

OPERATIONS AND MAINTENANCE MANUAL
FOR

Raising Cane's Restaurant # C1360

Puyallup, WA

February 2026

Owner Name: Raising Cane's Restaurants, L.L.C.
Owner Address: 6800 Bishop Rd Plano, TX 75024
Owner Telephone: (972) 769-3100

Project Engineer Name: Liz Willmot, P.E.
Project Engineer Address: 1201 Third Ave, Suite 2800, Seattle, WA 98101
Project Engineer Telephone: (206) 677-8610
Project Engineer Email: Liz.Willmot@kimley-horn.com



PROJECT DESCRIPTION

This project proposes the development of a new restaurant with outdoor seating, two drive-thru lanes with canopies, and associated infrastructure in the City of Puyallup, WA. The site zoning is listed as Urban Center Mixed Use (UCX) and the parcel number for the proposed development is 0419091073. The land is situated in the county of Pierce, state of Washington.

The existing project site is currently one commercial building with an associated parking and pavement area. The site generally slopes east at average slope of 4% with approximately 8 feet total drop from the west to the east.

The site drains to proposed catch basins on site. The runoff then flows into a proposed water quality vault, before routing into a gravel infiltration trench onsite. From there, the runoff infiltrates into native soils. During storm events exceeding the 100-year storm, emergency overflow will be routed into the existing stormwater infrastructure offsite via an emergency overflow standpipe from the gravel infiltration trench.

MAINTENANCE IMPORTANCE AND INTENT

The importance of maintenance for the proper functioning of stormwater control facilities cannot be over-emphasized. A substantial portion of failure (clogging of filters, resuspension of sediments, loss of storage capacity, etc.) is due to inadequate maintenance. Stormwater BMP maintenance is essential to ensure that BMPs function as intended throughout their full life cycle.

The fundamental goals of maintenance activities are to ensure the entire flow regime and treatment train designed for the proposed stormwater facilities continue to function in their complete capacity. For this site, these include:

- Maintain ability to safely convey design stormwater flows
- Maintain ability to treat stormwater runoff quality
- Preserve soil and plant health, as well as stormwater flow contact with plant and soil systems
- Clearly identify systems so they can be protected
- Keep maintenance costs low
- Prevent large-scale or expensive stormwater system failures
- Prevent water quality violations or damage to downstream properties

The intent of this section and manual is to pass on to the party (or parties) responsible all the critical information to understand the design of the system, risks and considerations for proper use, suggestions for maintenance frequencies, and cost with the intent of establishing realistic budgets for such maintenance.

RESPONSIBLE PARTIES

Raising Cane's Restaurants, L.L.C. the current tenant, will be the party responsible for the operation and maintenance of the proposed storm facilities upon completion of construction.

Raising Cane's Restaurants, L.L.C.
10025 Lakewood Dr SW
Lakewood, WA 98499
972-769-3100

FACILITIES REQUIRING MAINTENANCE

The facilities requiring maintenance include catch basins, storm cleanouts, infiltration pipes, modular wetland, and storm drainpipes.

MAINTENANCE INSTRUCTIONS

The parties responsible for maintenance must review and apply the maintenance requirements contained herein. These maintenance instructions outline conditions for determining if maintenance actions are required, as identified through inspection. However, they are not intended to be measures of the facility's required condition at all times between inspections. Exceedance of these conditions at any time between inspections or maintenance activity does not automatically constitute a violation of these standards. However, based upon inspection observations, the inspection and maintenance presented in the checklists shall be adjusted to minimize the length of time that a facility is in a condition that requires a maintenance action. A log of maintenance activity that indicates what actions were taken must be kept on site and be available for inspection by the City.

All facilities on the project site should be inspected at least twice per year at an interval of every six months with one inspection occurring after the first storm of the wet season. Catch basins should have the sediment removed when depth exceeds 60 percent of the sump depth, 2.4 feet, or if the accumulated sediment is equal to or exceeding the invert out elevation. During inspection, the storm system should be inspected for cracks or other damage in the pipes and structures, and trash and other debris shall be removed.

Determination of water not infiltrating as designed shall be observed after rainfall ceases and appropriate time allowed for infiltration to occur. Proper construction methods and sequencing play a significant role in reducing operations and maintenance problems.

The document also lists the action and procedures which should be taken. The document was pulled from the Department of Ecology's Stormwater Manual for Western Washington. The Maintenance Checklist is included for the following:

- Catch Basins
- Manholes
- Infiltration Trench
- Water Quality Vault
- Conveyance pipes
- Control Structures

VEGETATION MAINTENANCE

If landscaping and vegetation becomes sparse or dies, it should be replaced to match the design conditions of the site just after the initial construction was complete. Regular mowing and irrigation should occur as needed to maintain healthy vegetation.

**APPENDIX A: GRADING AND DRAINAGE PLANS AND STORMWATER
DETAILS**

K:\SEA_Civil\090042 - Raising Cane's\090042022 - C1360 Meridian & 43rd, Puyallup, WA\CAD\PlanSheets\C5.0 GRADING & DRAINAGE PLAN.dwg Jun 23, 2026 6:04pm by Sydney Proffitt

This document, together with the concepts and designs presented herein, is an instrument of service, is intended only for the specific purpose and client for which it was prepared. Reuse of and improper reliance on this document without written authorization and adaptation by Kimley-Horn and Associates, Inc. shall be without liability to Kimley-Horn and Associates, Inc.

GRADING & DRAINAGE NOTES

- ALL CONSTRUCTION TO BE IN ACCORDANCE WITH THESE PLANS AND THE CITY/HJH STANDARDS AND SPECIFICATIONS.
- PRIOR TO STARTING CONSTRUCTION, THE CONTRACTOR SHALL MAKE CERTAIN THAT ALL REQUIRED PERMITS AND APPROVALS HAVE BEEN OBTAINED. NO CONSTRUCTION OR FABRICATION SHALL BEGIN UNTIL THE CONTRACTOR HAS RECEIVED AND THOROUGHLY REVIEWED ALL PLANS AND OTHER DOCUMENTS APPROVED BY ALL OF THE PERMITTING AUTHORITIES.
- THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS SHALL VERIFY THE SUITABILITY OF ALL EXISTING AND PROPOSED SITE CONDITIONS INCLUDING GRADES AND DIMENSIONS BEFORE COMMENCEMENT OF ANY CONSTRUCTION. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES. MINOR ADJUSTMENTS TO FINISH GRADE TO ACCOMPLISH SPOT DRAINAGE ARE ACCEPTABLE. IF NECESSARY, UPON PRIOR APPROVAL OF ENGINEER, PAVING INSTALLED SHALL "FLUSH OUT" AT ANY JUNCTURE WITH EXISTING PAVING.
- THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANIES AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
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- CONTRACTOR SHALL ADJUST EXISTING VALVES, MANHOLE RIMS, ETC. AS NECESSARY TO MATCH FINISHED GRADE.
- GRADING FOR ALL SIDEWALKS AND ACCESSIBLE ROUTES INCLUDING CROSSING DRIVEWAYS SHALL CONFORM TO ADA STANDARDS. SLOPES SHALL NOT EXCEED 5% LONGITUDINAL SLOPE OR 2% CROSS SLOPE. SIDEWALK ACCESS TO EXTERNAL BUILDING DOORS SHALL BE ADA COMPLIANT. CONTRACTOR SHALL NOTIFY ENGINEER IMMEDIATELY IF ADA CRITERIA CANNOT BE MET AT ANY LOCATION.
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GRADING SUMMARY TABLE

CUT: 131 CUBIC YARDS

FILL: 554 CUBIC YARDS

NET FILL: 422 CUBIC YARDS

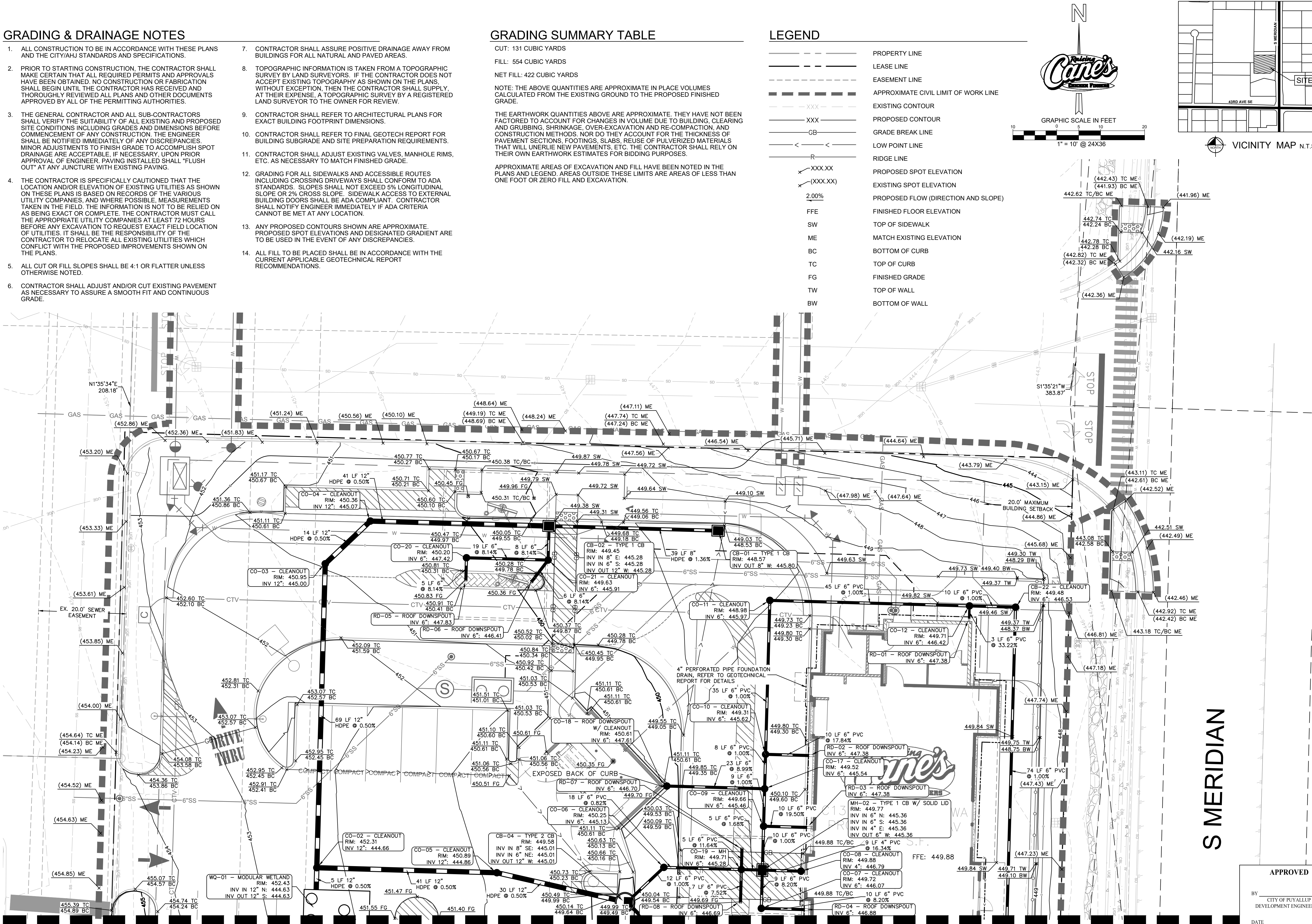
NOTE: THE ABOVE QUANTITIES ARE APPROXIMATE IN PLACE VOLUMES CALCULATED FROM THE EXISTING GROUND TO THE PROPOSED FINISHED GRADE.

