E Ink Corporation Facility Expansion
South Hadley, Massachusetts
Stormwater Management Report

January 2022
Revised April 11, 2022

Prepared for:
E Ink Corporation
7 Gaylord Street
South Hadley MA, 01075

BSC Project No. 23381.01

Prepared by:

BSC GROUP

300 Brickstone Square, Suite 901
Andover, MA 01810

Table of Contents

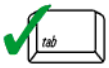
E Ink Corporation Facility Expansion
South Hadley, Massachusetts
Stormwater Management Report

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☒ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☒ Reduced Impervious Area (Redevelopment Only)
- ☐ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of “country drainage” versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☐ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☐ Soil Analysis provided.

☐ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☐ The ½" or 1" Water Quality Volume or
- ☒ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☒ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☒ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☒ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☐ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Section 1.0 Abbreviated Stormwater Management Report

Applicant/Project Name: E Ink Corporation

Project Address: 7 Gaylord Street, South Hadley, Massachusetts

Application Prepared by:
Firm: BSC Group, Inc.
Registered PE Robert S. Newton, P.E.

The following narrative relates to the Massachusetts Department of Environmental Protection Stormwater Management Policy and associated Standards #1-10, as they apply to the E Ink Corporation Facility Expansion Project:

General:

E Ink Corporation (E Ink) is proposing a redevelopment of their existing facility located at 7 Gaylord Street in South Hadley, Massachusetts. The proposed project generally consists of removal of a portion of the existing building, construction of a new building and covered loading dock within the same approximate footprint, construction of an aboveground storage tank farm with associated appurtenances, water quality and drainage upgrades, repaving impacted portions of the site, and replacement of deteriorated hot mix asphalt curbing.

The existing drainage system consists of several catch basins that collect runoff from the parking lot and discharges via a headwall into Buttery Brook. At the southern end of the site, where the parking lot abuts Buttery Brook, the curbing is deteriorated to the point of allowing runoff from the parking lot to sheet flow directly into Buttery Brook. The existing system does not have any water quality treatment measures.

According to the Massachusetts Department of Environmental Protection Stormwater Design Guide (Volume 2, Chapter 3), this project is considered a redevelopment project:

> "Development rehabilitation, expansion and phased projects on previously developed sites, provided the redevelopment results in no net increase in impervious area…"

Therefore, the project has been designed to meet all applicable standards of the MassDEP Stormwater Management Handbook to the maximum extent practicable. In accordance with the DEP Stormwater Management Handbook, Standards 1,8, 9, and 10 must be met fully, while the remaining standards must be met to the maximum extent practicable.

Standard 1: No New Untreated Discharges

Per Massachusetts Stormwater Management Standard #1, no new outfalls may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth. A new outfall with outlet protection is proposed as part of this project. Supporting total suspended solids (TSS) removal calculations and outlet velocity calculations are provided to demonstrate adequate treatment prior to discharge and resistance to erosion or scour.

Standard 2: Peak Rate Attenuation

The redevelopment will increase the pervious coverage on the site and therefore reducing the peak rate of stormwater discharge. As a result, this standard has been met.

Standard 3: Recharge

The redevelopment will increase the pervious area within the property and therefore, there will be an increase in stormwater recharge from the property. As a result, this standard has been met.

Standard 4: Water Quality

The project will result in an overall improvement to water quality through a reduction in impervious surface and an improved stormwater drainage system, including deep sump catch basins and proprietary stormwater BMPs, and can therefore be considered in compliance with this standard.

Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

The project will provide an external storage tank farm, which has the potential to generate higher potential pollutant loads. The project is designed to meet the MA Stormwater Handbook Standard #5 by proposing deep-sump hooded catch basins and proprietary water quality units to provide at least 80% TSS prior to discharge. Additionally, these water quality units will act as oil-grit separators, which is also a requirement in treatment trains within this land use.

Standard 6: Critical Area

According to the latest Water Resource Map this project is not located within an Outstanding Resource Water (ORW).

Standard 7: Redevelopments and Other Project Subject to the Standards only to the maximum extent possible

This project is a redevelopment project. In accordance with the DEP Stormwater Management Handbook, Standards 1, 8, 9 and 10 have been fully met. In addition, the project has met all other standards (2, 3, 4, 5, 6 and 7) to the maximum extent possible.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

Prior to the start of construction all existing catch basin structures will be fitted with new silt sacks.

During construction as existing catch basin structures are removed and new deep sump catch basin structures installed and placed on-line, the new structures will also be fitted with new silt sacks for the duration of the project.

Due to the fact the construction will involve the disturbance of greater than one acre of land, coverage under the NPDES Construction General Permit issued by the EPA along with the preparation of a SWPPP will be required.

In general, stormwater control measures will include the use of silt sacks as required by the Engineer. Permanent control measures will include deep sump catch basins that will be used to divert, store, or limit runoff, along with other Best Management Practices (BMPs).

The objectives of the BMPs for construction activity are to minimize the disturbed areas, stabilize any disturbed areas as soon as practical, control the stormwater runoff within the project limits and retain sediment. Both erosion and sedimentation controls and non-stormwater best management measures will be used to ensure compliance with the Stormwater Standards.

Measures will be taken to minimize the area disturbed by construction activities to reduce the potential for soil erosion and stormwater pollution problems. These practices will be designed to limit the amount of stormwater entering a disturbed area or to trap sediment prior to the stormwater leaving the site. In addition, good housekeeping measures will be followed for the day-to-day operation of the construction site, under the control of the contractor, to minimize the impact of construction.

Standard 9: Operations and Maintenance Plan

The long-term operations and maintenance plan is outlined is Section 2.0 of this report. The stormwater collection system will be inspected and cleaned as necessary four time each year. This will include the maintenance of all catch basin sumps and water quality units.

The outlets for the stormwater system will be inspected to ensure they are stable, and no erosion has occurred since the last inspection.

Standard 10: Prohibition of Illicit Discharges

There are no known illicit discharges to the stormwater drainage system, and no new ones are proposed.

SECTION 2.0

LONG-TERM POLLUTION PREVENTION& OPERATION AND MAINTENANCE PLAN

2.0 LONG-TERM POLLUTION PREVENTION & OPERATION AND MAINTENANCE PLAN

This Long-Term Pollution Prevention & Operation and Maintenance Plan (LTPPOM Plan) has been developed for source control and pollution prevention at the site after construction.

MAINTENANCE RESPONSIBILITY

The enforcement of the LTPPOM Plan will be the responsibility of the Applicant, **E Ink,** the owner of the property where the development is situated.

GOOD HOUSEKEEPING PRACTICES

The site is to be kept clean of trash and debris at all times. Trash, junk, etc. is not to be left outside and will be subject to removal at the owner's expense. All deicing materials and sand will not be stored outside and exposed to rain and snow.

REQUIREMENTS FOR ROUTINE INSPECTIONS AND MAINTENANCE OF STORMWATER BEST MANAGEMENT PRACTICES

All stormwater Best Management Practices (BMP's) are to be inspected and maintained as follows:

Straw Wattles, Silt Fences, and other temporary measures

The temporary erosion control measures will be installed up gradient of any wetland resource area where any disturbance or alteration might otherwise allow for erosion or sedimentation. They will be regularly inspected to insure that they are functioning adequately. Additional supplies of these temporary measures will be stockpiled on site for any immediate needs or routine replacement. Temporary BMP's will be removed and disposed of appropriately upon site stabilization.

Deep Sump Hooded Catch Basins

Deep Sump Hooded Catch Basins are an important part of the treatment train for LUHPPLs. Regular maintenance is essential. Deep sump catch basins remain effective at removing pollutants only if they are cleaned out frequently. Inspect or clean at least four times per year including at the end of the foliage and snow removal seasons. Sediments must also be removed four times per year or whenever the depth of the deposits in the catch basin sump is greater than or equal to one foot from the bottom of the basin. Maintenance of these units should be done by a vacuum truck that will remove the water, sediment, debris, floating hydrocarbons and other materials in unit. The proper cleaning and disposal of the removed materials and liquid must be followed.

Stormceptor Water Quality Units or approved equal

Stormceptors are also an important part of the treatment train for LUHPPL's, as they have the ability to trap both sediment and oils from a parking lot. The Stormceptor water quality units or approved equal will require periodic inspection and cleaning to maintain operation and function. Owners should have these units inspected on a quarterly basis and after periods of intense precipitation. Inspections of the units can be done by using a clear Plexiglas tube ("sludge judge") to extract a water column sample. When sediment depths exceed 12-inches or other depth recommended by the manufacturer, then cleaning of the unit is required.

These water quality structures must and will be checked and cleaned immediately after petroleum spills. In the event of a spill, the appropriate regulatory agency must be notified.

Maintenance of these units should be done by a vacuum truck that will remove the water, sediment, debris, floating hydrocarbons and other materials in unit. The proper cleaning and disposal of the removed materials and liquid must be followed.

Inlet and outlet pipes must be checked for any obstructions and if any obstructions are found, they must be removed. Structural parts of the units will be repaired as needed.

SNOW DISPOSAL AND PLOWING

The purpose of the snow and snowmelt management plan is to provide guidelines regarding snow disposal site selection, site preparation and maintenance that are acceptable to the Department of Environmental Protection. For the areas that require snow removal, snow storage onsite will largely be accomplished by using impervious upland areas along the access area between the existing structure and the rear fence line. No snow shall be pushed into the wetlands. Snow melt will be collected within the stormwater collection system and treated by the stormwater quality unit before entering the Buttery Brook. This procedure is in accordance with current snow handling procedure followed by E Ink Corporation. In keeping with current E Ink practices, salt products are not utilized on pavement surfaces in this area. Salt deicing material are only used on walkways and the employee parking areas across Gaylord Street.

- Avoid dumping of snow into any water body, including rivers, ponds, or wetlands. In addition to water quality impacts and flooding, snow disposed of in open water can cause navigational hazards when it freezes into ice blocks.
- Avoid disposing of snow on top of storm drain catch basins or in stormwater basins. Snow combined with sand and debris may block a storm drainage system, causing localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water.

