2018 OHIO STORMWATER CONFERENCE
11th Annual

Incorporating Ohio Storm Water Requirements Into Your Projects – SWPPPs and BMPs

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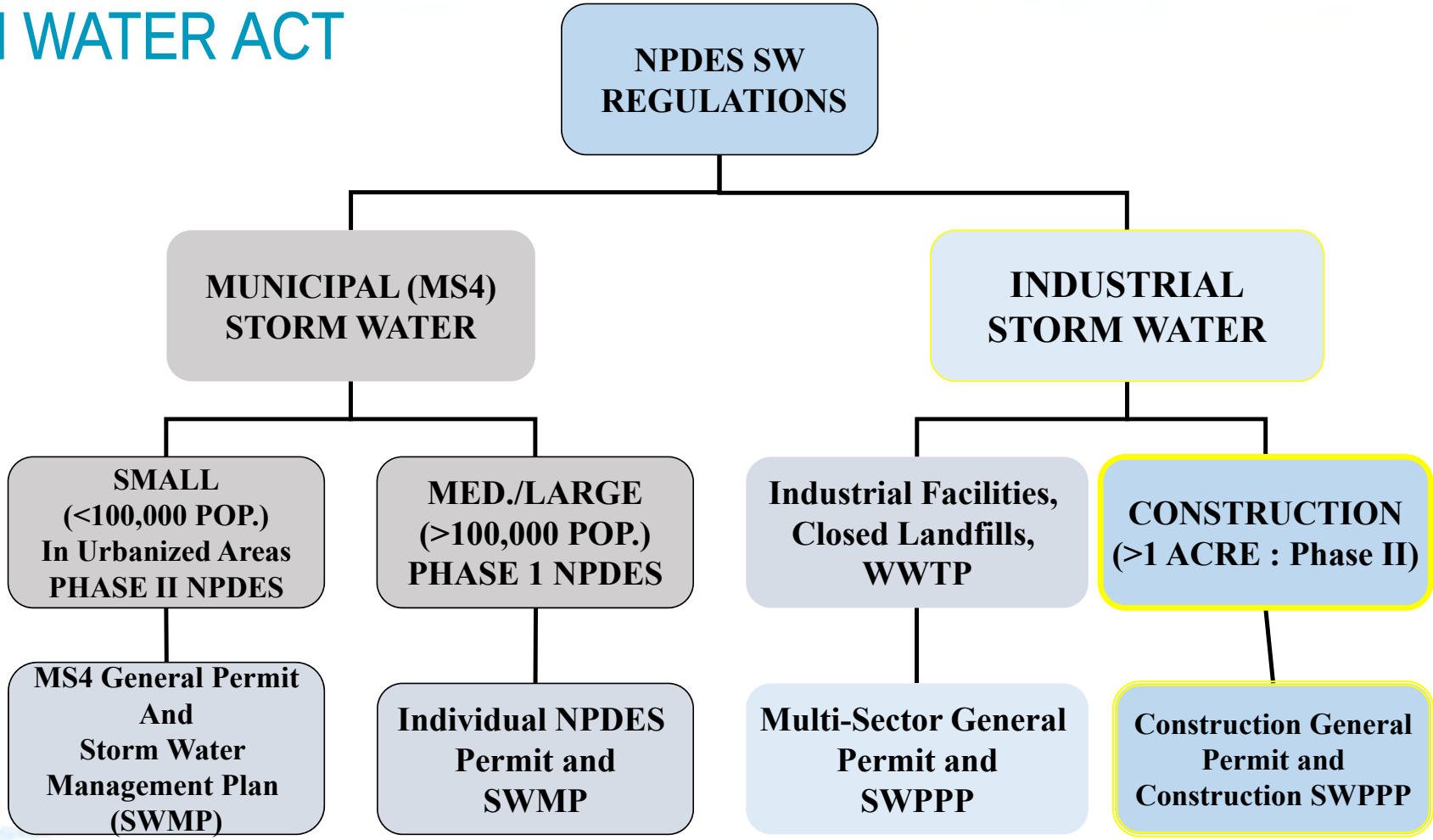
AGENDA

1. Clean Water Act/NPDES Framework
2. Construction Storm Water Permits
3. BMP Case Studies:
   a. Large Manufacturing Facility, Circleville, Ohio
   b. Ohio Health Interchange
   c. Sawmill Parkway Extension
   d. Lake County Subdivision Project
   e. Honda of America
   f. Metro Parks

CLEAN WATER ACT



Ohio EPA eBusiness Center

- Beginning February 1, 2017 General Permit forms are only accessible electronically via the Ohio EPA eBusiness Center. https://ebiz.epa.ohio.gov

- **IMPORTANT NOTE**: Consultants **CANNOT PIN** (electronically sign) applications on behalf of their clients. Consultants can **COMPLETE** the application then **DELEGATE** it to their client to pin and submit.

- Access electronic versions of the General Permit NOI, NOT, Co-Permittee NOI/NOT through Ohio EPA eBusiness Center account and submit electronically.

Ohio Construction Storm Water Permit

- Ohio Construction Storm Water General Permit
  - Statewide
  - Big Darby Creek Watershed
  - Olentangy River Watershed

Ohio Construction Storm Water Permit

Ohio Construction Storm Water General Permit

- *DRAFT* issued Feb. 9, 2018
- OHC000004 expires April 20, 2018
- OHCD00002 (Big Darby) expired Sept. 30, 2017
- OHCO00002 (Olentangy) expires May 31, 2019

Applicability
General Construction Storm Water Permit

- **One or more acre of disturbance**
- Each operator/contractor must seek coverage (co-permittee)
- Off-site borrow pits (one project only) included
- Runoff from contaminated sites not authorized
- Non-impervious, reclamation, mitigation, restoration, and linear projects exempt from post-construction BMPs
- Transportation projects: ODOT L&D Manual

All NOIs must be submitted via Ohio EPA eBusiness Center

Operator Definition

"Operator" means any party associated with a construction project that meets either of the following two criteria:

1. The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or
2. The party has day-to-day operational control of those activities at a project which are necessary to ensure compliance with an SWPPP for the site or other permit conditions.