THE EARTHWORK QUANTITIES ABOVE ARE APPROXIMATE. THEY HAVE NOT BEEN FACTORED TO ACCOUNT FOR CHANGES IN VOLUME DUE TO BUILDING, CLEARING AND GRUBBING, SHRINKAGE, OVER-EXCAVATION AND RE-COMPACTION, AND CONSTRUCTION METHODS. NOR DO THEY ACCOUNT FOR THE THICKNESS OF PAVEMENT SECTIONS, FOOTINGS, SLABS, REUSE OF PULVERIZED MATERIALS THAT WILL UNDERLIE NEW PAVEMENTS, ETC. THE CONTRACTOR SHALL RELY ON THEIR OWN EARTHWORK ESTIMATES FOR BIDDING PURPOSES.

APPROXIMATE AREAS OF EXCAVATION AND FILL HAVE BEEN NOTED IN THE PLANS AND LEGEND. AREAS OUTSIDE THESE LIMITS ARE AREAS OF LESS THAN ONE FOOT OR ZERO FILL AND EXCAVATION.

LEGEND

- PROPERTY LINE
- LEASE LINE
- EASEMENT LINE
- APPROXIMATE CIVIL LIMIT OF WORK LINE
- EXISTING CONTOUR
- PROPOSED CONTOUR
- GRADE BREAK LINE
- LOW POINT LINE
- RIDGE LINE
- PROPOSED SPOT ELEVATION
- EXISTING SPOT ELEVATION
- PROPOSED FLOW (DIRECTION AND SLOPE)
- FINISHED FLOOR ELEVATION
- TOP OF SIDEWALK
- MATCH EXISTING ELEVATION
- BOTTOM OF CURB
- TOP OF CURB
- FINISHED GRADE
- TOP OF WALL
- BOTTOM OF WALL



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APPROVED

BY: CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE:

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**PM
DESIGN**

211 GATEWAY RD W
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CONTACT: CHET RUST
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PM DESIGN GROUP, INC.



CONSULTANT:

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RAISING CANE'S

RESTAURANT NO.: #C1360

4110 SOUTH MERIDIAN

PUYALLUP, WA 98373

PROTOTYPE P&E-AV
SCHEME
VERSION 2025-1.0

REV	DATE	DESCRIPTION
02/24/26	80% CLIENT REVIEW SET	
03/10/26	1ST CITY SUBMITTAL	
06/23/26	2ND CITY SUBMITTAL	

DRAWN BY:

CHECKED BY:

ARCH. PROJECT NO.:
RAC25014.0

SHEET NAME:

GRADING &
DRAINAGE PLAN

SHEET NUMBER:

C5.0

MATCHLINE - REFER TO SHEET C5.1

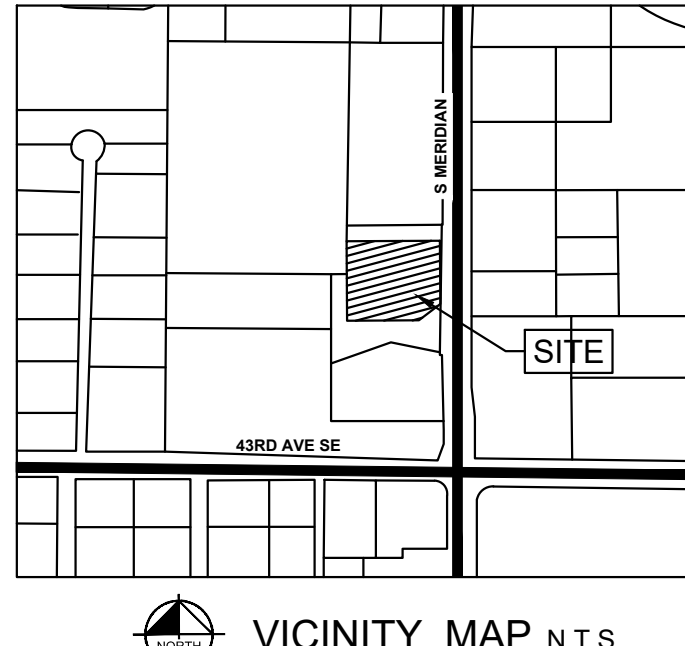
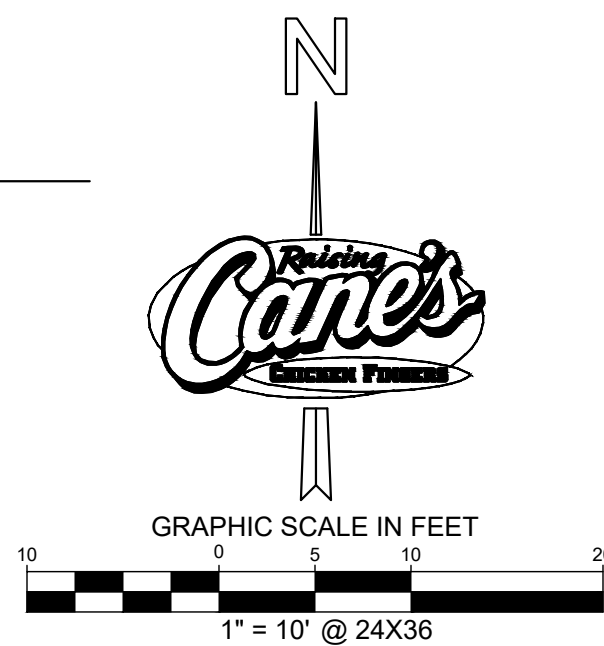
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**GRADING &
DRAINAGE PLAN**

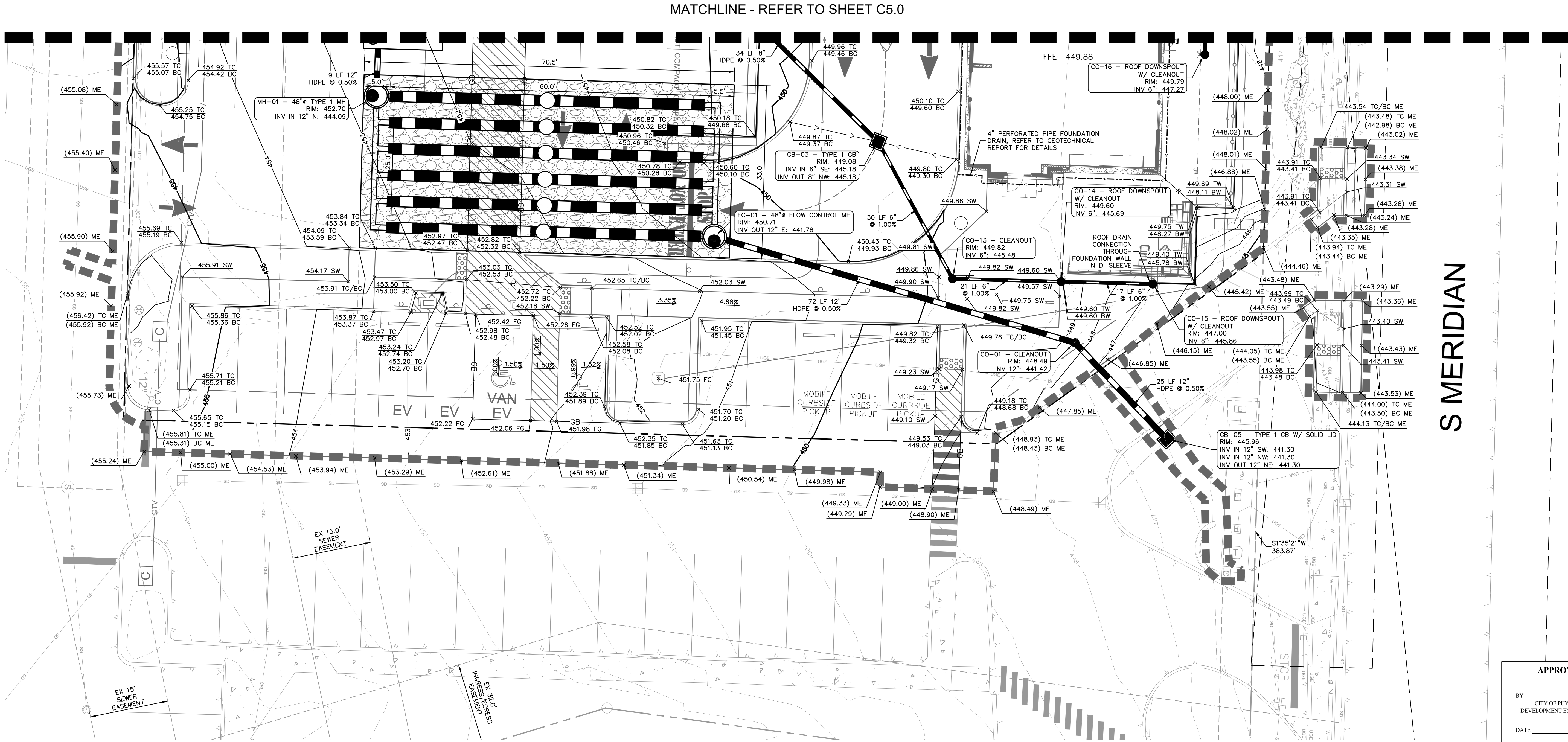
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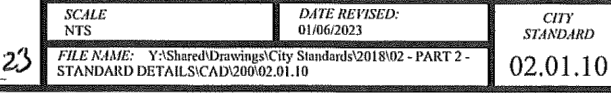
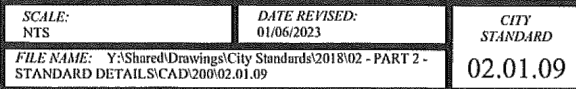
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APPENDIX B: OPERATION & MAINTENANCE CHECKLISTS

