

August 26, 2025

RE: DEQ Review – 2024 Biennial Report  
University of Portland Franz River Campus  
ECSI #277

The Oregon Department of Environmental Quality (DEQ) reviewed the *2024 Biennial Report, University of Portland Franz River Campus* (2024 Biennial Report) dated February 27, 2025, that was submitted by Dalton Olmsted Fuglevand (DOF) on behalf of the University of Portland (UP). The 2024 Biennial Report was prepared in accordance with reporting requirements of the 2014 Easement and Equitable Servitudes (EES) granted by DEQ and the associated Institutional Controls Implementation Plan (ICIP).

DOF worked with UP to prepare this response to those comments. DEQ's comments are presented below. DOF's response is noted after each comment in *Italics*.

### **General Comments:**

- 1) Damage to the shoreline cap includes extensive erosion potentially exposing underlying contaminated soils and sediments, which poses an exposure risk to human health and the environment. For example, monitoring reports show encampments and evidence of wildlife activity along the riverbank and the exposed contamination may adversely impact aquatic life in the river. Despite these observations, UP has indicated no further repair work is planned to address the erosion and damage to the shoreline cap. DEQ considers this stance inconsistent with the obligations outlined in UP's agreements with both DEQ and the U.S. Environmental Protection Agency (EPA) and strongly disagrees with UP's decision. DEQ and EPA remain in contact and coordination regarding damage to UP's shoreline cap and potential impacts to EPA's in-water Portland Harbor work, including in-water remedy design.

*UP remains willing to continue working with DEQ (and EPA) to the maximum extent of its ability to do so, as outlined in our initial response to this letter via email on July 23, 2025. While the ICIP requires only annual inspections based on Section 5.1, to date UP has continued monthly visual inspections and provided those to DEQ to support long term monitoring of shoreline cap erosion.*

- 2) Additional relatively easy maintenance needs were identified in cap monitoring reports that do not appear to have been completed. For example, the May 2024 report first notes some silt fence failures and missing stakes from upland capped areas and the June 2024 report first notes evidence of burrowing mammals impacting the shoreline cap. These maintenance needs should be addressed as soon as possible.

*Silt fencing and stakes are not required parts of caps under the ICIP. Silt fencing has been used as part of stormwater control related to construction projects, not for protection of caps. It is only noted in cap inspections where stormwater might impact caps and in those instances, UP continues to routinely work with their contractors to improve stormwater BMPs. Stakes have been used during construction projects to help contractors identify the location of caps to avoid during construction. They were not intended to be a long term approach to marking cap locations at the site. When noted as missing in historical reports, it was to note them to UP solely for maintenance of the markers during those (now complete)*

*construction efforts near uplands caps.*

- 3) Some upland activities noted in the Cap Monitoring Reports may be out of compliance with the EES and ICIP and need additional clarification. DEQ notes that UP is required to immediately notify DEQ of any conditions that do not comply with the EES (EES Section 3.4).
- a. **Stormwater:** Stormwater source control is required at the site and the ICIP requires the use of best management practices to prevent stormwater impacts; however, it is unclear whether upland source control is being properly maintained. Some reports show stormwater runoff from the uplands to the river, and it is unclear whether any of that stormwater originated from upland capped areas and whether implemented improvements (i.e., sandbags) will be a sufficient long-term solution. DEQ should be notified when stormwater system failures occur. Further, site regrading appears to have occurred that may impact stormwater. DEQ should be notified prior to any site regrading to ensure that stormwater source control is properly maintained. Please provide documentation from regrading activities to verify that all stormwater infiltrates in the uplands (e.g., as-built topographic survey).

*Uplands construction projects have been completed that included upgraded stormwater management features designed to infiltrate and not allow for stormwater runoff. Where stormwater is observed at the property with the potential for runoff onto a cap, it is identified during a cap inspection per the ICIP and is reported to UP's ground team so that BMPs may be repaired or improved. This work has occurred outside of capped areas to date. Future inspection reports will more clearly state that stormwater is not (or is) originating from or observed on a capped area.*

*UP's current stormwater management plan is attached; this shows upgraded stormwater management permitted as part of property development for infiltration of stormwater falling on the property. These structures were originally designed as part of permitting the full property development with the City and during a period of heavy engagement with DEQ regarding planning of development to be compliant with the ICIP. The stormwater management infrastructure for the property (rain gardens, swales, etc.) were all designed to be outside of capped areas.*

- b. **Vehicles and equipment:** Some reports seem to show vehicle tracks over upland capped areas. Please clarify whether this occurred and note that driving over caps should be avoided.

*DOF is not aware of any instance of vehicles driving on capped areas. Construction activities near capped areas to date included marking caps with visual stakes and conducting planning meetings with contractors to brief them on ICIP requirements and avoidance of caps. The majority of uplands caps are now paved or within developed footprints (buildings, fields, etc).*

- c. **Mulch and topsoil material:** Some reports describe mulch and topsoil placement over upland capped areas. Please clarify whether this occurred and if any screening or testing of the material for compliance with Clean Fill and project cleanup levels was completed.

*The planting work was required and completed consistent with permits UP attained from the City of Portland. Installation was designed specifically within the parameters of the ICIP so as not to penetrate any existing caps more than 12 inches. Information regarding planting design and installation can be obtained and/or provided from the City permitting documents, but may not include the information requested in this comment.*

- d. Planting: Some reports describe planting completed in upland capped areas. Please clarify whether this occurred and notes that planting could disturb caps and should be avoided.

*See response to 3c above.*

- 4) DEQ's comments on the 2022 Biennial Report requested that the locations and extents of erosion be included on a figure. Please complete this activity for the erosion status as of the end of the 2022 and 2024 biennial reporting periods so that we can better understand the extent and rate of erosion.

*Approximate extent of erosion in the shoreline capped areas noted as of the end of 2022 and 2024 are shown on the attached map based on the visual inspections. Minor changes are noted in the monthly reports but has remained generally consistent over the past few years, with little in the way of observed new erosion.*

#### **Attachment A Comments:**

- 1) Some Cap Monitoring Reports are missing a map with photo locations (March 2023, July 2023, December 2023, and May 2024 through December 2024). Please revise to add these missing maps.

*The maps are not required under the ICIP as part of inspections but have generally been used as an extra tool to complete inspections. We will include maps with our reports going forward.*

- 2) Some Cap Monitoring Reports have photos missing labels that are also not included in the map with photo locations (May 2024 through December 2024). Please revise to label these photos and identify their locations on the map.

*Photos are not required under the ICIP as part of inspections but have generally been used as an extra tool to complete inspections. We will label any such photos when included going forward.*

- 3) Cap Monitoring Report, January 28, 2023: Item #4 indicates that no ponding is occurring on capped areas. However, Photo F appears to show ponded water. Please clarify whether Photo F is showing ponding on a capped area.

*Photo F is not showing ponding in a capped area. The capped area in this photo is the higher topographic 'bump' shown in the photo, near but beyond the ponded water.*



Photo F – Upland caps remain undisturbed January 2023

- 4) Cap Monitoring Report, February 29, 2023: Photo B shows an abandoned boat grounded along the shoreline. Please clarify whether the boat resulted in any damage to the shoreline cap, whether any sheen was observed from the boat, what happened to this boat following this monthly inspection, and whether there is a corresponding Oregon Emergency Response System report number.

*No damage was noted and the boat's presence is beyond the toe of the capped area as indicated by the large rock present between the boat and the finer grained material on the shoreline. The boat was not observed after this inspection and presumed to have subsequently drifted back out with the tide if not removed by its owner or other responders from the river.*



Photo B – Abandoned boat grounded on northern bank February 2023

- 5) Cap Monitoring Report, August 31, 2023: Please describe the purpose of the silt fence

that appears along the top of the bank.

*Silt fencing has been periodically used during uplands construction projects as required under those projects' applicable permits for construction stormwater management. This fencing was present during various periods of property development construction and establishment of newer permanent stormwater management features at the property.*

- 6) Cap Monitoring Report, September 29, 2023: Photo D shows stakes labeled with "CONTAMINATED" placed at the edge of the riverbank cap. Please provide more information about where these stakes were placed and why.

*This stake was an example of marking put in place to alert contractors working on the uplands construction projects that this area is within the shoreline cap and one of the soil caps that they were to avoid crossing or working in.*

- 7) Cap Monitoring Report, October 31, 2023: Photo D shows tire tracks over upland areas, possibly over capped areas given the location of the stake in the photo. DEQ notes that vehicles and equipment should avoid driving over capped areas. Please clarify whether vehicles or equipment were driving on capped areas (see General Comment #3 above).

*Photo D is upland outside of capped areas. Invasive vegetation was cut in preparation for the planting project performed in this area of the property.*

- 8) Cap Monitoring Report, November 28, 2023: Item #1 and Photo D indicate that mulch and topsoil were placed in an upland area followed by some planting and Photo F appears to show fill material placed over upland capped areas; please clarify whether this occurred and if any screening or testing of the material for compliance with Clean Fill and project cleanup levels was completed (see General Comment #3 above).

*See response to general comment #3 – plantings were designed for installation compliant with the ICIP so as to not disturb or penetrate caps more than 12 inches and per City of Portland Permits.*

- 9) Cap Monitoring Report, December 7, 2023: This report is missing photos from the site visit. Please add these photos to this report.

