Biofiltration Volume	758	712	153	311	1,607	696	0	0	0	0	cubic-feet	
	43	Option 2 - Store 0.75 DCV: Target Volume	379	356	76	155	804	348	0	0	0	0	cubic-feet	
	44	Option 2 - Provided Storage Volume	379	356	76	155	804	348	0	0	0	0	cubic-feet	
	45	Portion of Biofiltration Performance Standard Satisfied	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	ratio
	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-	-	-	yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	ratio
48	Deficit of Effectively Treated Stormwater	0	0	0	0	0	0	n/a	n/a	n/a	n/a	n/a	cubic-feet	

No Warning Messages

Automated Worksheet B.1: Calculation of Design Capture Volume (V2.0)

Category	#	Description	<i>i</i>	<i>ii</i>	<i>iii</i>	<i>iv</i>	<i>v</i>	<i>vi</i>	<i>vii</i>	<i>viii</i>	<i>ix</i>	<i>x</i>	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	unitless
	2	85th Percentile 24-hr Storm Depth	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	inches
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	11,736	11,692	12,394	19,292	3,204	7,422	8,754	6,615	57,349	1,209	sq-ft
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)											sq-ft
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	No	No	No	No	No	No	No	No	yes/no
	11	Impervious Surfaces Directed to Dispersion Area per SD-B (Ci=0.90)	0	0	0	0	0						sq-ft
	12	Semi-Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft
	13	Engineered Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.10)											sq-ft
	14	Natural Type A Soil Serving as Dispersion Area per SD-B (Ci=0.10)											sq-ft
	15	Natural Type B Soil Serving as Dispersion Area per SD-B (Ci=0.14)											sq-ft
	16	Natural Type C Soil Serving as Dispersion Area per SD-B (Ci=0.23)											sq-ft
	17	Natural Type D Soil Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft
	18	Number of Tree Wells Proposed per SD-A											#
	19	Average Mature Tree Canopy Diameter											ft
	20	Number of Rain Barrels Proposed per SD-E											#
21	Average Rain Barrel Size											gal	
Initial Runoff Factor Calculation	22	Total Tributary Area	11,736	11,692	12,394	19,292	3,204	7,422	8,754	6,615	57,349	1,209	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
26	Initial Design Capture Volume	519	517	548	854	142	328	387	293	2,538	53	cubic-feet	
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
Tree & Barrel Adjustments	32	Design Capture Volume After Dispersion Techniques	519	517	548	854	142	328	387	293	2,538	53	cubic-feet
	33	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	34	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
	35	Final Adjusted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	36	Final Effective Tributary Area	10,562	10,523	11,155	17,363	2,884	6,680	7,879	5,954	51,614	1,088	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	0	0	0	0	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	519	517	548	854	142	328	387	293	2,538	53	cubic-feet
No Warning Messages													

Automated Worksheet B.2: Retention Requirements (V2.0)

Category	#	Description	<i>i</i>	<i>ii</i>	<i>iii</i>	<i>iv</i>	<i>v</i>	<i>vi</i>	<i>vii</i>	<i>viii</i>	<i>ix</i>	<i>x</i>	Units
Basic Analysis	1	Drainage Basin ID or Name	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	unitless
	2	85th Percentile Rainfall Depth	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	inches
	3	Predominant NRCS Soil Type Within BMP Location	A	A	A	A	A	A	A	A	A	A	unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	unitless
	5	Nature of Restriction	Other	Other	Other	Other	Other	Other	Other	Other	Other	Other	unitless
	6	Do Minimum Retention Requirements Apply to this Project?	No	No	No	No	No	No	No	No	No	No	yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No	No	No	No	No	No	No	No	No	No	yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	percentage
	12	Fraction of DCV Requiring Retention	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	13	Required Retention Volume	0	0	0	0	0	0	0	0	0	0	cubic-feet

Attention!
 -Retention requirements have been omitted in these calculations. Such an omission is only be acceptable for Green Street projects or projects that submit supplemental calculations demonstrating retention requirements are satisfied at the project-level.

Automated Worksheet B.3: BMP Performance (V2.0)

* PROPRIETARY BIOFILTRATION UNIT. SEE WATER QUALITY TREATMENT FLOW RATE TABLE.

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units	
BMP Inputs	1	Drainage Basin ID or Name	C1	C2	C3*	C4	C5	C6	C7	C8	C9	C10	sq-ft	
	2	Design Infiltration Rate Recommended	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	in/hr	
	3	Design Capture Volume Tributary to BMP	519	517	548	854	142	328	387	293	2,538	53	cubic-feet	
	4	Is BMP Vegetated or Unvegetated?	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	unitless	
	5	Is BMP Impermeably Lined or Unlined?	Lined	Lined	Lined	Lined	Lined	Lined	Lined	Lined	Lined	Lined	unitless	
	6	Does BMP Have an Underdrain?	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	unitless	
	7	Does BMP Utilize Standard or Specialized Media?	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	unitless	
	8	Provided Surface Area	320	316	340	530	90	210	240	180	1,550	40	sq-ft	
	9	Provided Surface Ponding Depth	6	6	6	6	6	6	6	6	6	6	inches	
	10	Provided Soil Media Thickness	24	24	24	24	24	24	24	24	24	24	inches	
	11	Provided Gravel Thickness (Total Thickness)	12	12	12	12	12	12	12	12	12	12	inches	
	12	Underdrain Offset	3	3	3	3	3	3	3	3	3	3	inches	
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	inches	
	14	Specialized Soil Media Filtration Rate											in/hr	
	15	Specialized Soil Media Pore Space for Retention											unitless	
	16	Specialized Soil Media Pore Space for Biofiltration											unitless	
	17	Specialized Gravel Media Pore Space											unitless	
Retention Calculations	18	Volume Infiltrated Over 6 Hour Storm	0	0	0	0	0	0	0	0	0	0	cubic-feet	
	19	Ponding Pore Space Available for Retention	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless	
	20	Soil Media Pore Space Available for Retention	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	unitless	
	21	Gravel Pore Space Available for Retention (Above Underdrain)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless	
	22	Gravel Pore Space Available for Retention (Below Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless	
	23	Effective Retention Depth	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	inches	
	24	Fraction of DCV Retained (Independent of Drawdown Time)	0.12	0.12	0.12	0.12	0.13	0.13	0.12	0.12	0.12	0.15	ratio	
	25	Calculated Retention Storage Drawdown Time	120	120	120	120	120	120	120	120	120	120	hours	
	26	Efficacy of Retention Processes	0.14	0.14	0.14	0.14	0.15	0.15	0.14	0.14	0.14	0.17	ratio	
	27	Volume Retained by BMP (Considering Drawdown Time)	73	73	77	120	21	49	55	41	357	9	cubic-feet	
Biofiltration Calculations	28	Design Capture Volume Remaining for Biofiltration	446	444	471	734	121	279	332	252	2,181	44	cubic-feet	
	29	Max Hydromod Flow Rate through Underdrain	1.6375	1.6375	1.6375	1.6375	1.6375	1.6375	1.6375	1.6375	1.6375	1.6375	cfs	
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	221.06	223.86	208.06	133.47	786.01	336.86	294.75	393.00	45.64	1,768.51	in/hr	
	31	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr	
	32	Soil Media Filtration Rate to be used for Sizing	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr	
	33	Depth Biofiltered Over 6 Hour Storm	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	inches	
	34	Ponding Pore Space Available for Biofiltration	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	unitless	
	35	Soil Media Pore Space Available for Biofiltration	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	unitless	
	36	Gravel Pore Space Available for Biofiltration (Above Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless	
	37	Effective Depth of Biofiltration Storage	14.40	14.40	14.40	14.40	14.40	14.40	14.40	14.40	14.40	14.40	inches	
Result	38	Drawdown Time for Surface Ponding	1	1	1	1	1	1	1	1	1	1	hours	
	39	Drawdown Time for Effective Biofiltration Depth	3	3	3	3	3	3	3	3	3	3	hours	
	40	Total Depth Biofiltered	44.40	44.40	44.40	44.40	44.40	44.40	44.40	44.40	44.40	44.40	inches	
	41	Option 1 - Biofilter 1.50 DCV: Target Volume	669	666	706	1,101	181	418	499	378	3,271	66	cubic-feet	
	42	Option 1 - Provided Biofiltration Volume	669	666	706	1,101	181	418	499	378	3,271	66	cubic-feet	
	43	Option 2 - Store 0.75 DCV: Target Volume	334	333	353	550	90	209	249	189	1,635	33	cubic-feet	
	44	Option 2 - Provided Storage Volume	334	333	353	550	90	209	249	189	1,635	33	cubic-feet	
	45	Portion of Biofiltration Performance Standard Satisfied	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio	
	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
48	Deficit of Effectively Treated Stormwater	0	0	0	0	0	0	0	0	0	0	0	cubic-feet	

No Warning Messages

Automated Worksheet B.1: Calculation of Design Capture Volume (V2.0)

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units	
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	C11										unitless	
	2	85th Percentile 24-hr Storm Depth	0.59										inches	
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	3,400										sq-ft	
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft	
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft	
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft	
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft	
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)											sq-ft	
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft	
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No										yes/no	
	11	Impervious Surfaces Directed to Dispersion Area per SD-B (Ci=0.90)	0										sq-ft	
	12	Semi-Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft	
	13	Engineered Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.10)											sq-ft	
	14	Natural Type A Soil Serving as Dispersion Area per SD-B (Ci=0.10)											sq-ft	
	15	Natural Type B Soil Serving as Dispersion Area per SD-B (Ci=0.14)											sq-ft	
	16	Natural Type C Soil Serving as Dispersion Area per SD-B (Ci=0.23)											sq-ft	
	17	Natural Type D Soil Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft	
	18	Number of Tree Wells Proposed per SD-A											#	
	19	Average Mature Tree Canopy Diameter											ft	
	20	Number of Rain Barrels Proposed per SD-E											#	
21	Average Rain Barrel Size											gal		
Initial Runoff Factor Calculation	22	Total Tributary Area	3,400	0	0	0	0	0	0	0	0	0	sq-ft	
	23	Initial Runoff Factor for Standard Drainage Areas	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
26	Initial Design Capture Volume	150	0	0	0	0	0	0	0	0	0	0	cubic-feet	
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft	
	28	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft	
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.90	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	unitless
Tree & Barrel Adjustments	32	Design Capture Volume After Dispersion Techniques	150	0	0	0	0	0	0	0	0	0	cubic-feet	
	33	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	0	0	0	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	36	Final Effective Tributary Area	3,060	0	0	0	0	0	0	0	0	0	0	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	0	0	0	0	0	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	150	0	0	0	0	0	0	0	0	0	0	cubic-feet
No Warning Messages														

Automated Worksheet B.2: Retention Requirements (V2.0)

Category	#	Description	<i>i</i>	<i>ii</i>	<i>iii</i>	<i>iv</i>	<i>v</i>	<i>vi</i>	<i>vii</i>	<i>viii</i>	<i>ix</i>	<i>x</i>	Units
Basic Analysis	1	Drainage Basin ID or Name	C11	-	-	-	-	-	-	-	-	-	unitless
	2	85th Percentile Rainfall Depth	0.59	-	-	-	-	-	-	-	-	-	inches
	3	Predominant NRCS Soil Type Within BMP Location	A										unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Restricted										unitless
	5	Nature of Restriction	Other										unitless
	6	Do Minimum Retention Requirements Apply to this Project?	No										yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No										yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	Yes										yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer	0.200										in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.000	-	-	-	-	-	-	-	-	-	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	0.0%	-	-	-	-	-	-	-	-	-	percentage
	12	Fraction of DCV Requiring Retention	0.00	-	-	-	-	-	-	-	-	-	ratio
	13	Required Retention Volume	0	-	-	-	-	-	-	-	-	-	cubic-feet

Attention!
 -Retention requirements have been omitted in these calculations. Such an omission is only be acceptable for Green Street projects or projects that submit supplemental calculations demonstrating retention requirements are satisfied at the project-level.

