



Enumclaw Recycle

King County, WA

Operation and Maintenance Manual

Owner:
Ron Shear
P.O. Box 1373
Enumclaw, WA 98022

Prepared By:
CPH Consultants
Bryce Bessette, PE
11431 Willows Road NE, #120
Redmond, WA 98052
(425) 285-2390

May 22, 2018

**Stormwater Management Facility
*Operation and Maintenance (O&M) Manual***

for

Enumclaw Recycle

Located at:

Enumclaw-Franklin Rd SE
Enumclaw, WA 98022

Prepared for:

Ron Shear
P.O. Box 1373, Enumclaw, WA 98022

Prepared by:

CPH Consultants – Bryce Bessettee, PE
11431 Willows Road NE, #120, Redmond, WA 98052
(425) 285-2390

**Stormwater Management Facility
Operation and Maintenance (O&M) Manual**

Table of Contents

- I Contact Information
- II Compliance with King County Code
- III. Maintenance
- IV. Preventative Measures to Reduce Maintenance Costs
- V. General Location and Description of Stormwater Management Facilities
- VI. Inspecting Stormwater Management Facilities
- VII. Maintaining Stormwater Management Facilities
- VIII. Maintenance Documentation

Appendices

- Appendix A – Maintenance Activity Log
- Appendix B – Site Plan
- Appendix C – As-Built Drawings
- Appendix D – Maintenance Standards

Stormwater Management Facility Operation and Maintenance (O&M) Manual

I Contact Information

Owner: Buckley Recycle Center, Inc

Phone: (253) 223-8586

Email: ronshearbrc@aol.com

Maintenance Responsible Party: _____

Phone _____

Email _____

Emergency Contact: Ron Shear

Phone: (253) 223-8586

Email: ronshearbrc@aol.com

II Compliance King County Code

Maintenance and operation of all drainage facilities is the responsibility of the property owner, except for those facilities which King County assumes maintenance and operation as described in King County Code 9.04.115 and 9.04.120.

III. Maintenance

This O&M Manual shall be kept onsite. Maintenance logs should be kept for a record of routine maintenance. A sample Maintenance Log is provided in Appendix A.

IV. Preventative Measures to Reduce Maintenance Costs

The most effective way to maintain your water quality facility is to prevent the pollutants from entering the facility in the first place. Common pollutants include sediment, trash & debris, chemicals, dog wastes, runoff from stored materials, illicit discharges into the storm drainage system (like car wash or pressure washing runoff) and many others. A thoughtful maintenance program will include measures to address these potential contaminants, and will save money and time in the long run. Key points to consider in your maintenance program include:

- Educate property owners/residents/tenants to be aware of how their actions affect water quality, and how they can help reduce maintenance costs.
- Keep properties, streets and gutters, and parking lots free of trash, debris, and lawn clippings.
- Ensure the proper disposal of hazardous wastes and chemicals.
- Plan lawn care to minimize the use of chemicals and pesticides.

- Sweep paved surfaces and put the sweepings back on the lawn.
- Be aware of automobiles leaking fluids. Use absorbents such as cat litter to soak up drippings – dispose of properly.
- Re-vegetate disturbed and bare areas to maintain vegetative stabilization.
- Clean out the upstream components of the storm drainage system, including inlets, storm sewers and outfalls.
- Do not store materials outdoors (including landscaping materials) unless properly protected from runoff.
- Close the covers on dumpsters to prevent liquids from leaking into the storm system.

This project proposes stormwater conveyance, oil/debris separator, presettling ponds, catch basins, and infiltration ponds/sand filters that are expected to be maintained on-site by the property owner.

Most of the site runoff and surface flows are collected by on-site conveyance ditches. Runoff collected from the west asphalt area labeled “paved processing area” in Appendix B will be passed through a Contech Vortclarex VCL60-1 while runoff collected from the east asphalt area labeled “parking and access” in Appendix B will pass through a Contech Vortclarex VCL30 prior to discharge. Both of the oil/water separators will be preceded by a Contech Stormgate Manhole High Flow Bypass which will function as a flow splitter, delivering only the off-line water quality flows to the oil/water separators. From here, runoff will be routed through the conveyance ditches before discharging to a presettling pond then an infiltration pond/sand filter. Removable lids are provided on the catch basins. The specific maintenance requirements and conditions for the stormwater facilities must be followed are outlined in Appendix D of this report.

V. General Location and Description of Stormwater Management Facilities

The development area will drain to proposed infiltration ponds located on the east and west sides of the project site. To mitigate additional runoff on the eastern side of the site full dispersion trenches will be implemented

Maintenance personnel may use the site plan located in Appendix B containing the locations of the Stormwater Management facilities.

VI. Inspecting Stormwater Management Facilities

The King County inspects private stormwater systems.

VII. Maintaining Stormwater Management Facilities

Stormwater management facilities must be properly maintained to ensure that they operate correctly and provide the water quality treatment for which they were designed. Routine maintenance performed on a frequently scheduled basis, can help avoid more costly rehabilitative maintenance that results when facilities are not adequately maintained. The Maintenance requirements are contained in Appendix D. These requirements should be updated to reflect changes and updates to these facilities.

Routine Work

The majority of this work consists of inspection, sweeping, mowing, weed control, and trash and debris pickups for stormwater management facilities. This includes items such as the

removal of debris/material that may be clogging the catch basin inlets ability to drain. These activities normally will be performed numerous times during the year. These items can be completed without any prior correspondence with King County.

