The Art of LTOM/LTMA

Crafting Effective Manuals & Agreements

CARLA REGENER
CUYAHOGA SWCD

BRENT EYSENBACH
CUYAHOGA SWCD

Agenda

- Who is Cuyahoga SWCD?
- LTOM
  - What is it?
  - Key Components
  - Considerations
- LTMA
  - What is it?
  - History
  - Key Components

cuyahoga SOIL&WATER conservation district

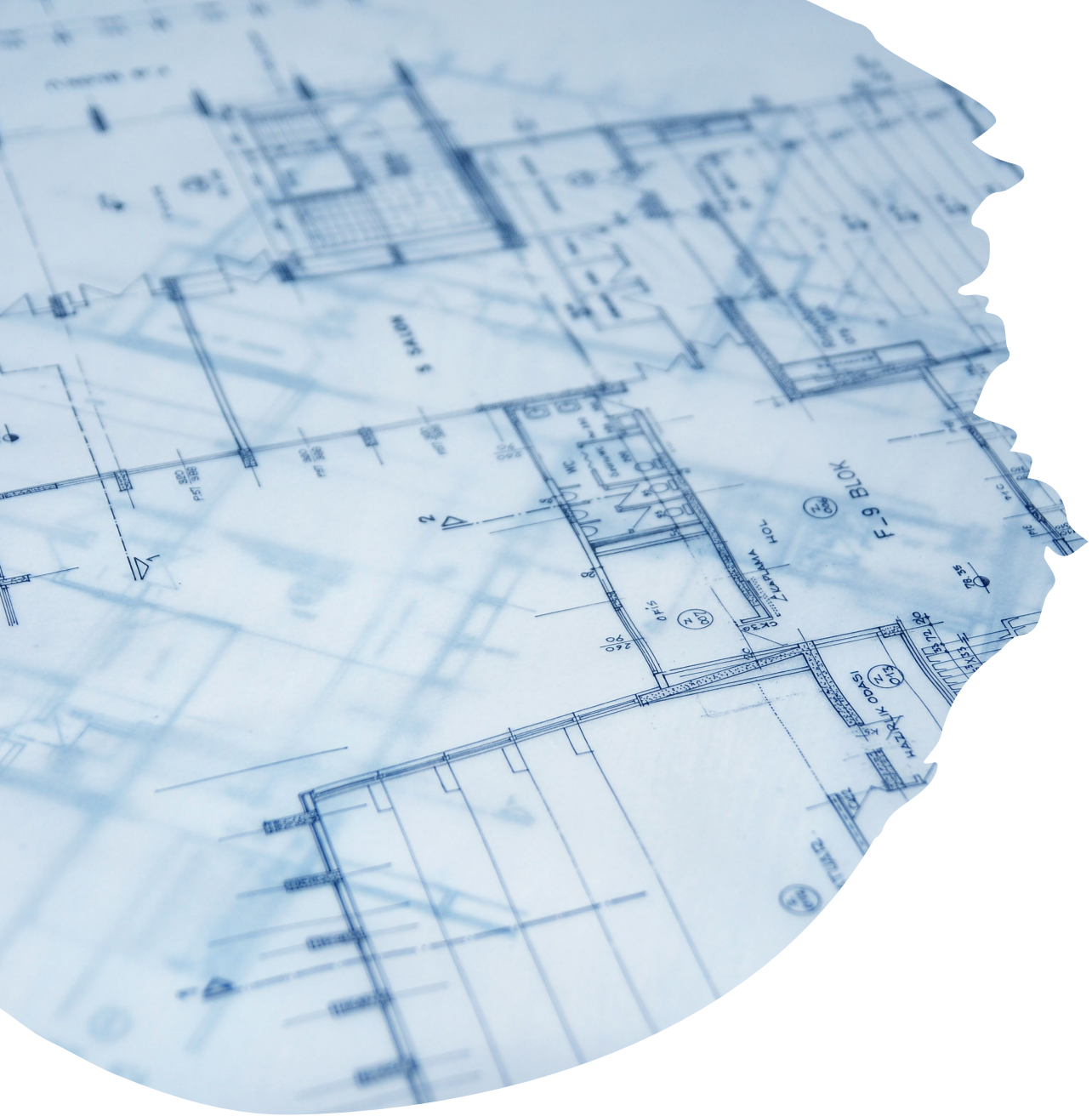
Mission: Implement programs and practices that protect and restore healthy soil and water resources.

Programs:

Watershed and Education – PIPE Activities (workshops, student & teacher education, tree plantings, native plant sales, stream restoration projects

Stormwater & Technical Services

- Active Construction – Plan Reviews, Site Inspections, Reporting
- Post-Construction – Inspections and Reporting
- Conservation Easement Monitoring
- Landowner Assistance



LTOM

LONG-TERM OPERATIONS & MAINTENANCE MANUAL

Audience Participation

- Engineers
- Community Officials
- Landscape Architects
- Site Contractors

- Maintenance Staff
- Landscape Contractor
- HOA Board Member

LTOM

What is it?

- Post-Construction Guidebook
- Stand Alone Document

Why do we need it?

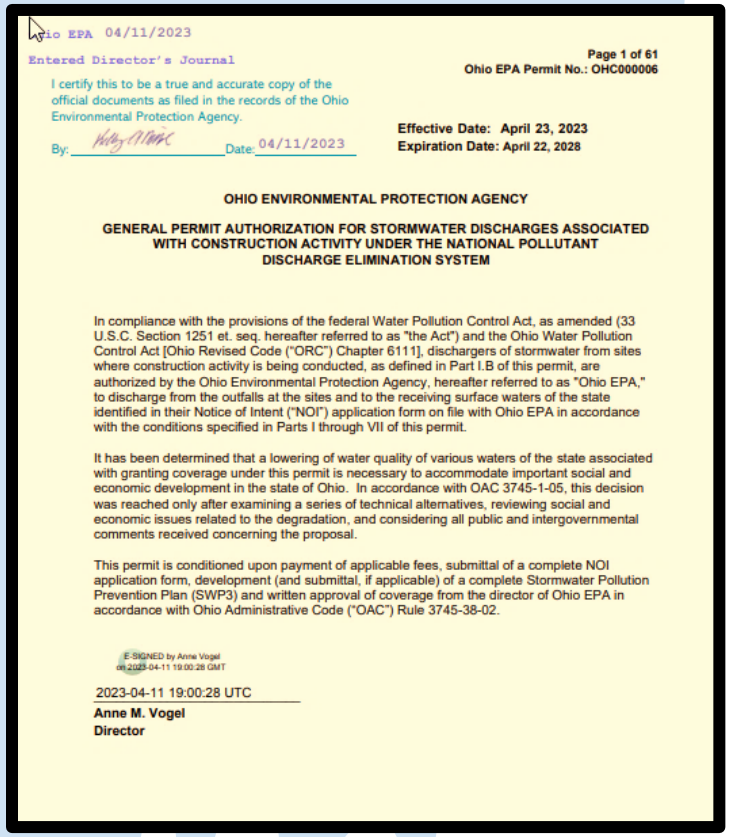
- No two systems are the same
- Provides Important Information
- Maintenance Staff Changes
- Reference for Larger Issues

Components of a good LTOM Manual

OEPA Permit Requires OHC000006

Stand-Alone Document

- Designate entity for stormwater inspection and maintenance responsibilities
- Routine and non-routine maintenance tasks
- Schedule for inspection
- Maintenance easements and agreements
- Construction drawings (plan, profile and details of outlet
- Map of access
- Elevations and volumes needed for sediment removal



io EPA 04/11/2023

Entered Director's Journal

I certify this to be a true and accurate copy of the official documents as filed in the records of the Ohio Environmental Protection Agency.

