ARCADIS Design & Consultancy for natural and built assets

Town of Stoneham, Massachusetts

STORMWATER MANAGEMENT MANUAL

Operations and Maintenance for Municipal Facilities

June 2020

VERSION CONTROL, OPTIONAL

Issue	Revision No.	Date Issued	Page No.	Description	Reviewed By

CONTENTS

TABLES

APPENDICES

ACRONYMS AND ABBREVIATIONS

AST	Aboveground Storage Tank
BMP	Best Management Practice
CWA	United States Environmental Protection Agency's Clean Water Act
DEP	Massachusetts Department of Environmental Protection
DPW	Department of Public Works
EPA	United States Environmental Protection Agency
IDDE	Illicit Discharge Detection and Elimination
MCM	Minimum Control Measure
MS4	Municipal Separate Storm Sewer System
MSDS	Material Safety Data Sheet
NPDES	National Pollutant Discharge Elimination System
NOI	Notice of Intent
SWPPP	Stormwater Pollution Prevention Plan
SPCC	Spill Prevention, Control and Countermeasure
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
UST	Underground Storage Tank
WQS	Water Quality Standards

1 INTRODUCTION

As part of the National Pollutant Discharge Elimination System (NPDES) General Permit for small Municipal Separate Storm Sewer Systems (MS4), the Town of Stoneham (Town) has adopted pollution prevention and good housekeeping controls intended to ensure that municipal operations and activities conducted at municipally-owned facilities do not contribute to stormwater pollution. In most urbanized areas such as Stoneham, stormwater is conveyed through a system of catch basins and pipes commonly referred to as a stormwater drainage system. Stormwater pollution can be conveyed through the stormwater drainage system and affects the quality of the Town's surface waters including Spot Pond, Crystal Lake, Sweetwater Brook, Burbank Stream, and many more.

These good housekeeping controls, referred to as best management practices (BMPs), are standard operating procedures for municipal personnel and for use at all municipal-owned facilities. These BMPs are intended to serve as guidance for properly conducting municipal-wide operations such as street sweeping, cleaning out catch basins, and general maintenance of the stormwater drainage system, and municipal-owned facilities including vehicle maintenance, vehicle washing, lawn care, and materials management.

1.1 Manual Purpose and Scope

The purpose of the Stormwater Management Manual (Manual) is to provide standard operating procedures for typical facility operations and activities to reduce and eliminate contamination that may enter Town facilities' stormwater drainage systems. These standard operating procedures are referred to as best management practices (BMPs) in this manual.

The BMPs in this Manual were selected based on a review and inventory of operations and activities at municipal-controlled facilities. The BMPs are intended to provide straightforward and up-to-date procedures for municipal personnel to follow in conducting their day-to-day activities. The Manual should be reviewed annually and periodically revised whenever operations and/or activities at these facilities change or in response to regulatory or permit changes.

1.1.1 Organization of Manual

The Manual is organized into the following sections:

- Section 1: Provides an overview of the Manual's purpose and content, as well as watersheds and water quality overviews.

- Section 2: Provides a listing of municipal leasees'/site users' responsibilities to adhere to permit regulations.

- Section 3: Provides BMP fact sheets for operations and activities conducted at municipal-controlled facilities. These BMP fact sheets are intended to be used as guidance on suggested BMPs, inspection procedures, and maintenance procedures. Each BMP fact sheet includes a list

of targeted facilities and operations, and pollutant constituents. These fact sheets are simple (two-to-three pages) and are intended to be copied and distributed as necessary to facility personnel, and/or contractors who work on-site.

- Appendix A: BMP Activities Assessment & Pollution Prevention Team - Identifies BMP activities relevant to specific Town properties and facilities that have been inspected as part of the good housekeeping work. A Pollution Prevention Team has been assigned for facilities requiring a SWPPP along with a list of SWPPP facilities and the location of where the corresponding SWPPP info can be found.

- Appendix B: Facility Stormwater System Maps - Includes stormwater system maps for the specific Town facilities inspected. Attributes including stormwater drainage system components (drain manholes, catch basins, and gravity mains) and, if applicable, discharge points (stormwater outfalls) are shown for each inspected facility. Maps should be made available to necessary facility personnel and contractors who work on-site.

- Appendix C: Training Sign-In Sheet - Provides a blank sign-in sheet for use at future training sessions for each facility.

- Appendix D: Good Housekeeping Inspection Form - The Inspection Form should be used at each facility on an annual basis. It serves as a checklist for facility managers to ensure that BMPs are being properly implemented and that if any new activities are being conducted, additional BMPs are implemented.

- Appendix E: Municipal Standard Operating Procedures (SOP) for catch basin cleaning, street sweeping, and winter maintenance.

- Appendix F: Municipal Structural Best Management Practices (BMP)

1.1.2 Manual Updates

The Manual should be reviewed and updated on an annual basis after the Good Housekeeping Inspection Form (Appendix D) is completed for the various Town facilities. If during any Municipal facility inspections, new activities are identified, additional BMPs should be placed in this Manual. In addition, BMPs should be revised based on updated procedures and protocols adopted by the Town, or in response to regulatory changes or permit conditions.

1.2 Stormwater Pollutants and Impacts on Water Quality

In some cases, the receiving waters associated with Town facilities can be impacted by pollutants when contaminated runoff from the facilities enters the stormwater drainage system and is discharged through outfalls.

1.2.1 Watersheds and Pollutants of Concern

Receiving surface waters and pollutants of concern for the Town of Stoneham are listed in Table 1. Additionally, Total Maximum Daily Loads (TMDLs) established for the area have been noted. TMDLs are regulatory limits established for pollutants to surface waters in order to maintain water quality standards.

The municipal separate storm sewer system (MS4) outfalls that are covered by the NPDES permit are provided on the stormwater system maps found in Appendix B. These maps also provide details on the layout of the stormwater drainage system, including catch basins, manholes, and pipes. These maps provide important information to guide actions described in this Manual.

Table 1. Stoneham Surface Water Classifications and Impairment Categories

Receiving Waterbody and Segment ID	Surface Water Class	TMDL Category	Impairment
Buckman Pond	Class B*	Category 3*	Insufficient Information
Burbank Stream	Class B*	Category 3*	Insufficient Information
Crystal Lake (MA93018)	Class A	Category 3	Insufficient Information
Dark Hollow Pond	Class B*	Category 3*	Insufficient Information
Doleful Pond	Class B*	Category 3*	Insufficient Information
North Stream	Class B*	Category 3*	Insufficient Information
Quarter Mile Pond	Class B*	Category 3*	Insufficient Information
Spot Pond (MA71039)	Class B*	Category 3	Insufficient Information
Spot Pond Brook	Class B*	Category 3*	Insufficient Information
Sweetwater Brook	Class B*	Category 3*	Insufficient Information

*Waters Classified based on 314 CMR 4.00 General Water Classifications

1.2.2 Pollutant Impacts on Water Quality

Typical pollutants, including environmental effects and sources, found in stormwater runoff include the following:

Sediment

- Sediment is often viewed as the largest pollutant load associated with stormwater runoff in an urban setting. The loadings have been shown to be exceptionally high in the case of construction activity.
- Sediment is associated with numerous impacts in surface waters, including increased turbidity, effects on aquatic and benthic habitat, and reduction in capacity of impoundments.
- A number of other pollutants often attach to, and are carried by, sediment particles.

Nutrients

- The nutrients most often identified in stormwater runoff are phosphorous and nitrogen.
- In surface waters, these nutrient loads can lead to heavy algae growth, eutrophication, and low dissolved oxygen levels. Nutrients enter the stormwater drainage system in a variety of ways, including landscaping practices in parks and recreation areas, leaks from sanitary sewers or septic systems, and animal waste.

Organic Matter

- Various forms of organic matter may be carried by stormwater in urban areas. Decomposition of this material by organisms in surface waters results in depleted oxygen levels.
- Low levels of dissolved oxygen severely impact water quality and life within surface waters.
- Sources of organic matter include garbage and yard waste.

Bacteria (Pathogens)

- High bacteria levels may be found in stormwater runoff as a result of garbage, pet waste, and illegal connections from sanitary sewers or leaking septic systems.
- The impacts of bacteria on surface waters may affect recreational uses and aquatic life as well as pose public health risks.

Oil and Grease

- Numerous activities produce oil, grease, and lubricating agents that are readily transported by stormwater.
- The intensity of activities, including vehicle traffic, maintenance and fueling activities, leaks and spills, and manufacturing processes, within an urban setting contribute to the level of these pollutants present in adjacent surface waters.

Heavy Metals

- Heavy metals such as copper, lead, zinc, arsenic, chromium, and cadmium may be typically found in urban stormwater runoff.
- Metals in stormwater may be toxic to some aquatic life and may accumulate in aquatic animals.
- Sources of metals in stormwater may include automobiles, paints, preservatives, motor oil, and various activities common in urban areas.

Temperature

- Stormwater runoff increases in temperature as it flows over impervious surfaces. In addition, water stored in shallow, unshaded ponds and impoundments can increase in temperature.
- Removal of natural vegetation (such as tree canopy) opens up water bodies to direct solar radiation.
- Elevated water temperatures can impact a water body’s ability to support certain fish and other aquatic organisms.

Pesticides and Herbicides

- Pesticides and herbicides in stormwater runoff can be toxic, even at low concentrations, to aquatic life and the birds that feed on them.

Trash and Debris

- Trash and debris including floatables, plant debris, animal wastes, street litter, and other material may contain pollutants including metals, pesticides, bacteria, and other toxins.
- Trash and debris can harbor bacteria, vectors, and low dissolved oxygen concentrations in surface waters affecting aquatic life.

Vectors

- Vectors including mosquitoes and rodents are frequently found in standing waters, including drainage structures, and eventually live and reproduce in such structures resulting in disease spread and a local nuisance.

2 TOWN OF STONEHAM STORMWATER MANAGEMENT POLICY

The Town of Stoneham recognizes and is in full agreement with the Clean Water Act's National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems. The Town's approach and detailed implementation schedule is provided in the Stormwater Management Program (June 2019). A copy is available at the Department of Public Works or online at the Town's Stormwater Management Website.

2.1 Other Related Policies and Protocols

The municipality's current documented policies and protocols that are applicable to good housekeeping include the following:

- Illicit Discharge Detection and Elimination Plan
- Stormwater Rules and Regulations
- Catch Basin Inspection and Cleaning Standard Operating Procedures (SOP)
- Snow Removal and De-Icing SOP
- Street Sweeping SOP

2.2 Requirements of Leases

Where the Town of Stoneham has leased use of municipal properties or facilities to others stormwater management on site is still required in accordance with the MS4 Permit. The following is example language that can be inserted into Town leases:

"The Town of Stoneham has submitted a Notice of Intent (NOI) to the Massachusetts DEP and EPA to obtain coverage under the NPDES Small MS4 General Permit. A copy of the NOI is available for review. In order to comply with the Permit requirements, the Town has developed Best Management Practices (BMPs) that parties leasing Town owned properties must adhere to. These BMPs contain pollution prevention and source control techniques to minimize the impact of those activities upon dry-weather urban runoff, stormwater runoff, and receiving water quality.

Activities performed at the facility leased shall conform to the Permit and BMPs, and must be performed as described within all applicable BMPs. The lessee shall fully understand the BMPs applicable to activities conducted at the facility leased prior to conducting them and maintain copies of the BMPs at the leased facility throughout the agreement duration.

Evaluation (or cost) of activities performed at the facility leased may be conducted by the Town to verify compliance with BMP requirement and may be required through lessor self-evaluation as determined by the Town."

2.3 Requirements of Contractors on Town Property

Where the Town of Stoneham has contracted services related to operations and maintenance at municipal facilities stormwater management on site is still required in accordance with the MS4 Permit. The following is example language that can be inserted into municipal field program contracts:

“The Town of Stoneham has submitted a Notice of Intent (NOI) to the Massachusetts DEP and EPA to obtain coverage under the NPDES Small MS4 General Permit. A copy of the NOI is available for review. In order to comply with Permit requirements, the Town has developed Best Management Practices (BMPs) that parties conducting the municipal activities must adhere to. These BMPs apply to any party conducting municipal activities and contain pollution prevention and source control techniques to minimize the impact of those activities upon dry-weather urban runoff, stormwater runoff, and receiving water quality.

Work performed under this CONTRACT shall conform to the Permit requirements and BMPs, and must be performed as described within all applicable BMPs. The CONTRACTOR shall fully understand the BMPs applicable to activities that are being conducted under this CONTRACT prior to conducting them and maintain copies of the BMPs throughout the CONTRACT duration. The applicable BMPs are included as Exhibit ___ of this CONTRACT.

Evaluation of activities subject to BMPs performed under this CONTRACT may be conducted to verify compliance with BMP requirements and may be required through CONTRACTOR self-evaluation as determined by the Town.”

3 BEST MANAGEMENT PRACTICES

The fact sheets presented in this section provide guidance on good housekeeping best management practices (BMPs) to be performed at Stoneham's Municipal facilities. Each of the fact sheets provides a description of the practice, the pollution prevention approach, suggested practices, inspection procedures, and maintenance procedures. In addition, the targeted facilities, operations, and pollutant constituents are identified. All of the suggested BMPs do not need to be implemented for the targeted facilities and operations. The BMPs that reduce an influx of pollutants to the stormwater drainage system to the maximum extent practicable should be considered for implementation.

Implemented BMPs should be reviewed annually for effectiveness using the Good Housekeeping Inspection Form provided in Appendix D and adjusted as necessary.

3.1 Fueling Operations and Petroleum Tank Storage

Purpose and Approach

Vehicle fueling operations can impact water quality if stormwater runoff from areas with these activities becomes polluted by components of the fuel. Spills and leaks that occur during vehicle and equipment fueling can contribute hydrocarbons, oil and grease, as well as heavy metals to stormwater runoff. It only takes one gallon of oil to contaminate one million gallons of drinking water. Similarly, activities and leaks from petroleum storage tanks have the potential to contaminate stormwater runoff. In the Inspection Matrix, Fueling Operations and Petroleum Tank Storage are separate inspection forms.

Best Management Practices (BMPs)

General Practices

- Store fluids in a labeled, plastic or metal container with a lid.
- Place flammables in a fire safe cabinet.
- Place drip pans under leaking vehicles, valves, spigots, and pumps.
- Routinely check for leaking vehicles.
- Do not conduct any vehicle maintenance near catch basins.
- Vehicle maintenance should be done in covered facility.

Fueling

- Ensure that all fueling activities are not conducted near catch basins or that procedures are in place to control any spills.
- Fuel storage tanks should be placed on impervious surfaces with no cracks or gaps; secondary containment is recommended.
- Provide barriers such as posts, guard rails, or bollards where tanks are exposed to prevent collision damage from vehicles.

Targeted Facilities and Operations

- All Fleet Vehicle and Equipment Operations
- All facilities with petroleum storage tanks

Targeted Pollutants

- Sediment
- Trash
- Metals
- Oil & Grease

Reference

- “California Stormwater Quality Association Municipal BMP Handbook”

- Post signs at the fuel dispenser or fuel island warning vehicle owners / operators against “topping off” of vehicle fuel tanks.
- Label drains within the facility boundary by paint/stencil (or equivalent) to indicate whether they flow to the sanitary sewer, to a catch basin, or into a dry well.

Petroleum Storage Tanks

- Ensure that outdoor storage areas are covered with a roof.
- Clearly tag or label valves and restrict access to valves.
- Provide secondary containment for all ASTs and portable containers of petroleum containing liquids.
- Place drip pans, absorbent materials, and/or secondary containment measures beneath all mounted container taps.
- Maintain spill kits that are clearly marked and located near all locations where loading and unloading of USTs or ASTs occur.
- Keep drums and other containers in good condition. Replace drums and other containers when leaks, corrosion, or deterioration is identified.
- Label new or secondary containers with the product name and hazards.
- Keep SPCC Plan up-to-date and implement accordingly.
- Clean up spill and leaks that occur during loading and unloading operations promptly and dispose of materials properly.
- Drums are stored indoors and in an area with secondary containment free of materials that may damage drums.

Inspection Procedures

Fueling

- Identify locations of floor drains and catch basins and keep a record ofwhere they discharge to. Floor drains should be connected to the sanitary sewer system and catch basins should be connected to the stormwater drainage system.
- Regularly inspect vehicles and equipment for leaks and repair immediately if leaks are found.
- Inspect fuel storage tank foundations, connections, coatings, tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Inspect fueling areas, catch basin inserts, containment areas, and drip pans on a regular schedule.

Petroleum Storage Tanks

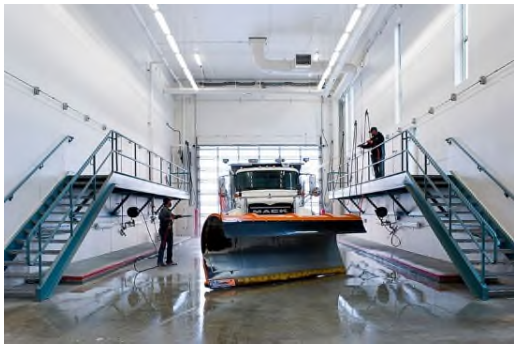
- Regularly inspect stormwater collection structures for petroleum sheen before draining. When sheen is detected, water should be removed and disposed of properly via sanitary contractor.
- Regularly Inspect storage areas for Spills and leaks.

Maintenance Procedures

- Sweep the maintenance area on a regular basis to collect loose particles. Wipe up spills with rags and other absorbent material immediately. Do not hose down the area to a catch basin.

- Keep ample supply of spill cleanup materials on-site. Clean up spills immediately.
- Properly train employees, tenants /site users, hired contractors, and any other personnel working with vehicles on fueling and handling oil and waste oil.

3.2 Vehicle Washing



Purpose and Approach

Wash water from vehicle and equipment cleaning activities performed outdoors or in areas where wash water flows onto the ground can contribute toxic hydrocarbons and other organic compounds, oils and greases, nutrients, phosphates, heavy metals, and suspended solids to stormwater runoff. It is important to be responsible with soap and detergents used during washing to ensure phosphates and other contaminants do not enter water bodies. Most soap products contain phosphates that can increase algae growth and degrade surface water quality.

Best Management Practices (BMPs)

General Practices

- Use biodegradable, phosphate-free detergents for washing vehicles as appropriate.
- Mark the area clearly as a wash area.
- Post signs stating that washing is only allowed in wash area and that discharges to the stormwater drainage system are prohibited. Facility employees should know where catch basins are.
- Provide a trash container in wash area. Vacuum floor mats or shake them into trash.
- Those that use facility to wash vehicles (e.g., municipal employees and contractors) should be informed of proper washing protocols.

Vehicle and Equipment Cleaning

- Install sumps or drain lines to collect wash water or construct berm around the designated area and grade the area to collect wash water as well as prevent stormwater run-on.
- Consider washing vehicles and equipment inside a designated building if washing/cleaning must occur on-site.
- If washing must occur on-site and outdoors:
  - Use designated paved wash areas. Designated wash areas must be be marked with signs indicating where and how washing must be be done. This area must be covered or bermed to collect the wash

<u>Targeted Facilities and Operations</u>

- All Fleet Vehicle and Equipment Operations

<u>Targeted Pollutants</u>

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics

<u>Reference</u>

- “California Stormwater Quality Association Municipal BMP Handbook”

water and graded to direct the wash water to a treatment or disposal facility, or washing must take place on a grassed area.
  - Cover the wash area when not in use to prevent contact with rain water.
  - Cover and protect catch basins during washing.
- Use hoses with nozzles that automatically turn off when left unattended. Use high-pressure, low-volume sprays.
- Perform pressure cleaning and steam cleaning off-site to avoid generating runoff with high pollutant concentrations. If conducted on-site, no pressure cleaning and steam cleaning should not be conducted in areas designated as wellhead protection areas for public water supply.

Disposal

- Filter and recycle wash water, if possible.

Inspection Procedures

- Inspect floor drain systems regularly; use only those that discharge to a sanitary sewer.
- Inspect nearby catch basins annually.

Maintenance Procedures

- Maintain a map of on-site stormwater drainage system locations and ensure awareness by personnel to avoid discharges to the stormwater drainage system.
- Take precautions against excess use and spillage of detergents.
- Clean vehicles only where wastes can be captured for proper disposal, such as a commercial vehicle wash station.

3.3 Vehicle and Equipment Maintenance

Purpose and Approach

Vehicle repair and service (e.g., parts cleaning and fueling), replacement of fluids (e.g., oil change), and outdoor equipment storage and parking (dripping engines) can impact water quality if stormwater runoff from areas with these activities becomes polluted by contaminants. Spills and leaks that occur during vehicle and equipment fueling can contribute hydrocarbons, oil and grease, as well as heavy metals to stormwater runoff. It only takes one gallon of oil to contaminate approximately onemillion gallons of drinking water.

Best Management Practices (BMPs)

General Practices

- Store fluids in labeled, plastic, or metal container with a lid.
- Place flammables in a fire safe cabinet.
- Place drip pans under leaking vehicles, valves, spigots, and pumps.
- Routinely check for leaking vehicles.
- Do not conduct any vehicle maintenance near catch basins.
- Vehicle maintenance should be done in covered facility.

Targeted Facilities and Operations

- All Fleet Vehicle and Equipment Operations
- Golf courses
- Cemetery

Targeted Pollutants

- Metals
- Oil & Grease
- Organics

Reference

- “California Stormwater Quality Association Municipal BMP Handbook”

Fueling

- Keep fueling areas clean and fuel tanks protected.
- Fueling activities should be conducted away from storm drains.
- Before fueling, make sure there is a fully stocked spill kit in close vicinity so that spills can be cleaned up immediately.

Vehicle Maintenance

- Provide a designated area for vehicle maintenance on an impervious surface.
- Keep equipment clean; do not allow excessive build-up of oil and grease.
- If possible, perform all vehicle fluid removal or changes inside or under cover:
    - Keep a drip pan under the vehicle while you unclip hoses, unscrew filters, or remove other parts.
    - Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.
    - Keep drip pans or containers under vehicles or equipment that might drip during repairs.
    - Do not change motor oil or perform equipment maintenance in non-appropriate areas, such as in close vicinity to storm drainage structures or on a pervious surface as it will not allow for proper clean up.
- If temporary work is being conducted outside, use a tarp, ground cloth or drip pan beneath the vehicle or equipment to capture all spills and drips.

Disposal

- Fluids should be recycled or properly disposed.
- Full pans should be dumped into 55-gallon drums.
- Drain fluids from out-of-service vehicles.
- Properly dispose of debris including oil filters, oil cans, rags, and clean-up supplies.
- Vehicle fluids should never be dumped into catch basins.
- Interior floor drains should discharge to holding tanks or be sealed.

Used Oil

- Recycle used oil.
- Do not mix waste with used oil.