- Operator must 'sign' (submit) NOI and SWPPP (they must have an eBusiness account in order to do this)

Watershed-Based Requirements

- **Big Darby Creek** Watershed Construction Storm Water Permit, OHCD00002 (expired 9/30/2017)
- Portions of **Olentangy River** Construction Storm Water Permit, OHCO00002 (expires 5/31/2019)

*These requirements are rolled into the new Construction General Permit **(April 2018)** for projects in those watersheds*

Big Darby Creek Watershed Requirements

- Submit NOI/SWPPP 45 days (not 21 days) prior to work
- Wait for authorization letter
- Mandatory Riparian Setbacks and Mitigation Requirements
- Groundwater recharge requirements
- Minimum 134 cy/ac sediment basin storage
- 45 mg/l TSS limit and sampling for sediment basins
- No dry detention basins (sites > 5 acres)

Olentangy River Watershed Requirements

- Submit NOI/SWPPP 45 days (not 21 days) prior to work
- Wait for authorization letter
- Mandatory Riparian Setbacks and Mitigation Requirements

Construction Storm Water Pollution Prevention Plans (SWPPPs)

Construction Storm Water Pollution Prevention Plan (SWPPP)

1. Site description: cover page, schedule, impervious areas, runoff calculations, soil, receiving stream, etc.
2. Site Map(s): existing & proposed contours, construction areas, sediment basin volumes, post-construction BMPs, drainage watersheds, erosion controls, stream crossings, etc.
3. Preservation Methods: preserve vegetation, phase construction, buffers
4. Erosion Control Practices: stabilization, construction entrances

Construction Storm Water Pollution Prevention Plan (SWPPP)

5. Runoff control practices: rock checks, slope drains, diversions, velocity dissipation
6. Sediment control practices: sediment ponds and traps, sediment barriers, diversions, inlet protection; timing; stabilization
   - Dewater ponds using a skimmer; remove accumulated sediment at 50%
7. Post-Construction controls: identify BMPs, design, maintenance plans, WQv calculations, drain times, etc.
8. Surface water protection: 401/404 permits; concentrated flow to wetlands

Construction Storm Water Pollution Prevention Plan (SWPPP)

9. Other controls: waste, concrete washout, off-site traffic tracking, local requirements, trench and gw control, contaminated sediment
10. Maintenance: procedures for maintenance of BMPs
11. Inspections: every 7 days and within 24 hours after 0.5" storm (monthly if temp. stabilized); "qualified inspection personnel"; inspection report; Summary Record and Certification (keep 3 years)
12. Approved state or local plans: ESC approved by local officials – keep with SWPPP; certify SWPPP meets MS4 requirements

New general permit requires all SWPPPs to be submitted to Ohio EPA with NOI on eBusiness Center

Sediment Pond Design

- Not just for >10 acre sites
- Dewatering zone: 67 cy/acre of drainage

  = Volume of water that will slowly discharge from the pond (skimmer)

  PLUS
- Sediment settling zone: 37 cy/ disturbed acre

  = Volume below the level of the pond outlet to allow for sediment accumulation

  AND
- Release rate: <u>48 hours</u>

Size Basins for the Total Drainage Area

Source: Ohio EPA

Erosion Control to minimize sediment control

Erosion Controls must be installed within 7 days when the site will remain idle for more than 14 days

Examples include:

- Vegetation
- Mulch (i.e., straw or wood chip mulch)
- Matting or Sod
- Ditch Checks
- Riprap
- Geotextiles

Sediment Control?

Maintenance of BMPs?

Maintenance of BMPs?

Appropriate Controls?

Stabilization Practices: Hydroseeding

Post-Construction BMPs

1. List of BMPs includes those suitable for small projects (<5 acres)
2. Public road projects
   - use ODOT L&D Manual, Vol. II Drainage Design (e.g., vegetated ditches)
3. Non-structural BMP options and incentives to reduce WQv and for non-common, low density areas of site
4. Local jurisdictions may have more stringent requirements
5. Long-term maintenance plan required

Post-Construction BMPs

Table 5a: Extended Detention Practices (24-hr drain)

- Wet extended detention basin
- Constructed extended detention wetland
- Dry extended detention basin (48-hr)
- Permeable pavement- Ext. Det.
- Underground storage – Ext. Det.
- Sand and other media filtration – Ext. Det.

Post-Construction BMPs

Table 5b: Infiltration Practices

- Bioretention area/cell (24-hr)
- Infiltration basin (24-hr)
- Infiltration trench (48-hr)
- Permeable pavement – Infiltration (48-hr)
- Underground storage –Infiltration (48-hr)

Post-Construction Design Considerations

- Local flood control requirements
- Maintenance
  - Access
  - Pond drain
- Forebays and micropools at inlets and outlets
- Low-Impact design of site
- Resources
  - ODNR “Rainwater and Land Development” Manual
  - City of Columbus “Stormwater Drainage Manual”
  - ODOT L&D Manual, Vol. II
  - Stormwater Manager’s Resource Center (www.stormwatercenter.net)

Water Quality Volume

The structural post-construction BMP must be sized to treat the water quality volume (WQv) for ALL sites over 1 acre.

$$WQv = Rv*P*A/12$$

where:

Rv = Volumetric Runoff Coefficient (Rv=0.05+0.9i)

P = Precipitation Depth of 0.9-inches

A = Total Contributing Drainage Area (Acres)

