ACEC – London

SWM Working Group

CLI-ECA Update Review
ETV and MTDs

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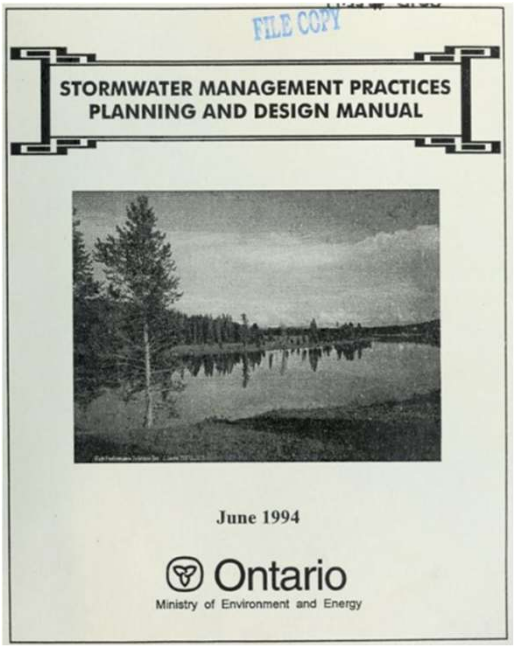
Background

Historically, many municipalities required application of the PSD identified in Table 3.3 of the 1994 MOE Stormwater Management Planning and Design Manual:

Table 3.3 Particle Size Distribution in Storm Water

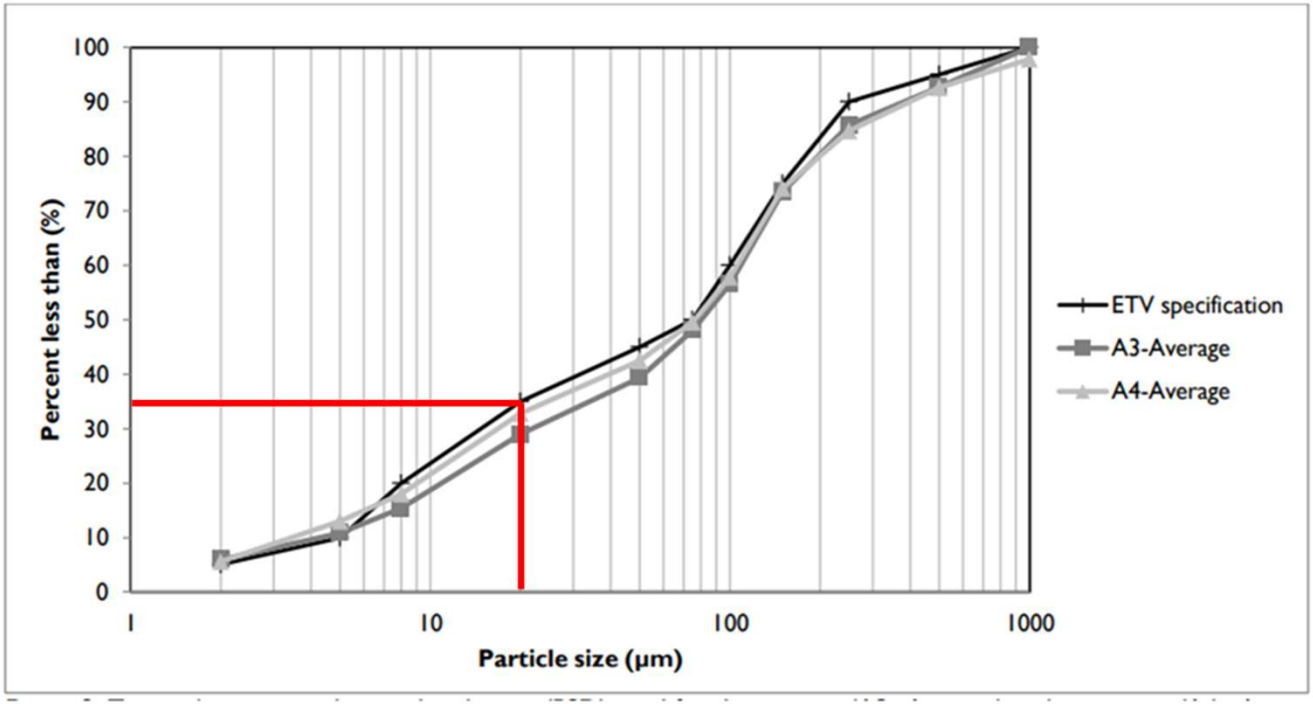
Size Fraction	% of Particle Mass	Average v_s (m/s) ≤
≤ 20 μm	0 - 20	0.00000254
20 μm ≤ x ≤ 40 μm	20 - 30	0.0000130
40 μm < x ≤ 60 μm	30 - 40	0.00002540
60 μm < x ≤ 0.13 mm	40 - 60	0.00012700
0.13 mm < x ≤ 0.40 mm	60 - 80	0.00059267
0.40 mm < x ≤ 4.00 mm	80 - 100	0.00550333