Inspection Procedures

- Identify locations of floor drains and catch basins and know where they discharge. Floor drains should be connected to the sanitary sewer system and catch basins should be connected to the stormwater drainage system.
- Regularly inspect vehicles and equipment for leaks and repair immediately.

- Inspect fuel storage tank foundations, connections, coatings, tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Inspect fueling areas, catch basin inserts, containment areas and drip pans on a regular schedule.

Maintenance Procedures

- Sweep the maintenance area on a regular basis to collect loose particles. Wipe up spills with rags and other absorbent material immediately. Do not hose down the area to a catch basin
- Keep ample supplies of spill cleanup materials on-site. Clean up spills immediately.
- Properly train employees, tenants/site users, hired contractors, and any other personnel working with vehicles on fueling and handling oil and waste oil.

3.4 Building and Grounds Maintenance

Purpose and Approach

In addition to ongoing building maintenance and repairs, facility upkeep also includes cleaning operations, such as outside pressure washing of buildup.. Implement applicable suggested BMPs to reduce the influx of pollutants to the stormwater drainage system from building and ground maintenance to the maximum extent practicable.

Nutrient loads generated by lawns can be significant which is why it is important to monitor which chemicals (if any) are applied to lawns and also use products that are safe for the environment. Pesticide runoff can contribute pollutants that contaminate drinking water supplies and are toxic to both humans and aquatic organisms.

It is important to reduce pesticides, herbicides, fertilizers, and lawn debris from entering surface and ground water supplies by washing with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the stormwater drainage systems, and maintaining the stormwater collection system.

Best Management Practices (BMPs)

Landscaping Activities

- Reduce or discontinue the use of chemicals (insecticide, herbicide, or fertilizer) on lawns
- Do not apply any chemicals (insecticide, herbicide, or fertilizer) directly to surface waters, unless the application is approved and permitted by the state.
- Use mulch or other erosion control measures on exposed soils.
- Check irrigation schedules so pesticides will not be washed away and to minimize non-stormwater discharge.
- Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the stormwater drainage system.
- Use hand or mechanical weeding where practical.

<u>Targeted Facilities and Operations</u>

- All Municipal Facilities

<u>Targeted Pollutants</u>

- Sediment
- Nutrients
- Trash
- Metals
- Bacteria
- Oil & Grease
- Organics
- Low Dissolved Oxygen

<u>Reference</u>

- “Mass Highway Stormwater Handbook”
- “Massachusetts Stormwater Handbook, Vol. 2, Chapter 1”
- “California Stormwater Quality Association Municipal BMP Handbook”

- Employ mowing techniques to maintain a healthy lawn and minimize chemical use—no more than 1" of lawn should be removed from each mowing (grasses kept at 2.5" to 3.0" high are more heat resistant than close-cropped grass). Keep mower blades sharp and leave clippings in place after mowing.
- Do not allow clippings to collect or be raked or swept onto catch basin grates.
- Water plants in the early morning.

Fertilizer and Pesticide Management

- Follow manufacturers' recommendations and label directions.
- Do not apply insecticides within 100 feet of surface waters such as lakes, ponds, wetlands, and streams.
- Use the least toxic pesticide necessary whenever possible and use the minimum amount needed. Avoid use of copper-based pesticides if possible.
- Do not use pesticides if rain is expected.
- Do not mix or prepare pesticides for application near catch basins.
- Calibrate fertilizer distributors to avoid excessive application.
- Apply pesticides only when wind speeds are low.
- Work fertilizers into the soil rather than dumping or broadcasting them onto the surface.
- Irrigate slowly to prevent runoff and then only as much as is needed.
- Dispose of empty pesticide containers according to the instructions on the container label.
- Use up the pesticides. Rinse containers and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Implement storage requirements for pesticide products with guidance from the local fire department and the Massachusetts Department of Agricultural Resources.
- Provide secondary containment for pesticides.

Debris Removal

- Compost or mulch yard waste to be used as mulch and topsoil.
- Sweep up yard debris instead of hosing down.
- Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Do not leave yard waste in the street or sweep it into catch basins or streams.

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a waste/water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.
- If soaps or detergents are not used and the surrounding area is paved, wash water runoff does not have to be collected, but must be screened. Pressure washers must use filter fabric or

another type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.

- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement. Ensure that this practice does not kill grass.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a catch basin.
- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.
- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.
- Clean paint brushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal. Use a catch basin cover, filter fabric or other similarly effective runoff control mechanism if dust, grit, wash water or other pollutants may escape the work area and enter a catch basin. The containment device(s) must be in place at the beginning of the workday and accumulated runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day. When pressure-washing to remove paint, collect wash water and dispose of it properly, as outlined above.
- If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. In this case, you should direct the water through hay bales and filter fabric or use other sediment filters or traps.
- Store toxic material under cover with secondary containment during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Inspection Procedures

Building Maintenance

- Sweep paved areas regularly to collect loose particles and wipe up spills with rags and other absorbent materials immediately. Do not hose down the area to a catch basin.

Grounds Maintenance

- Minimize excess watering and repair leaks in the irrigation system as soon as they are observed.
- Inspect and remove accumulated debris from grounds.
- Routinely monitor lawns to identify problems during their early stages.
- Identify nutrient/water needs of plants.
- Inspect for problems by testing soils.

Maintenance Procedures

Grounds Maintenance

- Sweep paved areas regularly to collect loose particles.
- Wipe up spills with rags and other absorbent materials immediately.
- Do not hose down the area to catch basins.
- Keep mower blades sharp.
- Do not sweep yard waste, debris, clippings, etc. into catch basins or surface waters.

3.5 Fire Training and Hose Flushing

Purpose and Approach

Fire training and hose/hydrant flushing requires certain procedures in order to prevent pollutants from entering the surrounding stormwater system. Training with and cleaning fire equipment typically uses chemicals that can be collected by runoff and distributed into adjacent waterways. The best management practices (BMPs) below should be implemented as appropriate to prevent pollutants from being discharged into the drainage system as a result of these actives.

Best Management Practices (BMPs)

- If possible, conduct training at a designated facility built and engineered for training activities.
- Sweep, vacuum, or use any other dry-cleaning method on pavement to clean up debris and sediment before flushing or training.
- Direct hydrant or hose flushing flows to landscaped or green areas when possible and without causing erosion or damage to the landscape.
- Use haybales, filter socks, or other filtration devices at all stormwater structures during all activities.
- When using foam, block storm drain inlets with plastic sheeting and sandbags to divert flow to sanitary system (with DPW approval).
- Limit use of straight streams and fog streams during training.
- Conduct vehicle and equipment cleaning indoors or at a facility that is connected to the sanitary sewer system.
- Use biodegradable, phosphate-free detergents (if needed) when cleaning.
- Conduct all maintenance and repair of fire vehicles and equipment indoors whenever possible..

Inspection Procedures

- Inspect training or flushing site for petroleum leaks or spills prior to flushing or fire training activities.
- Inspect vehicles prior to going to training site to ensure there are no leaks.
- Check that spill kit is fully stocked and on site.
- Locate all drainage structures and stormwater conveyances on site.
- Check for MSDS's for firefighting chemicals.

Targeted Facilities and Operations

- Fire Department
- Parking Lots for Fire Training

Targeted Pollutants

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease

Reference

- "California Stormwater Quality Association Municipal BMP Handbook"

Maintenance Procedures

- Repair any leaks on vehicles or equipment before going to training or flushing site.
- Routinely clean fire vehicles and equipment in a designed wash area to eliminate chemicals, gas, or any other pollutants from traveling to the training site. See Section 3.3 Vehicle and Equipment Maintenance for more BMPs.
- When on site, properly install filtration devices or barriers for stormwater structures.
- Update MSDS's for each vehicle for firefighting chemicals.
- If a chemical spill or leak is reported on site, use the spill kit that is on site and proper clean up procedures. Properly dispose of waste and report to the DPW.

3.6 Outdoor Waste Management & Disposal

Purpose and Approach

Waste management entails the selection of the individual products, the correct use and storage of the product, and the proper disposal of associated waste(s). It is important to be responsible with common chemicals and solvents including paints, cleaners, and automotive products to reduce contamination to stormwater runoff.

Best Management Practices (BMPs)

Materials Maintenance

- Routine cleaning of workspaces
- Proper collection/disposal of waste
- Product selection
- Product use and storage
- Routine vehicle and equipment maintenance and inspection
- Employee training

Materials Inventory

- Identify all hazardous and non-hazardous substances by reviewing purchase orders and conducting a walk-through of the facility.
- Compile Material Safety Data Sheets (MSDSs) for all chemicals. These should be readily accessible to all facility employees.
- Label all containers of significant materials that include cleaners, fuels and other hazards.
- Identify handling, storage and disposal requirements of all chemicals.
- Use environmentally friendly or non-hazardous substitutes when appropriate that include, but are not limited to, $H_2Orange_2$, Orange Thunder, and Simple Green®.
- Keep hazardous materials and waste off the ground.
- Provide secondary containment, when appropriate.
- All drums and containers should be in good condition and properly labeled.
- Loose materials/stockpiles should be covered with tarps or placed in shelter.

Solid Waste Management

- Trash storage bins, dumpsters, and disposal areas should be clean and free of debris, especially those located near catch basins.
- Dumpsters should be maintained in good condition and securely closed at all times.
- Clean up equipment and materials.

<u>Targeted Facilities and Operations</u>

- All Municipal Facilities
- All Fleet Vehicle and Equipment Operations

<u>Targeted Pollutants</u>

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics
- Low Dissolved Oxygen

<u>Reference</u>

- “California Stormwater Quality Association Municipal BMP Handbook”

- Dispose of solid waste in accordance with local, state, and federal laws.
- Temporary trash storage should be inspected weekly before being emptied by waste management contractor.
- Debris piles, including sweeping, construction, and wood debris should be covered. Covers should be inspected weekly before waste is removed off-site. Compostable yard debris does not need to be covered.

Inspection Procedures

- Inspect dumpsters and trash containers for leaks and make sure they are covered.
- Inspect material storage sheds (inside and outside) to verify items are not exposed to precipitation and are covered or in enclosed areas.
- Inspect stormwater discharge locations and on-site stormwater drainage infrastructure (e.g., catch basins) for contaminants, soil staining and plugged discharge lines.
- Physical on-site verification of sealed floor drains (or redirected to sanitary sewer).

Maintenance Procedures

- Repair or replace any leaking/defective containers and replace label as necessary
- Maintain caps and/or covers on containers
- Maintain aisle space for inspection of products/wastes
- Routinely clean work spaces
- Properly collect/dispose of waste
- Routinely maintain and inspect vehicles and equipment
- Train employees, tenants/site users, hired contractors and any other personnel performing materials management activities routinely and when new products enter the facility on proper use, storage, disposal and safety concerns. Material Safety Data Sheets (MSDSs) should be reviewed and readily accessible in central facility location
- Review any Spill Prevention, Control and Countermeasure (SPCC) Plans in place for a specific facility for petroleum products.

3.7 Outdoor Material Storage

Purpose and Approach

Storage of raw or finished materials outside must be done in a manner that prevents contamination of stormwater runoff.. Materials may be properly stored in containers, on platforms or pads, in bins or boxes, or in piles depending on the type of material and context. Storage areas that are exposed to rainfall and direct runoff can contribute pollutants to stormwater when solid materials wash off or materials dissolve into the runoff. The best management practices (BMPs) below can be applied to reduce contamination of runoff entering the drainage system.

Best Management Practices (BMPs)

- Properly label each outdoor storage bin or area.
- Create a berm around storage areas to contain any potential spills or leaks.
- Keep storage areas away from stormwater drainage structures.
- Ensure all liquids stored outside on a paved impervious surface are stored with a secondary containment mechanism.
- All chemical, drums, or bagged materials should also be placed on secondary containment.
- Cover treated wood products, other storage areas and/or bins with permanent or seasonal structures.
- Keep all storage areas secure to prevent vandalism and unauthorized access.

Inspection Procedures

- Inspect all storage areas and bins routinely for spills or leaks.
- Inspect all secondary containment and structures that are used for cover and ensure there are no breaks or cracks.
- Check for properly labeled containers and storage areas.

Targeted Facilities and Operations

- All Municipal Facilities

Targeted Pollutants

- Sediment
- Nutrients
- Trash
- Oil & Grease
- Organics
- Low Dissolved Oxygen

Reference

- “Massachusetts Stormwater Handbook, Vol. 2, Chapter

- Inspect spill kit and confirm all components are fully stocked.
- Identify the location of all stormwater drainage structures and ensure stored materials are not in the surrounding area.

Maintenance Procedures

- Repair or replace any leaking or defective containers and replace labels or signage as necessary.
- Ensure spill skit is readily available and stocked.
- If spills or leaks have occurred, use a spill kit, appropriate clean up equipment, and properly dispose of any materials or waste.
- Repair or replace any damaged secondary containment or structures used for cover.
- Regularly sweep and clean up any litter in or around the storage areas.

3.8 Painting & Equipment Loading/Disposal

Purpose and Approach

Containing paint and debris on a work site is important so that the chemicals can be properly disposed of. Without proper controls and disposal, contamination of surrounding areas is a risk. It is also important to properly maintain and clean all painting equipment to ensure chemicals are not being spilled or distributed on site. The best management practices (BMPs) below can be applied to reduce contamination of runoff entering the drainage system.

Best Management Practices (BMPs)

- Store paints, coatings, and solvents in a covered and well-ventilated area. Keep containers closed in storage area when not in use. Refer to Section 3.12 Hazardous Material Storage for more BMPs for storage.
- Remove excess paint from spent barrels and cans to allow residual paint to dry.
- Properly dispose of spent barrels and cans as solid waste once residual paint is dry.
- When possible, select water-based latex paints, as they include ff ewer chemicals and emit lower levels of chemical vapor.
- Contain painting activities and use other methods such as drop cloths, tarps, etc. under the painting/work area to contain any paint chips, drips, or spills.
- Install filtration devices or barriers to prevent chemicals, paint residue, or any other pollutants from entering the stormwater system.
- Wash all painting equipment in an approved wash area or wash rack. Refer to Section 3.2 Vehicle Washing for more BMPs.
- Use dry cleaning methods to clean up hardened paint residue and properly dispose as a solid waste.

Targeted Facilities and Operations

- All Municipal Facilities

Targeted Pollutants

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease

Reference

- “Massachusetts Stormwater Handbook, Vol. 2, Chapter

Inspection Procedures

- Inspect storage area for any leaks or spills.
- Identify the location of all stormwater drainage structures where painting is being completed.
- Inspect all structures for paint residue or chemical sheen.
- Inspect vents and air circulation in ventilated storage area.

Maintenance Procedures

- Repair or replace any leaking paint containers in the storage area.
- Routinely clean all paint equipment and repair any leaks or defects.
- Remove paint chips that collect on drainage structures
- Update all MSDSs and keep files on painting site.

3.9 Outdoor Vehicle and Equipment Storage

Purpose and Approach

Vehicles and equipment stored outdoors such as fleet parking can be a potential source of pollution during rain events. Vehicles and other equipment, such as snow-blowers or lawnmowers, typically contain oils, coolants, and fuel which have the potential to leak.. If these items are stored outdoors, leaks have the potential to be introduced to the stormwater system by surface runoff caused by rainfall. Note that this section pertains only to outdoor storage of vehicles and equipment, and that the maintenance of such vehicles and equipment is covered under Section 3.3 Vehicle and Equipment Maintenance.

Best Management Practices (BMPs)

- Fleet parking area and surrounding storage area(s) should be kept neat and orderly.
- Provide trash receptables in parking area(s) and maintain signage indicating “No Littering”
- Store vehicles and equipment prone to leaking under cover.
- Drain fluids from long-term inactive, decommissioned, and wrecked vehicles and equipment as soon as possible.
- Use drip pans or other spill/leak containment where fluid draining cannot be conducted.
- Clean spills/leaks promptly and dispose of properly.
- Use dry cleaning methods (sweeping/vacuuming) to remove debris from impervious parking area(s).

Inspection Procedures

- Regularly inspect vehicle and equipment and storage area(s) for signs of leaks/spills.
- Regularly inspect stormwater collection structures for petroleum sheen before draining. When sheen is detected, water should be removed and disposed of properly via sanitary contractor.

Targeted Facilities and Operations

- All Fleet Vehicle and Equipment Operations
- Golf Courses

Targeted Pollutants

- Metals
- Trash
- Oil & Grease
- Organics
- Low Dissolved Oxygen

Reference

- “Massachusetts Stormwater Handbook, Vol. 2, Chapter 1”

Maintenance Procedures

- Regularly perform dry cleaning methods (sweeping/vacuuming) for impervious surfaces that vehicles and equipment are stored on.
- Keep storage and parking area(s) clean and orderly.
- Utilize spill/leak prevention and containment for stored vehicles and clean any spills/leaks promptly with proper disposal.
- Provide trash receptacles in the parking and storage area(s).

3.10 Salt/Sand and Salt Brine/Calcium Chloride Storage

Purpose and Approach

Proper road sand/salt storage is necessary to prevent contamination to surface and ground water supplies. Salts are very soluble—once in contact with water it cannot be removed. The primary reasons for keeping salt covered and controlling use are that salt:

- Kills vegetation
- Corrodes infrastructure
- Blocks catch basins, swales, and other drainage structures
- Increases sedimentation to streams and rivers
- Even small quantities (5% road salt) contain phosphorus, nitrogen, copper, and cyanide

In addition, pollutants often attach to sand particles and excessive sand washed into the stormwater drainage system can clog catch basins. In order to ensure proper sand/salt management, it is important to address the following items:

- Proper Storage
- Proper Use
- Proper Removal
- Proper Disposal

Best Management Practices (BMPs)

Proper Storage

Storage facilities for sand/salt mixtures should have the following key elements:

- Covered structure on impervious surface
- Drainage should be diverted away from storage facility
- Sand/salt handling should be done within storage facility
- Should not be located in a water supply watershed or within 100-year floodplain as shown on the community's adopted flood maps.

Targeted Facilities and Operations

- All Municipal Facilities
- Facility Access Roads and Parking Lots

Targeted Pollutants

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics
- Low Dissolved Oxygen

Reference

- "Mass Highway Stormwater Handbook"
- "Massachusetts Stormwater Handbook, Vol. 2, Chapter 1"
- "California Stormwater Quality Association Municipal BMP Handbook"

Proper Use

- Establish a low salt area near any water bodies or residential areas.
- When feasible, use higher percentage of sand in sand/salt mixture.
- Regulate the amount of road salt applied to prevent over-salting of motorways and increasing runoff concentrations.
- Vary the amount of salt applied to reflect site-specific characteristics, such as road width and design, traffic concentration, and proximity to surface waters.
- Provide calibration devices for spreaders in trucks to aid maintenance workers in the proper application of road salts.
- Establish air temperature and snow depth conditions favorable for successful use of salt.
- Use alternative materials, such as sand or gravel, in especially sensitive areas.
- Use alternative products such as Magic Salt.

Proper Removal

- Street sweeping of facility access roads and parking lots in spring and fall.
- Catch basin cleaning once per year.

Proper Disposal

Disposal of sand/salt mixtures should never be done in the following areas:

- Wetlands or surface waters
- Stormwater drainage system
- Well locations and public drinking supplies

Dispose of sand/salt mixtures at appropriate disposal sites:

- Locate disposal sites adjacent to or on pervious surface in upland areas away from water resources and wells.
- Maintain the disposal site with silt fence and other barriers on the downgradient side of the site.

Salt Brine and Calcium Storage

- Store brine and liquid deicers in well maintained and clearly labeled storage tanks.
- Immediately repair spills and leaks from storage tank fittings, valves and pumps.
- For tanks located outside, utilize secondary containment (double walled tanks or containment dikes) with 110-125% of the capacity of the largest tank.
- House storage tanks and mixing equipment inside protective barriers (bollards, jersey barriers, etc).
- Use drain or inlet covers to prevent collection of accidental deicer spills/leaks from entering the storm system.
- Keep MSDS on site and accessible.

Inspection Procedures

- Inspect salt storage shed for leaks on a regular basis, including fall and spring.
- Inspect salt application equipment, including calibration equipment and spreaders.
- Inspect salt regularly for lumping or water contamination.
- Inspect surface areas for evidence of runoff – salt stains in ground near and around the salt storage shed, loading area or down slope.
- Inspect for excessive amounts of salt on roads.
- Perform regular scheduled inspection and maintenance of Salt Brine and Calcium storage tanks and fittings, valves, and pumps.

Maintenance Procedures

- Service trucks and calibrated spreaders regularly to ensure accurate, efficient distribution of salt.
- Educate and train operators on hazards of over-salting to roads and environment at the beginning of the snow season as part of meetings with supervisor and drivers.
- Repair salt storage shed leaks.
- Perform regularly scheduled maintenance on Salt Brine and Calcium storage tanks and accessories (valves, fittings and pumps), and immediately repair leaking or dripping connection on tanks.

3.11 Material Stockpiles

Purpose and Approach

Stockpiled materials such as snow, soil, gravel, and mulch represent a source of pollution during rain events. When stored unprotected outdoors, material stockpiles are exposed to precipitation. When the eroded material enters the stormwater system, the sediment can quickly fill the sumps of catch basin structures. The eroded material is also a surface to which pollutants may adhere to and then enter the drainage system, leading to pollution in the waterways and environment.

Best Management Practices (BMPs)

General Practices

- Store materials indoors whenever possible.
- When planning a location for a stockpile, use a relatively level site away from slopes, water features, and stormwater drainage structures.
- Store outdoor stockpiles under a covered area or use tarps for cover.
- Implement erosion control systems at storage site perimeter. Common practices include sediment basins, silt fences, or grass filter strips.
- Install berms, curbing and/or grading to prevent precipitation run-on into stockpile areas.
- Use catch basin filter inserts for catch basins located near outdoor material stockpiles.

Snow Dump/Stockpile

- Select snow storage sites before snow season begins. These sites should be on a pervious surface and away from stormwater features and wells.
- Place silt fence or sediment barrier as down grade side of site to collect any sediment from meltwater.
- Clean up and properly dispose of litter and sediment after snow season is over.

Targeted Facilities and Operations

- All Municipal Facilities

Targeted Pollutants

- Sediment
- Nutrients
- Metals
- Trash
- Oil & Grease
- Organics
- Low Dissolved Oxygen

Reference

- “Massachusetts Stormwater Handbook, Vol. 2, Chapter 1”

Inspection Procedures

- Inspect all material stockpiles for proper cover.
- Inspect the condition of all erosion control structures
- Identify the location of all stormwater drainage structures and ensure stockpiles are not in the surrounding area.

