Milwaukie High School
Baseball Indoor Practice Facility
Draft Stormwater Management Report

Prepared For:
The City of Milwaukie

Prepared By:
Angela Martinec, P.E. – Civil Engineer

November 2013

Harper Houf Peterson Righellis Inc.
ENGINEERS ◆ PLANNERS
LANDSCAPE ARCHITECTS ◆ SURVEYORS

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Portland, OR 97202
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Designer's Certification Statement

I hereby certify that this Stormwater Management Report for the Milwaukie High School Baseball Indoor Practice Facility has been prepared by me or under my supervision and meets minimum standards of the City of Portland 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 the drainage facilities designed by me.

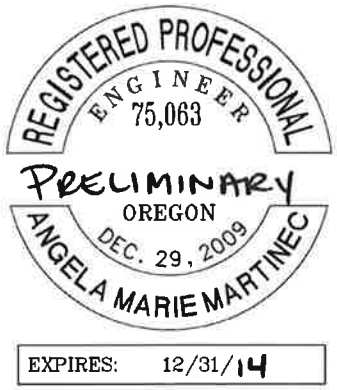

Table of Contents

Project Description

North Clackamas School District will construct a 40' x 120' metal building at Milwaukie High School on Lake Road. The structure will be used by the Milwaukie High School baseball team for indoor batting and fielding practice. Two existing concrete pads currently used for practice will be removed. Stormwater management for the project will be accomplished via infiltraion planters with an overflow routed to a storm-only system.

Existing Site Conditions

The existing project limits include 2,100 SF of concrete pads and structures that are proposed to be removed with this project. The rest of the area within the project limits is open space. Stormwater management for the existing site consists of sumped area drains collecting overland flow and routing to an existing storm-only system without treatment, detention, or infiltration.

Proposed Site Improvements

The proposed metal structure will have downspouts discharging to proposed infiltration planters. The impervious surfaces within the project limits (5,148 sf) will need to be managed per the 2008 City of Portland Stormwater Management Manual (SWMM). Per the SWMM, the Stormwater Infiltration and Discharge Hierarchy is to be used to determine the feasibility of the stormwater option to be used for the site. The following addresses each category in the Hierarchy;

Category 1: Requires total onsite infiltration with vegetated infiltration facilities.

Per USDA Soil Survey, the existing soils have an unfactored hydraulic conductivity of 1.3 in/hr, therefore it is ideal to provide infiltration and flow control to the maximum extent feasible prior to offsite discharge.

Category 2: Requires total onsite infiltration with a vegetated facility that overflows to a subsurface infiltration facility.

Due to existing onsite infiltration capacity, it is preferred to infiltrate and detain to the maximum extent feasible prior to offsite discharge.

Category 3: Requires onsite detention with vegetated facilities that overflow to a drainage way, river, or storm-only pipe.

Proposed vegetated infiltration planters are proposed to meet pollution reduction and flow control requirements to the maximum extent feasible prior to offsite discharge via overflow structures.

Category 4: Required onsite detention with vegetated facilities that overflow to the combined sewer system.

The category does not apply to this project since there is not a combined sewer directly adjacent to the site.

Conclusion

The proposed preliminary stormwater management for the area of improvement falls under Category 3 of the Stormwater Infiltration and Discharge Hierarchy. The stormwater planters will be used to meet pollution reduction and detention.

Sizing calculations for the stormwater planters can be found in the Appendix of this report. Below is a summary table;

	Area	**Treatment**	**Discharge**
Practice building (PB)	4,800 sf	Infiltration planters (100%)	Storm-only
Concrete Pads (CP)	288 sf	N/A	Storm-only
Concrete Stairs (CS)	60 sf	N/A	Storm-only
Total	**5,148 sf**	**Infiltration planters (100%)**	**Storm-only**

Appendix

Maps and Calculations

0 30 60 120

SCALE: 1" = 60'

SHEET NO.
EX

JOB NO.
NCS-20

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED:
DRAWN:
CHECKED:
DATE
NOV 2013

HHPR Harper Houf Peterson Righellis Inc.
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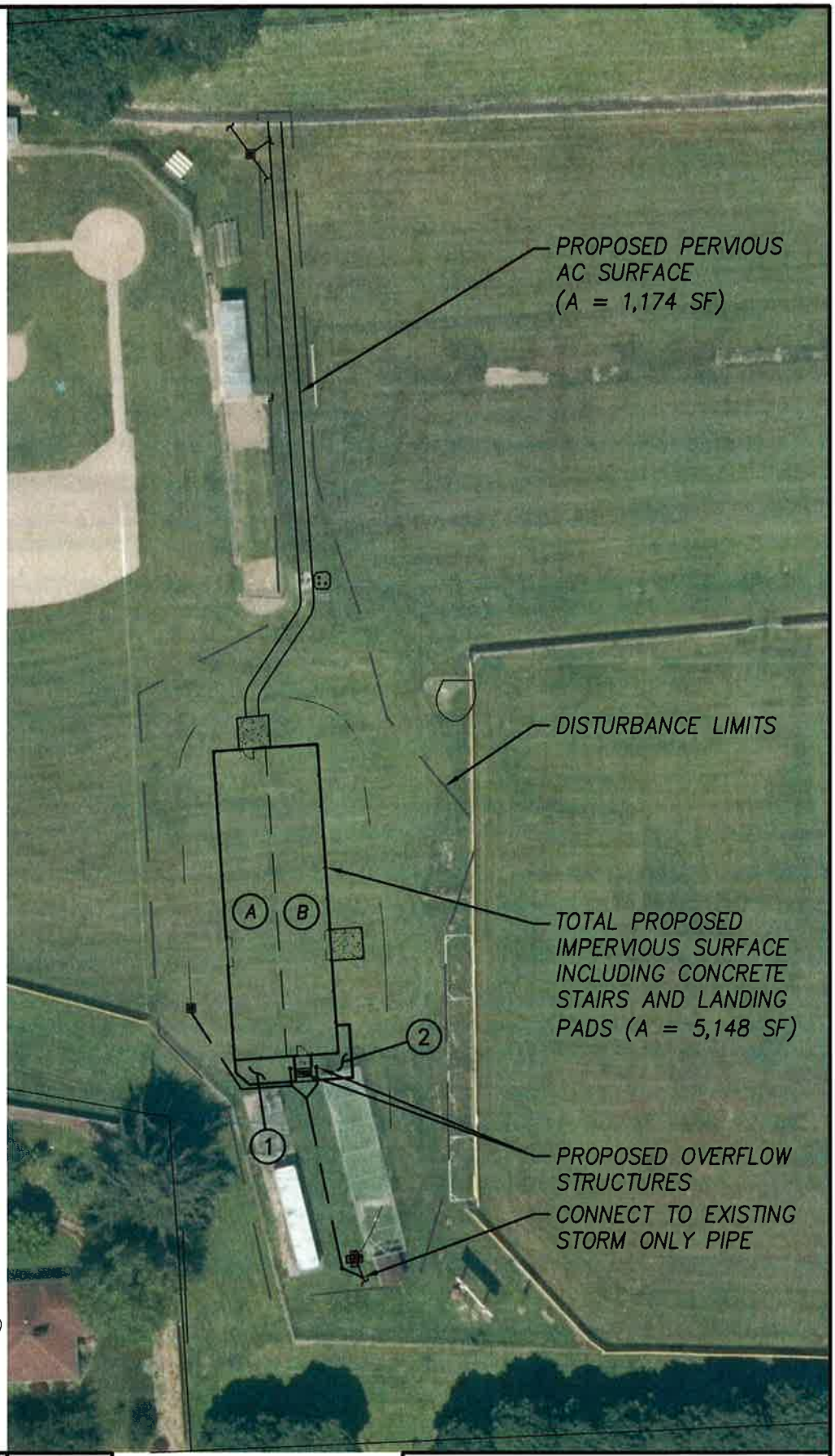
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

EXISTING CONDITIONS

INDOOR PRACTICE FACILITY

MILWAUKIE HIGH SCHOOL



ID	AREA (SF)
A	2,400
B	2,400
CS	60
CP	288
1	189
2	189

0 30 60 120

SCALE: 1" = 60'

SHEET NO
PROP

JOB NO
NCS-20

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: ---
DRAWN: ---
CHECKED: ---
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PROPOSED CONDITIONS

INDOOR PRACTICE FACILITY

MILWAUKIE HIGH SCHOOL

Table 2-2a Runoff curve numbers for urban areas [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area [2/]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5/]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

[1] Average runoff condition, and $I_a = 0.2S$.

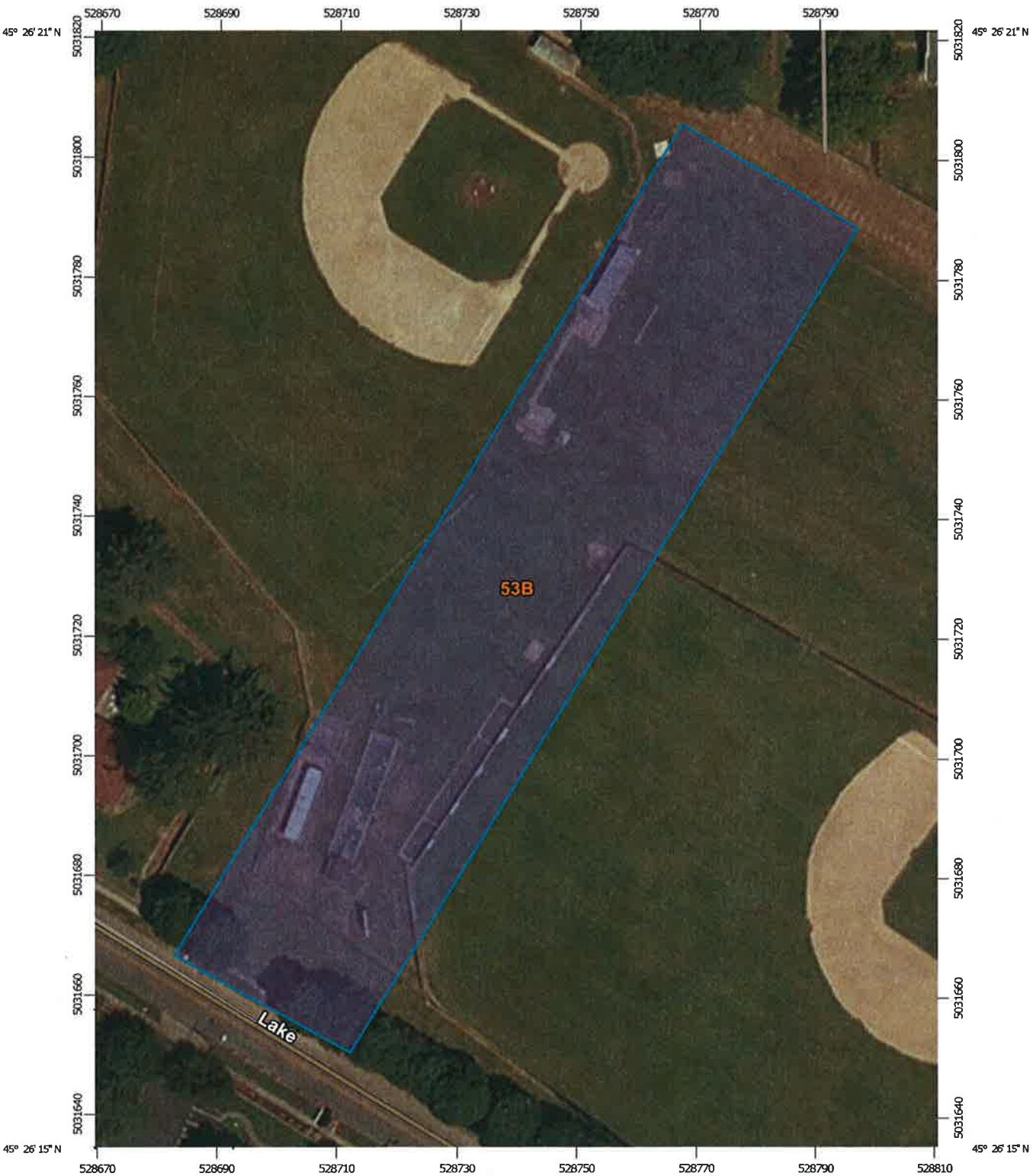
[2] The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

[3] CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

[4] Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

[5] Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Hydrologic Soil Group—Clackamas County Area, Oregon
(Milwaukie HS - Indoor Baseball Practice Facility)



Map Scale: 1:908 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 10 20 40 60

Feet
0 40 80 160 240

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Clackamas County Area, Oregon
Survey Area Data: Version 7, Aug 20, 2012

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

Date(s) aerial images were photographed: Jul 8, 2010—Sep 4, 2011

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

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Clackamas County Area, Oregon (OR610)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
53B	Latourell loam, 3 to 8 percent slopes	B	1.4	100.0%
Totals for Area of Interest			**1.4**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