WQv = in units of acre-feet

Wet Extended Detention Basin

Extended Detention is provided above the wet pool

Extended Detention Volume = 1.0 * WQv

Permanent Pool = (1.0 *WQv) + (0.20 * WQv) for sediment

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Source: Ohio EPA

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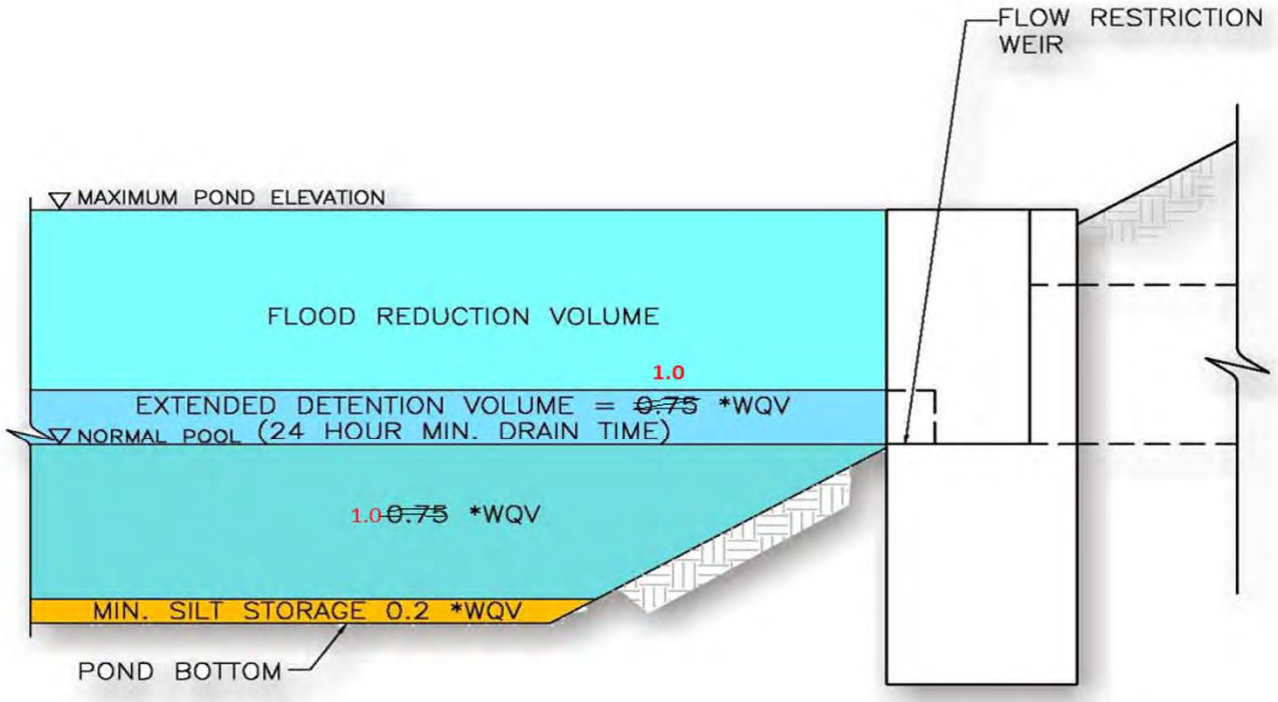
Wet Basin Outlet



*WQV = WATER QUALITY VOLUME

Bioretention

Runoff that exceeds the WQv bypasses into storm drain system

Storage volume in cell below this inlet = 1.2 * WQv

Source: Ohio EPA

BMP Case Studies

- Large manufacturing facility
- Ohio Health interchange
- Sawmill Parkway Extension
- Lake County subdivision
- Honda Marysville
- Metro Parks

Large Manufacturing Facility
Circleville, Ohio

Photo: Nov. 2017

Challenge:

- 280 acre site with 1.8 M sf facility (2.2 M sf impervious area)
- Agricultural field with no existing storm sewers
- Over two miles to Scioto River (Scippo Creek Storm Discharge)

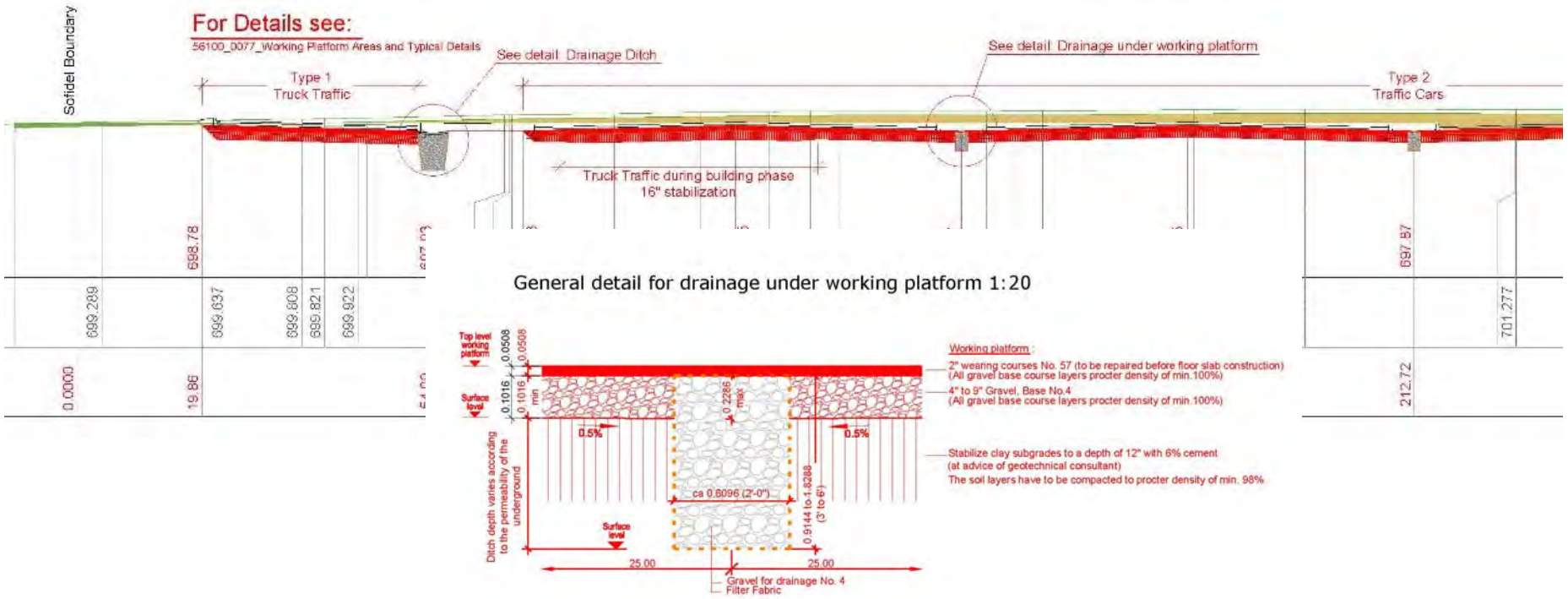
Large Manufacturing Facility
Circleville, Ohio

Construction Stormwater Solution:

- Large site challenges
- Multiple Contracts/Phases
- Excavation Dewatering

  (potential groundwater impacts)

Stormwater Management During Construction



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Large Manufacturing Facility
Circleville, Ohio

Post Construction Solution:

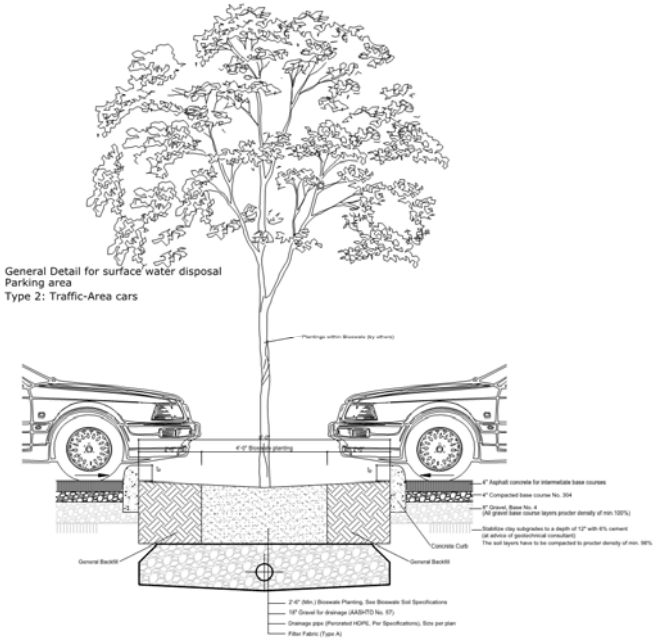
- Early County buy-in and regular discussions throughout design
- Over 52,000 lf storm sewers, 250 catch basins, 180 manholes
- Six detention basins
- Eleven Pump stations
- Discharge to nearby Scippo Creek at pre-construction peak flows