*Photos added, see attached.*

- 10) Cap Monitoring Report, January 31, 2024: Photo F shows planting in upland areas, possibly over capped areas given the location of the stake in the photo. Please clarify whether trees or other plants were planted in upland capped areas. DEQ notes that this could result in cap disturbance and should be avoided (see General Comment #3 above).

*See response to general comment #3.*

- 11) Cap Monitoring Report, February 29, 2024:  
a. Please correct the date of this report, as there are only 28 days in February.

*The date is accurate. February 2024 had 29 days as it was a leap year.*

- b. Item #1 and Photos A and D indicate that ponding and stormwater rills are

allowing stormwater to move beyond the top of bank and onto the riverbank. It is unclear whether any of that stormwater originated from upland capped areas and more information is needed to verify that is not the case (see General Comment #3 above).

*The photos show where stormwater from uplands outside of capped areas was beginning to run onto capped areas and warranted stormwater BMP improvements in the uplands to prevent damage to caps. As shown in Figure D this was shortly after new plants in the uplands areas were installed and becoming established.*



Photo A – Stormwater rill moving past top of bank February 2024.



Photo D – Second area of stormwater moving past top of bank February 2024.

- c. Photo E indicates silt fencing installed since February 2024; however, this report takes place in February. Please clarify when this silt fencing was installed.

*The silt fencing shown in the February 2024 inspection was not observed during the January 2024 inspection in this area of the property so noted as new.*

- 12) Cap Monitoring Report, March 24, 2024: Item #1 indicates that improvements have been made to where previous erosion was observed, and Photos A and D appear to show the placement of sandbags. Please include a description of these improvements in the report.

*UP engaged with their stormwater design consultant to get recommendations and then improvements made included silt fencing installed along more of the top of bank and sand bags placed above areas of previous stormwater erosion in the uplands (outside of capped areas) where it was previously noted as running onto capped areas.*

- 13) Cap Monitoring Report, April 29, 2024: Item #1 indicates improvements have been made to where previous erosion was observed, and Photo D appears to show the placement of additional sandbags. Please include a description of these improvements in the report.

*Improvements observed included placement of sandbags in uplands areas (outside of capped areas). No stormwater run onto or further erosion in capped areas was noted during this inspection.*

- 14) Cap Monitoring Report, May 31, 2024: This report first identifies the need for maintenance regarding some silt fence failures and missing stakes from upland capped areas. However, according to subsequent reports, this repair work does not seem to have been completed. Please complete this repair work as soon as possible (see General Comment #2 above).

*Repairs were not deemed required, the inspection was noting a change in a condition outside the capped area for UP to consider as part of their construction planning. The silt fencing was associated with completed revegetation work and drier season conditions had commenced. It continued to be noted in case of a need for maintenance to avoid damage to the caps when rainier weather returned.*

*Similarly, some stakes were noted to not be present, but were not required if construction in their vicinity was complete and no longer a risk of impacting these caps. Stakes are not required marking for soil caps in the ICIP.*

- 15) Cap Monitoring Report, June 28, 2024: This report first notes evidence of burrowing animals impacting the shoreline cap. However, according to subsequent reports, this repair work does not seem to have been completed. Please take action to address damage made to the cap by burrowing animals as soon as possible (see General Comment #2 above).

*Conditions remain unchanged and has not been observed to have increased in size. UP will fill the hole with clean sand and DOF will inspect as part of an upcoming inspection. Original photo included below for reference.*



Burrowing mammal hole formation.

- 16) Cap Monitoring Report, November 26, 2024: Photo F appears to show a drum washed up onto the shoreline. Was this drum examined for leaking contents or removed? Please include descriptions of any observations or actions taken for this drum.

*The poly barrel appeared empty during the inspection and had floated away by the next inspection. The barrel was presumed to have washed ashore initially and was not known to have come from any UP operations.*

- 17) Cap Monitoring Report, December 23, 2024: Item #6 indicates that DOF is coordinating with UP regarding upgrading stormwater management outside of capped areas to prevent damage to caps. Given stormwater requirements in the EES and ICIP, DEQ should be consulted prior to finalization of any plans.

*See response to general comment #3. Uplands construction projects have been completed that include upgraded stormwater management features designed to infiltrate and not allow for stormwater runoff. These were originally designed as part of permitting the full property development with the City and during a period of heavy engagement with DEQ regarding planning of development to be compliant with the ICIP. The stormwater management infrastructure for the property (rain gardens, swales, etc.) were all designed to be outside of capped areas.*

*With most of the development projects now complete, UP will continue to monitor runoff and evaluate stormwater design once all new plantings are established to determine next steps as required for infiltration improvements.*

Thank you,

Tasya Gray  
Principal Geologist, DOF  
Environmental Consultant to UP

Cc: Jennie Cambier, UP

Attachments:

December 2023 site photographs  
UP Frantz River Campus stormwater design plans  
Map of approximate primary erosion noted 2022-2024

## **December 2023 site photographs**

December 2023 Inspection









# **UP Frantz River Campus stormwater design plans**



CITY OF PORTLAND  
Stormwater  
Management  
Manual

# OPERATIONS & MAINTENANCE FORM

## PRIVATE STORMWATER MANAGEMENT FACILITIES

This O&M Form supercedes document number \_\_\_\_\_

(for official county use only)

**PROJECT NAME** University of Portland River Campus **OWNER INFORMATION (ALL LEGAL OWNERS)**

**PERMIT INFORMATION**

Permit # 19-247236-000-00-CO

Permit Submittal Date \_\_\_\_\_

Name (1) University of Portland

Name (2) \_\_\_\_\_

Address (Mailing) 5000 N Willamette Blvd.

City / State / Zip Portland, OR 97203

**SITE INFORMATION** (include all parcels)

R# (6 Digits) R315775, R315795, R683572, R248488

Site Address 5828 N Van Houten Pl.

City / State / Zip Portland, OR 97203

Preparation Date: 01/13/2020

**O&M PREPARER INFORMATION**

Name Josh Lighthipe, PE

Address (Mailing) 111 SW 5th Ave., Suite 2600

City / State / Zip Portland, OR 97204

Phone (area code required) 503-542-3840

Email josh.lighthipe@kpff.com

**Site Legal Description:**

Unplatted Property in the NE 1/4 of Section 18, Township 1 North, Range 1 East of the Willamette Meridian, Multnomah County, Oregon

**Responsible Party for Maintenance** (check one)

Homeowners Association  Property Owner

Property Management Company  Tenant

Other (describe) \_\_\_\_\_  
(not Contractor or Consultant)

**Contact Information for Responsible Party**

Contact Name Paul Luty

Contact Organization University of Portland

Phone (area code required) 503.943.8874

Email: luty@up.edu

**Maintenance Practices and Schedule**

These operation and maintenance practices are required in accordance with Portland City Code, Chapter 17.38.

The requirements are based on the current version of the *City of Portland Stormwater Management Manual* on the date of permit submittal.

For the **Simplified Approach and Presumptive Approach**, please attach the Standard O&M Plan for each facility type from the *Stormwater Management Manual*, Chapter 3.1.1

For the **Performance Approach**, please attach the approved, site specific O&M Plan per the *Stormwater Management Manual*, Chapter 3.1.2

# OPERATIONS & MAINTENANCE FORM

## PRIVATE STORMWATER MANAGEMENT FACILITIES

### SITE PLAN

Provide a site plan sketch in the area provided below, or attach a scaled site plan to this submittal that includes all of the information required as shown in Chapter 3.1.4, in Operations & Maintenance, Submittal Requirements, Site Plan.

#### STEP 1 – COMPLETE THE FOLLOWING TABLE

Facility Name	Type	Size (sf)	Drainage Basin	Source	Impervious Area Treated (sf)	Discharge Point
VIB-A	Vegetated Infiltration Basin	3663	Basin A	public street, sidewalk, parking lot, Physical Plant Building	171,301	infiltration with 3-inch weep hole into street for overflow
VIB-B	Vegetated Infiltration Basin	6680	Basin B	parking lot, sidewalk, future tennis court, future tennis facility	124,268	infiltration
VIB-C	Vegetated Infiltration Basin	3259	Basin C	parking lot and storage shed	36,406	infiltration
VIB-D	Vegetated Infiltration Basin	1490	Basin D	public street, sidewalk, driveway, proposed buildings	26,920	infiltration
VIB-E1	Vegetated Infiltration Basin	450	Basin E	parking and sidewalk	7,135	infiltration
VIB-E2	Vegetated Infiltration Basin	450	Basin E	parking and sidewalk	4,717	infiltration
VIB-E3	Vegetated Infiltration Basin	555	Basin E	parking and sidewalk	4,767	infiltration
VIB-E4	Vegetated Infiltration Basin	555	Basin E	parking and sidewalk	4,740	infiltration
VIB-E5	Vegetated Infiltration Basin	555	Basin E	parking and sidewalk	4,737	infiltration
VIB-E6	Vegetated Infiltration Basin	555	Basin E	parking and sidewalk	4,566	infiltration
VIB-E7	Vegetated Infiltration Basin	555	Basin E	parking and sidewalk	4,762	infiltration
VIB-E8	Vegetated Infiltration Basin	555	Basin E	parking and sidewalk	4,760	infiltration
VIB-E9	Vegetated Infiltration Basin	555	Basin E	parking and sidewalk	4,629	infiltration
VIB-E10	Vegetated Infiltration Basin	555	Basin E	parking and sidewalk	4,564	infiltration
VIB-E11	Vegetated Infiltration Basin	585	Basin E	parking and sidewalk	7,533	infiltration
VIB-E12	Vegetated Infiltration Basin	480	Basin E	parking and sidewalk	4,710	infiltration
VIB-F	Vegetated Infiltration Basin	2450	Basin F	public street, concrete deck, Boathouse Building	35,914	infiltration
VIB-G	Vegetated Infiltration Basin	263	Basin G	public street and sidewalk	2,605	infiltration
ST-H	Soakage Trench	2234	Basin H	Track and Field facility	173,965	infiltration
FS-I	Filter Strip	3470	Basin I	Boathouse Courtyard	4,375	infiltration
ST-J	Soakage Trench	120	Basin J	Boathouse Gravel and Courtyard	6,906	infiltration
FS-K	Filter Strip	9728	Basin K	Greenway Trail	23,818	infiltration

