Protecting Seattle's Waterways

Appendix G

Stormwater Control Operations and Maintenance Requirements

CITY OF SEATTLE
STORMWATER MANUAL

FINAL DRAFT
SEPTEMBER 2015

This appendix contains the maintenance requirements for the following typical stormwater facilities and components:

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- No. 2 – Infiltration Facilities
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- No. 5 – Catch Basins and Maintenance Holes
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Refer to the *Stormwater Management Manual for Western Washington* (SWMMWW) (Ecology 2012) for maintenance requirements for the following BMP:

- Media filter drain (MFD)

All stormwater facilities, Best Management Practices (BMPs), and drainage systems shall be kept in continuous working order consistent with their design and permitting.

Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries, or paint shall be immediately corrected. This includes removing the source of the contamination as well as any contaminants that have been collected or deposited into the facility or conveyance system.

Training/written guidance is required for the proper operation and maintenance of many of the BMPs contained in this manual. Provide proper training and copies of the Operations and Maintenance Manuals to property owners, tenants and responsible individuals.

No. 1 – Detention Ponds			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance Is Needed**	**Results Expected When Maintenance Is Performed**
Facility – General Requirements	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)	Trash and debris cleared from site
	Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to City personnel or the public	• Noxious and nuisance vegetation removed according to applicable regulations • No danger of noxious vegetation where City 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
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
	Beaver dams	Dam results in change or function of the facility	Facility is returned to design function (coordinate trapping of beavers and removal of dams with appropriate permitting agencies)
	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

No. 1 – Detention Ponds			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance Is Needed**	**Results Expected When Maintenance Is Performed**
Top or Side Slopes of Dam, Berm or Embankment (continued)	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 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 engineer should be consulted to determine the cause of the settlement.
Storage Area	Sediment accumulation	Accumulated sediment that exceeds 10 percent of the designed pond depth	• Sediment cleaned out to designed pond shape and depth • Pond reseeded if necessary to control erosion
	Liner damaged (if applicable)	Liner is visible or pond does not hold water as designed	Liner repaired or replaced
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20 percent 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 • 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
Emergency Overflow/Spillway	Tree growth	Tree growth impedes flow or threatens stability of spillway	Trees removed
	Rock missing	Only one layer of rock exists above native soil in area 5 square feet or larger or any exposure of native soil on the spillway	Spillway restored to design standards

No. 2 – Infiltration Facilities			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance Is Needed**	**Results Expected When Maintenance Is Performed**
Facility – General Requirements	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)	Trash and debris cleared from site
	Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to City personnel or the public	• Noxious and nuisance vegetation removed according to applicable regulations • No danger of noxious vegetation where City 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

No. 2 – Infiltration Facilities			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance Is Needed**	**Results Expected When Maintenance Is Performed**
Infiltration Pond, Top or Side Slopes of Dam, Berm or Embankment (continued)	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 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 engineer should be consulted to determine the cause of the settlement.
Infiltration Pond, Tank, Vault, Trench, or Small Basin Storage Area	Sediment accumulation	If 2 inches or more sediment is present or a percolation test indicates facility is working at or less than 90 percent 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 percent 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 • 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 • 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 percent 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 • 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 Maintenance Hole	Cover/lid not in place	• Cover/lid is missing or only partially in place • **Any open maintenance hole requires immediate maintenance**	Maintenance hole access cover/lid in place and secure
	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 and 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 opened as designed
	Gaps, does not cover completely	Large access doors not flat and/or access opening not completely covered	Doors close flat and 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 1/2 full	Replace filter bag or redesign system

No. 2 – Infiltration Facilities			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance Is Needed**	**Results Expected When Maintenance Is Performed**
Infiltration Pond, Tank, Vault, Trench, or Small Basin Pre-Settling Ponds and Vaults	Sediment accumulation	6 inches 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 5 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
Drain Rock	Water ponding	• If water enters the facility from the surface, inspect to see if water is ponding at the surface during storm events • If buried drain rock, observe drawdown through observation port or cleanout	• Clear piping through facility when ponding occurs • Replace rock material/sand reservoirs as necessary • Tilling of subgrade below reservoir may be necessary (for trenches) prior to backfill

No. 3 – Detention Pipes and Vaults			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Facility – General Requirements	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
Pipe or Vault Storage Area	Trash and debris	Any trash and debris accumulated in vault or pipe (includes floatables and non-floatables)	No trash or debris in vault or pipe
	Sediment accumulation	Accumulated sediment depth exceeds 10 percent of the diameter of the storage area for ½ length of storage vault or any point depth exceeds 15 percent of diameter	All sediment removed from storage area
Pipe or Vault Structure	Plugged air vent	Any blockage of the vent	Pipe or vault freely vents
	Pipe bent out of shape	Any part of vault/pipe is bent out of shape more than 10 percent of its design shape	Pipe or vault 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 pipe or vault sections • Any evidence of soil particles entering the pipe or vault at a joint or through a wall	No water or soil entering pipe or vault through joints or walls
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 • Qualified inspection personnel determines that the vault is not structurally sound	Vault sealed and structurally sound

No. 3 – Detention Pipes and Vaults			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Inlet/Outlet Pipes	Sediment accumulation	Sediment filling 20 percent 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 • 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 Maintenance Hole	Cover/lid not in place	• Cover/lid is missing or only partially in place • **Any open maintenance hole requires immediate maintenance**	Maintenance hole access cover/lid in place and secure
	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 and 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 opened as designed
	Gaps, does not cover completely	Large access doors not flat and/or access opening not completely covered	Doors close flat and 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

No. 4 – Flow Control Structure & Control Device			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
The Flow Control Structure and Control Device shall conform with design criteria shown upon the approved plans or the design standards in place at the time of construction. This includes but is not limited to, orifice diameter(s), orifice elevation(s) overflow elevation. Reference Standard Plans No. 270, 271, and 272.			
Structure	Trash and debris	Trash or debris of more than ½ cubic foot which is located immediately in front of the structure opening or is blocking capacity of the structure by more than 10 percent	No trash or debris blocking or potentially blocking entrance to structure
		Trash or debris in the structure that exceeds 1/3 the depth from the bottom of basin to invert the lowest pipe into or out of the basin.	No trash or debris in the structure
		Deposits of garbage exceeding 1 cubic foot in volume	No condition present which would attract or support the breeding of insects or rodents
	Sediment	Sediment exceeds 60 percent of the depth from the bottom of the structure to the invert of the lowest pipe into or out of the structure or the bottom of the control device section or is within 6 inches of the invert of the lowest pipe into or out of the structure or the bottom of the control device section	Sump of structure contains no sediment
	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

No. 4 – Flow Control Structure & Control Device			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Structure (continued)	Cracks in walls or bottom	• Cracks wider than ½ inch and longer than 3 feet • Any evidence of soil particles entering structure through cracks • Maintenance person judges that structure is unsound	Structure is sealed and structurally sound.
		• Cracks wider than ½ inch and longer than 1 foot at the joint of any inlet/outlet pipe • Any evidence of soil particles entering structure through cracks	No cracks more than ¼-inch wide at the joint of inlet/outlet pipe
	Settlement/misalignment	Structure 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 • Any evidence of soil entering the structure 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
	Ladder rungs missing or unsafe	Ladder is unsafe due to missing rungs, misalignment, rust, cracks, or sharp edges	Ladder meets design standards and allows maintenance person safe access.
Control Device	Damaged or missing	Riser section is not securely attached to structure wall and outlet pipe structure should support at least 1,000 lbs of up or down pressure	T section securely attached to wall and outlet pipe