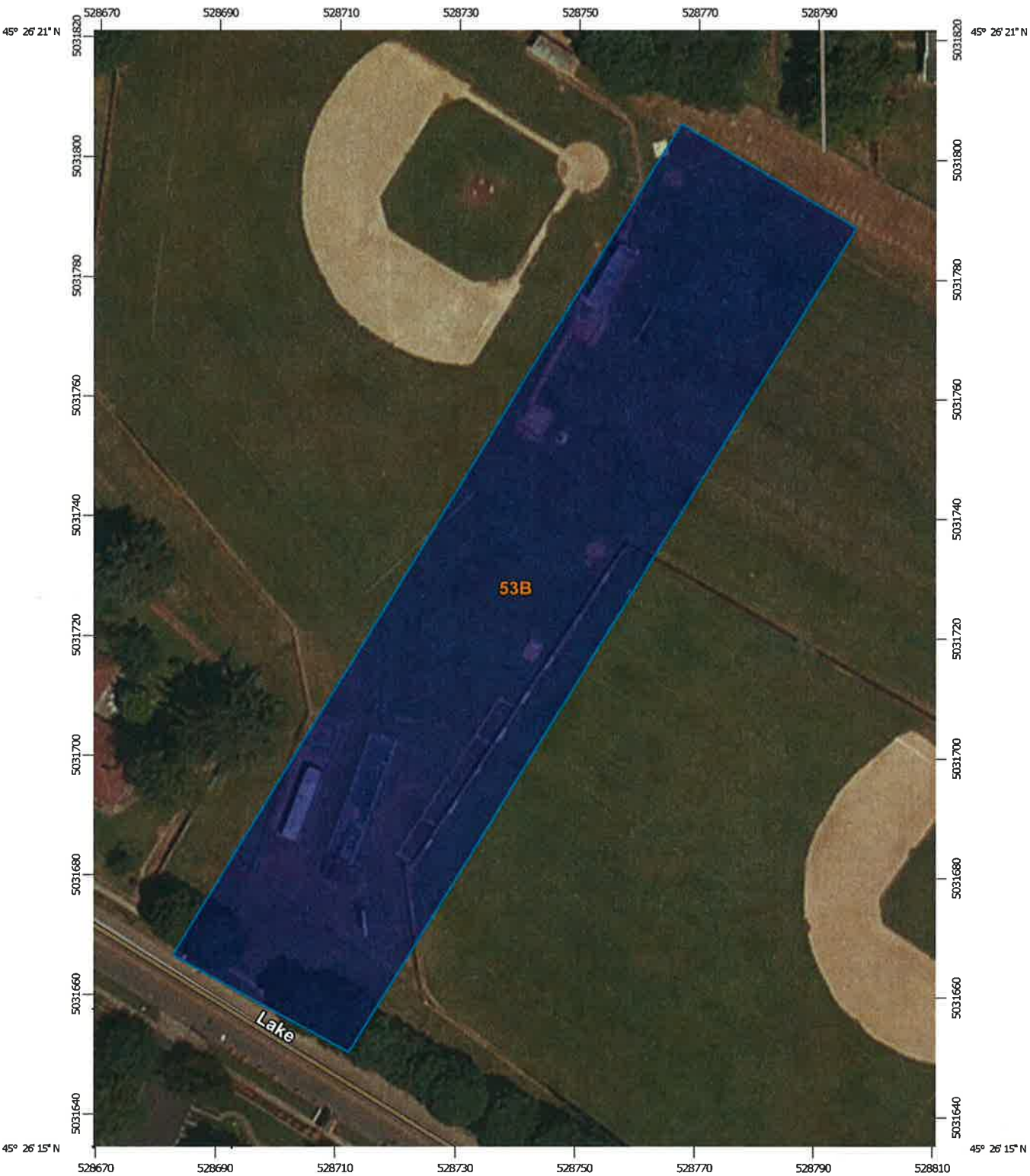
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Depth to Water Table—Clackamas County Area, Oregon
(Milwaukie HS - Indoor Baseball Practice Facility)



Map Scale: 1:908 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 10 20 40 60

Feet
0 40 80 160 240

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Lines
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Points
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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Coordinate System: Web Mercator (EPSG:3857)

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Depth to Water Table

Depth to Water Table— Summary by Map Unit — Clackamas County Area, Oregon (OR610)				
Map unit symbol	**Map unit name**	**Rating (centimeters)**	**Acres in AOI**	**Percent of AOI**
53B	Latourell loam, 3 to 8 percent slopes	>200 ≥ 6.0'	1.4	100.0%
Totals for Area of Interest			**1.4**	**100.0%**

Description

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

Saturated Hydraulic Conductivity (Ksat), Standard Classes—Clackamas County Area, Oregon
(Milwaukie HS - Indoor Baseball Practice Facility)

Map Scale: 1:908 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 40 80 160 240

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Very Low (0.0 - 0.01)
- Low (0.01 - 0.1)
- Moderately Low (0.1 - 1)
- Moderately High (1 - 10)
- High (10 - 100)
- Very High (100 - 705)
- Not rated or not available

Soil Rating Lines
- Very Low (0.0 - 0.01)
- Low (0.01 - 0.1)
- Moderately Low (0.1 - 1)
- Moderately High (1 - 10)
- High (10 - 100)
- Very High (100 - 705)
- Not rated or not available

Soil Rating Points
- Very Low (0.0 - 0.01)
- Low (0.01 - 0.1)
- Moderately Low (0.1 - 1)
- Moderately High (1 - 10)
- High (10 - 100)
- Very High (100 - 705)
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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Survey Area Data: Version 7, Aug 20, 2012

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

Date(s) aerial images were photographed: Jul 8, 2010—Sep 4, 2011

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Saturated Hydraulic Conductivity (Ksat), Standard Classes

Saturated Hydraulic Conductivity (Ksat), Standard Classes— Summary by Map Unit — Clackamas County Area, Oregon (OR610)				
Map unit symbol	**Map unit name**	**Rating (micrometers per second)**	**Acres in AOI**	**Percent of AOI**
53B	Latourell loam, 3 to 8 percent slopes	9.0000 X 0.142 = 1.3 IN/HR	1.4	100.0%
Totals for Area of Interest			**1.4**	**100.0%**

Description

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits. The classes are:

Very low: 0.00 to 0.01

Low: 0.01 to 0.1

Moderately low: 0.1 to 1.0

Moderately high: 1 to 10

High: 10 to 100

Very high: 100 to 705

Rating Options

Units of Measure: micrometers per second

Aggregation Method: Dominant Component

Component Percent Cutoff: *None Specified*

Tie-break Rule: Fastest

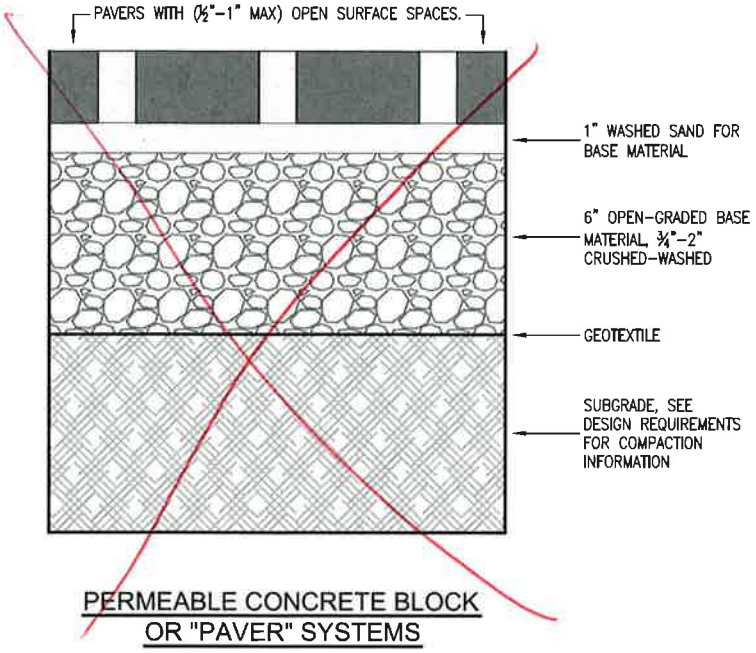
Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): Depth Range (Weighted Average)

Top Depth: 1

Bottom Depth: 24

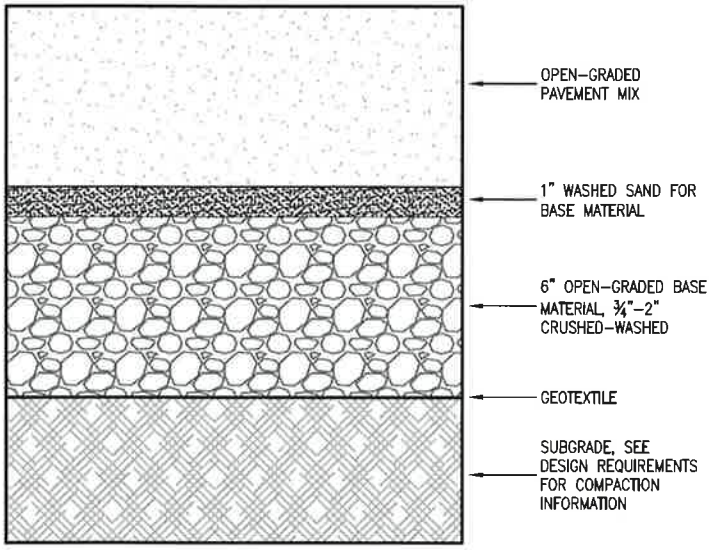
Units of Measure: Inches



PERMEABLE CONCRETE BLOCK OR "PAVER" SYSTEMS

	RESIDENTIAL DRIVEWAY OR PEDESTRIAN ONLY	PRIVATE STREET, PARKING LOT, OR FIRE LANE	PUBLIC STREET
CONCRETE	4"	4"	7"
ASPHALT	2 ½"	3"	6"
PAVERS	2 ⅜"	3 ⅛"	3 ⅛"
ENGINEERING REQ'D	NO	YES	YES
COMPACTION REQ'D	NO	YES	95%

EXHIBIT 2-8
PERVIOUS PAVEMENT REQUIREMENTS FOR TOP LIFT DEPTH, ENGINEERING, AND COMPACTION.



PERVIOUS (OPEN GRADED) CONCRETE AND ASPHALT SYSTEMS

- DRAWING NOT TO SCALE -

STORMWATER MANAGEMENT MANUAL TYPICAL DETAILS

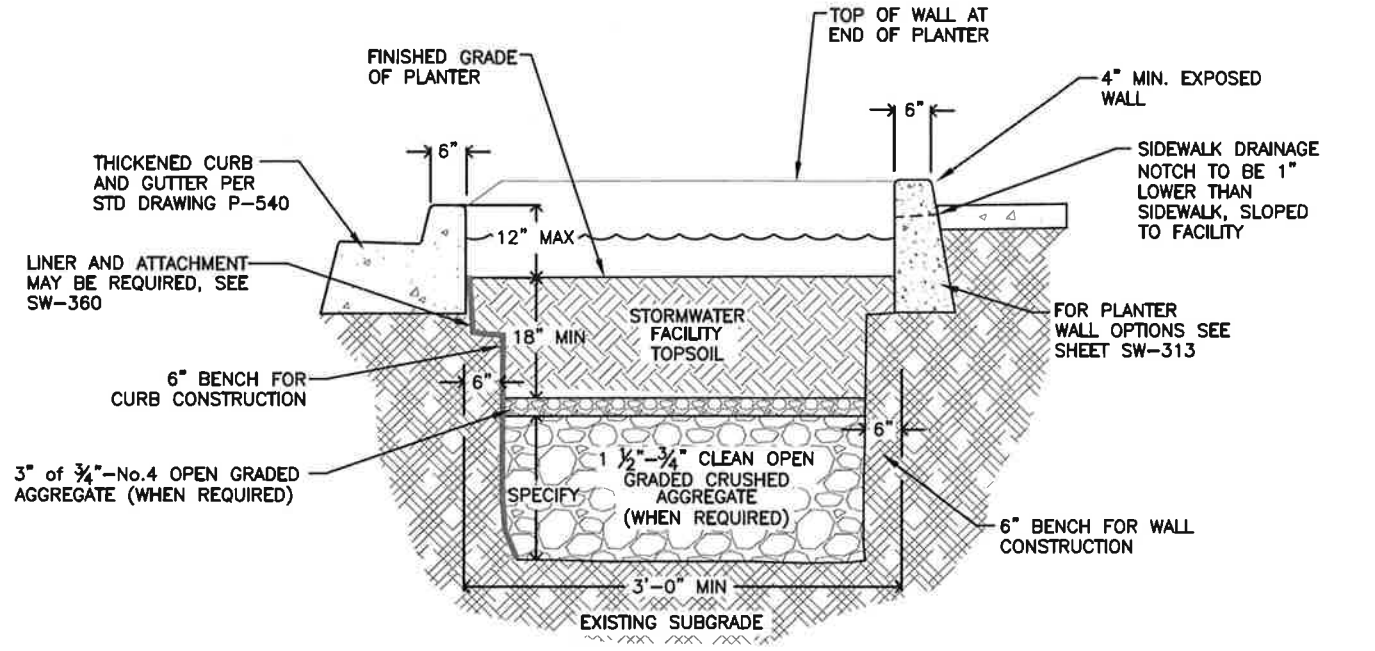
- Simplified / Presumptive / Performance Design Approach -