# OPERATIONS & MAINTENANCE FORM

## PRIVATE STORMWATER MANAGEMENT FACILITIES

### SIGNATURE AND ACKNOWLEDGEMENT

By signing below, the owner accepts and agrees to the terms and conditions contained in this O&M Form and in any document executed by filer and recorded with it. The owner further acknowledges that this documentation has been prepared on their behalf and that they are responsible for the quality and completeness of the O&M Plan. Any failure to comply with the terms of these plans may result in enforcement actions by BES requiring the property owner to restore the stormwater facilities to a functional state as approved under original requirements.

The owner also accepts that the City requires property owners to submit and record, with the County, complete and accurate O&Ms enforceable under City Code 17.38 and that substantial changes to the O&M require City approval prior to County recording. A revised O&M must state that it supersedes a previous O&M (with cited county document number; See Page 1).

THIS PAGE MUST BE SIGNED IN THE PRESENCE OF A NOTARY.

\_\_\_\_\_  
*Property Owner or Authorized Representative (1) Signature*

\_\_\_\_\_  
*Property Owner or Authorized Representative (2) Signature*

### NOTARY SIGNATURE AND STAMP

INDIVIDUAL Acknowledgement

*This acknowledgement is intended for property owned by individuals or trusts.*

STATE of OREGON county of: \_\_\_\_\_

This instrument was acknowledged  
before me on: *(date)* \_\_\_\_\_

By: *(owner 1)* \_\_\_\_\_

By: *(owner 2)* \_\_\_\_\_

Notary Signature \_\_\_\_\_

My Commission Expires \_\_\_\_\_

**Notary Seal:**

**OR**  CORPORATE Acknowledgement

*This acknowledgement is intended for corporation, government agencies, school districts, or other formal entities*

STATE of OREGON county of: \_\_\_\_\_

This instrument was acknowledged  
before me on: *(date)* \_\_\_\_\_

By: *(representative)* \_\_\_\_\_

As: *(Title)* \_\_\_\_\_

Of: *(Corporation)* \_\_\_\_\_

Notary Signature \_\_\_\_\_

My Commission Expires \_\_\_\_\_

**Notary Seal:**

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## Appendices

### Appendix A

System Map

### Appendix B

CDS Pretreatment Operation and Maintenance Manual

# Responsibility

The stormwater facilities on this site are to be maintained by the University of Portland. The Physical Plant Director is the main point of contact at the University and his/her phone number is 503-943-7306. University of Portland employees are in charge of conducting maintenance and regular inspections of the stormwater facilities. They are also to perform any tasks required to keep the stormwater facilities in working order, such as removing weeds and debris from the catch basins.

The preparer has worked with University of Portland staff to design a system that can be easily maintained by maintenance staff.

A copy of the Operations & Maintenance Plan shall be provided to all property owners and tenants.

# Description

## Site Description

The project site consists of approximately 23 acres of land in the City of Portland, Oregon. This site is known as the University of Portland Franz Campus, that covers both sides of the Union Pacific Railroad (UPRR) right-of-way (ROW) and is bounded by N Van Houten Pl at the bottom of the bluff and the top of bank of the Willamette River. This phase will contain the boathouse, track and field, physical plant, and road improvements along N Van Houten Pl.

## Stormwater System Description

The stormwater system collects and infiltrates all runoff within the site and treats pollution-generating surfaces from new development areas. All runoff is infiltrated into the ground through a soakage trench inside the Track and Field area, a soakage trench off the concrete courtyard of the Boathouse, or through vegetated infiltration basins in various locations across of the River Campus.

### Inner Track and Field Area

Runoff from the track and field will drain directly through the field section and into the field's sub-drainage system, which will either directly infiltrate into the ground or laterally flow to a soakage trench (H), which runs around the edge of the field; where it will then infiltrate into the ground. The track area is composed of permeable pavement and will also drain either directly into the ground or into the soakage trench. In the unlikely event the soakage trench cannot fully infiltrate all the stormwater it receives, it is designed to overflow to Storm Manhole T1 and out to the public storm main that drains to the river.

### Boathouse Courtyard

Runoff from the courtyard and gravel area adjacent to the Boathouse project will drain to two areas drains that are connected to soakage trench (J). In the unlikely event that the soakage trench cannot fully infiltrate all the stormwater it receives, it is designed to overflow to the Willamette river to the west.

## **Greater River Campus Areas**

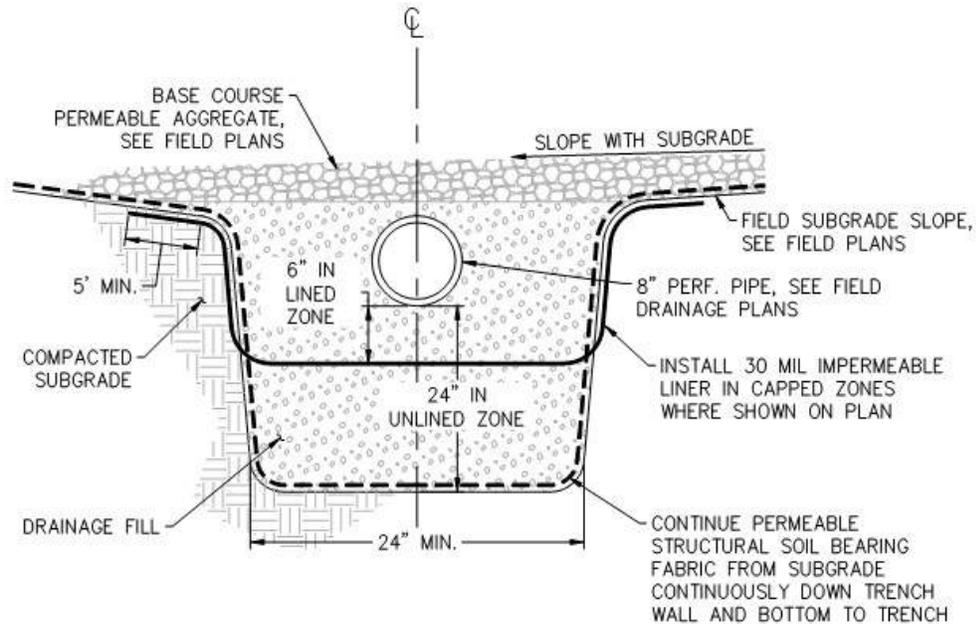
Runoff from all building roofs will drain directly to the piped stormwater system. The paved plaza, parking lots, and roadways will sheet flow to area drains or trapped catch basins connected to the piped storm system. Cleanouts and manholes are provided to provide maintenance access to these pipes. All the piped storm systems discharge into vegetated infiltration basins (VIB) A, B, C, D, E, F and G. The vegetated infiltration basins have been sized to provide treatment and infiltration of the runoff from the impervious surfaces of this project.

TABLE #1: Facilities Description Table

Facility Name	Type	Size (sf)	Drainage Basin	Source	Impervious Area Treated (sf)	Discharge Point
VIB-A	Vegetated Infiltration Basin	3663	Basin A	public street, sidewalk, parking lot, Physical Plant Building	171,301	infiltration with 3-inch weep hole into street for overflow
VIB-B	Vegetated Infiltration Basin	6680	Basin B	parking lot, sidewalk, future tennis court, future tennis facility	124,268	infiltration
VIB-C	Vegetated Infiltration Basin	3259	Basin C	parking lot and storage shed	36,406	infiltration
VIB-D	Vegetated Infiltration Basin	1490	Basin D	public street, sidewalk, driveway, proposed buildings	26,920	infiltration
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VIB-E4	Vegetated Infiltration Basin	555	Basin E	parking and sidewalk	4,740	infiltration
VIB-E5	Vegetated Infiltration Basin	555	Basin E	parking and sidewalk	4,737	infiltration
VIB-E6	Vegetated Infiltration Basin	555	Basin E	parking and sidewalk	4,566	infiltration
VIB-E7	Vegetated Infiltration Basin	555	Basin E	parking and sidewalk	4,762	infiltration
VIB-E8	Vegetated Infiltration Basin	555	Basin E	parking and sidewalk	4,760	infiltration
VIB-E9	Vegetated Infiltration Basin	555	Basin E	parking and sidewalk	4,629	infiltration
VIB-E10	Vegetated Infiltration Basin	555	Basin E	parking and sidewalk	4,564	infiltration
VIB-E11	Vegetated Infiltration Basin	585	Basin E	parking and sidewalk	7,533	infiltration
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VIB-G	Vegetated Infiltration Basin	263	Basin G	public street and sidewalk	2,605	infiltration
ST-H	Soakage Trench	2234	Basin H	Track and Field facility	173,965	infiltration
ST-J	Soakage Trench	120	Basin J	Boathouse Gravel and Courtyard	6,906	infiltration
FS-K	Filter Strip	9728	Basin K	Greenway Trail	23,818	infiltration
FCMH-1	Flow Bypass Manhole	4' Diameter MH	Basin A1	public street	51,256	24" public storm pipe