WINTER ROAD SALT AND/OR SAND USE AND STORAGE RESTRICTIONS

Road salt and sand shall not be stored onsite.

STREET SWEEPING SCHEDULES

There are three types of sweepers: Mechanical, Regenerative Air, and Vacuum Filter.

1) Mechanical: Mechanical sweepers use brooms or rotary brushes to scour the pavement.
2) Regenerative Air: These sweepers blow air onto the road or parking lot surface, causing fines to rise where they are vacuumed.
3) Vacuum Filter: These sweepers remove fines along roads. Two general types of vacuum filter sweepers are available - wet and dry. The dry type uses a broom in combination with the vacuum. The wet type uses water for dust suppression

Regardless of the type chosen, the efficiency of street sweeping is increased when sweepers are operated in tandem.

It is recommended that street sweeping of the parking areas occur four times a year using a Regenerative Air or Vacuum Filter sweeper, including once after the spring snow melt.

Reuse and Disposal of Street Sweepings

Once removed from paved surfaces, the sweepings must be handled and disposed of properly. Mass DEP's Bureau of Waste Prevention has issued a written policy regarding the reuse and disposal of street sweepings. These sweepings are regulated as a solid waste, and can be used in three ways:

- In one of the ways already approved by Mass DEP (e.g., daily cover in a landfill, additive to compost, fill in a public way)
- If approved under a Beneficial Use Determination
- Disposed in a landfill

TRAINING OF STAFF OR PERSONNEL INVOLVED WITH IMPLEMENTING LONG-TERM POLLUTION PREVENTION PLAN

The Long-Term Pollution Prevention Plan is to be implemented by the property owner. Trained and, if required, licensed Professionals are to be hired by the owner as applicable to implement the Long-Term Pollution Prevention Plan.

LIST OF EMERGENCY CONTACTS FOR IMPLEMENTING LONG-TERM POLLUTION PREVENTION PLAN

The Owner will be required to maintain an updated list of Emergency Contacts for the site. This list will be provided during construction.

POST CONSTRUCTON PHASE INSPECTION SCHEDULE AND EVALUATION CHECKLIST

Inspection Date	Inspector	BMP Inspected	Inspection Frequency Requirements	Comments	Recommendation	Follow-up Inspection Required (yes/no)
		Catch Basins	Four times a year			
		Stormceptor Water Quality Units	Four times a year			

1. Refer to the Massachusetts Stormwater Handbook Volume Two: Stormwater Technical Handbook (February 2008) for recommendations regarding frequency for inspections and maintenance of specific BMP's

2. Inspections to be conducted by a qualified professional such as an environmental scientist or civil engineer.

3. Limited or no use of sodium chloride salts, fertilizers or pesticides recommended.

Other Notes: (Include deviations from Conservation Commission Approvals, Planning Board Approvals and Approved Plans)

SECTION 3.0

CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN (STORM WATER POLLUTION PREVENTION PLAN - SWPPP)

3.0 CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN (STORM WATER POLLUTION PREVENTION PLAN - SWPPP)

This Section specifies requirements and suggestions for implementation of a Storm Water Pollution Prevention Plan (SWPPP) for the construction of the E Ink Facility. The SWPPP shall be provided and maintained on-site by the Contractor(s) during all construction activities. The SWPPP shall be updated as required to reflect changes to construction activity.

The storm water pollution prevention measures contained in the SWPPP shall be at least the minimum required by Local Regulations. The Contractor shall provide additional measures to prevent pollution from stormwater discharges in compliance with all local, state and federal requirements.

The SWPPP shall include provisions for, but not be limited to, the following:

1. Construction Trailers
2. Lay-down Areas
3. Equipment Storage Areas
4. Stockpile Areas
5. Disturbed Areas

Erosion and Sedimentation Control

The Contractor shall be solely responsible for erosion and sedimentation control at the site. The Contractor shall utilize a system of operations and all necessary erosion and sedimentation control measures, even if not specified herein or elsewhere, to minimize erosion damage at the site to prevent the migration of sediment into environmentally sensitive areas. Environmentally sensitive areas include all wetland resource areas within, and downstream of, the site, and those areas of the site that are not being altered.

Erosion and sedimentation control shall be in accordance with this Section, the design drawings, and the following:

- "Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices" (EPA 832-R92-005, Sept. 1992).
- "Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices – Summary Guidance" (EPA 833-R92-001, Oct. 1992).
- Massachusetts Stormwater Management Handbook issued by the Massachusetts Department of Environmental Protection, February 2008.
- Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, A Guide for Planners, Designers and Municipal Officials, March 1997.

The BMP's presented here should be used as a guide for erosion and sedimentation control and are not intended to be considered specifications for construction. The most important BMP is maintaining a rapid construction process, resulting in prompt stabilization of surfaces, thereby reducing erosion potential. Given the primacy of rapid construction, these guidelines have been designed to allow construction to progress with essentially no hindrance by the erosion control methods prescribed. These guidelines have also been designed with sufficient flexibility to allow the contractor to modify the suggested methods as required to suit seasonal, atmospheric, and site-specific physical constraints.

Another important BMP is the prevention of concentrated water flow. Sheet flow does not have the erosive potential of a concentrated rivulet. These guidelines recommend construction methods that allow localized erosion control and a system of construction, which inhibits the development of shallow concentrated flow. These BMP's shall be maintained throughout the construction process.

CONTACT INFORMATION AND RESPONSIBLE PARTIES

The following is a list of all project-associated parties:

Current Owner/Applicant
E Ink Corporation
7 Gaylord Street
South Hadley, MA

Contractor
TBD

Engineering Consultant
BSC Group, Inc.
300 Brickstone Square
Andover, MA

3.01 Procedural Conditions of the Construction General Permit (CGP)

The following list outlines the Stormwater responsibilities for all construction operators working on the Project. The operators below agree, through a cooperative agreement, to abide by the following conditions throughout the duration of the construction project, effective the date of signature of the required SWPPP. These conditions apply to all operators on the project site.

All contractors/operators involved in clearing, grading, and excavation construction activities must sign the appropriate certification statement, which will remain with the SWPPP. The owner must also sign a certification, which is to remain with the SWPPP in accordance with the signatory requirements of the SWPPP.

Once the SWPPP is finalized, a signed copy, plus supporting documents, must be maintained at the project site during construction. A copy must remain available to state and local agencies, and other interested parties during normal business hours.

The following items associated with this SWPPP must be posted in a prominent place at the construction site until final stabilization has been achieved:

- The completed/submitted NOI form
- Location where the public can view the SWPPP during normal business hours
- A copy of the signed/submitted NOI, permit number issued by the EPA.

Project specific SWPPP documents are not submitted to the US EPA unless the agency specifically requests a copy for review. If SWPPP documents are requested by a permitting authority, the permittee(s) will submit them in a timely manner.

EPA inspectors will be allowed free and unrestricted access to the project site and all related documentation and records kept under the conditions of the permit.

The permitee is expected to keep all BMP's and Storm Water controls operating correctly and maintained regularly.

Any additions to the project which will significantly change the anticipated discharges of pollutants, must be reported to the EPA. The EPA should also be notified in advance of any anticipated events of noncompliance. The permittee must also orally inform the EPA of any discharge, which may endanger health or the environment within 24 hours, with a written report following within 5 days.

In maintaining the SWPPP, all records and supporting documents will be compiled together in an orderly fashion. Inspection reports and amendments to the SWPPP must remain with the document. Federal regulations require permitee(s) to keep their Project Specific SWPPP and all reports and documents for at least three years after the project is complete.

3.02 Project Description and Intended Construction Sequence

The applicant is planning to redevelop the site. The site is currently comprised of open field and surface detention ponds serving recent development of the property to the southwest. The development activities will include the following major components:

- Demolition of existing drainage and utilities;
- Site grading and installation of site utilities, including stormwater management systems and stormwater treatment features;
- Construction of parking areas and building;
- Landscaping associated with utilities and grading.

Soil disturbing activities will include site demolition, installing stabilized construction exits, installation of erosion and sedimentation controls, grading, stormwater management system, utilities, construction of roadways and preparation for final seeding, mulching and landscaping. Please refer to Table 1 for the projects anticipated construction timetable. A description of BMP's associated with project timetable and construction-phasing elements is provided in this SWPPP.

Table 1 – Anticipated Construction Timetable

Construction Phasing Activity	Anticipated Timetable
Demolition, Grubbing and Stripping of Limits of Construction	Spring 2022
Rough Site Grading and Site Utilities	Fall 2022/Spring 2023
Building/Parking	Spring 2023
Final Clean-up	Summer 2023

3.03 Potential Sources of Pollution

Any project site activities that have the potential to add pollutants to runoff are subject to the requirements of this sample SWPPP. Listed below are a description of potential sources of pollution from both sediment addition to stormwater runoff, and pollutants from sources other than sedimentation.

Table 2 – Potential Sources of Sediment to Storm Water Runoff

Potential Source	Activities/Comments
Construction Site Entrance and Site Vehicles	Vehicles leaving the site can track soils onto public roadways. Site Vehicles can readily transport exposed soils throughout the site and off-site areas.
Grading Operations	Exposed soils have the potential for erosion and discharge of sediment to off-site areas.
Material Excavation, Relocation, and Stockpiling	Stockpiling of materials during excavation and relocation of soils can contribute to erosion and sedimentation. In addition fugitive dust from stockpiled material, vehicle transport and site grading can be deposited in wetlands and waterway.
Landscaping Operations	Landscaping operations specifically associated with exposed soils can contribute to erosion and sedimentation.

	Hydroseeding, if not properly applied, can run off to adjacent wetlands and waterways.

