Exhibit H1

ATTACHMENT 6

Stormwater Management Report

Myrtle Glenn Subdivision
Preliminary PUD Application to City of Florence
December 2, 2022
Attachment Revised/Resubmitted February 21, 2023

EGR & Associates, Inc.
Engineers, Geologists and Surveyors
2535B Prairie Road
Eugene, Oregon 97402
(541) 688-8322
Fax (541) 688-8087

Stormwater Management Report

Myrtle Glenn PUD

Map 18-12-22-11 Tax Lots 200, 1100, and 1200

Florence, Oregon

November 22, 2022

Revised February 1, 2023

Applicant

William Johnson Construction, Inc.
PO Box 1176
Florence, OR 97439

Engineer/Surveyor

EGR & Associates, Inc.
2535B Prairie Road
Eugene, Oregon 97402

This page intentionally left blank.

Designer's Certification and Statement

I hereby certify that this Stormwater Management Report for Myrtle Glenn PUD has been prepared by me or under my supervision and meets minimum standards of the City of Florence and normal standards of engineering practice. I hereby acknowledge and agree that the jurisdiction does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities designed by me.

11-22-2022

RENEWS: 1/1/2024

This page intentionally left blank.

Contents

List of Appendices

This page intentionally left blank.

PROJECT OVERVIEW AND DESCRIPTION

The project site is approximately 15.94 acres in size and is identified as Tax Lots 200, 1100, and 1200 on Lane County Assessor Map 18-12-22-11. The site is located north of 35th Street, west of Casa Del Mar subdivision and Oak Street, south of East Bank PUD and Florence Golf Links, and east of City of Florence public works facility and Florence Golf Links. Access is from 37th Street on the east side and 35th Street on the south side. A vicinity map is included in Appendix A.

The property is inside the City of Florence and is currently zoned High-Density Residential. The proposed development consists of 25 single-family attached dwellings or townhomes on Tax Lots 200 and 1200. The development will be subdivided so each townhouse is situated on a separate lot with zero setback at common walls. Areas surrounding the attached units and common ingress/egress and parking areas will consist of common space. Development on Tax Lot 1100 is not proposed at this time, thus is not included in this stormwater management plan.

Right-of-way for 37th Street abuts the east side of Tax Lot 1200 and the street will be extended approximately 590 lineal feet west from Oak Street on the south side of Tax Lot 1200 to serve the development. The townhome PUD will be north of the 37th Street extension. Underground utilities consisting of public wastewater, stormwater and water lines, franchise utilities, and private stormwater facilities will be installed to serve the development. These utilities are currently available at the 37th Street and Oak Street intersection. An existing water pipe crosses the south side of Tax Lot 1200 and an existing stormwater pipe crosses the east side of Tax Lot 1200 and the east and south sides of Tax Lot 1100.

The project site is currently vacant land overgrown with coastal brush and trees. Topography is generally flat with an approximate gradient of less than 1-percent from north to south towards 35th Street. A steep sandy dune is located along the westerly side of the site. Proposed development will include clearing and grading of the site as needed. A preliminary site grading plan is included on the stormwater management plan in Appendix A. Local groundwater and surface water generally flows from the northeast to southwest towards the Siuslaw River. The tributary watershed upgradient (northeast) from the site consists predominantly of residential developed land.

According to the Natural Resources Conservation Service (NRCS) the site soils consists predominantly of Yaquina loamy fine sand with dune land on the westerly side. The permeability is listed as moderately rapid, and the water table is listed as typically between two feet below ground surface and two feet above ground surface.

METHODOLOGY

Existing Hydrologic Conditions

The Florence Storm Water Management Plan, October 2000, Figure 4-3 "Groundwater Elevation, Normal Year" shows that the groundwater gradient in vicinity of the site is

approximately one percent flowing from a northeasterly to southwesterly direction towards the Siuslaw River. The site soils are generally fine dune sand overlaid with a layer of vegetative mulch. There is no visible historic surface water discharge from the site, relying solely on groundwater infiltration for stormwater management.

Rain that falls onto the site collects temporarily in localized depressions and quickly infiltrates into the sand. During times of low groundwater levels there is no stormwater discharge from the site. During times of high groundwater levels water will come to the surface and pool in low areas on the southerly side of Tax Lot 1100 until eventually reaching the level that it can overflow the curb adjacent to 35th Street. Proposed development on Tax Lots 200 and 1200 will not alter the hydrologic conditions that currently occur on Tax Lot 1100. A stormwater management plan for development on Tax Lot 1100 will be addressed at the time of future development on this area of the site.

An existing 36-inch diameter storm pipe routes stormwater from residential development to the north across the east and south sides of the site to the intersection of 35th Street and Laurelwood Street. The pipe continues south in Laurelwood Street to 34th Place, turns east and south where it then discharges into an open conveyance. The open conveyance flows southerly and westerly to the Siuslaw River.

Runoff at the intersection of 37th Street and Oak Street is collected in a piped stormwater system that flows south in Oak Street to just north of 31st Street where the pipe discharges into an open conveyance on the west side of Oak Street. This conveyance flows westerly and combines with the open conveyance described above serving the 36-inch pipe from Laurelwood Street. To the extent practicable, runoff from the extension of 37th Street will not be directed into the Oak Street piped system.

Proposed Stormwater Management

Stormwater management for proposed development consists of stormwater runoff from the street being directed into street-side stormwater facilities. These facilities are sized to receive the road and sidewalk runoff only with the intent that runoff from impervious surfaces associated with the townhomes be directed into private on-site stormwater facilities. Both public and private facilities will rely on infiltration for stormwater disposal with overflow pipes from each facility connected to a public stormwater pipe to be installed in 37th Street. The public pipe will connect into the existing 36-inch stormwater pipe where it crosses the extension of 37th Street.

The Florence Stormwater Management Design Manual, Revised September 2011 (Florence Stormwater Manual) requires treatment and flow control using vegetated surface facilities to the maximum extent feasible with the standard requirement to maintain peak flow rates at their pre-development levels for up to the 25-year runoff events. In high groundwater areas, such as sites with Yaquina soil type, groundwater is to be addressed per the Florence Stormwater Manual.

The proposed stormwater management approach addresses groundwater by incorporating an under-drain beneath the infiltration facility that is connected into the overflow pipe from each facility that then discharges into the public piped stormwater system. This is an approved method per the Florence Stormwater Manual.

Approved stormwater facilities include vegetated swales, rain gardens and planters. A combination of these facility types will be incorporated into the development. Street-side swales will be used predominantly for street runoff except where space limitations will require a planter. Vegetated basins (rain gardens) will be used predominantly for the townhome development except where space limitations will require a planter. Facility descriptions for vegetated swales, rain gardens and planters are excerpted from the Florence Stormwater Manual and included in Appendix C.

ANALYSIS

Presumptive Approach Analysis

The Florence Stormwater Manual requires that the Presumptive Approach be used for projects with new or redeveloped impervious area of 0.5 acre or greater, which applies to this project. Presumptive Approach calculations were performed utilizing the City of Eugene Stormwater Surface Filtration/Infiltration Facility Sizing Spreadsheet. This calculator is an Excel-based spreadsheet that is downloadable from the City of Eugene web page. Runoff calculations are based on unit hydrograph method for a 24-hour storm, NRCS Type 1A rainfall distribution.

Design storms for pollution reduction and flood control are based on a water quality rainfall depth of 0.8 inches and 25-year rainfall depth of 5.06 inches, respectively (from Table 4.1 of Florence Stormwater Manual).

The infiltration rate of dune sand is expected to be greater than 10 inches per hour, but the Florence Stormwater Manual limits the infiltration rate to the assumed long term infiltration rate for the growing medium, or 4 inches per hour.

A pre-development curve number (CN) of 73 is selected based on a Hydrologic Soil Group D and brush with greater than 75-pecent coverage. A post-development CN of 98 is selected for impervious surfaces.

For purposes of this preliminary design, the development area is delineated into drainage catchments served by individual stormwater facilities located within each catchment. Catchment areas are illustrated on the Tentative Stormwater Management Plan included in Appendix A and consists of pavement and walkway surfaces in the public street (Basin 1) and roof and pavement surfaces in the townhome subdivision (Basin 2). Stormwater facilities are included in the impervious surface area calculations.

Size of each stormwater facility is controlled by the required storage needed to fully infiltrate collected stormwater for the design storm, so if the facility size meets destination requirements,

then it also meets pollution reduction requirements. Facility sizing spreadsheets for each catchment area are included in Appendix B and summarized on the Tentative Stormwater Management Plan in Appendix A. Facilities located in the street (Basin 1) will be installed as part of 37th Street construction and will be publicly owned and maintained. Facilities located in the townhome subdivision (Basin 2) will be installed as part of private improvement construction and will be privately owned and maintained. Operation and Maintenance specifications for stormwater planters are included in Appendix C.

Conveyance Pipes

A stormwater conveyance pipe will be extended with street construction. The conveyance pipe will connect into an existing 36-inch diameter storm pipe that crosses the site on the east side. The conveyance pipe will extend to the east (East Pipe) and west (West Pipe) of an existing manhole that is located within the proposed street extension. The stormwater pipe will collect stormwater from public street-side facility overflows, private facility overflows, and facility under-drains. The conveyance pipes are sized to accommodate peak flow based on 25-year overflow from the tributary stormwater facilities. Calculation worksheets for pipe sizes are included in Appendix B. Peak flows are based on peak runoff rate calculations given in the facility sizing spreadsheet for a 25-year design storm, which results in a peak runoff rate of 0.0123 gpm per square foot impervious area. Peak flows and pipe sizes are summarized below.

Table 1. Conveyance Pipe Size Summary

Pipe I.D.	Basins Served	Impervious Area, s.f.	Peak Runoff, cfs	Pipe Size Required
West Pipe	1A, 1B, 1D, 1E, and 2A-2F	87,791	2.41	18” @ 0.5% slope
East Pipe	1C, 1F, and 2G	16,027	0.44	12” @ 0.5% slope

Escape Route

The street-side stormwater facilities and on-site private stormwater facilities will be installed with overflow pipes that discharge into a public piped system located in 37th Street. If the capacity in the stormwater facilities is exceeded, then stormwater from the subdivision will discharge into the existing 36-inch stormwater pipe on the east side of the site and drain southerly and westerly through a series of closed and open conveyances to the Siuslaw River.

ENGINEERING CONCLUSIONS

1. Florence standards require treatment and flow control using vegetated surface facilities to the maximum extent feasible with the standard requirement to maintain peak flow rates at their pre-development levels for up to the 25-year runoff events.

2. Site soils are predominantly loamy fine sand that are well suited for infiltration systems. Thus, vegetated infiltration facilities will be used on this site for final destination of stormwater runoff from impervious surfaces.

3. Adequate detention storage capacity can be provided using low impact development techniques, such as stormwater swales and planters installed adjacent to the street and vegetated basins and planters installed in the townhome subdivision common area. Surface runoff from pavement, roofs, and walks will be routed into the stormwater facilities. Overflow from these facilities will be directed into the piped stormwater system installed in the street.

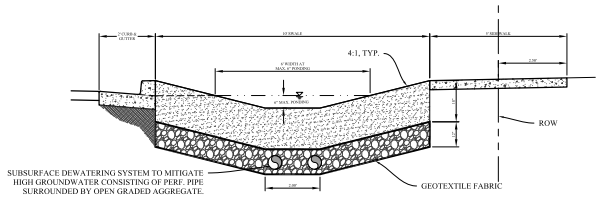
4. Street-side facilities will be publicly owned and maintained and installed at the time of street construction. Common facilities in the townhome PUD will be privately owned and maintained by a homeowner association and installed at the time of private improvement construction.

APPENDIX A

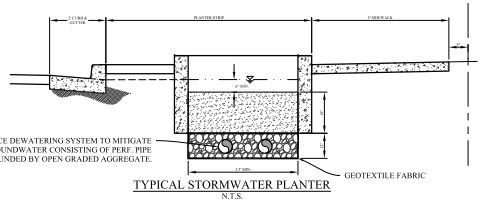
FIGURES


VICINITY MAP
Legend
FLORENCE GOLF LINKS
EAST BANK PUD
FLORENCE
PUBLIC WORKS
SITE
CASA DEL MAR
SUBDIVISION
Nandina Dr
Nandina Dr
38th Loop
101
35th St
35th St
Kingwood St
Lilac St
Pine St
34th Pl
34th St
N
1000 ft
Google Earth

TENTATIVE STORMWATER MANAGEMENT PLAN
FOR
MYRTLE GLENN PUD
NE 1/4, SECTION 22, TOWNSHIP 18 SOUTH, RANGE 12 WEST
OF THE WILLAMETTE MERIDIAN, LANE COUNTY, OREGON
AUGUST 16, 2022
REVISED FEBRUARY 1, 2023



TYPICAL STORMWATER SWALE
N.T.S.



TYPICAL STORMWATER PLANTER
N.T.S.