## Component Definitions

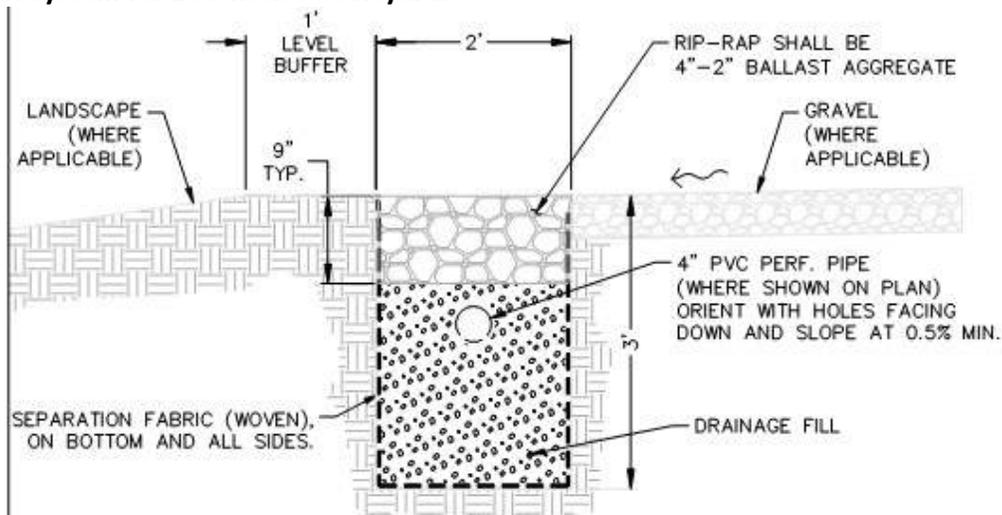
- **Soakage Trench (ST)** is a drainage rock filled sub-surface trench that also contains a perforated pipe. It is sized to store and slowly infiltrate all stormwater from the field's sub-drainage system.
  - **Detail of system for Track and Field:**



## 7 SOAKAGE TRENCH (UNLINED & LINED)

SCALE: NTS

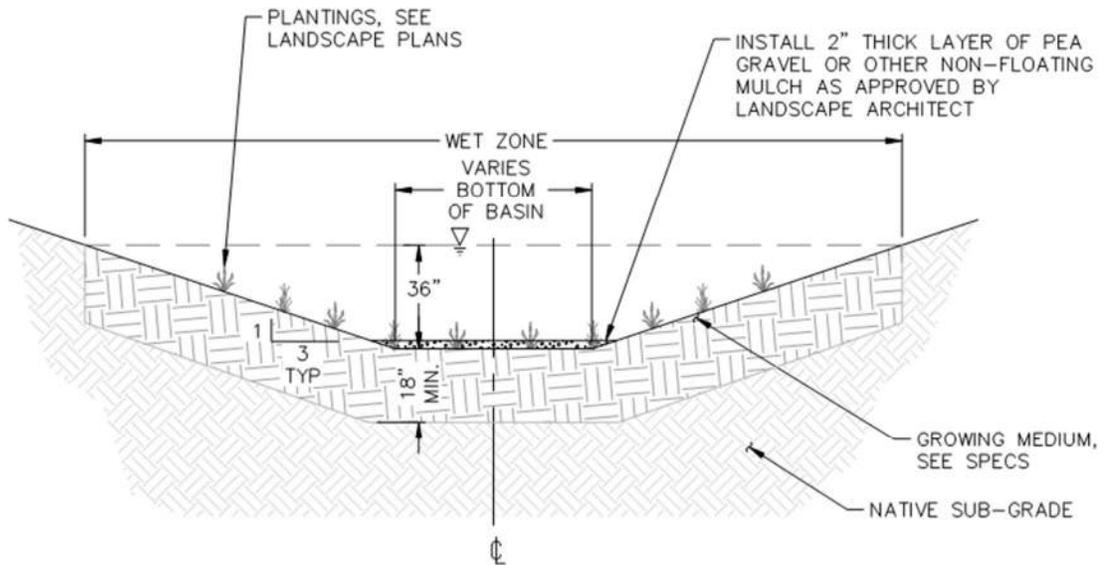
- **Detail of system for Boathouse Courtyard:**



## 12 FRENCH DRAIN - TYPE 2

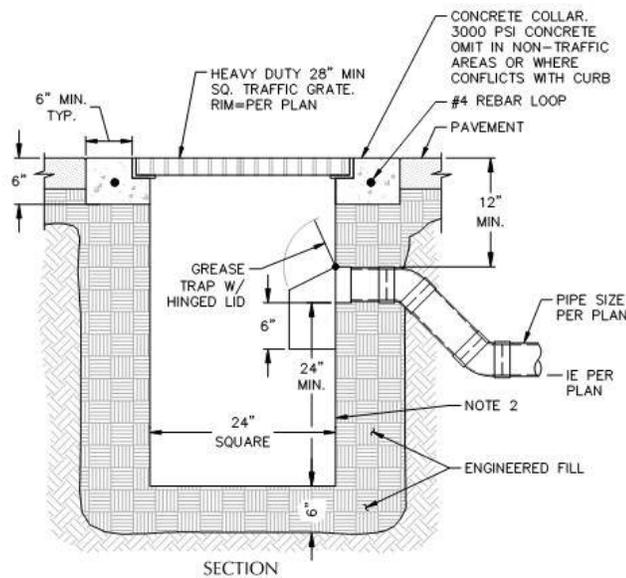
SCALE: NTS

- **Vegetated Infiltration Basins (VIB)** are planted areas filled with engineered soil and specialized plants that treat and dispose of stormwater by providing temporary storage, while allowing stormwater to infiltrate into the ground. VIBs have special non-floating mulch comprised of either gravel or aged compost that prevents the planter soil from eroding or clogging.



**10** TYP. VEGETATED INFILTRATION BASIN (VIB)  
SCALE: NTS

- **Trapped Catch Basins (CB)** are inlet structures that collect surface stormwater and convey it to the storm system. Each catch basin will have a removable turn down elbow to trap sediment and debris in the catch basin sump.

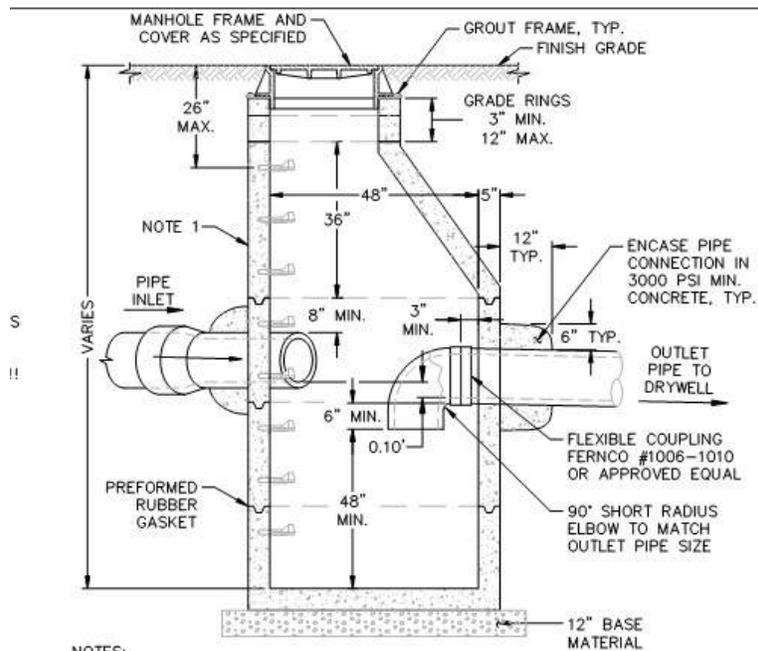


**NOTES:**

1. CONTRACTOR TO WIDEN EXCAVATION AS REQUIRED TO OBTAIN COMPACTION WITH CONTRACTORS COMPACTION EQUIPMENT.
2. 1/4" STEEL PLATE, BITUMINOUS COATED. AS MANUFACTURED BY GIBSON STEEL BASINS OR APPROVED EQUAL.