Pervious Pavement

NUMBER

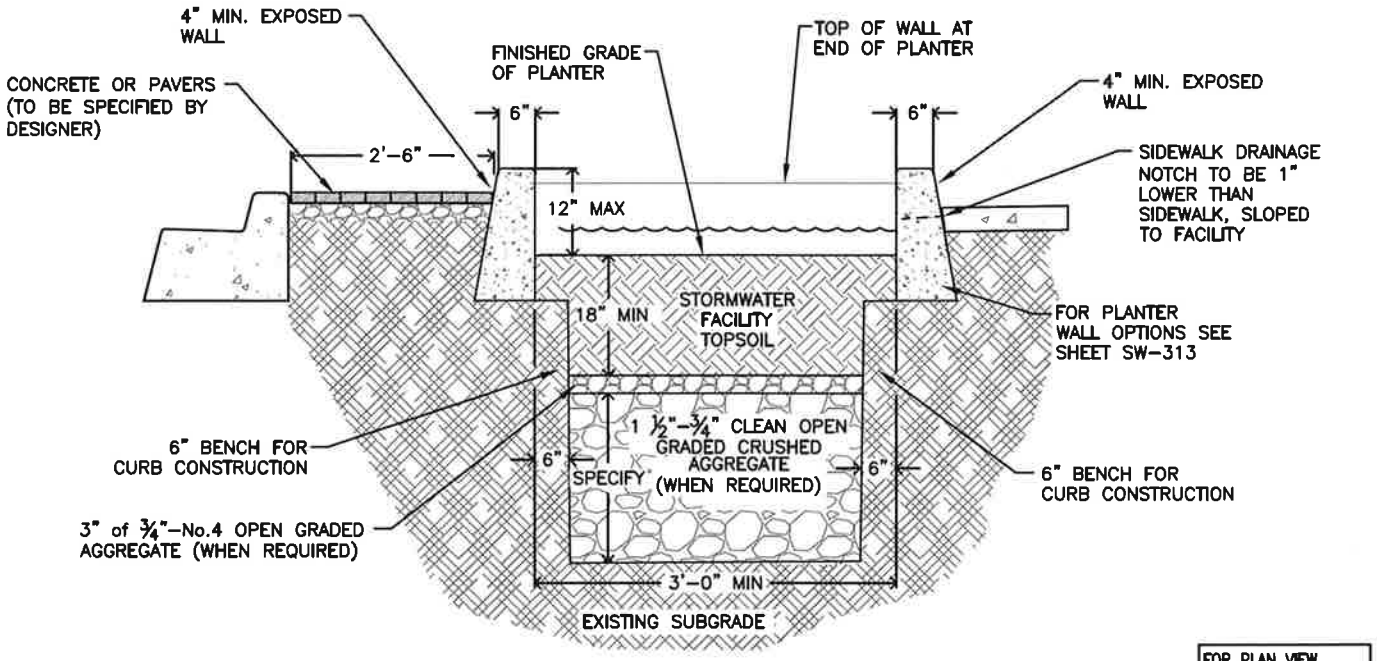
SW-110

Bureau of Environmental Services



SECTION A-A
PLANTER WITHOUT PARKING

FOR PLAN VIEW REFER TO SW-310



SECTION B-B
PLANTER WITH PARKING

FOR PLAN VIEW REFER TO SW-311

DESIGNER INFORMATION

See SW-335 and SW-336 for Channel and Grate.

CONSTRUCTION NOTE

Scarify the native soil following the initial excavation and before installing topsoil or rock.

- DRAWING NOT TO SCALE -

STORMWATER MANAGEMENT MANUAL TYPICAL DETAILS

NUMBER

SW-312

- 2011 GREEN STREETS -

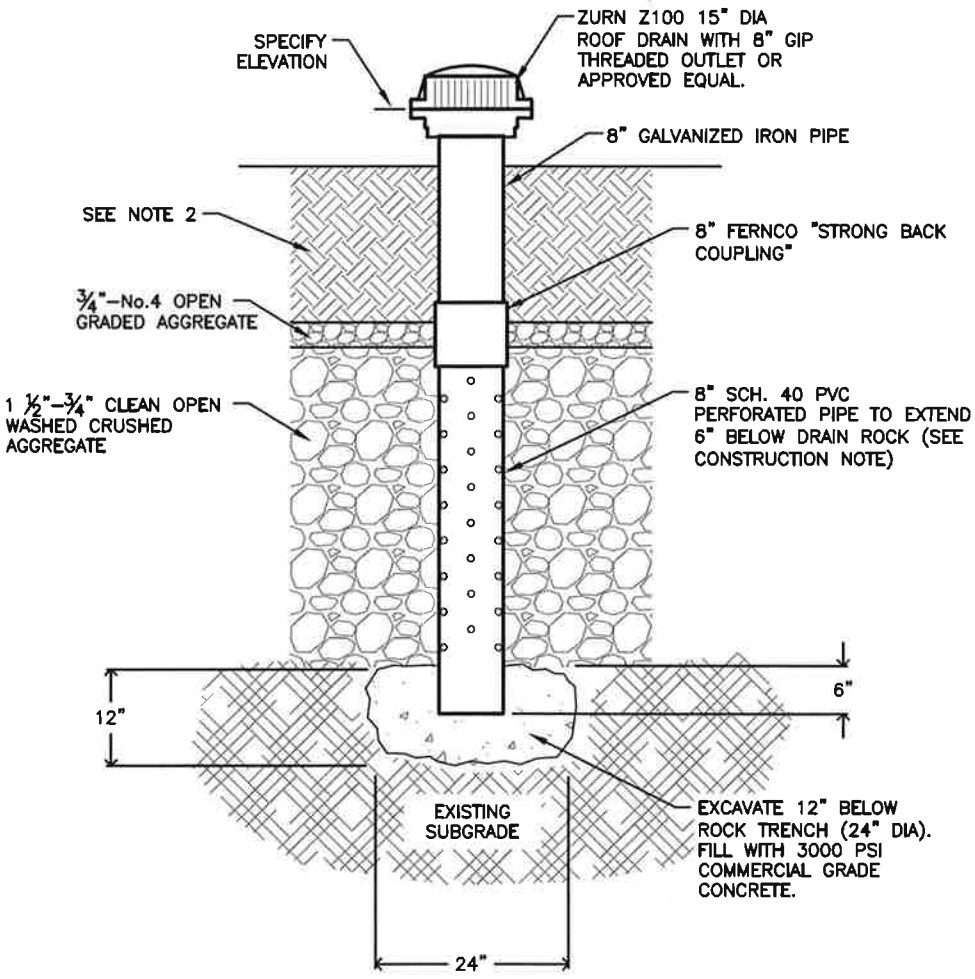
Sections Views

Planters

Bureau of Environmental Services

City of Portland

SET REVISED: 12-08-2011



DESIGNER INFORMATION

1. Show overflow drain in swale, planter or curb extension section. Separate swale, planter or curb extension section views may not be needed.
2. Dimension stormwater facility soil and rock layers per your design. See sections SW-301, SW-312 and SW-322.

CONSTRUCTION NOTE

Perforate 8" Schedule 40 PVC with ½" holes, 90 degrees around pipe, rows 2" apart. Offset holes in rows by 45 degrees.

- DRAWING NOT TO SCALE -

STORMWATER MANAGEMENT MANUAL TYPICAL DETAILS

NUMBER

SW-351

- 2011 GREEN STREETS -

Overflow Drain

Overflow Inlets

Bureau of Environmental Services

City of Portland

SET REVISED: 12–08–2011

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SBUH Runoff	------	-------	0.009	-------	0.017	0.027	0.037	-------	0.049	Pre-developed Conditions
	ALLOWABLE RELEASE RATE			.0045		0.017	0.027	0.037			ALLOWED POST-DEV DISCHARGE
											REFER TO PAC OUTPUT FOR PROPOSED DISCHARGE RATES

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

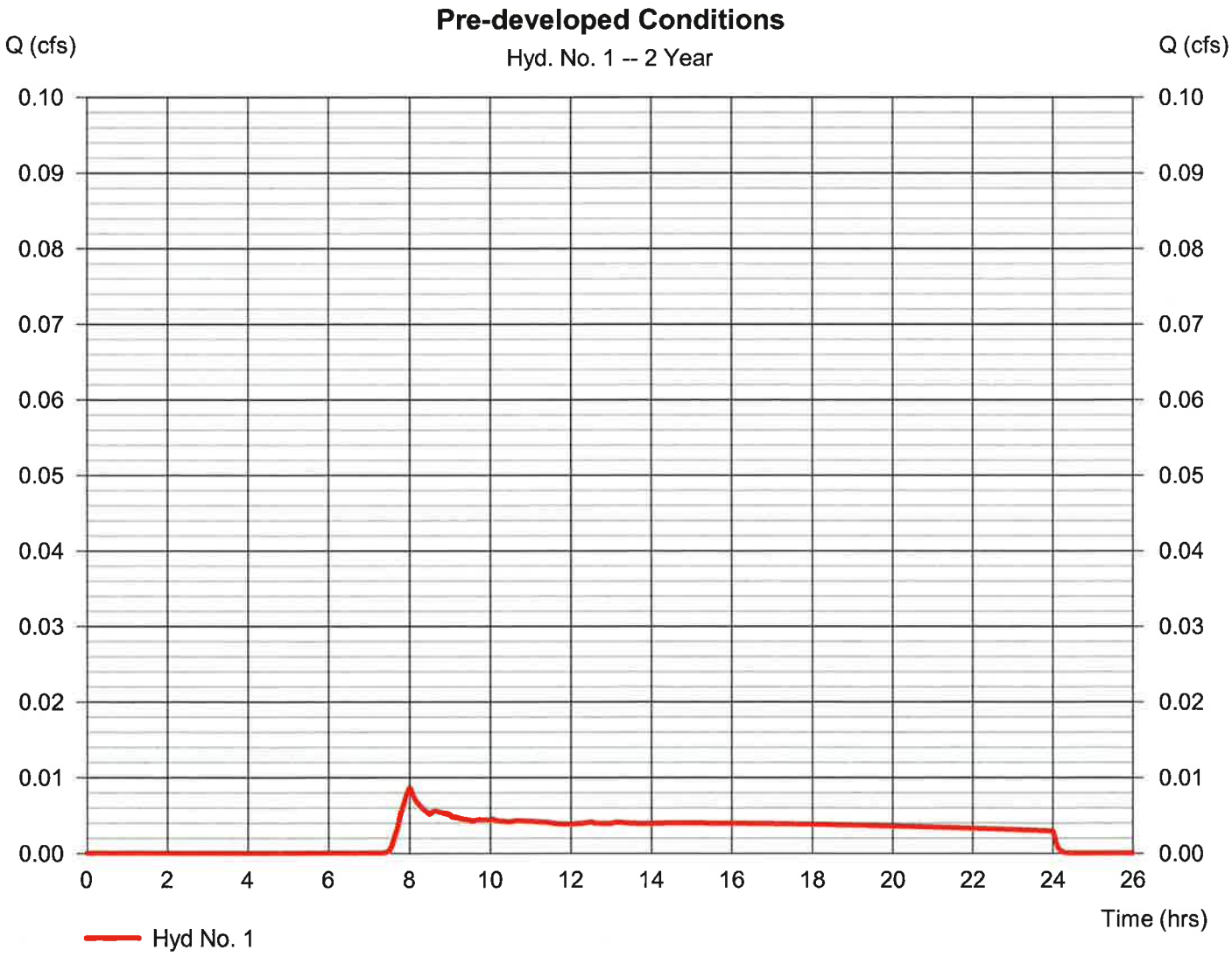
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.009	2	480	234	------	------	------	Pre-developed Conditions

Hydrograph Report

Hyd. No. 1

Pre-developed Conditions

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.009 cfs
Storm frequency	= 2 yrs	Time to peak	= 8.00 hrs
Time interval	= 2 min	Hyd. volume	= 234 cuft
Drainage area	= 0.116 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.40 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