By: _____ Date: 04/11/2023

Page 1 of 61
Ohio EPA Permit No.: OHC000006

Effective Date: April 23, 2023
Expiration Date: April 22, 2028

OHIO ENVIRONMENTAL PROTECTION AGENCY

GENERAL PERMIT AUTHORIZATION FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the federal Water Pollution Control Act, as amended (33 U.S.C. Section 1251 et. seq. hereafter referred to as "the Act") and the Ohio Water Pollution Control Act [Ohio Revised Code ("ORC") Chapter 6111], dischargers of stormwater from sites where construction activity is being conducted, as defined in Part I.B of this permit, are authorized by the Ohio Environmental Protection Agency, hereafter referred to as "Ohio EPA," to discharge from the outfalls at the sites and to the receiving surface waters of the state identified in their Notice of Intent ("NOI") application form on file with Ohio EPA in accordance with the conditions specified in Parts I through VII of this permit.

It has been determined that a lowering of water quality of various waters of the state associated with granting coverage under this permit is necessary to accommodate important social and economic development in the state of Ohio. In accordance with OAC 3745-1-05, this decision was reached only after examining a series of technical alternatives, reviewing social and economic issues related to the degradation, and considering all public and intergovernmental comments received concerning the proposal.

This permit is conditioned upon payment of applicable fees, submittal of a complete NOI application form, development (and submittal, if applicable) of a complete Stormwater Pollution Prevention Plan (SWP3) and written approval of coverage from the director of Ohio EPA in accordance with Ohio Administrative Code ("OAC") Rule 3745-38-02.

E-SIGNED by Anne Vogel on 2023-04-11 19:00:28 GMT

2023-04-11 19:00:28 UTC

Anne M. Vogel
Director

Narrative

TELL THE STORY

- Identify the number of SCMs
- Identify the type of SCMs
  - Describe function
  - Description from SWMR
- Any unique features
  - OptiRTC
  - Turf Reinforced Matting
  - Custom Native Seed Mix

PROJECT DESCRIPTION AND DESIGN CRITERIA

The storm water management basins for the Harsax proposed building and parking have been designed based on the City of Middleburg Heights Storm Water Quantity Management Plan design requirements whereas the critical storm and all more frequent storm events shall be constrained to the 1-year pre-developed runoff rate and all less frequent post developed events shall be restricted to their correlating pre developed runoff rates. The existing site consists of brush and woods (type D soil) draining primarily to the offsite lake located to the south of the site. This portion of the site includes an existing 48" RCP storm sewer to convey onsite and offsite runoff to the lake. A new storm sewer is proposed to convey the 100-year storm event to the same location. The remainder of the drainage area discharges to existing offsite inlets located at the northwest portion of the site. Proposed Basin #1 discharges to the existing ditch to the lake while Basin #2 discharges to the existing northwest inlets with the use of a level spreader. The critical storm for each of the two discharge locations has been calculated.

The pre-developed areas (Type D soil) are shown below:

The pre-developed drainage area for the Harsax site:

-The pre-developed drainage area to the south (Colored orange, listed as subcatchment 1S), is 6.67 Acres (CN=78 & Tc=19.7 min.).

-The pre-developed drainage area to the north (Colored green, listed as subcatchment 2S), is 5.71 Acres (CN=78 & Tc=62.9 min.).

The post developed drainage area for the Harsax site:

-The post developed drainage area to Basin #1 (Colored red, listed as subcatchment 3S/9S and routed through 1P/11P), is 8.32 Acres (CN=95 & Tc =12.0 min.).

-The post developed undetained south drainage area (Colored purple, listed as subcatchment 5S/10S), is 0.83 Acres (CN=80 & Tc =12.0 min.).

-The post developed drainage area to Basin #2 (Colored blue, listed as subcatchment 4S/13S and routed through 2P/15P), is 3.07 Acres (CN=95 & Tc =12.0 min.).

-The post developed undetained north drainage area (Colored pink, listed as subcatchment 6S/14S), is 0.16 Acres (CN=80 & Tc =12.0 min.).

STORM ROUTING

HydroCAD Stormwater Modeling was used to perform the storm routing and the pond calculations. The increase in runoff from the pre-developed to the post developed conditions is addressed through the use of two wet extended detention basins.

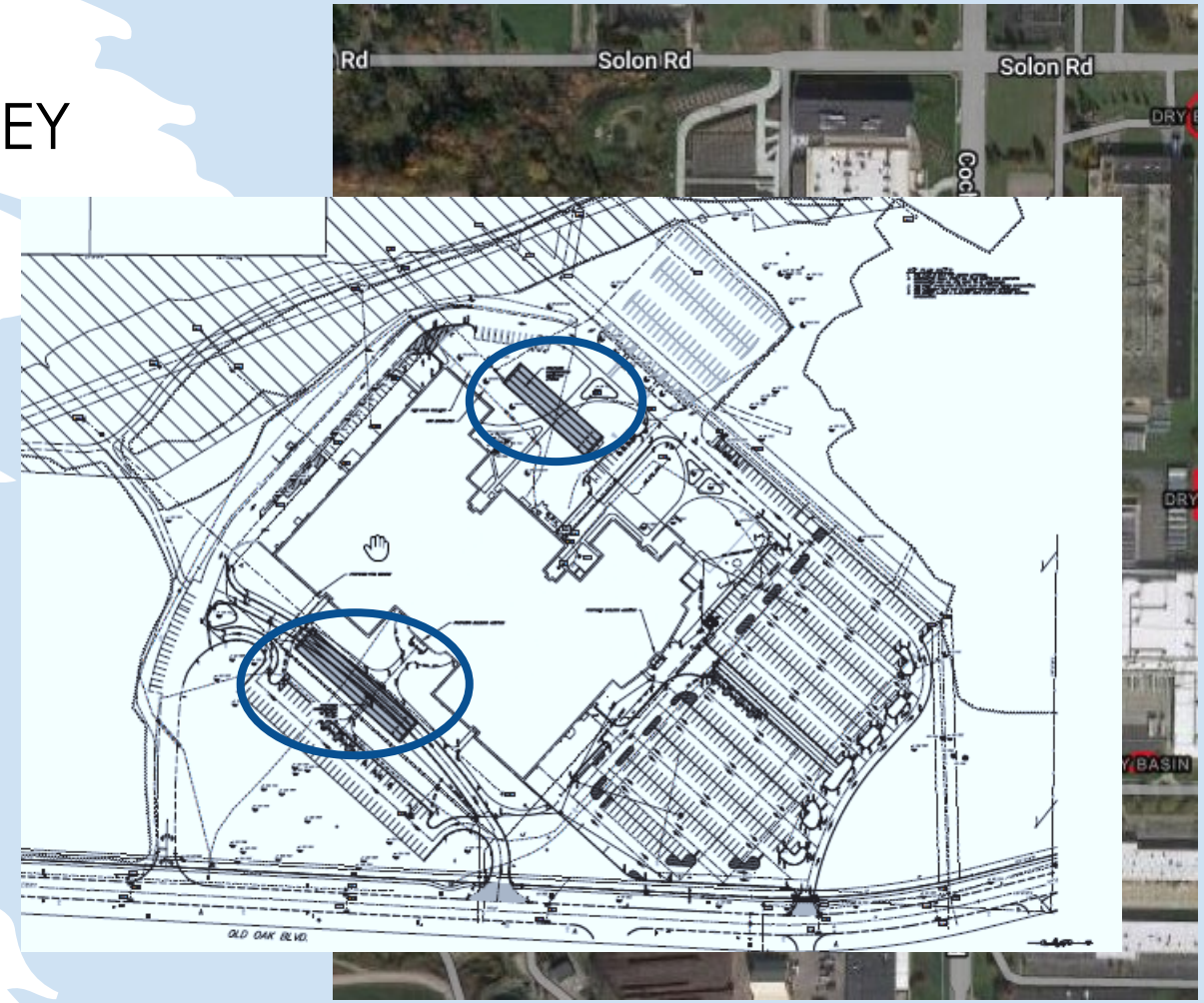
STORM WATER QUALITY

Water Quality (WQ) will be addressed by means of SWM Basins fit with the appropriate WQ orifice. The WQ orifice will account for the drainage area and storage volume for the basins.