Minor Work

This work consists of a variety of isolated or small-scale maintenance and work needed to address operational problems. Most of this work can be completed by a small crew, with minor tools, and small equipment. These items can be completed without any prior correspondence with King County.

Major Work

This work consists of large-scale maintenance and major improvements needed to address failures within the stormwater management facilities. This work may require an engineering design with construction plans to be prepared for review and approval by the City. This work may also require more specialized maintenance equipment, surveying, construction permits or assistance through private contractors and consultants. These items require prior correspondence with King County and may be subject to permits.

VIII. Maintenance Documentation

The Stormwater Management Facility Maintenance Activity Form provides a record of maintenance activities. Maintenance Forms for each facility type are provided in Appendix B. Maintenance shall be completed by the contractor and/or owner completing the required maintenance items. The form shall then be reviewed by the property owner or an authorized agent of the property owner and kept on site and submitted to the King County upon request.

Appendix A

Stormwater Facility Maintenance Activity Log

STORMWATER MANAGEMENT FACILITY INSPECTION & MAINTENANCE LOG (SAMPLE)

Property Address:

Inspection Date:

Inspection Time:

Inspected By:

Approximate Date/Time of Last Rainfall:

Type of Stormwater Management Facility:

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

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

Sediment accumulation & record of sediment removal:

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

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

Presence of insects or vectors. Record control activities:

Identify safety hazards present. Record resolution activities:

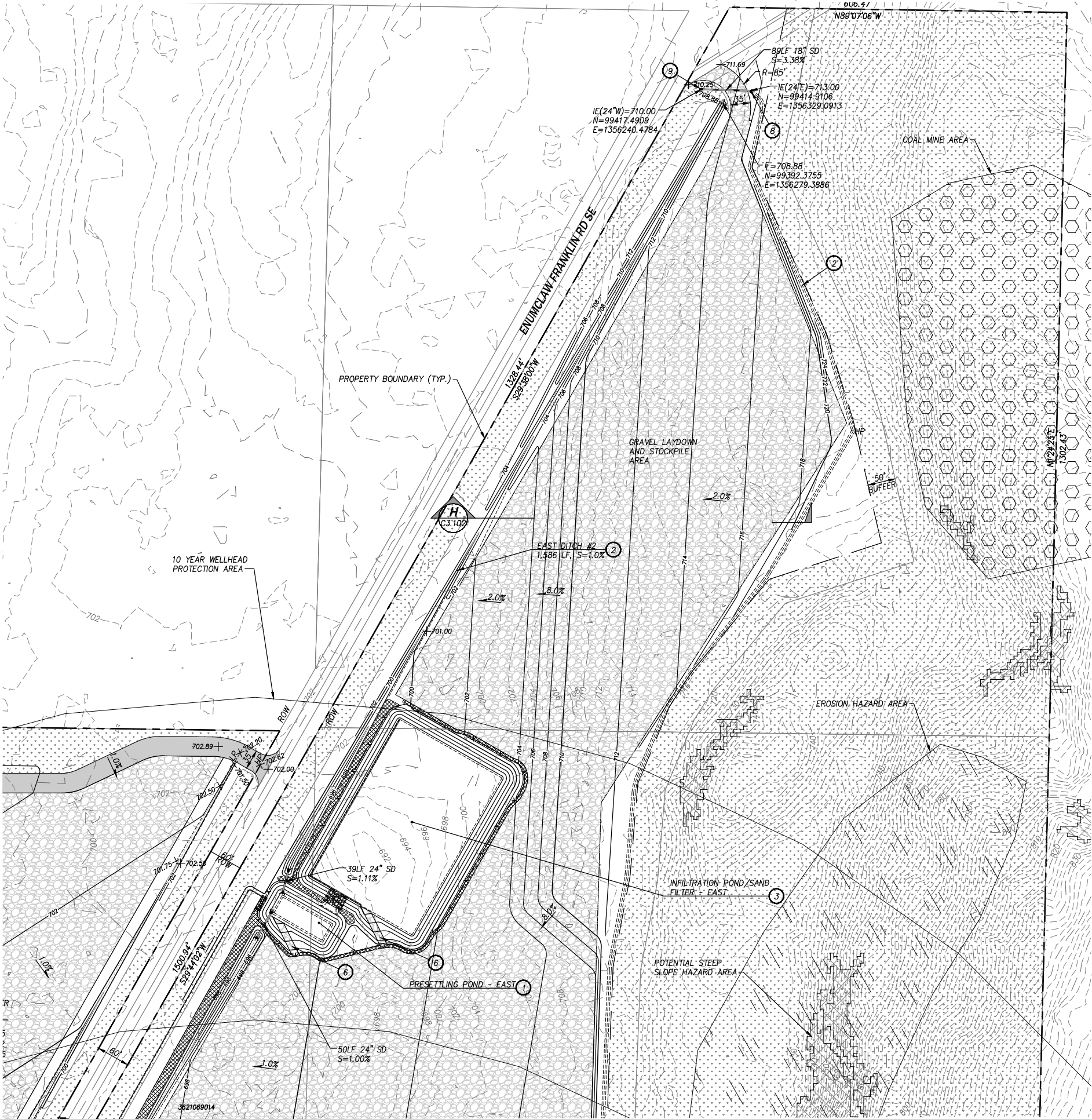
Appendix B

Site Plan

This is a simplified map of the site that shows the location of the stormwater system.