Photo: Nov. 2017

Large Manufacturing Facility
Circleville, Ohio

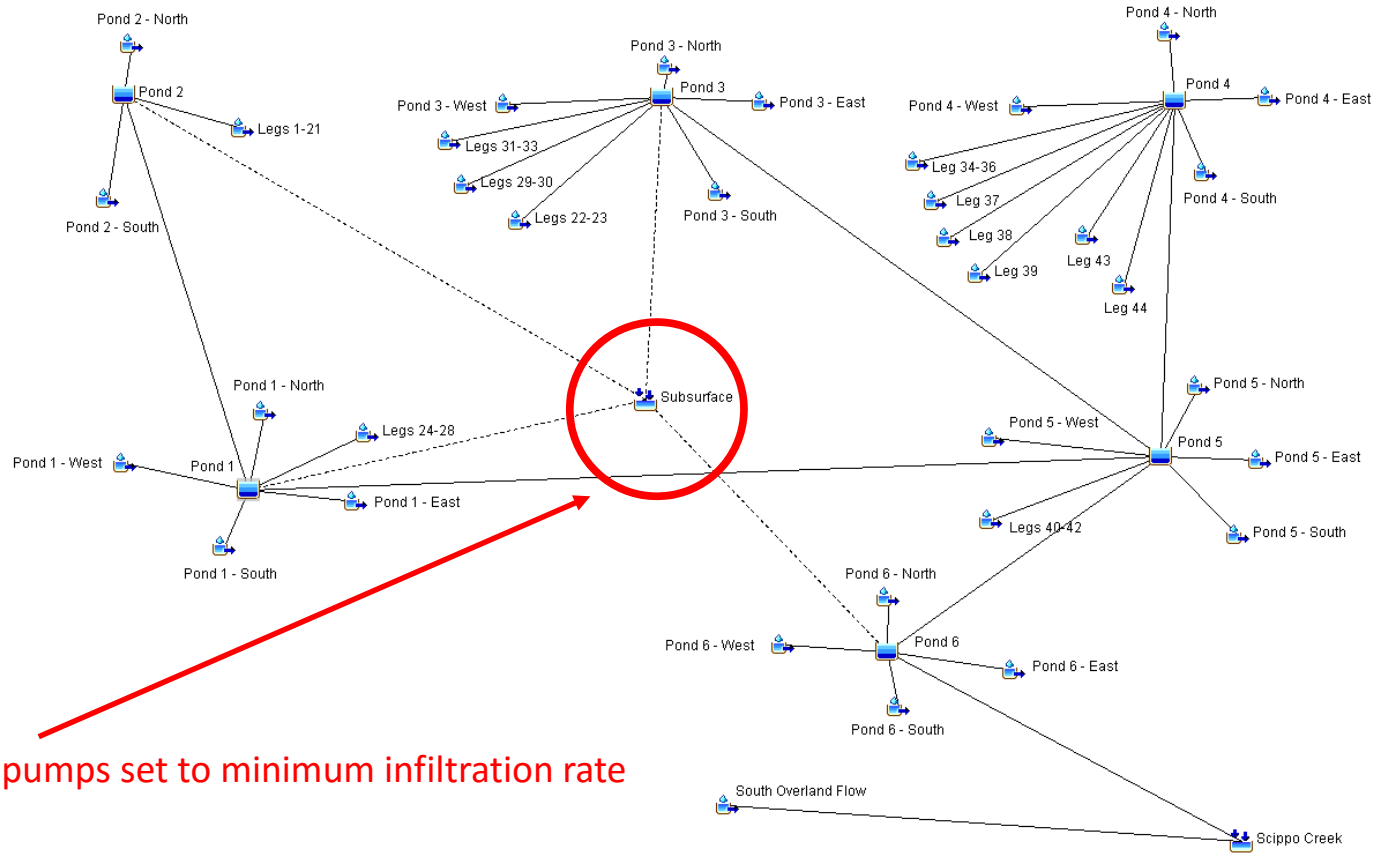
BMP Design:

- Worked with European architect on schematic design
  - Significant lengths of trench drain replaced with catch basins
  - Reuse of roof runoff to supplement groundwater source for process water
  - Sand- and gravel-dominated subsurface allowed for incorporation of infiltration trenches in design
- Modeling of 1-year to 25-year design storms in HEC-HMS with and without infiltration
- Risk management decisions to reduce costs for larger design storms
- Redesign of pump stations to reduce costs
- Reroute roof drainage to south ditch to be picked up with storm sewers in subsequent phases of design



Large Manufacturing Facility
Circleville, Ohio

Model Set-up



Infiltration simulated with artificial pumps set to minimum infiltration rate

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Ohio Health SR 315 Interchange

Storm Water Management

Challenges:

- Heavily-urbanized area with spatially-dispersed construction
- Restrictions on placement of stormwater control facilities (e.g., ROW, floodplain)
- Coordination with multiple agencies (e.g., Columbus, EPA, ODOT, USACE)
- City of Columbus Stream Corridor Protection Zones, Jurisdictional Streams, City plans for reginal basin

Ohio Health SR 315 Interchange

Storm Water Management

Success Metrics:

- Provide compensatory stormwater quantity control within the regional basin
- Provide stormwater quality control either on-site or compensatory within the regional basin (1.5X GP Requirement)
- Reduce peak water surface elevation in basin by 7.45 ft.
- Reduce peak outflow from regional basin by 39 cfs

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Ohio Health SR 315 Interchange