Catch Basin

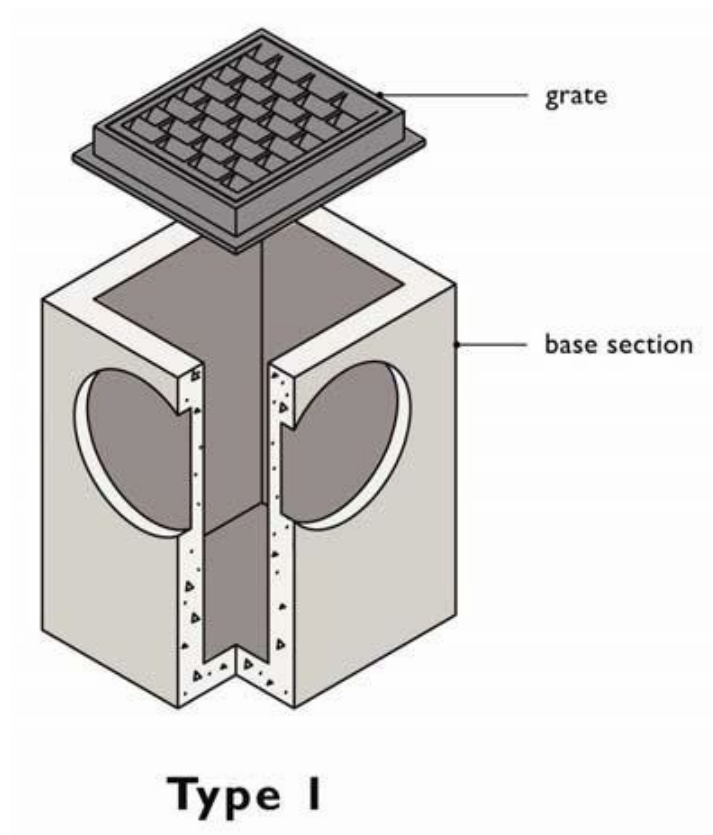
A catch basin is an underground concrete structure typically fitted with a slotted grate to collect stormwater runoff and route it through underground pipes. Catch basins can also be used as a junction in a pipe system and may have a solid lid. There are two types.

A Type 1 catch basin is a rectangular box with approximate dimensions of 3'x2'x5'. Type 1 catch basins are utilized when the connected conveyance pipes are less than 18 inches in diameter and the depth from the gate to the bottom of the pipe is less than 5 feet.

A Type 2 catch basin, also commonly referred to as a storm manhole, is listed separately under “Manhole” in this book.

Catch basins typically provide a storage volume (sump) below the outlet pipe to allow sediments and debris to settle out of the stormwater runoff. Some catch basins are also fitted with a spill control device (inverted elbow on outlet pipe) intended to contain large quantities of grease or debris.

Catch basins are frequently associated with all stormwater facilities.



Key Operations and Maintenance Considerations

- The most common tool for cleaning catch basins is an industrial vacuum truck with a tank and vacuum hose (e.g. Vactor® truck) to remove sediment and debris from the sump.
- A catch basin may be an enclosed space where harmful chemicals and vapors can accumulate. Therefore, if the inspection and maintenance requires entering a catch basin, it should be conducted by an individual trained and certified to work in hazardous confined spaces.

Catch Basin			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Note: table spans multiple pages.			
General	Trash and Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%.	No trash or debris located immediately in front of catch basin or on grate opening.
		Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe.	No trash or debris in the catch basin.
		Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	Inlet and outlet pipes free of trash or debris.
		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 the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin.
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into basin.)	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached.	Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in	Maintenance person judges that structure is unsound.	Basin replaced or repaired to design standards.

	Basin Walls/ Bottom	Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Pipe is regouted and secure at basin wall.
	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.
	Vegetation Inhibiting System	Vegetation growing across and blocking more than 10% of the basin opening.	No vegetation blocking opening to basin.
		Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation or root growth present.
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants, or other pollutants. Sheen, obvious oil, or other contaminants present. • Identify and remove source	No contaminants or pollutants present.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover is closed.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread. One or more bolts are missing.	Mechanism opens with proper tools. All bolts are seated and no bolts are missing. Cover is secure.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure (Intent is to keep cover from sealing off access to maintenance).	Cover can be removed by one maintenance person.
Metal Grates (If Applicable)	Grate Opening Unsafe	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% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.
Oil/Debris Trap (If Applicable)	Dislodged	Oil or debris trap is misaligned with or dislodged from the outlet pipe.	Trap is connected to and aligned with outlet pipe.

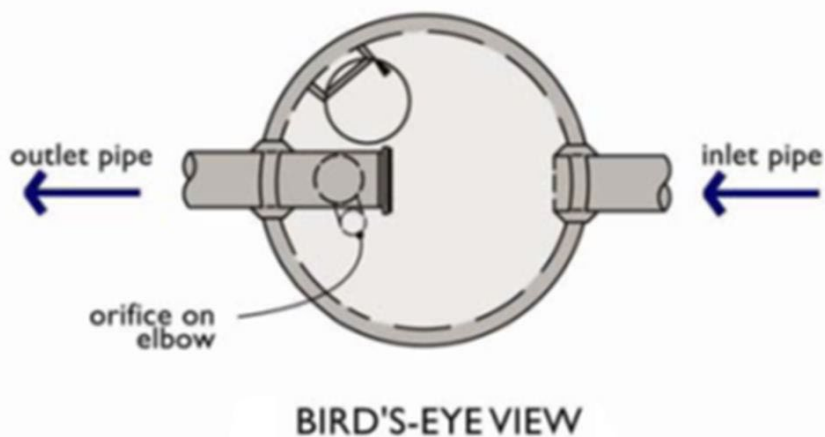
Control Structure/Flow Restrictor

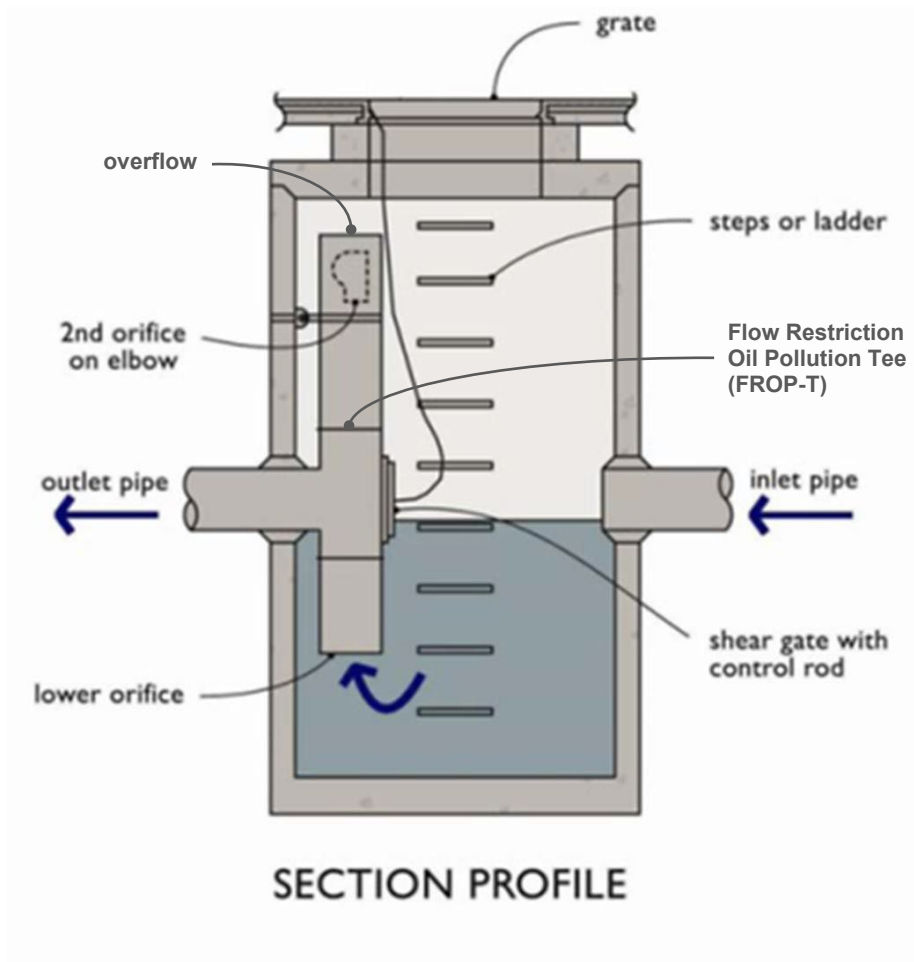
Flow control structures and flow restrictors direct or restrict flow in or out of facility components. Outflow controls on detention facilities are a common example where flow control structures slowly release stormwater at a specific rate. The flow is regulated by a combination of orifices (holes with specifically sized diameters) and weirs (plates with rectangular or “V” shaped notch). Lack of maintenance of the control structure can result in the plugging of an orifice. If these flow controls are damaged, plugged, bypassed, or not working properly, the facility could overtop or release water too quickly.