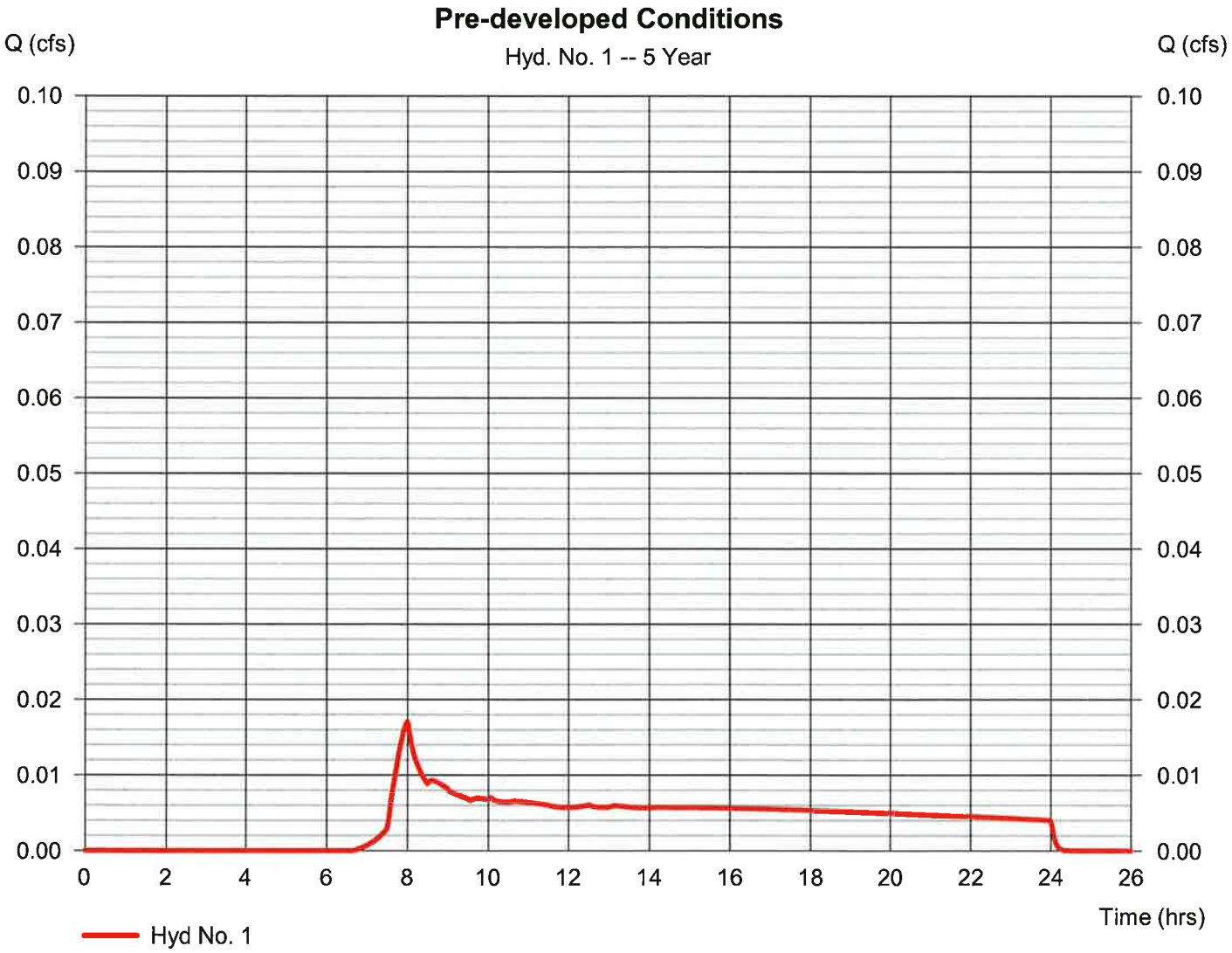
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.017	2	480	358	------	------	------	Pre-developed Conditions

Hydrograph Report

Hyd. No. 1

Pre-developed Conditions

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.017 cfs
Storm frequency	= 5 yrs	Time to peak	= 8.00 hrs
Time interval	= 2 min	Hyd. volume	= 358 cuft
Drainage area	= 0.116 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.90 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

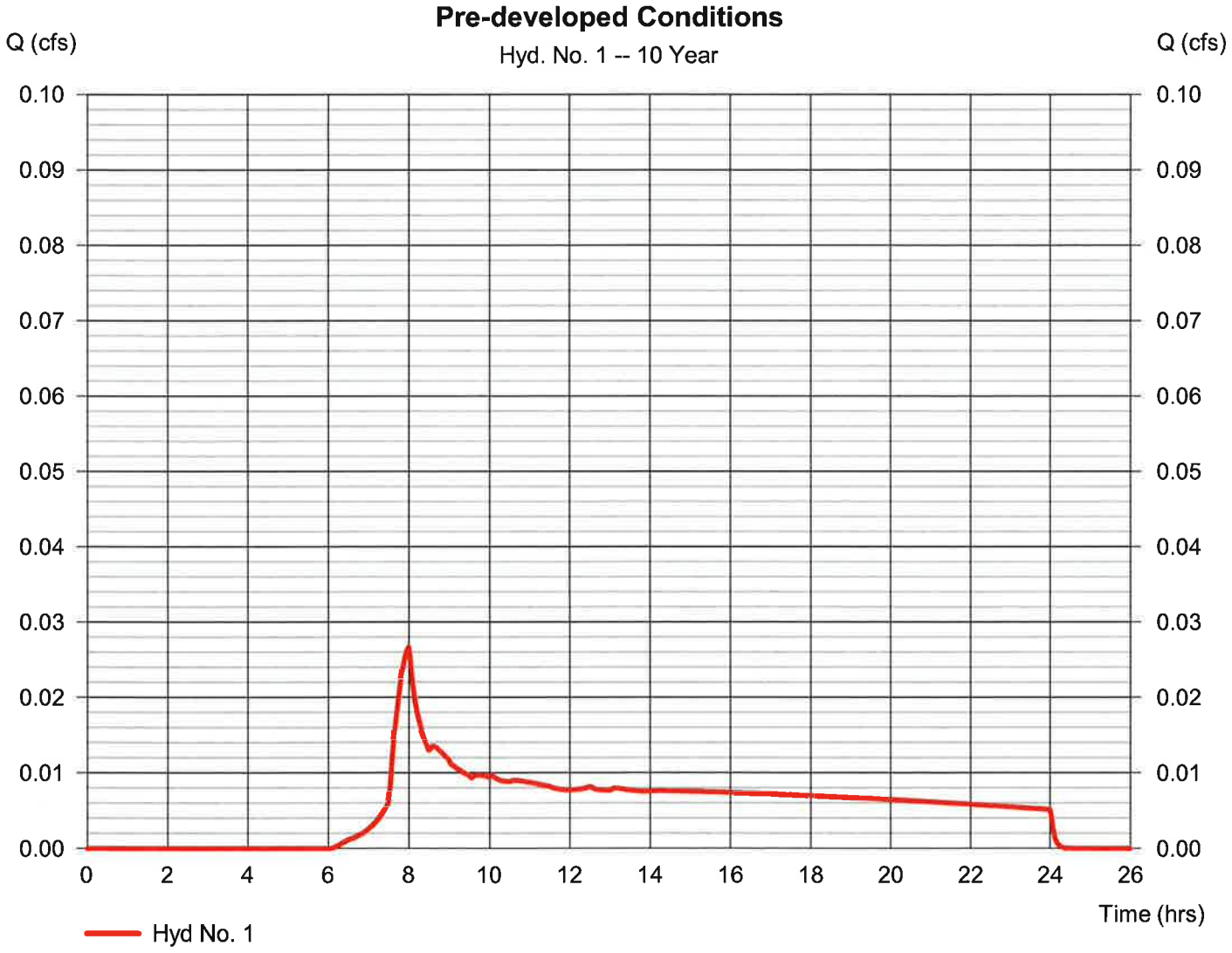


Hydrograph Report

Hyd. No. 1

Pre-developed Conditions

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.027 cfs
Storm frequency	= 10 yrs	Time to peak	= 8.00 hrs
Time interval	= 2 min	Hyd. volume	= 495 cuft
Drainage area	= 0.116 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.40 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

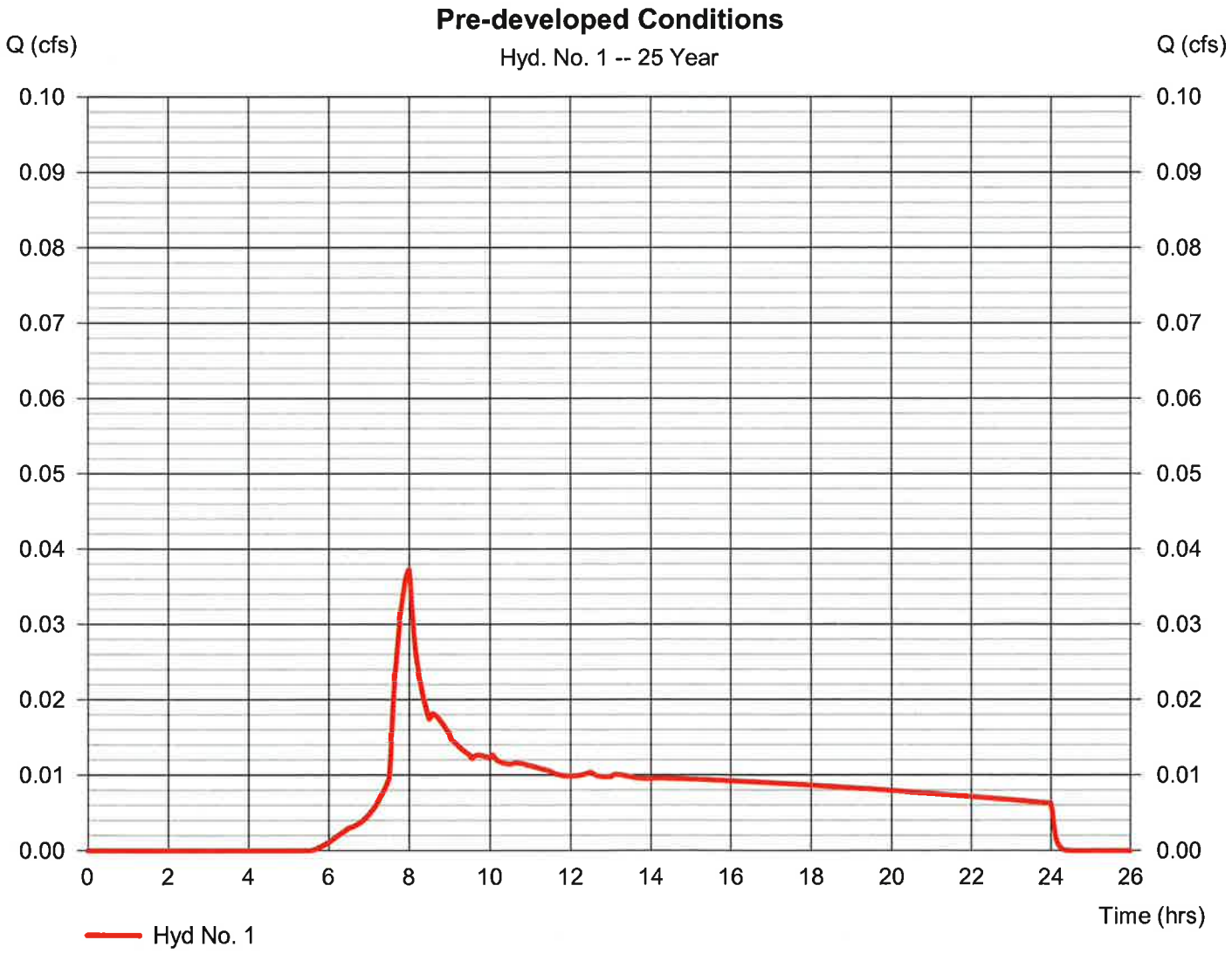
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.037	2	480	644	------	------	------	Pre-developed Conditions

Hydrograph Report

Hyd. No. 1

Pre-developed Conditions

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.037 cfs
Storm frequency	= 25 yrs	Time to peak	= 8.00 hrs
Time interval	= 2 min	Hyd. volume	= 644 cuft
Drainage area	= 0.116 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.90 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