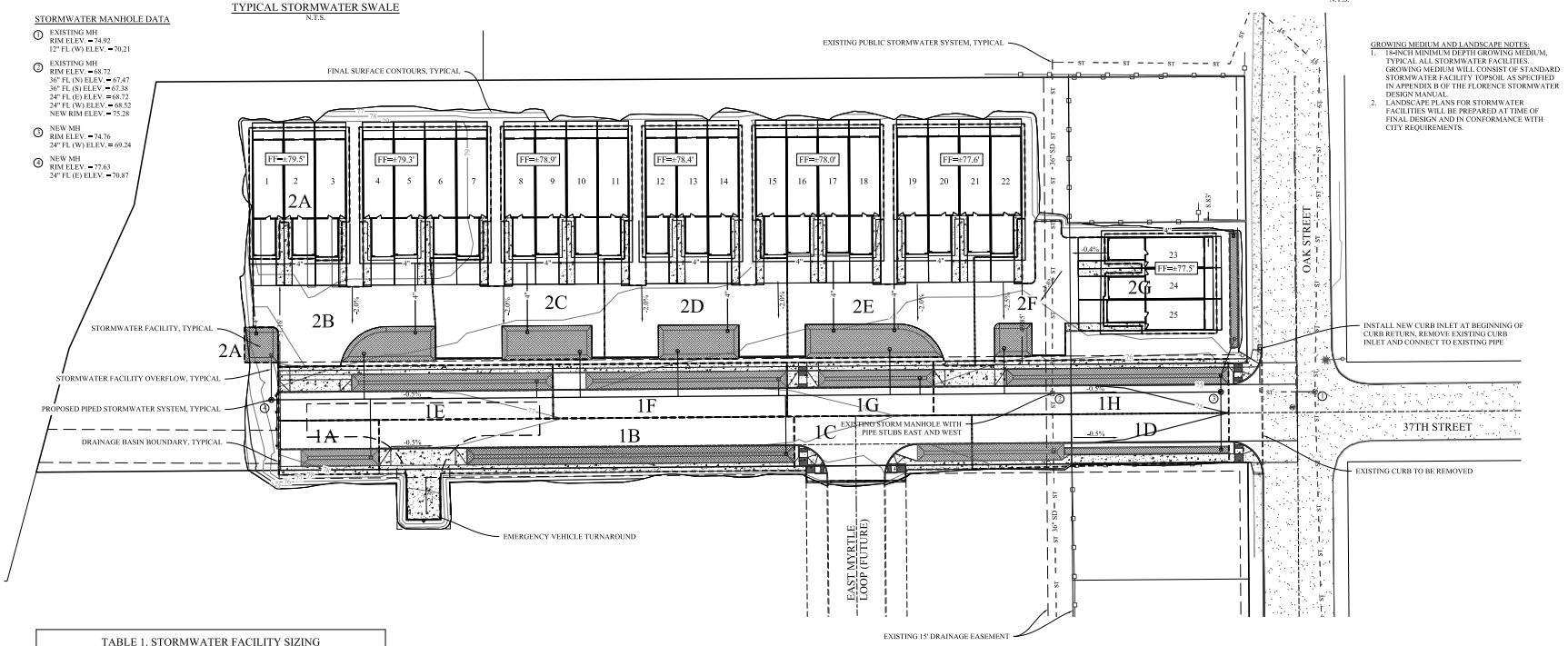
STORMWATER MANHOLE DATA

1. EXISTING MH
RIM ELEV. = 74.92
12" FL (W) ELEV. = 70.21

2. EXISTING MH
RIM ELEV. = 68.72
36" FL (N) ELEV. = 67.47
36" FL (S) ELEV. = 67.38
24" FL (E) ELEV. = 68.72
24" FL (W) ELEV. = 68.52
NEW RIM ELEV. = 75.28

3. NEW MH
RIM ELEV. = 74.76
24" FL (W) ELEV. = 69.24

4. NEW MH
RIM ELEV. = 77.63
24" FL (E) ELEV. = 70.87



GROWING MEDIUM AND LANDSCAPE NOTES:
1. 18-INCH MINIMUM DEPTH GROWING MEDIUM, TYPICAL ALL STORMWATER FACILITIES. GROWING MEDIUM WILL CONSIST OF STANDARD STORMWATER FACILITY TOPSOIL AS SPECIFIED IN APPENDIX B OF THE FLORENCE STORMWATER DESIGN MANUAL.
2. LANDSCAPE PLANS FOR STORMWATER FACILITIES WILL BE PREPARED AT TIME OF FINAL DESIGN AND IN CONFORMANCE WITH CITY REQUIREMENTS.

TABLE 1. STORMWATER FACILITY SIZING

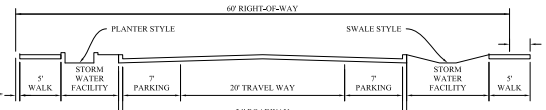
BASIN/ FACILITY I.D.	FACILITY TYPE	FACILITY SIDE SLOPES	BASIN AREA, S.F.	FACILITY SURFACE WIDTH	FACILITY SURFACE LENGTH	MAX. PONDING DEPTH
PUBLIC (BASIN 1) STORMWATER FACILITIES						
1A	IS	4:1	1,959	10.0'	47.0'	6"
1B	IS	4:1	8,672	10.0'	193.0'	6"
1C	IS	4:1	3,860	10.0'	88.0'	6"
1D	IP	0:1	4,785	3.5'	98.0'	10"
1E	IS	4:1	5,366	10.0'	121.0'	6"
1F	IS	4:1	4,574	10.0'	120.0'	6"
1G	IS	4:1	2,858	10.0'	69.0'	6"
1H	IS	4:1	5,765	10.0'	133.0'	6"
PRIVATE (BASIN 2) STORMWATER FACILITIES						
2A	IB	3:1	4,974	21.1'	20.2'	12"
2B	IB	3:1	12,635	21.0'	49.5'	12"
2C	IB	3:1	12,230	20.7'	54.0'	12"
2D	IB	3:1	11,172	20.5'	48.4'	12"
2E	IB	3:1	19,025	20.1'	75.7'	12"
2F	IB	3:1	5,145	19.9'	22.4'	12"
2G	IP	0:1	4,175	4.0'	68.0'	12"

IP = INFILTRATION PLANTER
IS = INFILTRATION SWALE
IB = INFILTRATION BASIN

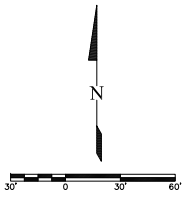
STORMWATER FACILITY DESIGN NOTES

1. FACILITIES ARE SIZED PER THE FLORENCE STORMWATER MANUAL PRESUMPTIVE APPROACH.
2. RUNOFF CALCULATIONS ARE PER THE UNIT HYDROGRAPH METHOD, 24 HOUR STORM, NRCS TYPE 1A RAINFALL DISTRIBUTION.
3. FACILITIES ARE SIZED TO MEET POLLUTION REDUCTION, FLOW CONTROL, AND FINAL DESTINATION (INFILTRATION FACILITY) STANDARDS.
4. PER FLORENCE STORMWATER MANUAL, A WATER QUALITY DESIGN RAINFALL DEPTH OF 0.8 INCHES IS USED FOR POLLUTION REDUCTION AND A 25-YEAR RECURRENCE INTERVAL RAINFALL DEPTH OF 5.06 INCHES IS USED FOR FLOW CONTROL AND FINAL DESTINATION. THE INFILTRATION RATE OF FINE DUNE SAND IS CONSERVATIVELY AT LEAST 10 INCHES PER HOUR. THE FLORENCE STORMWATER MANUAL LIMITS THE DESIGN INFILTRATION RATE TO THE INFILTRATION RATE OF THE GROWING MEDIUM WHICH IS GIVEN AS A MAXIMUM 4 INCHES PER HOUR. THE RESULTING FACILITY SIZES AND DEPTH WERE DESIGNED TO STORE A 25-YEAR EVENT AT THIS INFILTRATION RATE.
5. FINAL DESTINATION IS INFILTRATION INTO GROUNDWATER. FOR AN ESCAPE ROUTE, STORMWATER FACILITIES WILL INCLUDE OVERFLOW PIPES THAT DISCHARGE INTO A PROPOSED PUBLIC STORMWATER PIPE IN 37TH STREET. THE PROPOSED PIPE CONNECTS INTO AN EXISTING 36-INCH DIAMETER PUBLIC STORM DRAIN PIPE LOCATED IN A DRAINAGE EASEMENT ON THE EASTERLY SIDE OF THE SITE. THE EXISTING PIPE FLOWS SOUTH AND WEST TO THE INTERSECTION OF 35TH AND LAURELWOOD STREETS, SOUTH IN LAURELWOOD STREET TO 34TH PLACE, THEN EAST TO AN OPEN CONVEYANCE THAT FLOWS SOUTHERLY AND WESTERLY TO THE SIUSLAW RIVER.

FINAL DESIGN NOTE:
THIS STORMWATER MANAGEMENT PLAN IS TENTATIVE. FINAL FACILITY SIZES, ELEVATIONS, INLET AND CHECK DAM DETAILS, OVERFLOW DETAILS, CONVEYANCE PIPE SIZES, CONNECTION DETAILS TO THE PUBLIC STORMWATER MAIN LINE IN THE STREET AND ANALYSIS OF EXISTING STORMWATER PIPE CAPACITY WILL BE PERFORMED AT TIME OF FINAL DESIGN AND PREPARATION OF PUBLIC AND PRIVATE IMPROVEMENT PLANS. PREPARATION OF IMPROVEMENT PLANS WILL BE COORDINATED WITH FLORENCE PUBLIC WORKS FOR CONFORMANCE WITH CITY STANDARDS AND CITY APPROVALS WILL BE OBTAINED PRIOR TO CONSTRUCTION.



TYPICAL LOCAL STREET
NO SCALE



PRELIMINARY - NOT FOR CONSTRUCTION

EGR & Associates, Inc.
Engineers, Geologists, and Surveyors
2535B Prairie Road
Eugene, Oregon 97402
(541) 686-8322
Fax (541) 688-8067

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 29, 1977
CLINT BEECROFT
EXPIRES: 06/30/23

RENEWS: 07/01/24

MYRTLE GLENN PUD
TENTATIVE PLAN
DRAINAGE AND GRADING PLAN
FLORENCE, LANE COUNTY, OREGON

No	Description of Revisions	Date	Name

Date	1-5-2023
Job Number	7091-21-0067
Design by	CLINT BEECROFT
Drawn by	CLINT BEECROFT
Checked by	

Sheet Number
SHEET 4

APPENDIX B

SIZING SPREADSHEETS AND CALCULATIONS

Stormwater Surface Filtration/Infiltration Facility Sizing Spreadsheet
24 Hour Storm, NRCS Type 1A Rainfall Distribution
City of Eugene

Version 2.1

Project Information

Project Name:	Myrtle Glenn PUD	**Date:**	2/1/2023
Project Address:	18-12-22-11-01200	**Permit Number:**	NA
	Florence, OR	**Catchment ID:**	1A
Designer:	Clint Beecroft		
Company:	EGR & Associates		

Instructions:

1. Complete this form for each drainage catchment in the project site that is to be sized per the Presumptive Approach.
2. Provide a distinctive Catchment ID for each facility coordinated with the site basin map to correlate the appropriate calculations with the facility.
3. The maximum drainage catchment to be modeled per the Presumptive Approach is 1 acre (43,560 SF)
4. For infiltration facilities in Class A or B soils where no infiltration testing has been perfromed use an infiltration rate of 0.5 in/hr. For all facilities use a maximum soil infiltration rate of 2.5 in/hr for topsoil/growing medium.

Design Requirements:

Choose "Yes" from the dropdown boxes below next to the design standards requirements for this facility.

Pollution Reduction (PR)	Yes
Flow Control (FC)	Yes
Destination (DT)	Yes

*An infiltration facility must be chosen as the facility type to meet destination requirements

Site Data-Post Development

Total Square Footage Impervious Area=	1959	sqft	**Total Square Footage Pervious Area=**	0	sqft
Impervious Area CN=	98		**Pervious Area CN=**	85	
Total Square Footage of Drainage Area=	1959	sft	**Time of Concentration Post Development=**	7	min
Weighted Average CN=	98				

Site Data-Pre Development (Data in this section is only used if Flow Control is required)

Pre-Development CN=	73		**Time of Concentration Pre-Development=**	5	min

Soil Data

Tested Soil Infiltration Rate=	10	in/hr (See Note 4)	**Destination Design=**	4	in/hr
Design Soil Infiltration Rate=	4	in/hr	**Soil Infiltration Rate**		

Design Storms Used For Calculations

Requirement	Rainfall Depth		Design Storm
Pollution Reduction	0.8	inches	Water Quality
Flow Control	5.1	inches	Flood Control
Destination	5.1	inches	Flood Control

Facility Data

Facility Type=	Infiltration Stormwater Planter		**Facility Surface Area=**	258	sqft
Surface Width=	6	ft	**Facility Surface Perimeter=**	98	ft
Surface Length=	43	ft	**Facility Bottom Area=**	78	sqft
Facility Side Slopes=	4	to 1	**Facility Bottom Perimeter=**	82	ft
Max. Ponding Depth in Stormwater Facility=	6	in	**Basin Volume=**	88.0	cf
Depth of Growing Medium (Soil)=	18	in	**Ratio of Facility Area to Impervious Area=**	0.132	

Pollution Reduction-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.008	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	102	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	0.0	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Pollution Reduction Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Flow Control-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.056	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	785	cf	Total Overflow Volume=	0	cf
			Peak Off-Site Flow Rate		
Max. Depth of Stormwater in Facility=	5.8	in	Filtration Facility Underdrain=	N\A	cfs
Drawdown Time=	0.2	hours			

Pre-Development Runoff Data

Peak Flow Rate =	0.025	cfs
Total Runoff Volume =	380	cf

Yes **Facility Sizing Meets Flow Control Standards?**

YES **Meets Requirement for Post Development offsite flow less or equal to Pre-Development Flow?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Destination-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.056	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	785	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	5.8	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Destination Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 30 hour Drawdown Time?**

Stormwater Surface Filtration/Infiltration Facility Sizing Spreadsheet
24 Hour Storm, NRCS Type 1A Rainfall Distribution
City of Eugene

Version 2.1

Project Information

Project Name:	Myrtle Glenn PUD	**Date:**	2/1/2023
Project Address:	18-12-22-11-01200	**Permit Number:**	NA
	Florence, OR	**Catchment ID:**	1B
Designer:	Clint Beecroft		
Company:	EGR & Associates		

Instructions:

1. Complete this form for each drainage catchment in the project site that is to be sized per the Presumptive Approach.
2. Provide a distinctive Catchment ID for each facility coordinated with the site basin map to correlate the appropriate calculations with the facility.
3. The maximum drainage catchment to be modeled per the Presumptive Approach is 1 acre (43,560 SF)
4. For infiltration facilities in Class A or B soils where no infiltration testing has been perfromed use an infiltration rate of 0.5 in/hr. For all facilities use a maximum soil infiltration rate of 2.5 in/hr for topsoil/growing medium.

Design Requirements:

Choose "Yes" from the dropdown boxes below next to the design standards requirements for this facility.

Pollution Reduction (PR)	Yes
Flow Control (FC)	Yes
Destination (DT)	Yes

*An infiltration facility must be chosen as the facility type to meet destination requirements

Site Data-Post Development

Total Square Footage Impervious Area=	8672	sqft	**Total Square Footage Pervious Area=**	0	sqft
Impervious Area CN=	98		**Pervious Area CN=**	85	
Total Square Footage of Drainage Area=	8672	sft	**Time of Concentration Post Development=**	10	min
Weighted Average CN=	98				

Site Data-Pre Development (Data in this section is only used if Flow Control is required)

Pre-Development CN=	73		**Time of Concentration Pre-Development=**	5	min

Soil Data

Tested Soil Infiltration Rate=	10	in/hr (See Note 4)	**Destination Design=**	4	in/hr
Design Soil Infiltration Rate=	4	in/hr	**Soil Infiltration Rate**		

Design Storms Used For Calculations

Requirement	Rainfall Depth		Design Storm
Pollution Reduction	0.8	inches	Water Quality
Flow Control	5.1	inches	Flood Control
Destination	5.1	inches	Flood Control

Facility Data

Facility Type=	Infiltration Stormwater Planter		**Facility Surface Area=**	1134	sqft
Surface Width=	6	ft	**Facility Surface Perimeter=**	390	ft
Surface Length=	189	ft	**Facility Bottom Area=**	370	sqft
Facility Side Slopes=	4	to 1	**Facility Bottom Perimeter=**	374	ft
Max. Ponding Depth in Stormwater Facility=	6	in	**Basin Volume=**	380.0	cf
Depth of Growing Medium (Soil)=	18	in	**Ratio of Facility Area to Impervious Area=**	0.131	

Pollution Reduction-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.032	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	451	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	0.0	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Pollution Reduction Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Flow Control-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.238	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	3471	cf	Total Overflow Volume=	0	cf
			Peak Off-Site Flow Rate		
Max. Depth of Stormwater in Facility=	5.8	in	Filtration Facility Underdrain=	N\A	cfs
Drawdown Time=	0.2	hours			

Pre-Development Runoff Data

Peak Flow Rate =	0.112	cfs
Total Runoff Volume =	1682	cf

Yes **Facility Sizing Meets Flow Control Standards?**

YES **Meets Requirement for Post Development offsite flow less or equal to Pre-Development Flow?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Destination-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.238	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	3471	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	5.8	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Destination Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 30 hour Drawdown Time?**

Stormwater Surface Filtration/Infiltration Facility Sizing Spreadsheet
24 Hour Storm, NRCS Type 1A Rainfall Distribution
City of Eugene

Version 2.1

Project Information

Project Name:	Myrtle Glenn PUD	**Date:**	2/1/2023
Project Address:	18-12-22-11-01200	**Permit Number:**	NA
	Florence, OR	**Catchment ID:**	1C
Designer:	Clint Beecroft		
Company:	EGR & Associates		

Instructions:

1. Complete this form for each drainage catchment in the project site that is to be sized per the Presumptive Approach.
2. Provide a distinctive Catchment ID for each facility coordinated with the site basin map to correlate the appropriate calculations with the facility.
3. The maximum drainage catchment to be modeled per the Presumptive Approach is 1 acre (43,560 SF)
4. For infiltration facilities in Class A or B soils where no infiltration testing has been perfromed use an infiltration rate of 0.5 in/hr. For all facilities use a maximum soil infiltration rate of 2.5 in/hr for topsoil/growing medium.