Maintenance Procedures

- Regularly sweep and clean up any eroded material in stockpile storage area.
- For snow storage areas, clean up litter and collected sediment from snow melt at the end of the snow season.
- Remove debris from catch basin filter inserts.
- Repair or replace any damaged tarps, structures used for cover, or erosion control systems.
- Move any stockpiles that have been placed within the vicinity of any drainage structures.

3.12 Hazardous Material Storage

Purpose and Approach

It is important to properly store hazardous materials (which may include antifreeze, paints, solvents, and cleaners, among other substances) to prevent them from contaminating stormwater runoff. The best management practices (BMPs) below can be applied to prevent hazardous materials from entering the drainage system.

Hazardous materials include:

- Cleaning agents: solvents and drain cleaners
- Vehicle maintenance fluids: motor oil, gasoline, antifreeze, degreasers, and radiator flush
- Water treatment chemicals
- Paints

Best Management Practices (BMPs)

Loading / Unloading

- All facilities should have proper procedures in place for loading and/or unloading hazardous materials received, especially areas located near catch basins.
- Do not conduct loading and unloading of exposed hazards during wet weather, whenever possible.
- If feasible, load and unload all materials and equipment in covered areas, such as building overhangs at loading docks.
- Load / unload only at designated loading areas.
- Use drip pans underneath hose and pipe connections and other leak-prone spots during liquid transfer operations, and when making and breaking connections.

Container Storage

- Keep containers away from high traffic areas

Targeted Facilities and Operations

- All Municipal Facilities

Targeted Pollutants

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics
- Low Dissolved Oxygen

Reference

- “Massachusetts Stormwater Handbook, Vol. 2, Chapter 1”
- “California Stormwater Quality Association Municipal BMP Handbook”

- When possible, store indoors. If stored outdoors, cover all containers and drums or place under shelter.
- Place containers in a designated area that is paved, free of cracks and gaps, and impervious in order to contain leaks and spills. The area should also be covered. Store containers on pallets.
- Provide secondary containment for hazardous materials and waste placed outdoors.
- Log inventory and supply MSDSs for all stored materials.
- Chemicals should be kept in original labeled containers. Containers should not be glass.
- Containers should not be overfilled. Install overfill protection on storage tanks/drums.
- Properly stack containers and drums.
- Storage areas should be enclosed, clean and organized.
- Minimize storage on-site. Lock storage areas and provide warning signs.
- Contractors should be trained on delivery and storage practices.
- Segregate reactive/incompatible materials (such as chlorine and ammonia).
- Place drip pans under container spout.

Maintenance

- Routinely inspect storage spaces and containers for leaks and cracks.
- Train maintenance personnel, employees, leases/site users, hired contractors and any other personnel working with hazardous materials for spill cleanup.

Disposal

- Properly dispose of hazardous materials.
- Recycle when possible.

Inspection Procedures

- Check loading and unloading equipment regularly for leaks, including valves, pumps, flanges and connections
- Look for dust or fumes during loading or unloading operations
- Inspect storage areas regularly for leaks or spills
- Conduct routine inspections and check for external corrosion of material containers
- Check for structural failure, spills and overfills due to operator error or failure of piping system
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa
- Visually inspect new tank or container installations for loose fittings, poor welding and improper or poorly fitted gaskets
- Inspect tank foundations, connections, coatings, tank walls and piping system. Look for corrosion, leaks, cracks, scratches and other physical damage that may weaken the tank or container system.

- Replace containers that are leaking, corroded, or otherwise deteriorating with ones in good condition. If the liquid chemicals are corrosive, containers made of compatible materials must be used instead of metal drums.
- Label new or secondary containers with the product name and hazards

Maintenance Procedures

- Conduct regular inspections and make repairs as necessary. The frequency of repairs will depend on the age of the facility.
- Check loading and unloading equipment regularly for leaks.
- Sweep area regularly with dry broom.
- Conduct major clean-out of loading and unloading area and any sumps prior to October 1 of each year.
- Repair or replace any leaking/defective containers and replace labels as necessary.
- Maintain caps and/or covers on containers.
- Maintain aisle space for inspection of products/wastes.
- Train employees, leases/site users, hired contractors and any other personnel working with hazardous materials on proper procedures when new hazardous materials are used.

3.13 Catch Basin Cleaning

Purpose and Approach

It is important to routinely remove sediments that are collected in the sumps of catch basins. Sediments can have high concentrations of pollutants including metals and hydrocarbons. These sediments can also clog downstream drainage systems and transport pollutants to nearby water bodies.

Best Management Practices (BMPs)

- Provide this BMP sheet to any catch basin cleaning contractor who will work on-site.
- EPA recommends to clean basins when solids reach one-third the depth from the basin bottom to the invert of the lowest pipe into or out of the basin.
- Target cleaning for early Spring or late Fall.
- Clean structures prior to rainy season.
- Clean manually or with equipment (i.e., bucket loaders).
- Properly dispose of catch basin material (MADEP and EPA requires chemical analysis to determine if substance is hazardous waste).
- Repair damaged catch basins including outlet traps.
- Install hoods if catch basins do not have them.
- Install outlet traps if catch basins do not have them.
- Inform employees that catch basins are part of the stormwater collection system and not the septic system.
- Maintain a log of cleaning activities. Information should include amount of debris/sediment removed and areas with heavily filled basins.

Inspection Procedures

- Inspect catch basins, grates and ditches at least twice per year (best times are before the start and before the end of the rainy season).
- Inspections should be incorporated during yearly routine cleaning.

Targeted Facilities and Operations

- All Municipal Facilities
- Facility Access Roads and Parking Lots

Targeted Pollutants

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics
- Low Dissolved Oxygen

Reference

- “California Stormwater Quality Association Municipal BMP Handbook”

Maintenance Procedures

- Clean catch basins annually. Catch basins should be checked for sediment levels in sump, in accordance with the inspection schedule discussed above. Basins in areas that accumulate a significant amount of sediment should be cleaned more frequently.
- During catch basin repairs, any missing hoods should be replaced.

3.14 Pavement Maintenance

Purpose and Approach

Pavement cleaning and repairs are necessary to keep municipal lots and roadways functional and safe for travel. If debris continually collects on paved surfaces and it not properly removed, it can also collect pollutants and enter the drainage system with stormwater runoff. In addition, when conducting pavement repair, it is important in implement controls that prevent from entering the stormwater system where they may enter the stormwater system and pollute waterways.

Best Management Practices (BMPs)

- Schedule regular sweeping to remove sediment and debris from paved surfaces.
- Keep work sites clean and orderly and remove debris from construction in a timely fashion.
- Use dry cleaning methods for spills and leaks on site and properly dispose of waste after clean-up is complete.
- Load and transfer hot bituminous material away from stormwater structures and watercourses.
- Cover and seal nearby stormwater catch basins, inlets, and manholes before applying seal coat, slurry seal, etc.

Inspection Procedures

- Locate all stormwater structures that are surrounding or along the path of construction.
- Check to see that there is a fully stocked spill kit on site.

Maintenance Procedures

- Sweep and properly dispose of any sediment during regular scheduled cleaning and post-construction.
- Use a spill kit for any leaks or spills on site and properly dispose of waste.
- For sweeping or pavement construction, cover and seal stormwater structures surrounding the site.

Targeted Facilities and Operations

- Facility Access Roads and Parking Lots

Targeted Pollutants

- Sediment
- Nutrients
- Trash
- Metals
- Bacteria
- Oil & Grease
- Organics
- Low Dissolved Oxygen

Reference

- “California Stormwater Quality Association Municipal BMP Handbook”

3.15 Street and Parking Lot Sweeping

Purpose and Approach

Street and parking lot sweeping uses self-propelled equipment to remove sediment from paved surfaces, preventing it from entering catch basins or receiving waters. Sweeping is most effective for removing coarse particles, leaves, and trash. Regular sweeping helps reduce the need for catch basin cleaning as the amount of sediment collected in the structures decreases.

Best Management Practices (BMPs)

Implementation

- Provide this sheet to any sweeping contractors that will work on-site.
- Prioritize by sweeping the dirtiest roadways more frequently.
- Sweep before rain events to prevent particles and pollutants from entering runoff.
- Sweep as early in the spring as possible (after snowmelt).
- Sweep in June (after trees drop seeds and flowers) to prevent phosphorus-laden runoff.
- Any visible sediment should be swept up (including sand/salt mixtures and granular material).
- Control the number of points where vehicles leave the site to allow sweeping to be focused on certain areas.
- Sweep up the smallest particles feasible.
- Sweep in pattern to keep spilled material from being pushed into catch basins.
- Before sweeping, manually rake sand from turf areas on surfaces to be swept.
- Properly dispose of sweepings as a solid waste (dumpsters). If possible, recycle fall leaf sweepings by composting.
- Maintain a log of sweeping activities. Information should include: location of sweeping, amount of sediment and debris removed and location of extensive sediment and debris buildup.

Sweeper Operation and Maintenance

- Adjust broom frequently to maximize efficiency of sweeping operations.

<u>Targeted Facilities and Operations</u>

- Facility Access Roads and Parking Lots

<u>Targeted Pollutants</u>

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics
- Low Dissolved Oxygen

<u>Reference</u>

- “Massachusetts Stormwater Handbook, Vol. 2, Chapter 1”
- “California Stormwater Quality Association Municipal BMP Handbook”

- After sweeping is finished, properly dispose of sweeper waste.
- Do not use kick brooms or sweeper attachments that tend to spread dirt.
- When unloading sweeper, make sure there is no dust or sediment release.

Inspection Procedures

- Regularly inspect streets and municipal parking lots for debris.

Maintenance Procedures

- Adjust broom frequently to maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes. Street sweepings are regulated as solid waste by the Commonwealth of Massachusetts and can be used in a variety of ways, including as a landfill cover, compost additive, or as fill in a public way. (MassDEP Policy BWP-94.092).
- Do not use kick brooms or sweeper attachments that tend to spread dirt.
- When unloading sweeper, try to avoid dust or sediment release.
- Inspect sweepers to check that they are properly maintained and repaired.

3.16 Spill Prevention and Response

Purpose and Approach

It is important to have a plan in place in the event a spill occurs so contaminants do not mix with stormwater runoff. A plan can be effective at reducing risk of surface and groundwater contamination—but the plan is only effective with adequate personnel training, availability of cleanup supplies, and management to ensure appropriate procedures are followed. The items below should be followed as part of an effective spill prevention and response protocol:

- Create a well thought out and implemented plan
- Post a response checklist in any hazardous waste storage area with contact information (including emergency phone numbers), and spill containment procedures
- Train employees, tenants/site users, hired contractors, and any other personnel working with spill prevention activities
- Regularly update plan, checklists, and contact information
- Regularly inspect spill potential areas
- Facilities with aboveground storage tanks (ASTs) and underground storage tanks (USTs) greater than 1,320 gallons and 42,000 gallons must have Spill Prevention Control & Countermeasure plans in place.

Spill Prevention and Response Plan

An effective Spill Prevention and Response Plan should include the following:

- Description of the facilities, the address, activities and materials involved.
- Identification of key spill response personnel and hospital contacts.
- Identification of the potential spill areas or operations prone to spills/leaks.
- Identification of which areas should be or are bermed to contain spills/leaks
- Facility map identifying the key locations of areas, activities, materials, structural BMPs, etc.

<u>Targeted Facilities and Operations</u>

- Facilities with Fueling Activities and Hazardous Wastes
- Facility Access Roads and Parking Lots

<u>Targeted Pollutants</u>

- Nutrients
- Metals
- Oil & Grease
- Organics

<u>Reference</u>

- “Oil Spill Prevention, Control and Countermeasure Plan, Lancaster Complex, Lancaster, MA”, August 2003
- “California Stormwater Quality Association Municipal BMP Handbook”

- Material handling procedures and safety measures for each kind of waste.
- Spill response procedures including:
  - Assessment of the site and potential impacts
  - Containment of the material
  - Notification of the proper personnel and evacuation procedures
  - Clean up of the site
  - Disposal of the waste material
  - Proper record keeping procedures
- Plan to protect all catch basins in the event of a spill.
- Descriptions of spill response equipment, including safety and cleanup equipment.

Best Management Practices (BMPs)

Spill/Leak Prevention

- If possible, move material handling indoors, under cover, or away from catch basins or sensitive water bodies.
- Properly label all containers so that the contents are easily identifiable.
- Berm storage areas so that if a spill or leak occurs, the material is contained.
- Cover outside storage areas either with a permanent structure or with a seasonal one such as a tarp so that rain will not come into contact with the materials.
- Check containers (and any containment sumps) often for leaks and spills. Replace containers that are leaking, corroded, or otherwise deteriorating with containers in good condition. Collect all spilled liquids and properly dispose of them.
- Store, contain, and transfer liquid materials in such a manner that if the container is ruptured or the contents spilled, they will not discharge, flow or be washed into the stormwater drainage system, surface waters, or groundwater.
- Place drip pans or absorbent materials beneath all mounted taps and at all potential drip and spill locations during the filling and unloading of containers. Any collected liquids or soiled absorbent materials should be reused/recycled or properly disposed of.

- Only transport the minimum amount of material needed for the daily activities and transfer materials between containers at a municipal yard where leaks and spill are easier to control.
- If paved, sweep and clean storage areas monthly, do not use water to hose down the area unless all of the water will be collected and disposed of properly (e.g., sanitary sewer)
- Install a spill control device (such as a tee section) in any catch basins that collect runoff from any storage areas if the materials stored are oil, gas, or other materials that separate from and float on water. This will allow for easier cleanup if a spill occurs.
- If necessary, protect catch basins while conducting field activities so that if a spill occurs, the material will be contained.
- Keep ample supplies of spill cleanup materials including Speedi Dry and absorbent boom pads on-site. Train all employees, leases/site users, hired contractors and any other personnel working with spill prevention activities on where materials are stored.

Spill Clean Up

- Small non-hazardous spills:
  - Use a rag, damp cloth or absorbent materials for general cleanup of liquids.
  - Use brooms or shovels for the general cleanup of dry materials
  - If water is used, it must be collected and properly disposed of. The wash water cannot be allowed to enter the stormwater drainage system.
  - Dispose of any waste materials properly.
  - Clean or dispose of any equipment used to clean up the spill properly.
- Large non-hazardous spills
  - Use absorbent materials for general cleanup of liquids.
  - Use brooms, shovels or street sweepers for the general cleanup of dry materials.
  - If water is used, it must be collected and properly disposed of. The wash water cannot be allowed to enter the stormwater drainage system.
  - Dispose of any waste materials properly.
- Clean or dispose of any equipment used to clean up the spill properly.
- For hazardous or very large spills, the Fire Department and/or a private cleanup contractor may need to be contacted to assess the situation and conduct the cleanup and disposal of the materials. Keep spill contractor contact information available for all employees.
- Chemical cleanups of material can be achieved with the use of absorbents, gels, and foams.
- Remove the adsorbent materials promptly and dispose of according to regulations.
- If the spilled material is hazardous, then the used cleanup materials (rags) are also hazardous and must be sent to a certified laundry facility or disposed of as hazardous waste.

Reporting

- Report any spills immediately to key spill response personnel.
- Report spills in accordance with applicable reporting laws. Spills that pose an immediate threat to human health or the environment must be reported immediately.
- Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour).

- After the spill has been contained and cleaned up, a detailed report about the incident should be generated and kept on file. The incident may also be used in briefing staff about proper procedures.

Inspection Procedures

- Inspect secondary containment systems periodically to identify any operational problems.
- Inspect containers for leaks, areas near catch basins and stormwater outlets, and floor drains for indications of spills.

Maintenance Procedures

- Protect drains with oil absorbent materials.
- Clean out catch basins on regular schedule (annually).
- Repair any damage secondary containment structures and replace all containers that have leaks.

Appendix A: BMP Activities Assessment & Pollution Prevention Team

BMPs			BMP 1	BMP 2	BMP 3	BMP 4	BMP 5	BMP 6	BMP 7	BMP 8	BMP 9
Facility Activities	**SWPPP Required**	**Inspection Frequency**	**Fueling Activities**	**Vehicle Washing**	**Vehicle and Equipment Maintenance**	**Building and Grounds Maintenance**	**Fire Training and Hose Flushing**	**Outdoor Waste Management**	**Outdoor Material Storage**	**Painting and Equipment Loading/Disposal**	**Petroleum Tank Storage**
Citation Avenue Pumping Station		Annual				X					
Colonial Park Elementary School		Annual				X		X			
DPW Garage and Office	X	Quarterly	X	X	X	X		X	X		X
Fallon Road Pumping Station		Annual				X					
Fire Department		Annual		X		X		X			
Fuller Street Parking Lot		Annual						X			
Joseph C. Cerrone Memorial Park		Annual				X		X			
Lindenwood Cemetery		Annual	X			X		X			
North Street Pumping Station		Annual				X					
Old Central School		Annual				X		X			
Police Department		Annual		X		X		X			X
Pomeworth Field		Annual				X		X			
Recreation Park		Annual				X		X			
Rita Road Pumping Station		Annual	X			X					X
Robin Hood Elementary School		Annual				X		X			
Rounds Playground		Annual				X		X			
Senior Center		Annual				X		X			
South Elementary School		Annual				X		X			
Stevens St. Recycling Center	X	Quarterly						X	X		
Stoneham Arena		Annual				X		X			
Stoneham Central Middle School		Annual				X		X			
Stoneham High School		Annual				X		X			
Stoneham Historical Society		Annual				X					
Stoneham Oaks Golf Course		Annual	X	X	X	X		X			X
Stoneham Public Library		Annual				X					
Stoneham Town Common		Annual				X		X			
Town Hall		Annual				X		X			
Unicorn Golf Course		Annual	X	X	X	X		X			X
Upland Road Pumping Station		Annual	X			X					
Whip Hill Park		Annual				X					

BMPs	BMP 10	BMP 11	BMP 12	BMP 13	BMP 14	BMP 15	BMP 16	BMP 17
Facility Activities	**Outdoor Vehicle and Equipment Storage**	**Salt and Sand Storage**	**Salt Brine and Calcium Storage**	**Material Stockpiles**	**Hazardous Material Storage**	**Catch Basin and Storm System**	**Pavement Maintenance**	**Structural BMP Maintenance**
Citation Avenue Pumping Station								
Colonial Park Elementary School						X		
DPW Garage and Office	X	X	X	X	X	X	X	
Fallon Road Pumping Station								
Fire Department						X		
Fuller Street Parking Lot						X		
Joseph C. Cerrone Memorial Park						X		
Lindenwood Cemetery				X		X		
North Street Pumping Station								
Old Central School	X							
Police Department	X					X		
Pomeworth Field				X		X		
Recreation Park						X		
Rita Road Pumping Station								
Robin Hood Elementary School						X		
Rounds Playground								
Senior Center						X		
South Elementary School						X		
Stevens St. Recycling Center				X				
Stoneham Arena						X		
Stoneham Central Middle School						X		
Stoneham High School	X					X		
Stoneham Historical Society								
Stoneham Oaks Golf Course	X	X		X	X	X		
Stoneham Public Library						X		
Stoneham Town Common						X		
Town Hall						X		
Unicorn Golf Course	X	X		X	X	X		
Upland Road Pumping Station								
Whip Hill Park								

Town of Stoneham

Pollution Prevention Team

Facility: DPW Garage

Name:	Title:
Brett Gonsalves	Director of Public Works
Eric Richard	Deputy Director of Public Works

Town of Stoneham

Pollution Prevention Team

Facility: Stevens St. Recycling Center

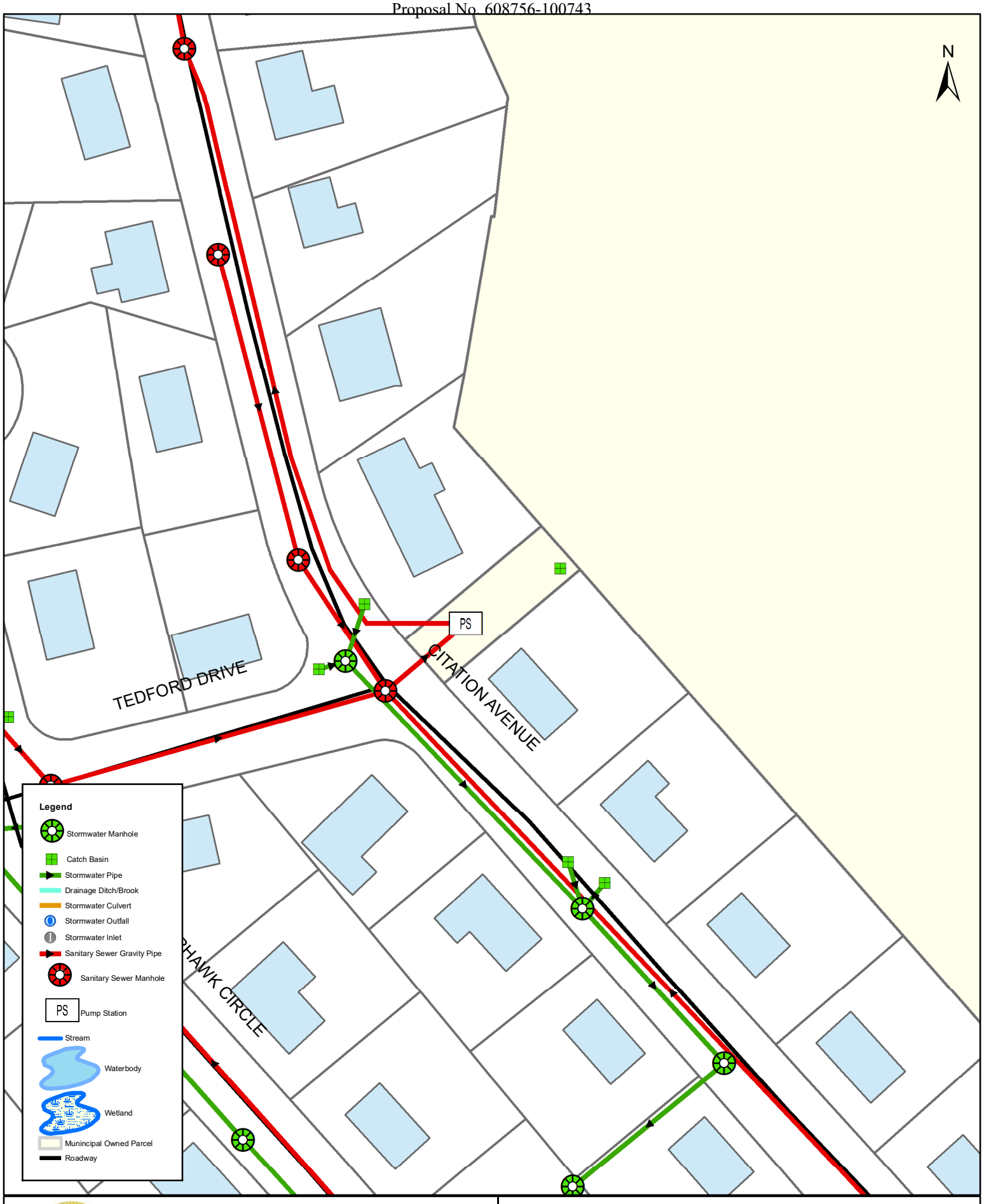
Name:	Title:
Brett Gonsalves	Director of Public Works
Eric Richard	Deputy Director of Public Works

The following facilities require a SWPPP in accordance with the National Pollutant Discharge Elimination System (NPDES) General Permit for small Municipal Separate Storm Sewer Systems (MS4):

1. DPW Garage
2. Stevens St. Recycling Center
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

The SWPPP facilities list will be updated as needed. The Pollution Prevention Team can be found in Appendix A. The facility description and floor drains for the SWPPP facilities can be found on the Facility Stormwater System Maps in Appendix B.