No. 4 – Flow Control Structure & Control Device			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Control Device (continued)		Structure is not in upright position (allow up to 10 percent from plumb)	Structure in correct position
		Connections to outlet pipe are not watertight or show signs of deteriorated grout	Connections to outlet pipe are water tight; structure repaired or replaced and works as designed
		Any holes—other than designed holes—in the structure	Structure has no holes other than designed holes
Shear Gate (if applicable)	Damaged or missing	Cleanout gate is missing	Replace cleanout gate
		Cleanout gate is not watertight	Gate is watertight and works as designed.
		Gate cannot be moved up and down by one maintenance person	Gate moves up and down easily and is watertight.
		Chain/rod leading to gate is missing or damaged.	Chain is in place and works as designed.
Orifice Plate	Damaged or missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate	Plate is free of all obstructions and works as designed
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe	Pipe is free of all obstructions and works as designed
	Deformed or damaged lip	Lip of overflow pipe is bent or deformed	Overflow pipe does not allow overflow at an elevation lower than design
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20 percent 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 • 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. 4 – Flow Control Structure & Control Device			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Metal Grates (If Applicable)	Unsafe grate opening	Grate with opening wider than 7/8 inch	Grate opening meets design standards
	Trash and debris	Trash and debris that is blocking more than 20 percent 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	Grate is in place and meets design standards
Maintenance Hole 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. 5 – Catch Basins and Maintenance Holes			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Structure	Sediment	Sediment exceeds 60 percent 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 percent	No trash or debris blocking or potentially blocking entrance to catch basin
		Trash or debris in the catch basin that exceeds 1/3 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.

No. 5 – Catch Basins and Maintenance Holes			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Structure (continued)	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 • Maintenance person judges that catch basin is unsound	Catch basin is sealed and structurally sound
		• Cracks wider than ½ inch and longer than 1 foot at the joint of any inlet/outlet pipe • 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 • 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 percent 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 • 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 Maintenance Holes			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Outlet Trap (Reference Standard Plan No. 267)	Missing	When the required outlet trap is not installed upon the outlet pipe	Outlet trap installed and prevents floatables from being discharged
	Permanently installed	When the trap is grouted to the outlet pipe and is not removable to allow for maintenance and inspection	Outlet trap removable for maintenance and inspection
	Damaged	Cracks, broken welds, seams or any other conditions that allows water to be discharged from other than the submerged portion of the trap	Water will be discharged from the submerged portion of the trap.
Metal Grates (Catch Basins)	Unsafe grate opening	Grate with opening wider than 7/8 inch	Grate opening meets design standards
	Trash and debris	Trash and debris that is blocking more than 20 percent 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
Maintenance Hole 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 and debris accumulation	Accumulated sediment or debris that exceeds 20 percent 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 percent 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 percent 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 City personnel or the public	• Noxious and nuisance vegetation removed according to applicable regulations • No danger of noxious vegetation where City personnel or the public might normally be

No. 6 – Conveyance Pipes and Ditches			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Ditches (continued)	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 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	Rock replaced to design standards

No. 7 – Debris Barriers (e.g., Trash Racks			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Facility – General Requirements	Trash and debris	Trash or debris plugging more than 20 percent of the area of the barrier	Barrier clear to receive capacity flow
	Sediment accumulation	Sediment accumulation of greater than 20 percent of the area of the barrier	Barrier clear to receive capacity flow
Structure	Cracked, broken, or loose	• Structure which bars attach to is damaged • Pipe is loose or cracked • Concrete structure is cracked, broken, or loose	Sound structure barrier
Bars	Bar spacing	Bar spacing exceeds 6 inches	Bars have at most 6-inch spacing
	Damaged or missing bars	Bars bent out of shape more than 3 inches	Bars in place with no bends more than ¾ inch
		Bars missing or entire barrier missing	Bars in place according to design
		Bars loose and rust is causing 50 percent deterioration to any part of barrier	Repair or replace barrier to design standards

No. 8 – Energy Dissipaters			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Facility – General Requirements	Trash and debris	Trash and/or debris accumulation	Dissipater clear of trash and/or debris
	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
Rock Pad	Missing or moved rock	• One layer or less of rock exists above native soil area 5 square feet or more • Any exposed native soil	Rock pad prevents erosion
Dispersion Trench	Pipe plugged with sediment	Accumulated sediment that exceeds 20 percent of the design depth	Pipe cleaned/flushed so that it matches design
	Not discharging water properly	Visual evidence of water discharging at concentrated points along trench (normal condition is a “sheet flow” of water along trench)	Water discharges from feature by sheet flow
	Perforations plugged	Over 1/4 of perforations in pipe are plugged with debris or sediment	Perforations freely discharge flow
	Water flows out top of “distributor” catch basin	Water flows out of distributor catch basin during any storm less than the design storm	No flow discharges from distributor catch basin
	Receiving area over-saturated	Water in receiving area is causing or has potential of causing landslide problems	No danger of landslides
Gabions	Damaged mesh	Mesh of gabion broken, twisted or deformed so structure is weakened or rock may fall out	Mesh is intact with no rock missing
	Corrosion	Gabion mesh shows corrosion through more than ¼ of its gage	All gabion mesh capable of containing rock and retaining designed form
	Collapsed or deformed baskets	Gabion basket shape deformed due to any cause	All gabion baskets intact, structure stands as designed
	Missing rock	Any rock missing that could cause gabion to loose structural integrity	No rock missing

No. 8 – Energy Dissipaters			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Maintenance Hole/Chamber	Worn or damaged post, baffles, or side of chamber	Structure dissipating flow deteriorates to ½ or original size or any concentrated worn spot exceeding 1 square foot, which would make structure unsound	Structure in no danger of failing
	Damage to wall, frame, bottom, and/or top slab	• Cracks wider than ½-inch • Any evidence of soil entering the structure through cracks • Maintenance inspection personnel determines that the structure is not structurally sound	Maintenance hole/chamber sealed and structurally sound
	Damaged pipe joints	• Cracks wider than ½-inch at the joint of the inlet/outlet pipes • Any evidence of soil entering the structure at the joint of the inlet/outlet pipes	• No soil or water enters • No water discharges at the joint of inlet/outlet pipes