Automated Worksheet B.3: BMP Performance (V2.0)

* PROPRIETARY BIOFILTRATION UNIT. SEE WATER QUALITY TREATMENT FLOW RATE TABLE.

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units	
BMP Inputs	1	Drainage Basin ID or Name	C11*	-	-	-	-	-	-	-	-	-	sq-ft	
	2	Design Infiltration Rate Recommended	0.000	-	-	-	-	-	-	-	-	-	in/hr	
	3	Design Capture Volume Tributary to BMP	150	-	-	-	-	-	-	-	-	-	cubic-feet	
	4	Is BMP Vegetated or Unvegetated?	Vegetated										unitless	
	5	Is BMP Impermeably Lined or Unlined?	Lined										unitless	
	6	Does BMP Have an Underdrain?	Underdrain										unitless	
	7	Does BMP Utilize Standard or Specialized Media?	Standard										unitless	
	8	Provided Surface Area	100										sq-ft	
	9	Provided Surface Ponding Depth	6										inches	
	10	Provided Soil Media Thickness	24										inches	
	11	Provided Gravel Thickness (Total Thickness)	12										inches	
	12	Underdrain Offset	3										inches	
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	6.00										inches	
	14	Specialized Soil Media Filtration Rate											in/hr	
	15	Specialized Soil Media Pore Space for Retention											unitless	
	16	Specialized Soil Media Pore Space for Biofiltration											unitless	
	17	Specialized Gravel Media Pore Space											unitless	
Retention Calculations	18	Volume Infiltrated Over 6 Hour Storm	0	0	0	0	0	0	0	0	0	0	cubic-feet	
	19	Ponding Pore Space Available for Retention	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	unitless	
	20	Soil Media Pore Space Available for Retention	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	unitless	
	21	Gravel Pore Space Available for Retention (Above Underdrain)	0.00	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless	
	22	Gravel Pore Space Available for Retention (Below Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless	
	23	Effective Retention Depth	2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches	
	24	Fraction of DCV Retained (Independent of Drawdown Time)	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio	
	25	Calculated Retention Storage Drawdown Time	120	0	0	0	0	0	0	0	0	0	hours	
	26	Efficacy of Retention Processes	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio	
	27	Volume Retained by BMP (Considering Drawdown Time)	23	0	0	0	0	0	0	0	0	0	cubic-feet	
Biofiltration Calculations	28	Design Capture Volume Remaining for Biofiltration	127	0	0	0	0	0	0	0	0	0	cubic-feet	
	29	Max Hydromod Flow Rate through Underdrain	1.6375	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	cfs	
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	707.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	in/hr	
	31	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr	
	32	Soil Media Filtration Rate to be used for Sizing	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	in/hr	
	33	Depth Biofiltered Over 6 Hour Storm	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches	
	34	Ponding Pore Space Available for Biofiltration	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless	
	35	Soil Media Pore Space Available for Biofiltration	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	unitless	
	36	Gravel Pore Space Available for Biofiltration (Above Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless	
	37	Effective Depth of Biofiltration Storage	14.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches	
	38	Drawdown Time for Surface Ponding	1	0	0	0	0	0	0	0	0	0	hours	
	39	Drawdown Time for Effective Biofiltration Depth	3	0	0	0	0	0	0	0	0	0	hours	
	40	Total Depth Biofiltered	44.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches	
Result	41	Option 1 - Biofilter 1.50 DCV: Target Volume	191	0	0	0	0	0	0	0	0	0	cubic-feet	
	42	Option 1 - Provided Biofiltration Volume	191	0	0	0	0	0	0	0	0	0	cubic-feet	
	43	Option 2 - Store 0.75 DCV: Target Volume	96	0	0	0	0	0	0	0	0	0	cubic-feet	
	44	Option 2 - Provided Storage Volume	96	0	0	0	0	0	0	0	0	0	cubic-feet	
	45	Portion of Biofiltration Performance Standard Satisfied	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio	
	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	-	-	-	-	-	-	-	-	-	-	yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio	
	48	Deficit of Effectively Treated Stormwater	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	cubic-feet

No Warning Messages

Automated Worksheet B.1: Calculation of Design Capture Volume (V2.0)

Category	#	Description	<i>i</i>	<i>ii</i>	<i>iii</i>	<i>iv</i>	<i>v</i>	<i>vi</i>	<i>vii</i>	<i>viii</i>	<i>ix</i>	<i>x</i>	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	unitless
	2	85th Percentile 24-hr Storm Depth	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	inches
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	56,117	1,163	9,477	8,816	6,363	6,454	2,802	9,550	9,197	337	sq-ft
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)											sq-ft
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	No	No	No	No	No	No	No	No	yes/no
	11	Impervious Surfaces Directed to Dispersion Area per SD-B (Ci=0.90)	0	0	0	0	0						sq-ft
	12	Semi-Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft
	13	Engineered Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.10)											sq-ft
	14	Natural Type A Soil Serving as Dispersion Area per SD-B (Ci=0.10)											sq-ft
	15	Natural Type B Soil Serving as Dispersion Area per SD-B (Ci=0.14)											sq-ft
	16	Natural Type C Soil Serving as Dispersion Area per SD-B (Ci=0.23)											sq-ft
	17	Natural Type D Soil Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft
	18	Number of Tree Wells Proposed per SD-A											#
	19	Average Mature Tree Canopy Diameter											ft
	20	Number of Rain Barrels Proposed per SD-E											#
21	Average Rain Barrel Size											gal	
Initial Runoff Factor Calculation	22	Total Tributary Area	56,117	1,163	9,477	8,816	6,363	6,454	2,802	9,550	9,197	337	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
Dispersion Area Adjustments	26	Initial Design Capture Volume	2,483	51	419	390	282	286	124	423	407	15	cubic-feet
	27	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
Tree & Barrel Adjustments	32	Design Capture Volume After Dispersion Techniques	2,483	51	419	390	282	286	124	423	407	15	cubic-feet
	33	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	36	Final Effective Tributary Area	50,505	1,047	8,529	7,934	5,727	5,809	2,522	8,595	8,277	303	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	0	0	0	0	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	2,483	51	419	390	282	286	124	423	407	15	cubic-feet
No Warning Messages													

Automated Worksheet B.2: Retention Requirements (V2.0)

Category	#	Description	<i>i</i>	<i>ii</i>	<i>iii</i>	<i>iv</i>	<i>v</i>	<i>vi</i>	<i>vii</i>	<i>viii</i>	<i>ix</i>	<i>x</i>	Units
Basic Analysis	1	Drainage Basin ID or Name	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	unitless
	2	85th Percentile Rainfall Depth	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	inches
	3	Predominant NRCS Soil Type Within BMP Location	A	A	A	A	A	A	A	A	A	A	unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	unitless
	5	Nature of Restriction	Other	Other	Other	Other	Other	Other	Other	Other	Other	Other	unitless
	6	Do Minimum Retention Requirements Apply to this Project?	No	No	No	No	No	No	No	No	No	No	yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No	No	No	No	No	No	No	No	No	No	yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	percentage
	12	Fraction of DCV Requiring Retention	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	13	Required Retention Volume	0	0	0	0	0	0	0	0	0	0	cubic-feet

Attention!
 -Retention requirements have been omitted in these calculations. Such an omission is only be acceptable for Green Street projects or projects that submit supplemental calculations demonstrating retention requirements are satisfied at the project-level.

Automated Worksheet B.3: BMP Performance (V2.0)

* PROPRIETARY BIOFILTRATION UNIT. SEE WATER QUALITY TREATMENT FLOW RATE TABLE.

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units	
BMP Inputs	1	Drainage Basin ID or Name	D1*	D2	D3	D4	D5	D6	D7	D8	D9	D10	sq-ft	
	2	Design Infiltration Rate Recommended	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	in/hr	
	3	Design Capture Volume Tributary to BMP	2,483	51	419	390	282	286	124	423	407	15	cubic-feet	
	4	Is BMP Vegetated or Unvegetated?	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	unitless	
	5	Is BMP Impermeably Lined or Unlined?	Lined	Lined	Lined	Lined	Lined	Lined	Lined	Lined	Lined	Lined	unitless	
	6	Does BMP Have an Underdrain?	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	unitless	
	7	Does BMP Utilize Standard or Specialized Media?	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	unitless	
	8	Provided Surface Area	1,520	40	260	240	180	180	80	260	260	10	sq-ft	
	9	Provided Surface Ponding Depth	6	6	6	6	6	6	6	6	6	6	inches	
	10	Provided Soil Media Thickness	24	24	24	24	24	24	24	24	24	24	inches	
	11	Provided Gravel Thickness (Total Thickness)	12	12	12	12	12	12	12	12	12	12	inches	
	12	Underdrain Offset	3	3	3	3	3	3	3	3	3	3	inches	
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	inches	
	14	Specialized Soil Media Filtration Rate											in/hr	
	15	Specialized Soil Media Pore Space for Retention											unitless	
	16	Specialized Soil Media Pore Space for Biofiltration											unitless	
	17	Specialized Gravel Media Pore Space											unitless	
Retention Calculations	18	Volume Infiltrated Over 6 Hour Storm	0	0	0	0	0	0	0	0	0	0	cubic-feet	
	19	Ponding Pore Space Available for Retention	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless	
	20	Soil Media Pore Space Available for Retention	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	unitless	
	21	Gravel Pore Space Available for Retention (Above Underdrain)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless	
	22	Gravel Pore Space Available for Retention (Below Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless	
	23	Effective Retention Depth	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	inches	
	24	Fraction of DCV Retained (Independent of Drawdown Time)	0.12	0.16	0.12	0.12	0.13	0.13	0.13	0.12	0.13	0.13	ratio	
	25	Calculated Retention Storage Drawdown Time	120	120	120	120	120	120	120	120	120	120	hours	
	26	Efficacy of Retention Processes	0.14	0.18	0.14	0.14	0.15	0.15	0.15	0.14	0.15	0.15	ratio	
	27	Volume Retained by BMP (Considering Drawdown Time)	350	9	59	55	43	43	19	60	61	2	cubic-feet	
Biofiltration Calculations	28	Design Capture Volume Remaining for Biofiltration	2,133	42	360	335	239	243	105	363	346	13	cubic-feet	
	29	Max Hydromod Flow Rate through Underdrain	1.6375	1.6375	1.6375	1.6375	1.6375	1.6375	1.6375	1.6375	1.6375	1.6375	cfs	
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	46.54	1,768.51	272.08	294.75	393.00	393.00	884.26	272.08	272.08	7,074.06	in/hr	
	31	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr	
	32	Soil Media Filtration Rate to be used for Sizing	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr	
	33	Depth Biofiltered Over 6 Hour Storm	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	inches	
	34	Ponding Pore Space Available for Biofiltration	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	unitless	
	35	Soil Media Pore Space Available for Biofiltration	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	unitless	
	36	Gravel Pore Space Available for Biofiltration (Above Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless	
	37	Effective Depth of Biofiltration Storage	14.40	14.40	14.40	14.40	14.40	14.40	14.40	14.40	14.40	14.40	inches	
Result	38	Drawdown Time for Surface Ponding	1	1	1	1	1	1	1	1	1	1	hours	
	39	Drawdown Time for Effective Biofiltration Depth	3	3	3	3	3	3	3	3	3	3	hours	
	40	Total Depth Biofiltered	44.40	44.40	44.40	44.40	44.40	44.40	44.40	44.40	44.40	44.40	inches	
	41	Option 1 - Biofilter 1.50 DCV: Target Volume	3,200	63	540	503	359	364	158	545	518	19	cubic-feet	
	42	Option 1 - Provided Biofiltration Volume	3,200	63	540	503	359	364	158	545	518	19	cubic-feet	
	43	Option 2 - Store 0.75 DCV: Target Volume	1,600	31	270	251	180	182	79	273	259	10	cubic-feet	
	44	Option 2 - Provided Storage Volume	1,600	31	270	251	180	182	79	273	259	10	cubic-feet	
	45	Portion of Biofiltration Performance Standard Satisfied	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio	
	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
48	Deficit of Effectively Treated Stormwater	0	0	0	0	0	0	0	0	0	0	0	cubic-feet	