Maps

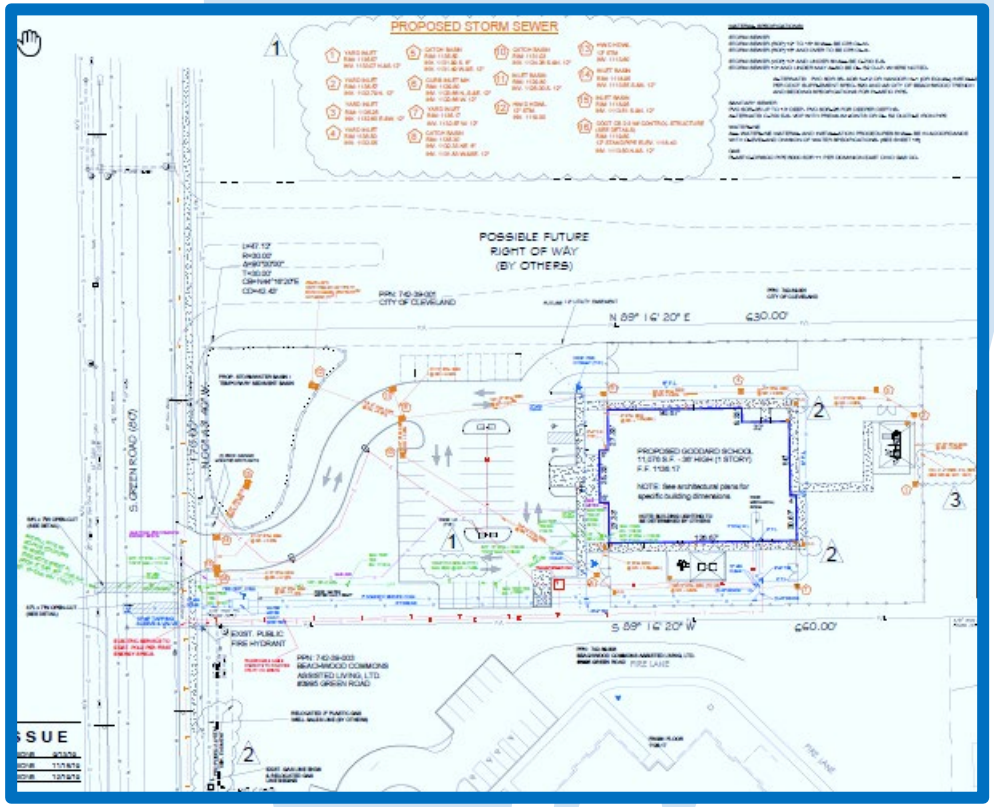
USE IMAGES TO CONVEY INFORMATION

- Identify the location of each SCM
- Identify access roads to the practice/easements
- Include drainage area maps to show size of watershed
- Enlarged Images to show detail