In the above, particle sizes less than 20 microns account for 0-20% of the total sample size (by mass)

Comparison to ETV PSD

The Environmental Technology Verification (ETV) Program utilizes a PSD which includes sub-20 micron particles which account for approximately 35% of the total sample (by mass)



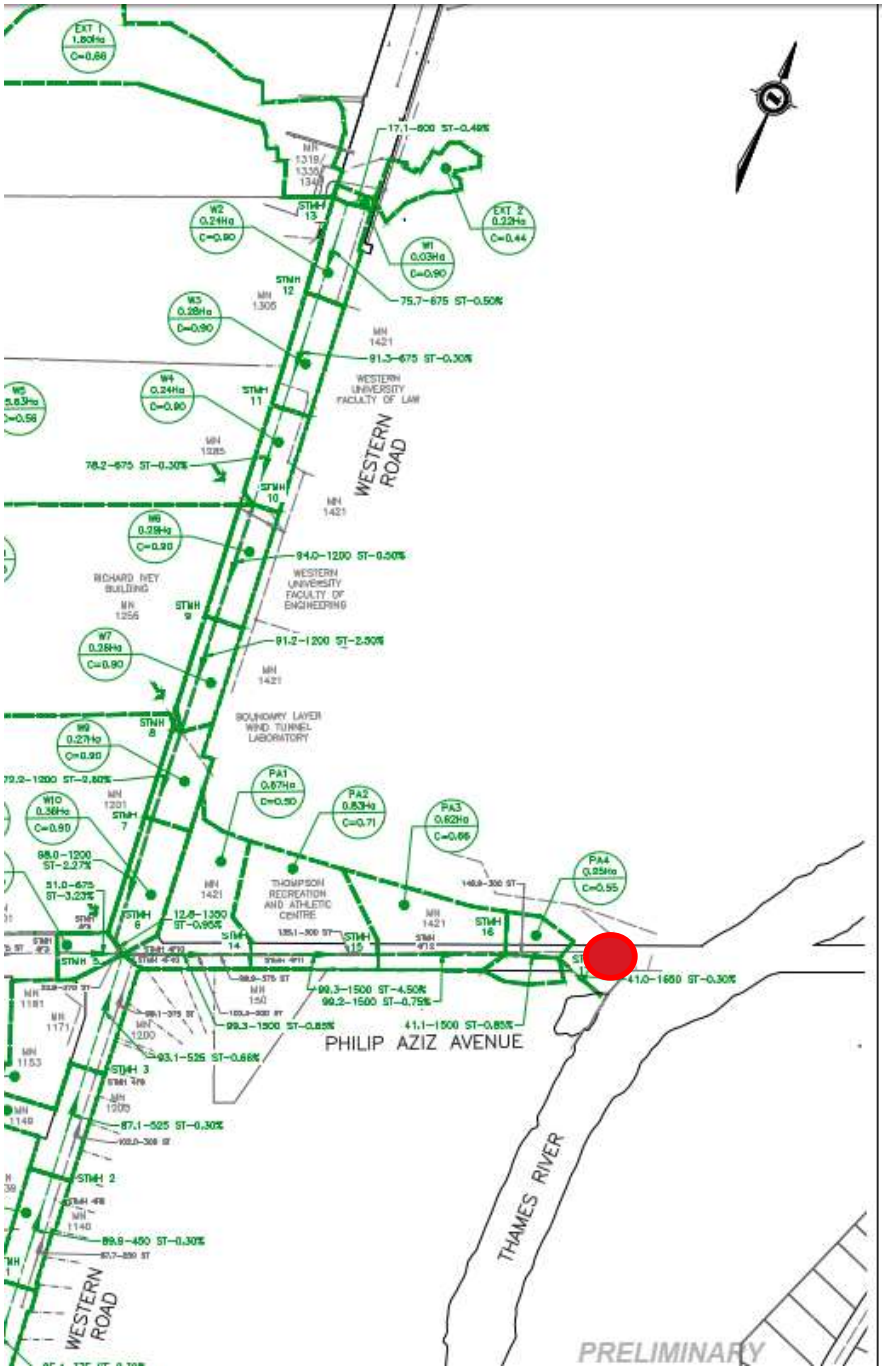
- The ETV PSD is very similar to the sediment PSD specified by the New Jersey lab protocol (NJDEP)

Practical Implications


06/10/2021
Ivey Business School
Thompson Engineering
Boundary Layer Wind Tunnel
ChargePoint Charging Station
Western Student Recreation Centre
Thompson Arena
7-Eleven
University Child Care Centre
Essex Hall
Essex Hall
Google Earth