No Warning Messages

Automated Worksheet B.1: Calculation of Design Capture Volume (V2.0)

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units	
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	D11										unitless	
	2	85th Percentile 24-hr Storm Depth	0.59										inches	
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	28,158										sq-ft	
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft	
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft	
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft	
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft	
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)											sq-ft	
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft	
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No										yes/no	
	11	Impervious Surfaces Directed to Dispersion Area per SD-B (Ci=0.90)	0										sq-ft	
	12	Semi-Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft	
	13	Engineered Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.10)											sq-ft	
	14	Natural Type A Soil Serving as Dispersion Area per SD-B (Ci=0.10)											sq-ft	
	15	Natural Type B Soil Serving as Dispersion Area per SD-B (Ci=0.14)											sq-ft	
	16	Natural Type C Soil Serving as Dispersion Area per SD-B (Ci=0.23)											sq-ft	
	17	Natural Type D Soil Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft	
	18	Number of Tree Wells Proposed per SD-A											#	
	19	Average Mature Tree Canopy Diameter											ft	
	20	Number of Rain Barrels Proposed per SD-E											#	
21	Average Rain Barrel Size											gal		
Initial Runoff Factor Calculation	22	Total Tributary Area	28,158	0	0	0	0	0	0	0	0	0	sq-ft	
	23	Initial Runoff Factor for Standard Drainage Areas	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	26	Initial Design Capture Volume	1,246	0	0	0	0	0	0	0	0	0	0	cubic-feet
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft	
	28	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft	
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.90	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	unitless
	32	Design Capture Volume After Dispersion Techniques	1,246	0	0	0	0	0	0	0	0	0	0	cubic-feet
Tree & Barrel Adjustments	33	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	0	0	0	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	36	Final Effective Tributary Area	25,342	0	0	0	0	0	0	0	0	0	0	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	0	0	0	0	0	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	1,246	0	0	0	0	0	0	0	0	0	0	cubic-feet
No Warning Messages														

Automated Worksheet B.2: Retention Requirements (V2.0)

Category	#	Description	<i>i</i>	<i>ii</i>	<i>iii</i>	<i>iv</i>	<i>v</i>	<i>vi</i>	<i>vii</i>	<i>viii</i>	<i>ix</i>	<i>x</i>	Units
Basic Analysis	1	Drainage Basin ID or Name	D11	-	-	-	-	-	-	-	-	-	unitless
	2	85th Percentile Rainfall Depth	0.59	-	-	-	-	-	-	-	-	-	inches
	3	Predominant NRCS Soil Type Within BMP Location	A										unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Restricted										unitless
	5	Nature of Restriction	Other										unitless
	6	Do Minimum Retention Requirements Apply to this Project?	No										yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No										yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	Yes										yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer	0.200										in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.000	-	-	-	-	-	-	-	-	-	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	0.0%	-	-	-	-	-	-	-	-	-	percentage
	12	Fraction of DCV Requiring Retention	0.00	-	-	-	-	-	-	-	-	-	ratio
	13	Required Retention Volume	0	-	-	-	-	-	-	-	-	-	cubic-feet

Attention!
 -Retention requirements have been omitted in these calculations. Such an omission is only be acceptable for Green Street projects or projects that submit supplemental calculations demonstrating retention requirements are satisfied at the project-level.

Automated Worksheet B.3: BMP Performance (V2.0)

* PROPRIETARY BIOFILTRATION UNIT. SEE WATER QUALITY TREATMENT FLOW RATE TABLE.

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units	
BMP Inputs	1	Drainage Basin ID or Name	D11*	-	-	-	-	-	-	-	-	-	sq-ft	
	2	Design Infiltration Rate Recommended	0.000	-	-	-	-	-	-	-	-	-	in/hr	
	3	Design Capture Volume Tributary to BMP	1,246	-	-	-	-	-	-	-	-	-	cubic-feet	
	4	Is BMP Vegetated or Unvegetated?	Vegetated										unitless	
	5	Is BMP Impermeably Lined or Unlined?	Lined										unitless	
	6	Does BMP Have an Underdrain?	Underdrain										unitless	
	7	Does BMP Utilize Standard or Specialized Media?	Standard										unitless	
	8	Provided Surface Area	770										sq-ft	
	9	Provided Surface Ponding Depth	6										inches	
	10	Provided Soil Media Thickness	24										inches	
	11	Provided Gravel Thickness (Total Thickness)	12										inches	
	12	Underdrain Offset	3										inches	
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	6.00										inches	
	14	Specialized Soil Media Filtration Rate											in/hr	
	15	Specialized Soil Media Pore Space for Retention											unitless	
	16	Specialized Soil Media Pore Space for Biofiltration											unitless	
	17	Specialized Gravel Media Pore Space											unitless	
Retention Calculations	18	Volume Infiltrated Over 6 Hour Storm	0	0	0	0	0	0	0	0	0	0	cubic-feet	
	19	Ponding Pore Space Available for Retention	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	unitless	
	20	Soil Media Pore Space Available for Retention	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	unitless	
	21	Gravel Pore Space Available for Retention (Above Underdrain)	0.00	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless	
	22	Gravel Pore Space Available for Retention (Below Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless	
	23	Effective Retention Depth	2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches	
	24	Fraction of DCV Retained (Independent of Drawdown Time)	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio	
	25	Calculated Retention Storage Drawdown Time	120	0	0	0	0	0	0	0	0	0	hours	
	26	Efficacy of Retention Processes	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio	
	27	Volume Retained by BMP (Considering Drawdown Time)	176	0	0	0	0	0	0	0	0	0	cubic-feet	
Biofiltration Calculations	28	Design Capture Volume Remaining for Biofiltration	1,070	0	0	0	0	0	0	0	0	0	cubic-feet	
	29	Max Hydromod Flow Rate through Underdrain	1.6375	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	cfs	
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	91.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	in/hr	
	31	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr	
	32	Soil Media Filtration Rate to be used for Sizing	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	in/hr	
	33	Depth Biofiltered Over 6 Hour Storm	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches	
	34	Ponding Pore Space Available for Biofiltration	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless	
	35	Soil Media Pore Space Available for Biofiltration	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	unitless	
	36	Gravel Pore Space Available for Biofiltration (Above Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless	
	37	Effective Depth of Biofiltration Storage	14.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches	
	38	Drawdown Time for Surface Ponding	1	0	0	0	0	0	0	0	0	0	hours	
	39	Drawdown Time for Effective Biofiltration Depth	3	0	0	0	0	0	0	0	0	0	hours	
	40	Total Depth Biofiltered	44.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches	
Result	41	Option 1 - Biofilter 1.50 DCV: Target Volume	1,606	0	0	0	0	0	0	0	0	0	cubic-feet	
	42	Option 1 - Provided Biofiltration Volume	1,606	0	0	0	0	0	0	0	0	0	cubic-feet	
	43	Option 2 - Store 0.75 DCV: Target Volume	803	0	0	0	0	0	0	0	0	0	cubic-feet	
	44	Option 2 - Provided Storage Volume	803	0	0	0	0	0	0	0	0	0	cubic-feet	
	45	Portion of Biofiltration Performance Standard Satisfied	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio	
	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	-	-	-	-	-	-	-	-	-	-	yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio	
	48	Deficit of Effectively Treated Stormwater	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	cubic-feet

No Warning Messages

Automated Worksheet B.1: Calculation of Design Capture Volume (V2.0)

Category	#	Description	<i>i</i>	<i>ii</i>	<i>iii</i>	<i>iv</i>	<i>v</i>	<i>vi</i>	<i>vii</i>	<i>viii</i>	<i>ix</i>	<i>x</i>	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	unitless
	2	85th Percentile 24-hr Storm Depth	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	inches
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	8,917	12,965	4,770	4,720	1,941	5,155	6,440	12,054	5,776	24,492	sq-ft
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)											sq-ft
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	No	No	No	No	No	No	No	No	yes/no
	11	Impervious Surfaces Directed to Dispersion Area per SD-B (Ci=0.90)	0	0	0	0	0						sq-ft
	12	Semi-Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft
	13	Engineered Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.10)											sq-ft
	14	Natural Type A Soil Serving as Dispersion Area per SD-B (Ci=0.10)											sq-ft
	15	Natural Type B Soil Serving as Dispersion Area per SD-B (Ci=0.14)											sq-ft
	16	Natural Type C Soil Serving as Dispersion Area per SD-B (Ci=0.23)											sq-ft
	17	Natural Type D Soil Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft
	18	Number of Tree Wells Proposed per SD-A											#
	19	Average Mature Tree Canopy Diameter											ft
	20	Number of Rain Barrels Proposed per SD-E											#
21	Average Rain Barrel Size											gal	
Initial Runoff Factor Calculation	22	Total Tributary Area	8,917	12,965	4,770	4,720	1,941	5,155	6,440	12,054	5,776	24,492	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	26	Initial Design Capture Volume	395	574	211	209	86	228	285	533	256	1,084	cubic-feet
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	32	Design Capture Volume After Dispersion Techniques	395	574	211	209	86	228	285	533	256	1,084	cubic-feet
Tree & Barrel Adjustments	33	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	36	Final Effective Tributary Area	8,025	11,669	4,293	4,248	1,747	4,640	5,796	10,849	5,198	22,043	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	0	0	0	0	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	395	574	211	209	86	228	285	533	256	1,084	cubic-feet

No Warning Messages

Automated Worksheet B.2: Retention Requirements (V2.0)

Category	#	Description	<i>i</i>	<i>ii</i>	<i>iii</i>	<i>iv</i>	<i>v</i>	<i>vi</i>	<i>vii</i>	<i>viii</i>	<i>ix</i>	<i>x</i>	Units
Basic Analysis	1	Drainage Basin ID or Name	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	unitless
	2	85th Percentile Rainfall Depth	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	inches
	3	Predominant NRCS Soil Type Within BMP Location	A	A	A	A	A	A	A	A	A	A	unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	unitless
	5	Nature of Restriction	Other	Other	Other	Other	Other	Other	Other	Other	Other	Other	unitless
	6	Do Minimum Retention Requirements Apply to this Project?	No	No	No	No	No	No	No	No	No	No	yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No	No	No	No	No	No	No	No	No	No	yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	percentage
	12	Fraction of DCV Requiring Retention	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	13	Required Retention Volume	0	0	0	0	0	0	0	0	0	0	cubic-feet

Attention!
 -Retention requirements have been omitted in these calculations. Such an omission is only be acceptable for Green Street projects or projects that submit supplemental calculations demonstrating retention requirements are satisfied at the project-level.