**8** TRAPPED CATCH BASIN  
SCALE: NTS

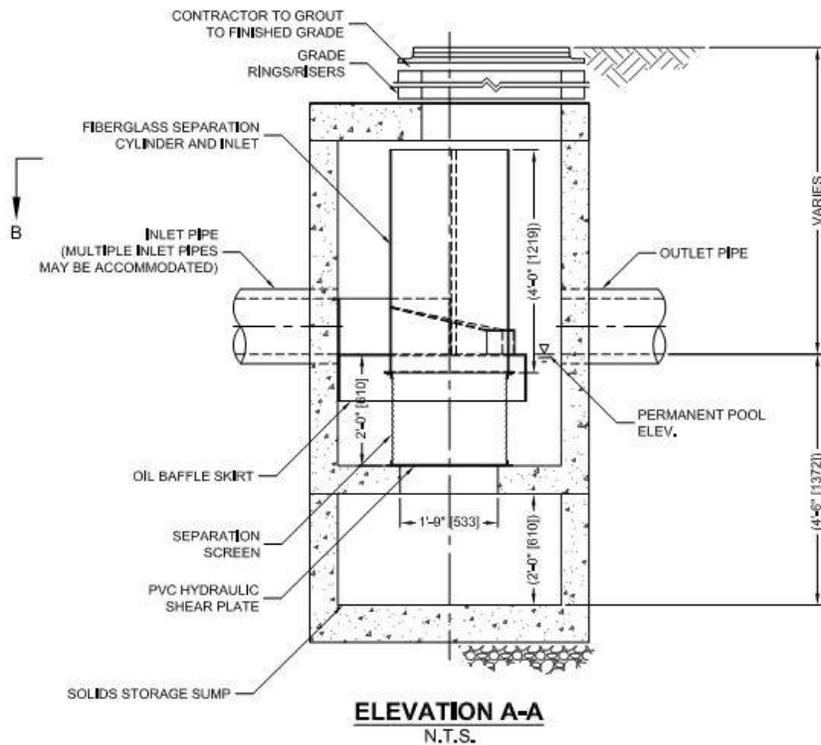
- **Sedimentation Manhole (SEDMH):** designed to settle out incoming sediment and separate oils and grease from stormwater runoff before discharging to a vegetated infiltration basin.



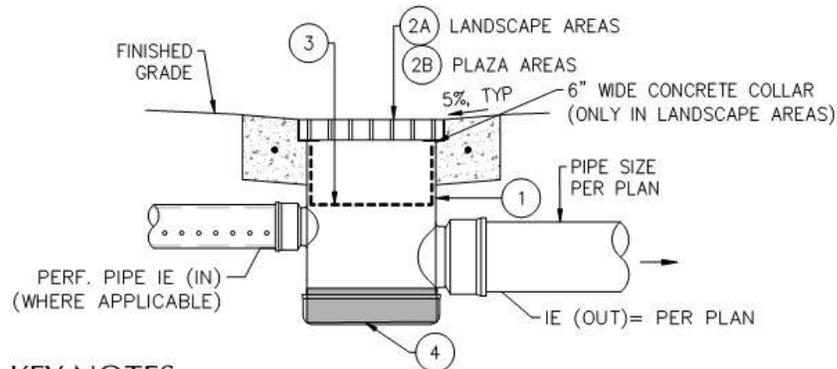
- NOTES:**
1. ALL PRECAST SECTIONS SHALL CONFORM TO REQUIREMENTS OF ASTM C-478.
  2. MANHOLE BASE MAY BE PRECAST OR CAST IN PLACE.
  3. ALL CONNECTING PIPES SHALL HAVE FLEXIBLE, GASKETED AND UNRESTRAINED JOINT WITHIN 18" OF MANHOLE VAULT.

**11 SEDIMENTATION MANHOLE**  
SCALE: NTS

- **CDS Pretreatment Manhole (CDS):** designed to settle out incoming total suspended solids, trap floatables, and separate oils and grease from stormwater runoff before discharging to a vegetated infiltration basin.



- **Area Drain (AD):** Are small box-shaped inlet structures that collect stormwater and convey it to the storm system. They have square grates set flush with the ground that allow stormwater to enter the structure. The drains onsite are each equipped with a reusable Sediment Bag to catch debris and sediment, which should be periodically inspected and emptied.

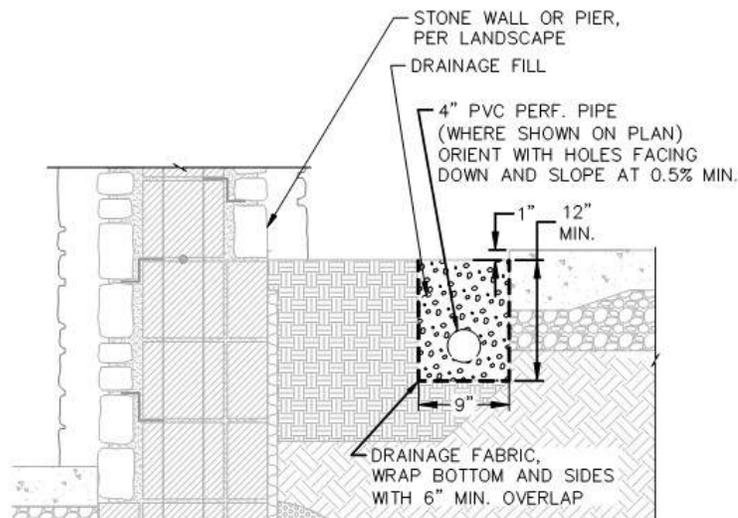


**(X) KEY NOTES**

- 1 12" NYLOPLAST DRAIN BASIN, OR APPROVED EQUAL
- 2A 12" STANDARD HINGED GRATE, H-10 RATED BY ADS, OR APPROVED EQUAL.
- 2B 12" PEDESTRIAN HINGED GRATE, H-10 RATED BY ADS, OR APPROVED EQUAL.
- 3 FLEXSTORM SHORT CATCH-IT INLET SEDIMENT BAG, OR APPROVED EQUAL.
- 4 INSTALL 12" DIA SUMP INSERT (NYLOPLAST PART NUMBER 3812AGSI) TO ELIMINATE SUMP IN BASIN.

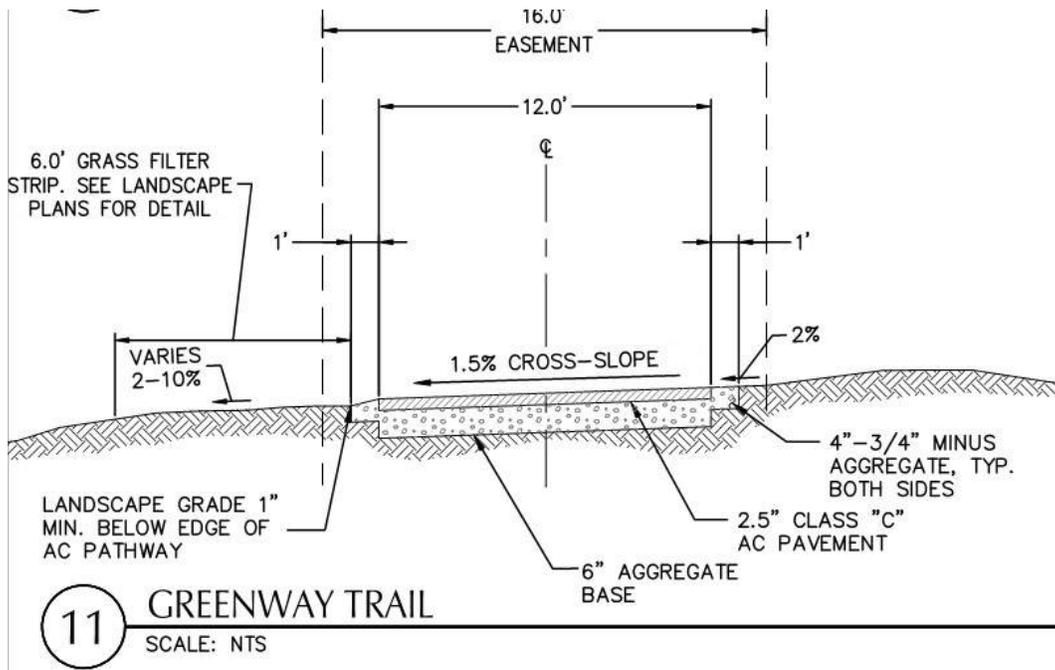
**(6) AREA DRAIN - TYPE 1**  
SCALE: NTS

- **French Drain (FD):** A rock filled trench used to convey stormwater underground.