Table 3 – Potential Pollutants and Sources, other than Sediment to Storm Water Runoff

Potential Source	Activities/Comments
Staging Areas and Construction Vehicles	Vehicle refueling, minor equipment maintenance, sanitary facilities and hazardous waste storage
Materials Storage Area	General building materials, solvents, adhesives, paving materials, paints, aggregates, trash, etc.
Construction Activities	Construction, paving, curb/gutter installation, concrete pouring/mortar/stucco

3.04 Erosion and Sedimentation Control Best Management Practices

The project site is characterized primarily by impervious surface. All construction activities will implement Best Management Practices (BMP's) in order to minimize overall site disturbance and impacts to the sites natural features. Please refer to the following sections for a detailed description of site specific BMP's. In addition, an Erosion and Sedimentation Control Plan is provided in the Site Plans.

3.05 Timetable and Construction Phasing

This section provides the Owner and Contractor with a suggested order of construction that shall minimize erosion and the transport of sediments. The individual objectives of the construction techniques described herein shall be considered an integral component of the project design intent of each project phase. The construction sequence is not intended to prescribe definitive construction methods and should not be interpreted as a construction specification document. It is likely that portions of the development area will be constructed in phases. However, the Contractor shall follow the general construction phase principles, as applicable, provided below:

- Protect and maintain existing vegetation wherever possible.
- Minimize the area of disturbance.
- To the extent possible, route unpolluted flows around disturbed areas.
- Install mitigation devices as early as possible.
- Minimize the time disturbed areas are left unstabilized.
- Maintain siltation control devices in proper condition.
- The contractor should use the suggested sequence and techniques as a general guide and modify the suggested methods and procedures as required to best suit seasonal, atmospheric, and site specific physical constraints for the purpose of minimizing the environmental impact of construction.

Demolition, Grubbing and Stripping to Limits of Construction

- Install TEC devices as required to prevent sediment transport into resource areas.
- Place a ring of silt socks and/or hay bales around stockpiles.
- Stabilize all exposed surfaces that will not be under immediate construction.
- Store and/or dispose all pavement and building demolition debris as indicated in accordance with all applicable local, state, and federal regulations.

Roadway Sub-base Construction

- Install temporary culverts and diversion ditches and additional TEC devices as required by individual construction area constraints to direct potential runoff toward detention areas designated for the current construction phase.

- Compact gravel as work progresses to control erosion potential.
- Apply water to control air suspension of dust.
- Avoid creating an erosive condition due to over-watering.
- Install piped utility systems as required as work progresses, keeping all inlets sealed until all downstream drainage system components are functional.

Binder Construction

- Fine grade gravel base and install processed gravel to the design grades.
- Compact pavement base as work progresses.
- Install pavement binder course starting from the downhill end of the site and work toward the top.

Finish Paving

- Repair and stabilize damaged side slopes.
- Clean inverts of drainage structures.
- Install final top course of pavement.

Final Clean-up

- Clean inverts of culverts and catch basins.
- Remove sediment and debris from rip-rap outlet areas.
- Remove TEC devices only after permanent vegetation and erosion control has been fully established.

3.06 Site Stabilization

Grubbing Stripping and Grading

- Erosion control devices shall be in place as shown on the design plans before grading commences.
- Stripping shall be done in a manner, which will not concentrate runoff. If precipitation is expected, earthen berms shall be constructed around the area being stripped, with a silt sock, silt fence or hay bale dike situated in an arc at the low point of the berm.
- If intense precipitation is anticipated, silt socks, hay bales, dikes and /or silt fences shall be used as required to prevent erosion and sediment transport. The materials required shall be stored on site at all time.
- If water is required for soil compaction, it shall be added in a uniform manner that does not allow excess water to flow off the area being compacted.
- Dust shall be held at a minimum by sprinkling exposed soil with an appropriate amount of water.

Maintenance of Disturbed Surfaces

- Runoff shall be diverted from disturbed side slopes in both cut and fill.
- Mulching may be used for temporary stabilization.
- Silt sock, hay bale or silt fences shall be set where required to trap products of erosion and shall be maintained on a continuing basis during the construction process.

Loaming and Seeding

- Loam shall not be placed unless it is to be seeded directly thereafter.
- All disturbed areas shall have a minimum of 4-inches of loam placed before seeding and mulching.
- Consideration shall be given to hydro-mulching, especially on slopes in excess of 3H:1V.
- Loamed and seeded slopes shall be protected from washout by mulching or other acceptable slope protection until vegetation begins to grow.

Stormwater Management System Installation

- The stormwater management system shall be installed from the downstream end up and in a manner which will not allow runoff from disturbed areas to enter pipes.
- Excavation for the system shall not be left open when rainfall is expected overnight. If left open under other circumstances, pipe ends shall be closed by a staked board or by an equivalent method.
- All catch basin openings shall be covered by a silt bag between the grate and the frame or protected from sediment by silt fence surrounding the catch basin grate.

Completion of Paved Areas

- During the placement of sub-base and pavement, entrances to the stormwater management system shall be sealed when rain is expected. When these entrances are closed, consideration must be given to the direction of run-off and measures shall be undertaken to minimize erosion and to provide for the collection of sediment.
- In some situations, it may be necessary to keep catch basins open.
- Appropriate arrangements shall be made downstream to remove all sediment deposition.

Stabilization of Surfaces

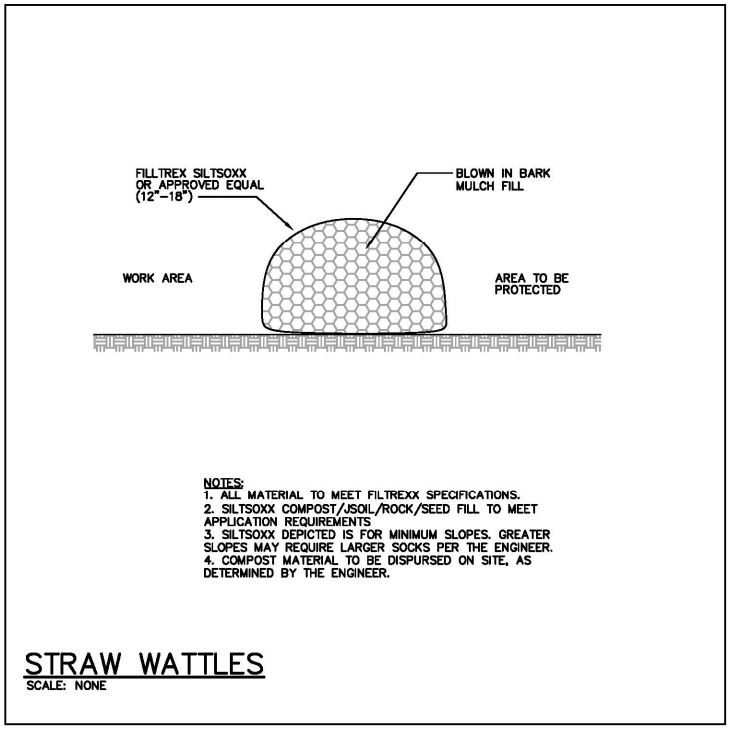
- Stabilization of surfaces includes the placement of pavement, rip-rap, wood bark mulch and the establishment of vegetated surfaces.
- Upon completion of construction, all surfaces shall be stabilized even though it is apparent that future construction efforts will cause their disturbance.
- Vegetated cover shall be established during the proper growing season and shall be enhanced by soil adjustment for proper pH, nutrients and moisture content.
- Surfaces that are disturbed by erosion processes or vandalism shall be stabilized as soon as possible.
- Areas where construction activities have permanently or temporarily ceased shall be stabilized within 14-days from the last construction activity, except when construction activity will resume within 21-days (e.g., the total time period that construction activity is temporarily ceased is less than 21-days).
- Hydro-mulching of grass surfaces is recommended, especially if seeding of the surfaces is required outside the normal growing season.
- Hay mulch is an effective method of temporarily stabilizing surfaces, but only if it is properly secured by branches, weighted snow fences or weighted chicken wire.

3.07 Temporary Structural Erosion Control Measures

Temporary erosion control measures serve to minimize construction-associated impacts to wetland resource and undisturbed areas. Please refer to the following sections for a description of temporary erosion control measures implemented as part of the project and this sample SWPPP.

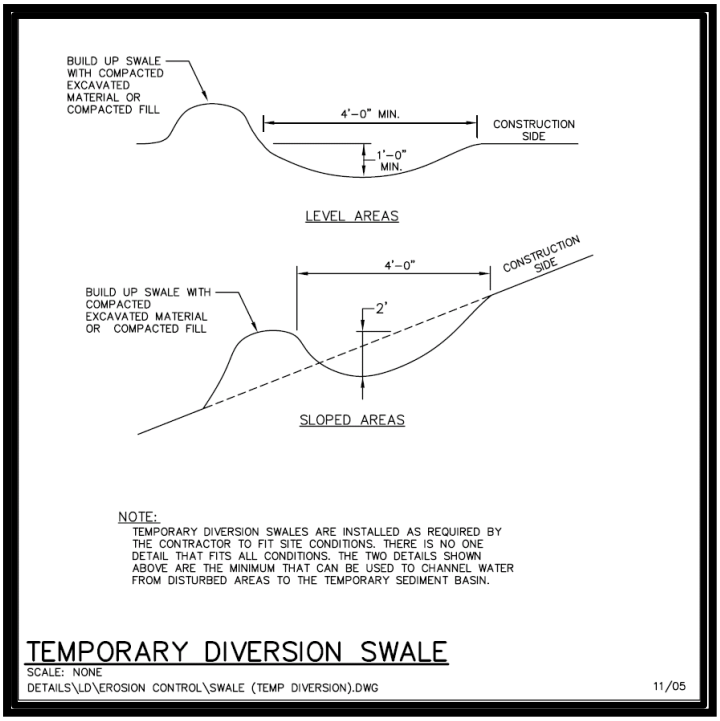
3.07.1 Silt Socks, Straw Wattles, and Silt Fencing

Siltation barriers composed of silt socks or straw wattles and trenched silt fence will be installed as shown on the Site Plans. The siltation barriers will demarcate the limit of work, form a work envelope and provide additional assurance that construction equipment will not enter the adjacent wetlands or undisturbed portions of the site. All barriers will remain in place until disturbed areas are stabilized.