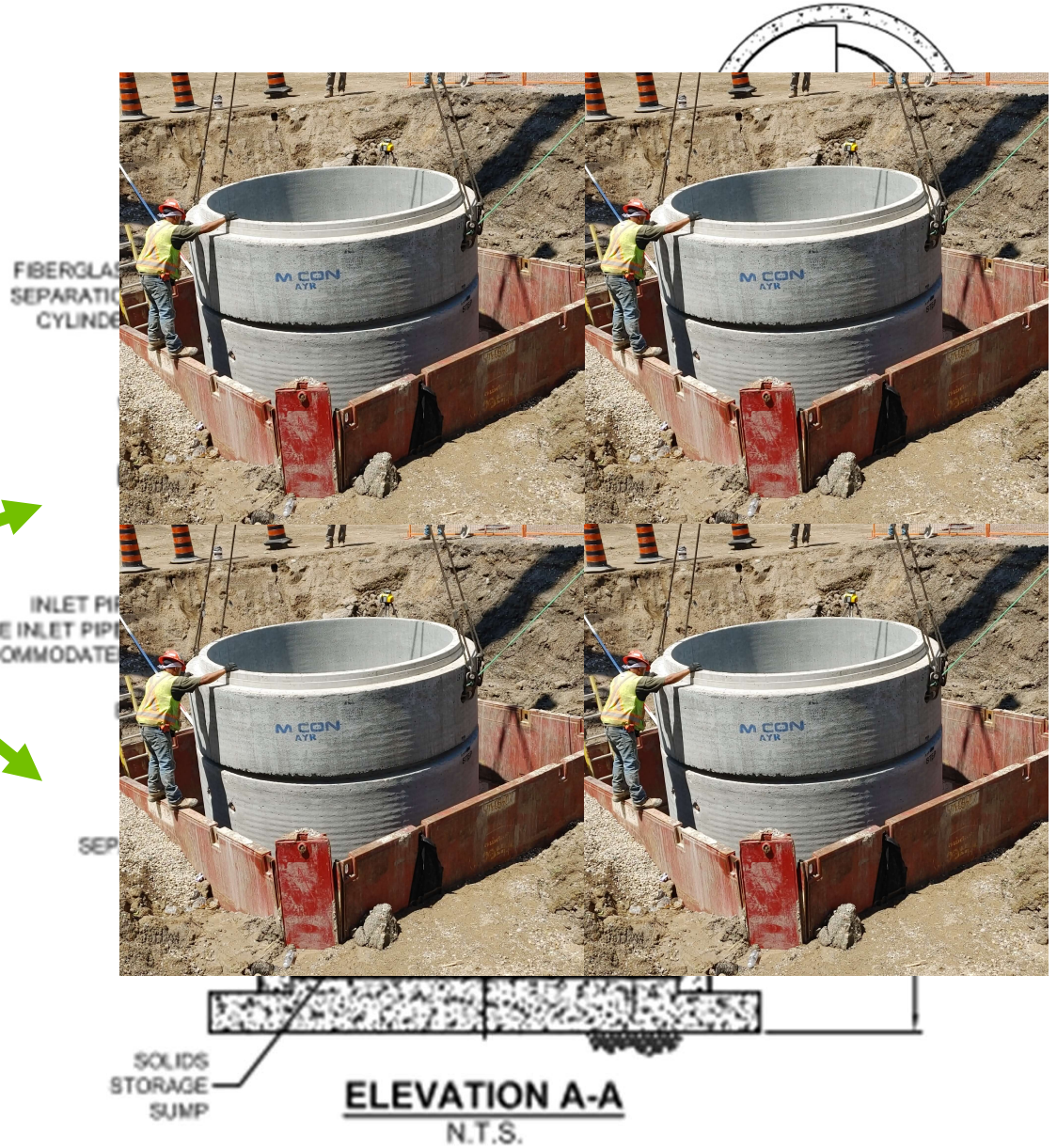
Western Road / Philip Aziz

- In the Central Thames Catchment Area (70% TSS removal target)
- Overall drainage area is 36 ha (large and includes many external lands)
- 55% imperviousness (C = 0.58)
- Model identified: CDS PSMU 5668
- Long-term RE: 74%
- Cleanout frequency: 12-15 months (based on estimated catchment loading rates)
- Cost (procurement only): $150,000



Western Road / Philip Aziz

- Applying the ETV PSD to the same example, we get the following:
- Most appropriate unit: CDS-10 (X4)
- Long-term RE: 50% (less than level 3)
- Cost (procurement only):
  - $460,000 CDS (4 unit)
    +
  - $130,000 diversion vault
- Drainage area too large to accommodate polishing unit (e.g. filter system)
- 4X cost increase (procurement only)



Other Examples (shared separately)