Automated Worksheet B.3: BMP Performance (V2.0)

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units	
BMP Inputs	1	Drainage Basin ID or Name	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	sq-ft	
	2	Design Infiltration Rate Recommended	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	in/hr	
	3	Design Capture Volume Tributary to BMP	395	574	211	209	86	228	285	533	256	1,084	cubic-feet	
	4	Is BMP Vegetated or Unvegetated?	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	unitless	
	5	Is BMP Impermeably Lined or Unlined?	Lined	Lined	Lined	Lined	Lined	Lined	Lined	Lined	Lined	Lined	unitless	
	6	Does BMP Have an Underdrain?	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	unitless	
	7	Does BMP Utilize Standard or Specialized Media?	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	unitless	
	8	Provided Surface Area	250	360	130	130	60	140	180	330	160	670	sq-ft	
	9	Provided Surface Ponding Depth	6	6	6	6	6	6	6	6	6	6	inches	
	10	Provided Soil Media Thickness	24	30	24	24	24	24	24	24	24	24	inches	
	11	Provided Gravel Thickness (Total Thickness)	12	12	12	12	12	12	12	12	12	12	inches	
	12	Underdrain Offset	3	3	3	3	3	3	3	3	3	3	inches	
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	6.00	8.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	inches	
	14	Specialized Soil Media Filtration Rate											in/hr	
	15	Specialized Soil Media Pore Space for Retention											unitless	
	16	Specialized Soil Media Pore Space for Biofiltration											unitless	
	17	Specialized Gravel Media Pore Space											unitless	
Retention Calculations	18	Volume Infiltrated Over 6 Hour Storm	0	0	0	0	0	0	0	0	0	0	cubic-feet	
	19	Ponding Pore Space Available for Retention	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless	
	20	Soil Media Pore Space Available for Retention	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	unitless	
	21	Gravel Pore Space Available for Retention (Above Underdrain)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless	
	22	Gravel Pore Space Available for Retention (Below Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless	
	23	Effective Retention Depth	2.40	2.70	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	inches	
	24	Fraction of DCV Retained (Independent of Drawdown Time)	0.13	0.14	0.12	0.12	0.14	0.12	0.13	0.12	0.13	0.12	ratio	
	25	Calculated Retention Storage Drawdown Time	120	120	120	120	120	120	120	120	120	120	hours	
	26	Efficacy of Retention Processes	0.15	0.16	0.14	0.14	0.16	0.14	0.15	0.14	0.15	0.14	ratio	
	27	Volume Retained by BMP (Considering Drawdown Time)	60	92	30	29	14	32	43	75	39	153	cubic-feet	
Biofiltration Calculations	28	Design Capture Volume Remaining for Biofiltration	335	482	181	180	72	196	242	458	217	931	cubic-feet	
	29	Max Hydromod Flow Rate through Underdrain	1.6375	3.1067	1.6375	1.6375	1.6375	1.6375	1.6375	1.6375	1.6375	1.6375	cfs	
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	282.96	372.81	544.16	544.16	1,179.01	505.29	393.00	214.37	442.13	105.58	in/hr	
	31	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr	
	32	Soil Media Filtration Rate to be used for Sizing	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr	
	33	Depth Biofiltered Over 6 Hour Storm	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	inches	
	34	Ponding Pore Space Available for Biofiltration	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	unitless	
	35	Soil Media Pore Space Available for Biofiltration	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	unitless	
	36	Gravel Pore Space Available for Biofiltration (Above Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless	
	37	Effective Depth of Biofiltration Storage	14.40	15.60	14.40	14.40	14.40	14.40	14.40	14.40	14.40	14.40	inches	
Result	38	Drawdown Time for Surface Ponding	1	1	1	1	1	1	1	1	1	1	hours	
	39	Drawdown Time for Effective Biofiltration Depth	3	3	3	3	3	3	3	3	3	3	hours	
	40	Total Depth Biofiltered	44.40	45.60	44.40	44.40	44.40	44.40	44.40	44.40	44.40	44.40	inches	
	41	Option 1 - Biofilter 1.50 DCV: Target Volume	503	722	272	269	108	294	363	687	326	1,397	cubic-feet	
	42	Option 1 - Provided Biofiltration Volume	503	722	272	269	108	294	363	687	326	1,397	cubic-feet	
	43	Option 2 - Store 0.75 DCV: Target Volume	252	361	136	135	54	147	181	343	163	698	cubic-feet	
	44	Option 2 - Provided Storage Volume	252	361	136	135	54	147	181	343	163	698	cubic-feet	
	45	Portion of Biofiltration Performance Standard Satisfied	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio	
	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio	
48	Deficit of Effectively Treated Stormwater	0	0	0	0	0	0	0	0	0	0	0	cubic-feet	

No Warning Messages

Automated Worksheet B.1: Calculation of Design Capture Volume (V2.0)

Category	#	Description	<i>i</i>	<i>ii</i>	<i>iii</i>	<i>iv</i>	<i>v</i>	<i>vi</i>	<i>vii</i>	<i>viii</i>	<i>ix</i>	<i>x</i>	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	E11	E12	E13	E14	E15	E16					unitless
	2	85th Percentile 24-hr Storm Depth	0.59	0.59	0.59	0.59	0.59	0.59					inches
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	5,864	2,580	10,398	3,795	5,164	14,314					sq-ft
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)											sq-ft
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	No	No	No	No					yes/no
	11	Impervious Surfaces Directed to Dispersion Area per SD-B (Ci=0.90)	0	0	0	0	0						sq-ft
	12	Semi-Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft
	13	Engineered Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.10)											sq-ft
	14	Natural Type A Soil Serving as Dispersion Area per SD-B (Ci=0.10)											sq-ft
	15	Natural Type B Soil Serving as Dispersion Area per SD-B (Ci=0.14)											sq-ft
	16	Natural Type C Soil Serving as Dispersion Area per SD-B (Ci=0.23)											sq-ft
	17	Natural Type D Soil Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft
	18	Number of Tree Wells Proposed per SD-A											#
	19	Average Mature Tree Canopy Diameter											ft
	20	Number of Rain Barrels Proposed per SD-E											#
21	Average Rain Barrel Size											gal	
Initial Runoff Factor Calculation	22	Total Tributary Area	5,864	2,580	10,398	3,795	5,164	14,314	0	0	0	0	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.90	0.90	0.90	0.90	0.90	0.90	0.00	0.00	0.00	0.00	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.00	0.00	0.00	0.00	unitless
	26	Initial Design Capture Volume	259	114	460	168	229	633	0	0	0	0	cubic-feet
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.90	0.90	0.90	0.90	0.90	0.90	n/a	n/a	n/a	n/a	unitless
	32	Design Capture Volume After Dispersion Techniques	259	114	460	168	229	633	0	0	0	0	cubic-feet
Tree & Barrel Adjustments	33	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.00	0.00	0.00	0.00	unitless
	36	Final Effective Tributary Area	5,278	2,322	9,358	3,416	4,648	12,883	0	0	0	0	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	0	0	0	0	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	259	114	460	168	229	633	0	0	0	0	cubic-feet
No Warning Messages													

Automated Worksheet B.2: Retention Requirements (V2.0)

Category	#	Description	<i>i</i>	<i>ii</i>	<i>iii</i>	<i>iv</i>	<i>v</i>	<i>vi</i>	<i>vii</i>	<i>viii</i>	<i>ix</i>	<i>x</i>	Units
Basic Analysis	1	Drainage Basin ID or Name	E11	E12	E13	E14	E15	E16	-	-	-	-	unitless
	2	85th Percentile Rainfall Depth	0.59	0.59	0.59	0.59	0.59	0.59	-	-	-	-	inches
	3	Predominant NRCS Soil Type Within BMP Location	A	A	A	A	A	A					unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted					unitless
	5	Nature of Restriction	Other	Other	Other	Other	Other	Other					unitless
	6	Do Minimum Retention Requirements Apply to this Project?	No	No	No	No	No	No					yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No	No	No	No	No	No					yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	Yes	Yes	Yes	Yes	Yes	Yes					yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer	0.200	0.200	0.200	0.200	0.200	0.200					in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	percentage
	12	Fraction of DCV Requiring Retention	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	ratio
	13	Required Retention Volume	0	0	0	0	0	0	-	-	-	-	cubic-feet

Attention!
 -Retention requirements have been omitted in these calculations. Such an omission is only be acceptable for Green Street projects or projects that submit supplemental calculations demonstrating retention requirements are satisfied at the project-level.

Automated Worksheet B.3: BMP Performance (V2.0)

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units
BMP Inputs	1	Drainage Basin ID or Name	E11	E12	E13	E14	E15	E16	-	-	-	-	sq-ft
	2	Design Infiltration Rate Recommended	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	in/hr
	3	Design Capture Volume Tributary to BMP	259	114	460	168	229	633	-	-	-	-	cubic-feet
	4	Is BMP Vegetated or Unvegetated?	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	-	-	-	-	unitless
	5	Is BMP Impermeably Lined or Unlined?	Lined	Lined	Lined	Lined	Lined	Lined	-	-	-	-	unitless
	6	Does BMP Have an Underdrain?	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	Underdrain	-	-	-	-	unitless
	7	Does BMP Utilize Standard or Specialized Media?	Standard	Standard	Standard	Standard	Standard	Standard	-	-	-	-	unitless
	8	Provided Surface Area	160	70	290	110	140	390	-	-	-	-	sq-ft
	9	Provided Surface Ponding Depth	6	6	6	6	6	6	-	-	-	-	inches
	10	Provided Soil Media Thickness	24	30	24	24	24	24	-	-	-	-	inches
	11	Provided Gravel Thickness (Total Thickness)	12	12	12	12	12	12	-	-	-	-	inches
	12	Underdrain Offset	3	3	3	3	3	3	-	-	-	-	inches
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	6.00	8.00	6.00	6.00	6.00	6.00	-	-	-	-	inches
	14	Specialized Soil Media Filtration Rate							-	-	-	-	in/hr
	15	Specialized Soil Media Pore Space for Retention							-	-	-	-	unitless
	16	Specialized Soil Media Pore Space for Biofiltration							-	-	-	-	unitless
	17	Specialized Gravel Media Pore Space							-	-	-	-	unitless
Retention Calculations	18	Volume Infiltrated Over 6 Hour Storm	0	0	0	0	0	0	0	0	0	0	cubic-feet
	19	Ponding Pore Space Available for Retention	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	unitless
	20	Soil Media Pore Space Available for Retention	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	unitless
	21	Gravel Pore Space Available for Retention (Above Underdrain)	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.40	0.40	0.40	unitless
	22	Gravel Pore Space Available for Retention (Below Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	23	Effective Retention Depth	2.40	2.70	2.40	2.40	2.40	2.40	0.00	0.00	0.00	0.00	inches
	24	Fraction of DCV Retained (Independent of Drawdown Time)	0.12	0.14	0.13	0.13	0.12	0.12	0.00	0.00	0.00	0.00	ratio
	25	Calculated Retention Storage Drawdown Time	120	120	120	120	120	120	0	0	0	0	hours
	26	Efficacy of Retention Processes	0.14	0.16	0.15	0.15	0.14	0.14	0.00	0.00	0.00	0.00	ratio
	27	Volume Retained by BMP (Considering Drawdown Time)	36	18	69	25	32	89	0	0	0	0	cubic-feet
Biofiltration Calculations	28	Design Capture Volume Remaining for Biofiltration	223	96	391	143	197	544	0	0	0	0	cubic-feet
	29	Max Hydromod Flow Rate through Underdrain	1.6375	3.1067	1.6375	1.6375	1.6375	1.6375	0.0000	0.0000	0.0000	0.0000	cfs
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	442.13	1,917.29	243.93	643.10	505.29	181.39	0.00	0.00	0.00	0.00	in/hr
	31	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr
	32	Soil Media Filtration Rate to be used for Sizing	5.00	5.00	5.00	5.00	5.00	5.00	0.00	0.00	0.00	0.00	in/hr
	33	Depth Biofiltered Over 6 Hour Storm	30.00	30.00	30.00	30.00	30.00	30.00	0.00	0.00	0.00	0.00	inches
	34	Ponding Pore Space Available for Biofiltration	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	unitless
	35	Soil Media Pore Space Available for Biofiltration	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	unitless
	36	Gravel Pore Space Available for Biofiltration (Above Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	37	Effective Depth of Biofiltration Storage	14.40	15.60	14.40	14.40	14.40	14.40	0.00	0.00	0.00	0.00	inches
Result	38	Drawdown Time for Surface Ponding	1	1	1	1	1	1	0	0	0	0	hours
	39	Drawdown Time for Effective Biofiltration Depth	3	3	3	3	3	3	0	0	0	0	hours
	40	Total Depth Biofiltered	44.40	45.60	44.40	44.40	44.40	44.40	0.00	0.00	0.00	0.00	inches
	41	Option 1 - Biofilter 1.50 DCV: Target Volume	334	143	586	214	295	816	0	0	0	0	cubic-feet
	42	Option 1 - Provided Biofiltration Volume	334	143	586	214	295	816	0	0	0	0	cubic-feet
	43	Option 2 - Store 0.75 DCV: Target Volume	167	72	293	107	148	408	0	0	0	0	cubic-feet
	44	Option 2 - Provided Storage Volume	167	72	293	107	148	408	0	0	0	0	cubic-feet
	45	Portion of Biofiltration Performance Standard Satisfied	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	ratio
	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-	-	yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	ratio
48	Deficit of Effectively Treated Stormwater	0	0	0	0	0	0	n/a	n/a	n/a	n/a	cubic-feet	