Control structures have a history of maintenance-related problems and it is imperative to establish a good maintenance program for them to function properly. Sediment typically builds up inside the structure, which blocks or restricts flow to the outlet. To prevent this problem, routinely clean out these structures and conduct regular inspections to detect the need for non-routine cleanout.

Facility objects that are typically associated with a control structure/flow restrictor include:

- detention ponds
- media cartridge filters
- closed detention system
- conveyance stormwater pipe





Key Operations and Maintenance Considerations

- Conduct regular inspections of control structures to detect the need for non-routine cleanout, especially if construction or land-disturbing activities occur in the contributing drainage area.
- The most common tool for cleaning control structures/flow restrictors is a truck with a tank and vacuum hose (Vactor® truck) to remove sediment and debris from the sump.
- A control structure is an enclosed space where harmful chemicals and vapors can accumulate. Therefore, if the inspection and maintenance requires entering a control structure, it should be conducted by an individual trained and certified to work in hazardous confined spaces.

Control Structure/Flow Restrictor			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
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%.	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% 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 FROP-T section or is within 6 inches of the invert of the lowest pipe into or out of the structure or the bottom of the FROP-T section.	Sump of structure contains no sediment.
	Damage to frame and/or top slab	Top slab has holes larger than 2 square inches or cracks wider than ¼ inch.	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than ¾ inch of the frame from the top slab.	Frame is sitting flush on top slab.
	Cracks in walls or bottom	Cracks wider than ½ inch and longer than 3 feet, any evidence of soil particles entering structure through cracks, or 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 or any evidence of soil particles entering structure through cracks.	No cracks more than 1/4 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 or 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.
FROP-T Section	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.
	Damage	T 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.
		Structure is not in upright position (allow up to 10% from plumb).	Structure in correct position.
Shear Gate	Damaged or missing	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 is missing.	Replace shear gate.
		Shear 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	Damaged	Cracks wider than 1/2-inch at the joint of the inlet/outlet pipes or any evidence of soil entering at the joints of the inlet/outlet pipes.	No cracks more than 1/4-inch wide at the joint of the inlet/outlet pipe.
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% of grate surface.	Grate free of trash and debris.
	Damaged or missing	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.
Manhole Cover/Lid	Cover/lid not in place	Cover/lid is missing or only partially in place. Any open structure requires urgent maintenance.	Cover/lid protects opening to structure.
	Locking mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Mechanism opens with proper tools.
	Cover/lid difficult to Remove	One maintenance person cannot remove cover/lid after applying 80 lbs. of lift.	Cover/lid can be removed and reinstalled by one maintenance person.

Conveyance Pipe

Storm sewer pipes convey stormwater. Inlet and outlet stormwater pipes convey stormwater in, through, and out of stormwater facilities.

Pipes are built from many materials. Pipes are cleaned to remove sediment or blockages when problems are identified. Stormwater pipes must be clear of obstructions and breaks to prevent localized flooding. All stormwater pipes should be in proper working order and free of the possible defects listed below.

Key Operations and Maintenance Considerations

- The most common tool for cleaning stormwater conveyance pipes is a truck with a tank, vacuum hose, and a jet hose (Vactor® truck) to flush sediment and debris from the pipes.

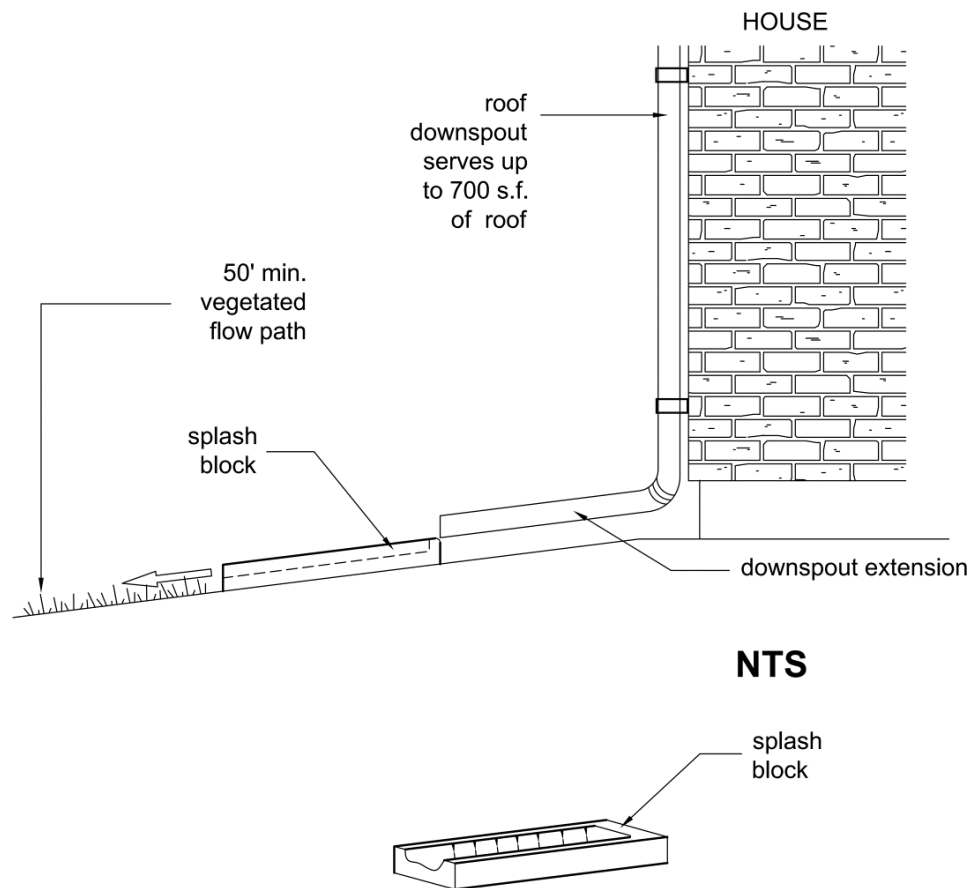
Conveyance Pipe			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
General	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants, or other pollutants. Sheen, obvious oil, or other contaminants present. Identify and remove source.	No contaminants or pollutants present.
	Obstructions, Including Roots	Root enters or deforms pipe, reducing flow.	Roots have been removed from pipe (using mechanical methods; do not put root-dissolving chemicals in storm sewer pipes). If necessary, vegetation over the line removed.
	Sediment and Debris	Sediment depth is greater than 20% of pipe diameter.	Pipe has been cleaned and is free of sediment/ debris. (Upstream debris traps installed where applicable.)
	Debris Barrier or Trash Rack Missing	Stormwater pipes > than 18 inches need debris barrier.	Debris barrier present on all stormwater pipes 18 inches and greater.
	Damage to protective coating or corrosion	Protective coating is damaged; rust or corrosion is weakening the structural integrity of any part of pipe.	Pipe repaired or replaced.
	Damaged	Any dent that decreases the cross section area of pipe by more than 20% or is determined to have weakened structural integrity of the pipe.	Pipe repaired or replaced.

Downspout Splash Block

Downspout splash block dispersion systems consist of splash blocks, which serve to spread roof runoff over vegetated pervious areas.

Facility objects that are typically associated with downspout splash block include:

- Splash block
- Downspout extension
- Dispersal area: Stormwater is dispersed to an area vegetated with well-established lawn or pasture, landscaping with well-established groundcover, or native vegetation with natural groundcover. The required vegetated flow path is 50 feet for splash blocks and concentrated dispersion.



Downspout Dispersion using Splash Blocks

Key Operations and Maintenance Considerations

- For dispersion practices to be effective, the dispersion area must remain covered with dense, well-established vegetation. Site uses should protect vegetation and avoid compaction.
- The groundcover for the extent of the flow in any dispersal area must be maintained to be dense enough to help disperse and infiltrate flows and to prevent erosion.
- The most common tools for cleaning these systems are hand tools to redistribute material disturbed by concentrated flows and a hose to flush downspouts.

Downspout Splash Block			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Note: table spans multiple pages.			
General	Pests	Signs of pest infestations (IPM protocol threshold(s) are exceeded), including rodent holes or mounds that disturb dispersion flow paths.	Pests are not present or engaged in activities that present a significant public health risk or compromise to the intended design function of the facility. Pests that have exceeded acceptable thresholds have been addressed using appropriate IPM measures.
	Inspection Frequency	Annually and after large storms.	Rain harvesting equipment is functioning normally.
Splash Block	Water Directed Towards Building	Water is being directed towards building structure.	Water is directed away from foundations and other building structures.
	Downspout water misdirected	Water coming from the downspout is not discharging to the dispersal area.	Water is discharging normally to the dispersal area.
	Dislodged	Splash block moved from outlet of downspout.	Splash block correctly positioned to catch discharge from downspout.
	Trash and Debris	Trash and debris accumulated on the splash block.	Splash block site free of any trash or debris.
	Erosion	Water coming off the splash block causing erosion.	No erosion occurs from the splash block.
		Water disrupts soil media.	Water is dispersed into soil/mulch/plantings in a manner that does not create erosion or other issues due to concentrated flows.