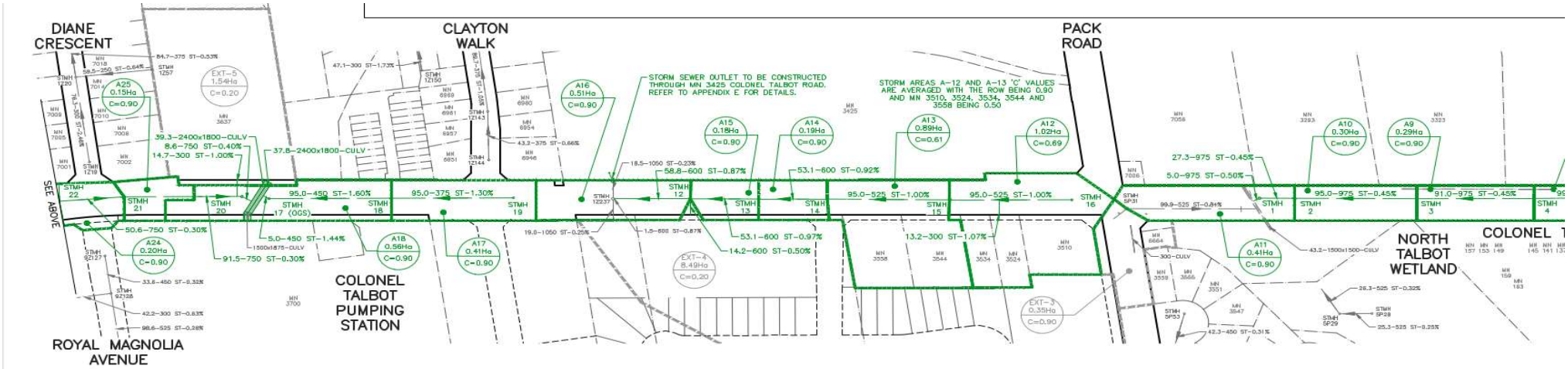
Col. Talbot Road – Inability to achieve 'Normal' (70%) treatment level; 2.5 X 6m cartridge system required to meet Level 1 targets. **5.3X** cost increase; conflict with feeder main in ROW

Liberty Crossing (subdivision) - Inability to achieve Level 1 treatment requirements; 5.4m X 2.4m cartridge system required. **11.3X** cost increase

Significantly increased maintenance frequency and effort in most cases (e.g., quarterly intersection closures, back flushing, etc.)

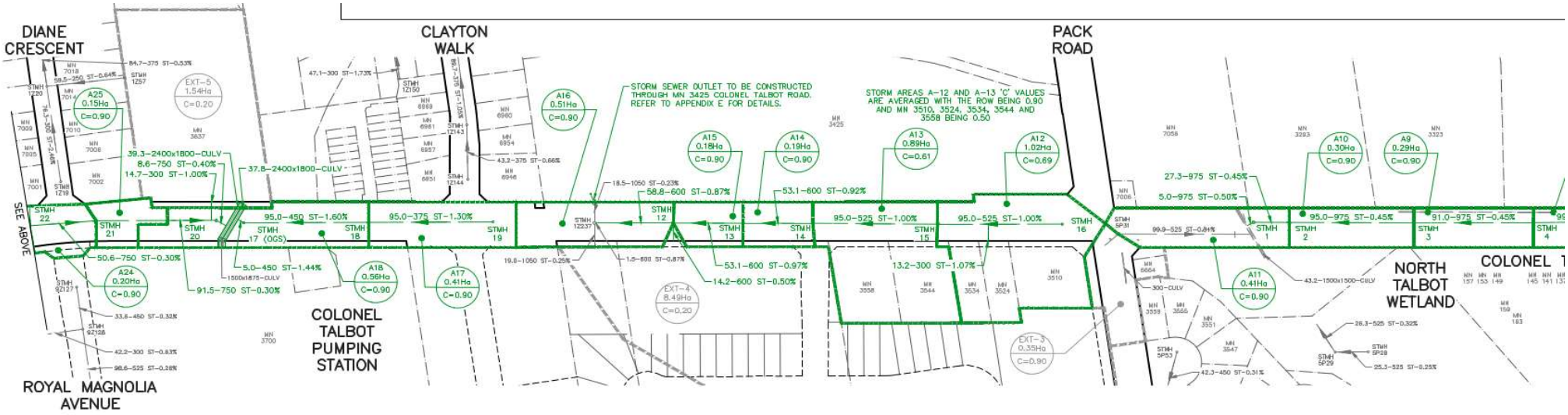
Col. Talbot Road

- In the Dingman Creek Catchment Area (80% TSS removal target)
- Overall drainage area is 1 ha (small but highly impervious – includes road ROW drainage only).
- 100% imperviousness (C = 0.90)
- Model identified: PSMU 2025
- Long-term RE: 83%
- Cleanout frequency: 24-30 months (based on estimated catchment loading rates)
- Cost (procurement only): $20,000