TBLOCK
CSIT1641701
OTOP1641701
CGRD1641701
CUSD1641701
OLIDAR1641701
OGIS1641701

SEC. 25, TWP 28 N, R4E W.M.



SEE C3.00

CONSTRUCTION NOTES

- 1 PRE-SETTLING POND, PER DET. ON SHT. C3.02
- 2 DITCH PER DET. ON SHT. C3.100
- 3 INFILTRATION POND/SAND FILTER PER DET. ON SHT. C3.02
- 4 DISPERSION TRENCH PER DET. ON SHT. C3.100
- 5 6" PVC ROOF DRAIN
- 6 GRAVEL POND ACCESS ROAD PER DET. ON SHT. C3.101
- 7 TRENCH DRAIN, 24" WIDE, POLY DRAIN PDX WITH TRAFFIC RATED GRATES OR APPROVED EQUAL
- 8 INLET PIPE PROTECTION PER DET. ON SHT. C3.100
- 9 OUTLET PIPE PROTECTION PER DET. ON SHT. C3.100

LEGEND

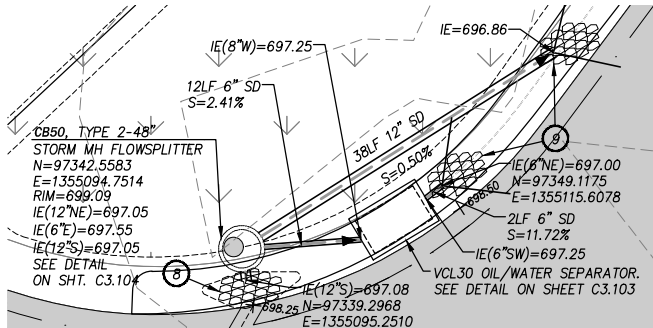
- FF= FINISHED FLOOR ELEVATIONS
--- GRADE BREAK LINE
---100--- FINISHED GRADE CONTOUR
--- FLOW LINE

APPROX. EARTHWORK QUANTITIES

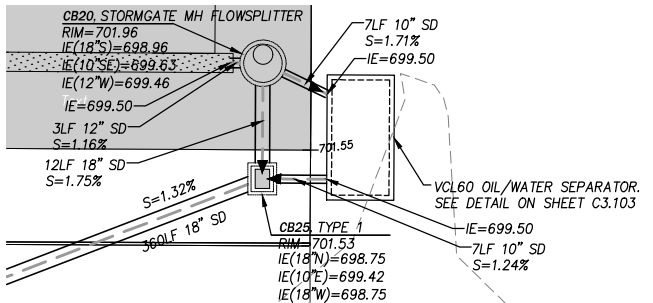
EARTHWORK QUANTITIES WERE ESTIMATED USING A GRID VOLUME METHOD AND AUTODESK AUTOCAD CIVIL3D SOFTWARE. THE FOLLOWING VALUES ARE APPROXIMATE AND PROVIDED TO ILLUSTRATE GENERAL EARTHWORK EFFORTS BASED ON AVAILABLE SURVEY AND DESIGN DATA EXCLUDING ESTIMATES OF ANY VAULT, FOUNDATION, AND PAVEMENT QUANTITIES:

FILL: 90,018 CY
CUT: 82,509 CY
NET: 7,509 CY(FILL)

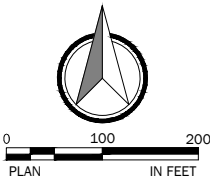
THESE VALUES ARE NOT FOR CONSTRUCTION BID PURPOSES. THE CONTRACTOR SHALL USE THEIR OWN MEANS AND METHODS TO ESTIMATE EARTHWORK QUANTITIES.



A
C3.00
1"=10'



B
C3.00
1"=10'



ENUMCLAW RECYCLE

COMMERCIAL SITE DEVELOPMENT PERMIT

OVERALL GRADING AND DRAINAGE

KING COUNTY WASHINGTON

CLIENT

BUCKLEY RECYCLE
CENTER, INC.
P.O BOX 1372
ENUMCLAW, WA 98022
PHONE: (253) 223-8586

CPH
CONSULTANTS
Site Planning • Civil Engineering
Land Use Consulting • Project Management
11431 Wilkes Rd. NE, Suite 120
Redmond, WA 98052
Phone: (425) 285-2390 FAX: (425) 285-2389
www.cphconsultants.com