Storm Water Management

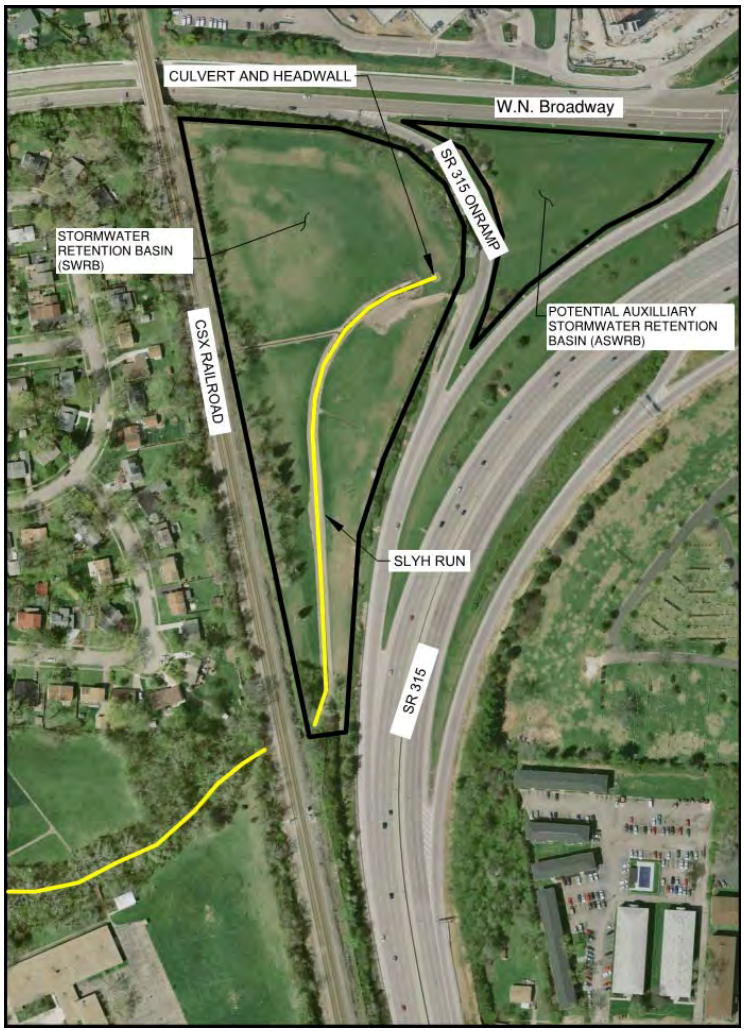
Solutions:

- Redesign of existing regional basin for compensatory stormwater quantity control
- Vegetated swales, filter strips, and existing manufactured systems for stormwater quality control
- Forebays/micropools in regional basin for quality control
- Realignment of on-ramps and roadways

Ohio Health SR 315 Interchange
Storm Water Management

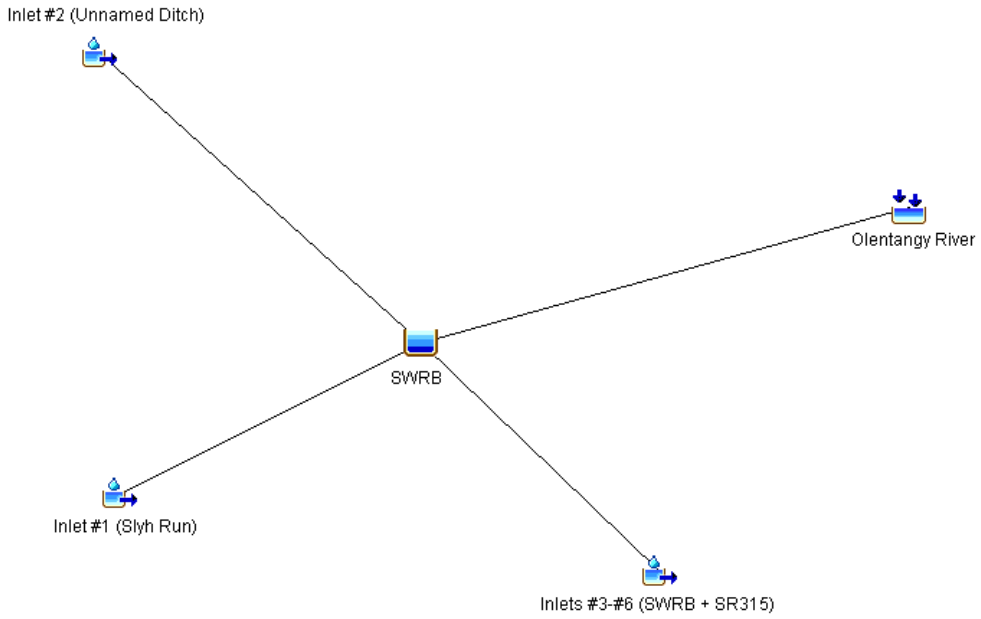
Regional Basin:

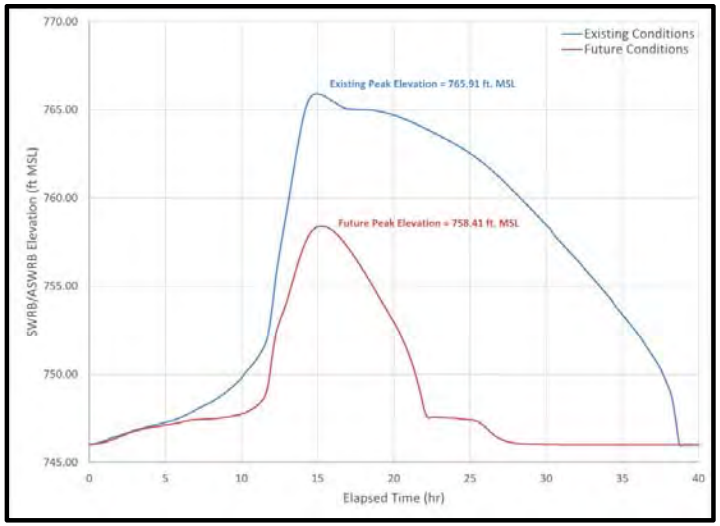
- Currently provides quantity control (1991 design) but no quality control
- Six inlets total (one stream, one ditch, four storm drains from SR-315)
- Jurisdictional stream (Slyh Run) running through the basin
- Mostly flat area not conducive to vegetated swales (in most locations)

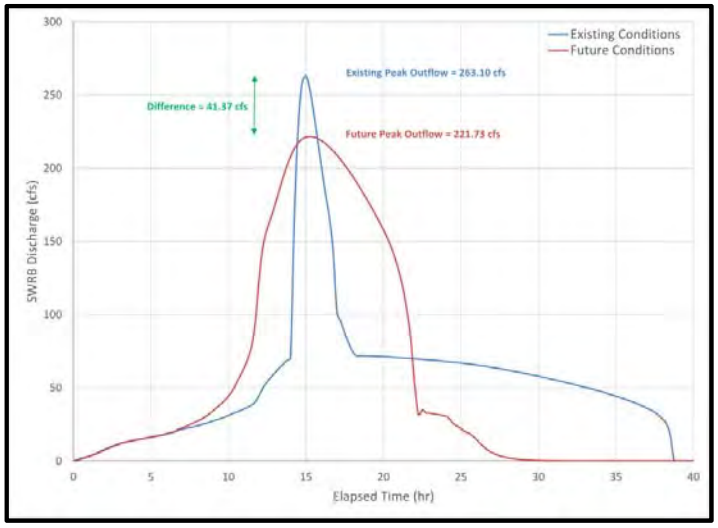


Ohio Health SR 315 Interchange
Storm Water Management

- Model Set-up and Results







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Sawmill Parkway Extension

Challenge:

- 4 lane divided highway through residential and agricultural areas; original design completed 10 years before construction
- Olentangy River Watershed Permit Area
- While the plans sat, regulations changed and some BMP's were no longer permissible
- Right of way had already been purchased, so an innovative solution was needed

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Sawmill Parkway Extension

Solution:

- In-line detention within the footprint of the ditches
- Utilized embankment to impound WQv and spillway to convey larger storms

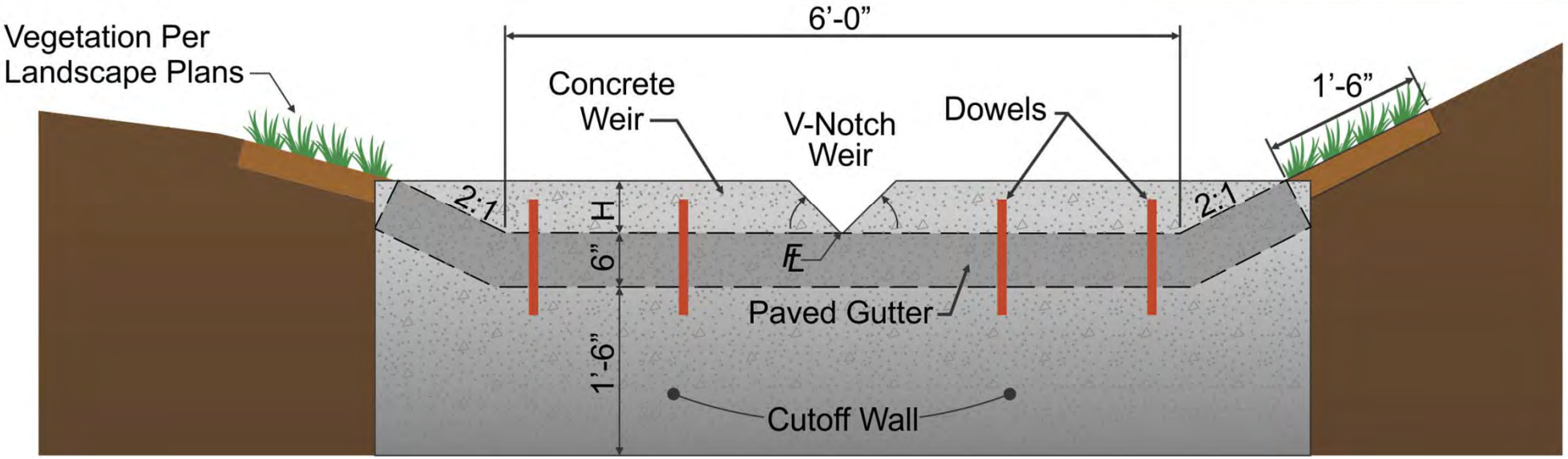
Sawmill Parkway Extension

Stormwater Design

- 14 extended retention basins
  - Designed to meet the post construction water quality volume (WQv) requirements
  - Ultra flat terrain
  - **2-stage concrete weir** vs. catch basin for the outlet structure
  - Easy to inspect/maintain
  - Far more reliable than the catch basin and pipe system

Sawmill Parkway Extension

2-Stage V-Notch Weir



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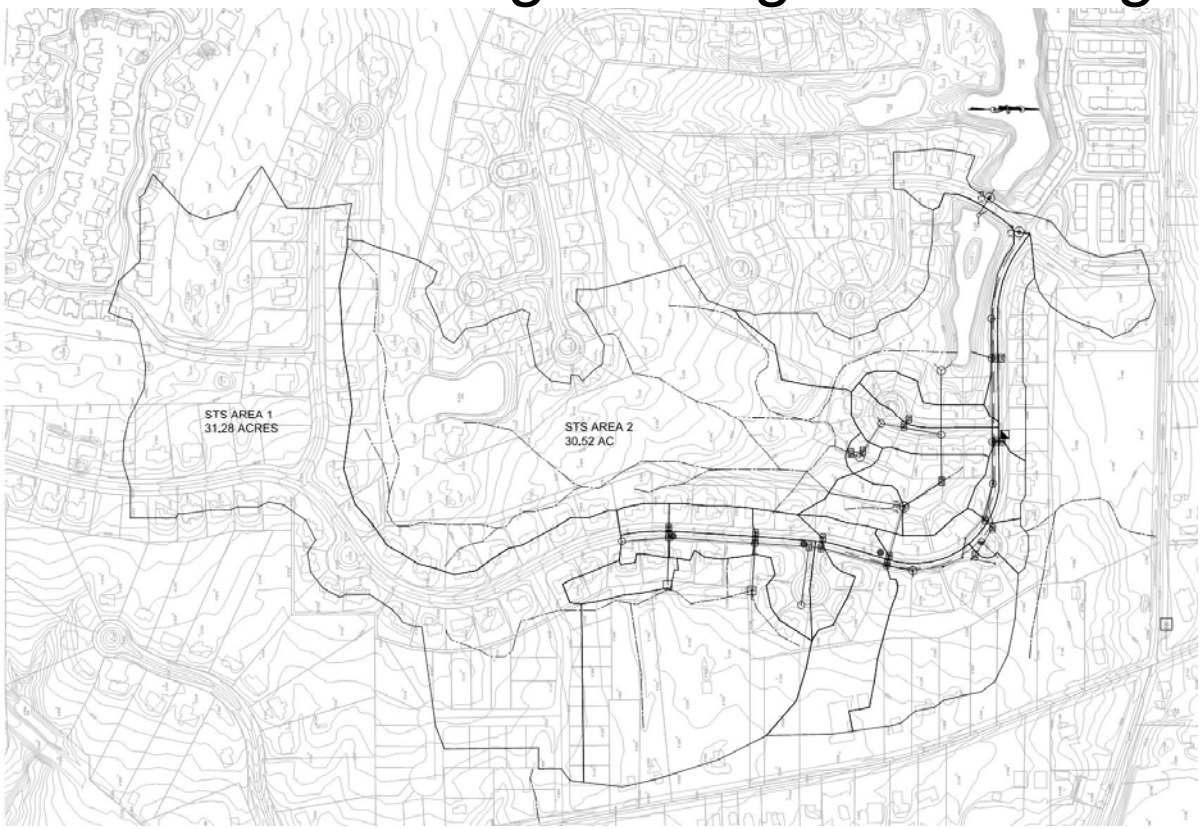
Sawmill Parkway Extension