No. 9 – Basic and Compost-Amended Biofiltration Swales			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Facility – General Requirements	Trash and debris	Trash and/or debris accumulation	No trash or debris at the site
	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
Swale Section	Sediment accumulation	Sediment depth exceeds 2 inches in 10 percent of the swale treatment area	No sediment deposits in treatment area of the biofiltration swale
		Sediment inhibits grass growth over 10 percent of swale length	Grass growth not inhibited by sediment
		Sediment inhibits even spreading of flow	Flows are spread evenly over entire swale width
	Erosion/scouring	Eroded or scoured swale bottom due to channelization or high flows	• No eroded or scoured areas in biofiltration swale • Cause of erosion or scour addressed
	Poor vegetation coverage	Grass is sparse or bare or eroded patches occur in more than 10 percent of the swale bottom	• Swale has no bare spots • Grass is thick and healthy
	Grass too tall	• Grass is excessively tall (greater than 10 inches) • Grass is thin • Nuisance weeds and other vegetation has taken over	• Grass between 3 and 4 inches tall, thick and healthy • No clippings left in swale • No nuisance vegetation present
	Excessive shade	Grass growth is poor because sunlight does not reach swale	• Healthy grass growth or • Swale converted to a wet biofiltration swale
	Constant baseflow	• Continuous flow through the swale, even when it has been dry for weeks or an eroded • Muddy channel has formed in the swale bottom	Baseflow removed from swale by a low-flow pea-gravel drain or bypassed around the swale

No. 9 – Basic and Compost-Amended Biofiltration Swales			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Swale Section (continued)	Standing water	Water pools in the swale between storms or does not drain freely	Swale drains freely and no standing water in swale between storms
	Channelization	Flow concentrates and erodes channel through swale	No flow channels in swale
Flow Spreader	Concentrated flow	Flow from spreader not uniformly distributed across entire swale width	Flows are spread evenly over entire swale width
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20 percent 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 • 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. 10 – Wet and Continuous Inflow Biofiltration Swales			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance Is Performed**
Facility – General Requirements	Trash and debris	Any trash and/or debris accumulated at the site	No trash or debris at the site
	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
Swale Section	Sediment accumulation	Sediment depth exceeds 2 inches in 10 percent of the swale treatment area	No sediment deposits in treatment area
	Erosion/scouring	Eroded or scoured swale bottom due to channelization or high flows	• No eroded or scoured areas in biofiltration swale • Cause of erosion or scour addressed
	Water depth	Water not retained to a depth of about 4 inches during the wet season	Water depth of 4 inches throughout swale for most of wet season
	Vegetation ineffective	• Vegetation sparse; does not provide adequate filtration • Vegetation crowded out by very dense clumps of cattail or nuisance vegetation	• Wetland vegetation fully covers bottom of swale • No cattails or nuisance vegetation present
	Insufficient water	Wetland vegetation dies due to lack of water	Wetland vegetation remains healthy (may require converting to grass-lined biofiltration swale)
Flow Spreader	Concentrated flow	Flow from spreader not uniformly distributed across entire swale width	Flows are spread evenly over entire swale width
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20 percent 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 • 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. 11 – Filter Strips (Basic and CAVFS)			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance Is Performed**
Facility – General Requirements	Trash and debris	Any trash and/or debris accumulated at the site	No trash or debris at the site
	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 Strip	Sediment accumulation	Sediment accumulation exceeds 2 inches depth	No sediment deposits in treatment area
	Erosion/scouring	Eroded or scoured areas due to channelization or high flows	• No eroded or scoured areas • Cause of erosion or scour addressed
	Vegetation ineffective	• Grass has died out • Grass has become excessively tall (greater than 10 inches) • Nuisance vegetation is taking over	• Grass is healthy; between 3 and 4 inches tall • No nuisance vegetation present
Flow Spreader	Concentrated flow	Flow from spreader not uniformly distributed across entire filter width	Flows are spread evenly over entire filter width
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20 percent 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 • 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. 12 – Wet Ponds			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance Is Performed**
Facility – General Requirements	Trash and debris	Any trash and/or debris accumulated at the site	No trash or debris at the site
	Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to City personnel or the public	• Noxious and nuisance vegetation removed according to applicable regulations • No danger of noxious vegetation where City 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
Side Slopes of Dam, Berm, Internal Berm or Embankment	Rodent holes	• Any evidence of rodent holes if facility is acting as a dam or berm • Any evidence of water piping through dam or berm via rodent holes	• Rodents removed or destroyed • 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, are not interfering with access or maintenance, or leaves do not cause a plugging problem 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 engineer should be consulted to resolve source of erosion.

No. 12 – Wet Ponds			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance Is Performed**
Top or Side Slopes of Dam, Berm, Internal Berm or Embankment	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 engineer should be consulted to determine the cause of the settlement.
	Irregular surface on internal berm	Top of berm not uniform and level	Top of berm graded to design elevation.
Pond Areas	Sediment accumulation (except first wet pool cell)	Accumulated sediment that exceeds 10 percent of the designed pond depth	Sediment cleaned out to designed pond shape and depth.
	Sediment accumulation (first wet pool cell)	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 • Pond does not hold water as designed	Liner repaired or replaced.
	Water level (first wet pool cell)	First cell empty; does not hold water	Water retained in first cell for most of the year
	Algae mats (first wet pool cell)	Algae mats develop over more than 10 percent of the water surface	Algae mats removed (usually in the late summer before fall rains)
Gravity Drain	Inoperable valve	Valve will not open and close	Valve opens and closes normally
	Valve will not seal	Valve does not seal completely	Valve completely seals closed
Emergency Overflow Spillway	Tree growth	Tree growth impedes flow or threatens stability of spillway	Trees removed
	Rock missing	• Only one layer of rock exists above native soil in area 5 square feet or larger • 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

No. 12 – Wet Ponds			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance Is Performed**
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20 percent 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 • 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. 13 – Wet Vaults			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Facility – General Requirements	Trash and debris	Trash and debris accumulation	Trash and debris removed from facility
Treatment Area	Trash and debris	Any trash and debris accumulated in vault (includes floatables and non-floatables)	No trash or debris in vault
	Sediment accumulation	Sediment accumulation in vault bottom exceeds the depth of the sediment zone plus 6 inches	No sediment in vault
	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
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 • Vault does not retain water • Qualified inspection personnel determines that the vault is not structurally sound	Vault sealed and structurally sound
	Baffles damaged	• Baffles corroding, cracking, warping, and/or showing signs of failure • Baffle cannot be removed	Repair or replace baffles or walls to specifications
	Ventilation	Ventilation area blocked or plugged	No reduction of ventilation area exists
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20 percent 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 • 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. 13 – Wet Vaults			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Gravity Drain	Inoperable valve	Valve will not open and close	Valve opens and closes normally
	Valve will not seal	Valve does not seal completely	Valve completely seals closed
Access Maintenance Hole	Access cover/lid damaged or difficult to open	• Access cover/lid cannot be easily opened by one person • Corrosion/deformation of cover/lid	Access cover/lid can be opened by one person
	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
	Access doors/plate has gaps, does not cover completely	Large access doors not flat and/or access opening not completely covered	Doors close flat and 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
	Ladder rungs unsafe	Missing rungs, misalignment, rust, or cracks	Ladder meets design standards and allows maintenance person safe access

No. 14 – Stormwater Treatment Wetlands			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance Is Performed**
Facility – General Requirements	Trash and debris	Trash and debris accumulation	Trash and debris removed from facility
	Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to City personnel or the public	• Noxious and nuisance vegetation removed according to applicable regulations • No danger of noxious vegetation where City 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
Side Slopes of Dam, Berm, Internal Berm, or Embankment	Rodent holes	Any evidence of rodent holes if facility is acting as a dam or berm Any evidence of water piping through dam or berm via rodent holes	• Rodents removed or destroyed • 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 engineer should be consulted to resolve source of erosion.