Design Requirements:

Choose "Yes" from the dropdown boxes below next to the design standards requirements for this facility.

Pollution Reduction (PR)	Yes
Flow Control (FC)	Yes
Destination (DT)	Yes

*An infiltration facility must be chosen as the facility type to meet destination requirements

Site Data-Post Development

Total Square Footage Impervious Area=	3860	sqft	**Total Square Footage Pervious Area=**	0	sqft
Impervious Area CN=	98		**Pervious Area CN=**	85	
Total Square Footage of Drainage Area=	3860	sft	**Time of Concentration Post Development=**	10	min
Weighted Average CN=	98				

Site Data-Pre Development (Data in this section is only used if Flow Control is required)

Pre-Development CN=	73		**Time of Concentration Pre-Development=**	5	min

Soil Data

Tested Soil Infiltration Rate=	10	in/hr (See Note 4)	**Destination Design=**	4	in/hr
Design Soil Infiltration Rate=	4	in/hr	**Soil Infiltration Rate**		

Design Storms Used For Calculations

Requirement	Rainfall Depth		Design Storm
Pollution Reduction	0.8	inches	Water Quality
Flow Control	5.1	inches	Flood Control
Destination	5.1	inches	Flood Control

Facility Data

Facility Type=	Infiltration Stormwater Planter		**Facility Surface Area=**	504	sqft
Surface Width=	6	ft	**Facility Surface Perimeter=**	180	ft
Surface Length=	84	ft	**Facility Bottom Area=**	160	sqft
Facility Side Slopes=	4	to 1	**Facility Bottom Perimeter=**	164	ft
Max. Ponding Depth in Stormwater Facility=	6	in	**Basin Volume=**	170.0	cf
Depth of Growing Medium (Soil)=	18	in	**Ratio of Facility Area to Impervious Area=**	0.131	

Pollution Reduction-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.014	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	201	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	0.0	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Pollution Reduction Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Flow Control-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.106	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	1545	cf	Total Overflow Volume=	0	cf
			Peak Off-Site Flow Rate		
Max. Depth of Stormwater in Facility=	5.8	in	Filtration Facility Underdrain=	N\A	cfs
Drawdown Time=	0.2	hours			

Pre-Development Runoff Data

Peak Flow Rate =	0.050	cfs
Total Runoff Volume =	749	cf

Yes **Facility Sizing Meets Flow Control Standards?**

YES **Meets Requirement for Post Development offsite flow less or equal to Pre-Development Flow?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Destination-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.106	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	1545	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	5.8	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Destination Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 30 hour Drawdown Time?**

Stormwater Surface Filtration/Infiltration Facility Sizing Spreadsheet
24 Hour Storm, NRCS Type 1A Rainfall Distribution
City of Eugene

Version 2.1

Project Information

Project Name:	Myrtle Glen Subdivision	**Date:**	2/1/2023
Project Address:	18-12-22-11-01200	**Permit Number:**	NA
	Florence, OR	**Catchment ID:**	1D
Designer:	Clint Beecroft		
Company:	EGR & Associates		

Instructions:

1. Complete this form for each drainage catchment in the project site that is to be sized per the Presumptive Approach.
2. Provide a distinctive Catchment ID for each facility coordinated with the site basin map to correlate the appropriate calculations with the facility.
3. The maximum drainage catchment to be modeled per the Presumptive Approach is 1 acre (43,560 SF)
4. For infiltration facilities in Class A or B soils where no infiltration testing has been perfromed use an infiltration rate of 0.5 in/hr. For all facilities use a maximum soil infiltration rate of 2.5 in/hr for topsoil/growing medium.

Design Requirements:

Choose "Yes" from the dropdown boxes below next to the design standards requirements for this facility.

Pollution Reduction (PR)	Yes
Flow Control (FC)	Yes
Destination (DT)	Yes

*An infiltration facility must be chosen as the facility type to meet destination requirements

Site Data-Post Development

Total Square Footage Impervious Area=	4785	sqft	**Total Square Footage Pervious Area=**	0	sqft
Impervious Area CN=	98		**Pervious Area CN=**	85	
Total Square Footage of Drainage Area=	4785	sft	**Time of Concentration Post Development=**	10	min
Weighted Average CN=	98				

Site Data-Pre Development (Data in this section is only used if Flow Control is required)

Pre-Development CN=	73		**Time of Concentration Pre-Development=**	5	min

Soil Data

Tested Soil Infiltration Rate=	10	in/hr (See Note 4)	**Destination Design=**	4	in/hr
Design Soil Infiltration Rate=	4	in/hr	**Soil Infiltration Rate**		

Design Storms Used For Calculations

Requirement	Rainfall Depth		Design Storm
Pollution Reduction	0.8	inches	Water Quality
Flow Control	5.1	inches	Flood Control
Destination	5.1	inches	Flood Control

Facility Data

Facility Type=	Infiltration Stormwater Planter		**Facility Surface Area=**	343	sqft
Surface Width=	3.5	ft	**Facility Surface Perimeter=**	203	ft
Surface Length=	98	ft	**Facility Bottom Area=**	343	sqft
Facility Side Slopes=	0	to 1	**Facility Bottom Perimeter=**	203	ft
Max. Ponding Depth in Stormwater Facility=	10	in	**Basin Volume=**	285.8	cf
Depth of Growing Medium (Soil)=	18	in	**Ratio of Facility Area to Impervious Area=**	0.072	

Pollution Reduction-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.018	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	249	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	0.0	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Pollution Reduction Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Flow Control-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.131	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	1915	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	9.3	in	Peak Off-Site Flow Rate Filtration Facility Underdrain=	N\A	cfs
Drawdown Time=	0.2	hours			

Pre-Development Runoff Data

Peak Flow Rate =	0.062	cfs
Total Runoff Volume =	928	cf

Yes **Facility Sizing Meets Flow Control Standards?**

YES **Meets Requirement for Post Development offsite flow less or equal to Pre-Development Flow?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Destination-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.131	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	1915	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	9.3	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Destination Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 30 hour Drawdown Time?**

Stormwater Surface Filtration/Infiltration Facility Sizing Spreadsheet
24 Hour Storm, NRCS Type 1A Rainfall Distribution
City of Eugene

Version 2.1

Project Information

Project Name:	Myrtle Glenn PUD	**Date:**	2/1/2023
Project Address:	18-12-22-11-01200	**Permit Number:**	NA
	Florence, OR	**Catchment ID:**	1E
Designer:	Clint Beecroft		
Company:	EGR & Associates		

Instructions:

1. Complete this form for each drainage catchment in the project site that is to be sized per the Presumptive Approach.
2. Provide a distinctive Catchment ID for each facility coordinated with the site basin map to correlate the appropriate calculations with the facility.
3. The maximum drainage catchment to be modeled per the Presumptive Approach is 1 acre (43,560 SF)
4. For infiltration facilities in Class A or B soils where no infiltration testing has been perfromed use an infiltration rate of 0.5 in/hr. For all facilities use a maximum soil infiltration rate of 2.5 in/hr for topsoil/growing medium.

Design Requirements:

Choose "Yes" from the dropdown boxes below next to the design standards requirements for this facility.

Pollution Reduction (PR)	Yes
Flow Control (FC)	Yes
Destination (DT)	Yes

*An infiltration facility must be chosen as the facility type to meet destination requirements

Site Data-Post Development

Total Square Footage Impervious Area=	5366	sqft	**Total Square Footage Pervious Area=**	0	sqft
Impervious Area CN=	98		**Pervious Area CN=**	85	
Total Square Footage of Drainage Area=	5366	sft	**Time of Concentration Post Development=**	10	min
Weighted Average CN=	98				

Site Data-Pre Development (Data in this section is only used if Flow Control is required)

Pre-Development CN=	73		**Time of Concentration Pre-Development=**	5	min

Soil Data

Tested Soil Infiltration Rate=	10	in/hr (See Note 4)	**Destination Design=**	4	in/hr
Design Soil Infiltration Rate=	4	in/hr	**Soil Infiltration Rate**		

Design Storms Used For Calculations

Requirement	Rainfall Depth		Design Storm
Pollution Reduction	0.8	inches	Water Quality
Flow Control	5.1	inches	Flood Control
Destination	5.1	inches	Flood Control

Facility Data

Facility Type=	Infiltration Stormwater Planter		**Facility Surface Area=**	702	sqft
Surface Width=	6	ft	**Facility Surface Perimeter=**	246	ft
Surface Length=	117	ft	**Facility Bottom Area=**	226	sqft
Facility Side Slopes=	4	to 1	**Facility Bottom Perimeter=**	230	ft
Max. Ponding Depth in Stormwater Facility=	6	in	**Basin Volume=**	236.0	cf
Depth of Growing Medium (Soil)=	18	in	**Ratio of Facility Area to Impervious Area=**	0.131	

Pollution Reduction-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.020	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	279	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	0.0	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Pollution Reduction Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Flow Control-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.147	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	2148	cf	Total Overflow Volume=	0	cf
			Peak Off-Site Flow Rate		
Max. Depth of Stormwater in Facility=	5.8	in	Filtration Facility Underdrain=	N\A	cfs
Drawdown Time=	0.2	hours			

Pre-Development Runoff Data

Peak Flow Rate =	0.069	cfs
Total Runoff Volume =	1041	cf

Yes **Facility Sizing Meets Flow Control Standards?**

YES **Meets Requirement for Post Development offsite flow less or equal to Pre-Development Flow?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Destination-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.147	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	2148	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	5.8	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Destination Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 30 hour Drawdown Time?**

Stormwater Surface Filtration/Infiltration Facility Sizing Spreadsheet
24 Hour Storm, NRCS Type 1A Rainfall Distribution
City of Eugene

Version 2.1

Project Information

Project Name:	Myrtle Glenn PUD	**Date:**	2/1/2023
Project Address:	18-12-22-11-01200	**Permit Number:**	NA
	Florence, OR	**Catchment ID:**	1F
Designer:	Clint Beecroft		
Company:	EGR & Associates		

Instructions:

1. Complete this form for each drainage catchment in the project site that is to be sized per the Presumptive Approach.
2. Provide a distinctive Catchment ID for each facility coordinated with the site basin map to correlate the appropriate calculations with the facility.
3. The maximum drainage catchment to be modeled per the Presumptive Approach is 1 acre (43,560 SF)
4. For infiltration facilities in Class A or B soils where no infiltration testing has been perfromed use an infiltration rate of 0.5 in/hr. For all facilities use a maximum soil infiltration rate of 2.5 in/hr for topsoil/growing medium.

Design Requirements:

Choose "Yes" from the dropdown boxes below next to the design standards requirements for this facility.

Pollution Reduction (PR)	Yes
Flow Control (FC)	Yes
Destination (DT)	Yes

*An infiltration facility must be chosen as the facility type to meet destination requirements

Site Data-Post Development

Total Square Footage Impervious Area=	4574	sqft	**Total Square Footage Pervious Area=**	0	sqft
Impervious Area CN=	98		**Pervious Area CN=**	85	
Total Square Footage of Drainage Area=	4574	sft	**Time of Concentration Post Development=**	10	min
Weighted Average CN=	98				

Site Data-Pre Development **(Data in this section is only used if Flow Control is required)**

Pre-Development CN=	73		**Time of Concentration Pre-Development=**	5	min

Soil Data

Tested Soil Infiltration Rate=	10	in/hr (See Note 4)	**Destination Design=**	4	in/hr
Design Soil Infiltration Rate=	4	in/hr	**Soil Infiltration Rate**		

Design Storms Used For Calculations

Requirement	Rainfall Depth		Design Storm
Pollution Reduction	0.8	inches	Water Quality
Flow Control	5.1	inches	Flood Control
Destination	5.1	inches	Flood Control

Facility Data

Facility Type=	Infiltration Stormwater Planter		**Facility Surface Area=**	696	sqft
Surface Width=	6	ft	**Facility Surface Perimeter=**	244	ft
Surface Length=	116	ft	**Facility Bottom Area=**	224	sqft
Facility Side Slopes=	4	to 1	**Facility Bottom Perimeter=**	228	ft
Max. Ponding Depth in Stormwater Facility=	6	in	**Basin Volume=**	234.0	cf
Depth of Growing Medium (Soil)=	18	in	**Ratio of Facility Area to Impervious Area=**	0.152	

Pollution Reduction-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.017	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	238	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	0.0	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Pollution Reduction Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Flow Control-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.125	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	1831	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	4.9	in	Peak Off-Site Flow Rate Filtration Facility Underdrain=	N\A	cfs
Drawdown Time=	0.2	hours			

Pre-Development Runoff Data

Peak Flow Rate =	0.059	cfs
Total Runoff Volume =	887	cf

Yes **Facility Sizing Meets Flow Control Standards?**

YES **Meets Requirement for Post Development offsite flow less or equal to Pre-Development Flow?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Destination-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.125	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	1831	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	4.9	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Destination Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 30 hour Drawdown Time?**

Stormwater Surface Filtration/Infiltration Facility Sizing Spreadsheet
24 Hour Storm, NRCS Type 1A Rainfall Distribution
City of Eugene

Version 2.1

Project Information

Project Name:	Myrtle Glenn PUD	**Date:**	2/1/2023
Project Address:	18-12-22-11-01200	**Permit Number:**	NA
	Florence, OR	**Catchment ID:**	1G
Designer:	Clint Beecroft		
Company:	EGR & Associates		

Instructions:

1. Complete this form for each drainage catchment in the project site that is to be sized per the Presumptive Approach.
2. Provide a distinctive Catchment ID for each facility coordinated with the site basin map to correlate the appropriate calculations with the facility.
3. The maximum drainage catchment to be modeled per the Presumptive Approach is 1 acre (43,560 SF)
4. For infiltration facilities in Class A or B soils where no infiltration testing has been perfromed use an infiltration rate of 0.5 in/hr. For all facilities use a maximum soil infiltration rate of 2.5 in/hr for topsoil/growing medium.