Dispersal Area	Erosion or Sediment Accumulation	Erosion (gullies/ rills) greater than 2 inches deep in dispersal area. Accumulated sediment or debris to extent that blocks or channelizes flow path.	Cause of erosion has been eliminated and the damaged area has been repaired and stabilized.
	Standing Water After Storm Event	Standing surface water in dispersion area remains for more than 3 days after the end of a storm event.	Standing water drains within 72 hours of a storm event.
	Transition Zone Erosion and Sizing	Adjacent soil erosion; uneven surface creating concentrated flow discharge; or less than two feet of width.	Transition zone meets design criteria and does not exhibit erosion or other evidence of concentrated flows.
	Poor Vegetation Cover	Poor vegetation cover such that erosion is occurring.	Vegetation has been properly watered and established to meet facility design specifications.
	Excessive Vegetation Cover	Vegetation inhibits dispersed flow along flow path.	Vegetation has been weeded, trimmed, pruned, or thinned to meet facility design criteria.

Grounds

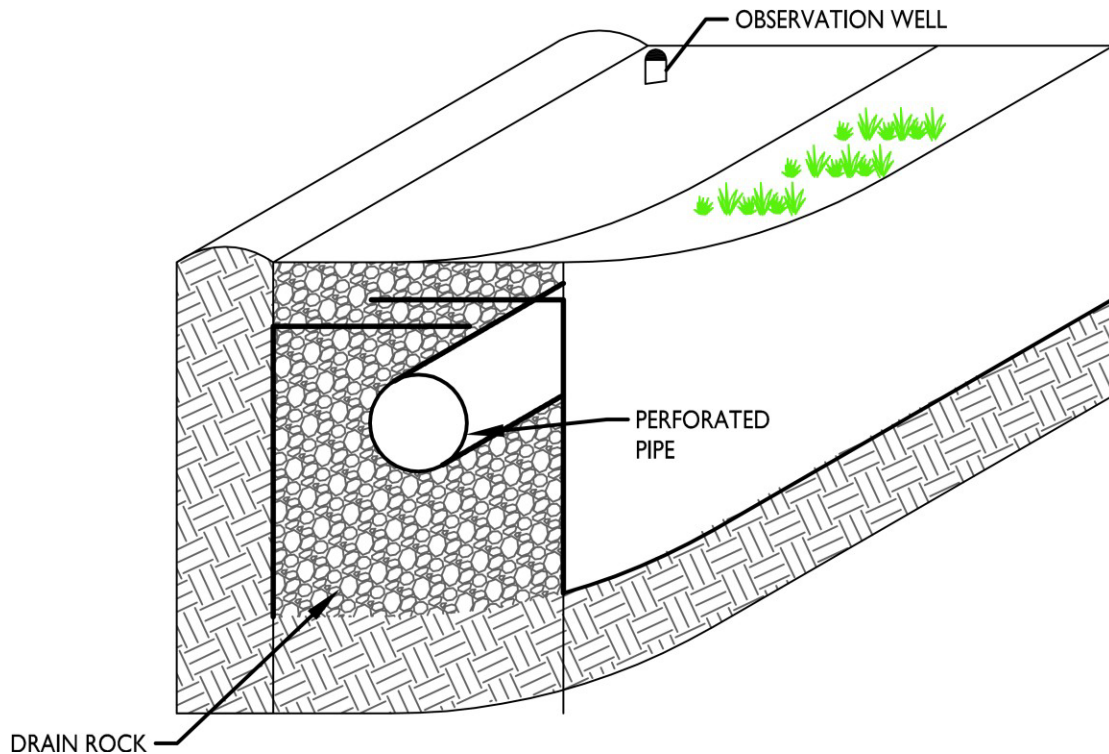
Grounds (Landscaping)			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Site	Trash or litter	Any trash and debris which exceed 1 cubic foot per 1,000 square feet (this is about equal to the amount of trash it would take to fill up one standard size office garbage can). In general, there should be no visual evidence of dumping.	Trash and debris cleared from site.
	Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to County personnel or the public.	Noxious and nuisance vegetation removed according to applicable regulations. No danger of noxious vegetation where County personnel or the public might normally be.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Grass/groundcover	Grass or groundcover exceeds 18 inches in height.	Grass or groundcover mowed to a height no greater than 6 inches.
Trees and Shrubs	Hazard	Any tree or limb of a tree identified as having a potential to fall and cause property damage or threaten human life. A hazard tree identified by a qualified arborist must be removed as soon as possible.	No hazard trees in facility.
	Damaged	Limbs or parts of trees or shrubs that are split or broken which affect more than 25% of the total foliage of the tree or shrub.	Trees and shrubs with less than 5% of total foliage with split or broken limbs.
		Trees or shrubs that have been blown down or knocked over.	No blown down vegetation or knocked over vegetation. Trees or shrubs free of injury.
		Trees or shrubs which are not adequately supported or are leaning over, causing exposure of the roots.	Tree or shrub in place and adequately supported; dead or diseased trees removed.

Infiltration Trench

A stormwater infiltration trench is a closed basin or an open-topped trench built by excavating below existing ground. Infiltration trenches temporarily store stormwater runoff during rain events. Infiltration trenches do not discharge to a downstream conveyance system or nearby surface water. Instead, infiltration trenches rely on the ability of the site's soils to infiltrate the stormwater into the ground.

Facility objects that are typically associated with an infiltration trench include:

- access road or easement
- fence, gate, and water quality sign
- bioswale
- sediment trap
- field inlet
- drywell



Key Operations and Maintenance Considerations

- Maintenance should be performed as indicated by routine inspections. The principal maintenance objective is to prevent clogging, which may lead to trench failure.
- Infiltration trenches and any pretreatment BMPs should be inspected after large storm events and any accumulated debris or material removed. A more thorough inspection of the trench should be conducted at least annually. Annual inspection should include monitoring the observation well (if one exists) to confirm that the trench is draining within the specified time.
- Monitor sediment buildup in the top foot of stone aggregate or the surface inlet on the same schedule as the observation well.
- Trenches with filter fabric should be inspected for sediment deposits by removing a small section of the top layer. If inspection indicates that the trench is partially or completely clogged, it should be restored to its design condition.
- The most common tools for cleaning infiltration trenches are hand tools to remove built-up sediments and the top layers of clogged infiltration media from the trench.

Infiltration Trench			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
General	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants, or other pollutants. Sheen, obvious oil, or other contaminants present. • Identify and remove source.	No contaminants or pollutants present.
	Sediment Depth (via Surface/ Observation Well Inspection)	Sediment depth greater than one foot above stone aggregate or the surface inlet or 20% of the pipe diameter.	No sediment in infiltration trench.
	Drainage Slow	Decreased capacity that indicates slow drainage. Does not meet facility design infiltration rate. The Water Quality Design Storm Volume does not infiltrate within 48 hours. Water remains in the trench for greater than 24 hours after the end of most moderate rainfall events.	Perforated drain pipe has been cleaned and drainage rates are per design specifications. (Do not allow removed sediment and water to discharge back into the storm sewer.)
	Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%.	No trash or debris located immediately in front of catch basin or on grate opening.

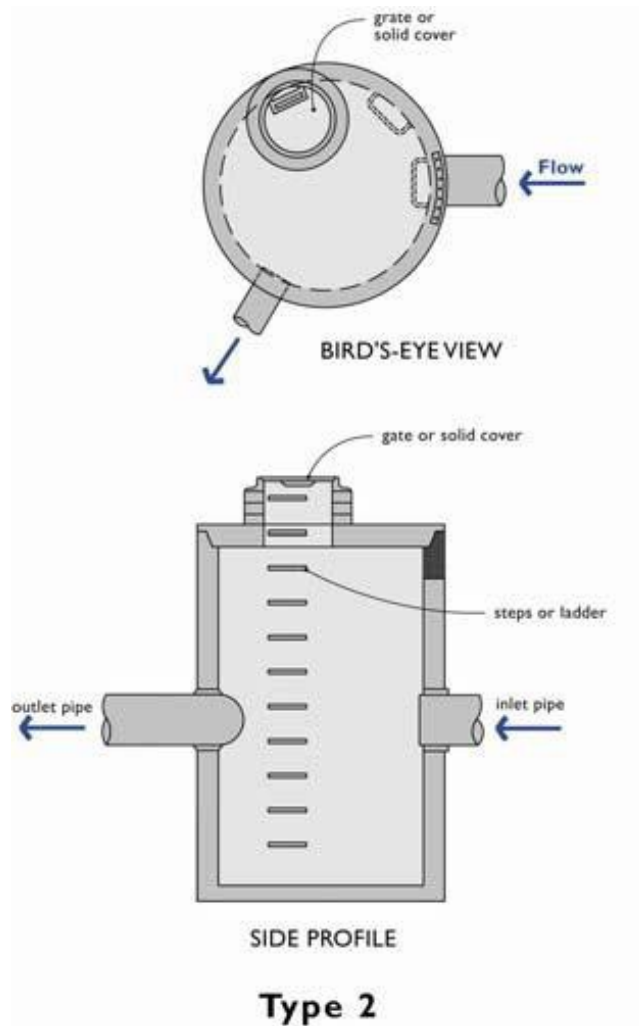
Manhole

A manhole is an underground concrete structure typically fitted with a slotted grate to collect stormwater runoff and route it through underground pipes. Manholes can also be used as a junction in a pipe system and may have a solid lid. A manhole is also known as a Type 2 catch basin.

Manholes are round concrete structures ranging in diameter from 4 feet to 8 feet. They are used when the connecting conveyance pipe is 18 inches or greater or the depth from grate to pipe bottom exceeds 5 feet. Manholes typically have steps mounted on the side of the structure to allow access.

Manholes typically provide a storage volume (sump) below the outlet pipe to allow sediments and debris to settle out of the stormwater runoff. Some manholes are also fitted with a spill control device (inverted elbow on outlet pipe) intended to contain large quantities of grease or oils.

Manholes are often associated with other stormwater facilities.