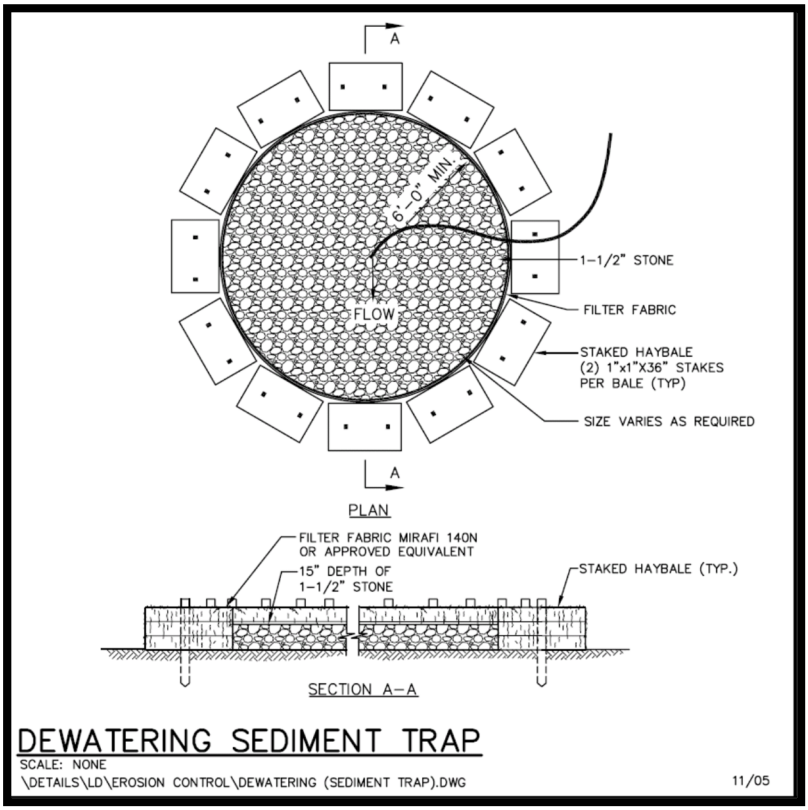
3.07.2 Temporary Storm Water Diversion Swale

A temporary diversion swale is an effective practice for temporarily diverting stormwater flows and to reduce stormwater runoff velocities during storm events. The swale channel can be installed before infrastructure construction begins at the site, or as needed throughout the construction process. The diversion swale should be routinely compacted or seeded to minimize the amount of exposed soil.



3.07.3 Dewatering Basins

Dewatering may be required during stormwater management system installation, foundation construction, and/or utility installation. Should the need for dewatering arise, groundwater will be pumped directly into a temporary settling basin, which will act as a sediment trap during construction. All temporary settling basins will be located within close proximity of daily work activities. Prior to discharge, all groundwater will be treated by means of the settling basin or acceptable substitute. Discharges from sediment basins will be free of visible floating, suspended and settleable solids that would impair the functions of a wetland or degrade the chemical composition of the wetland resource area receiving ground or surface water flows and will be to the combined system.



3.07.4 Material Stockpiling Locations

There will be no storage of soil, gravel or construction debris within the 100-foot buffer zone to wetland resource areas. It is anticipated that all excavated material will be placed in a dump truck and stockpiled outside the 100-foot buffer zone during construction activities. Materials from piping and trench excvation associated with the subsurface utility work will be contained with a single row of silt socks and/or wattles.

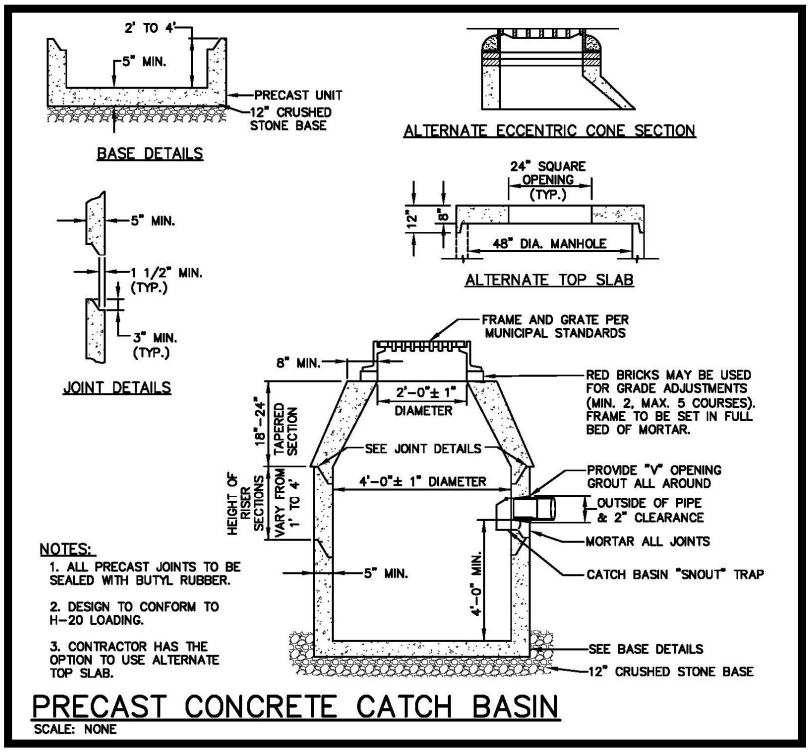
3.08 Permanent Structural Erosion Control Measures

Permanent erosion control measures serve to minimize post-construction impacts to wetland resource areas and undisturbed areas. Please refer to the following sections for a description of permanent erosion control measures implemented as part of the project and this SWPPP.

3.08.1 Catch Basins with Deep Sumps and Hooded Traps

Parking lots will be curbed and provided with catch basins to collect runoff. The entire stormwater management system for each respective project phase will be installed during the initial phases of construction. The system will be installed from the downstream end up, and in a manner which will not allow runoff from disturbed areas to enter the pipes.

Inspect or clean at least four times per year including at the end of the foliage and snow removal seasons. Sediments must also be removed four times per year or whenever the depth of the deposits in the catch basin sump is greater than or equal to one foot from the bottom of the basin. Maintenance of these units should be done by a vacuum truck that will remove the water, sediment, debris, floating hydrocarbons and other materials in unit. The proper cleaning and disposal of the removed materials and liquid must be followed



3.08.2 Stormceptor Water Quality Units or approved equal

The Stormceptor water quality structure or approved equal will require periodic inspection and cleaning to maintain operation and function. Owners should have these units inspected on a quarterly basis and after periods of intense precipitation. Inspections of the units can be done by using a clear Plexiglas tube ("sludge judge") to extract a water column sample. When sediment depths exceed 12-inches or other depth as recommended by the manufacturer, then cleaning of the unit is required.

These water quality structures must and will be checked and cleaned immediately after petroleum spills; contact appropriate regulatory agencies

Maintenance of these units should be done by a vacuum truck that will remove the water, sediment, debris, floating hydrocarbons and other materials in unit. The proper cleaning and disposal of the removed materials and liquid must be followed.

Inlet and outlet pipes must be checked for any obstructions and if any obstructions are found, they must be removed. Structural parts of the units will be repaired as needed.

3.09 Good Housekeeping Best Management Practices

3.09.1 Material Handling and Waste Management

Solid waste generation during the construction period will be primarily construction debris. The debris will include scrap lumber (used forming and shoring pallets and other shipping containers), waste packaging materials (plastic sheeting and cardboard), scrap cable and wire, roll-off containers (or dumpsters) and will be removed by a contract hauler to a properly licensed landfill. The roll-off containers will be covered with a properly secured tarp before the hauler exits the site. In addition to construction debris, the construction work force will generate some amount of household-type wastes (food packing, soft drink containers, and other paper). Trash containers for these wastes will be located around the site and will be emptied regularly so as to prevent wind-blown litter. This waste will also be removed by a contract hauler.

All hazardous waste material such as oil filters, petroleum products, paint and equipment maintenance fluids will be stored in structurally sound and sealed shipping containers in the hazardous-materials storage area and segregated from other non-waste materials. Secondary containment will be provided for all materials in the hazardous materials storage area and will consist of commercially available spill pallets. Additionally, all hazardous materials will be disposed of in accordance with federal, state and municipal regulations.

Temporary sanitary facilities (portable toilets) will be provided at the site. The toilets will be located away from a concentrated flow path and traffic flow and will have collection pans underneath as secondary treatment. All sanitary waste will be collected from an approved party at a minimum of three times per week.

3.09.2 Material Staging Areas

Construction equipment and maintenance materials will be stored at the combined staging area and materials storage areas. Silt fence will be installed around the perimeter to designate the staging and materials storage area. A watertight shipping container will be used to store hand tools, small parts and other construction materials.

All hazardous-waste materials such as oil filters, petroleum products, paint and equipment maintenance fluids will be stored in structurally sound and sealed containers under cover within the hazardous materials storage area.

Large items such as piping will be stored in the open storage area. Such materials will be elevated on wood blocks to minimize contact with runoff.

The combined storage areas are expected to remain clean, well organized and equipped with ample cleaning supplies as appropriate for the materials being stored. Perimeter controls such as containment structures, covers and liners will be repaired or replaced as necessary to maintain proper function.

3.09.3 Designated Washout Areas

Designated temporary, below-ground concrete washout areas will be constructed, as required, to minimize the pollution potential associated with concrete, paint, stucco, mixers etc. Signs will, if required, be posted marking the location of the washout area to ensure that concrete equipment operators use the proper facility. Concrete pours will not be conducted during or before an anticipated precipitation event. All excess concrete and concrete washout slurries from the concrete mixer trucks and chutes will be discharged to the washout area or hauled off-site for disposal.