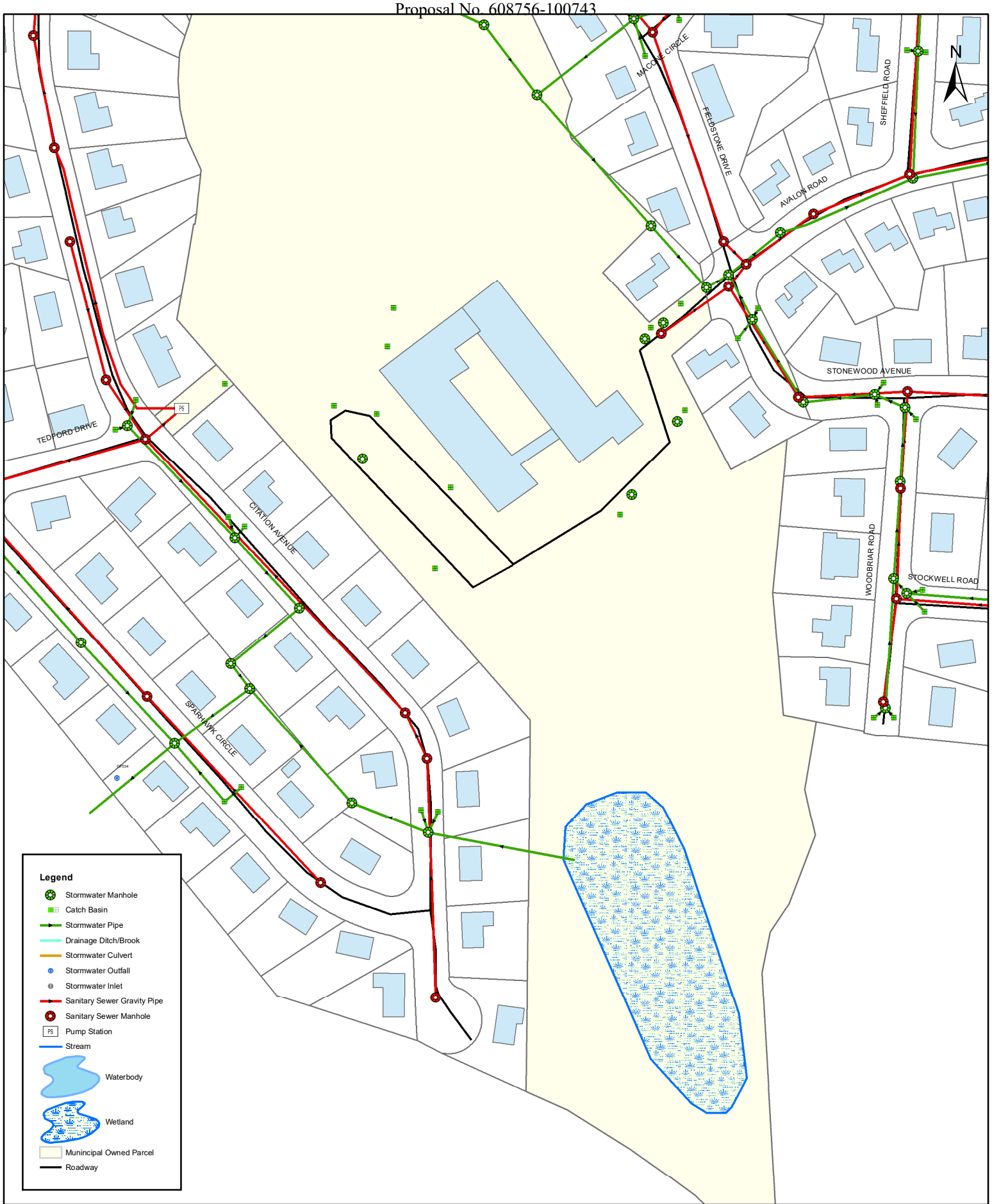
Appendix B: Facility Stormwater System Maps



TOWN OF STONEHAM, MASSACHUSETTS

Facility: Citation Avenue Pumping Station
Address: Citation Ave.

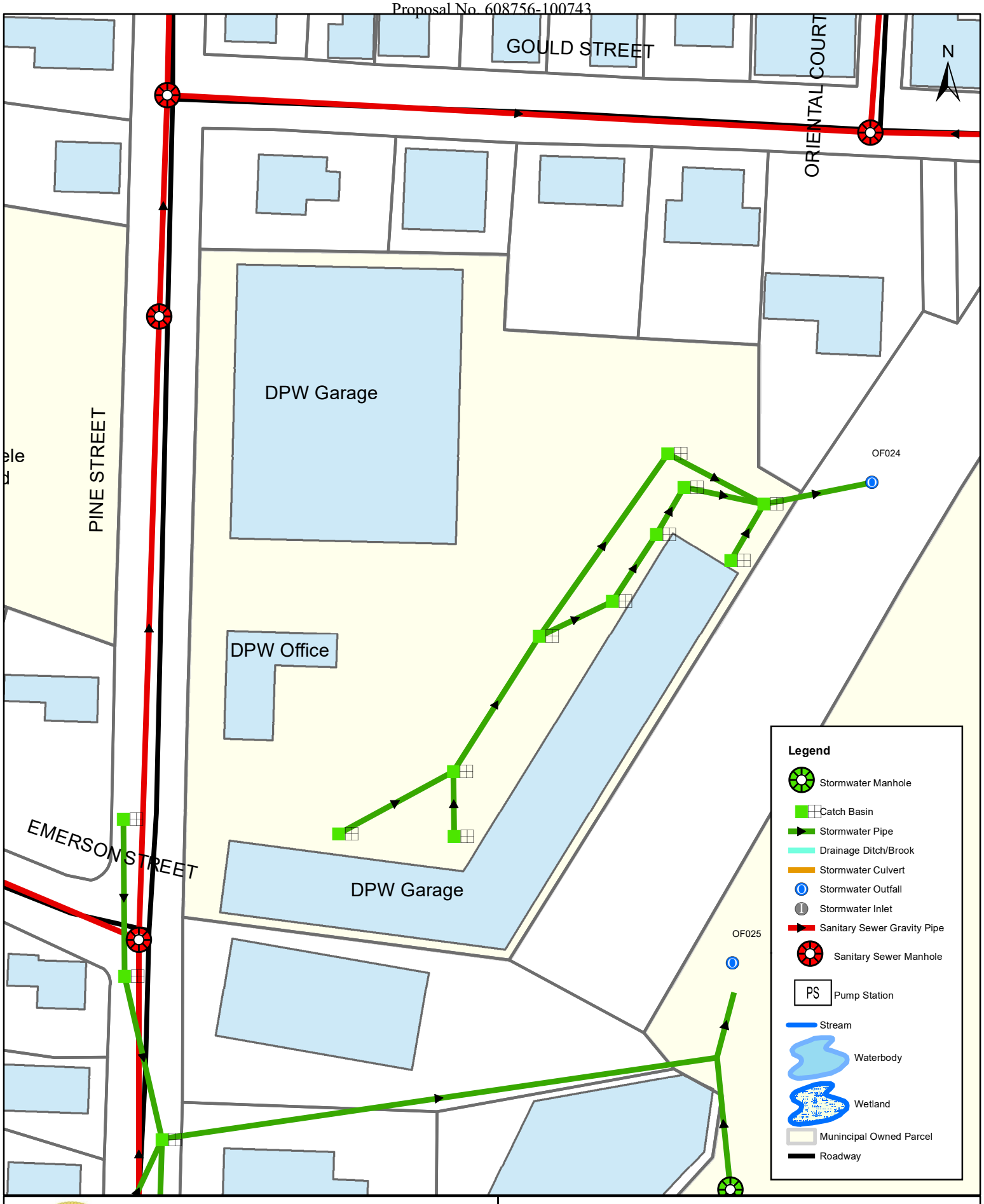
G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

Facility: Colonial Park Elementary School
Address: 30 Avalon Rd.

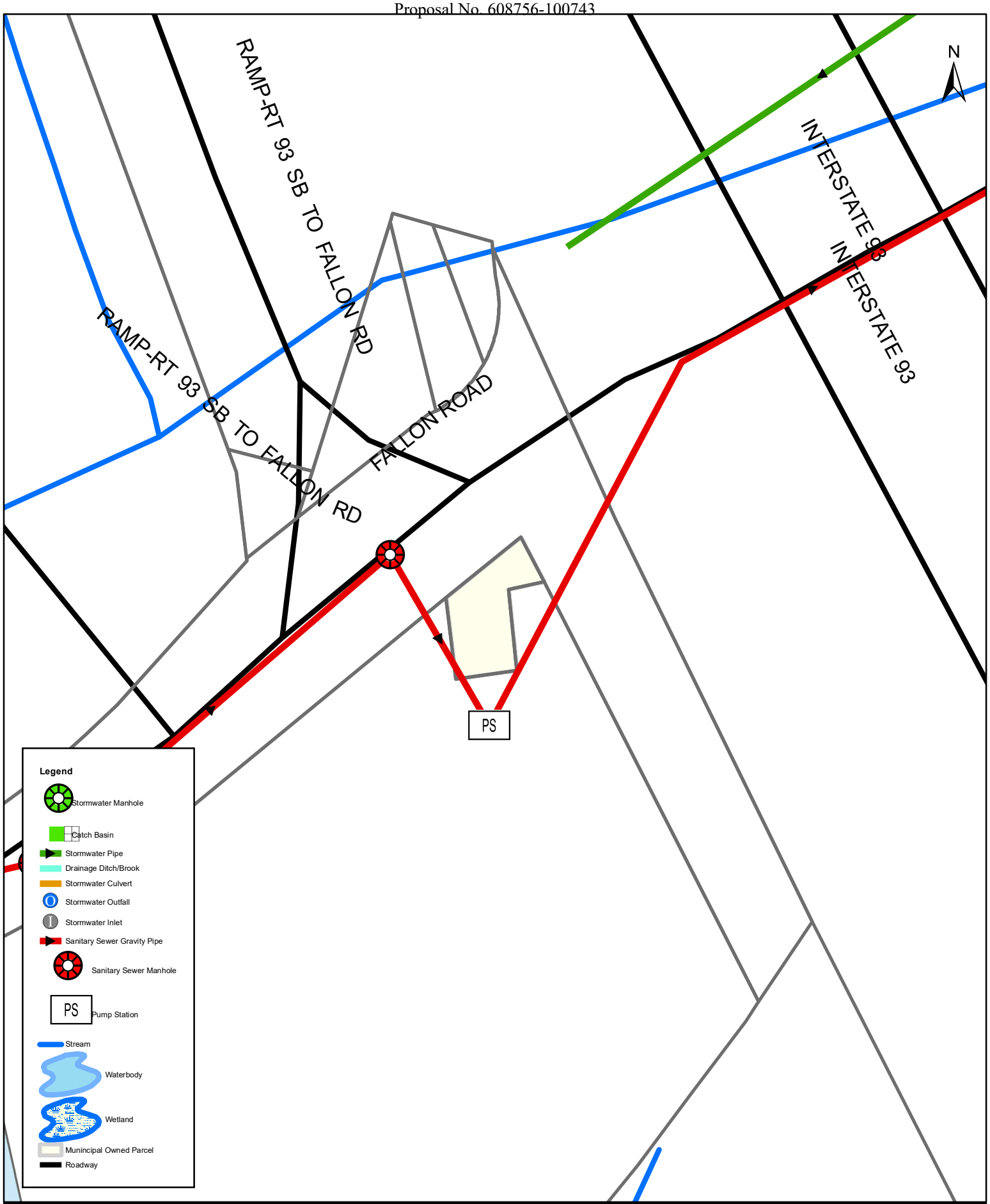
G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

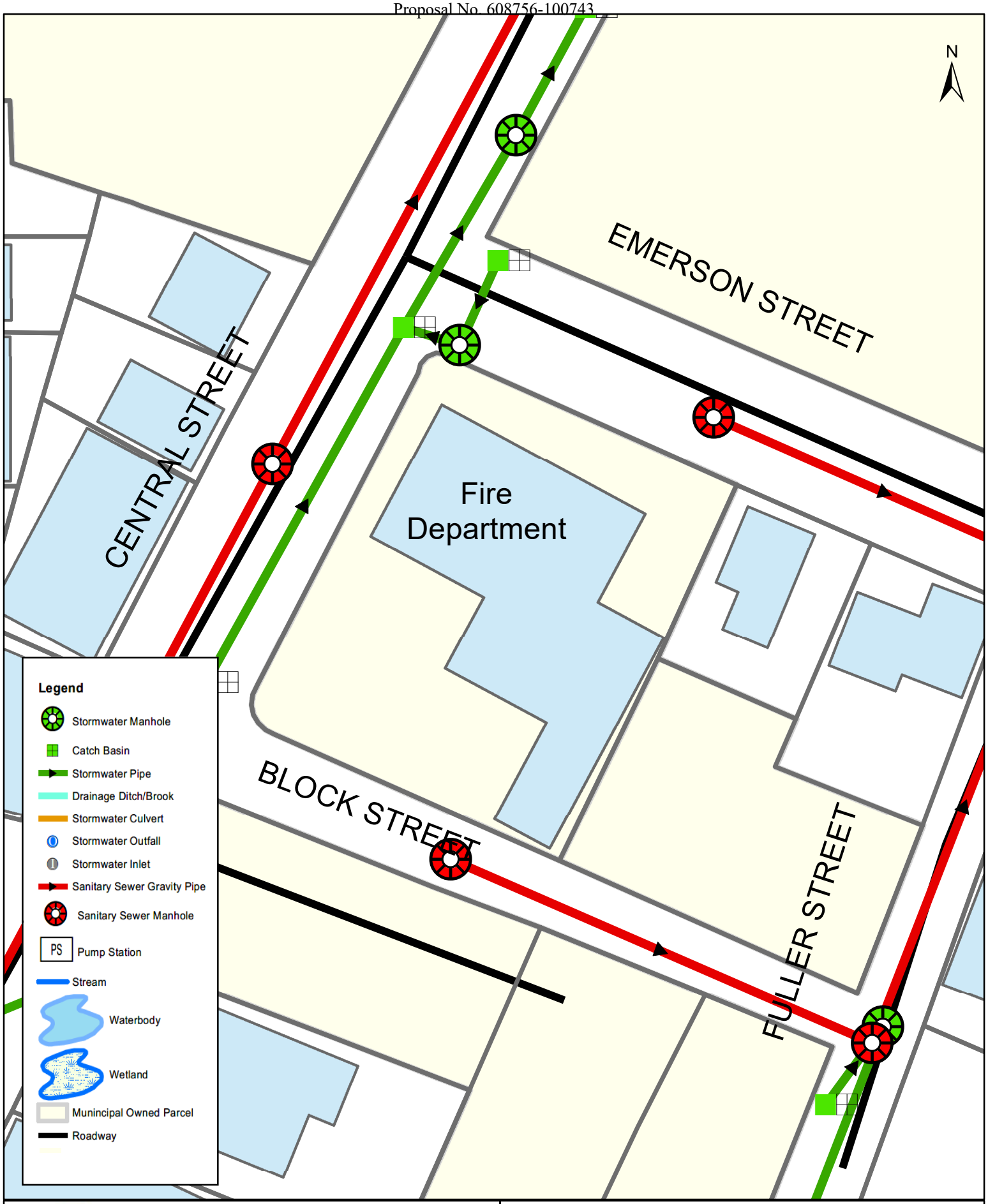
Facility: DPW Garage and Office
Address: 16 Pine St.

G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

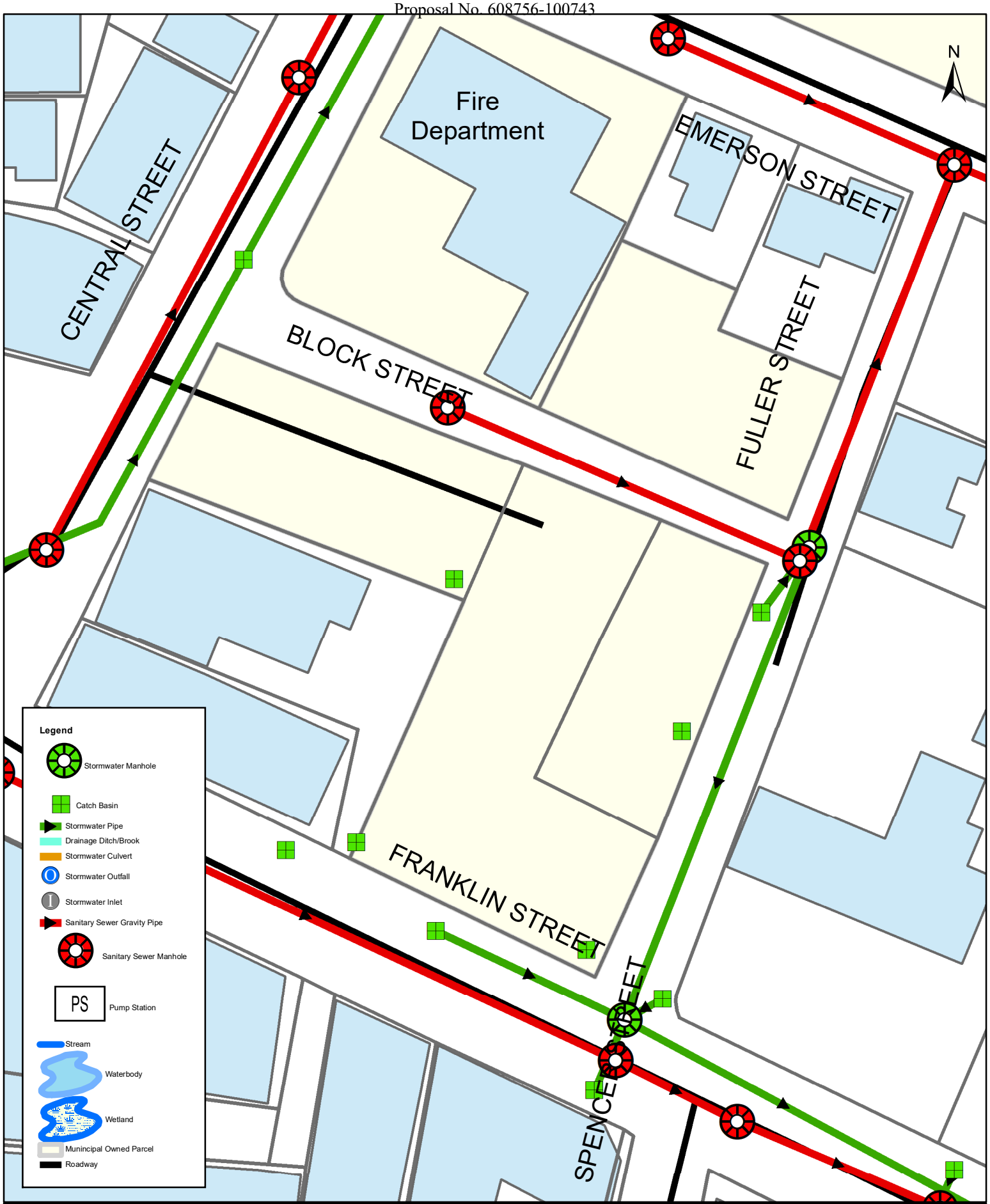
Facility: Fallon Road Pumping Station
Address: Fallon Rd.



TOWN OF STONEHAM, MASSACHUSETTS

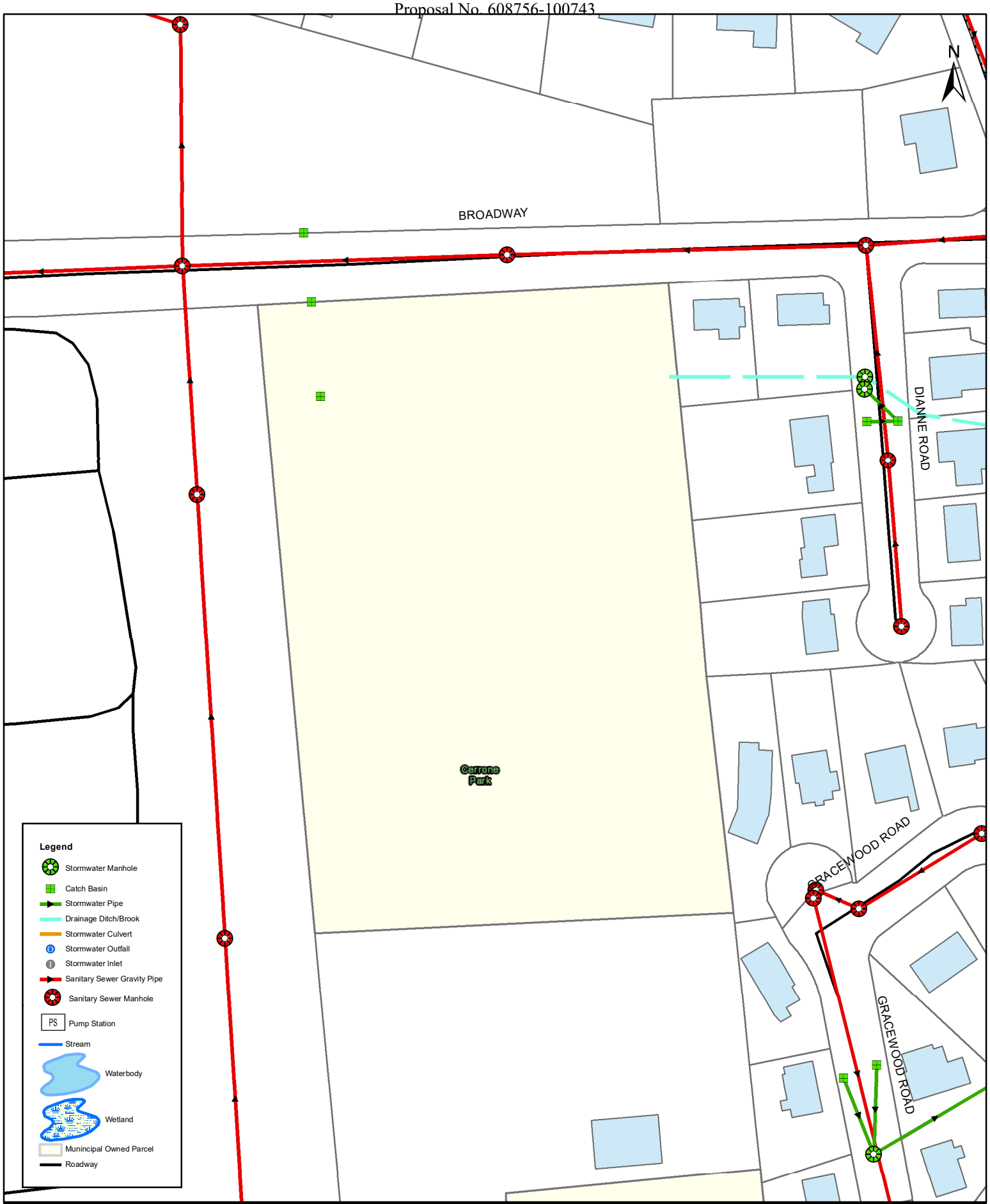
Facility: Fire Department
Address: 25 Central St

G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

Facility: Fuller Street Parking Lot
Address: Fuller St.