No. 14 – Stormwater Treatment Wetlands			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance Is Performed**
Top or Side Slopes of Dam, Berm, Internal Berm, or Embankment	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 engineer should be consulted to determine the cause of the settlement.
	Irregular surface on internal berm	Top of berm not uniform and level	Top of berm graded flat to design elevation
Pond Areas	Sediment accumulation (first cell/forebay)	Sediment accumulations in pond bottom that exceeds the depth of sediment storage (1 foot) plus 6 inches	Sediment storage contains no sediment
	Sediment accumulation (wetland cell)	Accumulated sediment that exceeds 10 percent of the designed pond depth	Sediment cleaned out to designed pond shape and depth
	Liner damaged (If Applicable)	Liner is visible or pond does not hold water as designed	Liner repaired or replaced
	Water level (first cell/forebay)	Cell does not hold 3 feet of water year round	3 feet of water retained year round
	Water level (wetland cell)	Cell does not retain water for at least 10 months of the year or wetland plants are not surviving.	Water retained at least 10 months of the year or wetland plants are surviving.
	Algae mats (first cell/forebay)	Algae mats develop over more than 10 percent of the water	Algae mats removed (usually in the late summer before fall rains)
	Vegetation	Vegetation dead, dying, or overgrown (cattails) or not meeting original planting specifications	Plants in wetland cell surviving and not interfering with wetland function
Gravity Drain	Inoperable valve	Valve will not open and close	Valve opens and closes normally
	Valve will not seal	Valve does not seal completely	Valve completely seals closed
Emergency Overflow Spillway	Tree growth	Tree growth impedes flow or threatens stability of spillway	Trees removed
	Rock missing	• Only one layer of rock exists above native soil in area 5 square feet or larger • 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

No. 14 – Stormwater Treatment Wetlands			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance Is Performed**
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20 percent 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 • 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. 15 – Sand Filter Basins			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance Is Performed**
Facility – General Requirements	Trash and debris	Trash and debris accumulation	Trash and debris removed from facility
	Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to City personnel or the public	• Noxious and nuisance vegetation removed according to applicable regulations • No danger of noxious vegetation where City 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 Pond does not hold water as designed	Liner repaired or replaced
	Water level	Cell empty; does not hold water.	Water retained in first cell for most of the year
	Algae mats	Algae mats develop over more than 10 percent of the water surface	Algae mats removed
Pond Area	Sediment accumulation	Sediment or crust depth exceeds ½-inch over 10 percent 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) • Nuisance weeds and other vegetation start to take over • Thatch build up occurs	Mow vegetation and/or remove nuisance vegetation

No. 15 – Sand Filter Basins			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance Is Performed**
Side Slopes of Pond	Rodent holes	• Any evidence of rodent holes if facility is acting as a dam or berm • Any evidence of water piping through dam or berm via rodent holes	Rodents removed or destroyed 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 • 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 engineer should be consulted to resolve source of erosion.
Sand Filter Media	Plugging	• Drawdown of water through the sand filter media, takes longer than 24 hours • Flow through the overflow pipes occurs frequently	• Sand filter media surface is aerated • 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 • 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 • Drawdown rate is normal
	Media thickness	Sand thickness is less than 6 inches	Rebuild sand thickness to a minimum of 6 inches and preferably to 18 inches

No. 15 – Sand Filter Basins			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance Is Performed**
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 percent 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 • 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 5 square feet or larger • 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

No. 16 – Sand Filter Vaults			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Facility – General Requirements	Trash and debris	Trash and debris accumulation	Trash and debris removed from facility
	Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to City personnel or the public	• Noxious and nuisance vegetation removed according to applicable regulations • No danger of noxious vegetation where City 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
Pre-Treatment Chamber	Sediment accumulation	Sediment accumulation exceeds the depth of the sediment zone plus 6 inches	Sediment storage contains no sediment
Sand Filter Media	Sediment accumulation	Sediment depth exceeds ½-inch on sand filter media	Sand filter freely drains at normal rate
	Trash and debris	Trash and debris accumulated in vault (floatables and non-floatables)	No trash or debris in vault
	Plugging	• Drawdown of water through the sand filter media, takes longer than 24 hours • Flow through the overflow pipes occurs frequently	Sand filter media drawdown rate is normal
	Short circuiting	• Seepage or flow occurs along the vault walls and corners • Sand eroding near inflow area • Cleanout wyes are not watertight	• Sand filter media section re-laid and compacted along perimeter of vault to form a semi-seal • Erosion protection added to dissipate force of incoming flow and curtail erosion

No. 16 – Sand Filter Vaults			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Vault Structure	Damaged to walls, frame, bottom and/or top slab.	• Cracks wider than ½-inch • Any evidence of soil entering the structure through cracks • Qualified inspection personnel determines that the vault is not structurally sound	Vault replaced or repaired to provide complete sealing of the structure
	Ventilation	Ventilation area blocked or plugged	No reduction of ventilation area exists
Underdrains and Cleanouts	Sediment/debris	Underdrains or clean-outs partially plugged, filled with sediment and/or debris or not watertight	Underdrains and clean-outs free of sediment and debris and sealed
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20 percent 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 • 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 Maintenance Hole	Cover/lid not in place	• Cover/lid is missing or only partially in place • **Any open maintenance hole requires immediate maintenance**	Maintenance hole access cover/lid in place and secure
	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 and allows maintenance person safe access

No. 16 – Sand Filter Vaults			
Maintenance Component	**Defect or Problem**	**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 opened as designed
	Gaps, does not cover completely	Large access doors not flat and/or access opening not completely covered	Doors close flat and 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

No. 17 – Proprietary Technology Cartridge Type Filter Systems (example: BayFilter, FloGard Park Filter, StormFilter)			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
In addition to the specific maintenance criteria provided below, all manufacturers' requirements shall be followed.			
Facility – General Requirements	Trash and debris	Any trash or debris or organic material which impairs the function of the facility	• Trash and debris removed from facility • Flow receives treatment instead of bypassing
	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
	Life cycle	Once per year	Facility is re-inspected and any needed maintenance performed
Vault Treatment Area	Sediment on vault floor	Greater than 2 inches of sediment	Vault is free of sediment
	Sediment on top of cartridges	Greater than ½ inch of sediment	Vault is free of sediment
	Multiple scum lines above top of cartridges	Thick or multiple scum lines above top of cartridges	Cause of plugging corrected and canisters replaced if necessary
Vault Structure	Damage to wall, frame, bottom, and/or top slab	• Cracks wider than ½-inch • Any evidence of soil particles entering the structure through the cracks • Qualified inspection personnel determines 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	Repair or replace baffles to specification
Filter Media	Standing water in vault	9 inches or greater of static water in the vault for more than 24 hours following a rain event and/or overflow occurs frequently	No standing water in vault 24 hours after a rain event
	Short circuiting	Flows do not properly enter filter cartridges	Flows go through filter media
Underdrains and Clean-Outs	Sediment/debris	Underdrains or clean-outs partially plugged or filled with sediment and/or debris	Underdrains and clean-outs free of sediment and debris