PROJECT NO.
0164-17-001

DRAWING
C3.01

SHEET 12 OF

Appendix C

**Stormwater As-Built Drawings
(Will be provided when available)**

Appendix D

Maintenance Standards

NO. 2 – INFILTRATION FACILITIES

Maintenance Component	Defect or Problem	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Site	Trash and debris	Any trash and debris which exceed 1 cubic foot per 1,000 square feet (this is about equal to the amount of trash it would take to fill up one standard size office garbage can). In general, there should be no visual evidence of dumping.	Trash and debris cleared from site.
	Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to County personnel or the public.	Noxious and nuisance vegetation removed according to applicable regulations. No danger of noxious vegetation where County personnel or the public might normally be.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Grass/groundcover	Grass or groundcover exceeds 18 inches in height.	Grass or groundcover mowed to a height no greater than 6 inches.
Infiltration Pond, Top or Side Slopes of Dam, Berm or Embankment	Rodent holes	Any evidence of rodent holes if facility is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes.	Rodents removed or destroyed and dam or berm repaired.
	Tree growth	Tree growth threatens integrity of dams, berms or slopes, does not allow maintenance access, or interferes with maintenance activity. If trees are not a threat to dam, berm, or embankment integrity or not interfering with access or maintenance, they do not need to be removed.	Trees do not hinder facility performance or maintenance activities.
	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. Any erosion observed on a compacted slope.	Slopes stabilized using appropriate erosion control measures. If erosion is occurring on compacted slope, a licensed civil engineer should be consulted to resolve source of erosion.
	Settlement	Any part of a dam, berm or embankment that has settled 4 inches lower than the design elevation.	Top or side slope restored to design dimensions. If settlement is significant, a licensed civil engineer should be consulted to determine the cause of the settlement.
Infiltration Pond, Tank, Vault, Trench, or Small Basin Storage Area	Sediment accumulation	If two inches or more sediment is present or a percolation test indicates facility is working at or less than 90% of design.	Facility infiltrates as designed.
	Liner damaged (If Applicable)	Liner is visible or pond does not hold water as designed.	Liner repaired or replaced.
Infiltration Tank Structure	Plugged air vent	Any blockage of the vent.	Tank or vault freely vents.
	Tank bent out of shape	Any part of tank/pipe is bent out of shape more than 10% of its design shape.	Tank repaired or replaced to design.
	Gaps between sections, damaged joints or cracks or tears in wall	A gap wider than ½-inch at the joint of any tank sections or any evidence of soil particles entering the tank at a joint or through a wall.	No water or soil entering tank through joints or walls.
Infiltration Vault Structure	Damage to wall, frame, bottom, and/or top slab	Cracks wider than ½-inch, any evidence of soil entering the structure through cracks or qualified inspection personnel determines that the vault is not structurally sound.	Vault is sealed and structurally sound.

NO. 2 – INFILTRATION FACILITIES			
Maintenance Component	Defect or Problem	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Inlet/Outlet Pipes	Sediment accumulation	Sediment filling 20% or more of the pipe.	Inlet/outlet pipes clear of sediment.
	Trash and debris	Trash and debris accumulated in inlet/outlet pipes (includes floatables and non-floatables).	No trash or debris in pipes.
	Damaged	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering at the joints of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of the inlet/outlet pipe.
Access Manhole	Cover/lid not in place	Cover/lid is missing or only partially in place. Any open manhole requires immediate maintenance.	Manhole access covered.
	Locking mechanism not working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Mechanism opens with proper tools.
	Cover/lid difficult to remove	One maintenance person cannot remove cover/lid after applying 80 lbs of lift.	Cover/lid can be removed and reinstalled by one maintenance person.
	Ladder rungs unsafe	Missing rungs, misalignment, rust, or cracks.	Ladder meets design standards. Allows maintenance person safe access.
Large access doors/plate	Damaged or difficult to open	Large access doors or plates cannot be opened/removed using normal equipment.	Replace or repair access door so it can be opened as designed.
	Gaps, doesn't cover completely	Large access doors not flat and/or access opening not completely covered.	Doors close flat; covers access opening completely.
	Lifting Rings missing, rusted	Lifting rings not capable of lifting weight of door or plate.	Lifting rings sufficient to lift or remove door or plate.
Infiltration Pond, Tank, Vault, Trench, or Small Basin Filter Bags	Plugged	Filter bag more than ½ full.	Replace filter bag or redesign system.
Infiltration Pond, Tank, Vault, Trench, or Small Basin Pre-settling Ponds and Vaults	Sediment accumulation	6" or more of sediment has accumulated.	Pre-settling occurs as designed
Infiltration Pond, Rock Filter	Plugged	High water level on upstream side of filter remains for extended period of time or little or no water flows through filter during heavy rain storms.	Rock filter replaced evaluate need for filter and remove if not necessary.
Infiltration Pond Emergency Overflow Spillway	Rock missing	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of out flow path of spillway. Rip-rap on inside slopes need not be replaced.	Spillway restored to design standards.
	Tree growth	Tree growth impedes flow or threatens stability of spillway.	Trees removed.

Regardless of location, the fertilizer must meet the requirements of Chapter 15.54.500 RCW limiting the use of fertilizer containing phosphorus.

4. A sand filter can add landscape interest and may be incorporated into the project **landscape design**. Interior side slopes may be stepped with flat areas for planting. Perennial beds may be planted above the overflow water surface elevation. However, large shrubs and trees are not allowed because falling leaves and needles can clog the filter surface, requiring more frequent maintenance, and roots may damage the structure and/or function of the filter. *Note: Examples of areas with stepped side slopes can be found at the Ballard Locks in Seattle and at Luther Burbank Park on Mercer Island.*
5. Recreational use of the filter surface is not allowed as activity can disrupt the structure and function of the filter media. Signage discouraging recreation is required. Signage shall be placed for maximum visibility from adjacent streets, sidewalks, and paths. More than one sign may be required to be sure the advisory will be noted by anyone approaching the facility.