TOWN OF STONEHAM, MASSACHUSETTS

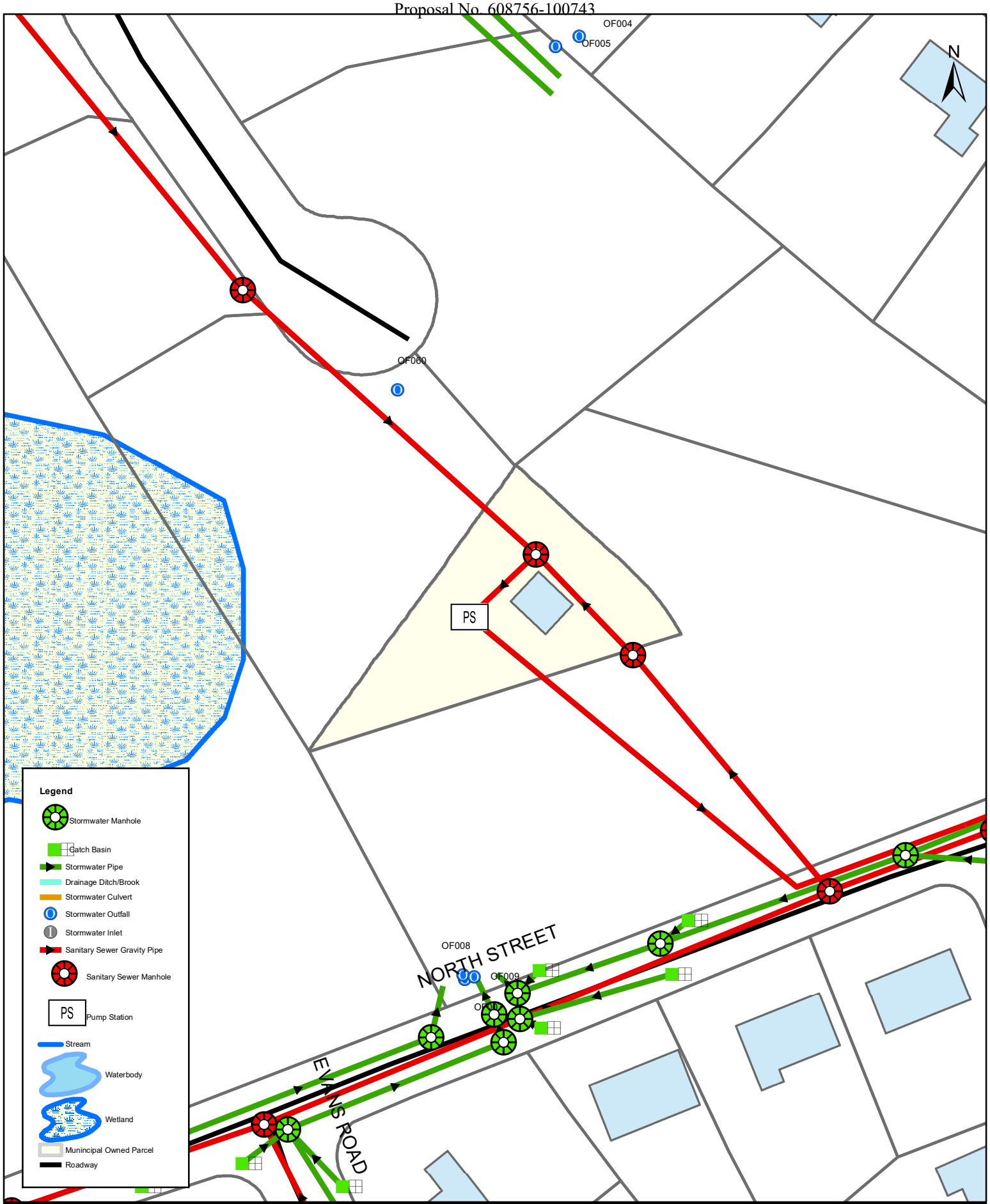
Facility: Joseph C. Cerrone Memorial Park
Address: 255 Broadway

G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd

TOWN OF STONEHAM, MASSACHUSETTS

Facility: Lindenwood Cemetery
Address: Montvale Ave.

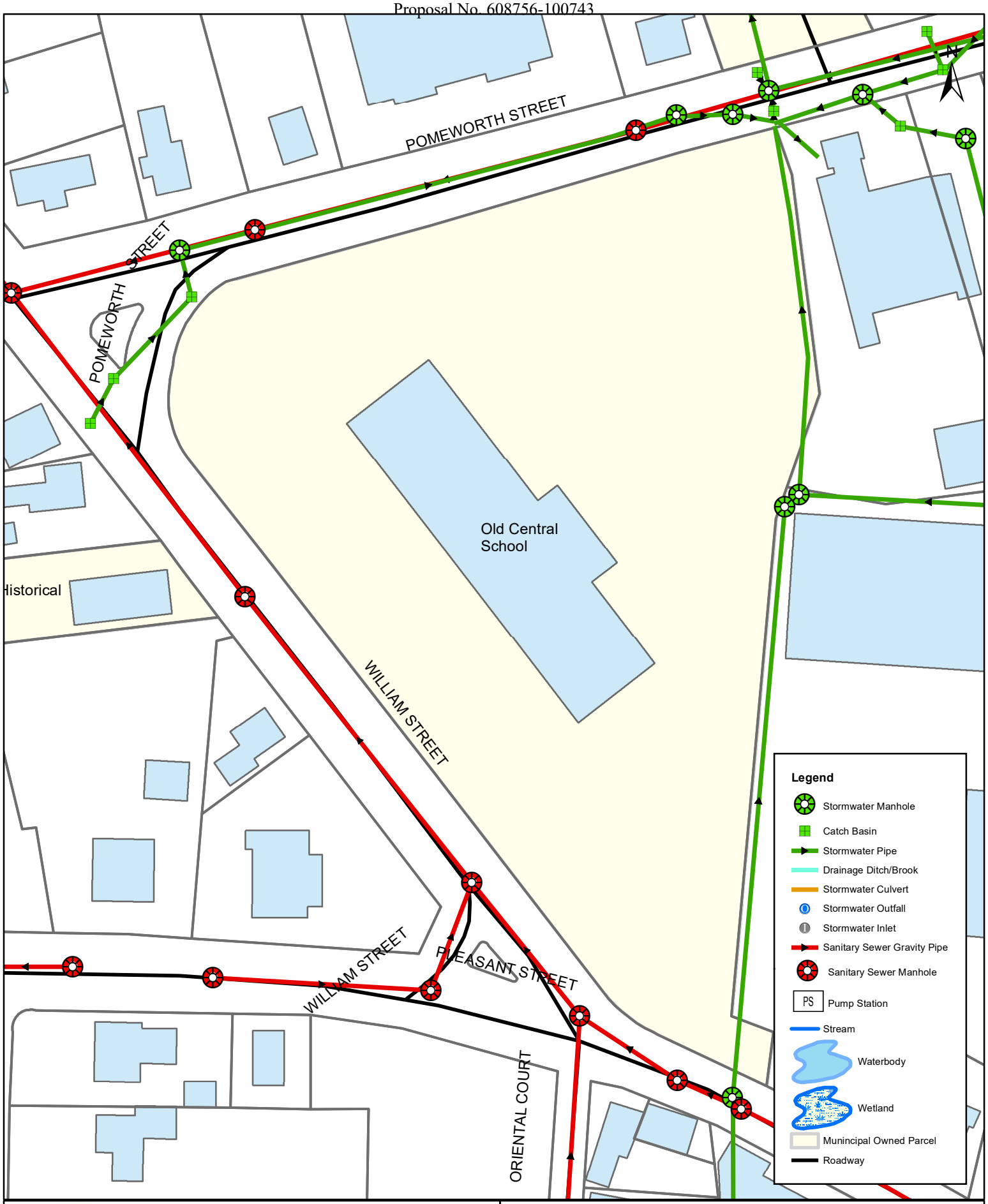
G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

Facility: North Street Pumping Station
Address: North St.

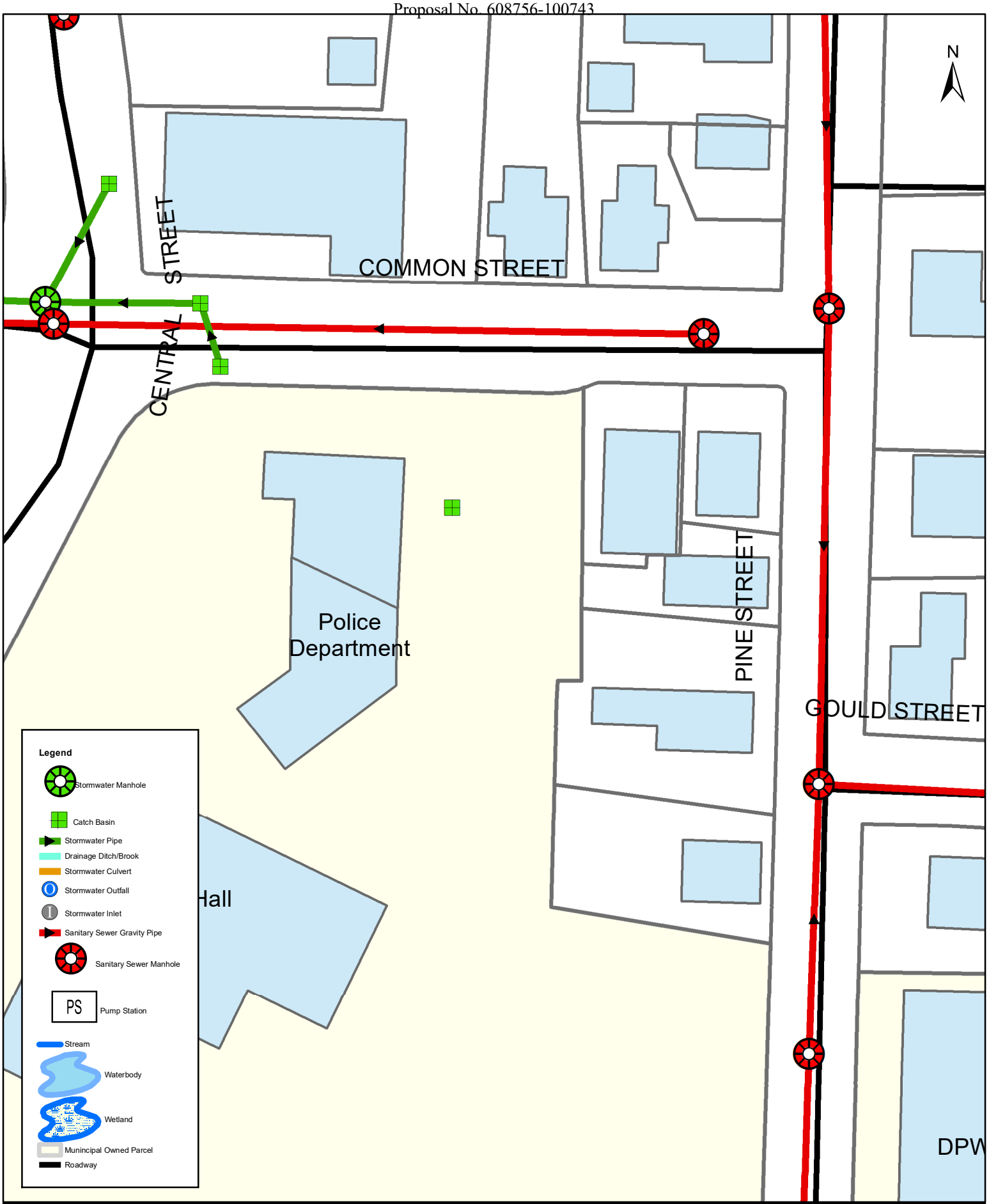
G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

Facility: Old Central School
Address: 25 William St.

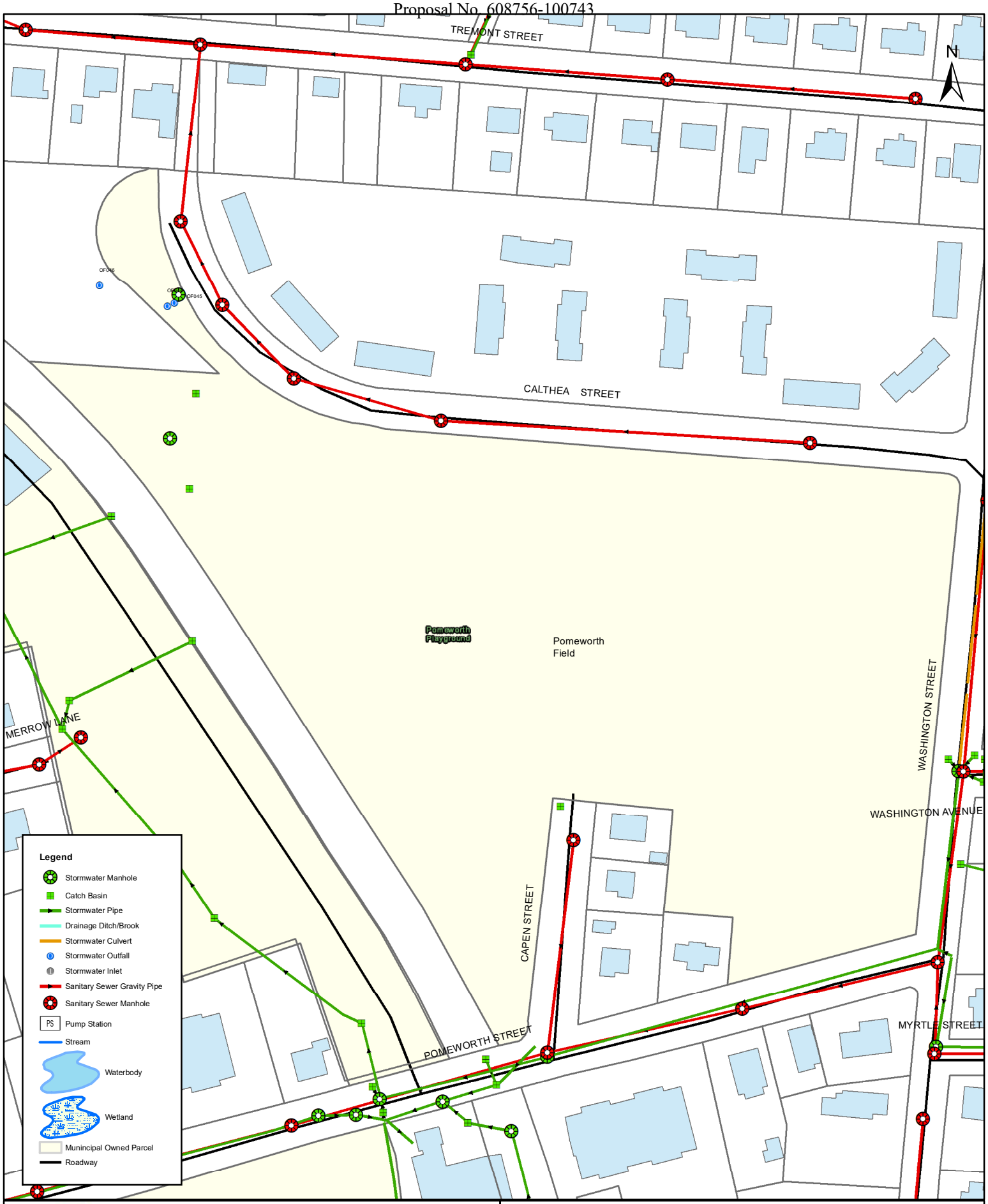
G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

Facility: Police Department
Address: 47 Central St.

G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

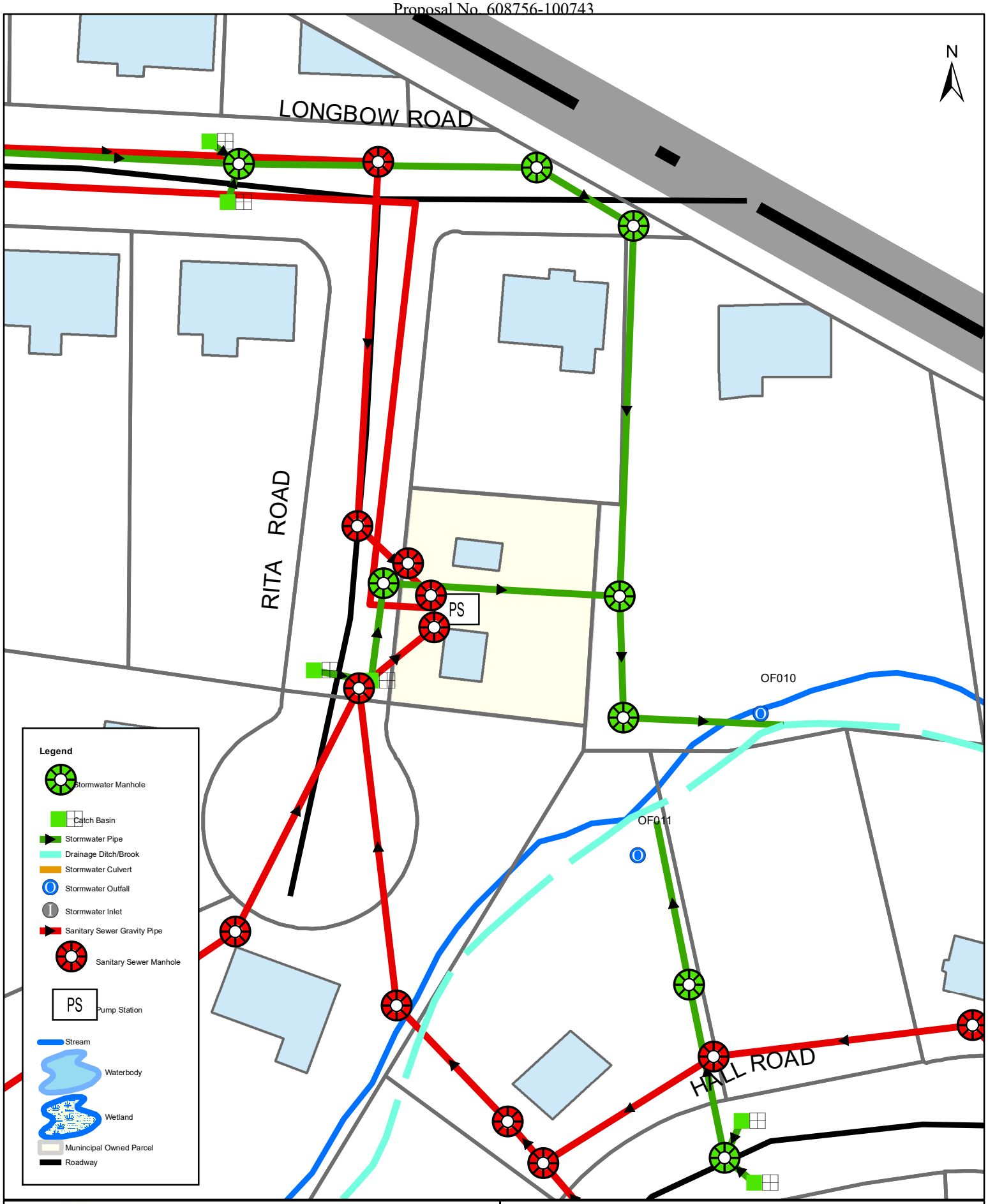
Facility: Pomeworth Field
Address: Calthea St.