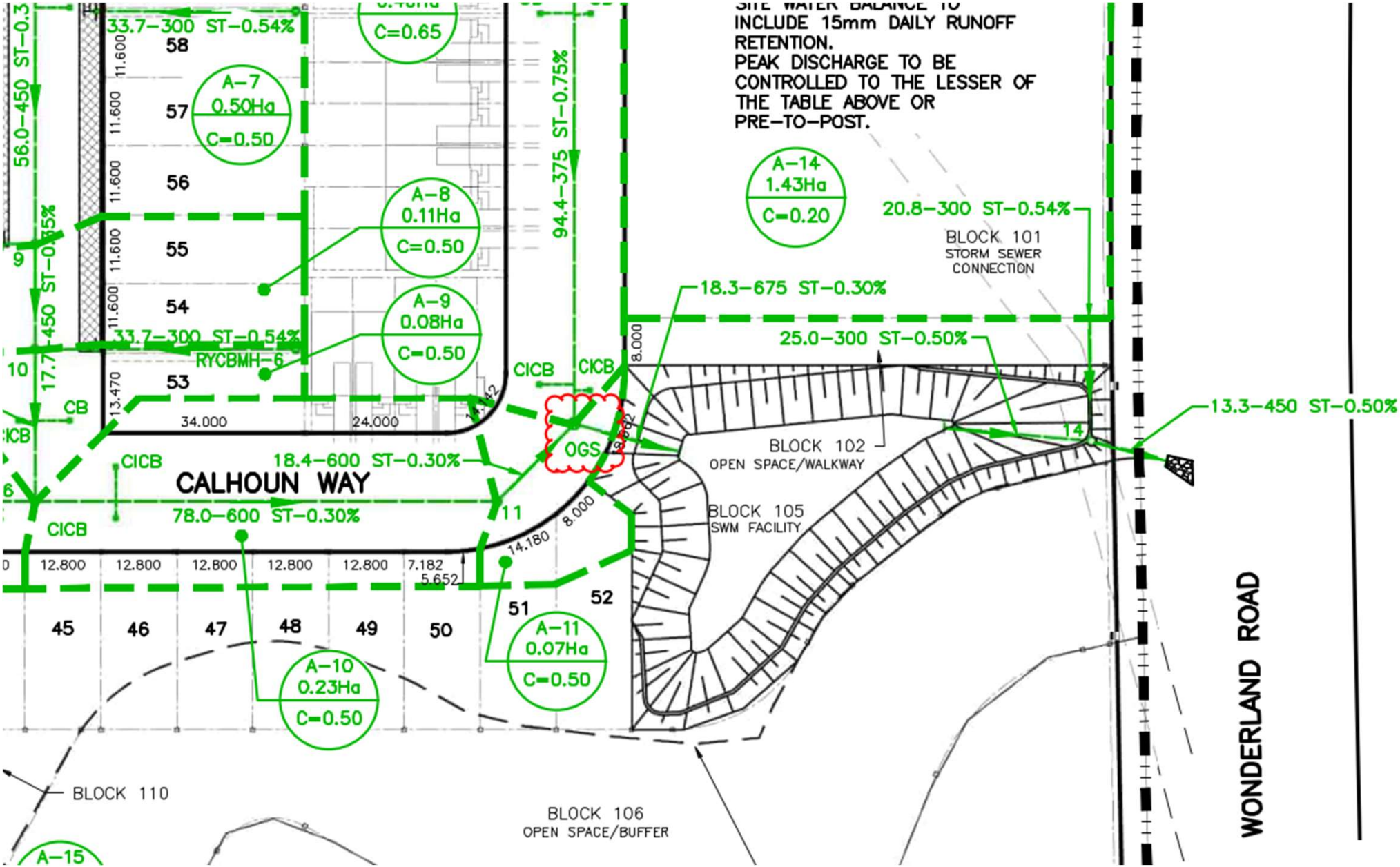


Col. Talbot Road

- Applying the ETV PSD to the same example, we get the following:
- Unit: CDS-5-C
- Long-term RE: 64%
- Cost: $25,000 +
- Parallel SF0820 cartridge system can be added to achieve 80% (Level 1)
  - Requires an addition 6m X 2.4m vault at a cost of $80,000 (procurement only; 5.3X cost increase)