Construction Considerations

1. If sand filters are put into service before construction of all parcels within the catchment is complete and all disturbed soil in the sand filter catchment has been stabilized, the filter will very likely clog prematurely. If individual lots are not stabilized, the options for **protection from upstream erosion** given in Section 5.2.1 for infiltration ponds may be used.

An **alternative** is to install the sand filter pond including full excavation for the filter sand and underdrain layers, delaying placement of the sand and underdrains until the **project site** is stabilized. The partially complete sand filter will then function like a small wetpond. Later, the accumulated sediment must be removed and the underdrain with gravel, geotextile separator, and sand layers placed. A second alternative is to place only the gravel underdrain during the construction phase. Then clean the gravel and place the geotextile separator and sand layer after the **project site** is stabilized.

The County will not assume maintenance responsibility or release financial guarantees unless the sand filter is installed per design and functioning properly. If the final sand layer cannot be completed before the typical two-year holding period for financial guarantees, the applicant may elect to pay the County to clean and install the sand when the watershed is stabilized, or may arrange a smaller financial guarantee specifically for completion of the sand filter.

2. **Careful placement of the sand** is necessary to avoid formation of voids within the sand that could lead to short-circuiting, particularly around penetrations for underdrain cleanouts, as well as to prevent damage to the underlying geomembranes and underdrain system. Voids between the trench wall and geotextile fabric should also be avoided.
3. **Over compaction must be avoided** to ensure adequate filtration capacity. Sand is best placed with a low ground pressure tracked bulldozer (4.6 pounds per square inch or less ground pressure). The number of passes over sand fill should be minimized during placement; using low ground-pressure vehicles can minimize ground pressure and compaction.
4. After the sand layer is placed, water settling is recommended. Flood the sand with 10 to 15 gallons of water per cubic foot of sand.

Maintenance Considerations

Sand filters are subject to clogging by fine sediment, oil and grease, and other debris (e.g., trash and organic matter such as leaves). Filters and pretreatment facilities should be inspected every 6 months during the first year of operation. Inspections should also occur immediately following a storm event to assess the filtration capacity of the filter. Once the filter is performing as designed, the frequency of inspection may be reduced to once per year.

During an inspection the following features should be evaluated and maintained as needed:

1. Remove debris and sediment from the pretreatment facility when depth exceeds 12 inches.

2. Remove debris and sediment from the surface of the filter when accumulations exceed 0.5 inches.
3. Observe operation of the overflow and drawdown time in the filter. Frequent overflow through the grated "birdcage" or "jailhouse" window into the outlet structure or slow drawdown are indicators of plugging problems. Under normal operating conditions, a sand filter should completely empty within 9 to 24 hours following a storm event (i.e., after the inflow of runoff to the filter ceases), depending on pond depth. Generally, if the water level over the filter drops at a rate less than $\frac{1}{2}$ -inch per hour ($V < \frac{1}{2}$ -inch per hour), corrective maintenance is needed. Recommendations for improving sand filter performance are summarized below:
 - a) Remove thatch accumulation in grass.
 - b) Aerate the filter surface to improve permeability.
 - c) Till the filter surface. Two separate passes following a criss-cross pattern (i.e., second pass at right angles to the first) are recommended.
 - d) Replace upper 4 to 6 inches of grass and sand.
4. Experience with sand filters used for stormwater treatment in Austin, Texas, has shown that the sand becomes clogged and must be replaced every 4 to 10 years.
5. Rapid drawdown in the filter (i.e., greater than 12 inches per hour) indicates short-circuiting of the filter media. Inspect the cleanouts on the underdrain pipes and along the base of the embankment for leakage.
6. Formation of rills and gullies on the surface of the filter indicates improper function of the inlet flow spreader or poor sand compaction. Check for accumulation of debris on or in the flow spreader, and refill rills and gullies with sand.

Other maintenance practices that should be employed to ensure proper operation of the sand filter are summarized below:

1. Avoid use of fertilizers along the bottom or sides of a landscape sand filter. Any fertilizer used must meet the requirements of Chapter 15.54.500 RCW limiting the use of fertilizer containing phosphorus⁴².
2. Avoid driving heavy machinery or equipment on the sand filter to minimize compaction of the filter media, prevent the formation of ruts in the surface of the filter that could concentrate or channelize flow, and prevent damage to the underdrain system. Use only low ground pressure tracked equipment (4.6 pounds per square inch or less ground pressure). The number of passes over sand fill should be minimized to the greatest extent possible.
3. Mow grass as needed, and remove the cut grass from the sand filter.
4. If vegetation is present, water it periodically when needed, especially during the summer dry season.
5. Discourage use of the sand bed by pets by installing signs reminding residents of scoop laws, providing scoop stations near the facilities, planting barriers such as barberry, and/or providing other measures as appropriate.