No Warning Messages

ATTACHMENT 1d

FORM I-7: HARVEST AND USE FEASIBILITY SCREENING CHECKLIST

Harvest and Use Feasibility Checklist		Form I-7
<p>1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season?</p> <p><input type="checkbox"/> Toilet and urinal flushing</p> <p><input type="checkbox"/> Landscape irrigation</p> <p><input type="checkbox"/> Other: _____</p> <p>Infeasibility assessment is based on automated Worksheet B.2. Line 7. No habitable structures greater than 9 stories proposed.</p>		
<p>2. If there is a demand; estimate the anticipated average wet season demand over a period of 36 hours. Guidance for planning level demand calculations for toilet/urinal flushing and landscape irrigation is provided in Section B.3.2.</p> <p>We anticipate no demand since a new recycled water line in Tremont would provide long term irrigation service for the project's life cycle.</p>		
<p>3. Calculate the DCV using worksheet B-2.1.</p> <p>DCV = _____ (cubic feet)</p>		
<p>3a. Is the 36 hour demand greater than or equal to the DCV?</p> <p><input type="checkbox"/> Yes / <input type="checkbox"/> No ⇒</p> <p align="center">↓</p>	<p>3b. Is the 36 hour demand greater than 0.25DCV but less than the full DCV?</p> <p><input type="checkbox"/> Yes / <input type="checkbox"/> No ⇒</p> <p align="center">↓</p>	<p>3c. Is the 36 hour demand less than 0.25DCV?</p> <p><input type="checkbox"/> Yes</p> <p align="center">↓</p>
<p>Harvest and use appears to be feasible. Conduct more detailed evaluation and sizing calculations to confirm that DCV can be used at an adequate rate to meet drawdown criteria.</p>	<p>Harvest and use may be feasible. Conduct more detailed evaluation and sizing calculations to determine feasibility. Harvest and use may only be able to be used for a portion of the site, or (optionally) the storage may need to be upsized to meet long term capture targets while draining in longer than 36 hours.</p>	<p>Harvest and use is considered to be infeasible.</p>



Is harvest and use feasible based on further evaluation?

Yes, refer to Appendix E to select and size harvest and use BMPs.

No, select alternate BMPs.



ATTACHMENT 1e

**FORM I-8: CATEGORIZATION OF INFILTRATION FEASIBILITY CONDITION
(NOTE FORM 4 PROVIDED IN LIEU OF FORM I-8)**





INFILTRATION RESTRICTIONS

Form 4 from the BMP Design Manual is intended to present the mandatory and optional criteria when considering stormwater infiltration feasibility at a site. NOVA has selected *Restricted* on this form due to the geologic conditions and proximity to the coastal bluff. Form 4 is presented below. Further discussion is presented following the form.

Infiltration Restrictions		Form 4	
Retention is required at the project site to the maximum extent practicable. Complete this form to summarize applicable infiltration restrictions. Supporting documentation must be provided in the Attachments.			
Restriction Element		Applicable?	
Mandatory Considerations	BMP is within 100 feet of contaminated soils	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within 100 feet of industrial activities lacking source control	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within 100 feet of well/groundwater basin	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within 50 feet of septic tanks/leach fields	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within 10 feet of structures/tanks/walls	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within 10 feet of sewer utilities	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within 10 feet of groundwater table	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within hydric soils	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within highly liquefiable soils and has connectivity to structures	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within 1.5 times the height of adjacent steep slopes ($\geq 25\%$)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	City staff has assigned "Restricted" Infiltration Category	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Optional Considerations	BMP is within predominantly Type D soil	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within 10 feet of property line	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within fill depths of ≥ 5 feet (existing or proposed)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within 10 feet of underground utilities	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within 250 feet of ephemeral stream	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	Other (provide detailed geotechnical support in Attachment 6)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Result	Unrestricted – No restriction elements are applicable	<input type="checkbox"/>	
	Restricted – One or more restriction elements are applicable	<input checked="" type="checkbox"/>	

* Note BMP 2 is within fill depths of ≥ 5 feet. Therefore the "BMP is within fill depths ≥ 5 feet" consideration is applicable.

ATTACHMENT 1f
POLLUTANT CONTROL BMP DESIGN WORKSHEETS/CALCULATIONS

SEE ATTACHMENT 1C FOR WORKSHEETS AND WATER QUALITY CALCULATIONS.



ATTACHMENT 2
BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

AS SHOWN IN FORM I-1 OF THIS REPORT, THE PROJECT IS NOT REQUIRED TO PROVIDE HYDROMODIFICATION CONTROL MEASURES SINCE ALL OF THE THREE TRIBUTARIES OF THE PROJECT DRAIN TO EXISTING FACILITIES THAT ARE HARDLINED TO THE ULTIMATE DISCHARGE POINT IN THE PACIFIC OCEAN.



ATTACHMENT 3
STRUCTURAL BMP MAINTENANCE INFORMATION



Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 3a	Structural BMP Maintenance Thresholds and Actions (Required)	<input checked="" type="checkbox"/> Included See Structural BMP Maintenance Information Checklist.
Attachment 3b	Draft Maintenance Agreement (when applicable)	<input type="checkbox"/> Included <input checked="" type="checkbox"/> Not Applicable



Use this checklist to ensure the required information has been included in the Structural BMP Maintenance Information Attachment:

Preliminary Design / Planning / CEQA level submittal:

- Attachment 3a must identify:
 - Typical maintenance indicators and actions for proposed structural BMP(s) based on Section 7.7 of the BMP Design Manual
- Attachment 3b is not required for preliminary design / planning / CEQA level submittal.

Final Design level submittal:

Attachment 3a must identify:

- Specific maintenance indicators and actions for proposed structural BMP(s). This shall be based on Section 7.7 of the BMP Design Manual and enhanced to reflect actual proposed components of the structural BMP(s)
- How to access the structural BMP(s) to inspect and perform maintenance
- Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- Recommended equipment to perform maintenance
- When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management

Attachment 3b: For private entity operation and maintenance, Attachment 3b shall include a draft maintenance agreement in the local jurisdiction's standard format (PDP applicant to contact the City Engineer to obtain the current maintenance agreement forms).



E.2 SD-1 Street Trees



Street Trees (Source: County of San Diego LID Manual – EOA, Inc.)

MS4 Permit Category

Site Design

Manual Category

Site Design

Applicable Performance Standard

Site Design

Primary Benefits

Volume Reduction

Description

Trees planted to intercept rainfall and runoff can be used as storm water management measures that provide additional benefits beyond those typically associated with trees, including energy conservation, air quality improvement, and aesthetic enhancement. Typical storm water management benefits associated with trees include:

- **Interception of rainfall** – tree surfaces (roots, foliage, bark, and branches) intercept, evaporate, store, or convey precipitation to the soil before it reaches surrounding impervious surfaces
- **Reduced erosion** – trees protect denuded area by intercepting or reducing the velocity of rain drops as they fall through the tree canopy
- **Increased infiltration** – soil conditions created by roots and fallen leaves promote infiltration
- **Treatment of storm water** – trees provide treatment through uptake of nutrients and other storm water pollutants (phytoremediation) and support of other biological processes that break down pollutants

Typical street tree system components include:

- Trees of the appropriate species for site conditions and constraints
- Available growing space based on tree species, soil type, water availability, surrounding land uses, and project goals

- Optional suspended pavement design to provide structural support for adjacent pavement without requiring compaction of underlying layers
- Optional root barrier devices as needed; a root barrier is a device installed in the ground, between a tree and the sidewalk, intended to guide roots down and away from the sidewalk in order to prevent sidewalk lifting from tree roots.
- Optional tree grates; to be considered to maximize available space for pedestrian circulation and to protect tree roots from compaction related to pedestrian circulation; tree grates are typically made up of porous material that will allow the runoff to soak through.
- Optional shallow surface depression for ponding of excess runoff
- Optional planter box drain

Design Adaptations for Project Goals

Site design BMP to provide incidental treatment. Street trees primarily functions as site design BMPs for incidental treatment. Benefits from street trees are accounted for by adjustment factors presented in Appendix B.2. This credit can apply to non-street trees as well (that meet the same criteria). Trees as a site design BMP are only credited up to 0.25 times the DCV from the project footprint (with a maximum single tree credit volume of 400 ft³).

Storm water pollutant control BMP to provide treatment. Applicants are allowed to design trees as a pollutant control BMP and obtain credit greater than 0.25 times the DCV from the project footprint (or a credit greater than 400 ft³ from a single tree). For this option to be approved by the City Engineer, applicant is required to do infiltration feasibility screening (Appendix C and D) and provide calculations supporting the amount of credit claimed from implementing trees within the project footprint. The City Engineer has the discretion to request additional analysis before approving credits greater than 0.25 times the DCV from the project footprint (or a credit greater than 400 ft³ from a single tree).

Design Criteria and Considerations

Street Trees must meet the following design criteria and considerations. Deviations from the below criteria may be approved at the discretion of the City Engineer if it is determined to be appropriate:

<i>Siting and Design</i>	<i>Intent/Rationale</i>
<input type="checkbox"/> Tree species is appropriately chosen for the development (private or public). For public rights-of-ways, City planning guidelines and zoning provisions for the permissible species and placement of trees are consulted. A list of trees appropriate for site design that can be	Proper tree placement and species selection minimizes problems such as pavement damage by surface roots and poor growth.