Design Requirements:

Choose "Yes" from the dropdown boxes below next to the design standards requirements for this facility.

Pollution Reduction (PR)	Yes
Flow Control (FC)	Yes
Destination (DT)	Yes

*An infiltration facility must be chosen as the facility type to meet destination requirements

Site Data-Post Development

Total Square Footage Impervious Area=	2858	sqft	**Total Square Footage Pervious Area=**	0	sqft
Impervious Area CN=	98		**Pervious Area CN=**	85	
Total Square Footage of Drainage Area=	2858	sft	**Time of Concentration Post Development=**	10	min
Weighted Average CN=	98				

Site Data-Pre Development (Data in this section is only used if Flow Control is required)

Pre-Development CN=	73		**Time of Concentration Pre-Development=**	5	min

Soil Data

Tested Soil Infiltration Rate=	10	in/hr (See Note 4)	**Destination Design=**	4	in/hr
Design Soil Infiltration Rate=	4	in/hr	**Soil Infiltration Rate**		

Design Storms Used For Calculations

Requirement	Rainfall Depth		Design Storm
Pollution Reduction	0.8	inches	Water Quality
Flow Control	5.1	inches	Flood Control
Destination	5.1	inches	Flood Control

Facility Data

Facility Type=	Infiltration Stormwater Planter		**Facility Surface Area=**	390	sqft
Surface Width=	6	ft	**Facility Surface Perimeter=**	142	ft
Surface Length=	65	ft	**Facility Bottom Area=**	122	sqft
Facility Side Slopes=	4	to 1	**Facility Bottom Perimeter=**	126	ft
Max. Ponding Depth in Stormwater Facility=	6	in	**Basin Volume=**	132.0	cf
Depth of Growing Medium (Soil)=	18	in	**Ratio of Facility Area to Impervious Area=**	0.136	

Pollution Reduction-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.011	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	149	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	0.0	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Pollution Reduction Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Flow Control-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.078	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	1144	cf	Total Overflow Volume=	0	cf
			Peak Off-Site Flow Rate		
Max. Depth of Stormwater in Facility=	5.5	in	Filtration Facility Underdrain=	N\A	cfs
Drawdown Time=	0.2	hours			

Pre-Development Runoff Data

Peak Flow Rate =	0.037	cfs
Total Runoff Volume =	554	cf

Yes **Facility Sizing Meets Flow Control Standards?**

YES **Meets Requirement for Post Development offsite flow less or equal to Pre-Development Flow?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Destination-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.078	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	1144	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	5.5	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Destination Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 30 hour Drawdown Time?**

Stormwater Surface Filtration/Infiltration Facility Sizing Spreadsheet
24 Hour Storm, NRCS Type 1A Rainfall Distribution
City of Eugene

Version 2.1

Project Information

Project Name:	Myrtle Glenn PUD	**Date:**	2/1/2023
Project Address:	18-12-22-11-01200	**Permit Number:**	NA
	Florence, OR	**Catchment ID:**	1H
Designer:	Clint Beecroft		
Company:	EGR & Associates		

Instructions:

1. Complete this form for each drainage catchment in the project site that is to be sized per the Presumptive Approach.
2. Provide a distinctive Catchment ID for each facility coordinated with the site basin map to correlate the appropriate calculations with the facility.
3. The maximum drainage catchment to be modeled per the Presumptive Approach is 1 acre (43,560 SF)
4. For infiltration facilities in Class A or B soils where no infiltration testing has been perfromed use an infiltration rate of 0.5 in/hr. For all facilities use a maximum soil infiltration rate of 2.5 in/hr for topsoil/growing medium.

Design Requirements:

Choose "Yes" from the dropdown boxes below next to the design standards requirements for this facility.

Pollution Reduction (PR)	Yes
Flow Control (FC)	Yes
Destination (DT)	Yes

*An infiltration facility must be chosen as the facility type to meet destination requirements

Site Data-Post Development

Total Square Footage Impervious Area=	5765	sqft	**Total Square Footage Pervious Area=**	0	sqft
Impervious Area CN=	98		**Pervious Area CN=**	85	
Total Square Footage of Drainage Area=	5765	sft	**Time of Concentration Post Development=**	10	min
Weighted Average CN=	98				

Site Data-Pre Development (Data in this section is only used if Flow Control is required)

Pre-Development CN=	73		**Time of Concentration Pre-Development=**	5	min

Soil Data

Tested Soil Infiltration Rate=	10	in/hr (See Note 4)	**Destination Design=**	4	in/hr
Design Soil Infiltration Rate=	4	in/hr	**Soil Infiltration Rate**		

Design Storms Used For Calculations

Requirement	Rainfall Depth		Design Storm
Pollution Reduction	0.8	inches	Water Quality
Flow Control	5.1	inches	Flood Control
Destination	5.1	inches	Flood Control

Facility Data

Facility Type=	Infiltration Stormwater Planter		**Facility Surface Area=**	774	sqft
Surface Width=	6	ft	**Facility Surface Perimeter=**	270	ft
Surface Length=	129	ft	**Facility Bottom Area=**	250	sqft
Facility Side Slopes=	4	to 1	**Facility Bottom Perimeter=**	254	ft
Max. Ponding Depth in Stormwater Facility=	6	in	**Basin Volume=**	260.0	cf
Depth of Growing Medium (Soil)=	18	in	**Ratio of Facility Area to Impervious Area=**	0.134	

Pollution Reduction-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.022	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	300	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	0.0	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Pollution Reduction Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Flow Control-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.158	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	2307	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	5.6	in	Peak Off-Site Flow Rate Filtration Facility Underdrain=	N\A	cfs
Drawdown Time=	0.2	hours			

Pre-Development Runoff Data

Peak Flow Rate =	0.075	cfs
Total Runoff Volume =	1118	cf

Yes **Facility Sizing Meets Flow Control Standards?**

YES **Meets Requirement for Post Development offsite flow less or equal to Pre-Development Flow?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Destination-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.158	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	2307	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	5.6	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Destination Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 30 hour Drawdown Time?**

Stormwater Surface Filtration/Infiltration Facility Sizing Spreadsheet
24 Hour Storm, NRCS Type 1A Rainfall Distribution
City of Eugene

Version 2.1

Project Information

Project Name:	Myrtle Glenn PUD	**Date:**	2/1/2023
Project Address:	18-12-22-11-01200	**Permit Number:**	NA
	Florence, OR	**Catchment ID:**	2A
Designer:	Clint Beecroft		
Company:	EGR & Associates		

Instructions:

1. Complete this form for each drainage catchment in the project site that is to be sized per the Presumptive Approach.
2. Provide a distinctive Catchment ID for each facility coordinated with the site basin map to correlate the appropriate calculations with the facility.
3. The maximum drainage catchment to be modeled per the Presumptive Approach is 1 acre (43,560 SF)
4. For infiltration facilities in Class A or B soils where no infiltration testing has been perfromed use an infiltration rate of 0.5 in/hr. For all facilities use a maximum soil infiltration rate of 2.5 in/hr for topsoil/growing medium.

Design Requirements:

Choose "Yes" from the dropdown boxes below next to the design standards requirements for this facility.

Pollution Reduction (PR)	Yes
Flow Control (FC)	Yes
Destination (DT)	Yes

*An infiltration facility must be chosen as the facility type to meet destination requirements

Site Data-Post Development

Total Square Footage Impervious Area=	4974	sqft	**Total Square Footage Pervious Area=**	0	sqft
Impervious Area CN=	98		**Pervious Area CN=**	85	
Total Square Footage of Drainage Area=	4974	sft	**Time of Concentration Post Development=**	5	min
Weighted Average CN=	98				

Site Data-Pre Development (Data in this section is only used if Flow Control is required)

Pre-Development CN=	73		**Time of Concentration Pre-Development=**	5	min

Soil Data

Tested Soil Infiltration Rate=	10	in/hr (See Note 4)	**Destination Design=**	4	in/hr
Design Soil Infiltration Rate=	4	in/hr	**Soil Infiltration Rate**		

Design Storms Used For Calculations

Requirement	Rainfall Depth		Design Storm
Pollution Reduction	0.8	inches	Water Quality
Flow Control	5.1	inches	Flood Control
Destination	5.1	inches	Flood Control

Facility Data

Facility Type=	Infiltration Rain Garden		**Facility Surface Area=**	426.22	sqft
Surface Width=	21.1	ft	**Facility Surface Perimeter=**	82.6	ft
Surface Length=	20.2	ft	**Facility Bottom Area=**	214	sqft
Facility Side Slopes=	3	to 1	**Facility Bottom Perimeter=**	59	ft
Max. Ponding Depth in Stormwater Facility=	12	in	**Basin Volume=**	338.3	cf
Depth of Growing Medium (Soil)=	18	in	**Ratio of Facility Area to Impervious Area=**	0.086	

Pollution Reduction-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.021	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	259	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	0.0	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Pollution Reduction Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Flow Control-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.152	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	1995	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	11.9	in	Peak Off-Site Flow Rate Filtration Facility Underdrain=	N\A	cfs
Drawdown Time=	0.2	hours			

Pre-Development Runoff Data

Peak Flow Rate =	0.064	cfs
Total Runoff Volume =	965	cf

Yes **Facility Sizing Meets Flow Control Standards?**

YES **Meets Requirement for Post Development offsite flow less or equal to Pre-Development Flow?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Destination-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.152	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	1995	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	11.9	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Destination Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 30 hour Drawdown Time?**

Stormwater Surface Filtration/Infiltration Facility Sizing Spreadsheet
24 Hour Storm, NRCS Type 1A Rainfall Distribution
City of Eugene

Version 2.1

Project Information

Project Name:	Myrtle Glenn PUD	**Date:**	2/1/2023
Project Address:	18-12-22-11-01200	**Permit Number:**	NA
	Florence, OR	**Catchment ID:**	2B
Designer:	Clint Beecroft		
Company:	EGR & Associates		

Instructions:

1. Complete this form for each drainage catchment in the project site that is to be sized per the Presumptive Approach.
2. Provide a distinctive Catchment ID for each facility coordinated with the site basin map to correlate the appropriate calculations with the facility.
3. The maximum drainage catchment to be modeled per the Presumptive Approach is 1 acre (43,560 SF)
4. For infiltration facilities in Class A or B soils where no infiltration testing has been perfromed use an infiltration rate of 0.5 in/hr. For all facilities use a maximum soil infiltration rate of 2.5 in/hr for topsoil/growing medium.

Design Requirements:

Choose "Yes" from the dropdown boxes below next to the design standards requirements for this facility.

Pollution Reduction (PR)	Yes
Flow Control (FC)	Yes
Destination (DT)	Yes

*An infiltration facility must be chosen as the facility type to meet destination requirements

Site Data-Post Development

Total Square Footage Impervious Area=	12635	sqft	**Total Square Footage Pervious Area=**	0	sqft
Impervious Area CN=	98		**Pervious Area CN=**	85	
Total Square Footage of Drainage Area=	12635	sft	**Time of Concentration Post Development=**	5	min
Weighted Average CN=	98				

Site Data-Pre Development (Data in this section is only used if Flow Control is required)

Pre-Development CN=	73		**Time of Concentration Pre-Development=**	5	min

Soil Data

Tested Soil Infiltration Rate=	10	in/hr (See Note 4)	**Destination Design=**	4	in/hr
Design Soil Infiltration Rate=	4	in/hr	**Soil Infiltration Rate**		

Design Storms Used For Calculations

Requirement	Rainfall Depth		Design Storm
Pollution Reduction	0.8	inches	Water Quality
Flow Control	5.1	inches	Flood Control
Destination	5.1	inches	Flood Control

Facility Data

Facility Type=	Infiltration Rain Garden		**Facility Surface Area=**	1039.5	sqft
Surface Width=	21	ft	**Facility Surface Perimeter=**	141	ft
Surface Length=	49.5		**Facility Bottom Area=**	653	sqft
Facility Side Slopes=	3	to 1	**Facility Bottom Perimeter=**	117	ft
Max. Ponding Depth in Stormwater Facility=	12	in	**Basin Volume=**	864.0	cf
Depth of Growing Medium (Soil)=	18	in	**Ratio of Facility Area to Impervious Area=**	0.082	

Pollution Reduction-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.052	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	659	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	0.0	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Pollution Reduction Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Flow Control-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.387	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	5068	cf	Total Overflow Volume=	0	cf
			Peak Off-Site Flow Rate		
Max. Depth of Stormwater in Facility=	11.4	in	Filtration Facility Underdrain=	N\A	cfs
Drawdown Time=	0.2	hours			

Pre-Development Runoff Data

Peak Flow Rate =	0.163	cfs
Total Runoff Volume =	2451	cf

Yes **Facility Sizing Meets Flow Control Standards?**

YES **Meets Requirement for Post Development offsite flow less or equal to Pre-Development Flow?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Destination-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.387	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	5068	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	11.4	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Destination Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 30 hour Drawdown Time?**

Stormwater Surface Filtration/Infiltration Facility Sizing Spreadsheet
24 Hour Storm, NRCS Type 1A Rainfall Distribution
City of Eugene

Version 2.1

Project Information

Project Name:	Myrtle Glenn PUD	**Date:**	2/1/2023
Project Address:	18-12-22-11-01200	**Permit Number:**	NA
	Florence, OR	**Catchment ID:**	2C
Designer:	Clint Beecroft		
Company:	EGR & Associates		

Instructions:

1. Complete this form for each drainage catchment in the project site that is to be sized per the Presumptive Approach.
2. Provide a distinctive Catchment ID for each facility coordinated with the site basin map to correlate the appropriate calculations with the facility.
3. The maximum drainage catchment to be modeled per the Presumptive Approach is 1 acre (43,560 SF)
4. For infiltration facilities in Class A or B soils where no infiltration testing has been perfromed use an infiltration rate of 0.5 in/hr. For all facilities use a maximum soil infiltration rate of 2.5 in/hr for topsoil/growing medium.

Design Requirements:

Choose "Yes" from the dropdown boxes below next to the design standards requirements for this facility.