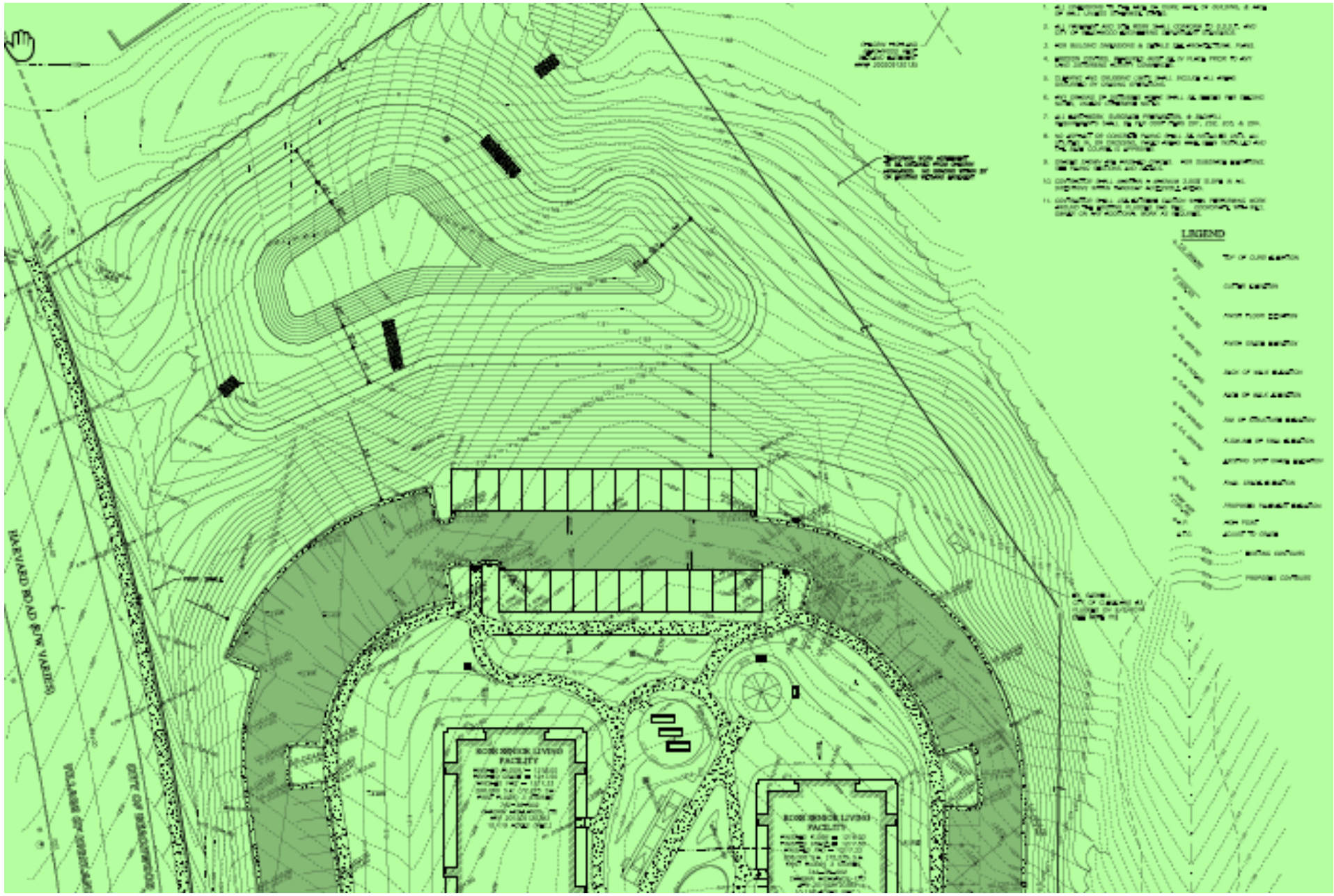
Utility Plans

- SHOW PIPE CONNECTIONS
- SHOW INVERT ELEVATIONS
- HOW IS WATER FLOWING INTO AND OUT OF THIS PRACTICE



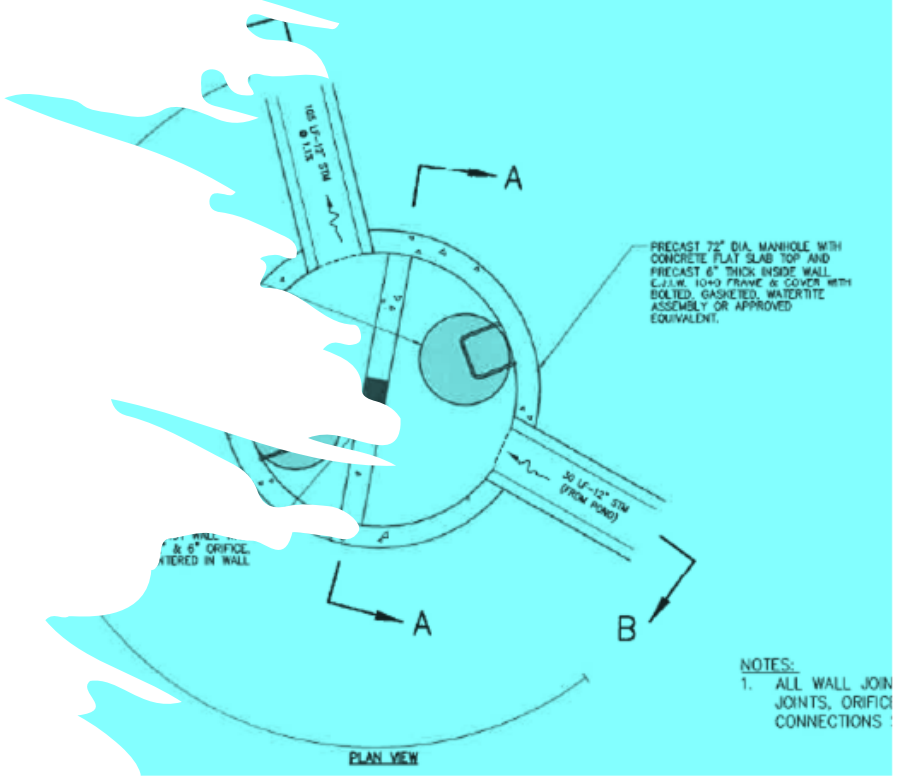
Grading Plans

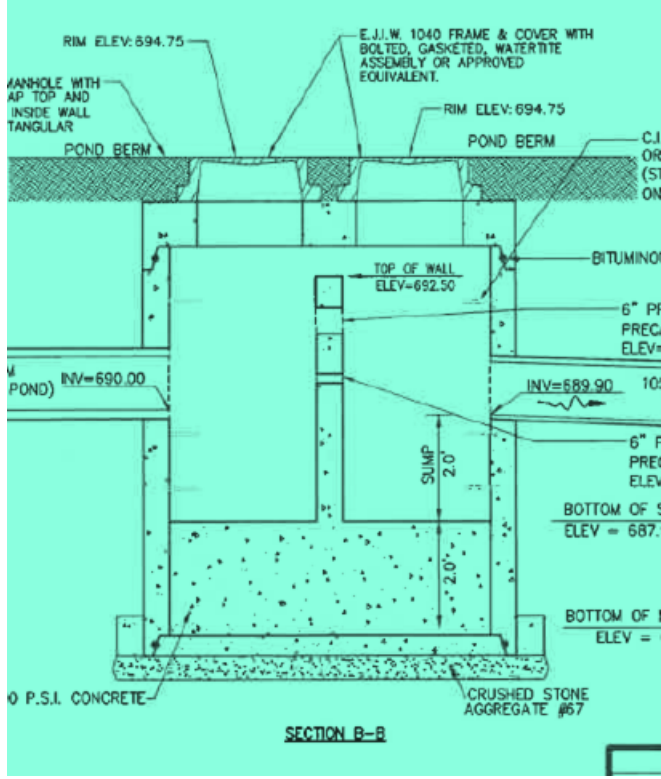
- Show elevations
  - Bottom of Basin
  - Side Slopes
  - Drainage Paths

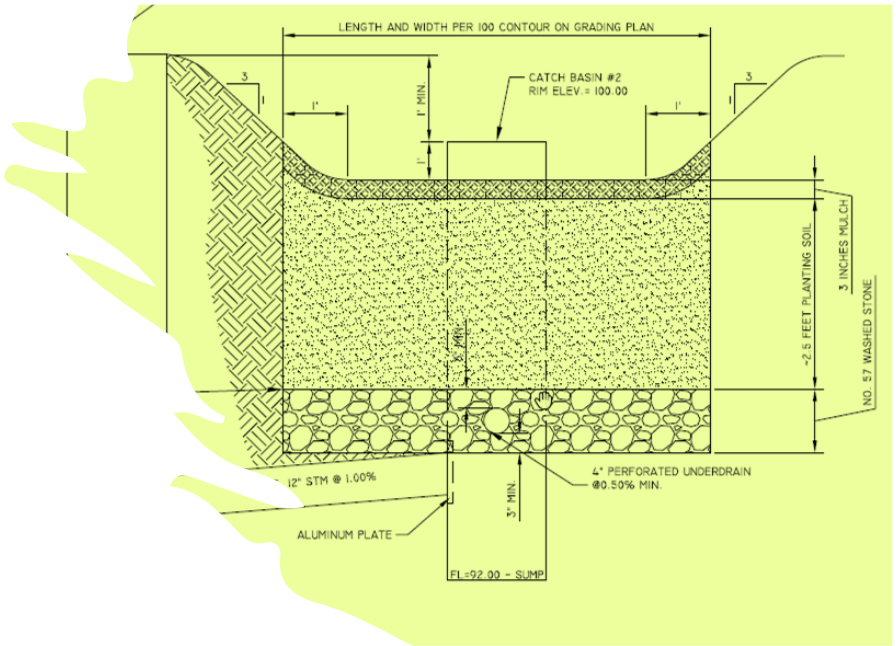

LEGEND
HARVARD ROAD R/W VARIES

Design Details

- Outlet Structure
- Profiles
  - Bioretention Layers
  - Permeable Pavement
  - Green Roof
- Emergency Spillway
- Rock Outlet Protection
- Curb Cut
- Material Selection



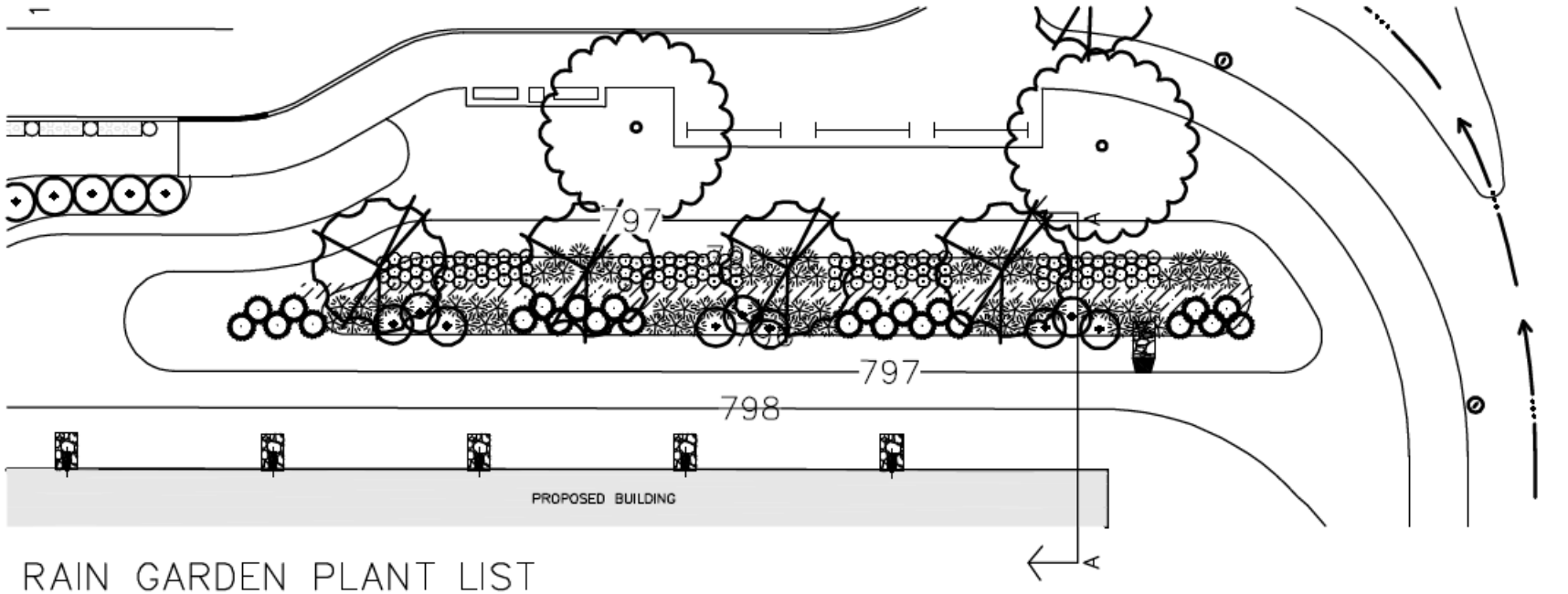




Landscape Plans

- Location of Native plantings/seeding
- Details on species used in native seed mixes
- Photos of native plants or show label or flagging used to indicate intentional plantings
- Limit the variety of 3 to 5 plant types

VD	Viburnum dentatum 'Rastzam'	Raspberry



RAIN GARDEN PLANT LIST

Symbol	Botanical Name	Common Name	Qty.	Size	Condition
	Mertensia virginica	Virginia Bluebells	277	No. 1	Cont.
	Aquilegia canadensis Biedrmeier	Columbine	119	No. 1	Cont.
	Osmunda cinnamomea	Cinnamon Fern	70	No. 1	Cont.
	Cornus alba 'Snow Pearls'	Snow Pearls Dogwood	24	No. 3	Cont.
	Viburnum dentatum 'Rastzam'	Raspberry Tart Viburnum	9	No. 5	Cont.
	Amelanchier canadensis	Shadblow Serviceberry	4	6'	B&B

A3
L-101

RAIN GARDEN ENLARGMENT

1"=20'


WHAT IS A WETLAND?