A word of caution about wildlife and plantings

- This project fell victim to migratory birds feeding on the fresh plantings for the retention basins
- A sizeable investment was very soon lost to birds
- Deer and muskrats can also be a problem with fresh plantings
- Use humane deterrents to keep migratory birds
- Work with your landscape architect to select plants that are project appropriate but undesirable to wildlife

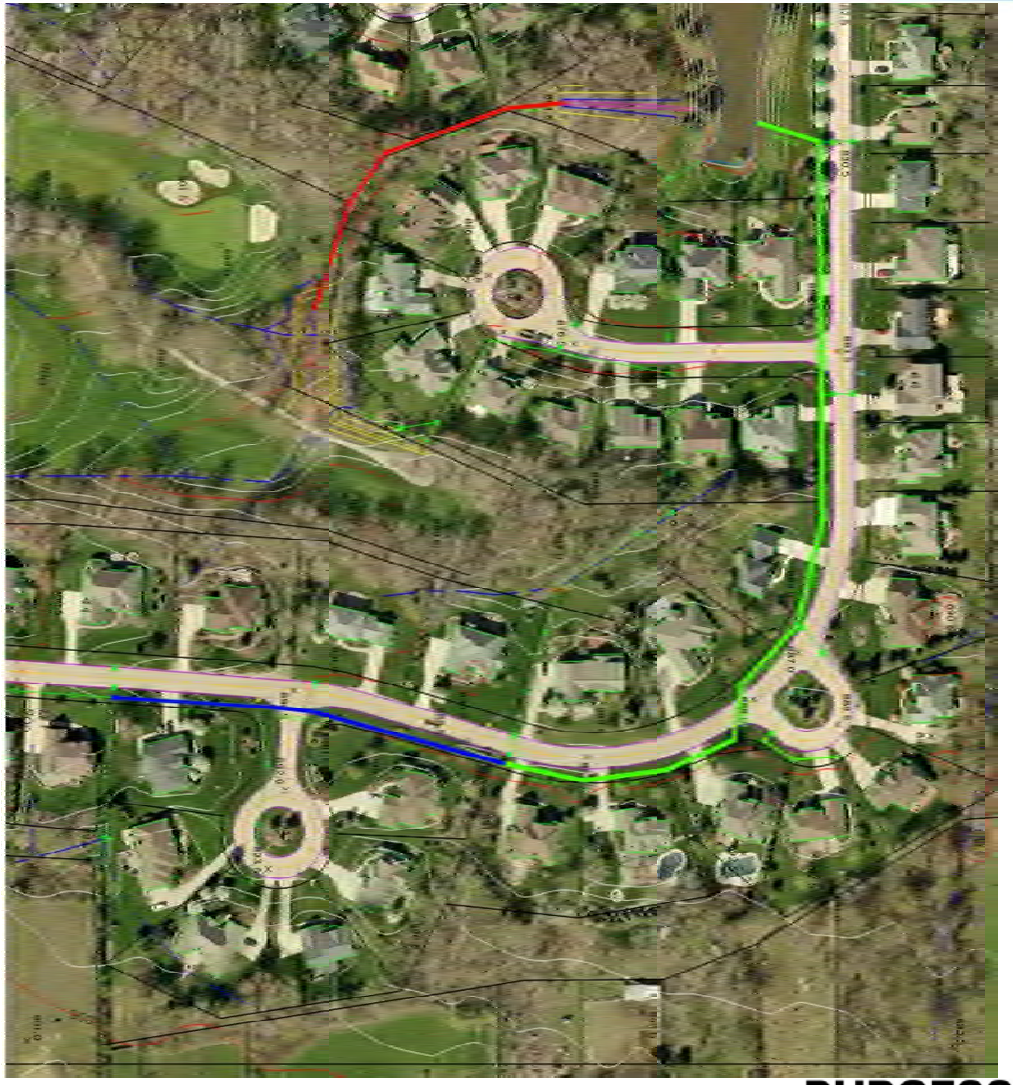
Lake County Subdivision Project

Two Watersheds Met Causing Damage and Danger



Lake County Subdivision Project

A Closer Look at the Problem and Solution



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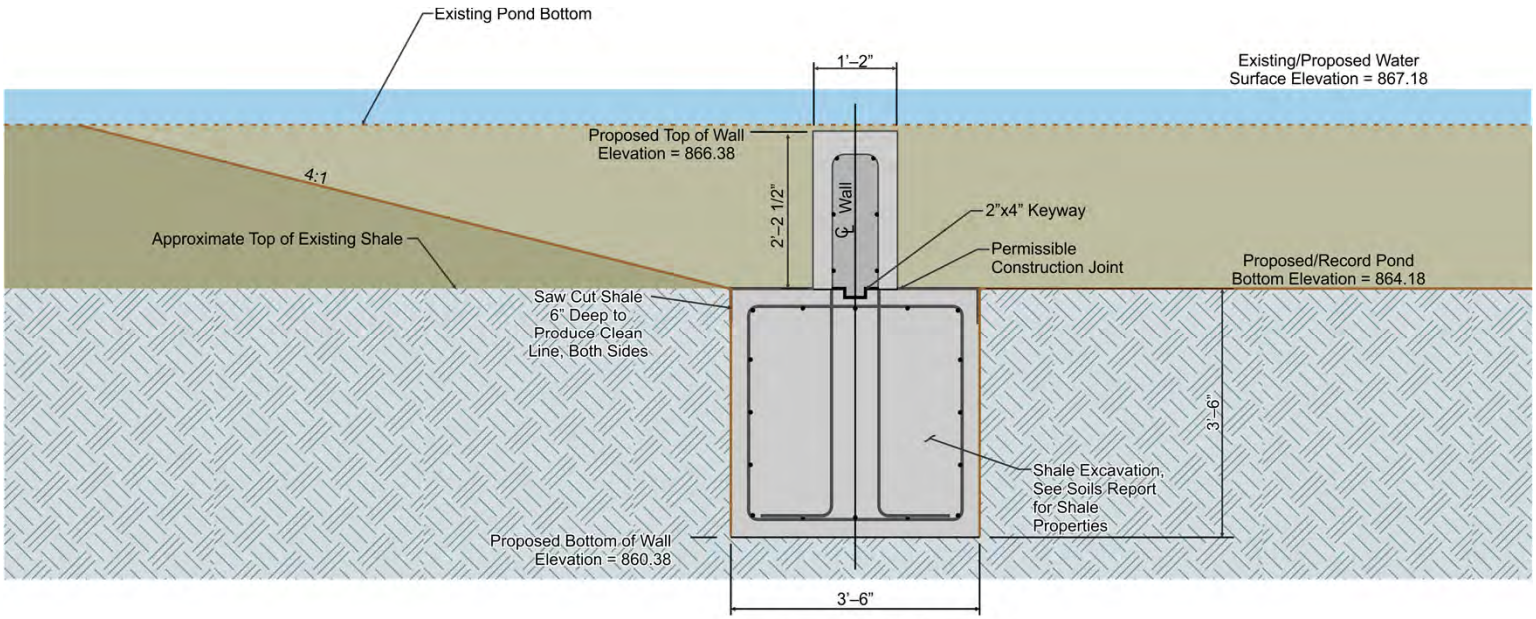
Lake County Subdivision Project