Pollution Reduction (PR)	Yes
Flow Control (FC)	Yes
Destination (DT)	Yes

*An infiltration facility must be chosen as the facility type to meet destination requirements

Site Data-Post Development

Total Square Footage Impervious Area=	12230	sqft	**Total Square Footage Pervious Area=**	0	sqft
Impervious Area CN=	98		**Pervious Area CN=**	85	
Total Square Footage of Drainage Area=	12303	sft	**Time of Concentration Post Development=**	5	min
Weighted Average CN=	97				

Site Data-Pre Development (Data in this section is only used if Flow Control is required)

Pre-Development CN=	73		**Time of Concentration Pre-Development=**	5	min

Soil Data

Tested Soil Infiltration Rate=	10	in/hr (See Note 4)	**Destination Design=**	4	in/hr
Design Soil Infiltration Rate=	4	in/hr	**Soil Infiltration Rate**		

Design Storms Used For Calculations

Requirement	Rainfall Depth		Design Storm
Pollution Reduction	0.8	inches	Water Quality
Flow Control	5.1	inches	Flood Control
Destination	5.1	inches	Flood Control

Facility Data

Facility Type=	Infiltration Rain Garden		**Facility Surface Area=**	1117.8	sqft
Surface Width=	20.7	ft	**Facility Surface Perimeter=**	149.4	ft
Surface Length=	54	ft	**Facility Bottom Area=**	706	sqft
Facility Side Slopes=	3	to 1	**Facility Bottom Perimeter=**	125	ft
Max. Ponding Depth in Stormwater Facility=	12	in	**Basin Volume=**	929.7	cf
Depth of Growing Medium (Soil)=	18	in	**Ratio of Facility Area to Impervious Area=**	0.091	

Pollution Reduction-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.046	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	592	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	0.0	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Pollution Reduction Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Flow Control-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.374	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	4865	cf	Total Overflow Volume=	0	cf
			Peak Off-Site Flow Rate		
Max. Depth of Stormwater in Facility=	9.6	in	Filtration Facility Underdrain=	N\A	cfs
Drawdown Time=	0.2	hours			

Pre-Development Runoff Data

Peak Flow Rate =	0.159	cfs
Total Runoff Volume =	2386	cf

Yes **Facility Sizing Meets Flow Control Standards?**

YES **Meets Requirement for Post Development offsite flow less or equal to Pre-Development Flow?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Destination-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.374	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	4865	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	9.6	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Destination Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 30 hour Drawdown Time?**

Stormwater Surface Filtration/Infiltration Facility Sizing Spreadsheet
24 Hour Storm, NRCS Type 1A Rainfall Distribution
City of Eugene

Version 2.1

Project Information

Project Name:	Myrtle Glenn PUD	**Date:**	2/1/2023
Project Address:	18-12-22-11-01200	**Permit Number:**	NA
	Florence, OR	**Catchment ID:**	2D
Designer:	Clint Beecroft		
Company:	EGR & Associates		

Instructions:

1. Complete this form for each drainage catchment in the project site that is to be sized per the Presumptive Approach.
2. Provide a distinctive Catchment ID for each facility coordinated with the site basin map to correlate the appropriate calculations with the facility.
3. The maximum drainage catchment to be modeled per the Presumptive Approach is 1 acre (43,560 SF)
4. For infiltration facilities in Class A or B soils where no infiltration testing has been perfromed use an infiltration rate of 0.5 in/hr. For all facilities use a maximum soil infiltration rate of 2.5 in/hr for topsoil/growing medium.

Design Requirements:

Choose "Yes" from the dropdown boxes below next to the design standards requirements for this facility.

Pollution Reduction (PR)	Yes
Flow Control (FC)	Yes
Destination (DT)	Yes

*An infiltration facility must be chosen as the facility type to meet destination requirements

Site Data-Post Development

Total Square Footage Impervious Area=	11172	sqft	**Total Square Footage Pervious Area=**	0	sqft
Impervious Area CN=	98		**Pervious Area CN=**	85	
Total Square Footage of Drainage Area=	11172	sft	**Time of Concentration Post Development=**	5	min
Weighted Average CN=	98				

Site Data-Pre Development (Data in this section is only used if Flow Control is required)

Pre-Development CN=	73		**Time of Concentration Pre-Development=**	5	min

Soil Data

Tested Soil Infiltration Rate=	10	in/hr (See Note 4)	**Destination Design=**	4	in/hr
Design Soil Infiltration Rate=	4	in/hr	**Soil Infiltration Rate**		

Design Storms Used For Calculations

Requirement	Rainfall Depth		Design Storm
Pollution Reduction	0.8	inches	Water Quality
Flow Control	5.1	inches	Flood Control
Destination	5.1	inches	Flood Control

Facility Data

Facility Type=	Infiltration Rain Garden		**Facility Surface Area=**	992.2	sqft
Surface Width=	20.5	ft	**Facility Surface Perimeter=**	137.8	ft
Surface Length=	48.4	ft	**Facility Bottom Area=**	615	sqft
Facility Side Slopes=	3	to 1	**Facility Bottom Perimeter=**	114	ft
Max. Ponding Depth in Stormwater Facility=	12	in	**Basin Volume=**	821.5	cf
Depth of Growing Medium (Soil)=	18	in	**Ratio of Facility Area to Impervious Area=**	0.089	

Pollution Reduction-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.046	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	582	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	0.0	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Pollution Reduction Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Flow Control-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.342	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	4481	cf	Total Overflow Volume=	0	cf
			Peak Off-Site Flow Rate		
Max. Depth of Stormwater in Facility=	10.2	in	Filtration Facility Underdrain=	N\A	cfs
Drawdown Time=	0.2	hours			

Pre-Development Runoff Data

Peak Flow Rate =	0.144	cfs
Total Runoff Volume =	2167	cf

Yes **Facility Sizing Meets Flow Control Standards?**

YES **Meets Requirement for Post Development offsite flow less or equal to Pre-Development Flow?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Destination-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.342	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	4481	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	10.2	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Destination Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 30 hour Drawdown Time?**

Stormwater Surface Filtration/Infiltration Facility Sizing Spreadsheet
24 Hour Storm, NRCS Type 1A Rainfall Distribution
City of Eugene

Version 2.1

Project Information

Project Name:	Myrtle Glenn PUD	**Date:**	2/1/2023
Project Address:	18-12-22-11-01200	**Permit Number:**	NA
	Florence, OR	**Catchment ID:**	2E
Designer:	Clint Beecroft		
Company:	EGR & Associates		

Instructions:

1. Complete this form for each drainage catchment in the project site that is to be sized per the Presumptive Approach.
2. Provide a distinctive Catchment ID for each facility coordinated with the site basin map to correlate the appropriate calculations with the facility.
3. The maximum drainage catchment to be modeled per the Presumptive Approach is 1 acre (43,560 SF)
4. For infiltration facilities in Class A or B soils where no infiltration testing has been perfromed use an infiltration rate of 0.5 in/hr. For all facilities use a maximum soil infiltration rate of 2.5 in/hr for topsoil/growing medium.

Design Requirements:

Choose "Yes" from the dropdown boxes below next to the design standards requirements for this facility.

Pollution Reduction (PR)	Yes
Flow Control (FC)	Yes
Destination (DT)	Yes

*An infiltration facility must be chosen as the facility type to meet destination requirements

Site Data-Post Development

Total Square Footage Impervious Area=	19025	sqft	**Total Square Footage Pervious Area=**	0	sqft
Impervious Area CN=	98		**Pervious Area CN=**	85	
Total Square Footage of Drainage Area=	19025	sft	**Time of Concentration Post Development=**	5	min
Weighted Average CN=	98				

Site Data-Pre Development (Data in this section is only used if Flow Control is required)

Pre-Development CN=	73		**Time of Concentration Pre-Development=**	5	min

Soil Data

Tested Soil Infiltration Rate=	10	in/hr (See Note 4)	**Destination Design=**	4	in/hr
Design Soil Infiltration Rate=	4	in/hr	**Soil Infiltration Rate**		

Design Storms Used For Calculations

Requirement	Rainfall Depth		Design Storm
Pollution Reduction	0.8	inches	Water Quality
Flow Control	5.1	inches	Flood Control
Destination	5.1	inches	Flood Control

Facility Data

Facility Type=	Infiltration Rain Garden		**Facility Surface Area=**	1521.57	sqft
Surface Width=	20.1	ft	**Facility Surface Perimeter=**	191.6	ft
Surface Length=	75.7	ft	**Facility Bottom Area=**	983	sqft
Facility Side Slopes=	3	to 1	**Facility Bottom Perimeter=**	168	ft
Max. Ponding Depth in Stormwater Facility=	12	in	**Basin Volume=**	1270.2	cf
Depth of Growing Medium (Soil)=	18	in	**Ratio of Facility Area to Impervious Area=**	0.080	

Pollution Reduction-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.079	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	992	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	0.0	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Pollution Reduction Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Flow Control-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.582	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	7631	cf	Total Overflow Volume=	0	cf
			Peak Off-Site Flow Rate		
Max. Depth of Stormwater in Facility=	11.7	in	Filtration Facility Underdrain=	N\A	cfs
Drawdown Time=	0.2	hours			

Pre-Development Runoff Data

Peak Flow Rate =	0.246	cfs
Total Runoff Volume =	3690	cf

Yes **Facility Sizing Meets Flow Control Standards?**

YES **Meets Requirement for Post Development offsite flow less or equal to Pre-Development Flow?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Destination-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.582	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	7631	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	11.7	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Destination Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 30 hour Drawdown Time?**

Stormwater Surface Filtration/Infiltration Facility Sizing Spreadsheet
24 Hour Storm, NRCS Type 1A Rainfall Distribution
City of Eugene

Version 2.1

Project Information

Project Name:	Myrtle Glenn PUD	**Date:**	2/1/2023
Project Address:	18-12-22-11-01200	**Permit Number:**	NA
	Florence, OR	**Catchment ID:**	2F
Designer:	Clint Beecroft		
Company:	EGR & Associates		

Instructions:

1. Complete this form for each drainage catchment in the project site that is to be sized per the Presumptive Approach.
2. Provide a distinctive Catchment ID for each facility coordinated with the site basin map to correlate the appropriate calculations with the facility.
3. The maximum drainage catchment to be modeled per the Presumptive Approach is 1 acre (43,560 SF)
4. For infiltration facilities in Class A or B soils where no infiltration testing has been perfromed use an infiltration rate of 0.5 in/hr. For all facilities use a maximum soil infiltration rate of 2.5 in/hr for topsoil/growing medium.

Design Requirements:

Choose "Yes" from the dropdown boxes below next to the design standards requirements for this facility.

Pollution Reduction (PR)	Yes
Flow Control (FC)	Yes
Destination (DT)	Yes

*An infiltration facility must be chosen as the facility type to meet destination requirements

Site Data-Post Development

Total Square Footage Impervious Area=	5145	sqft	**Total Square Footage Pervious Area=**	0	sqft
Impervious Area CN=	98		**Pervious Area CN=**	85	
Total Square Footage of Drainage Area=	5145	sft	**Time of Concentration Post Development=**	5	min
Weighted Average CN=	98				

Site Data-Pre Development (Data in this section is only used if Flow Control is required)

Pre-Development CN=	73		**Time of Concentration Pre-Development=**	5	min

Soil Data

Tested Soil Infiltration Rate=	10	in/hr (See Note 4)	**Destination Design=**	4	in/hr
Design Soil Infiltration Rate=	4	in/hr	**Soil Infiltration Rate**		

Design Storms Used For Calculations

Requirement	Rainfall Depth		Design Storm
Pollution Reduction	0.8	inches	Water Quality
Flow Control	5.1	inches	Flood Control
Destination	5.1	inches	Flood Control

Facility Data

Facility Type=	Infiltration Rain Garden		**Facility Surface Area=**	445.76	sqft
Surface Width=	19.9	ft	**Facility Surface Perimeter=**	84.6	ft
Surface Length=	22.4	ft	**Facility Bottom Area=**	228	sqft
Facility Side Slopes=	3	to 1	**Facility Bottom Perimeter=**	61	ft
Max. Ponding Depth in Stormwater Facility=	12	in	**Basin Volume=**	354.9	cf
Depth of Growing Medium (Soil)=	18	in	**Ratio of Facility Area to Impervious Area=**	0.087	

Pollution Reduction-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.021	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	268	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	0.0	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Pollution Reduction Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Flow Control-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.158	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	2064	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	11.7	in	Peak Off-Site Flow Rate Filtration Facility Underdrain=	N\A	cfs
Drawdown Time=	0.2	hours			

Pre-Development Runoff Data

Peak Flow Rate =	0.067	cfs
Total Runoff Volume =	998	cf

Yes **Facility Sizing Meets Flow Control Standards?**

YES **Meets Requirement for Post Development offsite flow less or equal to Pre-Development Flow?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Destination-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.158	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	2064	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	11.7	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Destination Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 30 hour Drawdown Time?**

Stormwater Surface Filtration/Infiltration Facility Sizing Spreadsheet
24 Hour Storm, NRCS Type 1A Rainfall Distribution
City of Eugene

Version 2.1

Project Information

Project Name:	Myrtle Glenn PUD	**Date:**	2/1/2023
Project Address:	18-12-22-11-01200	**Permit Number:**	NA
	Florence, OR	**Catchment ID:**	2G
Designer:	Clint Beecroft		
Company:	EGR & Associates		

Instructions:

1. Complete this form for each drainage catchment in the project site that is to be sized per the Presumptive Approach.
2. Provide a distinctive Catchment ID for each facility coordinated with the site basin map to correlate the appropriate calculations with the facility.
3. The maximum drainage catchment to be modeled per the Presumptive Approach is 1 acre (43,560 SF)
4. For infiltration facilities in Class A or B soils where no infiltration testing has been perfromed use an infiltration rate of 0.5 in/hr. For all facilities use a maximum soil infiltration rate of 2.5 in/hr for topsoil/growing medium.

Design Requirements:

Choose "Yes" from the dropdown boxes below next to the design standards requirements for this facility.