3.09.4 Equipment/Vehicle Maintenance and Fueling Areas

Several types of vehicles and equipment will be used on-site throughout the project including graders, scrapers, excavators, loaders, paving equipment, rollers, trucks and trailers, backhoes and forklifts. All major equipment/vehicle fueling and maintenance will be performed off-site. A small, 20-gallon pickup bed fuel tank will be kept on-site in the combined staging area. When vehicle fueling must occur on-site, the fueling activity will occur in the staging area. Only minor equipment maintenance will occur on-site. All equipment fluids generated from maintenance activities will be disposed of into designated drums stored on spill pallets. Absorbent, spill-cleanup materials and spill kits will be available at the combined staging and materials storage area. Drip pans will be placed under all equipment receiving maintenance and vehicles and equipment parked overnight.

3.09.5 Equipment/Vehicle Wash down Area

All equipment and vehicle washing will be performed off-site.

3.09.6 Spill Prevention Plan

A spill containment kit will be kept on-site in the Contractor's trailer and/or the designated staging area throughout the duration of construction. Should there be an accidental release of petroleum product into a wetland or within 100-feet of a wetland, the appropriate agencies will be immediately notified.

3.10 Inspections

Maintenance of existing and proposed BMP's to address stormwater management facilities during construction is an on-going process. The purpose of the inspections is to observe all sources of stormwater or non-stormwater discharge as identified in the SWPPP as well as the status of the receiving waters and fulfill the requirements of the Order of Conditions (OOC).

The following sections describe the appropriate inspection measures to adequately implement the project's SWPPP. A blank inspection form is provided at the end of this section. Completed inspection forms are to be maintained on site.

3.10.1 Inspection Personnel

The owner's appointed representative will be responsible for performing regular inspections of erosion controls and ordering repairs as necessary.

3.10.2 Inspection Frequency

Inspections will be performed by qualified personnel as required by the OOC. The inspections must be documented on the inspection form provided at the end of this section, and completed forms will be provided to the on-site supervisor and maintained at the Owner's office throughout the entire duration of construction.

3.10.3 Inspection Reporting

Each inspection report will summarize the scope of the inspection, name(s) and qualifications of personnel making the inspection, and major observations relating to the implementation of the SWPPP, including compliance and non-compliance items. Completed inspection reports will remain with the completed SWPPP on site.

3.11 Amendment Requirements

The final SWPPP is intended to be a working document that is utilized regularly on the construction site, and provides guidance to the Contractor. It must reflect changes made to the originally proposed plan and will be updated to include project specific activities and ensure that they are in compliance with state and local laws and regulations. It should be amended whenever there is a change in design, construction, operation or maintenance that affects discharge of pollutants. The following items should be addressed should an amendment to the SWPPP occur:

- Dates of certain construction activities such as major grading activities, clearing and initiation of and completion of stabilization measures should be recorded.
- Future amendments to the SWPPP will be recorded as required. As this SWPPP is amended, all amendments will be kept on site and made part of the SWPPP.
- Upon completion of site stabilization (completed as designed and/or 70% background vegetative cover), it can be documented and marked on the plans. Inspections are no longer required at this time.
- Inspections often identify areas not included in the original SWPPP, which will require the SWPPP to be amended. These updates should be made within seven days of being recognized by the inspector.

SWPPP INSPECTION AND MAINTENANCE REPORT

E Ink Corporation
South Hadley, MA

TO BE COMPLETED AT LEAST EVERY 7 DAYS. AFTER SITE STABILIZATION, TO BE COMPLETED AT LEAST ONCE PER MONTH FOR THREE YEARS OR UNTIL A NOTICE OF TERMINATION IS FILED.

General Information			
Project Name			
NPDES Tracking No.		**Location**	
Date of Inspection		**Start/End Time**	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Inspector's Qualifications			
Describe present phase of construction			
Type of Inspection: ❑ Regular ❑ Pre-storm event ❑ During storm event ❑ Post-storm event			
Weather Information			
Has there been a storm event since the last inspection? ❑Yes ❑No **If yes, provide:** Storm Start Date & Time: Storm Duration (hrs): Approximate Amount of Precipitation (in):			
Weather at time of this inspection? ❑ Clear ❑Cloudy ❑ Rain ❑ Sleet ❑ Fog ❑ Snowing ❑ High Winds ❑ Other: Temperature:			
Have any discharges occurred since the last inspection? ❑Yes ❑No **If yes, describe:**			
Are there any discharges at the time of inspection? ❑Yes ❑No **If yes, describe:**			

Site-specific BMPs

- *Number the structural and non-structural BMPs identified in your SWPPP on your site map and list them below (add as many BMPs as necessary). Carry a copy of the numbered site map with you during your inspections. This list will ensure that you are inspecting all required BMPs at your site.*
- *Describe corrective actions initiated, date completed, and note the person that completed the work in the Corrective Action Log.*

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
1		❑Yes ❑No	❑Yes ❑No	
2		❑Yes ❑No	❑Yes ❑No	
3		❑Yes ❑No	❑Yes ❑No	
4		❑Yes ❑No	❑Yes ❑No	
5		❑Yes ❑No	❑Yes ❑No	
6		❑Yes ❑No	❑Yes ❑No	
7		❑Yes ❑No	❑Yes ❑No	
8		❑Yes ❑No	❑Yes ❑No	
9		❑Yes ❑No	❑Yes ❑No	
10		❑Yes ❑No	❑Yes ❑No	
11		❑Yes ❑No	❑Yes ❑No	
12		❑Yes ❑No	❑Yes ❑No	
13		❑Yes ❑No	❑Yes ❑No	
14		❑Yes ❑No	❑Yes ❑No	
15		❑Yes ❑No	❑Yes ❑No	
16		❑Yes ❑No	❑Yes ❑No	
17		❑Yes ❑No	❑Yes ❑No	
18		❑Yes ❑No	❑Yes ❑No	
19		❑Yes ❑No	❑Yes ❑No	
20		❑Yes ❑No	❑Yes ❑No	

Overall Site Issues

Below are some general site issues that should be assessed during inspections. Customize this list as needed for conditions at your site.

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	❑Yes ❑No	❑Yes ❑No	
2	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	❑Yes ❑No	❑Yes ❑No	
3	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	❑Yes ❑No	❑Yes ❑No	
4	Are discharge points and receiving waters free of any sediment deposits?	❑Yes ❑No	❑Yes ❑No	
5	Are storm drain inlets properly protected?	❑Yes ❑No	❑Yes ❑No	
6	Is the construction exit preventing sediment from being tracked into the street?	❑Yes ❑No	❑Yes ❑No	
7	Is trash/litter from work areas collected and placed in covered dumpsters?	❑Yes ❑No	❑Yes ❑No	
8	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	❑Yes ❑No	❑Yes ❑No	
9	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	❑Yes ❑No	❑Yes ❑No	
10	Are materials that are potential stormwater contaminants stored inside or under cover?	❑Yes ❑No	❑Yes ❑No	

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
11	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	❑Yes ❑No	❑Yes ❑No	
12	(Other)	❑Yes ❑No	❑Yes ❑No	

Non-Compliance

Describe any incidents of non-compliance not described above:

CERTIFICATION STATEMENT

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Print name and title: _____
(Qualified Person performing the Inspection)

Signature:_____ **Date:**_____

Print name and title:_____
(Duly Authorized Representative)

Signature:_____ **Date:**_____

Attachments and Supporting Calculations

Stormwater Management Facility Operation and Maintenance Cost Estimate

Methodology for determining costs:

- Unit costs based on review of available literature including the 1999 "Preliminary Data Summary for Urban Storm Water Management Best Practices" prepared by the United States Environmental Protection Agency
- Operation and Maintenance Cost of Infiltration Basins has been based on estimated construction costs.

Catch Basins
Assume $100.00/Basin to inspect and clean
5 Catch Basins
Estimated Annual O&M Cost = 5 basins *$100/Basin * 4 Cleanings a year = $2,000

Water Quality Inlet
Assume $200.00/Structure to inspect and clean
2 Water Quality Inlets
Estimated Annual O&M Cost = 2 Structures *$200/Structure * 4 Cleanings a year = $1,600

Total Estimated Cost for Operation and Maintenance of Proposed Stormwater BMP's = $3,600

Calculation Sheet

BSC GROUP

Project No.	23381.01	**Calc By**	MS
Subject	Proprietary WQV Sizing	**Date**	3/14/2022
Location	South Hadley, MA	**Checked by**	RN
		Date	3/15/2022

2013 MA DEP Standard Method to Convert Required Water Quality Volume to a Discharge Rate for Sizing Flow Based Manufactured Proprietary Stormwater Treatment Systems (2013 MADEP Q Rate)

STC 2400 Stormceptor

For 1-inch Water Quality Volume Requirement

Q = (qu)(A)(WQV) **0.96** **cfs**

Q = peak flow rate associated with the first 1-inch of runoff

qu = the unit peak discharge (csm/in)	774	(see 2013 MADEP Q Rate for Tc=0.1 hours)
A = impervious surface (sq.miles)	0.0012	
WQV = water quality volume (in)	1	

Calculation Sheet

BSC GROUP

Project No.	23381.01	**Calc By**	MS
Subject	Proprietary WQV Sizing	**Date**	3/14/2022
Location	South Hadley, MA	**Checked by**	RN
		Date	3/15/2022

2013 MA DEP Standard Method to Convert Required Water Quality Volume to a Discharge Rate for Sizing Flow Based Manufactured Proprietary Stormwater Treatment Systems (2013 MADEP Q Rate)