Key Operations and Maintenance Considerations

- The most common tool for cleaning manholes is a truck with a tank and vacuum hose (Vactor® truck) to remove sediment and debris from the sump.
- A manhole may be an enclosed space where harmful chemicals and vapors can accumulate. Therefore, if the inspection and maintenance requires entering a manhole, it should be conducted by an individual trained and certified to work in hazardous confined spaces.

Manhole			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Note: table spans multiple pages.			
General	Trash and Debris	Trash or debris which is located immediately in front of the opening or is blocking inletting capacity of the basin by more than 10%.	No trash or debris located immediately in front of manhole or on grate opening.
		Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe.	No trash or debris in the basin.
		Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	Inlet and outlet pipes free of trash or debris.
		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 the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the basin.
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into manhole.)	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached.	Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound.	Basin replaced or repaired to design standards.
		Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering manhole through cracks.	Pipe is regouted and secure at basin wall.

	Settlement/ Misalignment	Manhole has settled more than 1 inch or has rotated more than 2 inches out of alignment.	Manhole replaced or repaired to design standards.
	Vegetation Inhibiting System	Vegetation growing across and blocking more than 10% of the opening.	No vegetation blocking opening to manhole.
		Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation or root growth present.
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants, or other pollutants. Sheen, obvious oil, or other contaminants present. • Identify and remove source.	No contaminants or pollutants present.
Manhole Cover	Cover Not in Place	Cover is missing or only partially in place. Any open manhole is a safety hazard and requires immediate maintenance.	Manhole cover is closed.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread. One or more bolts are missing.	Mechanism opens with proper tools. All bolts are seated and no bolts are missing. Cover is secure.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure (Intent is to keep cover from sealing off access to maintenance).	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to manhole wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate Opening Unsafe	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% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.

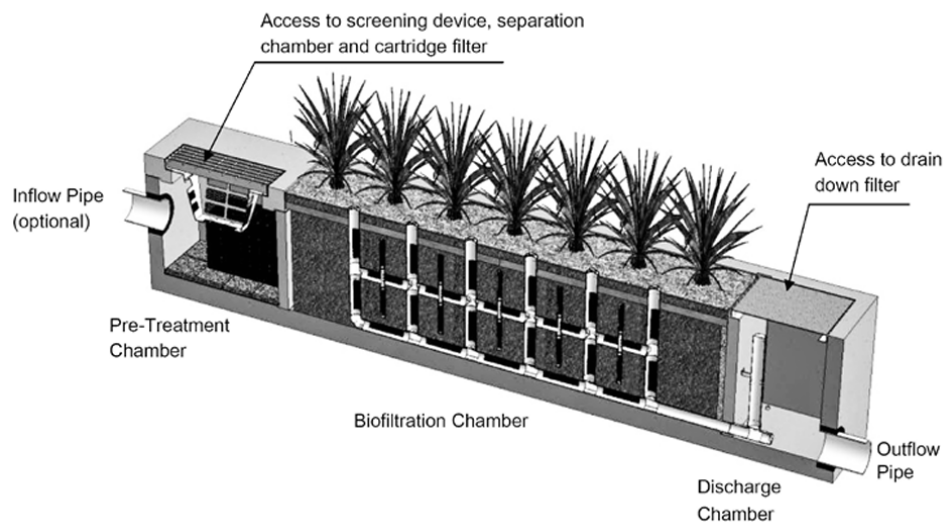
Modular Wetland Systems

Modular wetland systems are multi-stage, stormwater treatment systems that incorporate screening, sedimentation, filtration, adsorption, and biological remediation for removal of trash, floating and neutrally buoyant debris, suspended sediments, nutrients, heavy metals, and hydrocarbons from stormwater. Modular wetland systems typically consist of a settling chamber, a cartridge-based media pre-filter, a wetland filtration chamber, and an outlet chamber all housed in a precast concrete vault.



Example Modular Wetland System

(Source: Contech Engineered Solutions)



System Diagram

(Source: Contech Engineered Solutions)

Key Operations and Maintenance Considerations

- The most common tool for cleaning manufactured modular detention systems is a truck with a tank, vacuum hose, and pressure washer to remove sediment and debris.
 - Modular wetland systems are enclosed spaces where harmful chemicals and vapors can accumulate. Therefore, the inspection and maintenance of these facilities should be conducted by an individual trained and certified to work in hazardous confined spaces.
 - Cartridges require replacement when the individual cartridges no longer meet the specifications for pollutant removal.
 - Periodic inspections of the inlet and outlet areas to ascertain correct operation of the system.
 - Access and maintenance requirements and methods vary by type of system; some maintenance activities may be accomplished without human entry into the system. Check the manufacturer's publications and the site's maintenance plan for details.
-

Modular Wetland Systems			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
General	Missing or damaged internal component or cartridges	Missing or damaged internal component or cartridges	Internal components and cartridges installed properly and free from damage.
	Obstructed inlet or outlet	Accumulated of sediment and/or debris at inlet and/or outlet preventing the flow of stormwater.	Inlet and outlet free of sediment and debris.
	Poor Water Quality	Inspection of discharge water for obvious signs of poor water quality (i.e., obvious oil or other contaminants present).	Effluent discharge from outlet clear, without thick visible sheen.
	Damage – Includes Cracks in Walls and/or Bottom, Damage to Frame and/or Top Slab	Maintenance/inspection personnel determine that the unit is not structurally sound.	Unit replaced or repairs made such that unit meets design specifications and is structurally sound.
		Cracks wider than 1/2 inch at the joint of any inlet/outlet pipe or drain down pipe or evidence of soil particles entering through the cracks.	Unit repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe or drain down pipe.
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into unit.)	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached.	Frame is sitting flush on the riser rings or top slab and firmly attached.
	Other Defects Listed in Manufacturer Specifications or Maintenance Literature	Other damage or defects that prevent the system from functioning to design specifications.	Defects repaired/ corrected per manufacturer's documentation and/ or design specifications.
Pre-Treatment Chamber	Floatables	Accumulation of floatables in which the length and width of the chamber is fully impacted more than 18 inches.	Pre-treatment chamber free of floatables.
	Debris and Sediment	Accumulated sediment depth exceeds 6 inches in the pre-treatment chamber.	Storage area free of sediment and debris.
		Accumulation of sediment on the media housed within the pre-filter cartridges, when media is more than 85% clogged.	Media in pre-filter cartridges is free of sediment.

Modular Wetland Systems			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Discharge Chamber	Poor water level discharging	Water level in discharge chamber during full operating capacity (pre-treatment chamber water level at max height) is 20% lower or more than the highest discharge rate the system achieves.	Media in pre-filter cartridges is free of sediment.
Biofiltration Chamber	Vegetation	Vegetation dies or becomes unhealthy. Vegetation is overgrown or sparse.	Vegetation coverage restored and healthy.
		Nuisance plant species becomes abundant.	Nuisance plant species have been removed and desirable species should be planted in their place.
	Sediment and Debris in Wetland Media	Accumulation of sediment and debris in the wetland media.	Wetland media is free of sediment and debris.
Access Covers	Cover/lid not in place	Cover/lid is missing or only partially in place. Any open manhole requires immediate maintenance.	Manhole access covered.
	Locking mechanism not working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Mechanism opens with proper tools.
	Cover/lid difficult to remove	One maintenance person cannot remove cover/lid after applying 80 lbs. of lift.	Cover/lid can be removed and reinstalled by one maintenance person.

Modular Wetlands[®] Linear Operations & Maintenance Manual



MODULAR WETLANDS LINEAR OPERATION & MAINTENANCE MANUAL

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OVERVIEW

This operation and maintenance (O&M) manual is for the Modular Wetlands Linear Biofilter (MWL). Please read the instructions and equipment lists closely prior to starting. It is important to follow all necessary safety procedures associated with state and local regulations. Please contact Contech for more information on pre-authorized third-party service providers who can provide inspection and maintenance services in your area. For a list of service providers in your area, please visit www.conteches.com/maintenance.



WARNING

Confined space entry may be required. Contractor to obtain all equipment and training to meet applicable local and OSHA regulations regarding confined space entry. It is the Contractor's or entry personnel's responsibility to always proceed safely.

SAFETY NOTICE & PERSONAL SAFETY EQUIPMENT

Job site safety is a topic and a practice addressed comprehensively by others. The inclusions here are merely reminders to whole areas of Safety Practice that are the responsibility of the Owner(s), Manager(s), and Service Provider(s). OSHA and Canadian OSH, Federal, State/Provincial, and Local Jurisdiction Safety Standards apply on any given site or project. The knowledge and applicability of those responsibilities is the Service Provider's responsibility and outside the scope of Contech Engineered Solutions.