Pollution Reduction (PR)	Yes
Flow Control (FC)	Yes
Destination (DT)	Yes

*An infiltration facility must be chosen as the facility type to meet destination requirements

Site Data-Post Development

Total Square Footage Impervious Area=	4175	sqft	**Total Square Footage Pervious Area=**	0	sqft
Impervious Area CN=	98		**Pervious Area CN=**	85	
Total Square Footage of Drainage Area=	4175	sft	**Time of Concentration Post Development=**	10	min
Weighted Average CN=	98				

Site Data-Pre Development (Data in this section is only used if Flow Control is required)

Pre-Development CN=	73		**Time of Concentration Pre-Development=**	5	min

Soil Data

Tested Soil Infiltration Rate=	10	in/hr (See Note 4)	**Destination Design=**	4	in/hr
Design Soil Infiltration Rate=	4	in/hr	**Soil Infiltration Rate**		

Design Storms Used For Calculations

Requirement	Rainfall Depth		Design Storm
Pollution Reduction	0.8	inches	Water Quality
Flow Control	5.1	inches	Flood Control
Destination	5.1	inches	Flood Control

Facility Data

Facility Type=	Infiltration Stormwater Planter		**Facility Surface Area=**	272	sqft
Surface Width=	4	ft	**Facility Surface Perimeter=**	144	ft
Surface Length=	68	ft	**Facility Bottom Area=**	272	sqft
Facility Side Slopes=	0	to 1	**Facility Bottom Perimeter=**	144	ft
Max. Ponding Depth in Stormwater Facility=	12	in	**Basin Volume=**	272.0	cf
Depth of Growing Medium (Soil)=	18	in	**Ratio of Facility Area to Impervious Area=**	0.065	

Pollution Reduction-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.016	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	217	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	0.0	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Pollution Reduction Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Flow Control-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.114	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	1671	cf	Total Overflow Volume=	0	cf
			Peak Off-Site Flow Rate		
Max. Depth of Stormwater in Facility=	11.5	in	Filtration Facility Underdrain=	N\A	cfs
Drawdown Time=	0.2	hours			

Pre-Development Runoff Data

Peak Flow Rate =	0.054	cfs
Total Runoff Volume =	810	cf

Yes **Facility Sizing Meets Flow Control Standards?**

YES **Meets Requirement for Post Development offsite flow less or equal to Pre-Development Flow?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Destination-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.114	cfs	Peak Facility Overflow Rate=	0.000	cfs
Total Runoff Volume to Stormwater Facility =	1671	cf	Total Overflow Volume=	0	cf
Max. Depth of Stormwater in Facility=	11.5	in			
Drawdown Time=	0.2	hours			

Yes **Facility Sizing Meets Destination Standards?**

YES **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 30 hour Drawdown Time?**

Worksheet for West Pipe-25 Year Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00500	ft/ft
Diameter	1.50	ft
Discharge	2.68	ft³/s

Results

Normal Depth	0.62	ft
Flow Area	0.69	ft²
Wetted Perimeter	2.10	ft
Hydraulic Radius	0.33	ft
Top Width	1.48	ft
Critical Depth	0.62	ft
Percent Full	41.5	%
Critical Slope	0.00506	ft/ft
Velocity	3.86	ft/s
Velocity Head	0.23	ft
Specific Energy	0.85	ft
Froude Number	0.99	
Maximum Discharge	7.99	ft³/s
Discharge Full	7.43	ft³/s
Slope Full	0.00065	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	41.55	%
Downstream Velocity	Infinity	ft/s

Worksheet for West Pipe-25 Year Flow

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.62	ft
Critical Depth	0.62	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00506	ft/ft

Worksheet for East Pipe-25 Year Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00500	ft/ft
Diameter	1.00	ft
Discharge	0.49	ft³/s

Results

Normal Depth	0.30	ft
Flow Area	0.20	ft²
Wetted Perimeter	1.16	ft
Hydraulic Radius	0.17	ft
Top Width	0.92	ft
Critical Depth	0.29	ft
Percent Full	29.9	%
Critical Slope	0.00562	ft/ft
Velocity	2.48	ft/s
Velocity Head	0.10	ft
Specific Energy	0.39	ft
Froude Number	0.94	
Maximum Discharge	2.71	ft³/s
Discharge Full	2.52	ft³/s
Slope Full	0.00019	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	29.90	%
Downstream Velocity	Infinity	ft/s

Worksheet for East Pipe-25 Year Flow

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.30	ft
Critical Depth	0.29	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00562	ft/ft

Swale 1A 25-year Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.350	
Channel Slope	0.00500	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	2.00	ft
Discharge	0.06	ft³/s

Results

Normal Depth	0.23	ft
Flow Area	0.65	ft²
Wetted Perimeter	3.86	ft
Hydraulic Radius	0.17	ft
Top Width	3.80	ft
Critical Depth	0.03	ft
Critical Slope	5.89961	ft/ft
Velocity	0.09	ft/s
Velocity Head	0.00	ft
Specific Energy	0.23	ft
Froude Number	0.04	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.23	ft
Critical Depth	0.03	ft
Channel Slope	0.00500	ft/ft

Swale 1A 25-year Flow

GVF Output Data

Critical Slope	5.89961	ft/ft

Swale 1B 25-Year Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.350	
Channel Slope	0.00500	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	2.00	ft
Discharge	0.24	ft³/s

Results

Normal Depth	0.46	ft
Flow Area	1.77	ft²
Wetted Perimeter	5.79	ft
Hydraulic Radius	0.30	ft
Top Width	5.68	ft
Critical Depth	0.07	ft
Critical Slope	4.49200	ft/ft
Velocity	0.14	ft/s
Velocity Head	0.00	ft
Specific Energy	0.46	ft
Froude Number	0.04	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.46	ft
Critical Depth	0.07	ft
Channel Slope	0.00500	ft/ft

Swale 1B 25-Year Flow

GVF Output Data

Critical Slope	4.49200	ft/ft

Swale 1C 25-Year Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.350	
Channel Slope	0.00500	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	2.00	ft
Discharge	0.11	ft³/s

Results

Normal Depth	0.31	ft
Flow Area	1.00	ft²
Wetted Perimeter	4.56	ft
Hydraulic Radius	0.22	ft
Top Width	4.48	ft
Critical Depth	0.04	ft
Critical Slope	5.21490	ft/ft
Velocity	0.11	ft/s
Velocity Head	0.00	ft
Specific Energy	0.31	ft
Froude Number	0.04	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.31	ft
Critical Depth	0.04	ft
Channel Slope	0.00500	ft/ft

Swale 1C 25-Year Flow

GVF Output Data

Critical Slope	5.21490	ft/ft

Planter 1D 25-Year Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.350	
Channel Slope	0.00500	ft/ft
Bottom Width	3.50	ft
Discharge	0.13	ft³/s

Results

Normal Depth	0.30	ft
Flow Area	1.06	ft²
Wetted Perimeter	4.11	ft
Hydraulic Radius	0.26	ft
Top Width	3.50	ft
Critical Depth	0.04	ft
Critical Slope	5.59828	ft/ft
Velocity	0.12	ft/s
Velocity Head	0.00	ft
Specific Energy	0.30	ft
Froude Number	0.04	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.30	ft
Critical Depth	0.04	ft
Channel Slope	0.00500	ft/ft
Critical Slope	5.59828	ft/ft

Swale 1E 25-Year Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.350	
Channel Slope	0.00500	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	2.00	ft
Discharge	0.15	ft³/s

Results

Normal Depth	0.36	ft
Flow Area	1.26	ft²
Wetted Perimeter	5.00	ft
Hydraulic Radius	0.25	ft
Top Width	4.91	ft
Critical Depth	0.05	ft
Critical Slope	4.90771	ft/ft
Velocity	0.12	ft/s
Velocity Head	0.00	ft
Specific Energy	0.36	ft
Froude Number	0.04	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.36	ft
Critical Depth	0.05	ft
Channel Slope	0.00500	ft/ft

Swale 1E 25-Year Flow

GVF Output Data

Critical Slope	4.90771	ft/ft

Swale 1F 25-Year Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.350	
Channel Slope	0.00500	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	2.00	ft
Discharge	0.12	ft³/s

Results

Normal Depth	0.32	ft
Flow Area	1.07	ft²
Wetted Perimeter	4.67	ft
Hydraulic Radius	0.23	ft
Top Width	4.59	ft
Critical Depth	0.05	ft
Critical Slope	5.11754	ft/ft
Velocity	0.11	ft/s
Velocity Head	0.00	ft
Specific Energy	0.32	ft
Froude Number	0.04	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.32	ft
Critical Depth	0.05	ft
Channel Slope	0.00500	ft/ft

Swale 1F 25-Year Flow

GVF Output Data

Critical Slope	5.11754	ft/ft

Swale 1G 25-Year Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.350	
Channel Slope	0.00500	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	2.00	ft
Discharge	0.08	ft³/s

Results

Normal Depth	0.26	ft
Flow Area	0.80	ft²
Wetted Perimeter	4.16	ft
Hydraulic Radius	0.19	ft
Top Width	4.10	ft
Critical Depth	0.04	ft
Critical Slope	5.56087	ft/ft
Velocity	0.10	ft/s
Velocity Head	0.00	ft
Specific Energy	0.26	ft
Froude Number	0.04	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.26	ft
Critical Depth	0.04	ft
Channel Slope	0.00500	ft/ft

Swale 1G 25-Year Flow

GVF Output Data

Critical Slope	5.56087	ft/ft

Swale 1H 25-Year Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.350	
Channel Slope	0.00500	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	2.00	ft
Discharge	0.16	ft³/s

Results

Normal Depth	0.38	ft
Flow Area	1.32	ft²
Wetted Perimeter	5.10	ft
Hydraulic Radius	0.26	ft
Top Width	5.00	ft
Critical Depth	0.06	ft
Critical Slope	4.84598	ft/ft
Velocity	0.12	ft/s
Velocity Head	0.00	ft
Specific Energy	0.38	ft
Froude Number	0.04	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.38	ft
Critical Depth	0.06	ft
Channel Slope	0.00500	ft/ft

Swale 1H 25-Year Flow

GVF Output Data

Critical Slope	4.84598	ft/ft

Planter 2G 25-Year Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.350	
Channel Slope	0.00500	ft/ft
Bottom Width	4.00	ft
Discharge	0.11	ft³/s

Results

Normal Depth	0.25	ft
Flow Area	1.00	ft²
Wetted Perimeter	4.50	ft
Hydraulic Radius	0.22	ft
Top Width	4.00	ft
Critical Depth	0.03	ft
Critical Slope	5.94043	ft/ft
Velocity	0.11	ft/s
Velocity Head	0.00	ft
Specific Energy	0.25	ft
Froude Number	0.04	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.25	ft
Critical Depth	0.03	ft
Channel Slope	0.00500	ft/ft
Critical Slope	5.94043	ft/ft

APPENDIX C

FLORENCE STORMWATER MANUAL EXCERPTS

Stormwater Planters

See **Appendix I.1 SW-130** for typical private property planter detail and
Appendix I.3 SW-310 through **SW-313** for typical Green Street planter details.

Description: Stormwater planters are structural landscaped reservoirs used to collect, filter, and/or infiltrate stormwater runoff, allowing pollutants to settle and filter out as the water percolates through the planter soil before infiltrating into the ground below or piped to its downstream destination. In addition to providing pollution reduction, flow rates and volumes can also be managed with stormwater planters. Stormwater planters can be used to help fulfill a site's required landscaping area requirement and should be integrated into the overall site design. Numerous design variations of shape, wall treatment, and planting scheme can be used to fit the character of a site. Stormwater planters may provide either "infiltration treatment" or "filtration treatment".

5.4.1 Infiltration Stormwater Planters:

Groundwater In high groundwater areas, groundwater must be addressed per Section 4.6.

Construction Considerations: Location of *Infiltration Stormwater Planters* should be clearly marked before site work begins to avoid soil disturbance during construction. No vehicular traffic, except that specifically used to construct the facility, should be allowed within 10 feet facility areas.

Soil: Topsoil shall be used within the top 18 inches of the facility per **Appendix B** to support plant growth. Maximum design infiltration rate of the facility is controlled by the infiltration rate of the growing medium and shall not be greater than 4 in/hr. With a demonstrated hardship, higher design infiltration rates may be used with the infiltration blend soil (see **Appendix B)** if stormwater from vehicular surfaces is pretreated. Design infiltration rate shall be demonstrated with testing certified by a professional Engineer or Geologist and shall not exceed 10 inches per hour. The bottom shall be covered in non-floatable mulch or washed pea gravel.

Dimensions and Slopes: See **Appendix I** for detail drawings. Facility storage depth must be at least 9 inches, unless a larger than- required planter square-footage is used. Minimum *Infiltration Stormwater Planter* width is 30 inches. Planters shall be constructed without slope.

Setbacks: Required setback for *Infiltration Stormwater Planters* is 5 feet from property lines and 10 feet from structures. Easements for non-buildable areas on adjacent properties may be required if facilities are located next to property lines.

5.4.2 Filtration Stormwater Planters:

Design Considerations: These facilities are appropriate for facilities located within 10-feet of building foundations or in high groundwater areas with an approved impermeable membrane. Filtration Planters shall only be used where infiltration planters are not feasible.

Construction Considerations:
Special attention needs to be paid to the planter waterproofing if constructed adjacent to building structures. The walls of a *Filtration Stormwater Planter* can often times be incorporated with the building foundation plans. The bottom of *Filtration Stormwater Planters* must be lined with an impermeable membrane of 60 mil plastic film.

Soil: Topsoil shall be used within the top 18 inches of the facility per **Appendix B** to support plant growth. Maximum design infiltration rate of the facility is controlled by the infiltration rate of the growing medium and shall not be greater than 4 in/hr. With a demonstrated hardship, higher design infiltration rates may be used with the infiltration blend soil (see **Appendix B)** if stormwater from vehicular surfaces is pretreated. Design infiltration rate shall be demonstrated with testing certified by a professional Engineer or Geologist and shall not exceed 10 inches per hour. The bottom shall be covered in non-floatable mulch or washed pea gravel.

Dimensions and Slopes: Facility storage depth must be at least 9 inches, unless a larger than-required planter square-footage is used. Minimum *Filtration Stormwater Planter* width is 18 inches. Planters shall be constructed without slope.

Setbacks: A setback for *Filtration Stormwater Planters* is not required.

5.4.3 General Requirements

Planter Walls: Planter walls shall be made of stone, concrete, brick, wood, or other durable material. Chemically treated wood that can leach out toxic chemicals and contaminate stormwater shall not be used.

Simplified Sizing: Individual Stormwater Planters sized with the Simplified Approach shall be designed to receive less than 0.5 acre of impervious area runoff. For stormwater planters a Simplified Approach sizing factor of 0.06 may be used to receive credit.

Presumptive Method Sizing: The Presumptive Approach may be used to downsize the Simplified Approach sizing factor. The applicant shall size stormwater planter to have sufficient storage

volume for the entire 25 year storm. Planters shall be designed to pond water for less than 18 hours after each storm event.

Landscaping: Plantings shall be designed at the following quantities per **100** square feet of facility area. Facility area is equivalent to the area of the planter.

Zone A (wet): 115 herbaceous plants or 100 herbaceous plants and 4 small shrubs

Note: Tree planting is not required in planters, but tree planting is encouraged near planters.

Checklist of minimal information to be shown on the permit drawings:

1) Facility dimensions and setbacks from property lines and structures
2) Profile view of facility, including typical cross-sections with dimensions
3) Planter wall material and waterproofing membrane specification
4) Growing medium specification
5) Drain rock specification (if applicable)
6) Filter fabric specification (if applicable)
7) All stormwater piping associated with the facility, including pipe materials, sizes, slopes, and invert elevations at every bend or connection (if applicable)
8) Stormwater destination
9) Landscaping plan

Inspection requirements and schedule: The following table shall be used to determine which stormwater facility components require City inspection, and when the inspection shall be requested. Please note that, while not all facility components may require an inspection call, inspectors will inspect for all required components in the field.

Facility Component Inspection Requirement

Planter grading/ excavation	
Structural components/ liner	Call for Inspection
Piping (if applicable)	Call for Inspection
Filter fabric (if applicable)	
Growing medium	Call for Inspection
Plantings	Call for Inspection

Operations and Maintenance requirements: See **Chapter 6**

5.5 Rain Gardens

See **Appendix I.1 SW-140** for typical rain garden details.