No. 17 – Proprietary Technology Cartridge Type Filter Systems (example: BayFilter, FloGard Park Filter, StormFilter)			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20 percent 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 • Any evidence of soil entering at the joints of the inlet/outlet pipes	Cracks repaired, and no evidence of soil entering
Access Maintenance Hole	Cover/lid not in place	• Cover/lid is missing or only partially in place • **Any open maintenance hole requires immediate maintenance**	Maintenance hole access cover/lid in place and secure
	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
	Cover/lid rocking or noisy	Lid rocking when driven over	Cover/lid not rocking
	Ladder rungs unsafe	Missing rungs, misalignment, rust, or cracks	Ladder meets design standards and allows maintenance person safe access
Large Access Doors/Plate	Difficult to open	Large access doors or plates cannot be opened/removed using normal equipment	Replace or repair access door so it can opened as designed.
	Damaged	Hatch doors show major dents and stress	Replace to support surface loading and uses
	Gaps, does not 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. 18 – API Oil/Water Separators			
Maintenance Component	**Defect**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Facility – General Requirements	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	Sediment accumulates exceeds 6 inches in the vault	No sediment in the vault.
	Discharge water not clear	Inspection of discharge water shows obvious signs of poor water quality-effluent discharge from vault shows thick visible sheen	Effluent discharge is clear
	Trash or debris accumulation	Any trash and debris accumulation in vault (floatables and non-floatables)	Vault is clear of trash and debris
	Oil accumulation	Oil accumulations that exceed 1 inch, at the surface of the water in the oil/water separator chamber	No visible oil depth on water
Vault Structure	Damage to wall, frame, bottom, and/or top slab	• Cracks wider than ½-inch • Any evidence of soil particles entering the structure through the cracks • 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	Repair or replace baffles to specifications
Gravity Drain	Inoperable valve	Valve will not open and close	Valve opens and closes normally
	Valve will not seal	Valve does not seal completely	Valve completely seals closed

No. 18 – API Oil/Water Separators			
Maintenance Component	**Defect**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20 percent 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 • 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 Maintenance Hole	Cover/lid not in place	• Cover/lid is missing or only partially in place • **Any open maintenance hole requires immediate maintenance**	Maintenance hole access cover/lid in place and secure
	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 and 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 opened as designed
	Gaps, does not 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 cover/lid	Lifting rings sufficient to lift or remove cover/lid

No. 19 – Coalescing Plate Oil/Water Separators			
Maintenance Component	**Defect**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Facility – General Requirements	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 • Any evidence of soil particles entering the structure through the cracks • 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	Repair or replace baffles to specifications

No. 19 – Coalescing Plate Oil/Water Separators			
Maintenance Component	**Defect**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
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 percent 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 • 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 Maintenance Hole	Cover/lid not in place	• Cover/lid is missing or only partially in place • **Any open maintenance hole requires immediate maintenance**	Maintenance hole access cover/lid in place and secure
	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 and 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 opened as designed
	Gaps, does not 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. 20 – Catch Basin Inserts			
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 product	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

No. 21 – Proprietary Technology Filterra System			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
In addition to the specific maintenance criteria provided below, all manufacturers' requirements shall be followed.			
Facility – General Requirements	Life cycle	Once per year	Facility is re-inspected and any needed maintenance performed
	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	Excessive sediment or trash accumulation	Accumulated sediments or trash impair free flow of water into system	Inlet should be free of obstructions allowing free distributed flow of water into system
Mulch Cover	Trash and floatable debris accumulation	Excessive trash and/or debris accumulation	• Minimal trash or other debris on mulch cover • Mulch cover raked level
	"Ponding" of water on mulch cover	"Ponding" in unit could be indicative of clogging due to excessive fine sediment accumulation or spill of petroleum oils	Stormwater should drain freely and evenly through mulch cover
Proprietary Filter Media/ Vegetation Substrate	"Ponding" of water on mulch cover after mulch cover has been maintained	Excessive fine sediment passes the mulch cover and clogs the filter media/vegetative substrate	• Stormwater should drain freely and evenly through mulch cover • Replace substrate and vegetation when needed
Vegetation	Plants not growing or in poor condition	• Soil/mulch too wet • Evidence of spill • Incorrect plant selection • Pest infestation • Vandalism to plants	Plants should be healthy and pest free
	Plants absent	Plants absent	Appropriate plants are present
	Excessive plant growth	Excessive plant growth inhibits facility function or becomes a hazard for pedestrian and vehicular circulation and safety	• Pruning and/or thinning vegetation maintains proper plant density • Appropriate plants are present

No. 21 – Proprietary Technology Filterra System			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Structure, if used	Structure has visible cracks	• Cracks wider than ½ inch • Evidence of soil particles entering the structure through the cracks	Structure is sealed and structurally sound

No. 22 – Bioretention Facilities			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Facility – General Requirements	Pests: Insects/Rodents	Pest of concern is present and impacting facility function	• Pests removed or destroyed and facility returned to original functionality • Do not use pesticides or *Bacillus thuringiensis israelensis* (*Bti*)
	Trash	Trash and debris present	No trash and debris present
	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
Earthen Side Slopes and Berms	Erosion	Erosion (gullies/rills) greater than 2 inches deep around inlets, outlet, and alongside slopes	• Cause of erosion is eliminated • Damaged area is stabilized (regrade, rock, vegetation, erosion control blanket) For deep channels or cuts (over 3 inches in ponding depth), temporary erosion control measures are in place until permanent repairs can be made.
		Erosion of sides causes slope to become a hazard	The hazard is eliminated and slopes are stabilized
	Settlement	Settlement greater than 3 inches (relative to undisturbed sections of berm)	The design height is restored with additional mulch
	Berm leakage	Downstream face of berm wet, seeps or leaks evident	Holes are plugged and berm is compacted (may require consultation with licensed engineer, particularly for larger berms)
		Any evidence of rodent holes or water piping in berm	• Rodents (refer to "Pests: Insects/Rodents") removed or destroyed • Berm repaired/compacted
Concrete Sidewalls	Cracks	Rot, cracks, or failure of concrete sidewalls	Concrete is repaired or replaced

No. 22 – Bioretention Facilities			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Rockery Sidewalls	Instable rockery	Rockery side walls are insecure	Rockery sidewalls are stable (may require consultation with licensed engineer, particularly for walls 4 feet or greater in height)
Facility Bottom Area	Sediment accumulation	Accumulated sediment to extent that infiltration rate is reduced (refer to "Bioretention Soil") or surface storage capacity significantly impacted	• Sediment cleaned out to restore facility shape and depth • Damaged vegetation is replaced and mulched • Source of sediment identified and controlled (if feasible)
	Leaf accumulation	Accumulated leaves in facility	No leaves clogging outlet structure or impeding water flow
Check Dams and Weirs	Sediment, vegetation, or debris accumulation	Sediment, vegetation, or debris accumulated at or blocking (or having the potential to block) check dam, flow control weir, or orifice	Blockage is cleared
	Erosion	Erosion and/or undercutting present	• No eroded or undercut areas in bioretention facility • Cause of erosion or undercutting addressed • Check dam or weir is repaired
	Unlevel top of weir	Grade board or top of weir damaged or not level	Weir restored to level position
Bioretention Soil	Ponded water	Water remains in the basin 48 hours or longer after the end of a storm	Cause of ponded water is identified and addressed: 1) Leaf litter/debris is removed 2) Underdrain is clear 3) Other water inputs (e.g., groundwater, illicit connections) investigated 4) Contributing area verified and facility size is evaluated If items #1–4 do not solve the problem, imported bioretention soil is replaced and replanted.
	Protection of soil	Maintenance will occur requiring entrance into the facility footprint	Maintenance is performed without compacting bioretention soil media