Safety Boots



Gloves



Hard Hat



Eye Protection

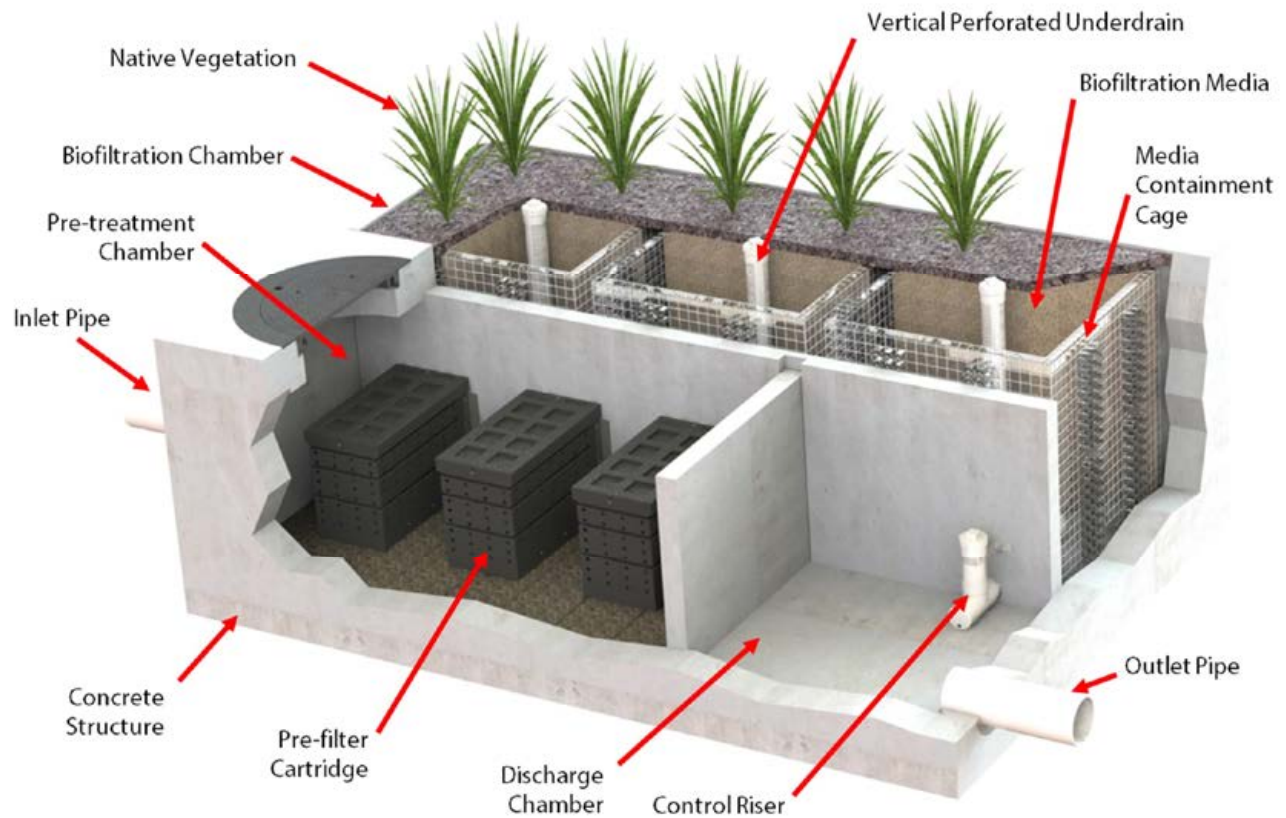


Maintenance and Protection
of Traffic Plan

MODULAR WETLANDS LINEAR COMPONENTS LIST

The MWL system comes in multiple sizes and configurations, including side by side or end to end layouts, both as open planters or underground systems. See shop drawings (plans) for project specific details.

The standard MWL system is comprised of the following components:



INSPECTION SUMMARY & EQUIPMENT LIST

Stormwater regulations require BMPs be inspected and maintained to ensure they are operating as designed to allow for effective pollutant removal and provide protection to receiving water bodies. It is recommended that inspections be performed multiple times during the first year to assess the site-specific loading conditions. The first year of inspections can be used to set inspection and maintenance intervals for subsequent years to ensure appropriate maintenance is provided.

- Inspect pre-treatment, biofiltration, and discharge chambers an average of once every six to twelve months. Varies based on site specific and local conditions.
- Average inspection time is approximately 15 minutes. Always ensure appropriate safety protocol and procedures are followed.

The following is a list of equipment required to allow for simple and effective inspection of the MWL:



Modular Wetlands Linear
Inspection Form



Flashlight



Tape Measure



Access Cover Hook



Ratchet
& 7/16" Socket
(if required for older pre-filter
cartridges that have two
bolts holding the lids on)

INSPECTION & MAINTENANCE NOTES

1. Following maintenance and/or inspection, it is recommended that the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.
2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.
3. Transport all debris, trash, organics, and sediments to approved facility for disposal in accordance with local and state requirements.
4. Entry into chambers may require confined space training based on state and local regulations.
5. No fertilizer shall be used in the biofiltration chamber.
6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may not require irrigation after initial establishment.

INSPECTION PROCESS

1. Prepare the inspection form by writing in the necessary information including project name, location, date & time, unit number and other information (see inspection form).
2. Observe the inside of the system through the access covers. If minimal light is available and vision into the unit is impaired, utilize a flashlight to see inside the system and all chambers.
3. Look for any out of the ordinary obstructions in the inflow pipe, pre-treatment chamber, biofiltration chamber, discharge chamber or outflow pipe. Write down any observations on the inspection form.
4. Through observation and/or digital photographs, estimate the amount of trash, debris accumulated in the pre-treatment chamber. Utilizing a tape measure or measuring stick, estimate the amount of sediment in this chamber. Record this depth on the inspection form.
5. Through visual observation, inspect the condition of the pre-filter cartridges. Look for excessive build-up of sediment on the cartridges, any build-up on the tops of the cartridges, or clogging of the holes. Record this information on the inspection form. The pre-filter cartridges can be further inspected by removing the cartridge tops and assessing the color of the BioMediaGREEN filter cubes (requires entry into pre-treatment chamber - see notes previous notes regarding confined space entry). Record the color of the material. New material is a light green color. As the media becomes clogged, it will turn darker in color, eventually becoming dark brown or black. The closer to black the media is the higher percentage that the media is exhausted and in need of replacement.



6. The biofiltration chamber is generally maintenance-free due to the system's advanced pre-treatment chamber. For units which have open planters with vegetation, it is recommended that the vegetation be inspected. Look for any plants that are dead or showing signs of disease or other negative stressors. Record the general health of the plants on the inspection form and indicate through visual observation or digital photographs if trimming of the vegetation is required.
7. The discharge chamber houses the control riser (if applicable), drain down filter (only in California - older models), and is connected to the outflow pipe. It is important to check to ensure the orifice is in proper operating condition and free of any obstructions. It is also important to assess the condition of the drain down filter media which utilizes a block form of the BioMediaGREEN. Assess in the same manner as the cubes in the pre-filter cartridge as mentioned above.
8. Finalize the inspection report for analysis by the maintenance manager to determine if maintenance is required.

MAINTENANCE INDICATORS

Based upon the observations made during inspection, maintenance of the system may be required based on the following indicators:

- Missing or damaged internal components or cartridges.
- Obstructions in the system or its inlet and/or outlet pipes.
- Excessive accumulation of floatables in the pre-treatment chamber in which the length and width of the chamber is fully impacted more than 18".
- Excessive accumulation of sediment in the pre-treatment chamber of more than 6" in depth.
- Excessive accumulation of sediment on the BioMediaGREEN media housed within the pretreatment cartridges. When media is more than 85% clogged, replacement is required. The darker the BioMediaGREEN, the more clogged it is and in need of replacement.
- Excessive accumulation of sediment on the BioMediaGREEN media housed within the drain down filter (California only - older models).
- Overgrown vegetation.

MAINTENANCE SUMMARY & EQUIPMENT LIST

The time has come to maintain your MWL. All necessary pre-maintenance steps must be carried out before maintenance occurs. Once traffic control has been set up per local and state regulations and access covers have been safely opened, the maintenance process can begin. It should be noted that some maintenance activities require confined space entry. All confined space requirements must be strictly followed before entry into the system. In addition, the following is recommended:

- Prepare the maintenance form by writing in the necessary information including project name, location, date & time, unit number and other info (see maintenance form).
- Set up all appropriate safety and maintenance equipment.
- Ensure traffic control is set up and properly positioned.
- Prepared pre-checks (OSHA, safety, confined space entry) are performed.
 - A gas meter should be used to detect the presence of any hazardous gases prior to entering the system. If hazardous gases are present, do not enter the vault. Following appropriate confined space procedures, take steps such as utilizing a venting system to address the hazard. Once it is determined to be safe, enter the system utilizing appropriate entry equipment such as a ladder and tripod with harness.

The following is a list of equipment required for maintenance of the MWL:



Modular Wetlands Linear
Maintenance Form



Flashlight



Access Cover Hook



Ratchet
& 7/16" Socket
(if required for older pre-filter
cartridges that have two
bolts holding the lids on)



Vacuum Assisted Truck with
Pressure Washer



Replacement
BioMediaGREEN
(If Required)

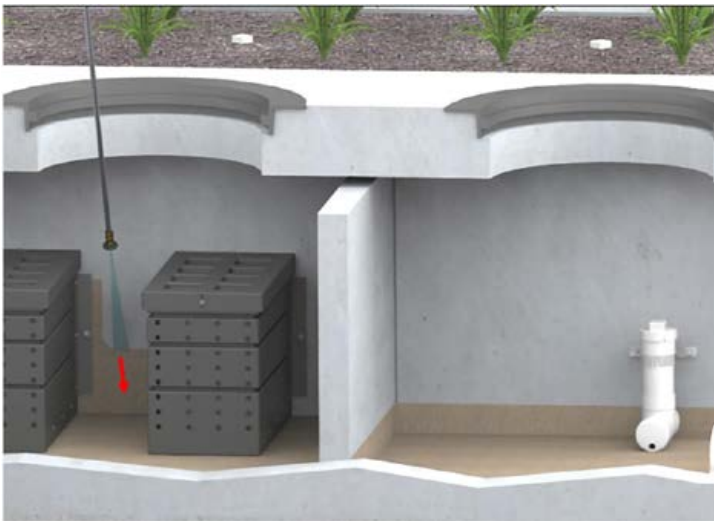
(order BioMediaGREEN from Contech's Maintenance Team members at <https://www.conteches.com/maintenance>)

MAINTENANCE INSTRUCTIONS



1. ACCESS COVER REMOVAL

Upon determining that the vault is safe for entry, remove all access cover(s) and position the vacuum truck accordingly.



2. PRESSURE WASH SYSTEM CHAMBERS

With the pressure washer, spray down pollutants accumulated on the walls and floors of the pre-treatment and discharge chambers. Then wash any accumulated sediment from the pre-filter cartridge(s).