Description: Rain gardens are landscaped reservoirs used to collect, filter, and/or infiltrate stormwater runoff, allowing pollutants to settle and filter out as the water percolates through the planter soil before infiltrating into the ground below or being piped to its downstream destination. In addition to providing pollution reduction, flow rates and volumes can also be managed with rain gardens. Rain gardens can be used to help fulfill a site's required landscaping area requirement and should be integrated into the overall site design. Numerous design variations of shape, and planting scheme can be used to fit the character of a site. Rain gardens may provide either "infiltration treatment" or "filtration treatment".

Simplified Method Sizing: A Simplified Approach sizing factor of 0.06 may be used to receive credit for pollution reduction and flow control. The square-footage is determined at the peak water surface prior to overflow.

Presumptive Method Sizing: The Presumptive Approach may be used to downsize the Simplified Approach sizing factor. The applicant shall size stormwater planter to have sufficient storage volume for the entire 25 year storm. Planters shall be designed to pond water for less than 18 hours after each storm event.

Soil: Topsoil shall be used within the top 18 inches of the facility per **Appendix B** to support plant growth. Maximum design infiltration rate of the facility is controlled by the infiltration rate of the growing medium and shall not be greater than 4 in/hr. With a demonstrated hardship, higher design infiltration rates may be used with the infiltration blend soil (see **Appendix B)** if stormwater from vehicular surfaces is pretreated. Design infiltration rate shall be demonstrated with testing certified by a professional Engineer or Geologist and shall not exceed 10 inches per hour. The bottom shall be covered in non-flotable mulch or washed pea gravel.

Geometry/Slopes: See **Appendix I** for detail drawings.

• There is no shape requirement for rain gardens. They can be designed as square, rectangular, circular, oblong, or irregular.
• The minimum width for any rain garden shall be 5 feet.
• The maximum side slopes within rain gardens shall be 3 horizontal to 1 vertical.
• The minimum ponding depth shall be 6 inches. Maximum ponding depth shall be 12 inches during water quality storm.
• The minimum depth of soil amendment for rain gardens shall be 18 inches. See Appendix B for the required soil amendment specifications to be included with the permit plans.

5.5.1 Infiltration Rain Gardens:

Infiltration Rain Gardens- Applicability: Infiltration rain gardens are used to manage stormwater flowing from all types of impervious surfaces on private property and from the public right-of-way. If located within 10 feet from building foundations or upslope of building structures, a filtration rain garden must be used instead with an impermeable liner.

Groundwater In high groundwater areas, groundwater must be addressed per Section 4.6.

Piping for Infiltration Rain Gardens: Piping per Plumbing Code requirements shall be used to direct stormwater from impervious if used within the public street right-of-way or within or surfaces to infiltration rain gardens, or adjacent to parking lot areas, stormwater may flow directly into them via curb openings. An overflow drain, when required, shall be constructed to allow at least 6 inches but not more than 12 inches of water to pond in the rain garden prior to overflow. On private property, this overflow drain and piping must meet Plumbing Code requirements and shall direct excess stormwater to an approved disposal point as identified on the Public Works Permit drawings.

Within the public street right-of-way, this overflow drain and piping must meet City of Florence Public Works Standards and shall direct excess stormwater to an approved disposal point.

5.5.2 Filtration Rain Gardens:

Filtration Rain Gardens- Applicability: Filtration rain gardens are used to manage stormwater flowing from all types of impervious surfaces on private property, when rain garden must be located within 10 feet of building foundations, immediately upslope of building structures.

Piping for Filtration Rain Gardens: Piping per Plumbing Code requirements shall be used to direct stormwater from impervious surfaces to filtration rain gardens, or if used within or adjacent to parking lot areas, stormwater may flow directly into them via curb openings. An overflow drain shall be constructed to allow at least 6 inches but not more than 12 inches of water to pond in the rain garden prior to overflow. A perforated system of pipes shall be constructed 18” under the filtration rain to drain water that has filtered through the topsoil and prevent long-term ponding. On private property, this overflow drain and piping must meet Plumbing Code requirements and shall dire excess and filtered stormwater to an approved disposal point as identified on the subdivision’s Public Works Permit drawings.

5.5.3 General Requirements

Setbacks

For infiltration rain gardens and filtration rain gardens without an impermeable liner:

- Minimum setback from building structures shall be 10 feet.
- Infiltration rain gardens or filtration rain gardens without a liner may not be located immediately upslope of building structures.
- There is not a required setback for filtration rain garden as long as an impermeable 60 mils a PVC liner is used.
- Infiltration rain gardens shall be set back a minimum of 5 feet from property lines.

Landscaping: Vegetation provides filtration and root uptake functions, protects from rain and wind erosion, and enhances aesthetic conditions. Plantings shall be designed at the following quantities per **100** square feet of facility area. Facility area is equivalent to the area of the rain garden calculated from Form SIM.

Zone A (wet): 115 herbaceous plants or 100 herbaceous plants and 4 small shrubs
Zone B (moderate to dry): 1 tree, 3 large shrubs/small trees, and 4 small shrubs.

Facility Component Inspection Requirement

Rain Garden grading/ excavation	
Structural components/ liner	Call for Inspection
Piping (if applicable)	Call for Inspection
Filter fabric (if applicable)	
Growing medium	Call for Inspection
Plantings	Call for Inspection

Operations and Maintenance requirements: See **Chapter 6**

5.3 Vegetated Swales

See **Appendix I SW-120** for typical private property swale detail and **Appendix I SW-300-302** for typical Green Street swale details.

Description: Swales are long and narrow landscaped depressions used to collect and convey stormwater runoff, allowing pollutants to settle and filter out as the water flows from one bay to the next through the facility. Swales should be integrated into the overall site design and can be used to help fulfill a site's required landscaping area requirement.

Design Considerations: When designing swales, slopes and depth should be kept as mild as possible to avoid safety risks, improve aesthetics, and prevent erosion within the facility. For street swales in the public right-of-way all applicable City requirements for other street elements (curbs, sidewalks, trees, etc.) must be met. Swales located next to public sidewalks shall have a minimum 12"-wide flat area between the swale and the sidewalk.

Construction Considerations: Swale areas should be clearly marked before site work begins to avoid soil disturbance and compaction during construction.

Design Requirements:

Groundwater In high groundwater areas, groundwater must be addressed per **Section 4.6**.

Growing Medium: Topsoil shall be used within the top 18 inches of the facility per **Appendix B** to support plant growth. Maximum design infiltration rate of the facility is controlled by the infiltration rate of the growing medium and shall not be greater than 4 in/hr. With a demonstrated hardship, higher design infiltration rates may be used with the infiltration blend soil (see **Appendix B)** if stormwater from vehicular surfaces is pretreated. Design infiltration rate shall be demonstrated with testing certified by a professional Engineer or Geologist and shall not exceed 10 inches per hour. Areas subject to inundation shall be covered in non-floatable mulch or washed pea gravel. Side slopes shall be covered with suitable mulch such as fine or medium hemlock bark mulch.

Dimensions and Slopes: See **Appendix I** for detail drawings. The minimum swale width is 5 feet on private property and 8 feet on streets. A 2-foot-wide flat bottom width is required where feasible. Swales designed with the Simplified Approach are 9 inches deep measured from the top

of the growing medium to the overflow inlet elevation. Swales designed with the Presumptive Approach vary in depth from 6 to 12 inches. In all cases, maximum side slopes are 3 horizontal to 1 vertical and 4 horizontal to 1 vertical is required immediately adjacent to pedestrian areas. Maximum longitudinal slope is 6 percent. Freeboard for swales must be noted on the plans. Freeboard can be defined as the vertical distance between the design water surface elevation and overtopping elevation or the vertical distance between the top of the check dam and the outside berm or curb elevation (whichever is lower).

Flow spreader: The swale shall incorporate a flow-spreading device at the inlet to the swale. The flow spreader shall provide a uniform flow distribution across the swale bottom. Private swales may use riprap to disperse the flow from the inlet pipe. In swales with a bottom width greater than 6 feet, a flow spreader shall be installed at least every 50 feet.

Check dams: Check dams are required in swales to allow water to pool and infiltrate into the ground. They shall be constructed of durable, non-toxic materials such as rock, brick, concrete, or soil by integrating these materials into the grading of the swale. Check dams are as long as the width of the swale, perpendicular to flow line. They generally form a 12 inch wide bench on top and measure 4 to 10 inches high, depending on the depth of the facility. See **Appendix I.3 SW-340** for typical check dam details.

Access routes: Access routes to the swale for maintenance purposes must be shown on the plans. Public swales require a minimum 10-foot wide access route for maintenance, not to exceed 10 percent in slope.

Setbacks: Required setback from building foundations is 10 feet unless lined with impermeable fabric. Easements for non-buildable areas on adjacent properties may be required if facilities are located next to property lines.

Simplified Approach Sizing: Swales sized with the Simplified Approach shall be designed to receive less than 0.5 acre of impervious area runoff. For these projects, a Simplified Approach sizing factor of 0.09 for vegetated swales may be used to receive credit for pollution reduction. Swales with greater than 0.5 acre of impervious area to manage must use the Presumptive Approach to size the swale.

Presumptive Approach Sizing Criteria:

1) Pollution Reduction Criteria (no flow control): The swale width and profile shall be designed to convey runoff from the Water Quality Design Storm (See Table 4.2) and shall meet the following criteria:

- Maximum flow depth during the Water Quality Design Storm is 4 inches.
- Maximum water velocity during the Water Quality Design Storm is 0.9 feet per second.
- Minimum hydraulic residence time (time for design flow rate to pass through the swale) of 9 minutes. (if infiltration not possible)
- Minimum longitudinal slope of 0.5 percent, maximum slope of 6 percent. For slopes greater than 2 percent, check dams shall be used (one dam every 12 feet).
- Designed using a Manning "n" value of 0.35 for vegetated swales.

2) Flow Control Criteria: In order for swale facilities to meet flow control requirements under the presumptive approach the swale shall be designed to store and infiltrate the entire 25 yr Design Storm. The areas behind each check dam shall be modeled as individual infiltration basins varying in depth from the height of the check dam to zero. The length of the pool is dependent on the height of the check dam and the slope of the swale.

3) Vegetation shall be established as soon as possible after the swale is completed, and before water is allowed to enter the facility.

4) Unless vegetation is established, biodegradable erosion control matting appropriate for low-velocity flows (approximately 1 foot per second) shall be installed in the flow area of the swale before allowing water to flow through the swale.

Landscaping:

Vegetated Swales

Vegetation provides filtration and root uptake functions, protects from rain and wind erosion, and enhances aesthetic conditions. The "facility area" is equivalent to the area of the swale, including bottom and side slopes. The minimum plant material quantities per **100** square feet of facility area shall be as follows:

Private Swales:

Zone A (wet): 115 herbaceous plants or 100 herbaceous plants and 4 small shrubs
Zone B (moderate to dry): 1 tree, 3 large shrubs/small trees, 4 small shrubs, and 140 groundcover plants

Public Swales:

Zone A (wet): 115 herbaceous plants or 100 herbaceous plants and 4 small shrubs
Zone B (moderate to dry): 12 small shrubs, and 70 groundcover plants

The delineation between Zone A and Zone B shall be either the height of the check dam or the overflow outlet elevation which ever is lower.

Trees: For private swales, the following evergreen or deciduous trees shall be retained or planted within or adjacent to the swale and continuing approximately 30 feet on center the length of the swale:

Evergreen trees: Minimum height: 6 feet
Deciduous trees: Minimum caliper: 1 ½ inches at 6 inches above base.

Stormwater Report Requirements For Presumptive Approach:
Checklist of minimal information to be shown on the permit drawings:

1) Facility dimensions and setbacks from property lines and structures

2) Profile view of facility, including typical cross-sections with dimensions
3) Growing medium specification
4) Filter fabric specification (if applicable)
5) All curb cut details and stormwater piping associated with the facility, including pipe materials, sizes, slopes, and invert elevations at every bend or connection
6) Landscaping plan

Inspection requirements and schedule: The following table shall be used to determine which stormwater facility components require City inspection, and when the inspection shall be requested:

Facility Component Inspection Requirement

Swale grading	
Curbs / curb cuts	Call for Inspection
Piping (if applicable)	Call for Inspection
Filter fabric (if applicable)	
Growing medium	Call for Inspection
Plantings/seeding/sod	Call for Inspection

Operations and Maintenance requirements: See **Chapter 6**.

APPENDIX D

PRE-DEVELOPED VERSUS POST-DEVELOPED RUNOFF

Presumptive Approach calculations were performed utilizing the City of Eugene Stormwater Surface Filtration/Infiltration Facility Sizing Spreadsheet. This calculator is an Excel-based spreadsheet that is downloadable from the City of Eugene web page. Runoff calculations are based on Santa Barbara Unit Hydrograph method for a 24-hour storm, NRCS Type 1A rainfall distribution. Pre- and post-developed peak runoff from each basin as calculated in the "flow control calculation results" section of the worksheet (see worksheets in Appendix B) and are summarized below.

Pre- and post-developed peak flows are based on the pre- and post-developed time of concentration (Tc), determined following the procedures in Appendix C.1: SBUH Method, Portland Stormwater Management Manual – August 1, 2008 (Appendix C.1). For shallow concentrated flow over paved surfaces, the flow velocity can be calculated as:

$$V = 20.3282(s)^{0.5}$$

Per Appendix C.1, minimum time of concentration is 5 minutes. Longer times of concentration reduces calculated peak flow, so for developed conditions the maximum time of concentration is conservatively selected to be 10 minutes.

Post-Developed Time of Concentration

The post-developed time of concentration is the travel time of runoff flowing over the street impervious surfaces plus the travel time of flow through the stormwater facility to the outlet. Basin 1A has the shortest time of concentration for developed conditions. The length of street impervious surfaces is approximately 17 feet at a two-percent slope to the gutter then one-half percent slope to the stormwater facility. Stormwater facilities adjacent to the street have one-half percent slope.

For shallow concentrated flow over paved surfaces, the flow velocities are:

$$V(2\%) = 20.3282(0.02)^{0.5} = 2.9 \text{ fps}$$

$$V(0.5\%) = 20.3282(0.005)^{0.5} = 1.44 \text{ fps}$$

Travel times for street surfaces are based on 17 feet at 2-percent slope and 15 feet at one-half percent slope, as follows:

$$Tt = 17 \text{ ft}/(60 \times 2.9 \text{ fps}) = 0.1 \text{ minute}$$

$$Tt = 15 \text{ ft}/(60 \times 1.44 \text{ fps}) = 0.2 \text{ minute}$$

The worksheet for Basin 1A (in Appendix B) shows a peak runoff of approximately 0.056 cfs. Flow velocity in the swale is approximately 0.1 fps (see worksheets for channel flows in Appendix B). The swale bottom length is 39 feet.

$$Tt = 39 \text{ ft}/(60 \times 0.1 \text{ fps}) = 6.5 \text{ minutes.}$$

Tc = 0.1 minute + 0.2 minute + 6.5 minutes = 6.8 minutes.