Routine Maintenance

- MONTHLY CHECKLIST
- NOTE TO CHECK PRACTICE AFTER LARGE RAIN EVENTS
- IDENTIFY AREAS TO TRIM BACK VEGETATION
- REMOVE CLIPPINGS (OR USE A MULCHING BLADE)
- SURVEY FOR EROSION
- REMOVE SEDIMENT ACCUMULATION OR DEBRIS
- SURVEY FOR PONDING WATER (INFILTRATION PRACTICES)
- LIFT MANHOLE AND/OR OBSERVATION PORT
- VISUALLY CHECK DEPTH OF MULCH
- SURVEY PLANTS
  - Trim dead/dying/overgrown vegetation
  - Water
  - Fertilize (slow release) – Green Roof Only

Non-Routine Maintenance

- SEDIMENT ACCUMULATION
  - Dredging
  - Regenerative Air Sweeping
  - Hydro Vac
- OVERGROWN VEGETATION
- EROSION
- SPECIALIZED SOIL REPLACEMENT
- PLANT REPLACEMENT
- DAMAGED INFRASTRUCTURE

Maintaining Stormwater Control Measures

Guidance for Private Owners & Operators

MAINTENANCE REQUIRED WHEN:

- Standing water is visible 48 hours after a rain event.
- Erosion is visible within the bioretention area, or on the slopes and inlets leading into the bioretention area.
- Vegetation, sediment or debris is blocking inlets or outlets.
- Vegetation is wilting, discolored, or dying.
- Foul odors present.
- Sediment has accumulated over the mulch or soil media.

Bioretention

Permeable Pavement

MAINTENANCE REQUIRED WHEN:

- Standing water is visible on the surface after a rain event.
- Significant amounts of sediment and/or debris have accumulated on the pavement surface or in PICP joints creating clogging issues.
- Vegetation found growing between PICP joints.
- Deterioration of porous asphalt or pervious concrete pavement surface that generates fine sediments which lead to clogging issues.
- For PICP, gravel between pavers is missing.

Dry Pond or Dry Extended Detention Basin

Routine Maintenance:

- Outlet Structures: Keep outlets such as principle spillway pipe, water quality orifice pipe and emergency spillway free from blockage by sediment, debris, or trash.
- Dam/Embankment: Mow grassed dam and embankment of dry pond to prevent establishment of woody vegetation.
- Erosion and Scour: Repair soil erosion or scouring on the side slopes leading into the dry pond or within the bottom or forebay of the dry pond.
- Vegetation Management: Remove woody vegetation from ponding area of dry pond.
- Sediment and Debris: Remove accumulated sediment, debris and trash from the dry pond forebay, low flow channel and ponding area. Remove sediments when accumulation reaches 6 inches in depth.

Non-Routine Maintenance:

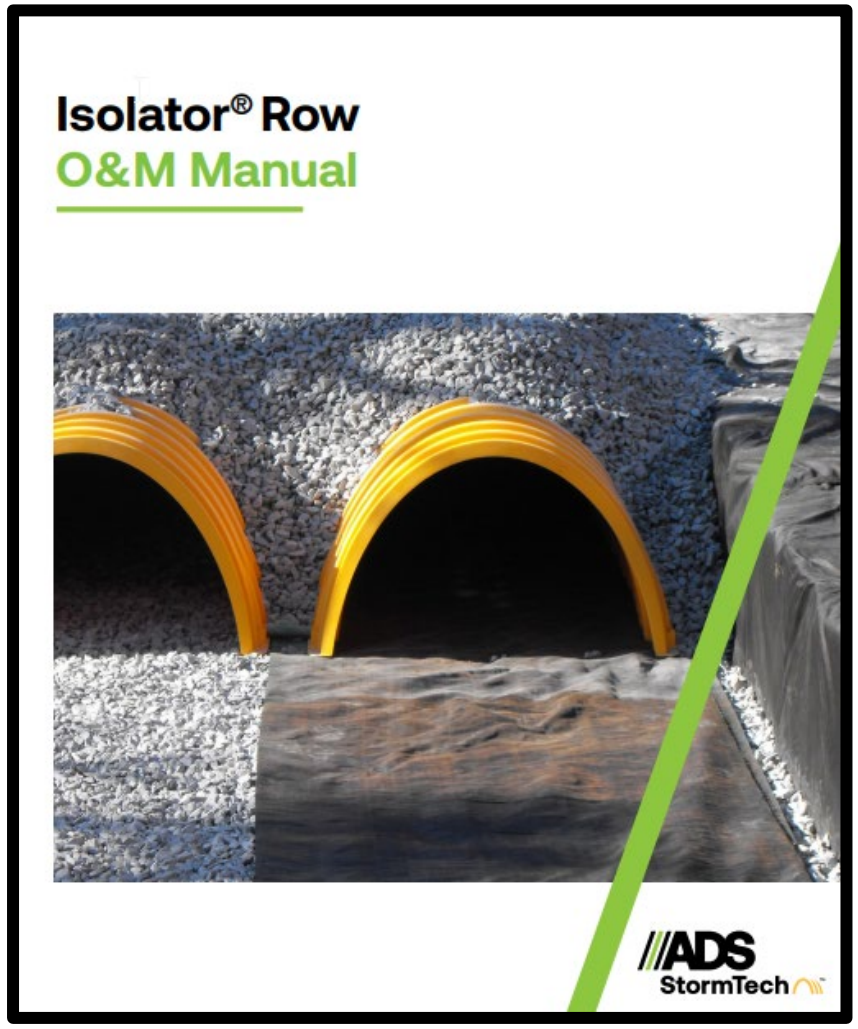
- Excessive Sediment: Remove sediment accumulation from the ponding area prior to 25 percent of the ponding storage volume being lost within the dry pond.
- Invasive Vegetation: Treat and remove invasive vegetation from ponding area, side slopes and emergency spillway.
- Outlet Structure: Repair or replace damaged outlet structure.
- Erosion Protection: Repair or replace riprap or stone protection at pipe inlets, pipe outlets or emergency spillway.
- Dam/Embankment: Seek professional consultation if seepage or leaks appear during ponding or erosion is discovered on the dam or embankment of the dry pond.

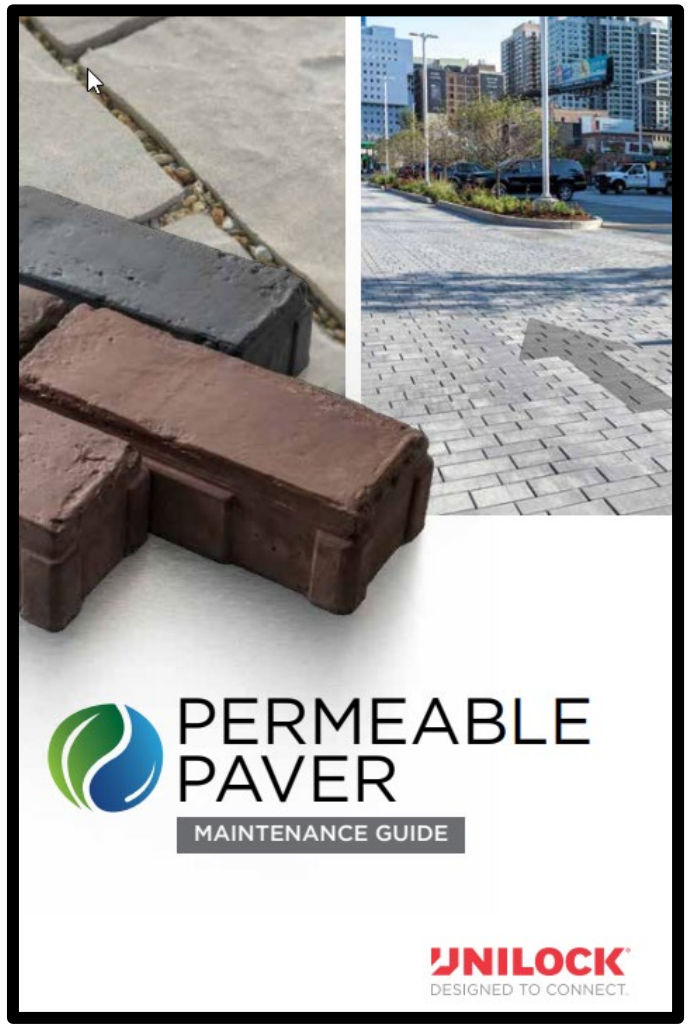
Wet Pond or Wet Extended Detention Basin Inspection and Maintenance Checklist