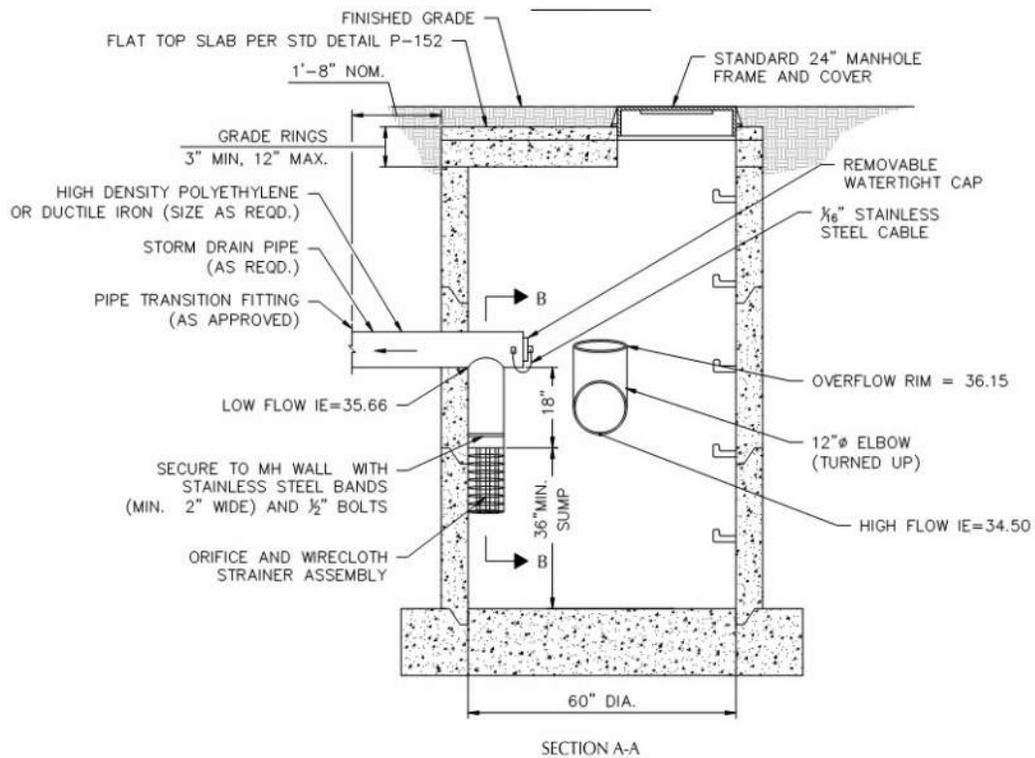


**(3) FRENCH DRAIN**  
SCALE: NTS

- Filter Strip (FS):** A gently-sloped vegetated area which manages runoff from walkways, slowing the runoff and allowing it to infiltrate.



- Flow Bypass Manhole (FBMH)** is a concrete manhole with an orifice to control the flow from the lower outlet pipe and a secondary high flow outlet activated when the water level backs up to a higher level in the manhole and overflows through a 12" riser.



- **Backwater Valve (BWV):** a valve used on some of the storm lines connected to foundation drains to prevent water from backing up into the foundation drains.
- **Cleanout (CO):** a maintenance structure (at grade or buried) that connects to storm and sanitary lines and allows for surface access to inspect the pipe network. It is constructed of a vertical pipe with a lid that can be opened for inspection or to allow maintenance personnel to access the system to remove blockages.
- **Downspout (DS):** a conventional vertical pipe that conveys roof rainwater to the piped gravity drained stormwater system.
- **Piped Storm System:** consists of all underground pipes that connect the VIBs to the existing storm system.
- **Outfall (OF):** are the open ends of stormwater pipes that discharge into the VIBs. They have a layer of rip-rap directly below the outfall to prevent erosion from occurring when water leaves the pipe and may have screens or grates to prevent rodents from entering the pipe system.

## Inspection/Maintenance Schedule

The whole system shall be inspected and maintained quarterly and inspected within 48 hours and maintained within 72 hours after each major storm event. For this Operations and Maintenance Plan, a major storm event is defined as greater than 1.0-inches of rain in 24 hours. All components of the storm system as described below must be inspected and maintained frequently or they will cease to function effectively. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. Receipts shall be saved when maintenance is performed and there is a record of expense.

## Inspection/Maintenance Procedure

### Source Control

Source control measures prevent pollutants from mixing with stormwater. Typical non-structural control measures include raking and removing leaves, street sweeping, vacuum sweeping, limited and controlled application of pesticides and fertilizers, and other good housekeeping practices.

- Source control measures shall be inspected and maintained (where applicable).

### Spill Prevention

Spill prevention measures shall be exercised when handling substances that can contaminate stormwater. It is important to exercise caution when handling substances that can contaminate stormwater. Activities that pose the chance of hazardous material spills shall not take place near collection facilities.

- Contact facility owner immediately if spill is observed.
- Releases of pollutants shall be corrected as soon as identified.

## Insects & Rodents

Insects and rodents shall not be harbored in the any part of the storm system.

- Pest control measures shall be taken when insects/rodents are found to be present.
- If sprays are considered, then a mosquito larvicide, such as Bacillus thurendensis or Altoside formulations can be applied only if absolutely necessary and shall not be used where it will enter groundwater or come in contact with any standing water. Sprays shall be applied only by a licensed individual or contractor.
- Holes in the ground located in and around the storm system shall be filled.
- Outfalls draining into flow-through planters and riprap conveyance swales shall be inspected and cleaned regularly to ensure no rodent activity which would clog or decrease the efficiency of the storm system.

## Access

Access to the storm system is required for efficient maintenance.

- Egress and ingress routes shall be open and maintained to design plans.

## Signage

Signage may serve to educate people about the importance or function of the site's stormwater protection measures. It may also discourage behaviors that adversely affect the stormwater protection measures. For example, if debris is a problem, a sign reminding people not to litter may partially solve the problem.

- Broken or defaced signs shall be replaced/repared.

## Hiring Professionals

- Underground facilities, such as manholes, drywells and manufactured facilities, must be cleaned by a vactor truck. Do not enter these facilities. They are defined by the Oregon Occupational Safety and Health Division as confined spaces that require proper certification to enter.
- Certain components, such as collection basins, piping and pervious pavement systems may require vacuuming with a vactor truck or street sweeping equipment.
- When heavy erosion occurs in a vegetated facility, professionals may be required to provide re-grading and re-planting services.

## Individual Components

The following components shall be inspected and maintained according to the table below.

TABLE #2: Individual Components Table

Component	Component Part	Observed Condition	Maintenance Action	Season
Area Drain	Piping	Debris and garbage build-up	Clear piping to facility when blockage occurs.	All
		Cracked Drain Pipe	Repair/seal cracks. Replace when repair is insufficient.	All
	Trap/Outlet Hood	Debris and garbage build-up	Clear hooded outlet.	All
	Sump	Depth of accumulated sediment has reached 1/3 of capacity	Remove sediment using vactor truck (manholes) or shovel (area drains and catch basins only).	All
	Structure Walls	Cracks	Repair/seal cracks. Replace when repair is insufficient.	All
	Cover	Missing cover	Replace missing cover.	All
		Cracks in grates	Replace cracked grates.	All
		Uneven cover	Remove debris from frame/collar and ensure cover is level and secured. If settling has occurred so that cover is no longer level with surrounding grades, adjust rim to remove tripping hazard.	All
	Catch Basin	Piping	Debris and garbage build-up	Clear piping to facility when blockage occurs.
Cracked Drain Pipe			Repair/seal cracks. Replace when repair is insufficient.	All
Trap/Outlet Hood		Debris and garbage build-up	Clear hooded outlet.	All
Sump		Depth of accumulated sediment has reached 1/3 of capacity	Remove sediment using vactor truck (manholes) or shovel (area drains and catch basins only).	All
Structure Walls		Cracks	Repair/seal cracks. Replace when repair is insufficient.	All
Cover		Missing cover	Replace missing cover.	All
		Cracks in grates	Replace cracked grates.	All
		Uneven cover	Remove debris from frame/collar and ensure cover is level and secured. If settling has occurred so that cover is no longer level with surrounding grades, adjust rim to remove tripping hazard.	All
Downspout			Scouring/Erosion	Add splash block/rock pads.
		Sediment or debris build-up	Remove sediment and debris to maintain at least 80% conveyance capacity at all times.	All
Sedimentation Manhole	Piping	Debris and garbage buildup	Clear piping to facility when blockage occurs.	All
		Cracked drain pipe	Repair/seal cracks. Replace when repair is insufficient.	All
	Trap/Outlet Hood	Debris and garbage buildup	Clear hooded outlet.	All
	Sump	Depth of accumulated sediments have reached 1/3 of the capacity	Remove sediment using vactor truck (manholes) or shovel (area drains and catch basins only).	All
	Structure Walls	Cracks	Repair/seal cracks. Replace when repair is insufficient.	All
	Cover	Missing cover	Replace missing cover.	All