G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd

TOWN OF STONEHAM, MASSACHUSETTS

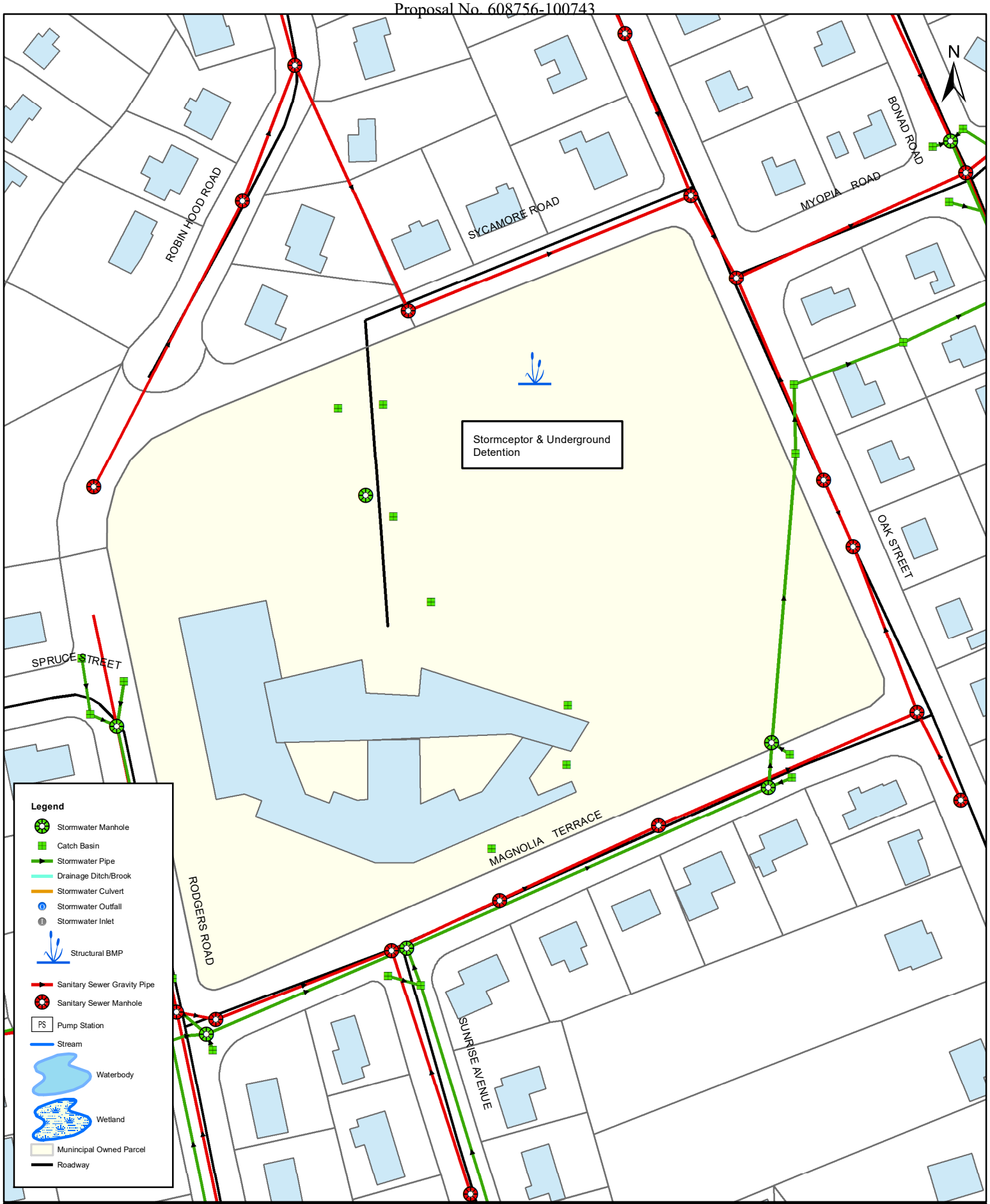
Facility: Recreation Park
Address: 99 Dale Ct.

G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

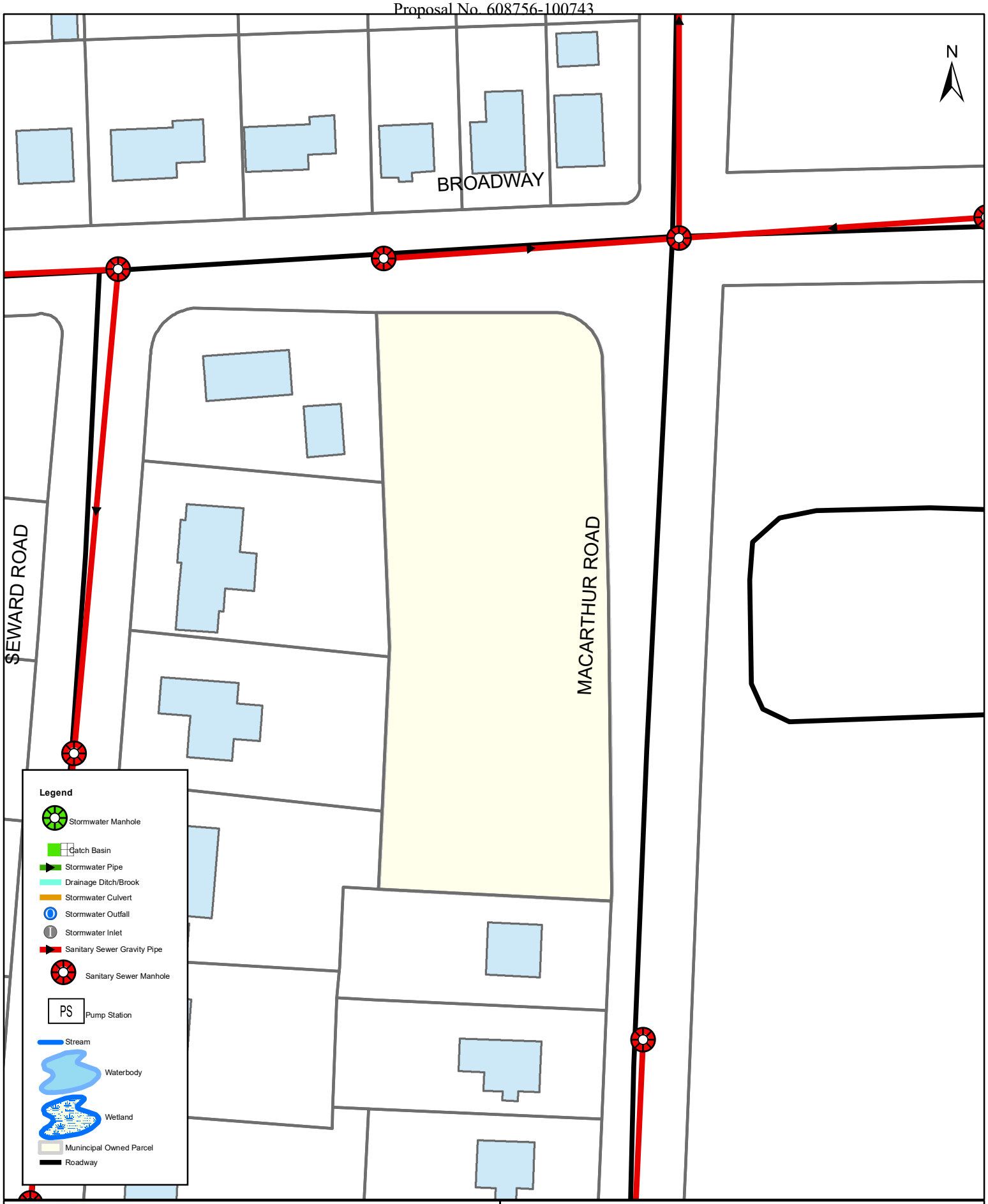
Facility: Rita Road Pumping Station
Address: Rita Rd.



TOWN OF STONEHAM, MASSACHUSETTS

Facility: Robin Hood Elementary School
Address: 70 Oak St.

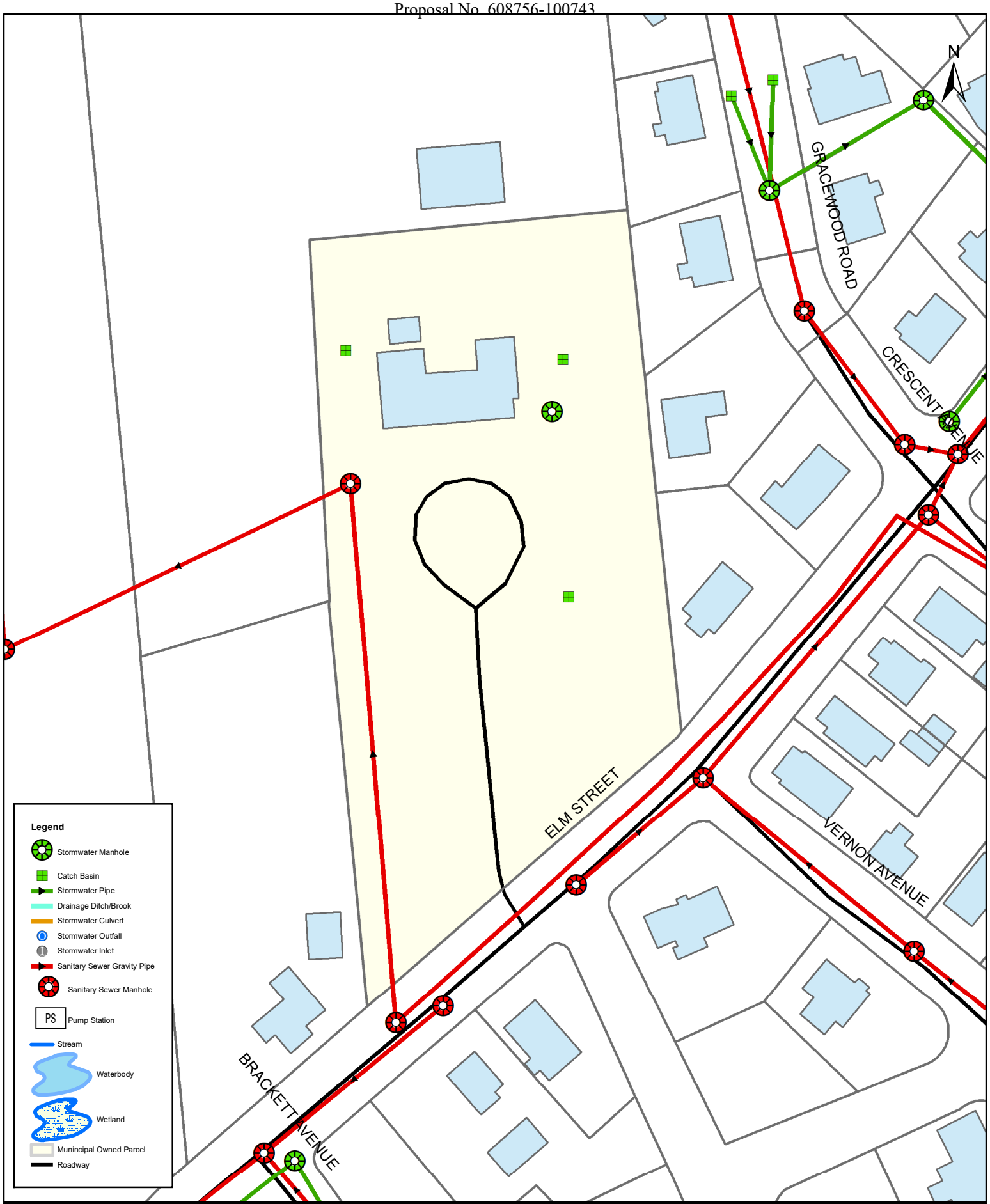
G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

Facility: Rounds Playground
Address: MacArthur Rd.

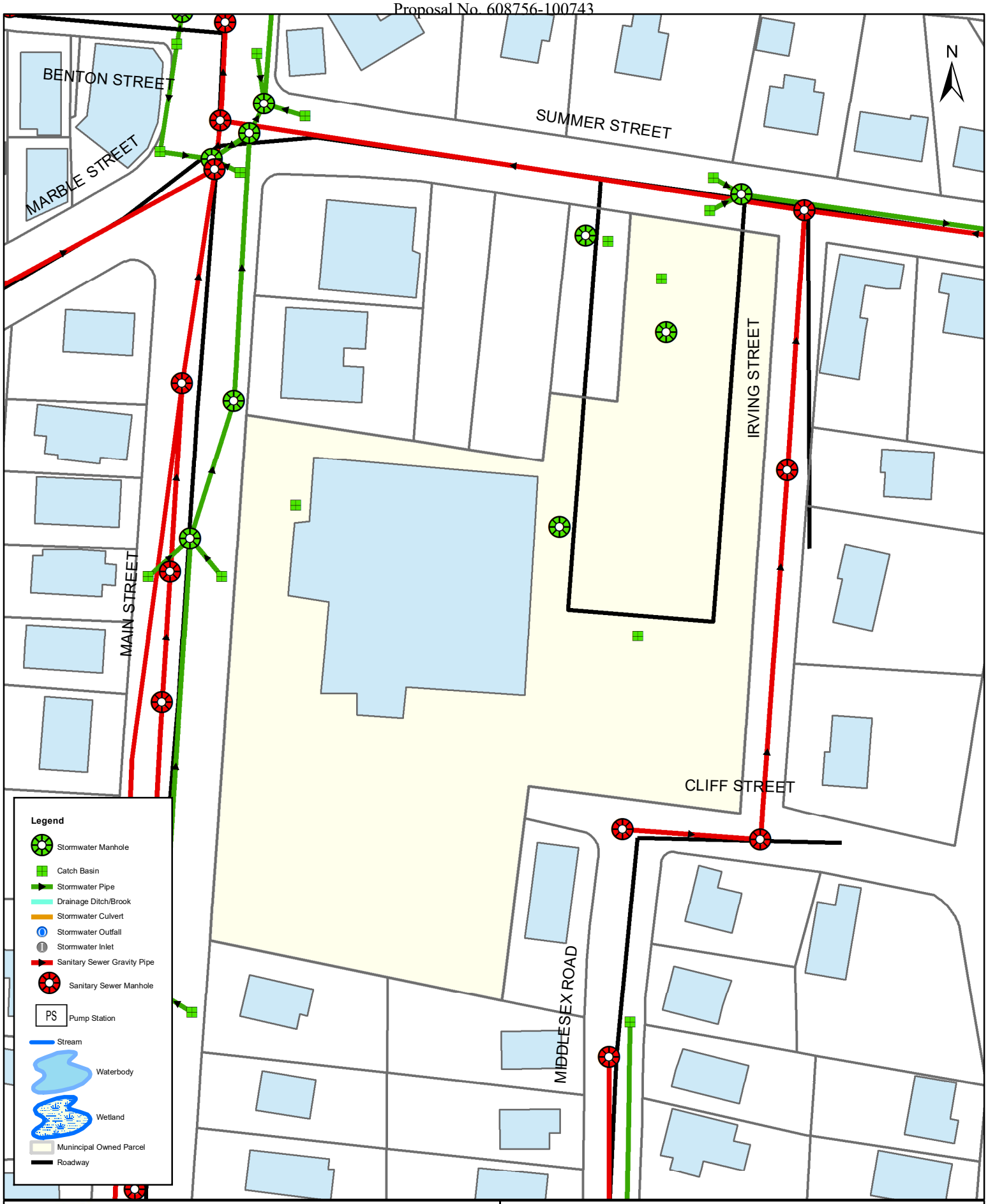
G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

Facility: Senior Center
Address: 136 Elm St.

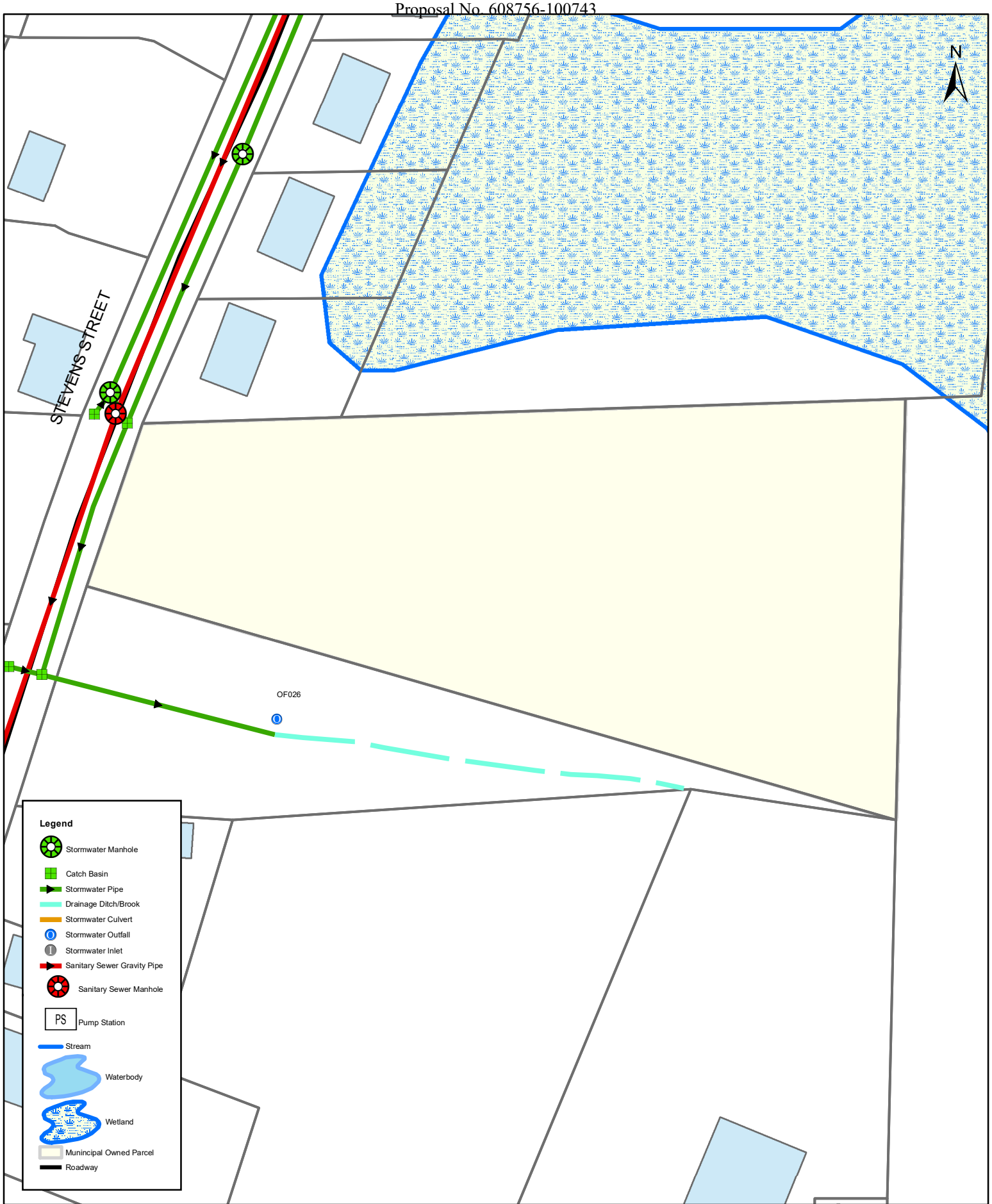
G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

Facility: South Elementary School
Address: 11 Summer St.

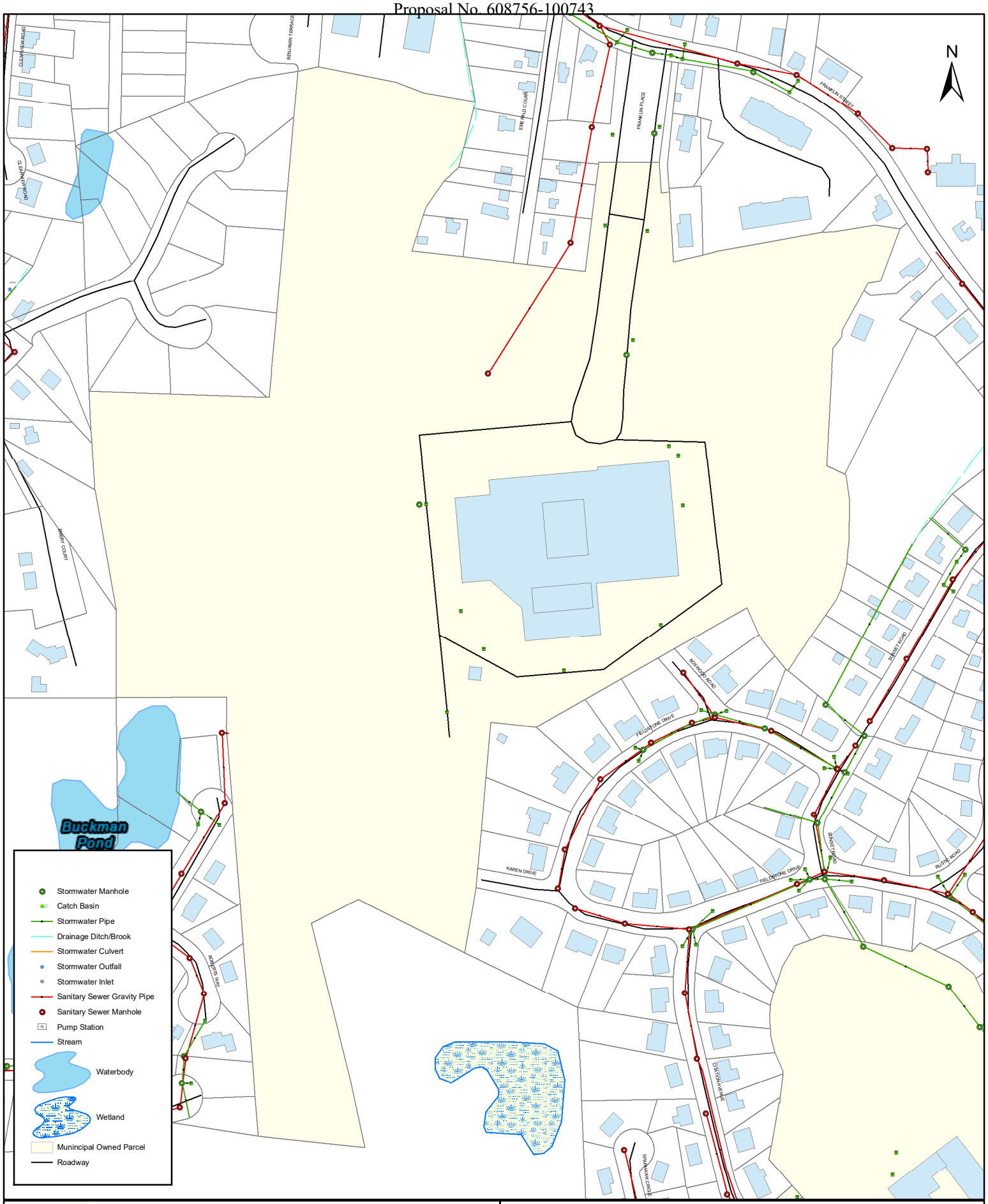
G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

Facility: Stevens Street Recycling Center
Address: 48 Stevens St.