CS-4 Cascade Separator

For 1-inch Water Quality Volume Requirement

Q = (qu)(A)(WQV) **0.06** **cfs**

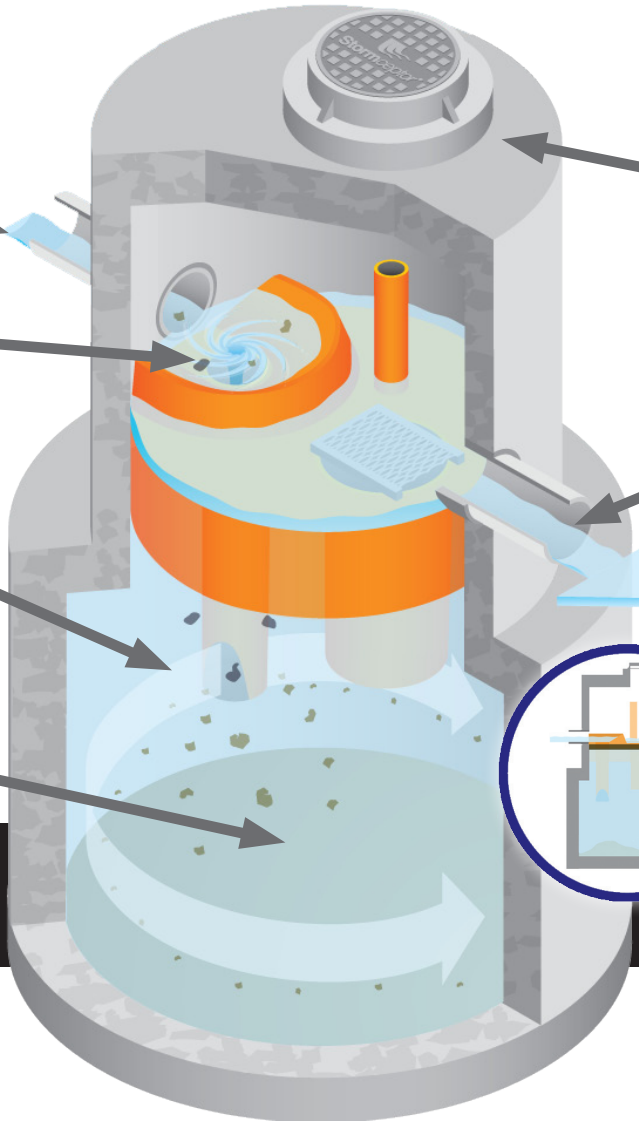
Q = peak flow rate associated with the first 1-inch of runoff

qu = the unit peak discharge (csm/in)	774	(see 2013 MADEP Q Rate for Tc=0.1 hours)
A = impervious surface (sq.miles)	0.0001	
WQV = water quality volume (in)	1	

Stormceptor®

Stormwater Treatment Made Simple!

TSS & Oil Removal ■ *Scour Prevention* ■ *Small Footprint*



Design Flexibility

Proven Performance

Environmentally Engineered Stormwater Solutions...
that exceed your client's needs!

www.rinkerstormceptor.com
Phone: (413) 562-3647

Rinker MATERIALS™

Stormceptor® STC

Stormceptor® is an underground stormwater quality treatment device that is unparalleled in its effectiveness for pollutant capture and retention. With thousands of systems operating worldwide, Stormceptor delivers protection every day in every storm.

With patented technology, optimal treatment occurs by allowing free oil to rise and sediment to settle. The Stormceptor design prohibits scour and release of previously captured pollutants, ensuring superior treatment and protection during even the most extreme storm events.

Stormceptor is very easy to design and provides flexibility under varying site constraints such as tight right-of-ways, zero lot lines and retrofit projects. Design flexibility allows for a cost-effective approach to stormwater treatment. Stormceptor has proven performance backed by the longest record of lab and field verification in the industry.

Tested Performance

- Fine particle capture
- Prevents scour or release
- 95%+ Oil removal

Massachusetts – Water Quality (Q) Flow Rate

Stormceptor STC Model	Inside Diameter	Typical Depth Below Inlet Pipe Invert [1]	Water Quality Flow Rate Q [2]	Peak Conveyance Flow Rate [3]	Hydrocarbon Capacity [4]	Maximum Sediment Capacity [4]
	(ft)	(in)	(cfs)	(cfs)	(Gallons)	(ft^3)
STC 450i	4	68	0.40	5.5	86	46
STC 900	6	63	0.89	22	251	89
STC 2400	8	104	1.58	22	840	205
STC 4800	10	140	2.47	22	909	543
STC 7200	12	148	3.56	22	1,059	839
STC 11000	2 x 10	142	4.94	48	2,792	1,086
STC 16000	2 x 12	148	7.12	48	3,055	1,677

[1] Depth Below Pipe Inlet Invert to the Bottom of Base Slab, and Maximum Sediment Capacity can vary to accommodate specific site designs and pollutant loads. Depths can vary to accommodate special designs or site conditions. Contact your local representative for assistance.
[2] Water Quality Flow Rate (Q) is based on 80% annual average TSS removal of the OK110 particle size distribution.
[3] Peak Conveyance Flow Rate is based upon ideal velocity of 3 feet per second and outlet pipe diameters of 18-inch, 36-inch, and 54-inch diameters.
[4] Hydrocarbon & Sediment capacities can be modified to accommodate specific site design requirements, contact your local representative for assistance.

Rinker MATERIALS™
www.rinkerstormceptor.com
Manufacturing Plant: Westfield, MA
Phone: (413) 562-3647
11-22-13-R13-802 MDEP

Stormceptor®
www.stormceptor.com

COVENTRY
UNIVERSITY

Laboratory Tests
Conducted in the School of The Built Environment
Coventry University, UK
on

X-CEPTOR CONCRETE BYPASS INTERCEPTOR
also known as STORMCEPTOR in North America

for
CSR Humes (UK) Ltd., Pontyclun, CF7 9YX
May-August 1996

Priority Street Coventry CVI 5FB Telephone 0203 631313

Subject: University of Coventry Stormceptor@ Testing Results

Please find enclosed the final report regarding the University of Coventry testing results for the Stormceptorg System. The University of Coventry (United Kingdom) tested the effectiveness of a full scale concrete Stormceptor in removing oil, sand, and peat. The unit that was tested incorporated the disc insert design and conforms to the UK production sizes. The UK Stormceptor sizes are smaller than those produced in North America.

The Stormceptor was tested at full treated flowrate (just before by-passing). Oil was introduced upstream of the unit at a consistent rate of 4100 mg/1 for a 20 minute period. Samples were taken at the outlet during the last 5 minutes to determine the oil removal performance. The same procedure was also performed with inorganic sediment (sand, S.G.=2.2) and organic sediment (peat, S.G.--0.45). The results can be summarized as follows:

Off removal	**97.8%**
Inorganic sediment removal (sand)	**83%**
Organic sediment removal (peat)	73%

These results exemplify the benefits of using Stormceptor as a source control technique in an urban stormwater quality control strategy. Please do not hesitate to contact us (1800-565-4801 in Canada or 1-800-763-4703 in the United States) if you require further information regarding this monitoring project.

Sincerely yours,

Graham Bryant, P.Eng. M.Sc.
Director of Engineering

Laboratory Tests On
X-CEPTOR CONCRETE BYPASS INTERCEPTOR
(also known as STORMCEPTOR in North America)
for
CSR Humes (UK) Ltd., Pontyclun, CF7 9YX
May-June 1996

SUMMARY

School of The Built Environment, Coventry University established a purpose -built test rig to assess the performance of the X-Ceptor Concrete Bypass Interceptor under steady flow condition s (9 I/s) with the addition of oil or inorganic/organic sediment. The X-Ceptor Bypass Interceptor is also known as the, Stormceptor in North America.

Two flow tests were performed on the X-Ceptor in accordance with the draft European Standard prEN858 -1:1992 for the oil retention tests with oil added continuously during each test at a rate of 5ml/l (4100mg/1) and four flow tests were developed to assess the trapping efficiency with sand added at a rate of 210mg/l (three flow tests) and with peat added at a rate of 154mg/l (one flow test).

The results obtained showed that the X-Ceptor was capable of limiting the through-flow of oil to some 90mg/l (mean of 10 samples with a standard deviation of 8.7mg/1). This performance is in line with that required of Clas s 2 Oil Interceptors in the UK, limiting the through-flow of oil to

less than 100mg/l.

Professor C J Pratt BSc(Eng) PhD CEng FICE FCIWEM
Dean of School and Professor of Stormwater Management
School of The Built Environment

6 September 1996

Telephone/Fax: +44 (0) 1203 838590
E-Mail: cbx038@coventry.ac.uk

1. INTRODUCTION

1.1 The School of The Built Environment, Coventry University was invited to tender for laboratory testing of the X-Ceptor Concrete Bypass Interceptor (Stormceptor) in February 1996. The tests were to investigate the X-Ceptor's effectiveness at oil retention andsediment trapping. The test procedures for oil retention performance assessment were to conform to the draft European Standard prEN858-1:1992 and additional tests for sediment trap efficiency were to be proposed during the test period.

1.2 A purpose-built rig was established for the testing of the X-Ceptor at the School's Hydraulics Laboratory, although because of its size (overall height 2.5m, outside diameter 2.24m, overall weight 6.7 tonnes) the X-Ceptor was positioned outside the Laboratory adjacent to a doorway.

1.3 During the test period, May-August 1996, 10 samples of the effluent from the X-Ceptor were obtained and analysed for oil discharge; 13 other samples were analysed for inorganic suspended solids discharge; and a further 10 samples were analysed for organic suspended solids discharge.

2. TEST EQUIPMENT

2.1 The test equipment consisted of:

- an inlet/mixing tank: 1050mm internal diameter with a 150mm diameter outlet, 300mm above the invert (see Plate 1). Water, oil and organic sediment were added separately to this tank, as prescribed by the particular test procedure, to achieve mixing prior to discharge to the X-Ceptor;
- a 2m, 150mm diameter connecting pipe from the inlet tank to the upper unit of the X-Ceptor;
- the X-Ceptor; and
- an outlet tank with calibrated orifice, controlling discharge to waste (see Plate 2).

2.2 The X-Ceptor consists of two units:

- the treatment chamber, nominal volume 3000 litres, internal diameter 1.785m and depth 1.25m; and
- the bypass chamber, internal diameter 1.785m which sits on top of the -treatment chamber and is connected to it by two openings:
  - -low-flow inlet, adjacent to the 150mm inlet pipe to the X-Ceptor and surrounded by a circular weir, which provides for overflow (the bypass operation) when inflow exceeds 9.8 I/s; and
  - -large diameter riser from the treatment chamber which feeds flows to the outlet (see Plate 3).