<i>Siting and Design</i>	<i>Intent/Rationale</i>															
<p>used by all county municipalities are provided in Appendix E.20</p>																
<p>Location of trees planted along public streets follows City requirements and guidelines. Vehicle and pedestrian line of sight are considered in tree selection and placement.</p> <p>Unless exemption is granted by the City Engineer the following minimum tree separation distance is followed</p>																
<input type="checkbox"/>	<table border="1"> <thead> <tr> <th data-bbox="293 661 680 793">Improvement</th> <th data-bbox="680 661 857 793">Minimum distance to Street Tree</th> </tr> </thead> <tbody> <tr> <td data-bbox="293 793 680 846">Traffic Signal, Stop sign</td> <td data-bbox="680 793 857 846">20 feet</td> </tr> <tr> <td data-bbox="293 846 680 940">Underground Utility lines (except sewer)</td> <td data-bbox="680 846 857 940">5 feet</td> </tr> <tr> <td data-bbox="293 940 680 993">Sewer Lines</td> <td data-bbox="680 940 857 993">10 feet</td> </tr> <tr> <td data-bbox="293 993 680 1125">Above ground utility structures (Transformers, Hydrants, Utility poles, etc.)</td> <td data-bbox="680 993 857 1125">10 feet</td> </tr> <tr> <td data-bbox="293 1125 680 1178">Driveways</td> <td data-bbox="680 1125 857 1178">10 feet</td> </tr> <tr> <td data-bbox="293 1178 680 1274">Intersections (intersecting curb lines of two streets)</td> <td data-bbox="680 1178 857 1274">25 feet</td> </tr> </tbody> </table>	Improvement	Minimum distance to Street Tree	Traffic Signal, Stop sign	20 feet	Underground Utility lines (except sewer)	5 feet	Sewer Lines	10 feet	Above ground utility structures (Transformers, Hydrants, Utility poles, etc.)	10 feet	Driveways	10 feet	Intersections (intersecting curb lines of two streets)	25 feet	<p>Roadway safety for both vehicular and pedestrian traffic is a key consideration for placement along public streets.</p>
Improvement	Minimum distance to Street Tree															
Traffic Signal, Stop sign	20 feet															
Underground Utility lines (except sewer)	5 feet															
Sewer Lines	10 feet															
Above ground utility structures (Transformers, Hydrants, Utility poles, etc.)	10 feet															
Driveways	10 feet															
Intersections (intersecting curb lines of two streets)	25 feet															
<input type="checkbox"/>	<p>Underground utilities and overhead wires are considered in the design and avoided or circumvented. Underground utilities are routed around or through the planter in suspended pavement applications. All underground utilities are protected from water and root penetration.</p>	<p>Tree growth can damage utilities and overhead wires resulting in service interruptions. Protecting utilities routed through the planter prevents damage and service interruptions.</p>														

<i>Siting and Design</i>	<i>Intent/Rationale</i>
<p><input type="checkbox"/> Suspended pavement design was developed where appropriate to minimize soil compaction and improve infiltration and filtration capabilities.</p> <p>Suspended pavement was constructed with an approved structural cell.</p>	<p>Suspended pavement designs provide structural support without compaction of the underlying layers, thereby promoting tree growth.</p> <p>Recommended structural cells include poured in place concrete columns, Silva Cells manufactured by Deeproot Green Infrastructures and Stratacell and Stratavault systems manufactured by Citygreen Systems.</p>
<p><input type="checkbox"/> A minimum soil volume of 2 cubic feet per square foot of canopy projection volume is provided for each tree. Canopy projection area is the ground area beneath the tree, measured at the drip line.</p>	<p>The minimum soil volume ensures that there is adequate storage volume to allow for unrestricted evapotranspiration.</p> <p>A lower amount of soil volume may be allowed at the discretion of the City Engineer if certified by a landscape architect or agronomist. The retention credit from the tree is directly proportional to the soil volume provided for the tree.</p>
<p><input type="checkbox"/> DCV from the tributary area draining to the tree is equal to or greater than the tree credit volume</p>	<p>The minimum tributary area ensures that the tree receives enough runoff to fully utilize the infiltration and evapotranspiration potential provided. In cases where the minimum tributary area is not provided, the tree credit volume must be reduced proportionately to the actual tributary area.</p>
<p><input type="checkbox"/> Inlet opening to the tree that is at least 18 inches wide.</p> <p>A minimum 2 inch drop in grade from the inlet to the finish grade of the tree.</p>	<p>Design requirement to ensure that the runoff from the tributary area is not bypassed.</p> <p>Different inlet openings and drops in grade may be allowed at the discretion of the City Engineer if calculations are shown that the diversion flow rate (Appendix B.1.2) from the tributary area can be conveyed to the tree. In cases</p>

<i>Siting and Design</i>	<i>Intent/Rationale</i>
Grated inlets are allowed for pedestrian circulation. Grates need to be ADA compliant and have sufficient slip resistance.	where the inlet capacity is limiting the amount of runoff draining to the tree, the tree credit volume must be reduced proportionately.

Conceptual Design and Sizing Approach for Site Design

1. Determine the areas where street trees can be used in the site design to achieve incidental treatment. Street trees reduce runoff volumes from the site. Refer to Appendix B.2. Document the proposed tree locations in the SWQMP.
2. When trees are proposed as a storm water pollutant control BMP, the project proponent must submit detailed calculations for the DCV treated by trees. Document the proposed tree locations on the BMP Plan & DMA Map, and provide sizing calculations in the SWQMP Attachment following the steps in Appendix B.
3. When trees are proposed as a flow control BMP, the project proponent must submit detailed calculations for the Required Retention Volume (RRV) treated by trees. Document the proposed tree locations on the BMP Plan & DMA Map, and provide sizing calculations in the SWQMP Attachment. Tree Wells that are designed to meet flow control requirements are designated as SSD BMPs.
 - a. Determine how much volume you need. The Required Retention Volume (RRV) is the volume of rainfall that must be retained by the tree wells in the DMA to meet flow control requirements. It is calculated by multiplying the DCV by a DCV multiplier.
 - i. Determine the DCV. See Appendix B.
 - ii. Determine the DCV Multiplier. The DCV Multiplier is based on two factors: (1) The tree well soil depth and, (2) The Hydrologic Soil Group. Once you know both values, determine the DCV Multiplier using this table:
 - iii. Calculate the Required Retention Volume (DCV x DCV Multiplier). Calculate the RRV by multiplying the DCV by the DCV Multiplier. This is the volume of runoff that must be offset by the Tree Well Credit Volume. Repeat this process for each DMA.

Minimum Tree Well Soil Depth (inches)	Hydrologic Soil Group				DCV Multiplier
	A	B	C	D (Default)	
30"	1.60	2.20	2.50	2.90	
36"	1.80	2.47	2.83	3.17	
42"	2.00	2.73	3.17	3.43	
48"	2.20	3.00	3.50	3.70	

DCV Multiplier Table

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Tree Well Soil Depth is the vertical distance from the top to the bottom of the soil layer in the tree well. Hydrologic Soil Group describes the native soil surrounding the tree well. Soil type affects how well water can infiltrate into the area surrounding the tree well. Group A soils provide the most infiltration and Group D the least. If your soil type is unknown, you can assume Group D. But this will result in larger DCV Multipliers, and in turn increase the size or number of tree wells needed.

Alternative Proposals: You can also propose RRV values or use methods and assumptions different than those described here. Proposals must be based on SWMM modeling or other methods acceptable to the County.

- b. Determine how much volume you have. The Tree Well Credit Volume is the volume of runoff retention in cubic feet per tree (ft³/tree) to be provided by each tree well (or group) in the DMA. Together retain a volume that is equal to or greater than the RRV for the DMA.

The volume credited for each tree well is based on the mature canopy diameter of the tree species selected. Any species listed below can be used in a tree well so long as it meets all other applicable restrictions and requirements for the project area. Native and drought tolerant species are required where feasible.

- c. Determine if you have enough volume. Compare your total Tree Well Credit Volume from Step 2 to the RRV you calculated in Step 1. Once your Credit Volume is equal to or greater than your RRV, this requirement is satisfied. If your Credit Volume is initially too low, adjust your design either to (1) increase it with more or bigger trees, or (2) decrease the RRV through DCV reductions.

Tree wells will normally be placed at the discharge point of the DMA, either individually or in groups. If some of them will retain runoff from different areas in the DMA, RRV and DCV calculations must be specific to each subarea.

If an underdrain is proposed for the Tree Well, the sizing factors shown in the DCV Multiplier Table cannot be used, and instead continuous simulation modeling should be performed. This would allow to obtain credit for soil volume underneath the underdrain.

E.12 BF-1 Biofiltration



Location: 43rd Street and Logan Avenue, San Diego, California

Description

Biofiltration (Bioretention with underdrain) facilities are vegetated surface water systems that filter water through vegetation, and soil or engineered media prior to discharge via underdrain or overflow to the downstream conveyance system. Bioretention with underdrain facilities are commonly incorporated into the site within parking lot landscaping, along roadsides, and in open spaces. Because these types of facilities have limited or no infiltration, they are typically designed to provide enough hydraulic head to move flows through the underdrain connection to the storm drain system. Treatment is achieved through filtration, sedimentation, sorption, biochemical processes and plant uptake.

Typical bioretention with underdrain components include:

- Inflow distribution mechanisms (e.g, perimeter flow spreader or filter strips)
- Energy dissipation mechanism for concentrated inflows (e.g., splash blocks or riprap)
- Shallow surface ponding for captured flows
- Side slope and basin bottom vegetation selected based on expected climate and ponding depth
- Non-floating mulch layer (Optional)
- Media layer (planting mix or engineered media) capable of supporting vegetation growth
- Filter course layer consisting of aggregate to prevent the migration of fines into uncompacted native soils or the aggregate storage layer
- Aggregate storage layer with underdrain(s)
- Impermeable liner or uncompacted native soils at the bottom of the facility
- Overflow structure