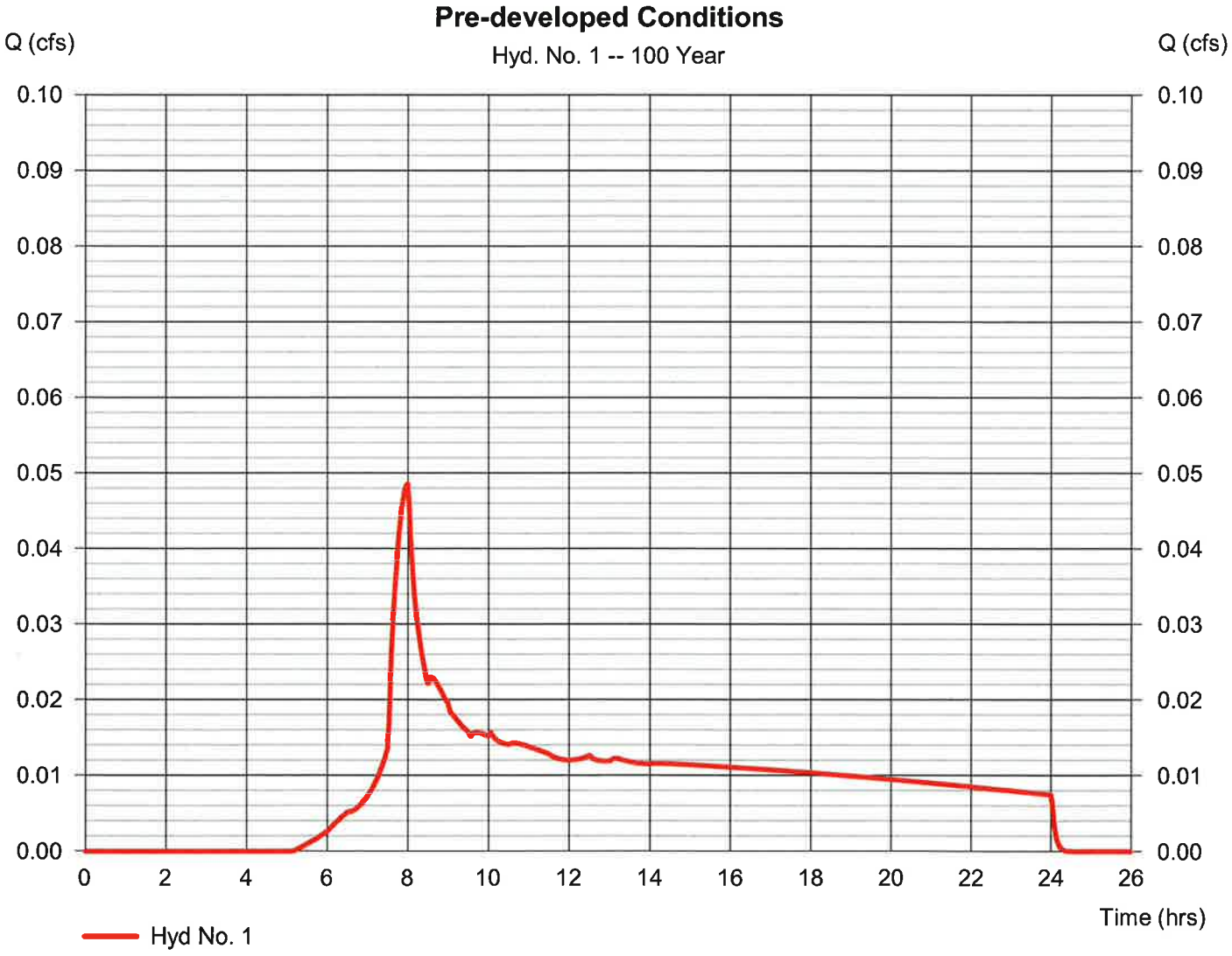
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.049	2	480	802	------	------	------	Pre-developed Conditions

Hydrograph Report

Hyd. No. 1

Pre-developed Conditions

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.049 cfs
Storm frequency	= 100 yrs	Time to peak	= 8.00 hrs
Time interval	= 2 min	Hyd. volume	= 802 cuft
Drainage area	= 0.116 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.40 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	69.8703	13.1000	0.8658	--------
3	0.0000	0.0000	0.0000	--------
5	79.2597	14.6000	0.8369	--------
10	88.2351	15.5000	0.8279	--------
25	102.6072	16.5000	0.8217	--------
50	114.8193	17.2000	0.8199	--------
100	127.1596	17.8000	0.8186	--------

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.69	4.61	3.89	3.38	2.99	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.57	5.43	4.65	4.08	3.65	3.30	3.02	2.79	2.59	2.42	2.27	2.15
10	7.24	6.04	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.80	4.38	4.02	3.73	3.48	3.26	3.07	2.91
50	9.04	7.65	6.66	5.92	5.34	4.87	4.49	4.16	3.88	3.65	3.44	3.25
100	9.83	8.36	7.30	6.50	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

Tc = time in minutes. Values may exceed 60.

02 (172nd and Sunnyside)\TAS02-DOCS\REPORTS\STORM - (Storm Report)\clackamas rainfall intensity.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.50	2.40	1.00	2.90	3.40	3.90	4.20	4.40
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Custom	0.00	1.75	0.00	2.80	3.90	5.25	6.00	7.10

Stormwater Planter Calculations – Practice Building and Concrete Pads

Roof runoff from the practice building (PB) will be routed to infiltration stormwater planters for treatment, partial detention and on-site infiltration. The adjacent concrete landing pads (CP) and concrete stairs (CS) will sheet flow to grassy depressions collected via sumped area drains. The proposed planters are sized to handle an equivalent area.

The Presumptive Approach Calculator (PAC) version 1.2 was used to determine the proposed planters meet the water quality requirements.

See following sheet for plan showing locations of planters and the roof area flowing into each planter.

Summary:

Planter	Area	Planter Area (sf)	Impervious Area (sf)	Sizing Factor
1	PB, CP, CS	189	2,574	0.073
2	PB, CP, CS	189	2,574	0.073

Area	Impervious Area (sf)	Area treated by planters (sf)	% treated by planters
PB	4,800	5,148	107%
CP	288	0	0%
CS	60	0	0%

Condition	2-year flow (cfs)	5-year flow (cfs)	10-year flow (cfs)	25-year flow (cfs)
Pre-developed	0.009	0.017	0.027	0.049
Allowed	0.0045	0.017	0.027	0.049
Post-Developed (from planters 1 & 2)	0 (100% infiltrated)	0.008	0.016	0.038
Post-Developed Flow Reduction	100%	53%	41%	22%

The following pages are results from PAC.

Presumptive Approach Calculator ver. 1.2

Catchment Data

Catchment ID: A

Project Name: Baseball Indoor Practice Facility
Project Address: Milwaukie High School
0
Designer: AMM
Company: HHPR

Date: 11/18/13
Permit Number: 0

Run Time 11/15/2013 12:13:26 PM

Drainage Catchment Information

Catchment ID	A	
	Catchment Area	
Impervious Area	2,574	SF
Impervious Area	0.06	ac
Impervious Area Curve Number, CN_{imp}	98	
Time of Concentration, Tc, minutes	5	min.

Site Soils & Infiltration Testing Data

Infiltration Testing Procedure:	Open Pit Falling Head	
Native Soil Field Tested Infiltration Rate (I_{test}):	1.3	in/hr
Bottom of Facility Meets Required Separation From High Groundwater Per BES SWMM Section 1.4:	Yes	

Correction Factor Component

CF_{test} (ranges from 1 to 3)	2	

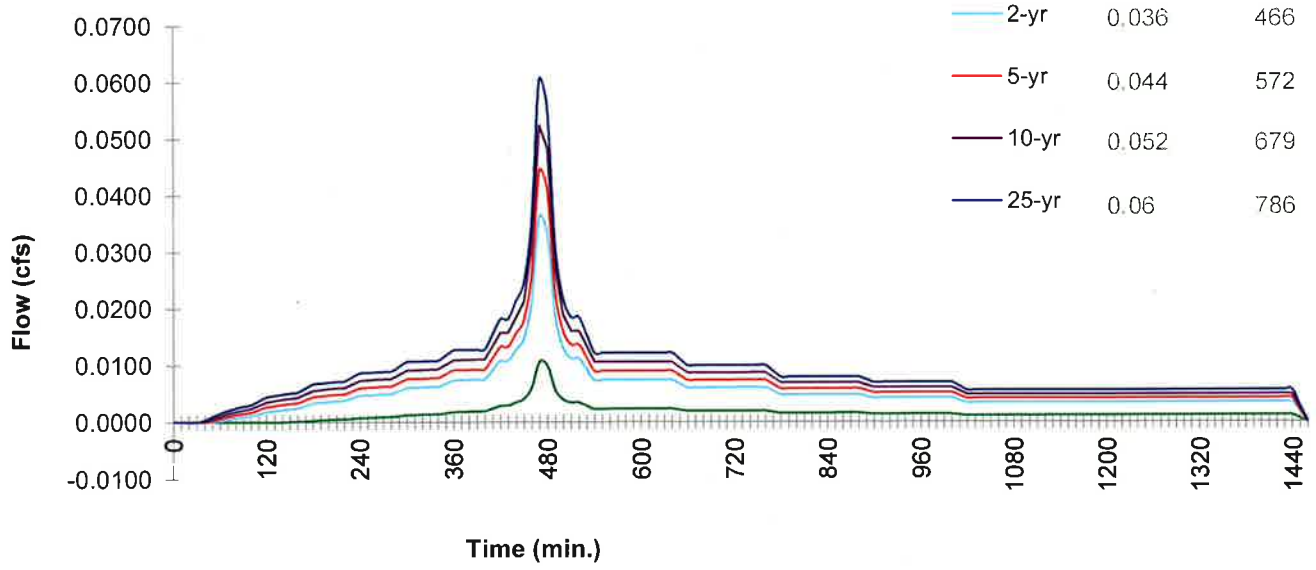
Design Infiltration Rates

I_{dsgn} for Native (I_{test} / CF_{test}):	0.65	in/hr
I_{dsgn} for Imported Growing Medium:	2.00	in/hr

Execute SBUH

SBUH Results

	Peak Rate (cfs)	Volume (cf)
PR	0.011	134
2-yr	0.036	466
5-yr	0.044	572
10-yr	0.052	679
25-yr	0.06	786



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Presumptive Approach Calculator ver. 1.2

Catchment ID: A

Run Time 11/15/2013 12:13:26 PM

Project Name: Baseball Indoor Practice Facility **Catchment ID:** A **Date:** 11/18/2013

Instructions:
1. Identify which Stormwater Hierarchy Category the facility.
2. Select Facility Type.
3. Identify facility shape of surface facility to more accurately estimate surface volume, except for Swales and sloped planters that use the PAC Sloped Facility Worksheet to enter data.
4. Select type of facility configuration.
5. Complete data entry for all highlighted cells.

Catchment facility will meet Hierarchy Category: 3

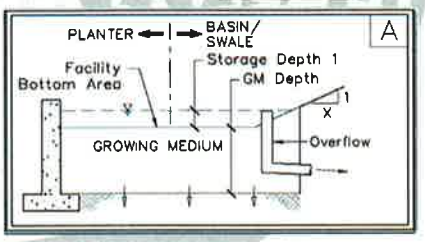
Goal Summary:

Hierarchy Category	SWMM Requirement	RESULTS box below needs to display...	
		Pollution Reduction as a	10-yr (nka disposal) as a
3	Off-site flow to drainageway, river, or storm-only pipe system.	PASS	N/A

Facility Type = Planter (Flat)

Facility Shape: Rectangle/Square

Facility Configuration: A



Calculation Guide
Max. Rock Stor. Bottom Area
189 SF

DATA FOR ABOVE GRADE STORAGE COMPONENT

Facility Bottom Area =	189	sf
Bottom Width =	10.0	ft
Facility Side Slope =	0	to 1
Storage Depth 1 =	17	in
Growing Medium Depth =	18	in
Freeboard Depth =	N/A	in
Surface Capacity at Depth 1 =	268	cf
GM Design Infiltration Rate =	2.00	in/hr
Infiltration Capacity =	0.009	cfs

BELOW GRADE STORAGE

Rock Storage Bottom Area =	189	sf
Rock Storage Depth =	0	in
Rock Storage Capacity =	0	cf
Native Design Infiltration Rate =	0.65	in/hr
Infiltration Capacity =	0.003	cfs