Component	Component Part	Observed Condition	Maintenance Action	Season
		Cracks in grates or manhole cover	Replace cracked grates or manhole cover.	All
		Uneven cover	Remove debris from frame/collar and ensure cover is level and secured. If settling has occurred so that cover is no longer level with surrounding grades, adjust rim to remove tripping hazard.	All
<b>Soakage Trench</b>	Piping	Standing water in field	Check rock layer beneath pipe for blockage	Fall and Spring
<b>French Drain</b>	Piping and Trench Channel	Debris and garbage buildup	<ul style="list-style-type: none"> <li>Clear piping to facility when blockage occurs.</li> <li>Remove sediment from trench channel.</li> </ul>	All
		Cracked drain pipe	Repair/seal cracks. Replace when repair is insufficient.	All
<b>Filter Strip</b>	Vegetation (must cover 100%)	Dead or stressed vegetation	Replant per original planting plan, or substitute from the plant list in Section 2.4.1. Irrigate and mulch as needed; prune tall, dry grasses and remove clippings.	Fall and Spring
		Weeds	Manually remove weeds.	All
	Growing Medium (must sustain healthy plant cover)	Gullies, erosion, exposed soils, sediment accumulations	Fill in and lightly compact areas of erosion with City-approved soil mix (see Section 2.3.6) and replant according to planting plan or substitute from the plant list in Section 2.4.1.	Fall and Spring
		Ponding	Rake, till, or amend soil surface with City-approved soil mix to restore infiltration rate. Remove and replace sediment at entrances.	All
<b>Flow Control Manhole</b>	Weir	Cracking or gaps	Repair cracks or gaps between weir and manhole side with non-shrink grout.	All
	Orifice	Clogging	Inspect and ensure orifice is not blocked.	All
	Stand-pipe	Clogging	Inspect and clean out stand pipe and screen at the bottom from any accumulated debris.	All
<b>Vegetated Infiltration Basin</b>	Structural components (must be operated and maintained in accordance with the design specifications)	Clogged outfalls or overflow inlets	Remove sediment and debris from catch basins, trench drains, curb inlets, and pipes; maintain at least 50% conveyance at all times.	All
		Broken inlets or outlets	Repair/replace broken downspouts, curb cuts, standpipes, and screens.	Summer
		Cracked or exposed drain pipes	Repair or seal cracks. Replace when repair is insufficient. Cover with 6 inches of growing medium to prevent freeze/thaw and UV damage	Summer
	Vegetation (must cover at least 90% of facility)	Dead or stressed vegetation	Replant per original planting plan, or substitute from the plant list in Section 2.4.1. Irrigate and mulch as needed; prune tall, dry grasses and remove clippings.	Fall and Spring
		Tall grass and vegetation	Maintain grass height at 6"-9". Trim to allow sight lines and foot traffic, also to ensure inlets and outlets freely convey stormwater into and/or out of facility.	All
		Weeds	Manually remove weeds.	All
	Growing Medium (must sustain healthy plant cover and infiltrate within 6 hours)	Gullies, erosion, exposed soils, sediment accumulations	Fill in and lightly compact areas of erosion with City-approved soil mix (see Section 2.3.6) and replant according to planting plan or substitute from the plant list in Section 2.4.1. Sediment more than 4 inches deep must be removed.	Fall and Spring
		Souring at the inlet(s)	Ensure splash blocks or inlet gravel/rock are adequate.	All
		Ponding	Rake, till, or amend soil surface with City-approved soil mix to restore infiltration rate. Remove and replace sediment at entrances.	All

Component	Component Part	Observed Condition	Maintenance Action	Season
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1. It is illegal to hose sediments through your system. Sediments often can be removed by hand.
2. Large facilities and underground facilities will need to be cleaned with heavy equipment, such as vactor trucks, by trained professionals.

# Inspection and Maintenance Logs

The City of Portland requires maintenance staff to complete inspection and maintenance logs. The logs shall be produced for:

## Infiltration/Flow Control

All facilities shall drain within 48 hours. Date, time, weather, and site conditions when ponding occurs shall be recorded.

## Pollution Prevention

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

## Vectors (mosquitoes and 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 with eradicating vectors. Record date, time, weather, and site conditions when vector activity is observed.

## Maintenance

Record date, description, and contractor (if applicable) for all structural repairs, landscape maintenance and facility cleanout activities.

A log sheet is provided on the following page.

# Inspection and Maintenance Log

## University of Portland River Campus

Perform all inspection and maintenance per the Operations and Maintenance (O&M) Plan.  
Record all observations and activities within this log.

Inspection Date: \_\_\_\_\_ Inspection Time: \_\_\_\_\_ Inspected By: \_\_\_\_\_

Approximate Date/Time of Last Rainfall: \_\_\_\_\_ Rainfall Depth: \_\_\_\_\_

### General Inspection and Maintenance to be Done Semi-Annually

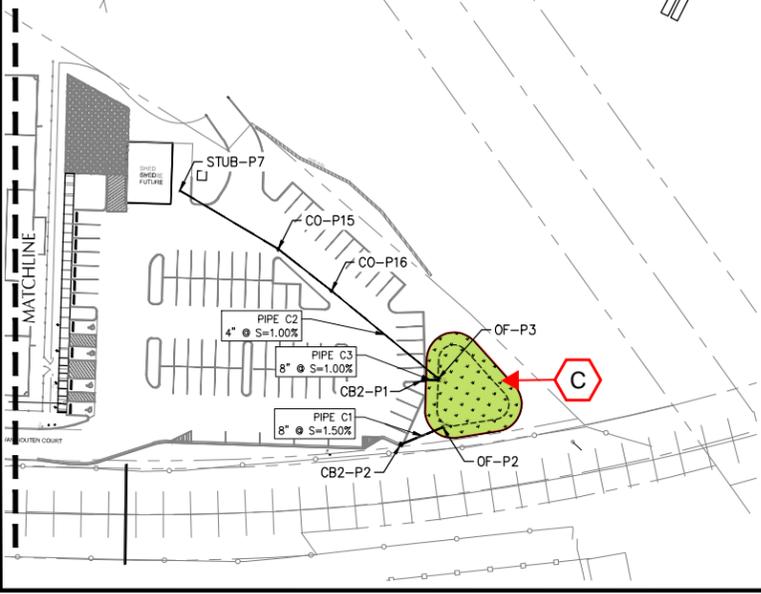
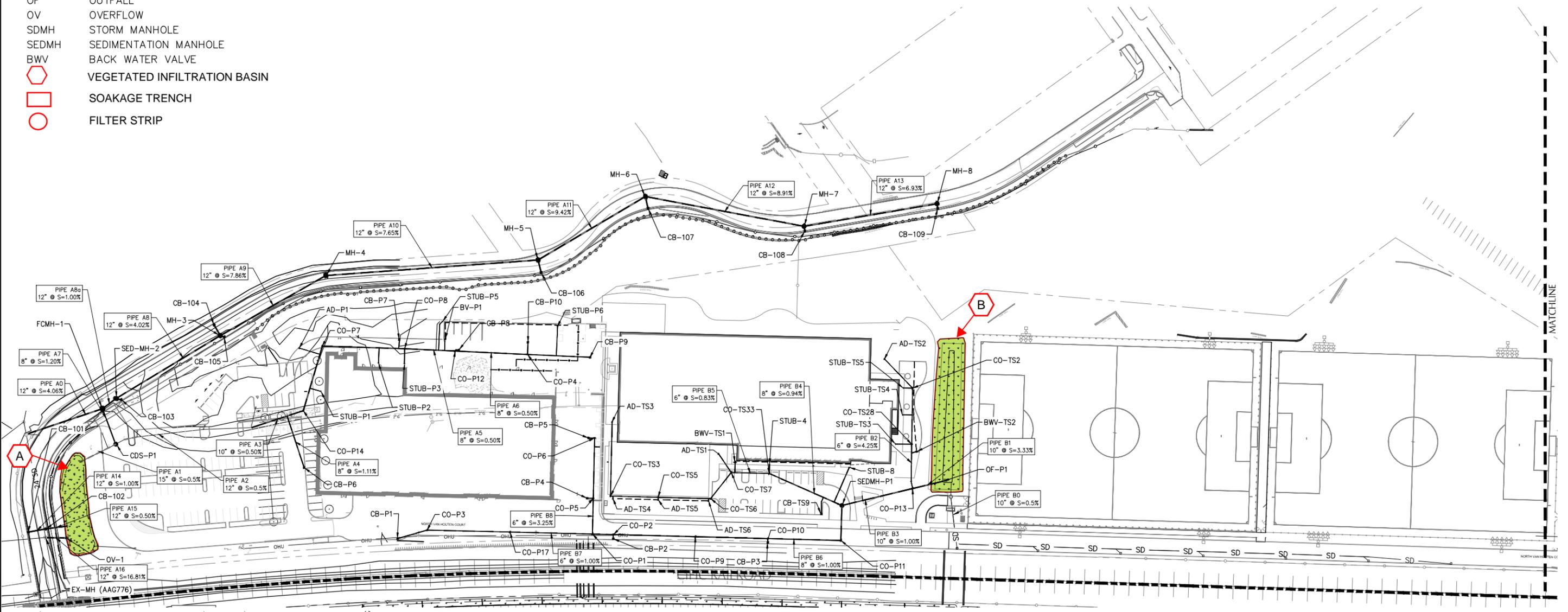
Condition of infrastructure – Damage, vandalism, theft, etc. Record damage and management activities (removing invasive species, cleaning up litter, repairing animal burrows, etc.):

### Storm System Component Checklist

(To be completed as scheduled or after a major storm event)

Component Type	Observations and Maintenance Notes
Area Drains	
Backwater Valve	
Catch Basins	
Cleanout	
Curb Cut	
Downspout	
Manhole	
Flow Bypass manhole	
Outfalls	
Overflow Inlets	
Piped Storm System	
Sedimentation Manhole	
CDS Pretreatment Manhole	
Soakage Trench	
Trapped Catch Basin	
French Drain	
Vegetated Infiltration Basin	

CALLOUT	DESCRIPTION
AD	AREA DRAIN TYPE 1
AD2	AREA DRAIN TYPE 2
CB	CATCH BASIN (TRAPPED)
CO	CLEANOUT TO GRADE
OF	OUTFALL
OV	OVERFLOW
SDMH	STORM MANHOLE
SEDMH	SEDIMENTATION MANHOLE
BWV	BACK WATER VALVE
	VEGETATED INFILTRATION BASIN
	SOAKAGE TRENCH
	FILTER STRIP