⁴² <http://apps.leg.wa.gov/billinfo/summary.aspx?bill=1489&year=2011>

NO. 5 – CATCH BASINS AND MANHOLES

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Structure	Sediment	Sediment exceeds 60% of the depth from the bottom of the catch basin to the invert of the lowest pipe into or out of the catch basin or is within 6 inches of the invert of the lowest pipe into or out of the catch basin.	Sump of catch basin contains no sediment.
	Trash and debris	Trash or debris of more than ½ cubic foot which is located immediately in front of the catch basin opening or is blocking capacity of the catch basin by more than 10%.	No Trash or debris blocking or potentially blocking entrance to catch basin.
		Trash or debris in the catch basin that exceeds ⅓ the depth from the bottom of basin to invert the lowest pipe into or out of the basin.	No trash or debris in the catch basin.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No dead animals or vegetation present within catch basin.
		Deposits of garbage exceeding 1 cubic foot in volume.	No condition present which would attract or support the breeding of insects or rodents.
	Damage to frame and/or top slab	Corner of frame extends more than ¾ inch past curb face into the street (If applicable).	Frame is even with curb.
		Top slab has holes larger than 2 square inches or cracks wider than ¼ inch.	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than ¾ inch of the frame from the top slab.	Frame is sitting flush on top slab.
	Cracks in walls or bottom	Cracks wider than ½ inch and longer than 3 feet, any evidence of soil particles entering catch basin through cracks, or maintenance person judges that catch basin is unsound.	Catch basin is sealed and is structurally sound.
		Cracks wider than ½ inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	No cracks more than ¼ inch wide at the joint of inlet/outlet pipe.
	Settlement/misalignment	Catch basin has settled more than 1 inch or has rotated more than 2 inches out of alignment.	Basin replaced or repaired to design standards.
	Damaged pipe joints	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering the catch basin at the joint of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of inlet/outlet pipes.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20% or more of the pipe.	Inlet/outlet pipes clear of sediment.
	Trash and debris	Trash and debris accumulated in inlet/outlet pipes (includes floatables and non-floatables).	No trash or debris in pipes.
	Damaged	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering at the joints of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of the inlet/outlet pipe.

NO. 5 – CATCH BASINS AND MANHOLES

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Metal Grates (Catch Basins)	Unsafe grate opening	Grate with opening wider than $\frac{7}{8}$ inch.	Grate opening meets design standards.
	Trash and debris	Trash and debris that is blocking more than 20% of grate surface.	Grate free of trash and debris. footnote to guidelines for disposal
	Damaged or missing	Grate missing or broken member(s) of the grate. Any open structure requires urgent maintenance.	Grate is in place and meets design standards.
Manhole Cover/Lid	Cover/lid not in place	Cover/lid is missing or only partially in place. Any open structure requires urgent maintenance.	Cover/lid protects opening to structure.
	Locking mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Mechanism opens with proper tools.
	Cover/lid difficult to Remove	One maintenance person cannot remove cover/lid after applying 80 lbs. of lift.	Cover/lid can be removed and reinstalled by one maintenance person.

NO. 6 – CONVEYANCE PIPES AND DITCHES

Maintenance Component	Defect or Problem	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Pipes	Sediment & debris accumulation	Accumulated sediment or debris that exceeds 20% of the diameter of the pipe.	Water flows freely through pipes.
	Vegetation/roots	Vegetation/roots that reduce free movement of water through pipes.	Water flows freely through pipes.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Damage to protective coating or corrosion	Protective coating is damaged; rust or corrosion is weakening the structural integrity of any part of pipe.	Pipe repaired or replaced.
	Damaged	Any dent that decreases the cross section area of pipe by more than 20% or is determined to have weakened structural integrity of the pipe.	Pipe repaired or replaced.
Ditches	Trash and debris	Trash and debris exceeds 1 cubic foot per 1,000 square feet of ditch and slopes.	Trash and debris cleared from ditches.
	Sediment accumulation	Accumulated sediment that exceeds 20% of the design depth.	Ditch cleaned/flushed of all sediment and debris so that it matches design.
	Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to County personnel or the public.	Noxious and nuisance vegetation removed according to applicable regulations. No danger of noxious vegetation where County personnel or the public might normally be.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Vegetation	Vegetation that reduces free movement of water through ditches.	Water flows freely through ditches.
	Erosion damage to slopes	Any erosion observed on a ditch slope.	Slopes are not eroding.
	Rock lining out of place or missing (If Applicable)	One layer or less of rock exists above native soil area 5 square feet or more, any exposed native soil.	Replace rocks to design standards.

NO. 19 – SAND FILTER POND			
Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance Is Performed
Site	Trash and debris	Trash and debris accumulated on facility site.	Trash and debris removed from facility site.
	Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to County personnel or the public.	Noxious and nuisance vegetation removed according to applicable regulations. No danger of noxious vegetation where County personnel or the public might normally be.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Grass/groundcover (not in the treatment area)	Grass or groundcover exceeds 18 inches in height.	Grass or groundcover mowed to a height no greater than 6 inches.
Pre-Treatment (if applicable)	Sediment accumulation	Sediment accumulations in pond bottom that exceeds the depth of sediment storage (1 foot) plus 6 inches.	Sediment storage contains no sediment.
	Liner damaged (If Applicable)	Liner is visible or pond does not hold water as designed.	Liner repaired or replaced.
	Water level	Cell empty, doesn't hold water.	Water retained in first cell for most of the year.
	Algae mats	Algae mats develop over more than 10% of the water surface should be removed.	Algae mats removed (usually in the late summer before Fall rains, especially in Sensitive Lake Protection Areas.)
Pond Area	Sediment accumulation	Sediment or crust depth exceeds ½-inch over 10 % of surface area of sand filter.	No sediment or crust deposit on sand filter that would impede permeability of the filter section.
	Grass (if applicable)	Grass becomes excessively tall (greater than 6 inches) or when nuisance weeds and other vegetation start to take over or thatch build up occurs.	Mow vegetation and/or remove nuisance vegetation.
Side Slopes of Pond	Rodent holes	Any evidence of rodent holes if facility is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes.	Rodents removed or destroyed and dam or berm repaired.
	Tree growth	Tree growth threatens integrity of dams, berms or slopes, does not allow maintenance access, or interferes with maintenance activity. If trees are not a threat to dam, berm, or embankment integrity or not interfering with access or maintenance, they do not need to be removed.	Trees do not hinder facility performance or maintenance activities.
	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. Any erosion observed on a compacted slope.	Slopes stabilized using appropriate erosion control measures. If erosion is occurring on compacted slope, a licensed civil engineer should be consulted to resolve source of erosion.