Facility:			
Location/Address:			
Date:	**Time:**	**Weather Conditions:**	**Date of Last Inspection:**
Inspector:		**Title:**	
Rain in Last 48 Hours □ **Yes** □ **No**		**If yes, list amount and timing:**	
Pretreatment: □ **vegetated filter strip** □ **swale** □ **forebay** □ **other, specify:**			
Site Plan or As-Built Plan Available: □ **Yes** □ **No**			

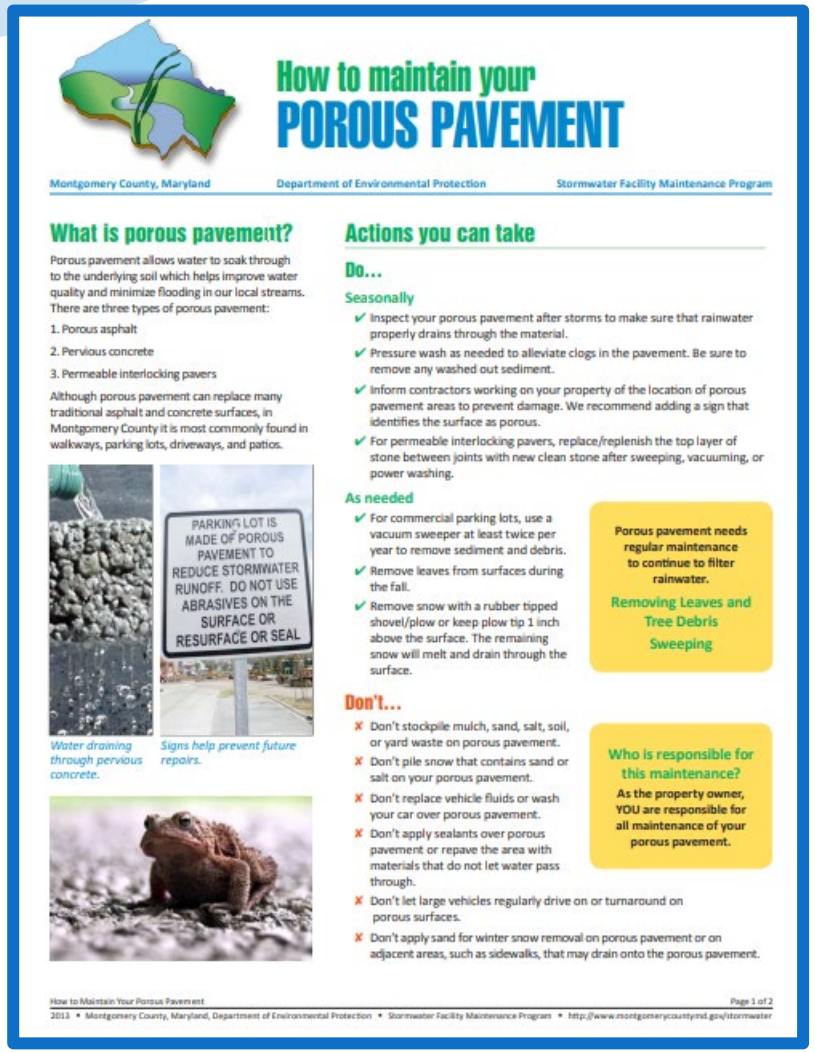
Inspection Item		Comment	Action Needed
1. PRETREATMENT			
Sediment has accumulated.	☐Yes ☐No ☐N/A		☐Yes ☐No
Trash and debris have accumulated.	☐Yes ☐No ☐N/A		☐Yes ☐No
2. DEWATERING			
The water quality orifice is visible.	☐Yes ☐No ☐N/A		☐Yes ☐No
3. INLETS			
Inlets are in poor structural condition.	☐Yes ☐No ☐N/A		☐Yes ☐No
Sediment has accumulated and/or is blocking the inlets.	☐Yes ☐No ☐N/A		☐Yes ☐No
Erosion is occurring around the inlets.	☐Yes ☐No ☐N/A		☐Yes ☐No
3. EMBANKMENT			
Sinkholes, cracks or seeps are visible in the embankment.	☐Yes ☐No ☐N/A		☐Yes ☐No
Trees or woody vegetation present on the dam or embankment.	☐Yes ☐No ☐N/A		☐Yes ☐No
4. BASIN PERMANENT POOL			
Trash and debris have accumulated.	☐Yes ☐No ☐N/A		☐Yes ☐No
Sediment has accumulated and reduced pool volume.	☐Yes ☐No ☐N/A		☐Yes ☐No

Manufacture Specific Literature





Other Resources



How to maintain your
POROUS PAVEMENT

Montgomery County, Maryland | Department of Environmental Protection | Stormwater Facility Maintenance Program

What is porous pavement?

Porous pavement allows water to soak through to the underlying soil which helps improve water quality and minimize flooding in our local streams. There are three types of porous pavement:

1. Porous asphalt
2. Pervious concrete
3. Permeable interlocking pavers

Although porous pavement can replace many traditional asphalt and concrete surfaces, in Montgomery County it is most commonly found in walkways, parking lots, driveways, and patios.

Water draining through pervious concrete. *Signs help prevent future repairs.*

Actions you can take

Do...

Seasonally

- ✔ Inspect your porous pavement after storms to make sure that rainwater properly drains through the material.
- ✔ Pressure wash as needed to alleviate clogs in the pavement. Be sure to remove any washed out sediment.
- ✔ Inform contractors working on your property of the location of porous pavement areas to prevent damage. We recommend adding a sign that identifies the surface as porous.
- ✔ For permeable interlocking pavers, replace/replenish the top layer of stone between joints with new clean stone after sweeping, vacuuming, or power washing.

As needed

- ✔ For commercial parking lots, use a vacuum sweeper at least twice per year to remove sediment and debris.
- ✔ Remove leaves from surfaces during the fall.
- ✔ Remove snow with a rubber tipped shovel/plow or keep plow tip 1 inch above the surface. The remaining snow will melt and drain through the surface.

Porous pavement needs regular maintenance to continue to filter rainwater.