**PROPOSED SYSTEM MAP**  
UP RIVER CAMPUS  
EAST OF RR TRACKS

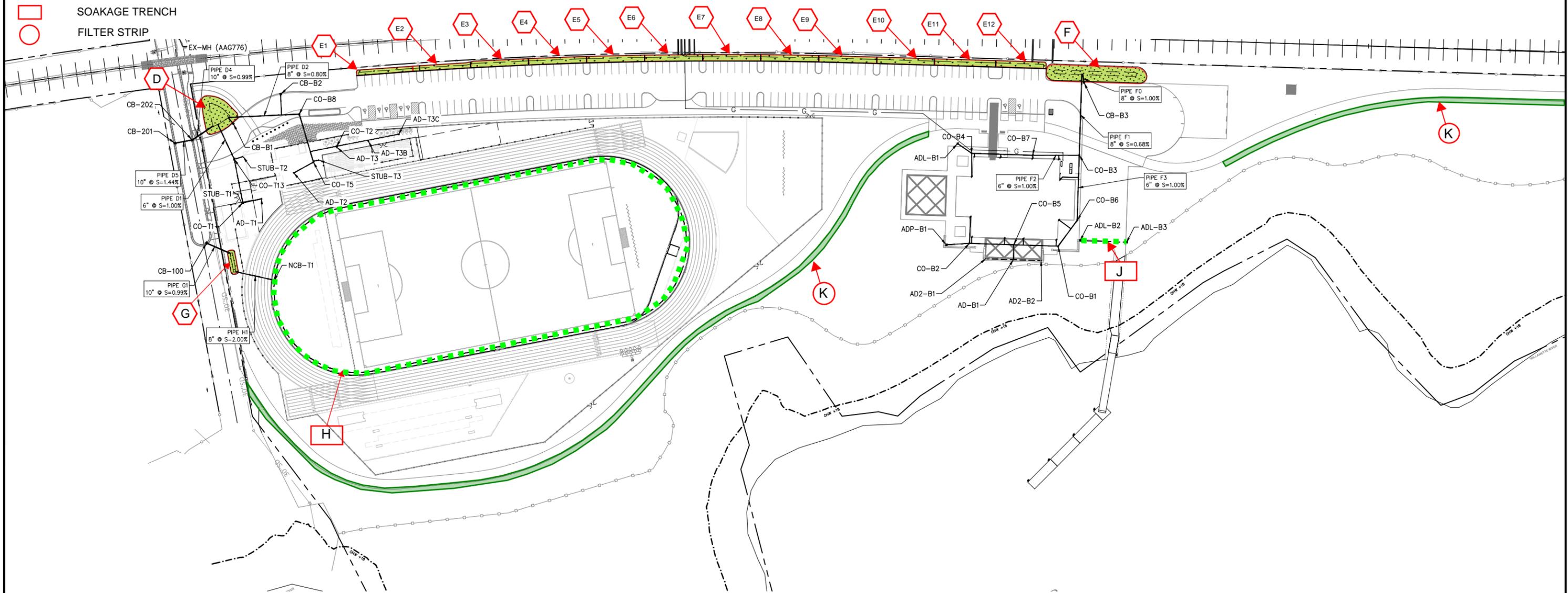


APPENDIX A

File: \\civildx1\Civil-Projects\2016\1600362-UP-River-Greenway\PROJ-INFO\Planning-Design\storm\_map\600362-system-map.dwg TAB:EXH-1A E BLOCK  
 Plotted: 2/11/20 at 3:42pm By: kthomason

**CALLOUT DESCRIPTION**

- AD AREA DRAIN TYPE 1
- AD2 AREA DRAIN TYPE 2
- CB CATCH BASIN (TRAPPED)
- CO CLEANOUT TO GRADE
- OF OUTFALL
- OV OVERFLOW
- SDMH STORM MANHOLE
- SEDMH SEDIMENTATION MANHOLE
- BWV BACK WATER VALVE
-  VEGETATED INFILTRATION BASIN
-  SOAKAGE TRENCH
-  FILTER STRIP



File: \\civildpax1\Civil-Projects\c\p\2016\1600362-UP-River-Greenway\PROJ-INFO\Planning-Design\storm-map.dwg TAB:EXH-1B W BLOCK  
 Plotted: 2/11/20 at 3:56pm By: kthomason



SCALE: 1" = 120'  
 0 120'

**PROPOSED SYSTEM MAP**  
 UP RIVER CAMPUS  
 WEST OF RR TRACKS

**APPENDIX A**

## CDS<sup>®</sup> Inspection and Maintenance Guide

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## Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

## Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allow both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine whether the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

## Cleaning

Cleaning of a CDS system should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.



CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y <sup>3</sup>	m <sup>3</sup>
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.3	3.0	0.9	1.3	1.0
CDS2020	5	1.3	3.5	1.1	1.3	1.0
CDS2025	5	1.3	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities



**Support**

- Drawings and specifications are available at [www.contechstormwater.com](http://www.contechstormwater.com).
- Site-specific design support is available from our engineers.

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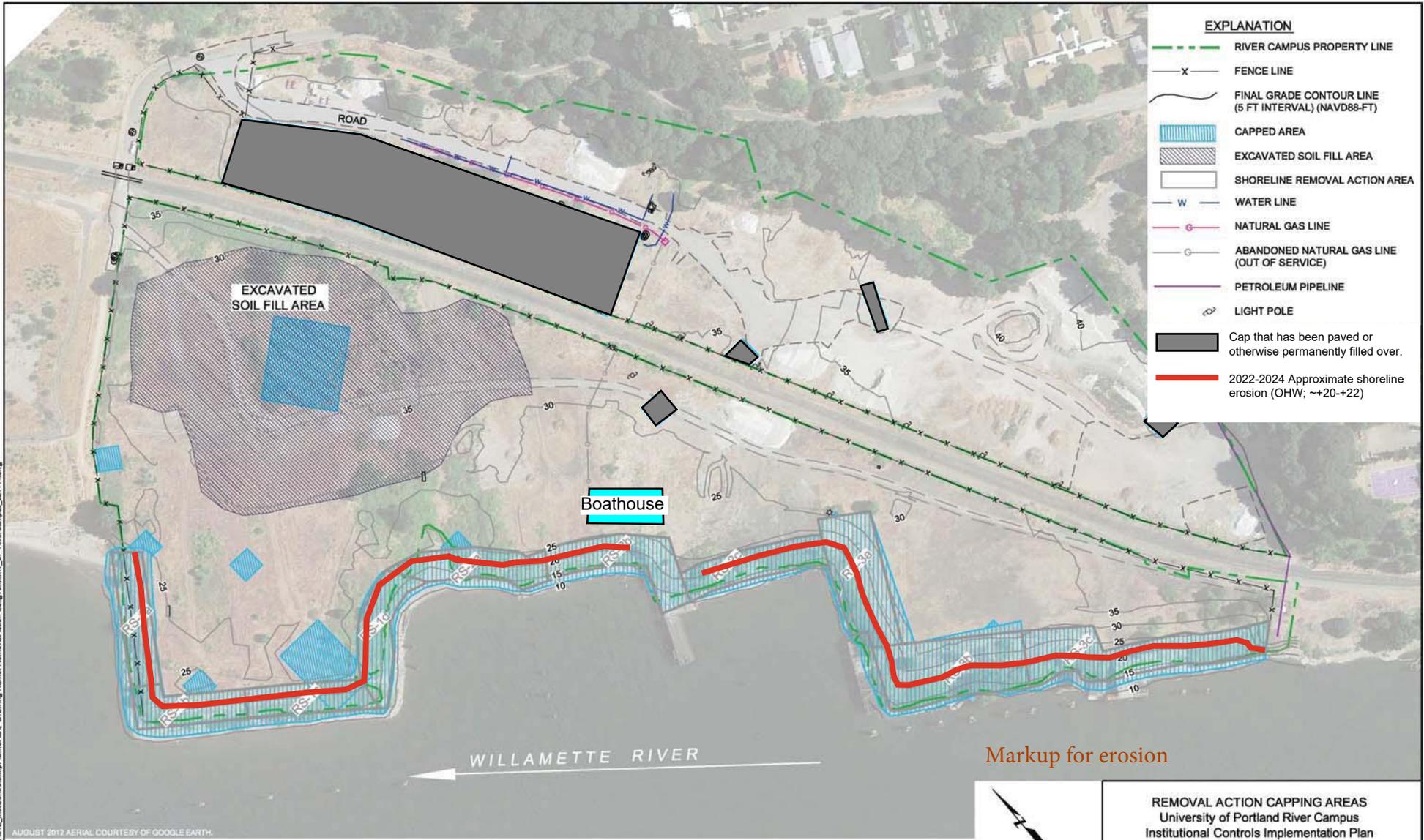
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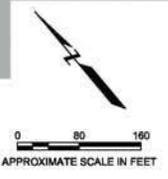
The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266; 7,517,450 related foreign patents or other patents pending.



## **Map of approximate primary erosion noted 2022-2024**



Plot Date: 02/11/14 - 4:34pm. Plotted by: adam.sienberg  
 Drawing Path: S:\138670\2\_InstControl\ampl\amplCAD, Drawing Name: RemovalAction-LongTerm\W\_UR-RiverCampus\_021114.dwg



<b>REMOVAL ACTION CAPPING AREAS</b> University of Portland River Campus Institutional Controls Implementation Plan Portland, Oregon		
By: APS	Date: 02/11/14	Project No. 13867
		<b>Figure 1</b>