Native Infiltration Rate Used in P/

RESULTS

Pollution Reduction: PASS

Overflow Volume: 0 CF

6% Surf. Cap. Used

Run PAC

Output File

	2-yr	5-yr	10-yr	25-yr
Peak cfs	0.000	0.004	0.008	0.019

FACILITY FACTS

Total Facility Area Including Freeboard = 189 SF

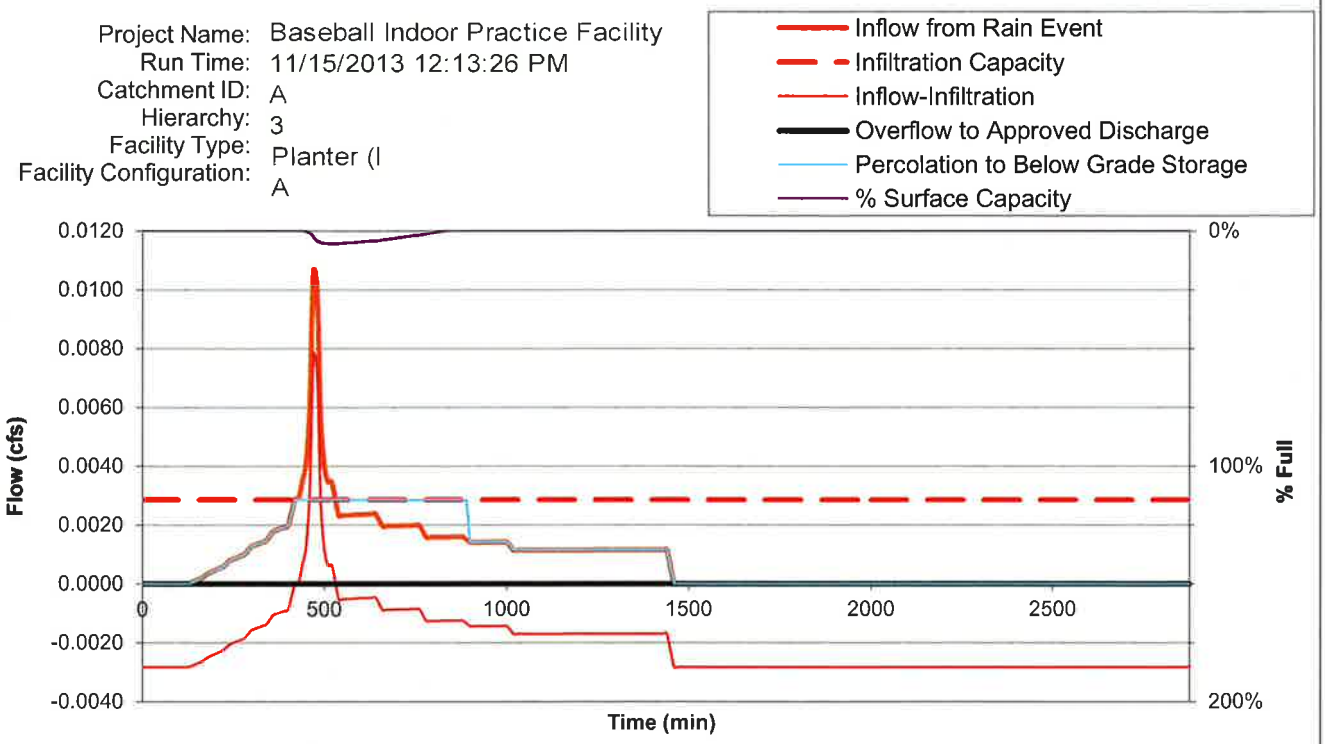
Sizing Ratio (Total Facility Area / Catchment Area) = 0.073

BES - Presumptive Approach Calculator - Ver 1.2

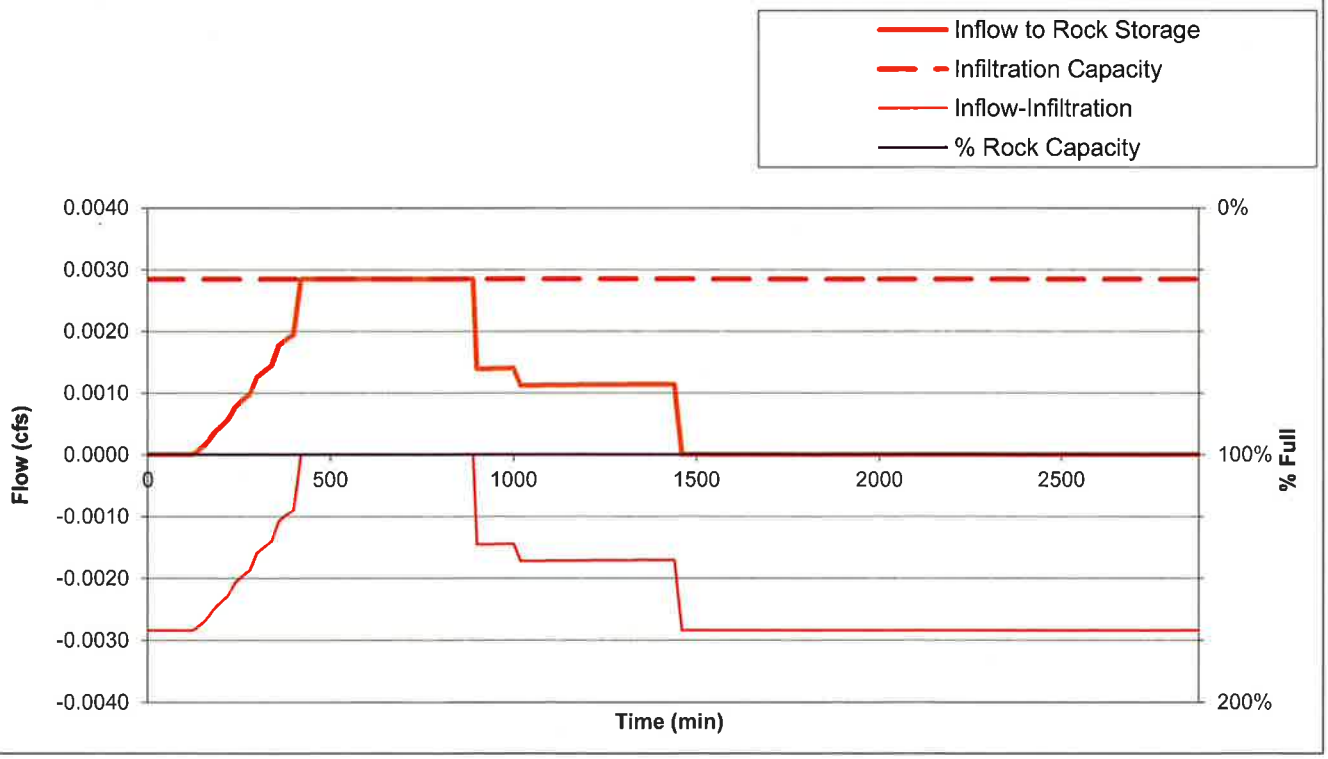
PR Con-A&B

Pollution Reduction Event
Surface Facility Modeling

Project Name: Baseball Indoor Practice Facility
Run Time: 11/15/2013 12:13:26 PM
Catchment ID: A
Hierarchy: 3
Facility Type: Planter (I
Facility Configuration: A



Pollution Reduction Event
Below Grade Modeling



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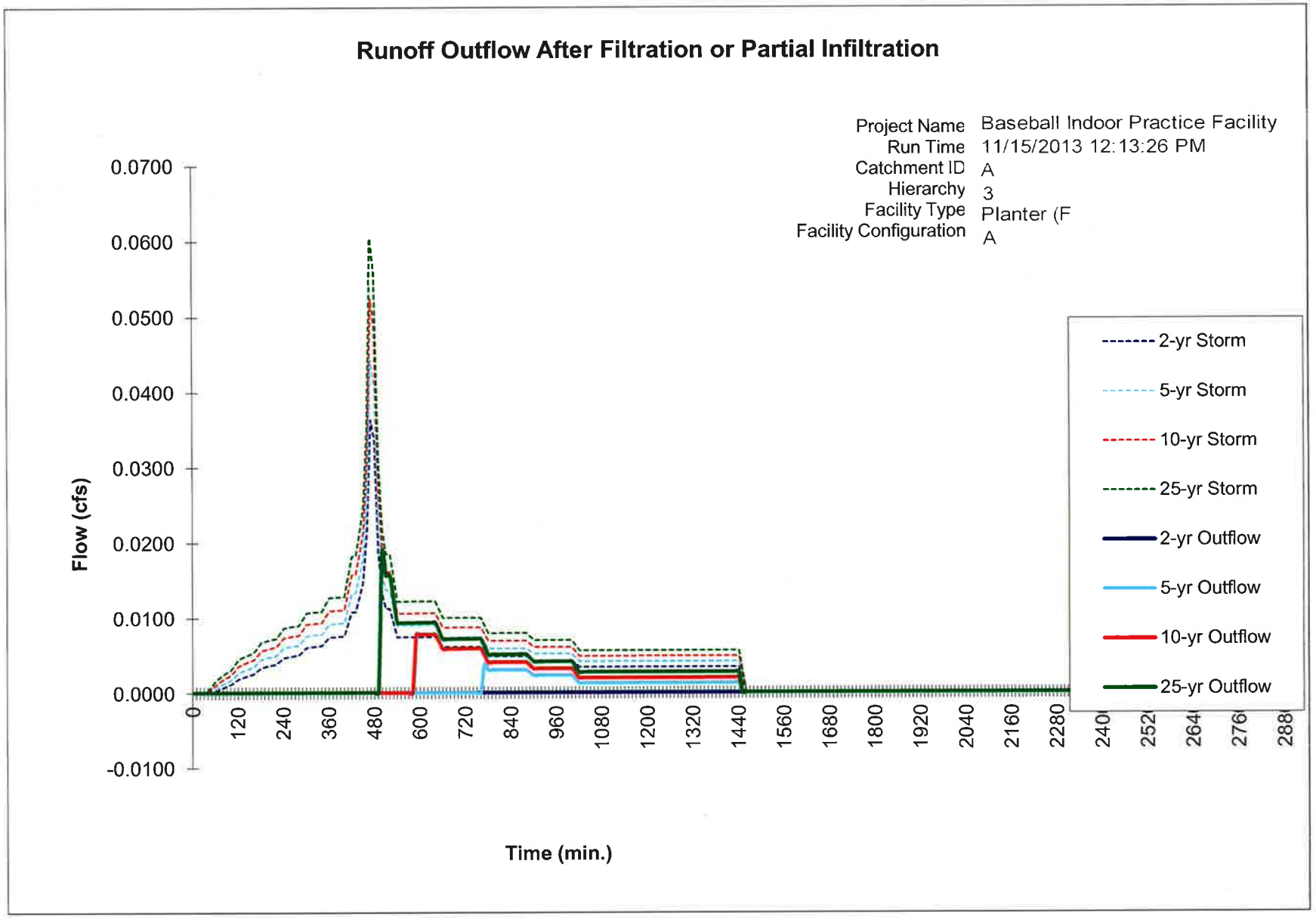
BES - Presumptive Approach Calculator - Ver 1.2

Output Chart



Presumptive Approach Calculator ver. 1.2

Catchment Data

Catchment ID: B

Project Name: Baseball Indoor Practice Facility
Project Address: Milwaukie High School
0
Designer: AMM
Company: HHPR

Date: 11/18/13
Permit Number: 0

Run Time 11/15/2013 12:14:17 PM

Drainage Catchment Information

Catchment ID	B	
	Catchment Area	
Impervious Area	2,574	SF
Impervious Area	0.06	ac
Impervious Area Curve Number, CN_{imp}	98	
Time of Concentration, Tc, minutes	5	min.

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Infiltration Testing Procedure:	Open Pit Falling Head	
Native Soil Field Tested Infiltration Rate (I_{test}):	1.3	in/hr
Bottom of Facility Meets Required Separation From High Groundwater Per BES SWMM Section 1.4:	Yes	

Correction Factor Component

CF_{test} (ranges from 1 to 3)	2	

Design Infiltration Rates

I_{dsgn} for Native (I_{test} / CF_{test}):	0.65	in/hr
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Execute SBUH

SBUH Results

	Peak Rate (cfs)	Volume (cf)
PR	0.011	134
2-yr	0.036	466
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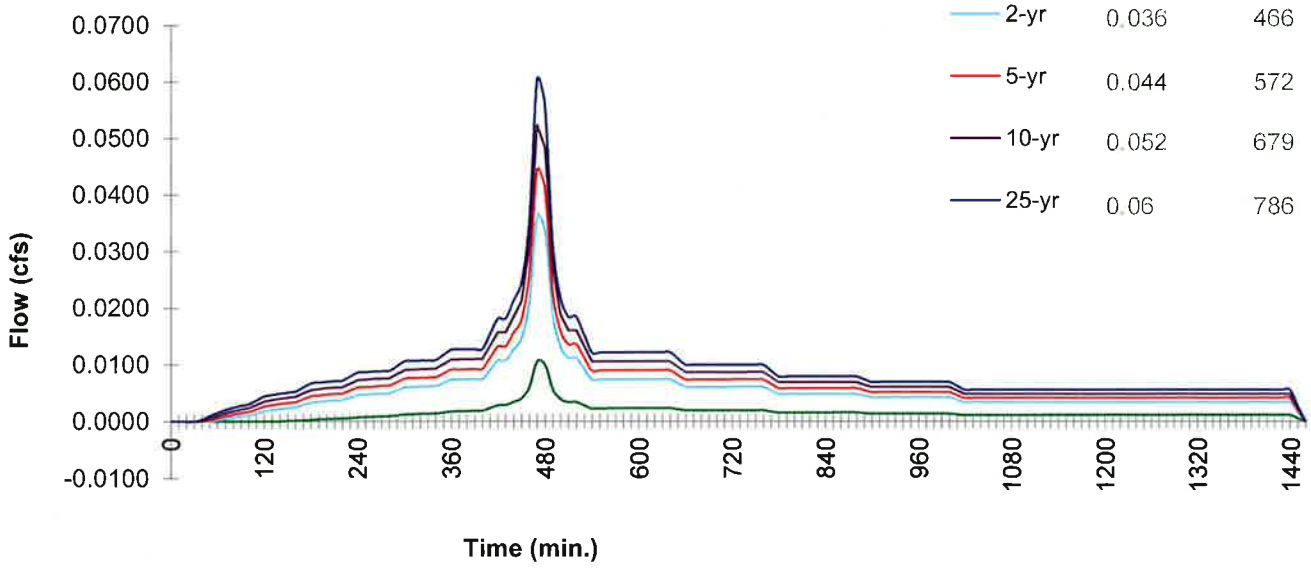

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Presumptive Approach Calculator ver. 1.2

Catchment ID: B

Run Time 11/15/2013 12:14:17 PM

Project Name: Baseball Indoor Practice Facility **Catchment ID:** B **Date:** 11/18/2013

Instructions:

1. Identify which Stormwater Hierarchy Category the facility.
2. Select Facility Type.
3. Identify facility shape of surface facility to more accurately estimate surface volume, except for Swales and sloped planters that use the PAC Sloped Facility Worksheet to enter data.
4. Select type of facility configuration.
5. Complete data entry for all highlighted cells.