MS4 Permit Category

Biofiltration

Manual Category

Biofiltration

Applicable Performance Standard

Pollutant Control

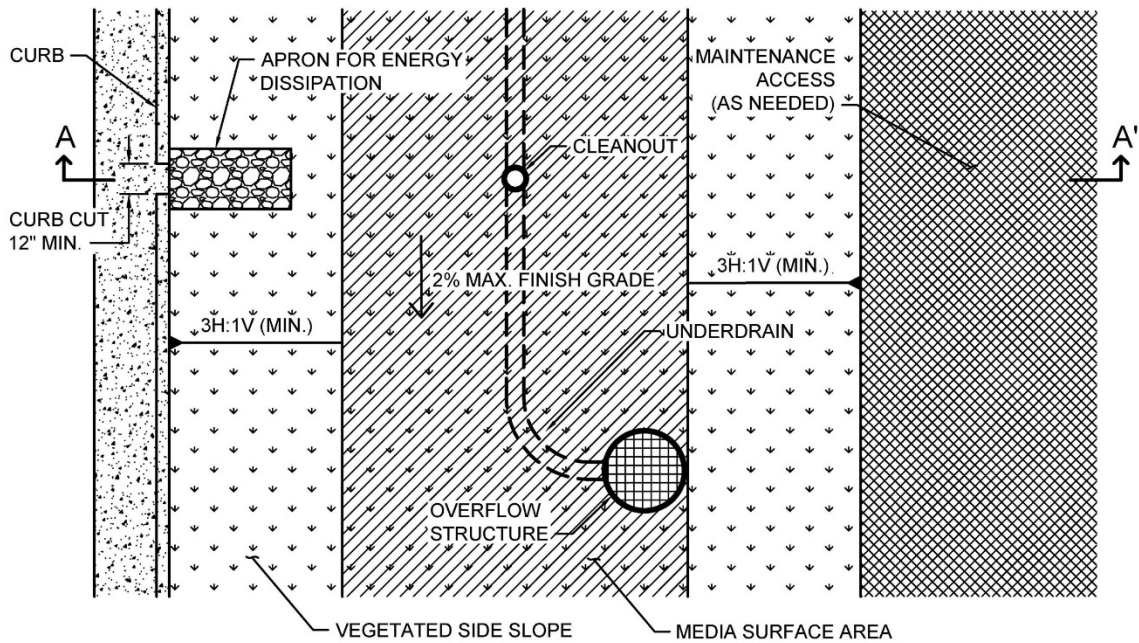
Flow Control

Primary Benefits

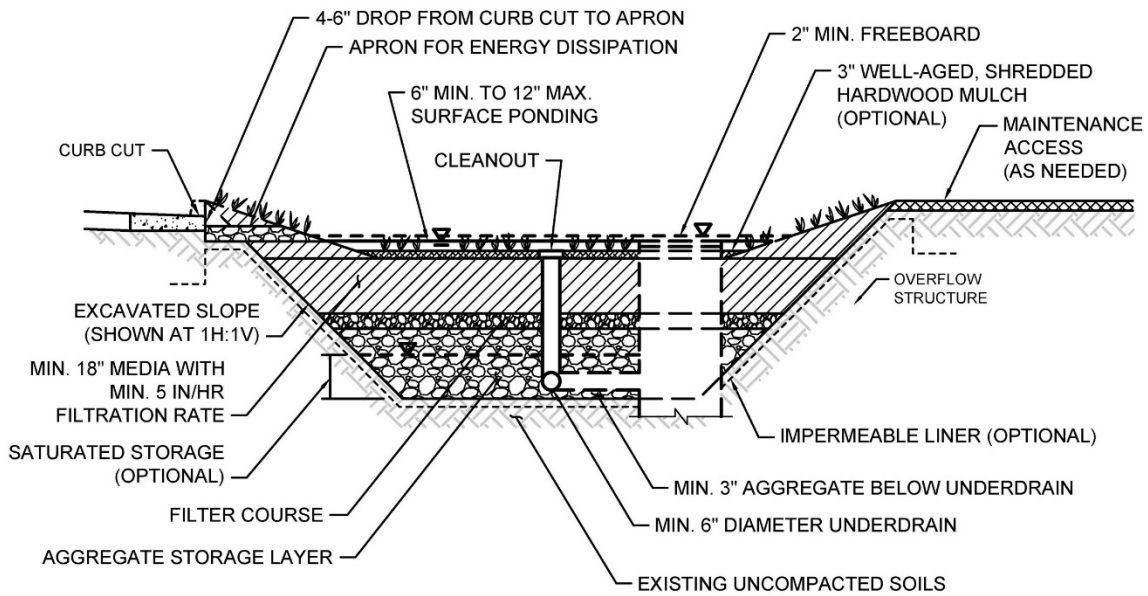
Treatment

Volume Reduction (Incidental)

Peak Flow Attenuation (Optional)



PLAN
NOT TO SCALE



SECTION A-A'
NOT TO SCALE

Typical plan and Section view of a Biofiltration BMP

Design Adaptations for Project Goals

Biofiltration Treatment BMP for storm water pollutant control. The system is lined or un-lined to provide incidental infiltration, and an underdrain is provided at the bottom to carry away filtered runoff. This configuration is considered to provide biofiltration treatment via flow through the media layer. Storage provided above the underdrain within surface ponding, media, and aggregate storage is considered included in the biofiltration treatment volume. Saturated storage within the aggregate storage layer can be added to this design by raising the underdrain above the bottom of the aggregate storage layer or via an internal weir structure designed to maintain a specific water level elevation.

Integrated storm water flow control and pollutant control configuration. The system can be designed to provide flow rate and duration control by primarily providing increased surface ponding and/or having a deeper aggregate storage layer above the underdrain. This will allow for significant detention storage, which can be controlled via inclusion of an outlet structure at the downstream end of the underdrain.

Design Criteria and Considerations

Bioretention with underdrain must meet the following design criteria. Deviations from the below criteria may be approved at the discretion of the City Engineer if it is determined to be appropriate:

<i>Siting and Design</i>	<i>Intent/Rationale</i>
<input type="checkbox"/> Placement observes geotechnical recommendations regarding potential hazards (e.g., slope stability, landslides, liquefaction zones) and setbacks (e.g., slopes, foundations, utilities).	Must not negatively impact existing site geotechnical concerns.
<input type="checkbox"/> An impermeable liner or other hydraulic restriction layer is included if site constraints indicate that infiltration or lateral flows should not be allowed.	Lining prevents storm water from impacting groundwater and/or sensitive environmental or geotechnical features. Incidental infiltration, when allowable, can aid in pollutant removal and groundwater recharge.
<input type="checkbox"/> Contributing tributary area shall be ≤ 5 acres (≤ 1 acre preferred).	Bigger BMPs require additional design features for proper performance. Contributing tributary area greater than 5 acres may be allowed at the discretion of the City Engineer if the following conditions are met: 1) incorporate design features (e.g. flow spreaders) to minimizing short circuiting of flows in

<i>Siting and Design</i>	<i>Intent/Rationale</i>
	the BMP and 2) incorporate additional design features requested by the City Engineer for proper performance of the regional BMP.
<input type="checkbox"/> Finish grade of the facility is $\leq 2\%$.	Flatter surfaces reduce erosion and channelization within the facility.
<i>Surface Ponding</i>	
<input type="checkbox"/> Surface ponding is limited to a 24-hour drawdown time.	Surface ponding limited to 24 hours for plant health. Surface ponding drawdown time greater than 24-hours but less than 96 hours may be allowed at the discretion of the City Engineer if certified by a landscape architect or agronomist.
<input type="checkbox"/> Surface ponding depth is ≥ 6 and ≤ 12 inches.	Surface ponding capacity lowers subsurface storage requirements. Deep surface ponding raises safety concerns. Surface ponding depth greater than 12 inches (for additional pollutant control or surface outlet structures or flow-control orifices) may be allowed at the discretion of the City Engineer if the following conditions are met: 1) surface ponding depth drawdown time is less than 24 hours; and 2) safety issues and fencing requirements are considered (typically ponding greater than 18" will require a fence and/or flatter side slopes) and 3) potential for elevated clogging risk is considered.
<input type="checkbox"/> A minimum of 12 inches of freeboard is provided.	Freeboard provides room for head over overflow structures and minimizes risk of uncontrolled surface discharge.
<input type="checkbox"/> Side slopes are stabilized with vegetation and are = 3H:1V or shallower.	Gentler side slopes are safer, less prone to erosion, able to establish vegetation more quickly and easier to maintain.
<i>Vegetation</i>	

<i>Siting and Design</i>	<i>Intent/Rationale</i>
<input type="checkbox"/> Plantings are suitable for the climate and expected ponding depth. A plant list to aid in selection can be found in Appendix E.20.	Plants suited to the climate and ponding depth are more likely to survive.
<input type="checkbox"/> An irrigation system with a connection to water supply should be provided as needed.	Seasonal irrigation might be needed to keep plants healthy.
<i>Mulch</i>	
<input type="checkbox"/> A minimum of 3 inches of well-aged, shredded hardwood mulch that has been stockpiled or stored for at least 12 months is provided.	Mulch will suppress weeds and maintain moisture for plant growth. Aging mulch kills pathogens and weed seeds and allows the beneficial microbes to multiply.
<i>Media Layer</i>	
<input type="checkbox"/> Media maintains a minimum filtration rate of 5 in/hr over lifetime of facility. An initial filtration rate of 8 to 12 in/hr is recommended to allow for clogging over time; the initial filtration rate should not exceed 12 inches per hour.	A filtration rate of at least 5 inches per hour allows soil to drain between events. The initial rate should be higher than long term target rate to account for clogging over time. However an excessively high initial rate can have a negative impact on treatment performance, therefore an upper limit is needed.
<input type="checkbox"/> Media is a minimum 18 inches deep, meeting either of these two media specifications: City of San Diego Storm Water Standards Appendix F.3 (May 2021, unless superseded by more recent edition) or County of San Diego BMP Design Manual: Appendix F.2 Biofiltration Soil Media Composition, Testing,(September 2020, unless superseded by more recent edition). Alternatively, for proprietary designs and custom media mixes not meeting the media specifications contained in the 2021 City of San Diego Storm Water Standards or County LID Manual, the media meets the pollutant treatment performance criteria in Section F.1.	A deep media layer provides additional filtration and supports plants with deeper roots. Standard specifications shall be followed. For non-standard or proprietary designs, compliance with F.1 ensures that adequate treatment performance will be provided.

<i>Siting and Design</i>	<i>Intent/Rationale</i>
<input type="checkbox"/> Media surface area is 3% of contributing area times adjusted runoff factor or greater. Unless demonstrated that the BMP surface area can be smaller than 3%.	<p>Greater surface area to tributary area ratios: a) maximizes volume retention as required by the MS4 Permit and b) decrease loading rates per square foot and therefore increase longevity.</p> <p>Adjusted runoff factor is to account for site design BMPs implemented upstream of the BMP (such as rain barrels, impervious area dispersion, etc.). Refer to Appendix B.2 guidance.</p> <p>Use Worksheet B.5-1 Line 26 to estimate the minimum surface area required per this criteria.</p>
<input type="checkbox"/> Where receiving waters are impaired or have a TMDL for nutrients, the system is designed with nutrient sensitive media design (see fact sheet BF-2).	<p>Potential for pollutant export is partly a function of media composition; media design must minimize potential for export of nutrients, particularly where receiving waters are impaired for nutrients.</p>
<i>Filter Course Layer</i>	
<input type="checkbox"/> A filter course is used to prevent migration of fines through layers of the facility. Filter fabric is not used.	<p>Migration of media can cause clogging of the aggregate storage layer void spaces or subgrade. Filter fabric is more likely to clog.</p>
<input type="checkbox"/> Filter course is washed and free of fines.	<p>Washing aggregate will help eliminate fines that could clog the facility and impede infiltration.</p>
<input type="checkbox"/> Filter course calculations assessing suitability for particle migration prevention have been completed.	<p>Gradation relationship between layers can evaluate factors (e.g., bridging, permeability, and uniformity) to determine if particle sizing is appropriate or if an intermediate layer is needed.</p>
<i>Aggregate Storage Layer</i>	
<input type="checkbox"/> Class 2 Permeable per Caltrans specification 68-1.025 is recommended for the storage layer. Washed, open-graded crushed rock may be used, however a 4-6 inch washed pea gravel	<p>Washing aggregate will help eliminate fines that could clog the aggregate storage layer void spaces or subgrade.</p>

<i>Siting and Design</i>	<i>Intent/Rationale</i>
filter course layer at the top of the crushed rock is required.	
☐ The depth of aggregate provided (12-inch typical) and storage layer configuration is adequate for providing conveyance for underdrain flows to the outlet structure.	Proper storage layer configuration and underdrain placement will minimize facility drawdown time.
<i>Inflow, Underdrain, and Outflow Structures</i>	
☐ Inflow, underdrains and outflow structures are accessible for inspection and maintenance.	Maintenance will prevent clogging and ensure proper operation of the flow control structures.
☐ Inflow velocities are limited to 3 ft/s or less or use energy dissipation methods. (e.g., riprap, level spreader) for concentrated inflows.	High inflow velocities can cause erosion, scour and/or channeling.
☐ Curb cut inlets are at least 12 inches wide, have a 4-6 inch reveal (drop) and an apron and energy dissipation as needed.	Inlets must not restrict flow and apron prevents blockage from vegetation as it grows in. Energy dissipation prevents erosion.
☐ Underdrain outlet elevation should be a minimum of 3 inches above the bottom elevation of the aggregate storage layer.	A minimal separation from subgrade or the liner lessens the risk of fines entering the underdrain and can improve hydraulic performance by allowing perforations to remain unblocked.
☐ Minimum underdrain diameter is 6 inches.	Smaller diameter underdrains are prone to clogging.
☐ Underdrains are made of slotted, PVC pipe conforming to ASTM D 3034 or equivalent or corrugated, HDPE pipe conforming to AASHTO 252M or equivalent.	Slotted underdrains provide greater intake capacity, clog resistant drainage, and reduced entrance velocity into the pipe, thereby reducing the chances of solids migration.
☐ An underdrain cleanout with a minimum 6-inch diameter and lockable cap is placed every 250 to 300 feet as required based on underdrain length.	Properly spaced cleanouts will facilitate underdrain maintenance.
☐ Overflow is safely conveyed to a downstream storm drain system or discharge point Size overflow structure to pass 100-year peak flow	Planning for overflow lessens the risk of property damage due to flooding.