2.3 The water supply to the test equipment was provided from the storage tank on the roof of the Hydraulics Laboratory. The flow rate was set by reference to the water level in the outlet tank. Prior to commencement of the experiments the outlet tank (with orifice) was set up in the Hydraulics Laboratory so that a range of flow rates could be provided to it and the depth of water in the tank be measured under steady conditions. The flow rate was measured by collecting a measured volume of the outflow from the orifice in a known time.

This test procedure was repeated for a range of flow rates (7.8 - 11 I/s) and a calibration graph produced.

2.4 The test equipment, as per para. 2. 1., was installed in preparation for the tests and the required test flow rate was established. This was a process of slow, careful adjustment of a control valve on the overhead supply pipe to the inlet/mixing tank. The control valve was opened and the system was allowed to stabilise giving a certain depth of water in the outlet tank equivalent to a steady flow of 9 I/s. Over a period of hours the control valve was adjusted to achieve steady flow conditions at 9 I/s, shown by the outlet tank water depth. A second upstream valve on the supply pipe was used as an on/off valve: the control valve was left untouched during the, tests.

3. TEST PROCEDURE

3.1 Each test was conducted over minimum period of 20 minutes with the water flow rate constant at 9 I/s. This ensured that the volume contained within the treatment chamber was exchanged at least four times during a test, in accordance with prEN858-1:1992.

3.2 Any additive (oil, inorganic or organic solids) was continuously supplied to the test equipment throughout the test and sampling of the effluent leaving the X-Ceptor (Stormceptor) was begun only after 15 minutes: samples were then taken at I minute intervals.

3.3 The oil and the organic sediment were added to the inlet tank to provide for mixing time before entry to the X-Ceptor: both these additives, being less dense than water were not likely to accumulate within the inlet tank under the turbulent conditions. The inorganic sediment was added to the X-Ceptor directly above the low-flow inlet to the treatment chamber, upstream of the bypass weir. This procedure prevented any accumulation of sediment upstream of the X-Ceptor and ensured that all sediment passed rapidly to the treatment chamber.

3.4 The oil was added to the inlet tank at a constant rate of 2.7 litres/minute (concentration 5ml/l (4100mg/1) in the water). This was achieved through an air pressure system which forced the oil from its storage drum to the delivery point (see Plate 1). Calibration of the air pressure control valve ensured a constant rate of oil delivery. Checks at the start and end of tests showed that a consistent rate of delivery seemed to be maintained: checks could not be made during each test as the oil supply was to be continuous throughout the test period.

3.5 Both the inorganic and the organic sediments were added manually in prepared nominal volumes (250ml and 920ml respectively), over 30-second intervals, giving concentrations in the flow of 210mg/l and 154mg/l respectively, thought to be typical of highway stormwater runoff in moderate/highly polluted conditions.

3.6 Samples of the effluent from the X-Ceptor were collected at the point of free discharge from the outlet pipe prior to entry into the outlet tank. Sample volumes were from 0.5 - I litre, from which the test results were obtained by standard methods.

PLATE 1: General view inside the Hydraulics Laboratory showing the drum of test oil (right); the inlet/mixing tank on the red frame with the oil feed pipe and grey water supply pipe (centre); and the X-Ceptor unit in the doorway.

PLATE 2: View of the X-Ceptor and outlet tank standing outside the Hydraulics Laboratory: discharge from the unit falls freely onto the surface of the water in the outlet tank.

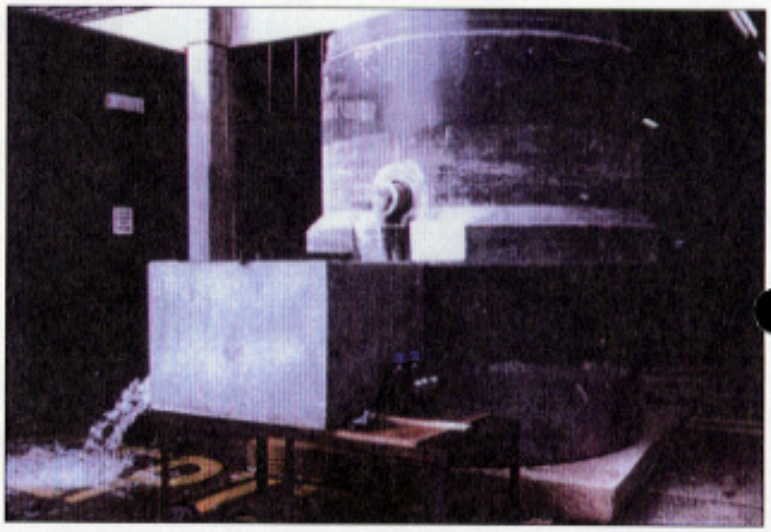


PLATE 3: A view inside the bypass chamber during tests with organic sediment additions, revealing the bypass overflow weir, the small diameter inlet and large diameter outlet pipes from the treatment chamber.

PLATE 4: View of the inlet to the X-Ceptor with flow contained behind the overflow weir at 9l/s. Note the marked difference in colour between the red, oil polluted inflow and the near-clear waters just prior to outlet, having passed through the treatment chamber.

PLATE 5: View of inlet during tests with the addition of organic sediment (peat) showing vortex above inlet pipe to treatment chamber.

PLATE 6: View of inlet following drain down after inorganic sediment retention test.

4. TEST ANALYSES

4.1 A Nicolet-250 Fourier Transfer Infrared spectrometer (FTIR) was employed in all of the analytical procedures to determine the quantities of oil present in the effluent from the X-Ceptor. The method of analysis of oil in the effluent samples was based upon ASTM D-3921-81 and the work was conducted in the laboratories of the School of Natural and Environmental Sciences, Coventry University. Details of the oil used in the tests is given in Appendix I and was the best suited, commercially available oil to th at required under prEN 858-1:1992 Annex B : Shell Gas Oil, Gas Oil UN 1202.

4.2 The suspended solids concentration and the relative density analyses were conducted in accordance with BS3680 : Part IOD : 1986.

5. TEST RESULTS: OIL

5.1 Two sets of results were obtained for the oil interception performance of the X -Ceptor (Stormceptor): tests R I and R2 were 20 -minute duration and the five results given for each test were obtained from samples collected at 1 -minute intervals in the last five minutes of the test. (See Appendix I and Plate 4).

TABLE 1: MEAN EFFLUENT OIL CONCENTRATIONS FROM THE X-CEPTOR BYPASS INTERCEPTOR (also known as the STORMCEPTOR in North America) IN TESTS AT COVENTRY UNIVERSITY, UK, AUGUST 1996

Test No.	Oil Concentration in outflow, mg/I		
	Test Series Mean **mg/1**	**Standard Deviation mg/1**	No. **of Samples**
Rl	88.4	5.9	5
R2	92.3	11.2	5
Overall	90.4	8.7	10

6. TEST RESULTS: SEDIMENT

6. 1 Four sets of results were obtained for the suspended solids interception performance of the X-Ceptor (Stormceptor): tests S I and S3 were 20 -minute duration and the results given for each test -were obtained from samples collected at I -minute intervals in the last five minutes of the test (the last two samples in Test S3 were lost through accidental s pillage); test P1 lasted 25 minutes and the ten results were obtained at 1 -minute intervals in the last ten minutes (see Appendix II).

6.2 Prior to these tests with sediment, the treatment chamber was filled to a depth of 300mm with the same type of sand used in tests S I to S3. The X-Ceptor was then operated for one hour to allow the dust in the sand bed to wash through the system (see Plates 5 and 6).

6.3 The following table summarises the results obtained:

TABLE 2: MEAN EFFLUENT SUSPENDED SEDIMENT CONCENTRATIONS AND PERCENTAGE RETENTION OF SEDIMENTS FROM THE X-CEPTOR BYPASS INTERCEPTOR (also known as the STORMCEPTOR in North America) IN TESTS AT COVENTRY UNIVERSITY, UK, MAY-JUNE 1996

Test No.	**Sediment**	**Suspended Sediment Concentrations, mg/l**		**Percentage Retention, %**	
		Test **Series Mean mg/I**	**Standard Deviation mg/I**	Test Series **Mean** %	**Standard Deviation** %
S1	Sand	47	9	78	4
S2	Sand	30	5	86	3
S3	Sand	29	2	87	1
Overall(S)	Sand	36	11	83	5
P1	Peat	43	6	73	4

7. CONCLUSIONS

7.1 The two flow tests performed with the addition of oil at a concentration of 4100mg/l showed that the X-Ceptor Oil Interceptor (also known as Stormceptor in North America) was capable of reducing the concentration in the effluent to some 90mg/l on average. This performance is in line with that required of Class 2 Oil Interceptors in the UK, limiting the through-flow of oil to less than 90mg/l.

7.2 The four flow tests performed with the addition of inorganic and organic sediment showed that the X-Ceptor was capable of effective trapping, with some 80% of the inorganic and 70% of the organic sediment being retained within the treatment chamber.

7.3 This first series of tests in the U.K. on the X-Ceptor provide very satisfactory early indications of the efficiency of this device.