No. 22 – Bioretention Facilities			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Splash Block Inlet	Water not properly directed to facility	Water is not being directed properly to the facility and away from the inlet structure	Blocks are reconfigured to direct water to facility and away from structure
Curb Cut Inlet/Outlet	Accumulated debris	Accumulated leaves, sediment, debris or vegetation at curb cuts	• Blockage is cleared • Source of the blockage is identified and action is taken to prevent future blockages
Inlet/Outlet Pipe	Damaged pipe	Pipe is damaged	• Pipe is repaired/replaced • No cracks more than ¼-inch wide at the joint of inlet/outlet pipes exist
	Clogged pipe	Pipe is clogged	Pipe is clear
	Accumulated debris	Accumulated leaves, sediment, debris or vegetation at inlet or outlet pipe	• Pipe is clear of debris • Source of the blockage is identified and action is taken to prevent future blockages
	Blocked access	Maintain access for inspections	• Vegetation is cleared within 1 foot of inlets and outlets • Access pathways are maintained
	Erosion	Water disrupts soil media	• No eroded or scoured areas in bioretention facility • Cause of erosion or scour addressed. • Pipes or splash blocks are reconfigured or repaired • A cover of rock or cobbles or other erosion protection measure maintained (e.g., matting) to protect the ground where concentrated water enters or exits the facility (e.g., a pipe, curb cut or swale)
Overflow	Blocked overflow	Capacity reduced by sediment or debris	No sediment or debris in overflow

No. 22 – Bioretention Facilities			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Underdrain Pipe	Blocked underdrain	• Plant roots, sediment or debris reducing capacity of underdrain • Prolonged surface ponding (refer to "Bioretention Soil")	Underdrains and orifice are free of sediment and debris
Facility Bottom Area and Upland Slope Vegetation	Lack of vegetation	Vegetation survival rate falls below 75 percent within first 2 years of establishment (unless project O&M manual or record drawing stipulates more or less than 75 percent survival rate)	• Plants are healthy and pest free • Cause of poor vegetation growth addressed • Bioretention facility is replanted as necessary to obtain 75 percent survival rate or greater • Plant selection is appropriate for site growing conditions
Trees and Shrubs	Causing problems for operation of facility	Large trees and shrubs interfere with operation of the facility or access for maintenance	Trees and shrubs do not hinder facility performance or maintenance activities
	Dead trees or shrubs	Standing dead vegetation is present	• Trees and shrubs do not hinder facility performance or maintenance activities • Dead vegetation is removed • Cause of dead vegetation is addressed • Specific plants with high mortality rate are replaced with more appropriate species
Trees and Shrubs Adjacent to Vehicle Travel Areas (or areas where visibility needs to be maintained)	Safety issues	Vegetation causes some visibility (line of sight) or driver safety issues	• Appropriate height for sight clearance is maintained • Regular pruning maintains visual sight lines for safety or clearance along a walk or drive • Tree or shrub is removed or transplanted if presenting a continual safety hazard
Emergent Vegetation	Conveyance blocked	Vegetation compromises conveyance	Sedges and rushes are clear of dead foliage

No. 22 – Bioretention Facilities			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Noxious Weeds	Presence of noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to City personnel or the public	• Noxious and nuisance vegetation removed according to applicable regulations • No danger of noxious vegetation where City personnel or the public might normally be
Excessive Vegetation	Adjacent facilities compromised	Low-lying vegetation growing beyond facility edge onto sidewalks, paths, or street edge poses pedestrian safety hazard or may clog adjacent permeable pavement surfaces due to associated leaf litter, mulch, and soil	• Vegetation does not impede function of adjacent facilities or pose as safety hazard • Groundcovers and shrubs trimmed at facility edge • Excessive leaf litter is removed.
	Causes facility to not function properly	Excessive vegetation density inhibits stormwater flow beyond design ponding or becomes a hazard for pedestrian and vehicular circulation and safety	• Pruning and/or thinning vegetation maintains proper plant density and aesthetics • Plants that are weak, broken, or not true to form are removed or replaced in-kind • Appropriate plants are present
Mulch	Lack of mulch	Bare spots (without mulch cover) are present or mulch depth less than 2 inches	• Facility has a minimum 3-inch layer of an appropriate type of mulch • Mulch is kept away from woody stems
Plant Watering	Plant establishment	Plant establishment period (1–3 years)	Plants are watered as necessary during periods of no rain to ensure plant establishment
Summer Watering (after establishment)	Drought period	Established vegetation (after 3 years)	• Plants are watered as necessary during drought conditions • Trees are watered up to 5 years after planting

No. 23 – Cisterns			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance Is Needed**	**Results Expected When Maintenance Is Performed**
Roof	Debris accumulation in cistern	Debris has accumulated	No debris in cistern
Gutter	Debris accumulation in cistern	Debris has accumulated	No debris in cistern or gutter
Screens at the Top of Downspout and Cistern Inlet	Debris accumulation in cistern	Screen has deteriorated or is missing	Screen is in place and functions as designed
		Preventative maintenance	No debris in cistern or accumulated on screen
Overflow Pipe	Damaged	Pipe is cracked, joints and fittings not sealed	Overflow pipe is watertight and does not leak.
	Discharge is sporadic, cistern overtops	Debris has accumulated blocking flow	Overflow pipe can convey overflow to point of discharge.
Cistern	Accumulated debris and/or sediment	More than 6 inches of accumulation in bottom of cistern	Accumulation of debris and/or sediment removed
Low Flow Orifice (detention cistern)	Cistern overflows are too frequent	Debris or other obstruction of orifice	Orifice is clear
Delivery and Distribution System (harvesting)	None – ongoing maintenance activity	Ongoing maintenance (e.g., replacing and/or cleaning filters, removing sediment and other pollutants from storage systems)	Manufacturer's, installer or designers instructions for O&M are followed
Access and Safety	None – ongoing maintenance activity	Access to cistern required for maintenance or cleaning	Any cistern opening that could allow the entry of people is marked: "DANGER—CONFINED SPACE"
Pests	Mosquito infestation	Standing water remains for more than 3 days following storms	• All inlets, overflows and other openings are protected with mosquito screens • No mosquito infestation present