<i>Siting and Design</i>	<i>Intent/Rationale</i>
for on-line infiltration basins and water quality peak flow for off-line basins.	

Conceptual Design and Sizing Approach for Storm Water Pollutant Control Only

To design bioretention with underdrain for storm water pollutant control only (no flow control required), the following steps should be taken:

1. Verify that siting and design criteria have been met, including placement requirements, contributing tributary area, maximum side and finish grade slopes, and the recommended media surface area tributary ratio.
2. Calculate the DCV per Appendix B based on expected site design runoff for tributary areas.
3. Use the sizing worksheet presented in Appendix B.5 to size biofiltration BMPs.

Conceptual Design and Sizing Approach when Storm Water Flow Control is Applicable

Control of flow rates and/or durations will typically require significant surface ponding and/or aggregate storage volumes, and therefore the following steps should be taken prior to determination of storm water pollutant control design. Pre-development and allowable post-project flow rates and durations should be determined as discussed in Chapter 6 of the manual.

1. Verify that siting and design criteria have been met, including placement requirements, contributing tributary area, maximum side and finish grade slopes, and the recommended media surface area tributary ratio.
2. Iteratively determine the facility footprint area, surface ponding and/or aggregate storage layer depth required to provide detention storage to reduce flow rates and durations to allowable limits. Flow rates and durations can be controlled from detention storage by altering outlet structure orifice size(s) and/or water control levels. Multi-level orifices can be used within an outlet structure to control the full range of flows.
3. If bioretention with underdrain cannot fully provide the flow rate and duration control required by this manual, an upstream or downstream structure with significant storage volume such as an underground vault can be used to provide remaining controls.
4. After bioretention with underdrain has been designed to meet flow control requirements, calculations must be completed to verify if storm water pollutant control requirements to treat the DCV have been met.

E.13 BF-2 Nutrient Sensitive Media Design

Some studies of bioretention with underdrains have observed export of nutrients, particularly inorganic nitrogen (nitrate and nitrite) and dissolved phosphorus. This has been observed to be a short-lived phenomenon in some studies or a long term issue in some studies. The composition of the soil media, including the chemistry of individual elements is believed to be an important factor in the potential for nutrient export. Organic amendments, often compost, have been identified as the most likely source of nutrient export. The quality and stability of organic amendments can vary widely.

The biofiltration media specifications contained in the County of San Diego BMP Design Manual: Appendix F.2 Biofiltration Soil Media Composition, Testing, (September 2020, unless superseded by more recent edition) and the City of San Diego Low Impact Development Design Manual (page B-18) (July 2011, unless superseded by more recent edition) were developed with consideration of the potential for nutrient export. These specifications include criteria for individual component characteristics and quality in order to control the overall quality of the blended mixes. As of the publication of this manual, the September 2020 County of San Diego specifications provide more detail regarding mix design and quality control.

The City and County specifications noted above were developed for general purposes to meet permeability and treatment goals. In cases where the BMP discharges to receiving waters with nutrient impairments or nutrient TMDLs, the biofiltration media should be designed with the specific goal of minimizing the potential for export of nutrients from the media. Therefore, in addition to adhering to the City or County media specifications, the following guidelines should be followed:

1. Select plant palette to minimize plant nutrient needs

A landscape architect or agronomist should be consulted to select a plant palette that minimizes nutrient needs. Utilizing plants with low nutrient needs results in less need to enrich the biofiltration soil mix. If nutrient quantity is then tailored to plants with lower nutrient needs, these plants will generally have less competition from weeds, which typically need higher nutrient content. The following practices are recommended to minimize nutrient needs of the plant palette:

- **Utilize native, drought-tolerant plants and grasses where possible.** Native plants generally have a broader tolerance for nutrient content, and can be longer lived in leaner/lower nutrient soils.
- **Start plants from smaller starts or seed.** Younger plants are generally more tolerant of lower nutrient levels and tend to help develop soil structure as they grow. Given the lower cost of smaller plants, the project should be able to accept a plant mortality rate that is somewhat higher than starting from larger plants and providing high organic content.

2. Minimize excess nutrients in media mix

Once the low-nutrient plant palette is established (item 1), the landscape architect and/or agronomist should be consulted to assist in the design of a biofiltration media to balance the interests of plant establishment, water retention capacity (irrigation demand), and the potential for nutrient export. The following guidelines should be followed:

- **The mix should not exceed the nutrient needs of plants.** In conventional landscape design, the nutrient needs of plants are often exceeded intentionally in order to provide a factor of safety for plant survival. This practice must be avoided in biofiltration media as excess nutrients will increase the chance of export. The mix designer should keep in mind that nutrients can be added later (through mulching, tilling of amendments into the surface), but it is not possible to remove nutrients, once added.
- **The actual nutrient content and organic content of the selected organic amendment source should be determined when specifying mix proportions.** Nutrient content (i.e., C:N ratio; plant extractable nutrients) and organic content (i.e., % organic material) are relatively inexpensive to measure via standard agronomic methods and can provide important information about mix design. If mix design relies on approximate assumption about nutrient/organic content and this is not confirmed with testing (or the results of prior representative testing), it is possible that the mix could contain much more nutrient than intended.
- **Nutrients are better retained in soils with higher cation exchange capacity.** Cation exchange capacity can be increased through selection of organic material with naturally high cation exchange capacity, such as peat or coconut coir pith, and/or selection of inorganic material with high cation exchange capacity such as some sands or engineered minerals (e.g., low P-index sands, zeolites, rhyolites, etc). Including higher cation exchange capacity materials would tend to reduce the net export of nutrients. Natural silty materials also provide cation exchange capacity; however potential impacts to permeability need to be considered.
- **Focus on soil structure as well as nutrient content.** Soil structure is loosely defined as the ability of the soil to conduct and store water and nutrients as well as the degree of aeration of the soil. Soil structure can be more important than nutrient content in plant survival and biologic health of the system. If a good soil structure can be created with very low amounts of organic amendment, plants survivability should still be provided. While soil structure generally develops with time, biofiltration media can be designed to promote earlier development of soil structure. Soil structure is enhanced by the use of amendments with high humus content (as found in well-aged organic material). In addition, soil structure can be enhanced through the use of organic material with a distribution of particle sizes (i.e., a more heterogeneous mix).
- **Consider alternatives to compost.** Compost, by nature, is a material that is continually evolving and decaying. It can be challenging to determine whether tests previously done on a given compost stock are still representative. It can also be challenging to determine how the properties of the compost will change once placed in the media bed. More stable materials

such as aged coco coir pith, peat, biochar, shredded bark, and/or other amendments should be considered.

With these considerations, it is anticipated that less than 10 percent organic amendment by volume could be used, while still balancing plant survivability and water retention. If compost is used, designers should strongly consider utilizing less than 10 percent by volume.

3. Design with partial retention and/or internal water storage

An internal water storage zone, as described in Fact Sheet PR-1 is believed to improve retention of nutrients. For lined systems, an internal water storage zone worked by providing a zone that fluctuates between aerobic and anaerobic conditions, resulting in nitrification/denitrification. In soils that will allow infiltration, a partial retention design (PR-1) allows significant volume reduction and can also promote nitrification/denitrification.

Acknowledgment: This fact sheet has been adapted from the Orange County Technical Guidance Document (May 2011). It was originally developed based on input from: Deborah Deets, City of Los Angeles Bureau of Sanitation, Drew Ready, Center for Watershed Health, Rick Fisher, ASLA, City of Los Angeles Bureau of Engineering, Dr. Garn Wallace, Wallace Laboratories, Glen Dake, GDML, and Jason Schmidt, Tree People. The guidance provided herein does not reflect the individual opinions of any individual listed above and should not be cited or otherwise attributed to those listed.

E.14 BF-3 Proprietary Biofiltration Systems

The purpose of this fact sheet is to help explain the potential role of proprietary BMPs in meeting biofiltration requirements, when full retention of the DCV is not feasible. The fact sheet does not describe design criteria like the other fact sheets in this appendix because this information varies by BMP product model.

Criteria for Use of a Proprietary BMP as a Biofiltration BMP

A proprietary BMP may be acceptable as a “biofiltration BMP” under the following conditions:

- (1) The BMP meets the minimum design criteria listed in Appendix F, including the pollutant treatment performance standard in Appendix F.1;
- (2) The BMP is designed and maintained in a manner consistent with its performance certifications (See explanation in Appendix F.2); and
- (3) The BMP is acceptable at the discretion of the City Engineer. In determining the acceptability of a BMP, the City Engineer should consider, as applicable, (a) the data submitted; (b) representativeness of the data submitted; (c) consistency of the BMP performance claims with pollutant control objectives; certainty of the BMP performance claims; (d) for projects within the public right of way and/or public projects: maintenance requirements, cost of maintenance activities, relevant previous local experience with operation and maintenance of the BMP type, ability to continue to operate the system in event that the vending company is no longer operating as a business; and (e) other relevant factors. If a proposed BMP is not accepted by the City Engineer, a written explanation/reason will be provided to the applicant.

Guidance for Sizing a Proprietary BMP as a Biofiltration BMP

Proprietary biofiltration BMPs must meet the same sizing guidance as non-proprietary BMPs. Sizing is typically based on capturing and treating 1.50 times the DCV not reliably retained. Guidance for sizing biofiltration BMPs to comply with requirements of this manual is provided in Appendix F.2.

City of Oceanside Specific Guidance and Criteria

Proprietary systems being submitted for approval must have, at a minimum, a General Use Level Designation (GULD) through the Washington Dept. of Ecology’s TAPE process or certification through The Technology Acceptance Reciprocity Partnership (TARP) to treat the project’s pollutants of concern. While a GULD or TARP certification is required for consideration of

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approval, it does not guarantee the system will be approved. Additional project specific factors such as project applicability and maintenance requirements will also be considered in the evaluation process.

Proprietary Devices claiming to remove or destroy bacteria must be registered pursuant to the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) prior to approval by the City of Oceanside.