Thus, a post-developed time of concentration of 7 minutes is used for Basin 1A. The calculated time of concentration for all other stormwater swales and planters exceed 10 minutes, thus a maximum of 10 minutes is used. Travel distances to the rain gardens in Basins 2A through 2F are short resulting in travel times of less than 5 minutes, thus a minimum time of concentration of 5 minutes is used for the rain gardens.

Pre-Developed Time of Concentration

Rain that falls onto the site collects temporarily in localized depressions and quickly infiltrates into the sand. During times of low groundwater levels there is no stormwater runoff from the site (i.e. Tc = 0). During times of high groundwater levels when water is at the surface runoff will occur in a manner that mimics a paved surface. Basin 1B has the longest travel distance at approximately 263 feet. For an average ground slope of one percent over a travel length of 263 feet, the travel time is:

$$V = 20.3282(0.01)^{0.5} = 2.0 \text{ fps; } Tt = 263 \text{ ft}/(60x2.0 \text{ fps}) = 2.2 \text{ minutes}$$

Per Appendix C.1, minimum time of concentration is 5 minutes. Travel distances for all other basins are less than for Basin 1B, thus a pre-developed time of concentration of 5 minutes is used for all basins.

Pre-Developed and Post-Developed Runoff

The following summarizes the pre-developed peak flow rate of each basin, post-developed peak flow rate to the respective stormwater facility, and the peak facility overflow rate from the stormwater facility for each basin. These numbers were obtained from the "Flow Control Calculation Results" section of the facility sizing spreadsheets in Appendix B.

Basin I.D.	Pre-Developed Peak Flow Rate, cfs	Post-Developed	
		Peak Flow Rate to Facility, cfs	Peak Overflow Rate from Facility, cfs
1A	0.025	0.056	0.0
1B	0.112	0.238	0.0
1C	0.050	0.106	0.0
1D	0.062	0.131	0.0
1E	0.069	0.147	0.0
1F	0.059	0.125	0.0
1G	0.037	0.078	0.0
1H	0.075	0.158	0.0
2A	0.064	0.152	0.0
2B	0.163	0.387	0.0
2C	0.159	0.374	0.0
2D	0.144	0.342	0.0
2E	0.246	0.582	0.0
2F	0.067	0.158	0.0
2G	0.054	0.114	0.0

APPENDIX E

FLORENCE STORMWATER DESIGN MANUAL

EXCERPTED

OPERATION AND MAINTENANCE PLANS

Stormwater Planters

Operations & Maintenance Plan

Planters are designed to allow runoff to filter through layers of topsoil (thus capturing pollutants) and then either infiltrate into the native soils (infiltration planter) or be collected in a pipe to be discharged off-site (flow-through planter). The planter is sized to accept runoff and temporarily store the water in a reservoir on top of the soil. The flow-through planter is designed with an impervious bottom or is placed on an impervious surface. Water should drain through the planter within 3-4 hours after a storm event. All facility components and vegetation shall be inspected for proper operations and structural stability. These inspections shall occur, at a minimum, quarterly for the first 2 years from the date of installation, 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Downspout from rooftop or sheet flow from paving allows unimpeded stormwater flow to the planter.

- Debris shall be removed routinely (e.g., no less than every 6 months) and upon discovery.
- Damaged pipe shall be repaired upon discovery.

Splash Blocks prevent splashing against adjacent structures and convey water without disrupting media.

- Any deficiencies in structure such as cracking, rotting, and failure shall be repaired.

Planter Reservoir receives and detains storm water prior to infiltration. Water should drain from reservoir within 3-4 hours of storm event.

- Sources of clogging shall be identified and corrected.
- Topsoil may need to be amended with sand or replaced all together.

Filter Media consisting of sand, gravel, and topsoil shall allow stormwater to percolate uniformly through the planter.

The planter shall be excavated and cleaned, and gravel or soil shall be replaced to correct low infiltration rates.

- Holes that are not consistent with the design and allow water to flow directly through the planter to the ground shall be plugged.
- Sediment accumulation shall be hand removed with minimum damage to vegetation using proper erosion control measures. Sediment shall be removed if it is more than 4 inches thick or so thick as to damage or kill vegetation.
- Litter and debris shall be removed routinely (e.g., no less than quarterly) and upon discovery.

Planter shall contain filter media and vegetation.

- Structural deficiencies in the planter including rot, cracks, and failure shall be repaired.

Overflow Pipe safely conveys flow exceeding reservoir capacity to an approved stormwater receiving system.

- Overflow pipe shall be cleared of sediment and debris when 50% of the conveyance capacity is plugged.
- Damaged pipe shall be repaired or replaced upon discovery.

Vegetation shall be healthy and dense enough to provide filtering while protecting underlying soils from erosion.

- Mulch shall be replenished at least annually.
- Vegetation, large shrubs or trees that limit access or interfere with planter operation shall be pruned or removed.
- Fallen leaves and debris from deciduous plant foliage shall be raked and removed.
- Nuisance or prohibited vegetation from the Eugene Plant List shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed and replaced.
- Dead vegetation shall be removed to maintain less than 10% of area coverage or when planter function is impaired. Vegetation shall be replaced within a specific timeframe, e.g., 3 months, or immediately if required to maintain cover density and control erosion where soils are exposed.

Debris and Litter shall be removed to ensure stormwater infiltration and to prevent clogging of overflow drains and interference with plant growth.

Spill Prevention measures shall be exercised when handling substances that contaminate stormwater. Releases of pollutants shall be corrected as soon as identified.

Stormwater Planters

Operations & Maintenance Plan

Training and/or written guidance information for operating and maintaining stormwater planters shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the stormwater planter shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.

- Obstacles preventing maintenance personnel and/or equipment access to the stormwater planter shall be removed.
- Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Insects & Rodents shall not be harbored in the stormwater planter.
Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
    i) Installation of predacious bird or bat nesting boxes.
    ii) Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
    iii) Stocking ponds and other permanent water facilities with fish or other predatory species.
    iv) If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvacides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the stormwater planter shall be filled and compacted.

Rain Gardens

Operations & Maintenance Plan

A **vegetated Infiltration Basin** is a vegetated depression created by excavation, berms, or small dams to provide for short-term ponding of surface water until it percolates into the soil. The basin shall infiltrate stormwater within 24 hours. All facility components and vegetation shall be inspected for proper operations and structural stability, at a minimum, quarterly for the first 2 years from the date of installation, 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Basin Inlet shall assure unrestricted stormwater flow to the vegetated basin.

- Sources of erosion shall be identified and controlled when native soil is exposed or erosion channels are present.
- Inlet shall be cleared when conveyance capacity is plugged.
- Rock splash pads shall be replenished to prevent erosion.

Embankment, Dikes, Berms & Side Slopes retain water in the infiltration basin.

- Structural deficiencies shall be corrected upon discovery:
- Slopes shall be stabilized using appropriate erosion control measures when soil is exposed/ flow channels are forming.
- Sources of erosion damage shall be identified and controlled.

Overflow or Emergency Spillway conveys flow exceeding reservoir capacity to an approved stormwater receiving system.

- Overflow shall be cleared when 25% of the conveyance capacity is plugged.
- Sources of erosion damage shall be identified and controlled when soil is exposed.
- Rocks or other armament shall be replaced when only one layer of rock exists.

Filter Media shall allow stormwater to percolate uniformly through the infiltration basin. If water remains 36-48 hours after storm, sources of possible clogging shall be identified and corrected.

- Basin shall be raked and, if necessary, soil shall be excavated, and cleaned or replaced.

Sediment/ Basin Debris Management shall prevent loss of infiltration basin volume caused by sedimentation. Gauges located at the opposite ends of the basin shall be maintained to monitor sedimentation.

- Sediment and debris exceeding 4" in depth shall be removed every 2-5 years or sooner if performance is affected.

Debris and Litter shall be removed to ensure stormwater infiltration and to prevent clogging of overflow drains and interference with plant growth.

- Restricted sources of sediment and debris, such as discarded lawn clippings, shall be identified and prevented.

Vegetation shall be healthy and dense enough to provide filtering while protecting underlying soils from erosion.

- Mulch shall be replenished as needed to ensure healthy plant growth.
- Vegetation, large shrubs or trees that limit access or interfere with basin operation shall be pruned or removed.
- Grass shall be mowed to 4"-9" high and grass clippings shall be removed no less than 2 times per year.
- Fallen leaves and debris from deciduous plant foliage shall be raked and removed.
- Nuisance or prohibited vegetation from the Eugene Plant List (such as blackberries or English Ivy) shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed.
- Dead vegetation shall be removed to maintain less than 10% of area coverage or when infiltration basin function is impaired. Vegetation shall be replaced within 3 months, or immediately if required to control erosion.

Spill Prevention measures shall be exercised when handling substances that contaminate stormwater. Releases of pollutants shall be corrected as soon as identified.

Rain Gardens

Operations & Maintenance Plan

Training and/or written guidance information for operating and maintaining vegetated infiltration basins shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the infiltration basin shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.

- Obstacles preventing maintenance personnel and/or equipment access to the infiltration basin shall be removed.
- Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Insects & Rodents shall not be harbored in the infiltration basin. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i) Installation of predacious bird or bat nesting boxes.
  ii) Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii) Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv) If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvacides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the infiltration basin shall be filled.

If used at this site, the following will be applicable:

Fences shall be maintained to preserve their functionality and appearance.

- Collapsed fences shall be restored to an upright position.
- Jagged edges and damaged fences shall be repaired or replaced.

Swales (Vegetated, Grassy, and Street)
Operations & Maintenance Plan

Swales are planted or grassed open channels that trap pollutants by filtering and slowing flows, allowing particles to settle out. The swale should drain within 48 hours of a storm event. All facility components, vegetation, and source controls shall be inspected for proper operations and structural stability, at a minimum, quarterly for the first 2 years from the date of installation, 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Swale Inlet (such as curb cuts or pipes) shall maintain a calm flow of water entering the swale.

- Source of erosion shall be identified and controlled when native soil is exposed or erosion channels are forming.
- Sediment accumulation shall be hand-removed with minimum damage to vegetation using proper erosion control measures. Sediment shall be removed if it is more than 4" thick or so thick as to damage or kill vegetation.
- Inlet shall be cleared when conveyance capacity is plugged. Sources of sediment and debris shall be identified and corrected.
- Rock splash pads shall be replenished to prevent erosion.

Side Slopes shall be maintained to prevent erosion that introduces sediment into the swale.

- Slopes shall be stabilized and planted using appropriate erosion control measures when native soil is exposed or erosion channels are forming.

Swale Media shall allow stormwater to percolate uniformly through the landscape swale. If the swale does not drain within 48 hours, it shall be tilled and replanted according to design specifications.

- Annual or semi-annual tilling shall be implemented if compaction or clogging continues.
- Debris in quantities that inhibit operation shall be removed routinely (e.g., no less than quarterly), or upon discovery.

Swale Outlet shall maintain sheet flow of water exiting swale unless a collection drain is used. Source of erosion damage shall be identified and controlled when native soil is exposed or erosion channels are forming.

- Outlets such as drains and overland flow paths shall be cleared when 50% of the conveyance capacity is plugged.
- Sources of sediment and debris shall be identified and corrected.

Vegetation shall be healthy and dense enough to provide filtering while protecting underlying soils from erosion.

Mulch shall be replenished as needed to ensure survival of vegetation.

- Vegetation, large shrubs or trees that interfere with landscape swale operation shall be pruned.
- Fallen leaves and debris from deciduous plant foliage shall be removed.
- Grassy swales shall be mowed to keep grass 4″ to 9″ in height. Clippings shall be removed to remove pollutants absorbed in grasses.
- Nuisance and prohibited vegetation from the Eugene Plant List (such as blackberries and English Ivy) shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed and replaced.
- Dead vegetation and woody material shall be removed to maintain less than 10% of area coverage or when swale function is impaired. Vegetation shall be replaced within 3 months, or immediately if required to maintain cover density and control erosion where soils are exposed.

Debris and Litter shall be removed to ensure stormwater conveyance and to prevent clogging of inlet drains and interference with plant growth.

Spill Prevention measures shall be exercised when handling substances that contaminate stormwater. Releases of pollutants shall be corrected as soon as identified.

Training and/or written guidance information for operating and maintaining swales shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the swale shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.

Swales (Vegetated, Grassy, and Street)
Operations & Maintenance Plan

- Obstacles preventing maintenance personnel and/or equipment access to the swale shall be removed.
- Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Insects & Rodents shall not be harbored in the swale. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i) Installation of predacious bird or bat nesting boxes.
  ii) Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii) Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv) If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvacides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the swale shall be filled.

If used at this site, the following will be applicable:

Check Dams shall control and distribute flow.

- Causes for altered water flow shall be identified, and obstructions cleared upon discovery.
- Causes for channelization shall be identified and repaired.

STORMWATER MANAGEMENT FACILITY INSPECTION & MAINTENANCE LOG (SAMPLE)

Property Address:

Inspection Date:

Inspection Time:

Inspected By:

Approximate Date/Time of Last Rainfall:

Type of Stormwater Management Facility:

Location of Facility on Site (In relation to buildings or other permanent structures):

Water levels and observations (Oil sheen, smell, turbidity, etc.):

Sediment accumulation & record of sediment removal:

Condition of vegetation (Height, survival rates, invasive species present, etc.) & record of replacement and management (mowing, weeding, etc.):

Condition of physical properties such as inlets, outlets, piping, fences, irrigation facilities, and side slopes. Record damaged items and replacement activities:

Presence of insects or vectors. Record control activities:

Identify safety hazards present. Record resolution activities:

APPENDIX F

STORMWATER FACILITY LANDSCAPE PLAN

Landscaping of public and private stormwater facilities will be in conformance with the Florence Stormwater Design Manual. Final landscape plans will be prepared at time of engineered public and private improvement plans.

Swales and raingardens are delineated between Zone A (wet) and Zone B (moderate to dry). Zone A includes the bottom and sides up to the height of the overflow outlet elevation. Zone B is the area of facility above the overflow outlet elevation. The entire area of stormwater planters is Zone A. The facility area is equivalent to the area of the facility, including bottom and side slopes.

Stormwater Planter Landscaping (public and private)

The minimum plant material quantities per 100 square feet of facility area will be as follows:

Zone A: 115 herbaceous plants or 100 herbaceous plants and 4 small shrubs.

Plant material species will be selected from the city-approved plant list. Tree planting is not required in planters.

Swale Landscaping (public)

The minimum plant material quantities per 100 square feet of facility area will be as follows:

Zone A: 115 herbaceous plants or 100 herbaceous plants and 4 small shrubs.

Zone B: 12 small shrubs, and 70 groundcover plants.

Plant material species will be selected from the city-approved plant list.

Rain Garden Landscaping (private)

The minimum plant material quantities per 100 square feet of facility area will be as follows:

Zone A: 115 herbaceous plants or 100 herbaceous plants and 4 small shrubs.

Zone B: 1 tree, 3 large shrubs/small trees, and 4 small shrubs.

Plant material species will be selected from the city-approved plant list.