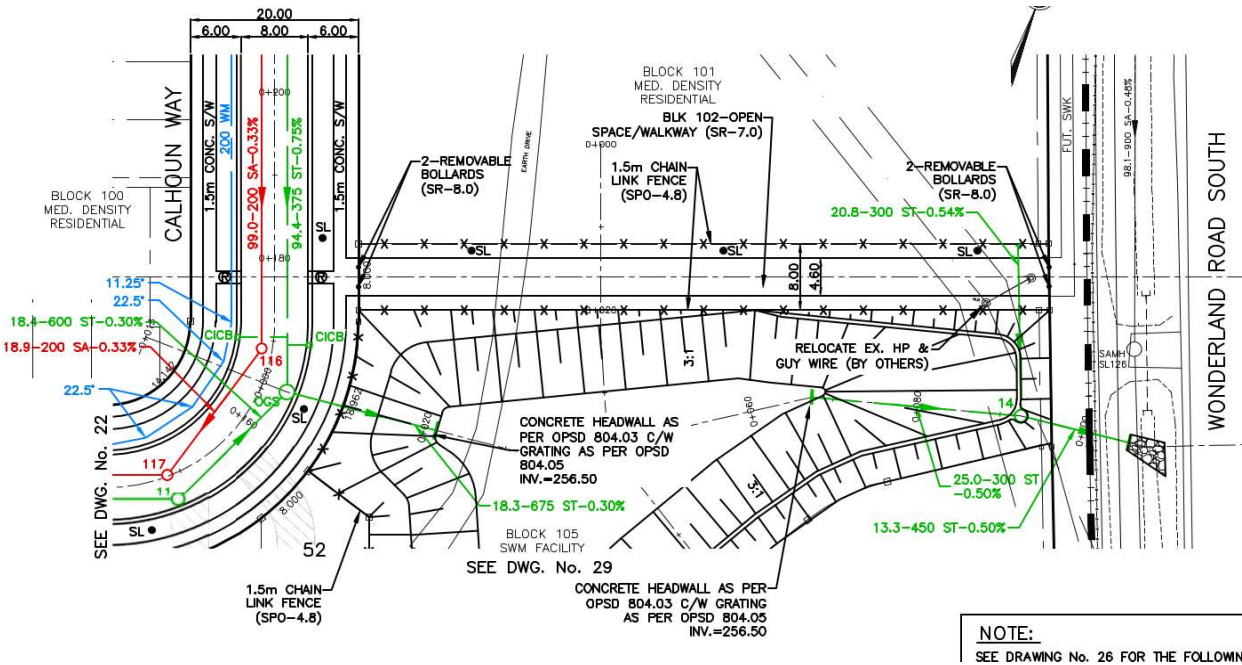


Liberty Crossing (Greenfield Subdivision



Liberty Crossing (Greenfield Subdivision)

- In the Dingman Creek Catchment Area (80% TSS removal target)
- Overall drainage area is 4.3 ha
- 51% imperviousness (C = 0.50)
- Model identified: Long-term RE: PSMU 3030_6
- Long-term RE: 81%
- Cleanout frequency: 12-14 months (based on estimated catchment loading rates)
- Cost (procurement only): $39,000