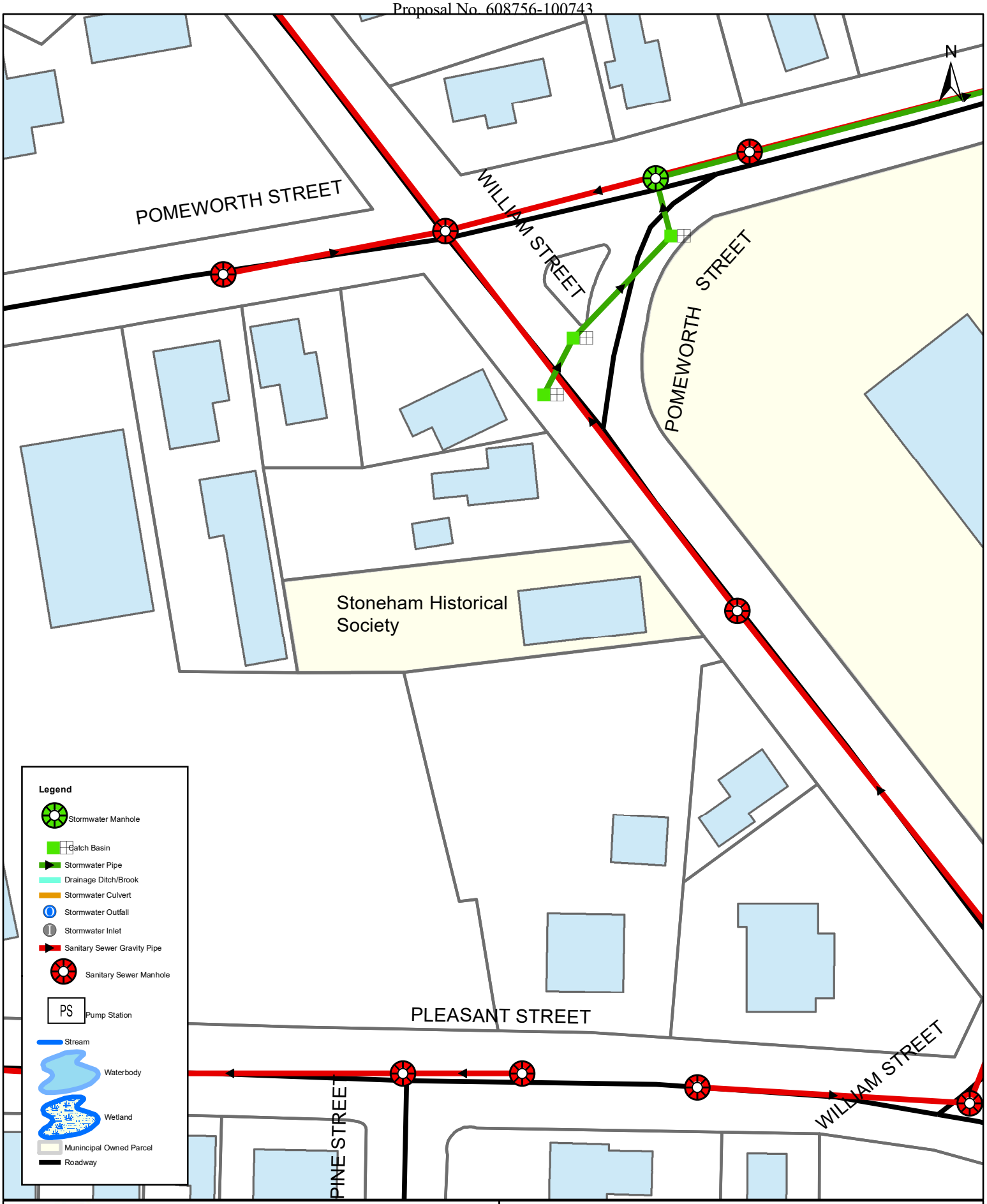
G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

Facility: Stoneham High School
Address: 149 Franklin St.

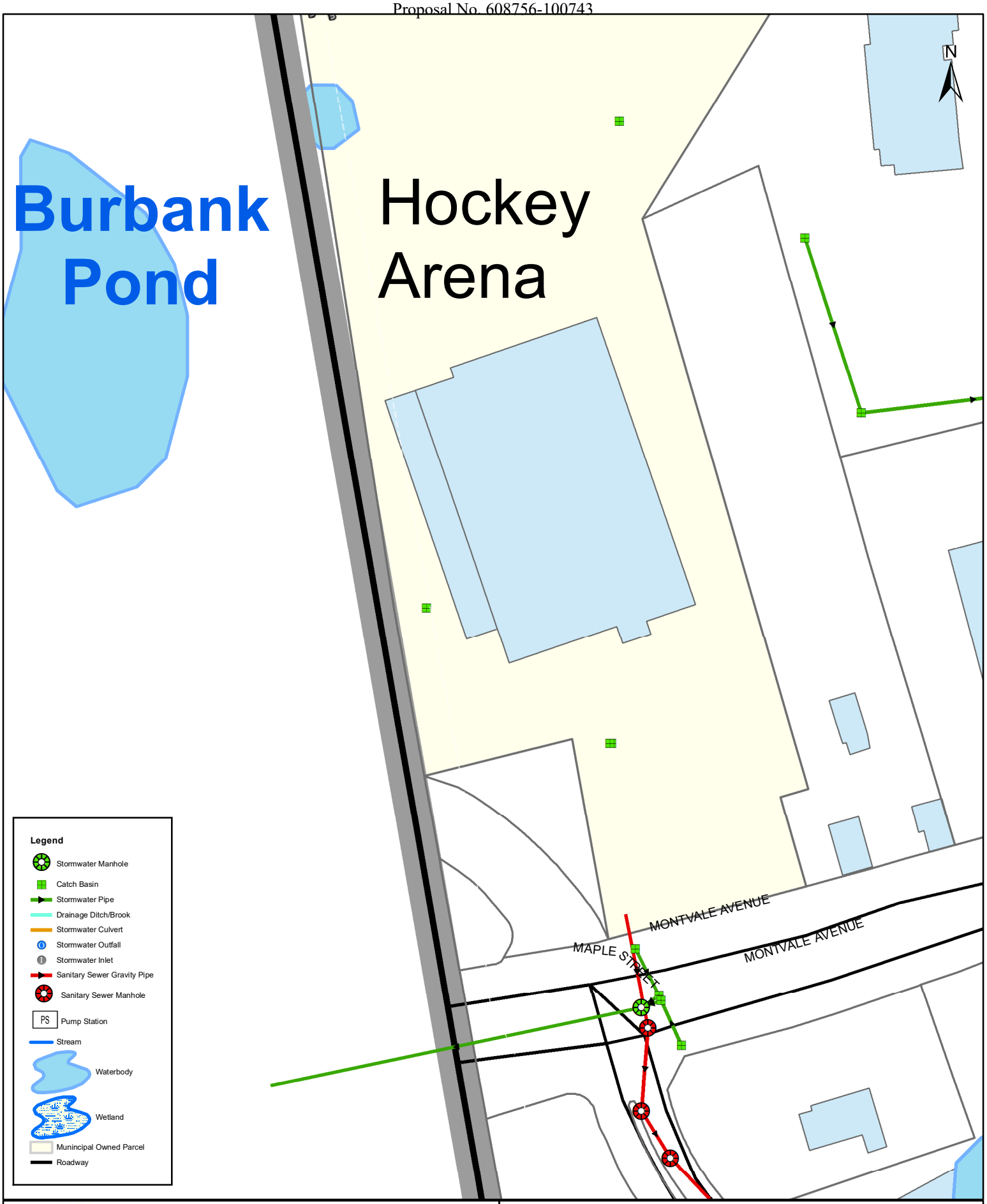
G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

Facility: Stoneham Historical Society
Address: 36 William St.

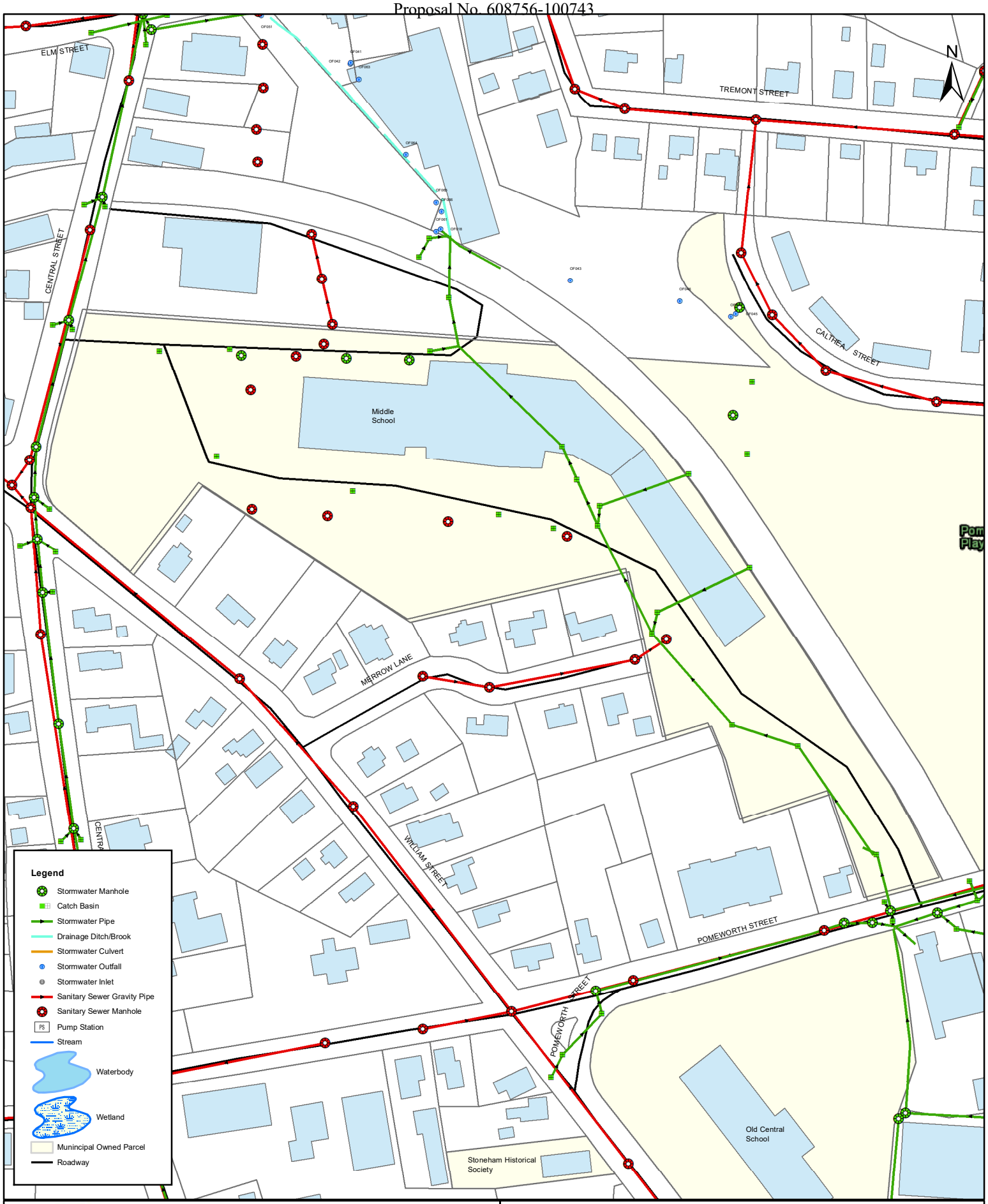
G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

Facility: Stoneham Arena
Address: 101 Montvale Ave

G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

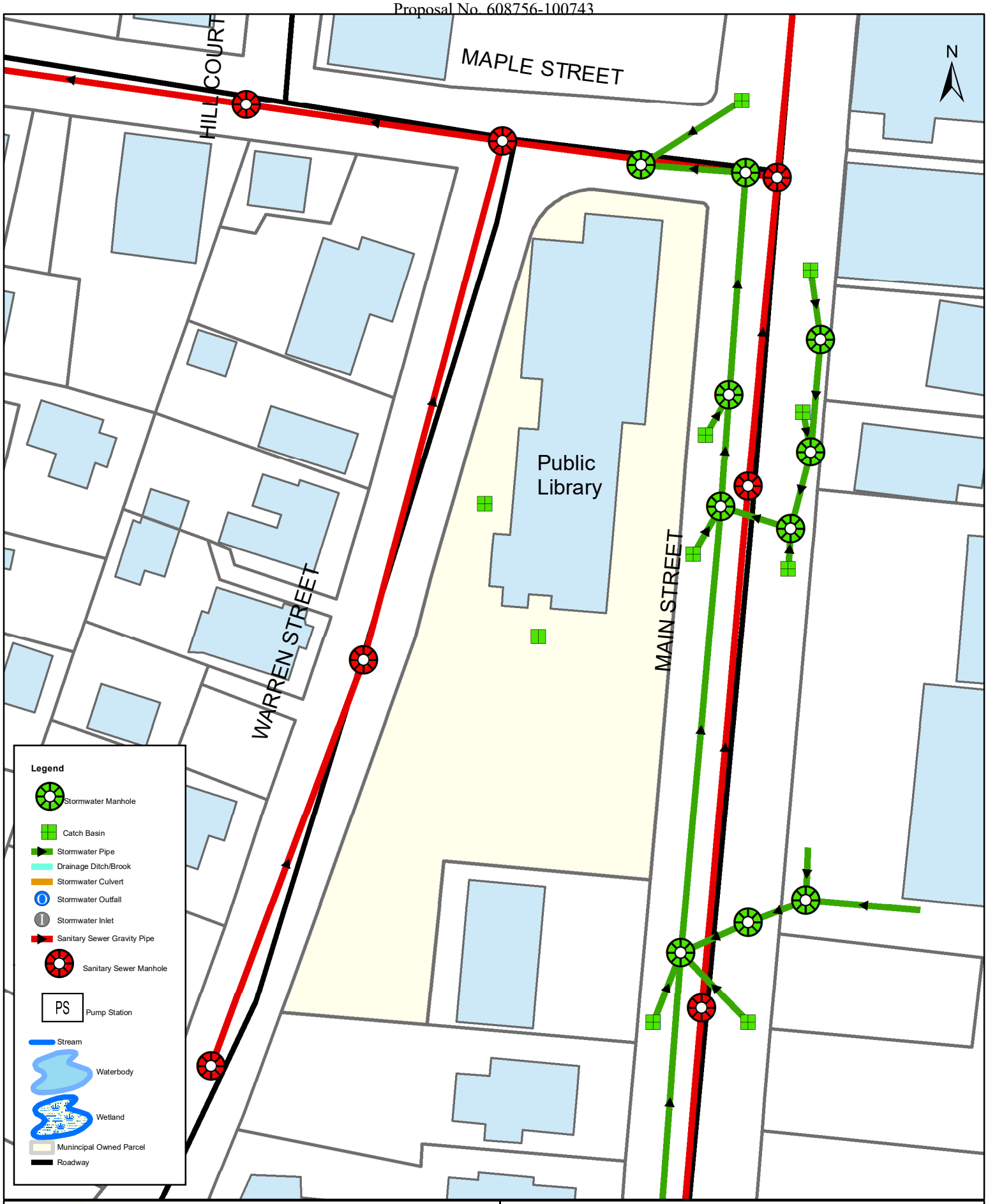
Facility: Stoneham Central Middle School
Address: 101 Central St.

G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd

TOWN OF STONEHAM, MASSACHUSETTS

Facility: Stoneham Oaks Golf Course
Address: 101 Rear Monvale Ave.

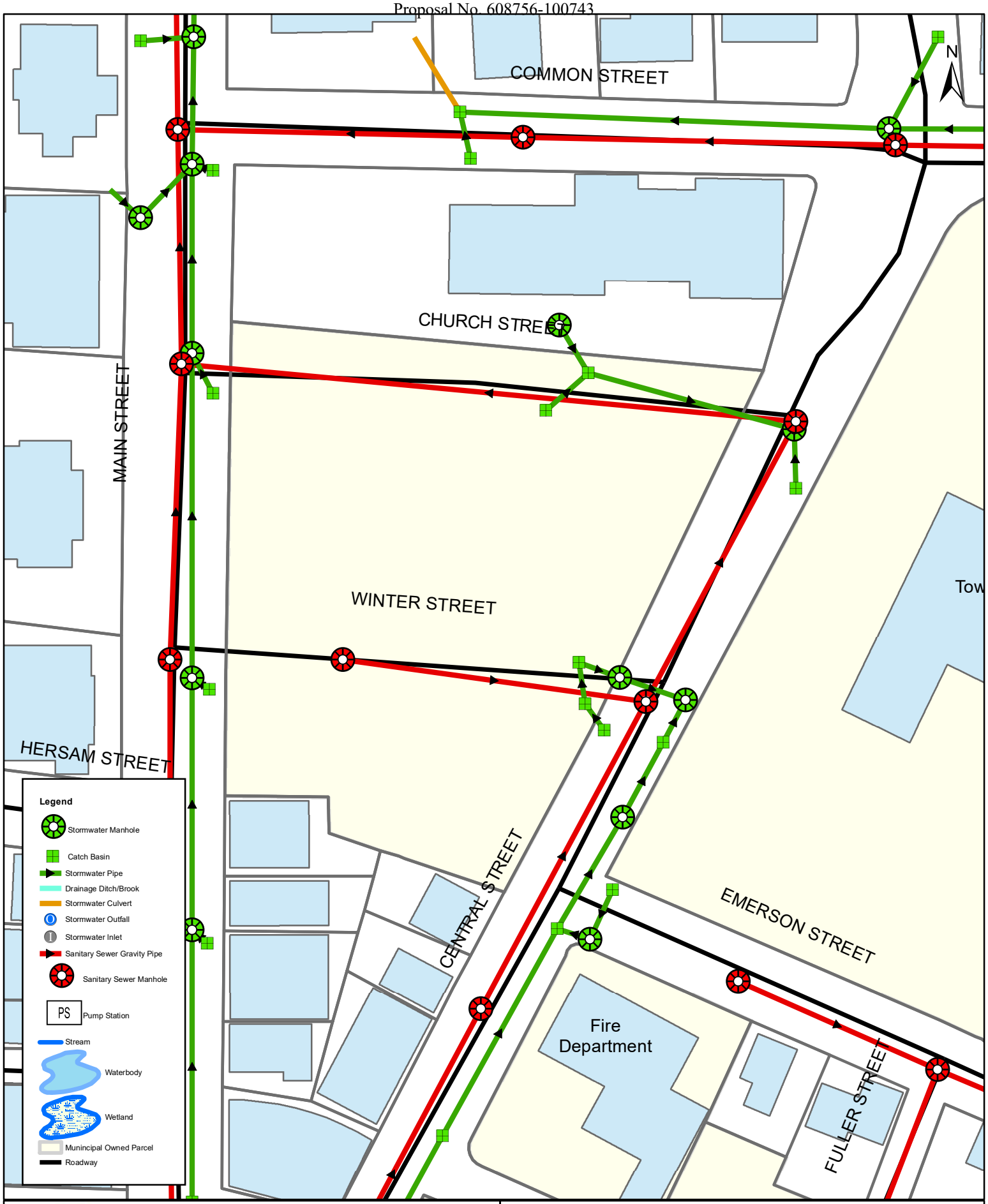
G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

Facility: Stoneham Public Library
Address: 413 Main St.

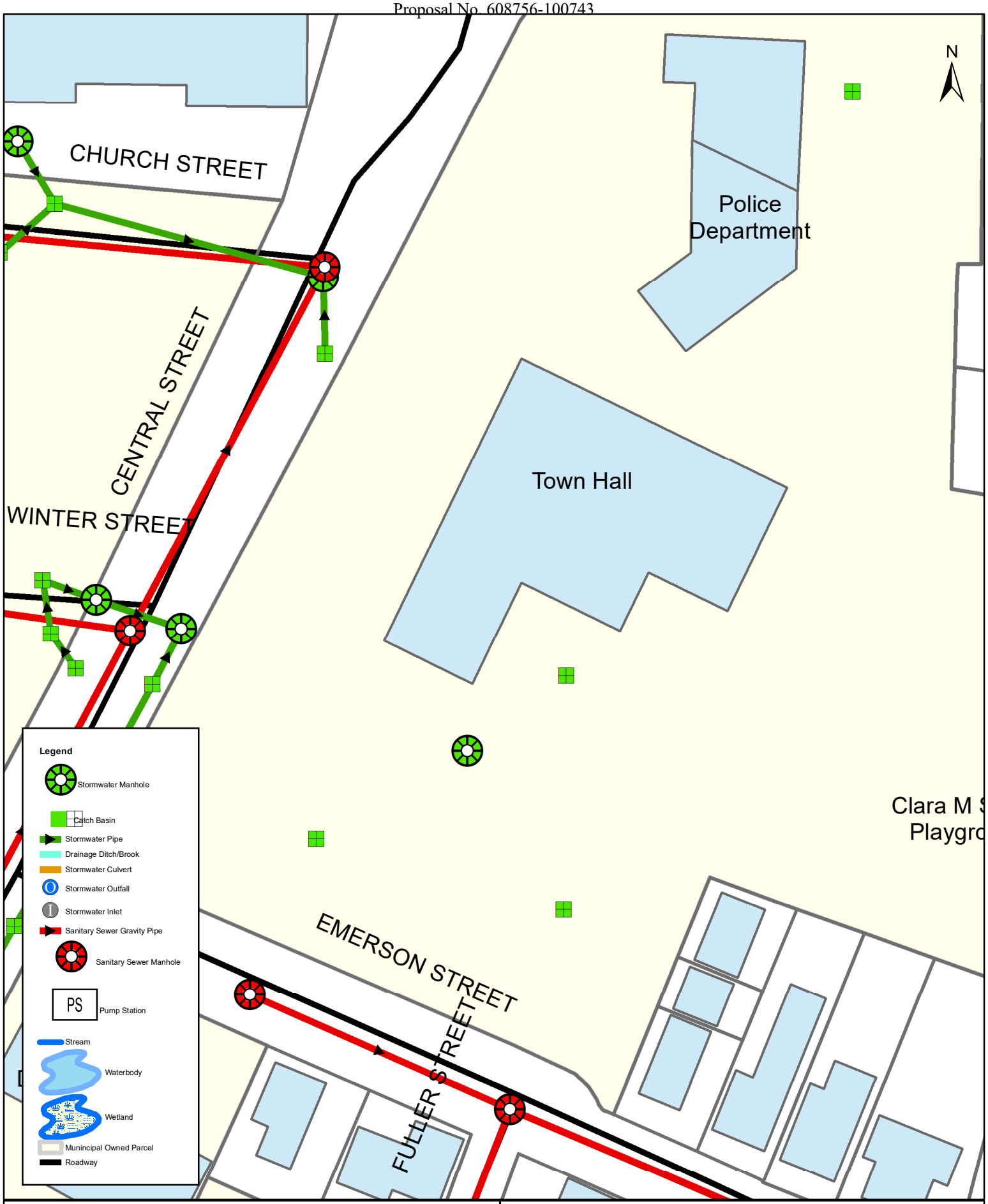
G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

Facility: Stoneham Town Common
Address: 340 Main St.