No. 24 – Downspout, Sheet Flow, and Concentrated Dispersion Systems			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance Is Needed**	**Results Expected When Maintenance Is Performed**
Splash Block	Water directed toward building	Water is being directed towards building structure	Blocks direct water away from building structure
	Water causing erosion	Water disrupts soil media	Blocks are reconfigured/repaired and media is restored
Transition Zone	Erosion	Adjacent soil erosion; uneven surface creating concentrated flow discharge; or less than 2 foot of width	No eroded or scoured areas Cause of erosion or scour is addressed
Dispersion Trench	Concentrated flow	Visual evidence of water discharging at concentrated points along trench (normal condition is a “sheet flow” from edge of trench; intent is to prevent erosion damage)	No debris on trench surface Notched grade board or other distributor type is aligned to prevent erosion Trench is rebuilt to standards, if necessary
Surface of Trench	Accumulated debris	Accumulated trash, debris, or sediment on drain rock surface impedes sheet flow from facility	Trash or debris is removed/disposed in accordance with local solid waste requirements
	Vegetation impeding flow	Vegetation/moss present on drain rock surface impedes sheet flow from facility	Freely draining drain rock surface
Pipe(s) to Trench	Accumulated debris in drains	Accumulation of trash, debris, or sediment in roof drains, gutters, driveway drains, area drains, etc.	No trash or debris in roof drains, gutters, driveway drains, or area drains
	Accumulated debris in inlet pipe	Pipe from sump to trench or drywell has accumulated sediment or is plugged	No sediment or debris in inlet/outlet pipe screen or inlet/outlet pipe
	Damaged pipes	Cracked, collapsed, broken, or misaligned drain pipes	No cracks more than ¼-inch wide at the joint of the inlet/outlet pipe
Sump	Accumulated sediment	Sediment in the sump	Sump contains no sediment
Access Lid	Hard to open	Cannot be easily opened	Access lid is repaired or replaced
	Buried	Buried	Access lid functions as designed (refer to record drawings for design intent)
	Missing cover	Cover missing	Cover replaced
Rock Pad (concentrated flow dispersion)	Inadequate rock cover	Only one layer of rock exists above native soil in area 6 square feet or larger, or any exposure of native soil	Rock pad is repaired/replaced to meet design standards
	Erosion	Soil erosion in or adjacent to rock pad	Rock pad is repaired/replaced to meet design standards

No. 24 – Downspout, Sheet Flow, and Concentrated Dispersion Systems			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance Is Needed**	**Results Expected When Maintenance Is Performed**
Dispersal Area (general)	Erosion	Erosion (gullies/rills) greater than 2 inches deep in dispersal area	No eroded or scoured areas Cause of erosion or scour is addressed
	Accumulated sediment	Accumulated sediment or debris to extent that blocks or channelizes flow path	No excess sediment or debris in dispersal area. Sediment source is addressed (if feasible)
Ponded Water	Ponded water	Standing surface water in dispersion area remains for more than 3 days after the end of a storm event	• System freely drains • Standing water in dispersion area does not persist for more than 3 days after a storm event • Cause of the standing water (e.g., grade depressions, compacted soil) addressed
Vegetation	Plant survival	Dispersal area vegetation in establishment period (1–2 years, or additional 3rd year) during extreme dry weather)	Vegetation healthy and watered weekly during periods of no rain to ensure plant establishment
	Lack of vegetation allowing erosion	Poor vegetation cover such that erosion is occurring	• Vegetation healthy and watered. • No eroded or scoured areas present • Cause of erosion or scour addressed • Plant species appropriate for the soil and moisture conditions
	Vegetation blocking flow	Vegetation inhibits dispersed flow along flow path	Vegetation is trimmed, weeded, or replanted to restore dispersed flow path
	Presence of noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to City personnel or the public	• Noxious and nuisance vegetation removed according to applicable regulations • No danger of noxious vegetation where City personnel or the public might normally be
Sump	Accumulated sediment	Accumulated sediment in the sump exceeds 30 percent of storage volume	No sediment in sump or inlet/outlet pipes

No. 24 – Downspout, Sheet Flow, and Concentrated Dispersion Systems			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance Is Needed**	**Results Expected When Maintenance Is Performed**
Access Lid	Hard to open	Cannot be easily opened	Access lid is repaired or replaced
	Buried	Buried	Access lid functions as designed (refer to record drawings for design intent)
	Missing cover	Cover missing	Cover replaced
Pest Control	Mosquito infestation	Standing surface water in dispersion area remains for more than 3 days after the end of a storm	• System freely drains • Standing water in dispersion area does not persist for more than 3 days after a storm event • Cause of the standing water (e.g., grade depressions, compacted soil) addressed
Rodents	Presence of rodents	Rodent holes or mounds disturb dispersion flow paths	• Rodents removed or destroyed • Holes filled • Flow path revegetated

No. 25 – Permeable Pavement			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance Is Needed**	**Results Expected When Maintenance Is Performed**
Facility – General Requirements	Unstable adjacent area	Runoff from adjacent pervious areas deposits soil, mulch or sediment on paving	• No deposited soil or other materials on permeable pavement or other adjacent surfacing • All exposed soils that may erode to pavement surface mulched and/or planted
	Wearing course covered by adjacent vegetation	Vegetation growing beyond facility edge onto sidewalks, paths, and street edge	• Vegetation does not impede function of adjacent facilities or pose as safety hazard • Groundcovers and shrubs trimmed to avoid overreaching the sidewalks, paths and street edge
	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
Pavement Wearing Course (all types)	Accumulated sediment on surface	Sediment present at the surface of the pavement	Sediment at surface does not inhibit infiltration
	Surface clogged by moss	Moss growth inhibits infiltration or poses slip safety hazard	Moss growth on surface does not inhibit infiltration or present a slip safety hazard
	Surface is clogged	Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate)	• System drains freely • No standing water on surface between storms
	Settlement	When deviation from original grade impedes function.	Original grade re-established
Permeable Asphalt or Cement Concrete	Cracks	Major cracks or trip hazards and concrete spalling and raveling	• Potholes or small cracks filled with patching mixes • Large cracks and settlement addressed by cutting and replacing the pavement section

No. 25 – Permeable Pavement			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance Is Needed**	**Results Expected When Maintenance Is Performed**
Interlocking Concrete Paver Blocks or Open-Celled Paving Grid	Paver block missing or damaged	Paver block missing or damaged	Individual damaged paver blocks removed and replaced or repaired per manufacturer's recommendations
	Loss of aggregate material between paver blocks	Loss of aggregate material between paver blocks	Aggregate replaced per manufacturer's recommendations
Open-Celled Paving Grid	Paving grid missing or damaged	Three or more adjacent rings in paving grid missing or damaged	Grid segment replaced or repaired per manufacturer's recommendations
	Loss of aggregate material in paving grid OR – Lack of grass coverage	Loss of aggregate material in paving grid	Aggregate gravel level maintained at the same level as the plastic rings or no more than ¼ inch above the top of rings
		Poor grass coverage in paving grid	• Growing medium restored • Facility reseeded or planted • Aerated • Vegetated area amended as needed
	Weeds present	Weeds present	Weeds are removed if infiltration is hindered. Noxious weeds are removed.
Inlet/Outlet Pipe	Pipe is damaged	Pipe is damaged	Pipe is repaired/replaced
	Pipe is clogged	Pipe is clogged	Roots or debris is removed
	Erosion	Native soil exposed or other signs of erosion damage present	• No eroded or scoured areas • Cause of erosion or scour is addressed
Underdrain Pipe	Blocked underdrain	Plant roots, sediment or debris reducing capacity of underdrain (may cause prolonged drawdown period)	Underdrains and orifice free of sediment and debris

No. 26 – Trees			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance Is Needed**	**Results Expected When Maintenance Is Performed**
Tree	Dead or declining	Dead, damaged, or declining	Tree replaced per planting plan or acceptable substitute