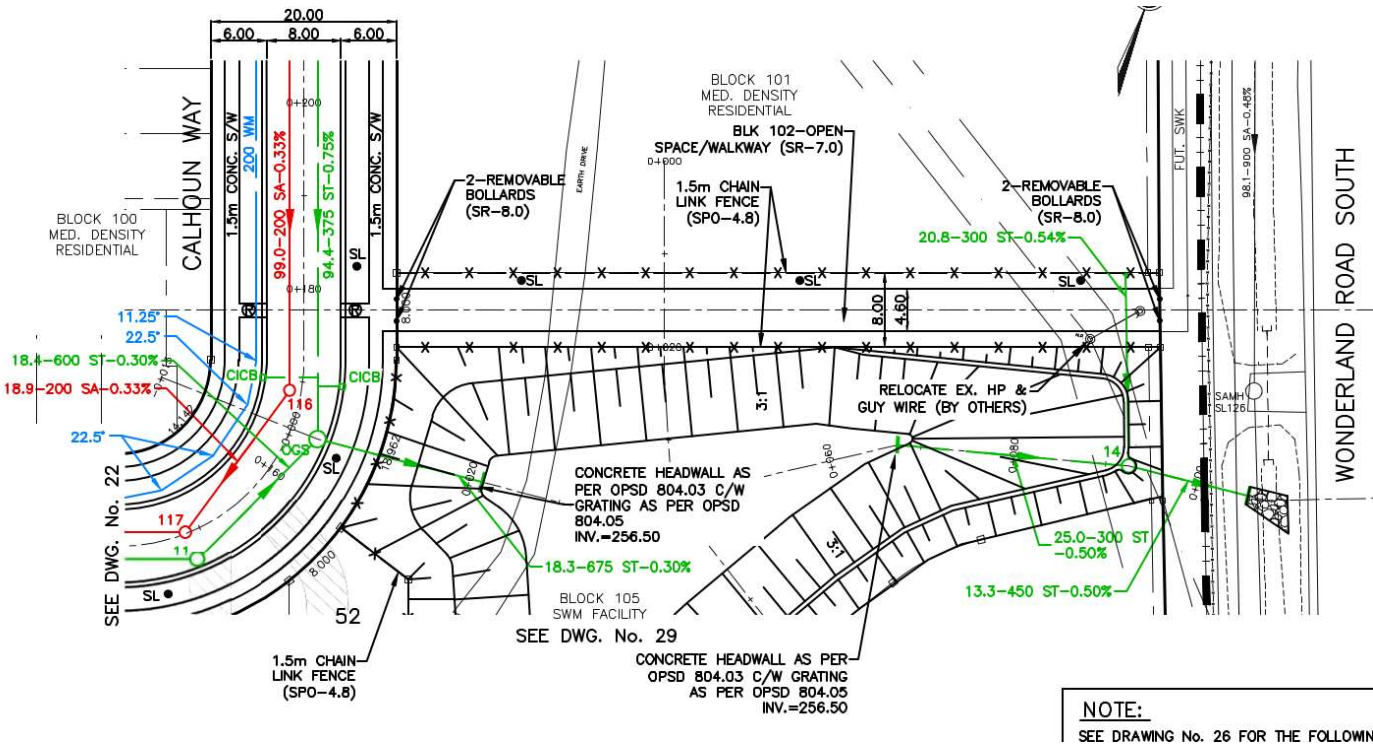


Liberty Crossing – ETV Scenario

- Applying the ETV PSD to the same example, we get the following:
- Long-term RE: 62%
- Cost: $95,000 (OGS only)
- Parallel SF0818 filter system can be added (5.4m X 2.4m vault) for an additional $350,000 (procurement only)

<u>Additional Considerations:</u>

- Elevated GW table will require dewatering. The depth of excavation and soil stability may also necessitate shoring/sheet piling to protect excavation



ACEC (London)
Working Group Activities

MTDs in the CLI-ECA

- Problem Statement:

Aim to identify and propose solutions to help address the challenges presented by the current stormwater CLI-ECA language, primarily as it relates to Stormwater Management (SWM) quality control requirements for Sedimentation Manufactured Treatment Devices (MTDs), through prescriptive use of the ETV protocol.

- Primary Issues:
  - Design Challenges (unclear objectives/ hydraulic limitations)
  - Cost (capital and ongoing maintenance)
  - Constructability (spatial limitations)
  - Questionable Net Benefit (Nominal additional improvement to overall water quality results)

MTDs in the CLI-ECA

- Approach to Solutions:

The guiding principle to our approach is commonly referred to as the **Best Available Technology Economically Achievable** (BATEA), along with reference to former MECP SWM documentation.

- Objectives:
  - Design Clarification (identify and simplify SWM and MTD requirements, consider treatment train approach)
  - Cost & Constructability Considerations (regard for capital / **ongoing maintenance requirements**, consider spatial limitations)
  - Achievable Results (target realistic treatment to overall water quality for urban runoff as part of over watershed)

MTDs in the CLI-ECA

- Inconsistencies between SWM requirements, specifically ETV protocol (PSD) for **S-MTDs**
- Implicit bias (other SWM measures inherently functioning better than these, regardless of practical constraints (cost/maintainability etc.)
- Stormwater having an achievable level of treatment (compared to say drinking water)
- Cost-effective Maintenance is central functionality of SWM measures

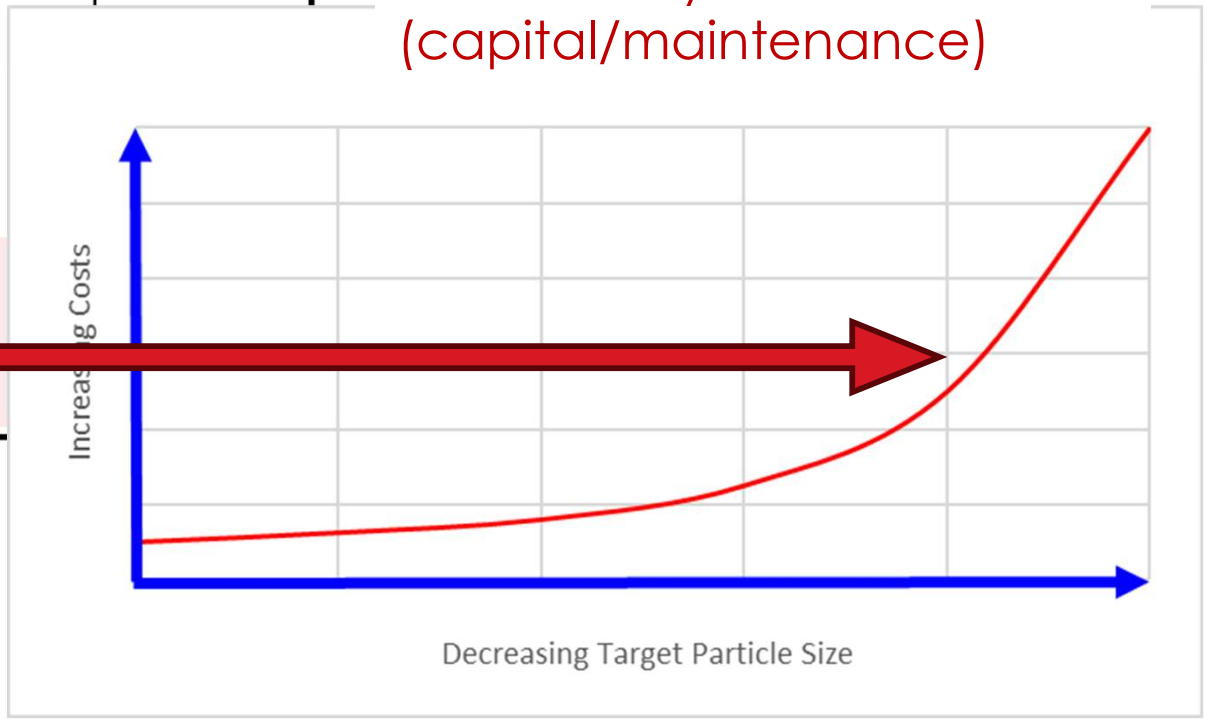
MTDs in the CLI-ECA

- ETV Particle Size Distribution:

Table 1: Particle Size Distribution of Test Sediment

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	
150	75	100-150	
100	60	75-100	
75	50	50-75	
50	45	20-50	
20	35	8-20	
8	20	5-8	
5	10	2-5	
2	5	<2	

Diminishing returns with substantially increased costs (capital/maintenance)



Technical Memo

- Provides background and rationale for proposed changes to MECP CLI-ECA documents.
- Aims to encourage a more simplified and practical approach to SWM quality control.
- Outlines some options/potential recommendations to be considered by the MECP.
- Provides opportunity for industry circulation and comment for further improvements.

CLI-ECA Document Proposed Revisions

- Updates to CLI documentation for streamlining design-related information (ease of use).

- Technical/Design content updates: changes to requirements for quality control, primarily for S-MTDs and F-MTDs to better align with effective SWM lifecycle considerations.

MTDs in the CLI-ECA

Recommendation:

- Changes to Schedule D' 5.2.4 and 5.2.5 to simplify and provide reference to the product qualification and design basis.

- Move and revise MTD design information from the CLI-ECA Sched. D to the MECP design criteria document and provide additional SWM guideline references for context.

These are examples of how to address within the current CLI-ECA document framework.

MTDs in the CLI-ECA

Revised CLI-ECA Schedule 'D':

- 5.2.4 Any new **Sedimentation** MTD that is part of the Alteration shall meet the following requirements:

  a) Product Qualification - Tested in accordance with approved protocols outlined in the current ECA design criteria document.

  b) Design Basis - The suspended solids removal claimed for the sedimentation MTD in achieving the water quality criteria in Appendix A, is based on the sizing methodology as outlined in the current ECA design criteria document.

- 5.2.5 Any new **Filtration** MTD that is part of the Alteration shall meet the following requirements:

  a) Product Qualification – field tested and verified in accordance with approved protocols outlined in the current ECA design criteria document.

  b) Design Basis - The suspended solids removal claimed for the filtration MTD in achieving the water quality criteria in Appendix A, is based on the sizing methodology as outlined in the current ECA design criteria document.

Proposed Update of the MECP CLI Design Criteria Document

Updated Section 6 – SWM

- Traditional EOP SWMF
- LID Measures Reference
- Third Pipe Collection
- Treatment Train Approach
- Sedimentation MTD's
- Filtration MTD's


Ontario

Design Criteria for
Sanitary Sewers, Storm Sewers ~~and~~ Forcemains
and Stormwater for Alterations Authorized under an
Environmental Compliance Approval

Ministry of Environment, Conservation and Parks
v.2.0, May 31, 2023

DRAFT Revisions as proposed by ACEC (LON) SWM Working Group.
Sept. 2024

Proposed Update of the MECP Design Criteria Document

Treatment Train Approach

- High-level guidance on best practice for SWM treatment train approach (CLI-Infrastructure)
- Consideration for allowance of in-series treatment removal efficiency calculation/credit (a simplified approach). Includes a 50% reduction factor for similar treatment measures placed in-line.

Proposed Update of the MECP Design Criteria Document

Sedimentation MTD's

- Product **Qualification** largely the same (per ETV)
- Product **Design** update to allow for 1994 MECP PSD for treatment up to Level 1 (80% TSS removal).
- S-MTDs can conform to current CLI-ECA 'Appendix A' criteria without accepting a lowered 'equivalent treatment removal' efficiency (per ETV).
- Includes practical design elements and Best Management Practice considerations (EMC and required maintenance) .

Proposed Update of the MECP Design Criteria Document

Filtration MTD's

- Product **Qualification** (per TAPE/ETV/GULD)
- Product **Design** updated to require practical maintenance frequency assessment (mass-loading).
- F-MTDs still conform to current CLI-ECA 'Appendix A' criteria (Level 1 treatment).
- Includes practical design elements and Best Management Practice considerations for implementation (EMC and required maintenance frequency) .

Anticipated Next Steps

- Provide Technical Review Memo to MECP / ACEC-ON Chapters for comment.
- Present to ACEC Ontario/ MEA (Liaison Committee).
- Engage with MECP agency staff to further review recommendations and assist with adapting to best-fit within the CLI-ECA framework.