Catchment facility will meet Hierarchy Category: 3

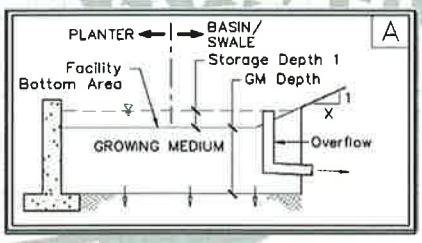
Goal Summary:

Hierarchy Category	SWMM Requirement	RESULTS box below needs to display...	
		Pollution Reduction as a	10-yr (aka disposal) as a
3	Off-site flow to drainageway, river, or storm-only pipe system.	PASS	N/A

Facility Type = Planter (Flat)

Facility Shape: Rectangle/Square

Facility Configuration: A



Calculation Guide
Max. Rock Stor. Bottom Area
189 SF

DATA FOR ABOVE GRADE STORAGE COMPONENT

Facility Bottom Area =	189	sf
Bottom Width =	10.0	ft
Facility Side Slope =	0	to 1
Storage Depth 1 =	17	in
Growing Medium Depth =	18	in
Freeboard Depth =	N/A	in
Surface Capacity at Depth 1 =	268	cf
GM Design Infiltration Rate =	2.00	in/hr
Infiltration Capacity =	0.009	cfs

BELOW GRADE STORAGE

Rock Storage Bottom Area =	189	sf
Rock Storage Depth =	0	in
Rock Storage Capacity =	0	cf
Native Design Infiltration Rate =	0.65	in/hr
Infiltration Capacity =	0.003	cfs

Native Infiltration Rate Used in PA

RESULTS

Pollution Reduction: PASS

Overflow Volume: 0 CF 6% Surf. Cap. Used

Run PAC

Output File

	2-yr	5-yr	10-yr	25-yr
Peak cfs	0.000	0.004	0.008	0.019

FACILITY FACTS

Total Facility Area Including Freeboard = 189 SF

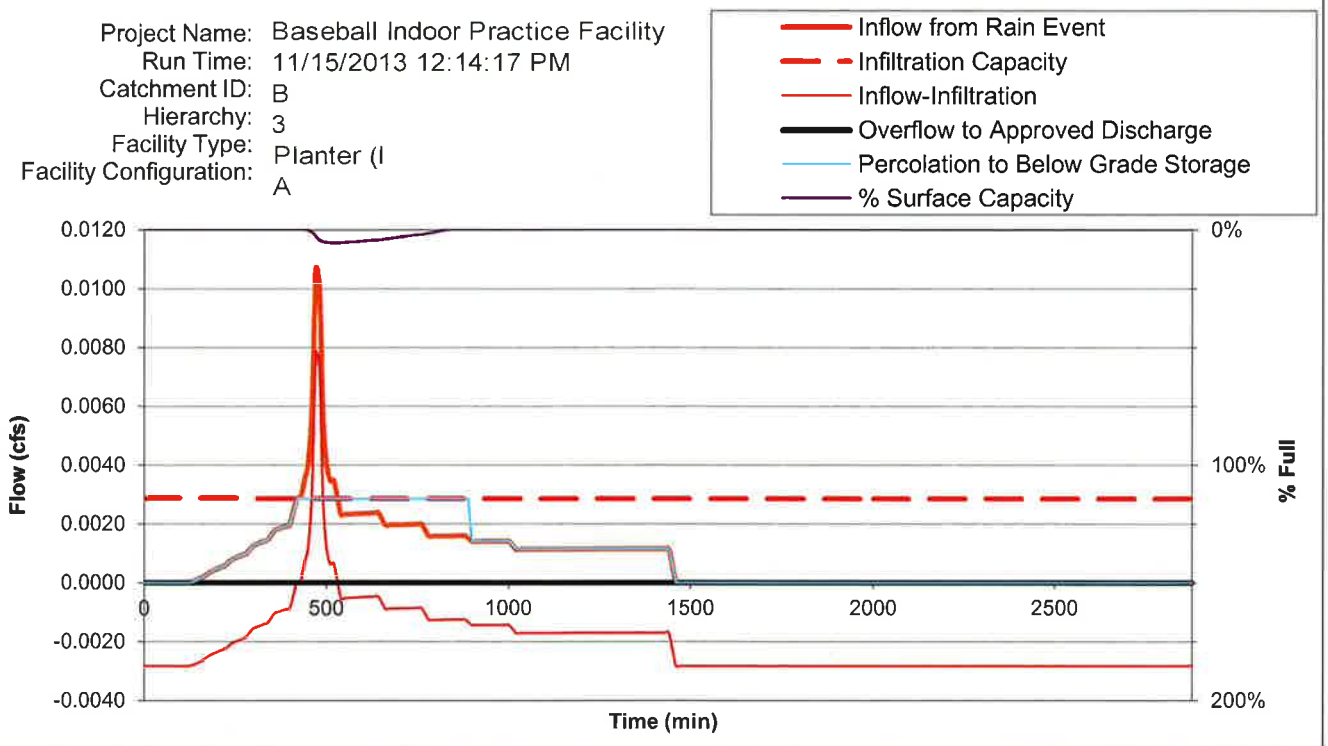
Sizing Ratio (Total Facility Area / Catchment Area) = 0.073

BES - Presumptive Approach Calculator - Ver 1.2

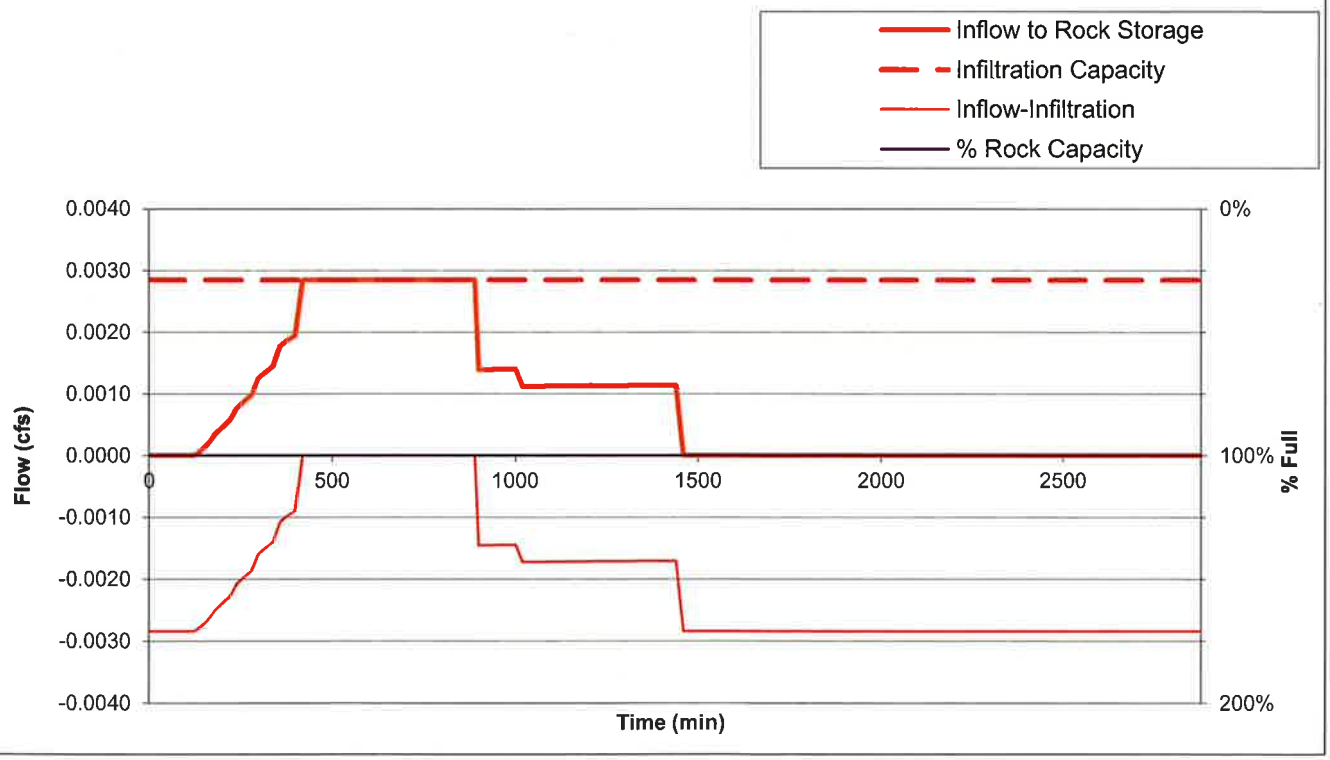
PR Con-A&B

Pollution Reduction Event
Surface Facility Modeling

Project Name: Baseball Indoor Practice Facility
Run Time: 11/15/2013 12:14:17 PM
Catchment ID: B
Hierarchy: 3
Facility Type: Planter (I
Facility Configuration: A



Pollution Reduction Event
Below Grade Modeling



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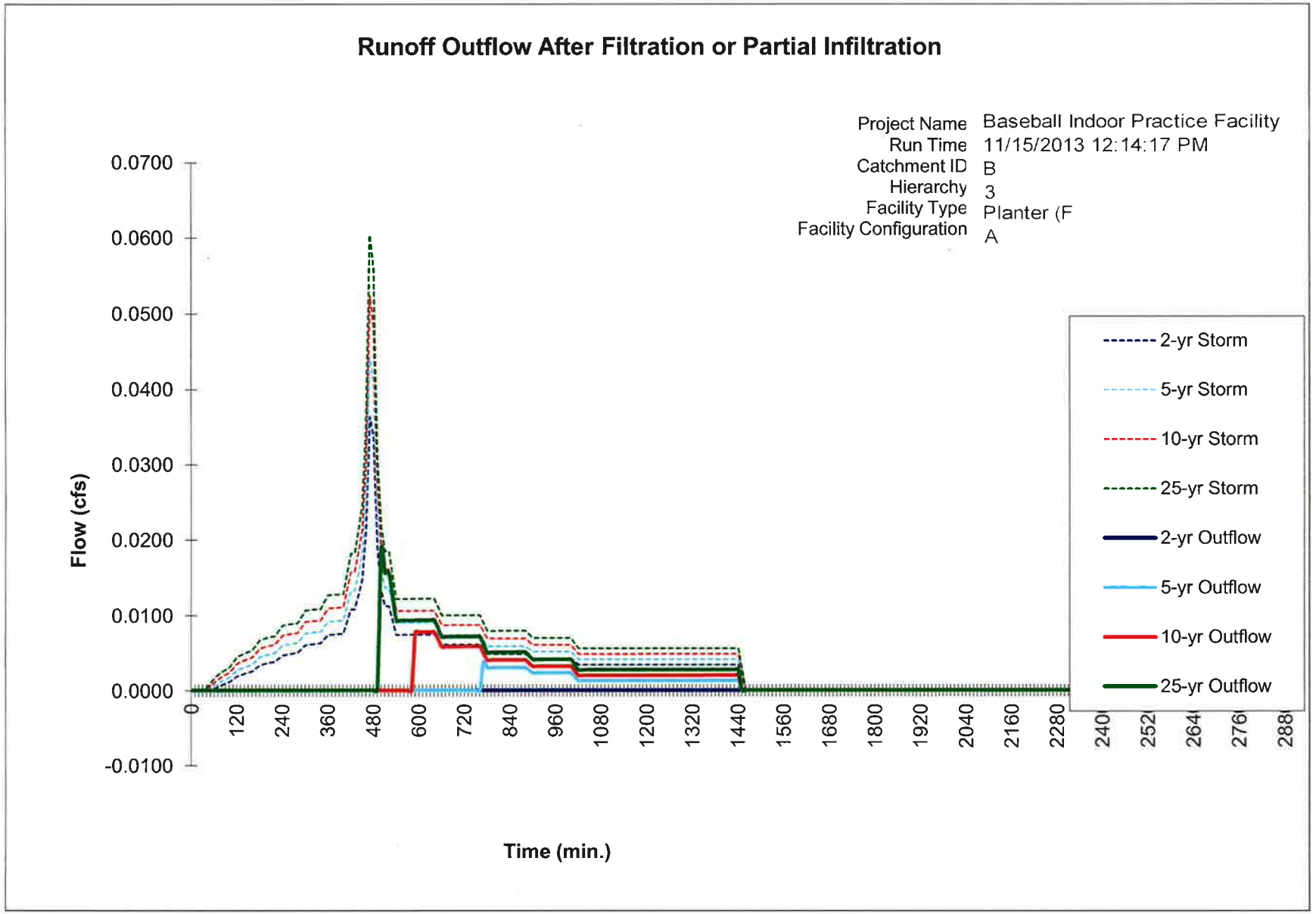
BES - Presumptive Approach Calculator - Ver 1.2