No. 27 – Vegetated Roof Systems			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance Is Needed**	**Results Expected When Maintenance Is Performed**
Facility – General Requirements	Improper access and safety for maintenance	Insufficient egress/ingress routes and fall protection	• Egress and ingress routes maintained to design standards and fire codes • Fall protection is appropriate
	Border zone not defined	Vegetation is encroaching into border zone aggregate	• No weeds and undesirable vegetation present • Desirable vegetation transplanted
	Flashing, gravel stops, utilities, or other structures on roof	Flashing, utilities or other structures on roof are deteriorating (can serve as source of metal pollution in vegetated roof runoff)	Potential pollutant sources replaced or eliminated
	Mosquitoes	Standing water remains for more than 3 days after the end of a storm	• System freely drains • Standing water on roof does not persist for more than 3 days after a storm event
	Nuisance animals	Nuisance animals causing erosion, damaging plants, or depositing large volumes of feces	Measures in place to deter nuisance species
Growth Medium	Water is not infiltrating properly	Water does not permeate growth media (runs off soil surface) or crusting is observed	Stormwater infiltrates freely through growth media
		Growth medium thickness is less than design thickness (due to erosion and plant uptake)	Growth medium is present at design thickness
		Fallen leaves or debris are present	No leaves or debris present
		Growth media erosion/scour is visible (e.g., gullies)	• No eroded or scoured areas • Cause of erosion or scour addressed
Roof Drain	Not draining	Sediment, vegetation, or debris reducing capacity of inlet structure	• Inlet clear • Cause of blockage addressed
		Pipe is clogged	Debris, roots, or other obstruction removed and pipe is free draining

No. 27 – Vegetated Roof Systems			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance Is Needed**	**Results Expected When Maintenance Is Performed**
Vegetation	Plant coverage	Vegetative coverage falls below 80 percent (unless design specifications stipulate less than 80 percent coverage)	• Bare areas planted with vegetation • Erosion control measures installed until percent coverage goal attained
		Summer watering – extensive vegetated roof system	Vegetation watered weekly during periods of no rain during vegetation establishment period (1–2 years)
			Vegetation watered during drought conditions or more often if necessary to maintain plant cover during post-establishment period (after 2 years)
		Summer watering – intensive vegetated roof system	Vegetation watered deeply, but infrequently, and the top 6 to 12 inches of the root zone is moist during vegetation establishment period (1–2 years)
			Vegetation watered during drought conditions or more often if necessary to maintain plant cover during post-establishment period (after 2 years)
		Extensive roof with low density sedum population	Sedums are mulch mowed
	Poor plant establishment and possible nutrient deficiency in growth medium	Fertilization– extensive vegetated roof system	• Organic debris replenished • Annual soil test conducted to assess need for fertilizer • Minimal amounts of slow-release fertilizer applied
		Fertilization– intensive vegetated roof system	• Annual soil test conducted to assess need for fertilizer • Minimal amounts of slow-release fertilizer applied

No. 27 – Vegetated Roof Systems			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance Is Needed**	**Results Expected When Maintenance Is Performed**
Vegetation (continued)	Poor plant establishment and possible nutrient deficiency in growth medium (continued)	Dead vegetation is present	Dead plant material recycled on the roof or removed and replaced (see manufacturer's recommendations)
	Weeds	Weeds are present	• Weeds removed (manual methods preferred) • IPM protocols followed
		Any noxious or nuisance vegetation which may constitute a hazard to City personnel or the public	• Noxious and nuisance vegetation removed according to applicable regulations • No danger of noxious vegetation where City personnel or the public might normally be
Irrigation System (if any)	Not applicable	Irrigation system is not working or routine maintenance needed	Manufacturer's/installer's instructions are followed for operation and maintenance

No. 28 – Rain Gardens			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Facility – General Requirements	Mosquitoes	Standing water remains for more than 3 days after the end of a storm	• Rain garden drains freely • Standing water in rain garden does not persist for more than 3 days after a storm event • Cause of the standing water addressed (see "Ponded water")
	Trash	Trash and debris present	No trash or debris present
Earthen Side Slopes and Berms	Erosion	Persistent soil erosion on slopes	• No eroded or scoured areas • Cause of erosion or scour addressed
Rockery Sidewalls	Unstable rockery	Rockery side walls are insecure	Stable rockery sidewalls (may require consultation with licensed engineer, particularly for walls 4 feet or greater in height)
Rain Garden Bottom Area	Sediment accumulation	Visible sediment deposition in the rain garden that reduces drawdown time of water in the rain garden	• No sediment accumulation in rain garden • Source of sediment addressed
	Debris accumulation	Accumulated leaves in facility	No leaves clogging outlet structure or impeding water flow
Mulch	Lack of mulch	Bare spots (without mulch cover) are present or mulch depth less than 2 inches	• Facility has a minimum 2- to 3-inch layer of an appropriate type of mulch • Mulch kept away from woody stems
Splash Block Inlet	Water not properly directed to rain garden	Water is being directed towards building structure	Blocks are reconfigured to direct water to rain garden and away from structure
Pipe Inlet/Outlet	Erosion	Rock or cobble removed or missing and concentrated flows contacting soil	• No eroded or scoured areas • Cause of erosion or scour addressed • Cover of rock or cobbles protects the ground where concentrated water flows into the rain garden

No. 28 – Rain Gardens			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Pipe Inlet/Outlet (continued)	Accumulated debris	Accumulated leaves, sediment, debris or vegetation at curb cuts, inlet or outlet pipe	Blockage cleared
	Damaged pipe	Pipe is damaged	Pipe repaired/replaced
	Clogged pipe	Pipe is clogged	Pipe clear of roots and debris
	Blocked access	Maintain access for inspections	Vegetation cleared or transplanted within 1 foot of inlets and outlets
Ponded Water	Ponded water	Excessive ponding water: Ponded water remains in the rain garden more than 48 hours after the end of a storm	• Rain garden drains freely • Standing water in rain garden does not persist for more than 48 hours after a storm event • Leaf litter/debris/sediment removed
Overflow	Blocked overflow	Capacity reduced by sediment or debris	No sediment or debris in overflow
Vegetation	Blocked site distances and sidewalks	Vegetation inhibits sight distances and sidewalks	Sidewalks and sight distances along roadways and sidewalks are kept clear
	Blocked pipes	Vegetation is crowding inlets and outlets	Inlets and outlets in rain garden clear of vegetation
	Unhealthy vegetation	• Yellowing: possible Nitrogen (N) deficiency • Poor growth: possible Phosphorous (P) deficiency • Poor flowering, spotting or curled leaves, or weak roots or stems: possible Potassium (K) deficiency	Plants are healthy and appropriate for site conditions
	Weeds	Presence of weeds	Weeds removed (manual methods preferred) and mulch applied
Summer Watering (years 1–3)	Plant establishment	Tree, shrubs and groundcovers in first 3 years of establishment period	Plants are watered during plant establishment period (years 1–3)

No. 28 – Rain Gardens			
Maintenance Component	**Defect or Problem**	**Conditions When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Summer Watering (after establishment)	Drought conditions	Vegetation requires supplemental water	Plants are watered during drought conditions or more often if necessary during post-establishment period (after 2 years)