- *A forebay addresses the 4 outfalls at west end of the pond*
- *This basin is unique - pond bottom is bed rock*



Typical Wall Section

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Lake County Subdivision Project

Before

Construction

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Lake County Subdivision Project

After

Operating

Lake County Subdivision Project

Honda Marysville
Storm Water Pond Enhancements

Challenge

- Do the Storm Water Management Ponds meet newer storm water requirements?
- If not, how do we enhance them to meet the new requirements (even though not required)?

Solution

- Evaluated the ponds
- Recommended enhancements

Honda Pond Outfall Enhancement

Before

After

HRA Pond – before

Challenge:

- Pond discharge does not meet 24-hour drain time
- Overtops above 2-year storm event

HRA Pond – after

Solution:

- Constructed wetland provides detention time and flood reduction volume

Columbus and Franklin County Metro Parks: Whittier Peninsula

Challenge:

- Revitalize an abandoned industrial center and reduce environmental impacts of storm water discharges.

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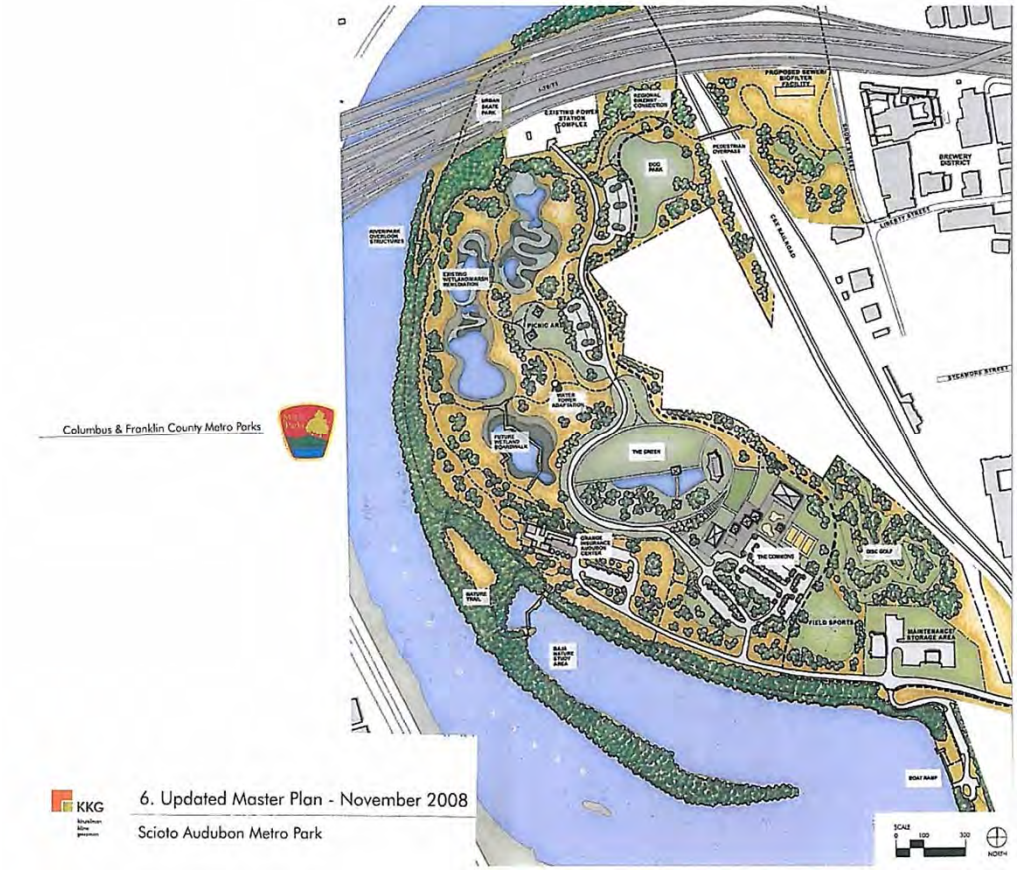
Scioto Audubon Metro Park

Solution:

- Clean-up under the Voluntary Action Program (VAP) and utilize a variety of storm water BMPs.



Scioto Audubon Metro Park
Rain Gardens

- Small drainage areas
- TSS reduction
- Relatively inexpensive

Scioto Audubon Metro Park
Pervious Pavements

- TSS reduction
- Quantity control

Scioto Audubon Metro Park
Bioswales

- Suspended Solids
- Organics
- Groundwater Recharge

Scioto Audubon Metro Park
Constructed Wetlands

Removes:

- Suspended solids
- Nitrogen
- Phosphorus
- Heavy metals

Columbus and Franklin County Metro Parks

Challenge:

Protect sensitive Big Darby Creek Watershed

Big Darby Creek Metro Park and Prairie Oaks Metro Park

Wetlands, Wet Prairies and Wildlife

Solution:

Convert agricultural land to wetlands, wet prairies, savannahs, and pastures to preserve the watershed and attract wildlife.

Battelle Darby Creek Nature Center

- Includes constructed wetlands, bioretention, native vegetation, green roof, and underground detention

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Prairie Oaks Metro Park

Wet Prairie Restoration

Challenge:

- Maintain off-site drainage
- Coordinate with County

Solution:

- Convert agricultural land to wet prairies and savanna
- New catch basins and piping for off-site drainage

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Final Thoughts

Managing storm water can be challenging

- Site constraints
- Local jurisdiction requirements
- Delays in project timing/changing regulatory requirements

There are a variety of solutions

- Understand the requirements in the construction permit
- Work with the site conditions
- Coordinate with the Ohio EPA and local jurisdictions early and often

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QUESTIONS?

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