Output Chart



Simplified Operations and Maintenance Specifications
PLANTERS

What To Look For	What To Do
Structural Components, including inlets and outlets/overflows, shall freely convey stormwater.	
➢ Clogged inlets or outlets	➢ Remove sediment and debris from catch basins, trench drains, curb inlets, and pipes to maintain at least 50% conveyance capacity at all times.
➢ Liner and foundation ➢ Cracked drain pipes	➢ Repair/seal cracks. Replace when repair is insufficient.
Vegetation shall cover 90% of the facility.	
➢ Dead or strained vegetation	➢ Replant per original planting plan, or substitute from SWMM **Appendix F.4** plant list. ➢ Irrigate as needed. Mulch annually. DO NOT apply fertilizers, herbicides, or pesticides.
➢ Tall or overgrown plants	➢ Prune to allow sight lines and foot traffic.
➢ Weeds	➢ Manually remove weeds. Remove all plant debris.
Growing/Filter Medium, including soil and gravels, shall sustain healthy plant cover and infiltrate within 48 hours.	
➢ Gullies	➢ Fill, lightly compact, and plant vegetation to disperse flow.
➢ Erosion	➢ Replace splash blocks or inlet gravel/rock.
➢ Ponding	➢ Stabilize soils with plantings from SWMM **Appendix F4**. ➢ Rake, till, or amend to restore infiltration rate.

Annual Maintenance Schedule

Summer. Make any structural repairs. Improve filter medium as needed. Clear drain. Irrigate as needed.
Fall. Replant exposed soil and replace dead plants. Remove sediment and plant debris.
Winter. Monitor infiltration/flow-through rates. Clear inlets and outlets/overflows to maintain conveyance.
Spring. Remove sediment and plant debris. Replant exposed soil and replace dead plants. Mulch.
All seasons. Weed as necessary.

Maintenance Records: Record date, description, and contractor (if applicable) for all structural repairs, landscape maintenance, and facility cleanout activities. Keep work orders and invoices on file and make available upon request of the City inspector.

Access: Maintain ingress/egress to design standards.

Infiltration/Flow Control: All facilities shall drain within 48 hours. Record time/date, weather, and site conditions when ponding occurs.

Pollution Prevention: All sites shall implement best management practices to prevent hazardous or solid wastes or excessive oil and sediment from contaminating stormwater. Contact Spill Prevention & Citizen Response at 503-823-7180 for immediate assistance responding to spills. Record time/date, weather, and site conditions if site activities contaminate stormwater.

Vectors (Mosquitoes & Rodents): Stormwater facilities shall not harbor mosquito larvae or rats that pose a threat to public health or that undermine the facility structure. Monitor standing water for small wiggling sticks perpendicular to the water's surface. Note holes/burrows in and around facilities. Call Multnomah County Vector Control at 503-988-3464 for immediate assistance to eradicate vectors. Record time/date, weather, and site conditions when vector activity observed.

Simplified Operations and Maintenance Specifications
PERVIOUS PAVEMENT

What To Look For	What To Do
Structural Components, including surface materials, shall evenly infiltrate stormwater.	
➢ Clogged surface	➢ Vacuum sweep at least twice a year. ➢ Powerwash annually or as needed. Do not use surfactants.
➢ Cracked or moving edge restraints ➢ Cracked or settled pavement	➢ Repair per manufacturer's specifications.
Vegetation	
➢ Large shrubs or trees	➢ Sweep leaf litter and sediment to prevent surface clogging and ponding. ➢ Prevent large root systems from damaging subsurface structural components.
➢ Weeds	➢ Permeable pavers: manually remove weeds. Do not use herbicides. Mow, torch, or inoculate with preferred vegetation. Many pavers are designed to have pore space vegetation.
Filter Medium	
➢ Aggregate loss in pavers from settling and from powerwashing	➢ Replace paver pore space with aggregate from original design.

Maintenance Schedule:
Summer. Make necessary structural repairs.
Fall. Vacuum sweep.
Winter. Monitor infiltration rate.
Spring. Powerwash, with proper disposal. Vacuum sweep.
All seasons. Weed as necessary.

Maintenance Records. Record date, description, and contractor (if applicable) for all structural repairs, landscape maintenance, and facility cleanout activities. Keep work orders and invoices on file and make available upon request of the City inspector.

Infiltration/Flow Control: All facilities shall drain within 48 hours. Record time/date, weather, and site conditions when ponding occurs.

Pollution Prevention: All sites shall implement best management practices to prevent hazardous or solid wastes or excessive oil and sediment from contaminating stormwater. Contact Spill Prevention & Citizen Response at 503-823-7180 for immediate assistance responding to spills. Record time/date, weather, and site conditions if site activities contaminate stormwater.

Vectors (Mosquitoes & Rodents): Stormwater facilities shall not harbor mosquito larvae or rats that pose a threat to public health or that undermine the facility structure. Monitor standing water for small wiggling sticks perpendicular to the water's surface. Note holes/burrows in and around facilities. Call Multnomah County Vector Control at 503-988-3464 for immediate assistance to eradicate vectors. Record time/date, weather, and site conditions when vector activity observed.

Design Storm

The SBUH method also requires a design storm to perform the runoff calculations. For flow control calculations, BES uses a NRCS Type 1A 24-hour storm distribution. This storm is shown in Figure C-1 and Table C-4. The depth of rainfall for the 2 through 100-year storm events is shown below in Table C-1.

Table C-1
24-HOUR RAINFALL DEPTHS AT PORTLAND AIRPORT

Recurrence Interval, Years	2	5	10	25	100
24-Hour Depths, Inches	2.4	2.9	3.4	3.9	4.4

APPENDIX F.3 TOPSOIL SPECIFICATION FOR VEGETATED STORMWATER SYSTEMS

The following specification is taken from the *2010 City of Portland Standard Construction Specifications,* as amended or corrected. Facilities include swales, planters, curb extensions, and basins.

(1) Standard Blend for Public and Private Facilities

NOTE: This specification is required for all public facilities and is recommended as a general guide for private facilities. Testing and submittals are not required for private facilities unless they are requested by the Bureau permitting the work.

SCS01040 (04-15-13 Excerpt) ***(This Section May Require SPP00415)***

01040.14 Topsoil - Furnish topsoil containing no substance detrimental to the growth of plants and that is free of plants designated by the Oregon Department of Agriculture as Type "A" or Type "B" weeds. Unsuitable topsoil, or topsoil placed by the Contractor without approval in areas to be planted, may be required to be replaced at no additional cost to the City.

(d) Stormwater Facility Topsoil - Furnish imported topsoil for vegetated stormwater facilities conforming to the following:

(1) Standard Blend for Public and Private Facilities - Use this blend for all vegetated stormwater management facilities.

a. General Composition - The material shall be any blend of loamy soil, sand, and compost that is 30-40% compost (by volume) and meets the other criteria in this specification.

b. Analysis Requirements for the Blended Material:

1. Particle Gradation - "A sieve analysis of the blended material, including compost, shall be conducted in conformance with ASTM C117/C136, AASHTO T11/T27, ASTM D422/D1140, or ASTM D6913." The analysis shall include the following sieve sizes: 1 inch, 3/8 inch, #4, #10, #20, #40, #60, #100, #200. The gradation of the blend shall meet the following gradation criteria.

Sieve Size	Percent Passing
1 inch	100
# 4	75 -100
# 10	40-100
# 40	15-50
# 100	5-25
# 200	5-15

The blend shall have a Coefficient of Uniformity (D60/D10) equal to or greater than 6 to ensure it is well graded (has a broad range of particle sizes). The coefficient is the ratio of two particle diameters on a grain-size distribution curve; it is the particle diameter at 60% passing divided by the particle diameter at 10% passing.

2. Acidity - The pH (Power of Hydrogen) of the blended material shall be tested and be between 6 to 8.

c. General Requirements for the Blended Material:

1. The material shall be loose and friable.

2. It shall be well mixed and homogenous.

3. It shall be free of wood pieces, plastic, and other foreign matter.

4. It shall have no visible free water.

d. Compost - The compost shall be derived from plant material and provided by a member of the US Composting Council Seal of Testing Assurance (STA) program. See www.compostingcouncil.org for a list of local providers.

The compost shall be the result of the biological degradation and transformation of plant-derived materials under conditions designed to promote aerobic decomposition. The material shall be well composted, free of viable weed seeds, and stable with regard to oxygen consumption and carbon dioxide generation. The compost shall have no visible free water and produce no dust when handled. It shall meet the following criteria, as reported by the US Composting Council STA Compost Technical Data Sheet provided by the vendor.

- 100% of the material must pass through a 1/2-inch screen.
- The pH of the material shall be between 6 and 8.
- Manufactured inert material (plastic, concrete, ceramics, metal, etc.) shall be less than 1.0% by weight.
- The organic matter content shall be between 30 and 70% (dry weight basis).
- Soluble salt content shall be less than 6.0 mmhos/cm.
- Maturity Indicator shall be greater than 80% for Germination and Vigor.
- Stability shall be 'Stable' to 'Very Stable'.
- Carbon/Nitrogen (C/N) ratio shall be less than 25:1.
- Trace metals test result = "Pass."

e. Submittals - At least 14 working days in advance of construction, submit the following:

1. Documentation for the two analyses described in section 01040.14(d)(1)(b) of this specification (particle gradation with calculated coefficient of uniformity; and pH) shall be performed by an accredited laboratory with certification maintained current. The date of the analyses shall be no more than 90 calendar days prior to the date of the submittal. The report shall include the following information:

   - Name and address of the laboratory.
   - Phone contact and e-mail address for the laboratory.
   - Test data, including the date and name of the test procedure.

2. A compost technical data sheet from the compost vendor. The analysis and report must conform to the sampling and reporting requirements of the US Composting Council Seal of Testing Assurance (STA) program. The analysis shall be performed and reported by an approved independent STA program laboratory and be no more than 90 calendar days prior to the date of the submittal.

3. Two 5-gallon buckets of the blended material.

4. A description of the location, equipment, and method proposed to mix the material.

f. Stormwater Facility Topsoil Installation - See 01040.43(e).

Construction

01040.43 Topsoil:

(e) Stormwater Facility Topsoil Installation:

(1) Protection of the Topsoil - The material shall be protected from all sources of contamination, including weed seeds, while at the supplier, in conveyance, and at the project site.

(2) Placement of the Topsoil - The material shall be placed in loose lifts, not to exceed 8 inches each and each lift shall be compacted with a water-filled landscape roller. The material shall not otherwise be mechanically compacted.

(3) Timing of Plant Installation - Weather permitting and as approved, plants shall be installed as soon as possible after placing and grading the topsoil in order to minimize erosion and further compaction.

(4) Erosion Control - Temporary erosion control measures are required until permanent stabilization measures are functional.

(5) Protection of the Installed Topsoil - In all cases, the installed material must be protected from foot or equipment traffic and surface water runoff. Temporary fencing or walkways should be installed as needed to keep workers, pedestrians, and equipment out of the area. Under no circumstances should materials and equipment be stored on top of the installation area.

(6) Wet and Winter Conditions - Placement of the topsoil will not be allowed when the ground is frozen or saturated or when the weather is too wet as determined by the Owners Representative.