APPENDIX I

COVENTRY UNIVERSITY, UK
School of The Built Environment
Test Results on X-Ceptor Bypass Interceptor,
also known as Stormceptor in North America,
August 1996

TEST RESULTS FROM X-CEPTOR ON OIL RETENTION

Test No.	Sample	Oil Concentration in outflow mg/I
RI	1	95.33
	2	86.66
	3	93.10
	4	86.61
	5	80.38
R2	1	104.41
	2	88.27
	3	96.26
	4	97.70
	5	75.07

APPENDIX II

COVENTRY UNIVERSITY, UK
School of The Built Environment
Test Results on X-Ceptor Bypass Interceptor,
also known as Stormceptor in North America,
May-June 1996

TEST RESULTS FROM X-CEPTOR ON SUSPENDED SOLIDS RETENTION

Determination of suspended solids and relative densities carried out in accordance with
BS 3680: Part IOD : 1986

1. SAND

Flow through separator: 540 I/min
Average dry weight of sand added per minute: 113.89 g/min
Dry weight of sand per litre of water added: 210 mg/I
Relative density of sand: 2.20

Test No.	Suspended Sediment Concentrations, mg/I	Percentage Retention In the X-Ceptor, %
SI	49	77
	54	75
	33	85
	54	75
	47	78
S2	35	84
	23	89
	25	89
	34	84
	31	86
S3	29	87
	31	86
	27	88

2. PEAT

Flow through separator: 540 I/min
Average dry weight of peat added per minute: 89.92 g/min
Dry weight of peat per litre of water added: 154 mg/l
Relative density of peat: 0.45

Test No.	**Suspended Sediment Concentration, mg/l**	**Percentage Retention in the X-Ceptor,** %
P1	47	70
	55	65
	38	76
	50	68
	36	77
	39	75
	40	74
	36	77
	46	71
	43	73

APPENDIX III

COVENTRY UNIVERSITY, UK
School of The Built Environment
Test Results on X-Ceptor Bypass Interceptor, also known as Stormceptor in North America, May-June 1996

RESULTS FROM DRY SIEVING OF SAND USED IN TESTS

Sieve Size microns	**Retained %**	**Cumulative % Passing**
1000	0.34	99.66
600	2.16	97.50
425	11.88	85.62
300	24.45	61.17
212	27.99	33.18
150	17.03	16.15
63	13.11	3.04
Passing	3.04	-

TESTING SUMMARY

Field Monitoring Results
Westwood, Massachusetts

Summary: From July 1997 to November 1997 a Massachusetts firm, Environmental Sampling and Technology (EST), collected stormwater samples from a Stormceptor® Model STC 1200. Data collected from six storm events during this period indicate a very high removal rate for Total Suspended Solids (TSS). The data also indicates a high removal rate for Total Petroleum Hydrocarbons (TPH).

Average TSS Removal	Average TPH Removal
93%	82%

The average TSS removal rate is based on three storm events that produced significant inflow TSS levels. Significant is defined as levels that typically require treatment by regulatory permitting criteria. Only one storm event produced significant TPH levels. The TPH removal rate for this event was 82%. The TSS removal rate is higher than that predicted by the current sizing criteria

Methodology: EST, which specializes in stormwater sampling, installed two automatic stormwater samplers (ISCO Model 3700) inside the Stormceptor to collect composite samples at the inlet and outlet. The purpose of the sampling program was to determine Total Suspended Solids (TSS), Total Petroleum Hydrocarbons (TPH) and metals during a variety of storm events.

Flow was measured using a flow meter (ISCO 3230) used in conjunction with a temporary weir inserted into the 12" diameter influent pipe. The sampling program includes a composite sample consisting of twenty-eight 200ml aliquot samples collected at five-minute intervals over a four-hour period. A rain gauge mounted nearby is used to measure and record rainfall in 0.01-foot increments. Following each rain event during this five-month period, samples were collected and preserved in accordance with 40 CFR Part 136 and delivered to a certified laboratory.

Project Details: This Stormceptor was installed in October 1996 at a loading/unloading trucking area at a local manufacturing facility located in Westwood, Massachusetts. The paved area (impervious area of 0.65 acres) contributes runoff to a catch basin that is located upstream of the Stormceptor. The size of the unit was based on the sizing criteria listed in Table 5 of the Stormceptor Technical Manual.

(More information on the next page)

Event #1 (August 5, 1997)

Storm Intensity:	0.06 in/hr (1.5 mm/h)
Total Precipitation during event:	0.18 inches (4.6 mm)
Maximum Flow:	1.8 gallons per minute (0.11 L/s)
Total Flow Volume (3 hours):	122 gallons (462 L)
Composite Sample Period:	3 hours

Pollutant	Influent Composite	Effluent Composite	Pollutant Removal Rate
TSS	400 mg/l	5.3 mg/l	98%

Event #2 (August 21, 1997)

Storm Intensity:	0.08 in/hr (2.0 mm/h)
Total Precipitation during event:	0.25 inches (6.4 mm)
Maximum Flow:	2.3 gallons per minute (0.15 L/s)
Total Flow Volume (3 hours):	304 gallons (1152 L)
Composite Sample Period:	3 hours

Pollutant	Influent Composite	Effluent Composite	Pollutant Removal Rate
TSS	86 mg/l	6.8 mg/l	92%
TPH	7.8 mg/l	1.4 mg/l	82%

Event #3 (September 29, 1997)

Storm Intensity:	0.03 in/hr (0.8 mm/h)
Total Precipitation during event:	0.22 inches (5.6 mm)
Maximum Flow	3.2 gallons per minute (0.2 L/s)
Total Flow Volume (7 hours)	672 gallons (2545 L)
Composite Sample Period:	7 hours

Pollutant	Influent Composite	Effluent Composite	Pollutant Removal Rate
TSS	47 mg/l	**<**5.0 mg/l	90%

Metropolitan St. Louis Sewer District
2350 Market Street
St. Louis, MO 63103

October 6, 2020

Contech Engineered Solutions, LLC
Attention: Joe Bratchie
4091 Quincy St.
St Louis, MO 63116

RE: Cascade Separator

Dear Mr. Bratchie,

The Metropolitan St. Louis Sewer District (MSD) has reviewed the 08/12/2020 application for the Contech Cascade Separator and is pleased to provide Highway Use Level (HUL), and Redevelopment Use Level (RUL) for use as a stand-alone water quality BMP subject to the following provisions.

- The Cascade Separator is only approved for use on public highway and roadway projects and for redevelopment sites less than 5 acres. This approval is based upon compliance with requirements listed in MSD's Proprietary Water Quality Products and the MSD's Stormwater Management Program (Rev. Jan. 2009).
- The Cascade Separator must be sized to capture all floatable trash and free oil, and remove 80% of total suspended solids for the OK-110 particle size distribution at the site water quality flow-rate (WQ_f). Procedures for calculating WQ_f are provided in Appendix D.10 of the Maryland Stormwater Design Manual (2000). Table 1 provides a list of approved models and their respective instantaneous peak treatment WQ_f. The 2400 micron screen will be used.

Model	Manhole Diameter [ft]	Max Treatment Flow [cfs]
CS-4	4	1.48
CS-5	5	2.31
CS-6	6	3.33
CS-8	8	5.93
CS-10	10	9.27
CS-12	12	13.35

Table 1. Maximum Water Quality Treatment Flow Rate (WQ_f) by Model

- Only concrete manholes are allowed at this time.
- Devices should be configured as off-line units, downstream from a diversion manhole. In most cases the BMP will be installed without the need to store the water quality volume (WQ_v) upstream of the unit.
- All devices shall provide a minimum sediment storage capacity of 10 ft^3.

- Confined space entry shall not be a requirement for routine maintenance. No special tools or attachments should be required to provide routine maintenance with a vacuum pumping truck.
- All proprietary lids and covers should be captive components. The minimum size access hole is 30 inches in diameter.

Project specific design calculations and maintenance plans furnished by Contech must be included within the project's "Stormwater Management Facilities Report" prepared by the consulting engineer.

MSD reserves the ability to withdraw or modify this approval based on subsequent information, including information indicating that the Cascade Separator does not satisfy MSD rules, requirements, or construction and material specifications.

Sincerely,

Robert A. Miller

Robert A. Miller, PE
BMP Committee Chair
Engineering / Development Review

TSS Removal Calculation Worksheet

Location: STC 2400
Project: South Hadley Site Improvements
Prepared By: M. Stephan
Date: 3/15/2022

A	B	C	D	E
BMP	TSS Removal Rate	Starting TSS Load*	Amount Removed (BxC)	Remaining Load (C-D)
Deep Sump Catch Basin	0.25	1.00	0.25	0.75
STC 2400	0.80	0.75	0.60	0.15

TSS Removal = 0.85

To be conservative, 80% TSS removal was used for STC2400.

3rd party testing information indicates a TSS removal greater than 80%.

TSS Removal Calculation Worksheet

Location: WS-4 Cascade Separator
Project: South Hadley Site Improvements
Prepared By: M. Stephan
Date: 3/15/2022

A	B	C	D	E
BMP	TSS Removal Rate	Starting TSS Load*	Amount Removed (BxC)	Remaining Load (C-D)
Deep Sump Catch Basin	0.25	1.00	0.25	0.75
WS-4 Cascade Separator	0.80	0.75	0.60	0.15

TSS Removal = 0.85

3rd party testing information indicates a TSS removal of 80%.

Calculation Sheet

BSC GROUP

Project No.	23381.01	**Calc By**	MS
Subject	Outlet Velocity - CS-4	**Date**	12/17/2021
Location	South Hadley, MA	**Checked by**	RN
		Date	12/22/2021

MA DEP Standard No. 1: No New Untreated Discharge
Outlets shall be designed so there is no erosion or scour to wetlands and waters of the Commonwealth

Determine Design Flow Rate, Q [cfs], to Proposed Inlet

Contributing Area =	1,787	square feet	
=	0.04	ac	
Runoff Coefficient, C =	0.90		
Time of Concentration, Tc =	5.0	minutes	
Return Period =	10	years	
Rainfall Intensity, i =	6.20	in/hr	*Hydrology Handbook, Appendix F-3, IDF Curve for Springfield, MA*
Flow Rate, Q=CiA =	**0.23**	cfs	

Determine Design Velocity, V [ft/s], at Proposed Headwall

Pipe Size =	12	in	
=	1.00	ft	
Q =	0.23	cfs	
Roughness Coefficient, n =	0.013		
Pipe Slope =	2.00%		
Depth =	0.15	ft	*Open channel flow calculator*
Velocity =	**3.25**	ft/s	*Open channel flow calculator*

Conclusion

The design velocity does not exceed the permissible transport velocity of the selected outlet protection material, Modified Riprap.