NO. 19 – SAND FILTER POND			
Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance Is Performed
Sand Filter Media	Plugging	Drawdown of water through the sand filter media, takes longer than 24 hours, and/or flow through the overflow pipes occurs frequently. A sieve analysis of >4% -100 or >2% -200 requires replacing sand filter media.	Sand filter media surface is aerated or the surface is scraped and replaced, and drawdown rate is normal.
	Prolonged flows	Sand is saturated for prolonged periods of time (several weeks) and does not dry out between storms due to continuous base flow or prolonged flows from detention facilities.	Excess flows bypassed or confined to small portion of filter media surface.
	Short circuiting	Flows become concentrated over one section of the sand filter rather than dispersed or drawdown rate of pool exceeds 12 inches per hour.	Flow and percolation of water through the sand filter is uniform and dispersed across the entire filter area and drawdown rate is normal.
	Media thickness	Sand thickness is less than 18 inches.	Rebuild sand thickness to a minimum of 18 inches.
Underdrains and Clean-Outs	Sediment/debris	Underdrains or clean-outs partially plugged or filled with sediment and/or debris. Junction box/cleanout wyes not watertight.	Underdrains and clean-outs free of sediment and debris and are watertight.
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20% or more of the pipe.	Inlet/outlet pipes clear of sediment.
	Trash and debris	Trash and debris accumulated in inlet/outlet pipes (includes floatables and non-floatables).	No trash or debris in pipes.
	Damaged	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering at the joints of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of the inlet/outlet pipe.
Rock Pad	Missing or out of place	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil.	Rock pad restored to design standards.
Flow spreader	Concentrated flow	Flow from spreader not uniformly distributed across sand filter.	Flows spread evenly over sand filter.

greater than this amount, it will be assumed to be from construction unless it can be shown otherwise. The County will not release maintenance and defect financial guarantees or assume maintenance responsibility for a facility unless it has been cleaned of construction phase sediments.

2. Sediment that has accumulated in the pond at the end of construction may be used as a liner in excessively drained soils if the sediment meets the criteria for low permeability or treatment liners defined in Section 6.2.4 (p. 6-27) and in keeping with guidance given in Table 6.2.4.A (p. 6-29). Sediment used for a soil liner must be graded to provide uniform coverage and thickness.

Maintenance Considerations

1. The pond should be inspected annually. Floating debris and accumulated petroleum products should be removed as needed, but at least annually.
2. Nearby vegetation should be trimmed as necessary to keep the pond free of leaves and to maintain the aesthetic appearance of the area. Slope areas that have become bare should be revegetated and eroded areas should be regraded prior to being revegetated.
3. Sediment should be removed when the 1-foot sediment zone is full plus 6 inches. Sediments should be tested for toxicants in compliance with current disposal requirements if land uses in the catchment include commercial or industrial zones, or if visual or olfactory indications of pollution are noticed.
4. Water drained or pumped from ponds prior to sediment removal may be discharged to storm drains if it is not excessively turbid (i.e., if water appears translucent when held to light) and if floatable debris and visual petroleum sheens are removed. Excessively turbid water (i.e., water appears opaque when held to light) should be discharged only after the solids have been settled and removed.
5. Pumping rates should be slow enough so that downstream channel erosion problems do not develop.

❑ LARGE WETPOND

All design criteria for **basic wetponds** shall apply to large wetponds, with the following **modifications**:

1. The wetpool for a large wetpond shall have a volume equal to 1.5 times the Basic wetpond volume described above.
2. If the project is subject to the Sensitive Lake Protection menu or the Sphagnum Bog Protection menu, the following shall apply:
 - a) Shrubs that form a dense cover shall be planted along the top of the wetpond bank on cut slopes. **Planting** is recommended for bermed slopes, except for berms meeting the criteria of dams regulated for safety (see “Dam Safety Compliance” in Section 5.1.1). Evergreen trees and shrubs are preferred.
Intent: Trees and shrubs discourage waterfowl use. Waterfowl tend to avoid areas that are not visually open.
 - b) Measures to enhance **waterfowl habitat value** (e.g., nesting structures) are not allowed.