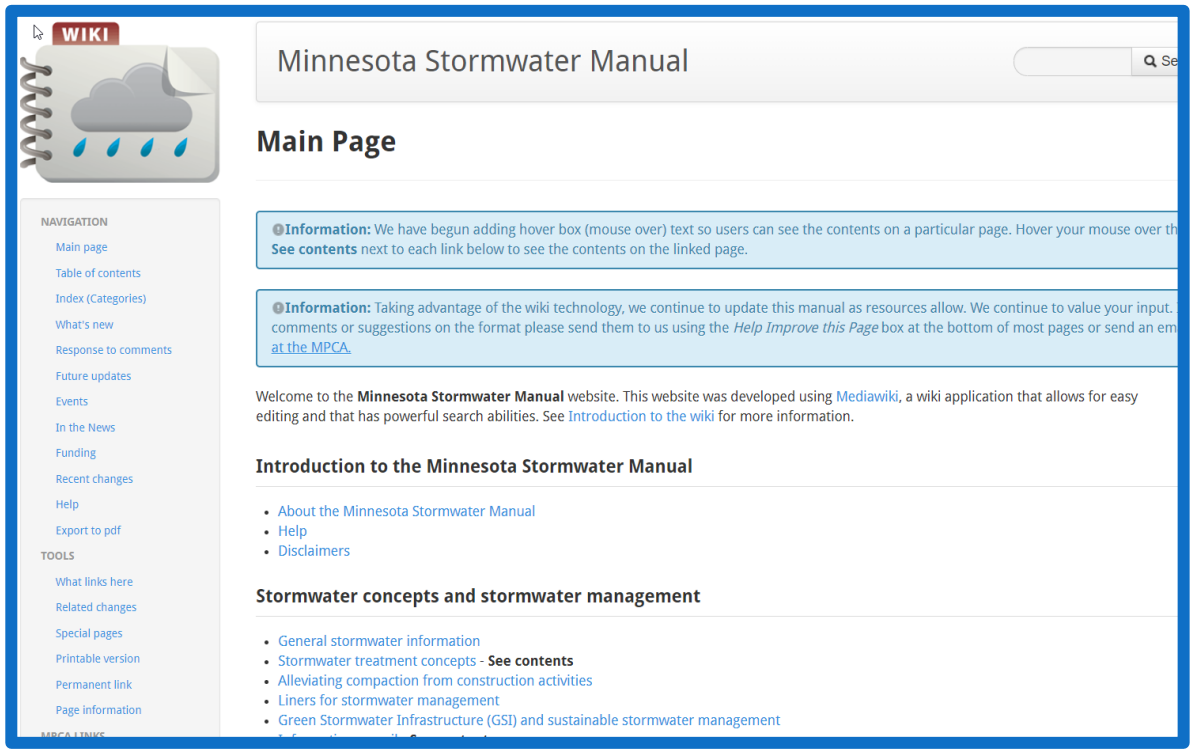
Removing Leaves and Tree Debris
Sweeping

Don't...

- ✘ Don't stockpile mulch, sand, salt, soil, or yard waste on porous pavement.
- ✘ Don't pile snow that contains sand or salt on your porous pavement.
- ✘ Don't replace vehicle fluids or wash your car over porous pavement.
- ✘ Don't apply sealants over porous pavement or repave the area with materials that do not let water pass through.
- ✘ Don't let large vehicles regularly drive on or turnaround on porous surfaces.
- ✘ Don't apply sand for winter snow removal on porous pavement or on adjacent areas, such as sidewalks, that may drain onto the porous pavement.

Who is responsible for this maintenance?

As the property owner, YOU are responsible for all maintenance of your porous pavement.



WIKI

Minnesota Stormwater Manual

Main Page

NAVIGATION
- Main page
- Table of contents
- Index (Categories)
- What's new
- Response to comments
- Future updates
- Events
- In the News
- Funding
- Recent changes
- Help
- Export to pdf

TOOLS
- What links here
- Related changes
- Special pages
- Printable version
- Permanent link
- Page information

Information: We have begun adding hover box (mouse over) text so users can see the contents on a particular page. Hover your mouse over th **See contents** next to each link below to see the contents on the linked page.

Information: Taking advantage of the wiki technology, we continue to update this manual as resources allow. We continue to value your input. comments or suggestions on the format please send them to us using the *Help Improve this Page* box at the bottom of most pages or send an em at the MPCA.

Welcome to the **Minnesota Stormwater Manual** website. This website was developed using Mediawiki, a wiki application that allows for easy editing and that has powerful search abilities. See Introduction to the wiki for more information.

Introduction to the Minnesota Stormwater Manual

- About the Minnesota Stormwater Manual
- Help
- Disclaimers

Stormwater concepts and stormwater management

- General stormwater information
- Stormwater treatment concepts - **See contents**
- Alleviating compaction from construction activities
- Liners for stormwater management
- Green Stormwater Infrastructure (GSI) and sustainable stormwater management

Numbers

- Calculations
  - Water Quality Volume
- Volume of stormwater treated/detained
  - Bottom Elevation
  - Depths of Forebays and Micropools
  - Depth of pool or NWL (Wet Basin)
  - Emergency spillway elevations
  - Dredge Elevations/Volumes

Other Items to Consider

- REVIEW THE DOCUMENT AT THE END OF THE PROJECT AND UPDATE IT
  - Amendments
- TRANSITION MEETING
  - Builders
  - Maintainers
  - Regulators

Other Items to Consider

- IDENTIFY LONG-TERM COSTS AND A GENERAL BUDGET
- LIST ITEMS
  - Type of Bioretention Soil
  - Type of paver
  - Type of specialized seed
- LIST MANUFACTURER
- LIST COST
- ITEMS TO BUDGET FOR IN FUTURE
  - Rock
  - Dredging
  - Grading

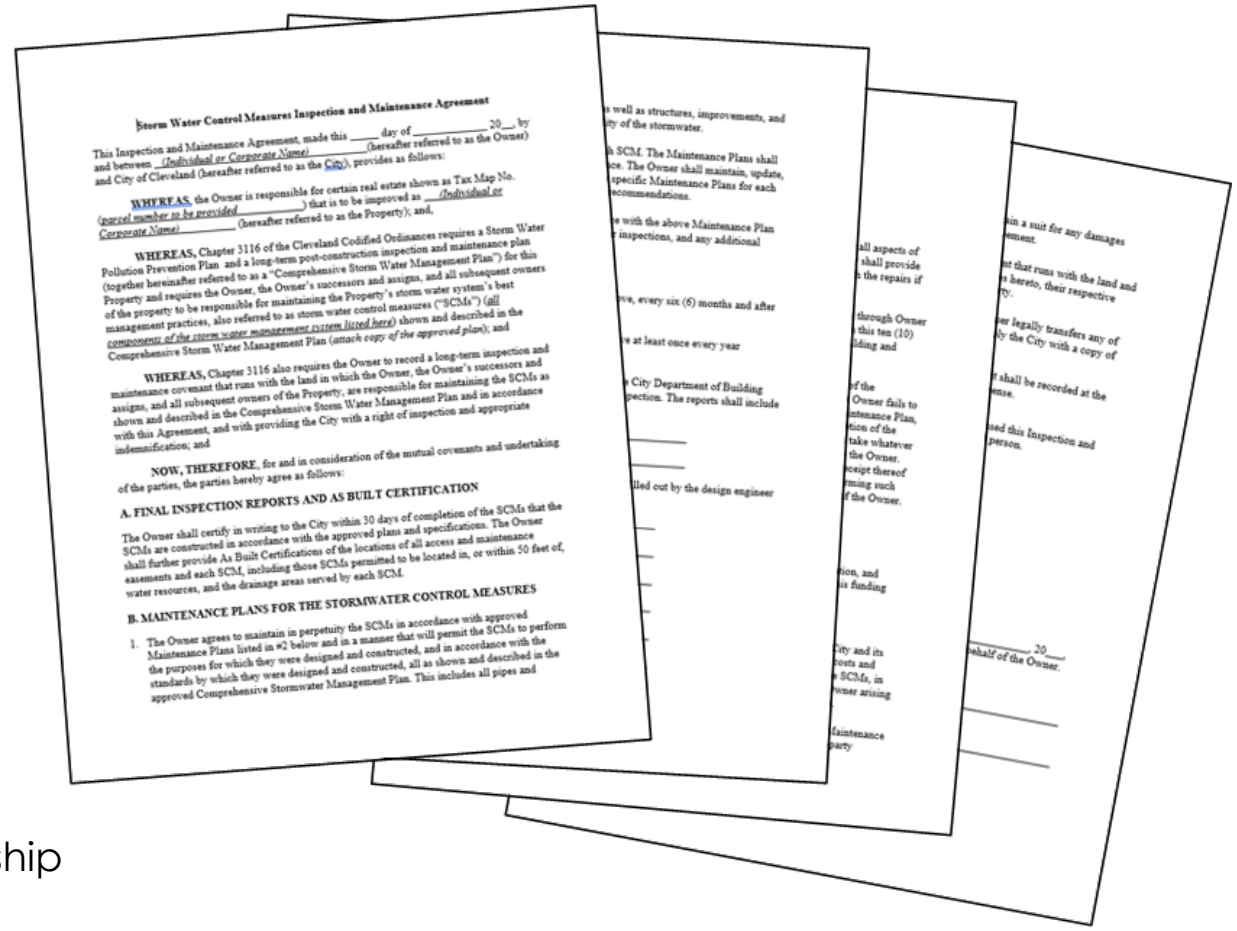
LTMA

LONG-TERM MAINTENANCE AGREEMENT

LTMA

What is it?