3. VACUUM SYSTEM CHAMBERS

Vacuum out pre-treatment and discharge chambers and remove all accumulated pollutants including trash, debris, and sediments. Be sure to vacuum the pre-treatment floor until the pervious pavers are visible and clean. **(MWL systems outside of California may or may not have pervious pavers on the floor in the pre-treatment chamber)** If pre-filter cartridges require media replacement, proceed to **Step 4**. If not, replace the access cover(s) and proceed to **Step 7**.



4. PRE-FILTER CARTRIDGE LID REMOVAL

After successfully cleaning out the pre-treatment chamber, enter the chamber and remove the lid(s) from the pre-filter cartridge(s) by removing the two thumb screws. (Older pre-filter cartridges have two bolts holding the lids on that require a 7/16" socket to remove)



5. VACUUM EXISTING PRE-FILTER MEDIA

Utilize the vacuum truck hose or hose extension to remove the filter media from each of the individual media cages. Once filter media has been sucked out, use a pressure washer to spray down the inside of the cartridge and its media cages. Remove cleaned media cages and place to the side. Once removed, the vacuum hose can be inserted into the cartridge to vacuum out any remaining material near the bottom of the cartridge.



6. PRE-FILTER MEDIA REPLACEMENT

Reinstall media cages and fill with new media from the manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase. The easiest way to fill the media cages is to utilize a refilling tray that can also be sourced from the manufacturer. Place the refilling tray on top of the cartridge and fill with new bulk media shaking it down into the cages. Using your hands, lightly compact the media into each filter cage. Once the cages are full (each cartridge will hold five heaping 5gal buckets of bulk media), remove the refilling tray and replace the cartridge top, ensuring fasteners are properly tightened.



7. MAINTAINING VEGETATION

In general, the biofiltration chamber is maintenance-free with the exception of maintaining the vegetation. The MWL utilizes vegetation similar to surrounding landscape areas, therefore, trim vegetation to match surrounding vegetation. If any plants have died, replace them with new ones.



8. INSPECT UNDERDRAIN SYSTEM

Each vertical under drain on the biofiltration chamber has a removable threaded cap that can be taken off to check for any blockages or root growth. Once removed, a jetting attachment to the pressure washer can be used to clean out the under drain and orifice riser if needed.



9. REPLACE ACCESS COVERS

Once maintenance is complete, replace all access cover(s)

REPLACING BIOFILTRATION MEDIA IF REQUIRED

As with all biofilter systems, at some point the biofiltration media will need to be replaced, either due to physical clogging or sorptive exhaustion (for dissolved pollutants) of the media ion exchange capacity (to remove dissolved metals and phosphorous). The general life of this media is 10 to 20 years based on site specific conditions and pollutant loading, so replacing the biofiltration media should not be a common occurrence. In the event that the biofiltration media requires replacement, contact one of Contech's Maintenance Team members at <https://www.conteches.com/maintenance> to order new biofiltration media. The quantity of media needed can be determined by providing the model number and unit depth. Media will be provided in super sacks for easy installation. Each sack will weigh between 1,000 and 2,000 lbs. Biofiltration media replacement can be done following the steps below:



1. VACUUM EXISTING BIOFILTRATION MEDIA

Remove the mulch and vegetation to access the biofiltration media, and then position the vacuum truck accordingly. Utilize the vacuum truck to vacuum out all the media. Once all media is removed, use the pressure washer to spray down all the netting and underdrain systems on the inside of the media containment cage. Vacuum out any remaining debris after spraying down netting. Inspect the netting for any damage or holes. If the netting is damaged, it can be repaired or replaced with guidance by the manufacturer.



2. INSTALLING NEW BIOFILTRATION MEDIA

Ensure that the chamber is fully cleaned prior to installation of new media into the media containment cage(s). Media will be provided in super sacks for easy installation. A lifting apparatus (forklift, backhoe, boom truck, or other) is recommended to position the super sack over the biofiltration chamber. Add media in lifts to ensure that the riser pipes remain vertical. Be sure to only fill the media cage(s) up to the same level as the old media.



3. REPLANT VEGETATION

Once the media has been replaced, replant the vegetation and cover biofiltration chamber with approved mulch (if applicable). If the existing vegetation is not being reused, and new vegetation is being planted, you will need to acquire new plant establishment media that will be installed just below the mulch layer at each plant location. (see plan drawings for details). Contact one of Contech's Maintenance Team members at <https://www.conteches.com/maintenance> to order new plant establishment media.

REPLACING DRAIN DOWN FILTER MEDIA (ONLY ON OLDER CALIFORNIA MODELS)

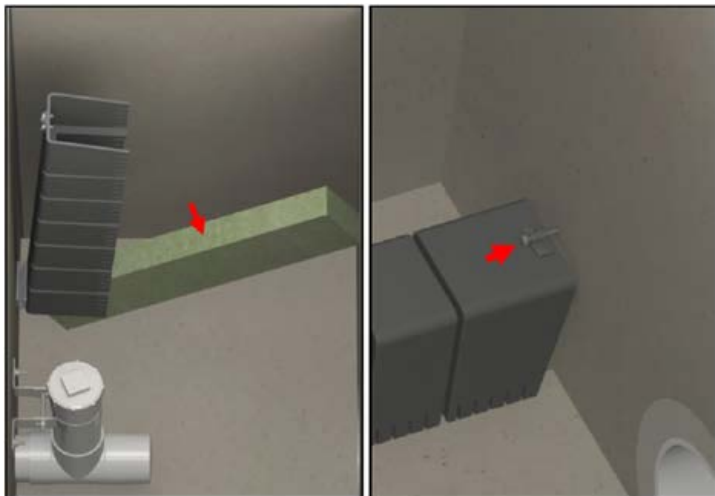
NOTE: The drain down filter is only found on units installed in California prior to 2023

If during inspection it was determined that the drain down filter media requires replacement, contact one of Contech's Maintenance Team members at <https://www.conteches.com/maintenance> to order new media.



1. REMOVE EXISTING DRAIN DOWN MEDIA

Pull knob back to unlock the locking mechanism and lift the drain down filter housing to remove the used BioMediaGREEN filter block.



2. INSTALL NEW DRAIN DOWN MEDIA

Ensure that the chamber and housing are fully cleaned prior to installation of new media, and then insert the new BioMediaGREEN filter block. The media filter block should fit snugly between the chamber walls and be centered under the filter housing. Lower the housing over the filter block and secure the locking mechanism.

[illegible]

Inspection Report Modular Wetlands Linear

Project Name _____		For Office Use Only (Reviewed By) _____ (Date) _____ Office personnel to complete section to the left.
Project Address _____ (city) (Zip Code)		
Owner / Management Company _____		
Contact _____	Phone () - _____	
Inspector Name _____	Date ____ / ____ / ____	Time ____ AM / PM
Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes		
Weather Condition _____		Additional Notes _____

Inspection Checklist

Modular Wetland System Type (Curb, Grate or UG Vault): _____ Size (22', 14' or etc.): _____

Structural Integrity:	Yes	No	Comments
Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)?			
Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly?			
Working Condition:			
Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit?			
Is there standing water in inappropriate areas after a dry period?			
Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system?			
Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber.			Depth: _____
Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber?			Chamber: _____
Any signs of improper functioning in the discharge chamber? Note issues in comments section.			
Other Inspection Items:			
Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)?			
Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below.			
Is there a septic or foul odor coming from inside the system?			

Waste:	Yes	No
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

Recommended Maintenance	
No Cleaning Needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes: _____



Cleaning and Maintenance Report Modular Wetlands Linear

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____

Phone () -

Inspector Name _____

Date ____ / ____ / ____ Time ____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint

☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____

Additional Notes _____

For Office Use Only
(Reviewed By)
(Date) Office personnel to complete section to the left.

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Total Debris Accumulation	Condition of Media 25/50/75/100 (will be changed @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat:	MWS Catch Basins						
	Long:							
		MWS Sedimentation Basin						
		Media Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

Comments:



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SUPPORT

DRAWINGS AND SPECIFICATIONS ARE AVAILABLE AT WWW.CONTECHES.COM

ModWetLinear OM Manual 03/24

Contech® CMP Detention Inspection and Maintenance Guide

Underground stormwater detention and infiltration systems must be inspected and maintained at regular intervals for purposes of performance and longevity.

Inspection

Inspection is the key to effective maintenance of CMP detention systems and is easily performed. Contech recommends ongoing, annual inspections. Sites with high trash load or small outlet control orifices may need more frequent inspections. The rate at which the system collects pollutants will depend more on-site specific activities rather than the size or configuration of the system.

Inspections should be performed more often in equipment washdown areas, in climates where sanding and/or salting operations take place, and in other various instances in which one would expect higher accumulations of sediment or abrasive/corrosive conditions. A record of each inspection is to be maintained for the life of the system.

Maintenance

CMP detention systems should be cleaned when an inspection reveals accumulated sediment or trash is clogging the discharge orifice. Accumulated sediment and trash can typically be evacuated through the manhole over the outlet orifice. If maintenance is not performed as recommended, sediment and trash may accumulate in front of the outlet orifice. Manhole covers should be securely seated following cleaning activities. Contech suggests that all systems be designed with an access/inspection manhole situated at or near the inlet and the outlet orifice. Should it be necessary to get inside the system to perform maintenance activities, all appropriate precautions regarding confined space entry and OSHA regulations should be followed.

Annual inspections are best practice for all underground systems. During this inspection if evidence of salting/de-icing agents is observed within the system, it is best practice for the system to be rinsed, including above the spring line soon after the spring thaw as part of the maintenance program for the system.

Maintaining an underground detention or infiltration system is easiest when there is no flow entering the system. For this reason, it is a good idea to schedule the cleanout during dry weather.

The foregoing inspection and maintenance efforts help ensure underground pipe systems used for stormwater storage continue to function as intended by identifying recommended regular inspection and maintenance practices. Inspection and maintenance related to the structural integrity of the pipe or the soundness of pipe joint connections is beyond the scope of this guide.



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CMP DETENTION SYSTEMS

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