NO. 23 – COALESCING PLATE OIL/WATER SEPARATOR			
Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Site	Trash and debris	Any trash or debris which impairs the function of the facility.	Trash and debris removed from facility.
	Contaminants and pollution	Floating oil in excess of 1 inch in first chamber, any oil in other chambers or other contaminants of any type in any chamber.	No contaminants present other than a surface oil film.
Vault Treatment Area	Sediment accumulation in the forebay	Sediment accumulation of 6 inches or greater in the forebay.	No sediment in the forebay.
	Discharge water not clear	Inspection of discharge water shows obvious signs of poor water quality - effluent discharge from vault shows thick visible sheen.	Repair function of plates so effluent is clear.
	Trash or debris accumulation	Trash and debris accumulation in vault (floatables and non-floatables).	Trash and debris removed from vault.
	Oil accumulation	Oil accumulation that exceeds 1 inch at the water surface in the in the coalescing plate chamber.	No visible oil depth on water and coalescing plates clear of oil.
Coalescing Plates	Damaged	Plate media broken, deformed, cracked and/or showing signs of failure.	Replace that portion of media pack or entire plate pack depending on severity of failure.
	Sediment accumulation	Any sediment accumulation which interferes with the operation of the coalescing plates.	No sediment accumulation interfering with the coalescing plates.
Vault Structure	Damage to Wall, Frame, Bottom, and/or Top Slab	Cracks wider than ½-inch and any evidence of soil particles entering the structure through the cracks, or maintenance inspection personnel determines that the vault is not structurally sound.	Vault replaced or repaired to design specifications.
	Baffles damaged	Baffles corroding, cracking, warping and/or showing signs of failure as determined by maintenance/inspection person.	Repair or replace baffles to specifications.
Ventilation Pipes	Plugged	Any obstruction to the ventilation pipes.	Ventilation pipes are clear.
Shutoff Valve	Damaged or inoperable	Shutoff valve cannot be opened or closed.	Shutoff valve operates normally.
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20% or more of the pipe.	Inlet/outlet pipes clear of sediment.
	Trash and debris	Trash and debris accumulated in inlet/outlet pipes (includes floatables and non-floatables).	No trash or debris in pipes.
	Damaged	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering at the joints of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of the inlet/outlet pipe.
Access Manhole	Cover/lid not in place	Cover/lid is missing or only partially in place. Any open manhole requires immediate maintenance.	Manhole access covered.
	Locking mechanism not working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Mechanism opens with proper tools.
	Cover/lid difficult to remove	One maintenance person cannot remove cover/lid after applying 80 lbs of lift.	Cover/lid can be removed and reinstalled by one maintenance person.
	Ladder rungs unsafe	Missing rungs, misalignment, rust, or cracks.	Ladder meets design standards. Allows maintenance person safe access.

NO. 23 – COALESCING PLATE OIL/WATER SEPARATOR

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Large access doors/plate	Damaged or difficult to open	Large access doors or plates cannot be opened/removed using normal equipment.	Replace or repair access door so it can be opened as designed.
	Gaps, doesn't cover completely	Large access doors not flat and/or access opening not completely covered.	Doors close flat and cover access opening completely.
	Lifting Rings missing, rusted	Lifting rings not capable of lifting weight of door or plate.	Lifting rings sufficient to lift or remove door or plate.

NO. 24 – CATCH BASIN INSERT

Maintenance Component	Defect or Problem	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Media Insert	Visible Oil	Visible oil sheen passing through media	Media insert replaced.
	Insert does not fit catch basin properly	Flow gets into catch basin without going through media.	All flow goes through media.
	Filter media plugged	Filter media plugged.	Flow through filter media is normal.
	Oil absorbent media saturated	Media oil saturated.	Oil absorbent media replaced.
	Water saturated	Catch basin insert is saturated with water, which no longer has the capacity to absorb.	Insert replaced.
	Service life exceeded	Regular interval replacement due to typical average life of media insert product, typically one month.	Media replaced at manufacturer's recommended interval.
	Seasonal maintenance	When storms occur and during the wet season.	Remove, clean and replace or install new insert after major storms, monthly during the wet season or at manufacturer's recommended interval.

NO. 27 – GRAVEL FILLED DISPERSION TRENCH BMP			
Maintenance Component	Defect or Problem	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Preventative	Blocking, obstructions	Debris or trash limiting flow to dispersion trench or preventing spreader function.	Dispersion trench able to receive full flow prior to and during wet season.
Site	Trash and debris	Trash or debris that could end up in the dispersion trench is evident.	No trash or debris that could get into the dispersion trench can be found.
Pipes	Inlet is plugged	The entrance to the pipe is restricted due to sediment, trash, or debris.	The entrance to the pipe is not restricted.
	Vegetation/roots	Vegetation/roots that reduce free movement of water through pipes.	Water flows freely through pipes.
	Plugged	Sediment or other material prevents free flow of water through the pipe.	Water flows freely through pipes.
	Broken joint or joint leaks.	Damage to the pipe or pipe joints allowing water to seep out.	Pipe does not allow water to exit other than at the outlet to the trench.
	Cleanout caps	Cleanout caps are broken, missing, or buried.	Cleanout caps are accessible and intact.
Structure	Flow not reaching trench	Flows are not getting into the trench as designed.	Water enters and exits trench as designed.
	Perforated pipe plugged	Flow not able to enter or properly exit from perforated pipe.	Water freely enters and exits perforated pipe.
	Flow not spreading evenly at outlet of trench	Outlet flows channelizing or not spreading evenly from trench.	Sheet flow occurs at the outlet of the trench.
	Cleanout/inspection access does not allow cleaning or inspection of perforated pipe	The cleanout/inspection access is not available.	Cleanout/inspection access is available.
Filter Media	Filter media plugged	Filter media plugged.	Flow through filter media is normal.
Inspection	Frequency	Annually and prior to and following significant storms.	Inspect dispersion trench system for any defects or deficiencies.