- Legal Agreement
- Contract
- Often tied to the Deed



Storm Water Control Measures Inspection and Maintenance Agreement

This Inspection and Maintenance Agreement, made this _____ day of _____, 20__, by and between *(Individual or Corporate Name)* _____ (hereafter referred to as the Owner) and City of Cleveland (hereafter referred to as the City), provides as follows:

WHEREAS, the Owner is responsible for certain real estate shown as Tax Map No. *(parcel number to be provided)* _____ that is to be improved as *(Individual or Corporate Name)* _____ (hereafter referred to as the Property); and,

WHEREAS, Chapter 3116 of the Cleveland Codified Ordinances requires a Storm Water Pollution Prevention Plan and a long-term post-construction inspection and maintenance plan (together hereinafter referred to as a "Comprehensive Storm Water Management Plan") for this Property and requires the Owner, the Owner's successors and assigns, and all subsequent owners of the property to be responsible for maintaining the Property's storm water system's best management practices, also referred to as storm water control measures ("SCMs") *(all components of the storm water management system listed here)* shown and described in the Comprehensive Storm Water Management Plan (*attach copy of the approved plan*); and

WHEREAS, Chapter 3116 also requires the Owner to record a long-term inspection and maintenance covenant that runs with the land in which the Owner, the Owner's successors and assigns, and all subsequent owners of the Property, are responsible for maintaining the SCMs as shown and described in the Comprehensive Storm Water Management Plan and in accordance with this Agreement, and with providing the City with a right of inspection and appropriate indemnification; and

NOW, THEREFORE, for and in consideration of the mutual covenants and undertaking of the parties, the parties hereby agree as follows:

A. FINAL INSPECTION REPORTS AND AS BUILT CERTIFICATION

The Owner shall certify in writing to the City within 30 days of completion of the SCMs that the SCMs are constructed in accordance with the approved plans and specifications. The Owner shall further provide As Built Certifications of the locations of all access and maintenance easements and each SCM, including those SCMs permitted to be located in, or within 50 feet of, water resources, and the drainage areas served by each SCM.

B. MAINTENANCE PLANS FOR THE STORMWATER CONTROL MEASURES

1. The Owner agrees to maintain in perpetuity the SCMs in accordance with approved Maintenance Plans listed in #2 below and in a manner that will permit the SCMs to perform the purposes for which they were designed and constructed, and in accordance with the standards by which they were designed and constructed, all as shown and described in the approved Comprehensive Stormwater Management Plan. This includes all pipes and

Why do we need it?

- Identify responsible party/parties
- Grants permission for the city/township to enter the site to inspect the SCM
- Ensures perpetual maintenance
- Ensures maintenance through property ownership changes (OHQ000004)

LTMAs in Codified Ordinances

East Cleveland Codified Ordinances Ch. 1334.15.a.3 (Bond)

An inspection and maintenance agreement signed by the developer, the contractor, the city and the private owner or homeowners' association who will take long term responsibility for these BMPs is accepted by the City Engineer.

Mayfield Heights Codified Ordinances Ch. 943.16

Unless other arrangements are approved by the City Council, the proper function, as determined by the City, of the approved permanent post-construction storm water management system, including on-site and off-site treatment/storage facilities that are constructed by the owner, shall be continuously assured in perpetuity by the owner as prescribed in the project development agreement. The applicant shall submit applicable documentation in accordance with Section 943.15.

Chagrin River Watershed Partners Comprehensive Stormwater Managements Model Ordinance

The owner shall inspect SCMs regularly as described in the Inspection and Maintenance Plan and Inspection and Maintenance Agreement.

Components of a good Long-term Maintenance Agreement (LTMA)

LTMA

Site Specifics

- Parcel Number of site where SCMs are present
- Type of SCM(s) covered
- Designates an entity responsible for stormwater inspection and maintenance
- Description of maintenance easements and agreements
- Reference to LTOM
- Require an As-built Drawing

LTMA

Owner Responsibility

- Statement that indicates maintenance in perpetuity and indemnification of the municipality
- Require a yearly inspection report be submitted to the City/Township with requirements
- Signature lines for owner, city official (if necessary) and public notary

LTMA

Inspection and Reporting

- Require a yearly inspection report be submitted to the City/Township with requirements
- Specific requirements for inspection
  - Signature of professional
  - Date
  - Conditions
  - Features inspected
  - Status
- Timeframe for resolving deficiencies
- Notification of transfer of ownership

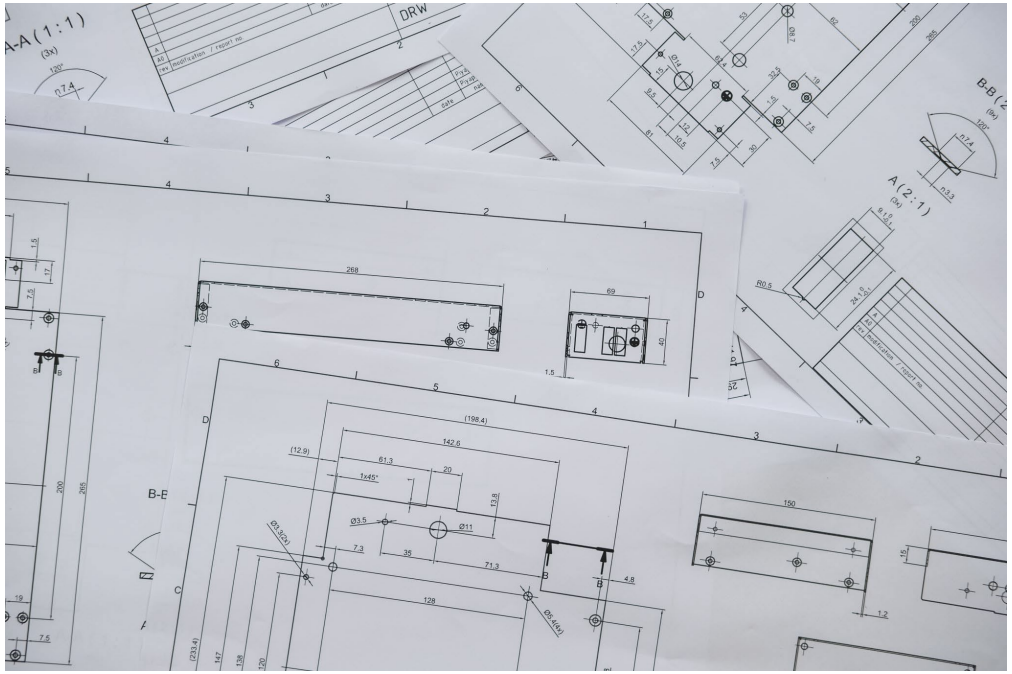
LTMA

Who Signs It?

- Site Owner (person responsible for maintenance)
- City/Township (entity responsible for ensuring maintenance is performed), if necessary
- City signature may not be required.
- Notarized

LTMA

Procedure for LTMA Acceptance



- Document put together during SWP3 design
  - May need to be adjusted during construction
- Once design is approved, owner signs in the presence of a notary then records document with County Auditor
- Copy of this agreement is submitted before project completion
  - Some cities collect and hold a bond pending submission of the LTMA.
- CSWCD maintains LTMA and informs City that final documentation is complete
- CSWCD will not issue a SWP3 completion report for the site until recorded documentation has been received.


Good Documents
Need Review and
Enforcement

Review

Which entity?

- Annual Reporting
  - Has a report been submitted?
    - Follow up with those that have failed to submit
- Review result of report
  - Is the report adequate?
  - Are there issues that need to be corrected?

Enforcement

Who enforces and how?

- Use plans, agreements and manual
- Ordinance or overlap of multiple ordinances
- Timeframe for resolution
- How will you know it has been resolved?
    - Documentation
    - Follow up Inspection

Thank you

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