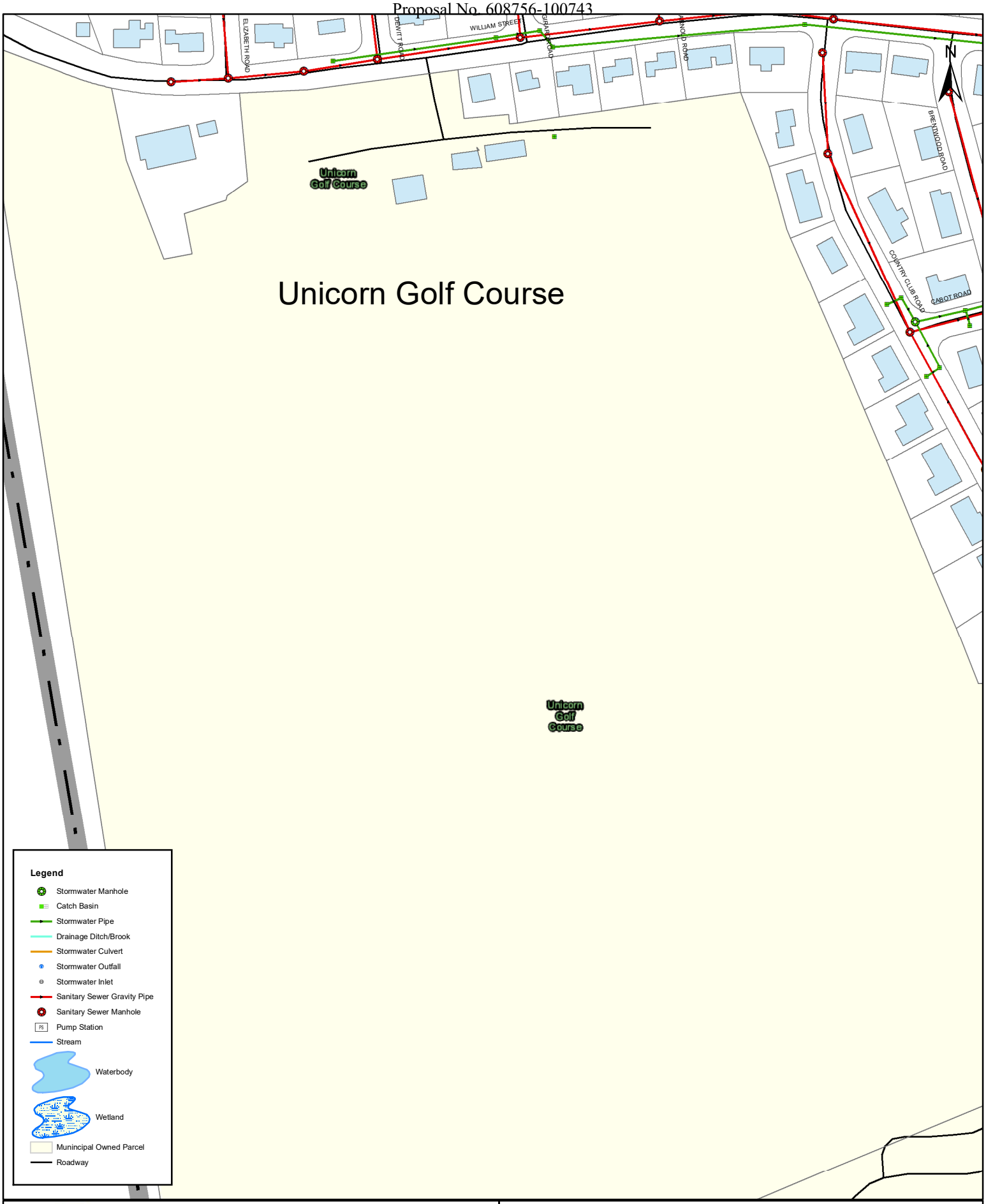
G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

Facility: Town Hall
Address: 35 Central St.

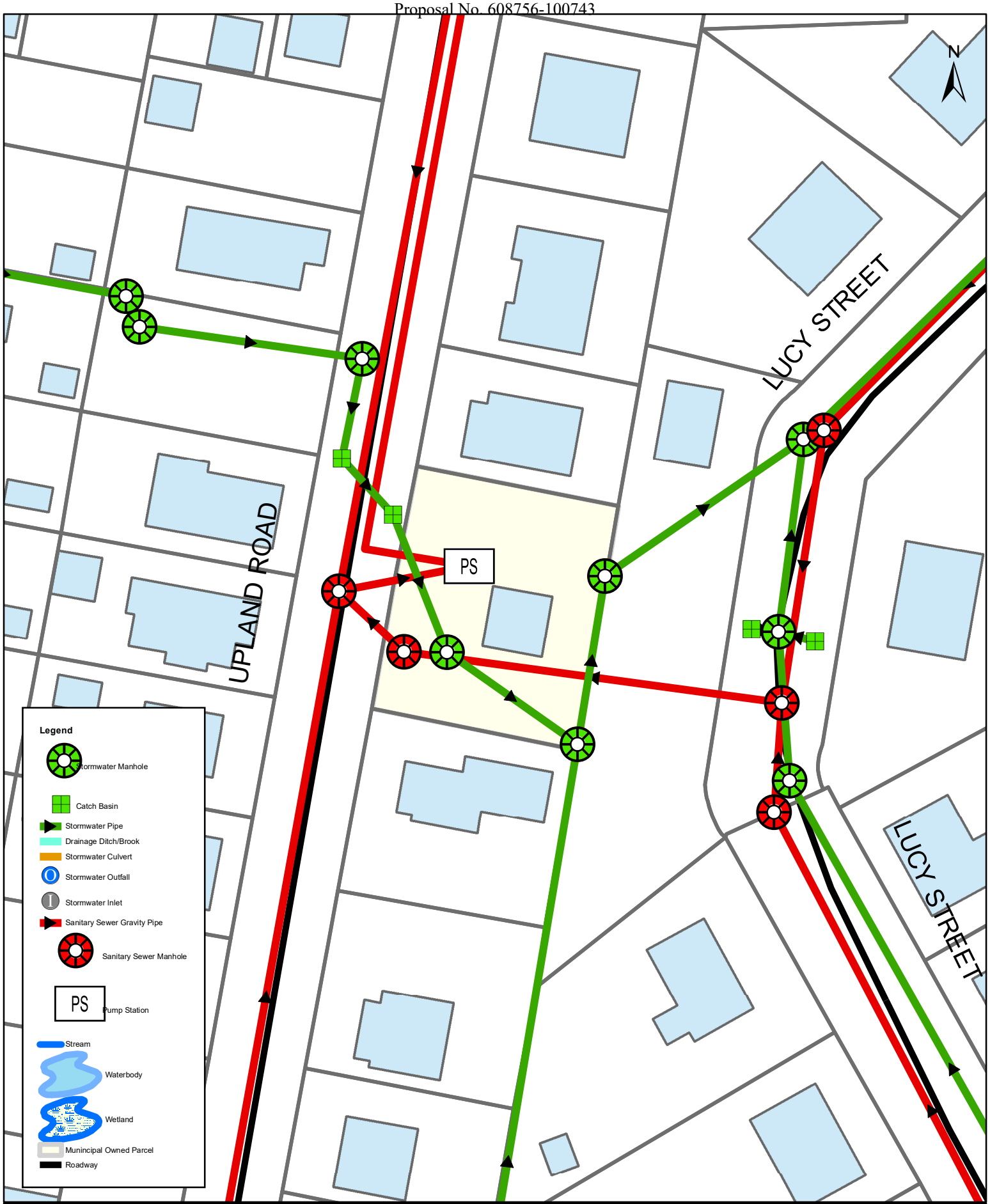
G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

Facility: Unicorn Golf Course
Address: 460 William St.

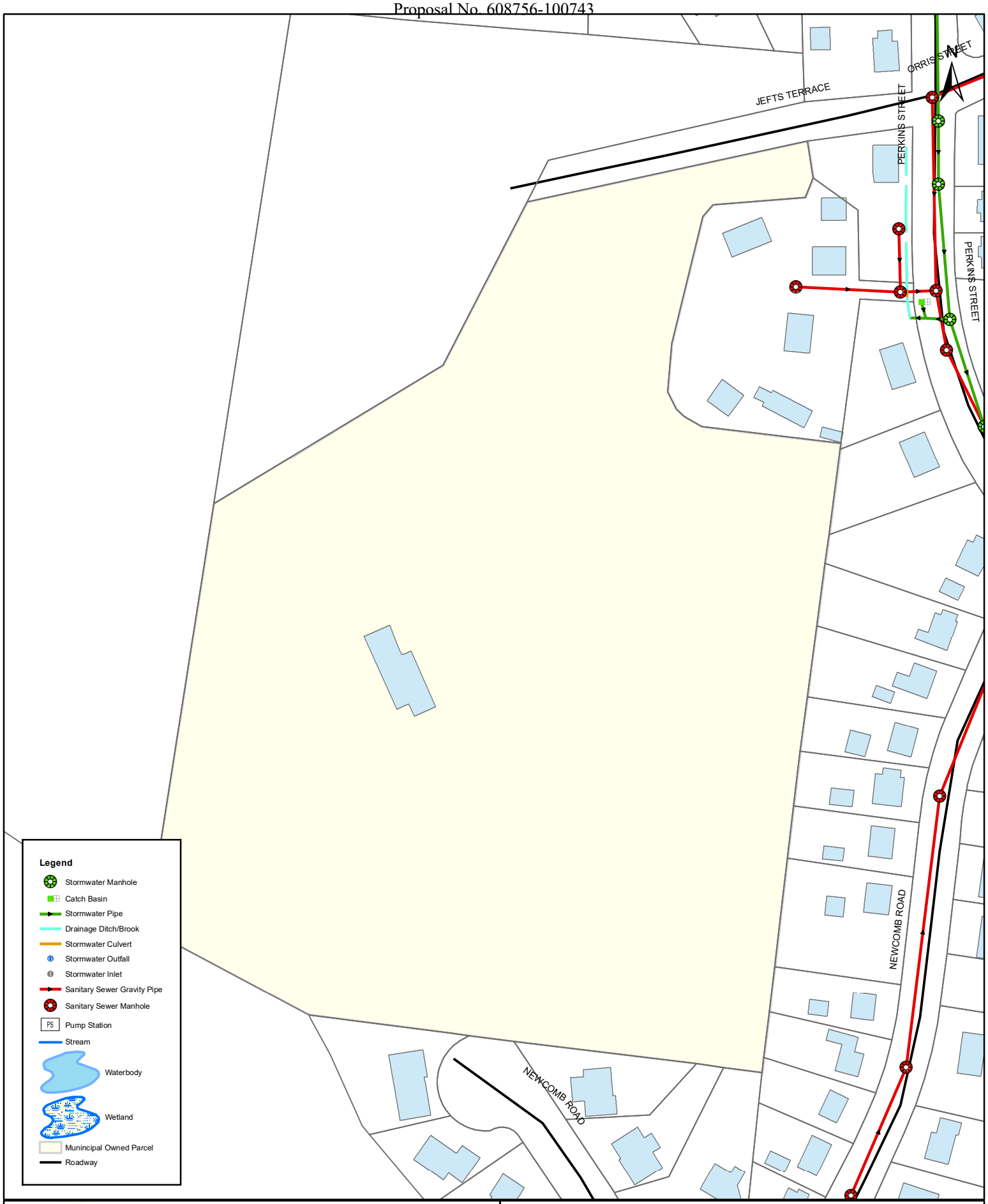
G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

Facility: Upland Road Pumping Station
Address: Upland Rd.

G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd



TOWN OF STONEHAM, MASSACHUSETTS

Facility: Whip Hill Park
Address: Whip Hill Road

G:\GIS\3487-Stoneham\IDDE Plan\2019 MS4 Compliance\Housekeeping and Pollution Prevention.mxd

Appendix C: Training

The Town of Stoneham
Municipal Facilities Good Housekeeping
Training & BMP Education Log

Facility Name _____

Please print date, name and contact information. This will be kept as a record of stormwater training & education on site.

DATE	NAME & ORGANIZATION	ADDRESS	TELEPHONE	E-MAIL	TRAINING TYPE / BMP SHEET NAME

The Town of Stoneham
Municipal Facilities Good Housekeeping
Training & BMP Education Log

Facility Name _____

Please print date, name and contact information. This will be kept as a record of stormwater training & education on site.

DATE	NAME & ORGANIZATION	ADDRESS	TELEPHONE	E-MAIL	TRAINING TYPE / BMP SHEET NAME

The Town of Stoneham
Municipal Facilities Good Housekeeping
Training & BMP Education Log

Facility Name _____

Please print date, name and contact information. This will be kept as a record of stormwater training & education on site.

DATE	NAME & ORGANIZATION	ADDRESS	TELEPHONE	E-MAIL	TRAINING TYPE / BMP SHEET NAME

Appendix D: Good Housekeeping Inspection Forms

FACILITY SITE COMPLIANCE INSPECTION COVER SHEET

Facility Name:	
Address:	
Facility Type/Department:	
Inspection Date and Time:	
Inspector:	

Facility Contact Information:

Name:	
Phone Number:	(____) - ____ - _____ ex _____
Email:	

Facility Information:

Site Description:	
Site Outfall(s):	
Receiving Water Body(ies):	
Spill Prevention Control and Countermeasures Plan?	
If Yes, Revision Date:	
Existing Structural BMPs:	

FACILITY SITE COMPLIANCE INSPECTION CHECKLIST

Facility Name: _____ **Date:** _____

Address: _____ **Inspector:** _____

Department: _____ **Weather :** _____

Question	Yes / No / N/A	If "YES", Describe Corrective Action
General		
Is there evidence of litter and debris in parking lots and paved areas?		
Is there evidence of a discharge, spill or leak on your site that has not been properly cleaned up? This includes dry sorbent materials that are not swept up.		
Are any storm drains, catch basins or ditches showing evidence of clogging or excessive sediment build-up?		
Fueling Areas		
Are spill kits missing from fuel islands or do they need to be restocked?		
Is there evidence of spills or leaks?		
Are fuel hoses exposed where they may be run over by vehicles or heavy equipment?		
Vehicle and Equipment Maintenance Areas		
Are materials stored indoors or under cover?		
Are maintenance activities being performed outside?		
Are wastes being improperly stored (outside, not on secondary containment, near storm drains, etc)?		
Are there leaks from any vehicles awaiting repair or decommisioning?		
Trash Storage Areas		
Are dumpsters uncovered?		
Do dumpsters have holes, missing plugs, or showing evidence of leaking?		
Are any waste storage containers cracked, leaking or damaged?		
Are dumpsters located on pervious ground area or away from watercourse to storm drain structures?		
Are universal wastes stored outdoors and not on secondary containment?		
Material Loading/Unloading and Storage Areas		
Are materials stored outside or not under cover?		
Are there signs of leaks or spills from storage containers?		
Are bulk hazardous materials/liquids stored outside and not in secondary containment?		
Do any containment pallets need to be drained? Check for sheen prior to discharge.		
Is there evidence of paint on the ground near loading areas or outdoor painting areas?		
Petroleum Tanks		
Are aboveground storage tanks not under cover?		
Are tanks clearly labeled/tagged?		
Is there evidence of any leaks or spills present?		
Vehicle and Equipment Storage		
Are fleet parking areas clean and orderly, with trash receptacles in the parking area?		
Is there any evidence of spills and leaks from stored vehicles?		
Salt Storage and Handling Areas		
Is there evidence of salt being discharged from the site or into the storm drain?		
Is there excess salt or sand on the pavement?		
Are there any leaks or spills of salt brine or calcium chloride in storage area?		
Hazardous Material Storage		
Are materials stored indoors or under cover?		
Are materials stored on secondary containment?		
Are storage containers clearly labeled with MSDS on file and accessible?		
Storm Drain System		
Are inspection records kept on file indicating cleaning and maintenance for storm drainage features?		
Is regular catch basin cleaning and other structure maintenance scheduled and performed?		
Are dry cleaning methods utilized on impervious surfaces that flow to storm drain inlets?		
Facility Changes		
Are there any changes in procedures, maintenance or equipment that would affect this SWPPP?		

FACILITY SITE COMPLIANCE INSPECTION COVER SHEET

Facility Name:	
Address:	
Facility Type/Department:	
Inspection Date and Time:	
Inspector:	

Facility Contact Information:

Name:	
Phone Number:	(____) - ____ - _____ ex _____
Email:	

Facility Information:

Site Description:	
Site Outfall(s):	
Receiving Water Body(ies):	
Spill Prevention Control and Countermeasures Plan?	
If Yes, Revision Date:	
Existing Structural BMPs:	

FACILITY SITE COMPLIANCE INSPECTION CHECKLIST

Facility Name: _____ **Date:** _____

Address: _____ **Inspector:** _____

Department: _____ **Weather :** _____

Question	Yes / No / N/A	If "YES", Describe Corrective Action
General		
Is there evidence of litter and debris in parking lots and paved areas?		
Is there evidence of a discharge, spill or leak on your site that has not been properly cleaned up? This includes dry sorbent materials that are not swept up.		
Are any storm drains, catch basins or ditches showing evidence of clogging or excessive sediment build-up?		
Fueling Areas		
Are spill kits missing from fuel islands or do they need to be restocked?		
Is there evidence of spills or leaks?		
Are fuel hoses exposed where they may be run over by vehicles or heavy equipment?		
Vehicle and Equipment Maintenance Areas		
Are materials stored indoors or under cover?		
Are maintenance activities being performed outside?		
Are wastes being improperly stored (outside, not on secondary containment, near storm drains, etc)?		
Are there leaks from any vehicles awaiting repair or decommisioning?		
Trash Storage Areas		
Are dumpsters uncovered?		
Do dumpsters have holes, missing plugs, or showing evidence of leaking?		
Are any waste storage containers cracked, leaking or damaged?		
Are dumpsters located on pervious ground area or away from watercourse to storm drain structures?		
Are universal wastes stored outdoors and not on secondary containment?		
Material Loading/Unloading and Storage Areas		
Are materials stored outside or not under cover?		
Are there signs of leaks or spills from storage containers?		
Are bulk hazardous materials/liquids stored outside and not in secondary containment?		
Do any containment pallets need to be drained? Check for sheen prior to discharge.		
Is there evidence of paint on the ground near loading areas or outdoor painting areas?		
Petroleum Tanks		
Are aboveground storage tanks not under cover?		
Are tanks clearly labeled/tagged?		
Is there evidence of any leaks or spills present?		
Vehicle and Equipment Storage		
Are fleet parking areas clean and orderly, with trash receptacles in the parking area?		
Is there any evidence of spills and leaks from stored vehicles?		
Salt Storage and Handling Areas		
Is there evidence of salt being discharged from the site or into the storm drain?		
Is there excess salt or sand on the pavement?		
Are there any leaks or spills of salt brine or calcium chloride in storage area?		
Hazardous Material Storage		
Are materials stored indoors or under cover?		
Are materials stored on secondary containment?		
Are storage containers clearly labeled with MSDS on file and accessible?		
Storm Drain System		
Are inspection records kept on file indicating cleaning and maintenance for storm drainage features?		
Is regular catch basin cleaning and other structure maintenance scheduled and performed?		
Are dry cleaning methods utilized on impervious surfaces that flow to storm drain inlets?		
Facility Changes		
Are there any changes in procedures, maintenance or equipment that would affect this SWPPP?		

FACILITY SITE COMPLIANCE INSPECTION COVER SHEET

Facility Name:	
Address:	
Facility Type/Department:	
Inspection Date and Time:	
Inspector:	

Facility Contact Information:

Name:	
Phone Number:	(____) - ____ - _____ ex _____
Email:	

Facility Information:

Site Description:	
Site Outfall(s):	
Receiving Water Body(ies):	
Spill Prevention Control and Countermeasures Plan?	
If Yes, Revision Date:	
Existing Structural BMPs:	

FACILITY SITE COMPLIANCE INSPECTION CHECKLIST

Facility Name: _____ **Date:** _____

Address: _____ **Inspector:** _____

Department: _____ **Weather :** _____

Question	Yes / No / N/A	If "YES", Describe Corrective Action
General		
Is there evidence of litter and debris in parking lots and paved areas?		
Is there evidence of a discharge, spill or leak on your site that has not been properly cleaned up? This includes dry sorbent materials that are not swept up.		
Are any storm drains, catch basins or ditches showing evidence of clogging or excessive sediment build-up?		
Fueling Areas		
Are spill kits missing from fuel islands or do they need to be restocked?		
Is there evidence of spills or leaks?		
Are fuel hoses exposed where they may be run over by vehicles or heavy equipment?		
Vehicle and Equipment Maintenance Areas		
Are materials stored indoors or under cover?		
Are maintenance activities being performed outside?		
Are wastes being improperly stored (outside, not on secondary containment, near storm drains, etc)?		
Are there leaks from any vehicles awaiting repair or decommisioning?		
Trash Storage Areas		
Are dumpsters uncovered?		
Do dumpsters have holes, missing plugs, or showing evidence of leaking?		
Are any waste storage containers cracked, leaking or damaged?		
Are dumpsters located on pervious ground area or away from watercourse to storm drain structures?		
Are universal wastes stored outdoors and not on secondary containment?		
Material Loading/Unloading and Storage Areas		
Are materials stored outside or not under cover?		
Are there signs of leaks or spills from storage containers?		
Are bulk hazardous materials/liquids stored outside and not in secondary containment?		
Do any containment pallets need to be drained? Check for sheen prior to discharge.		
Is there evidence of paint on the ground near loading areas or outdoor painting areas?		
Petroleum Tanks		
Are aboveground storage tanks not under cover?		
Are tanks clearly labeled/tagged?		
Is there evidence of any leaks or spills present?		
Vehicle and Equipment Storage		
Are fleet parking areas clean and orderly, with trash receptacles in the parking area?		
Is there any evidence of spills and leaks from stored vehicles?		
Salt Storage and Handling Areas		
Is there evidence of salt being discharged from the site or into the storm drain?		
Is there excess salt or sand on the pavement?		
Are there any leaks or spills of salt brine or calcium chloride in storage area?		
Hazardous Material Storage		
Are materials stored indoors or under cover?		
Are materials stored on secondary containment?		
Are storage containers clearly labeled with MSDS on file and accessible?		
Storm Drain System		
Are inspection records kept on file indicating cleaning and maintenance for storm drainage features?		
Is regular catch basin cleaning and other structure maintenance scheduled and performed?		
Are dry cleaning methods utilized on impervious surfaces that flow to storm drain inlets?		
Facility Changes		
Are there any changes in procedures, maintenance or equipment that would affect this SWPPP?		

Appendix E: Municipal Standard Operating Procedures (SOP)

	Standard Operating Procedures *Town of Stoneham, Massachusetts* *Department of Public Works* **Catch Basin Inspection and Cleaning**	**Issue Date:** July 2019

APPROVED BY:

_____

Brett F. Gonsalves
Director of Public Works

Introduction

Catch basins help minimize flooding and protect water quality by removing trash, sediment, decaying debris, and other solids from stormwater runoff. These materials are retained in a sump below the invert of the outlet pipe. Catch basin cleaning reduces foul odors, prevents clogs in the storm drain system, and reduces the loading of suspended solids, nutrients, and bacteria to receiving waters.

During regular cleaning and inspection procedures, data can be gathered related to the condition of the physical basin structure and its frame and grate and the quality of stormwater conveyed by the structure. Observations such as the following can indicate sources of pollution within the storm drain system:

- Oil sheen
- Discoloration
- Trash and debris

Both bacteria and petroleum can create a sheen on the water surface. The source of the sheen can be differentiated by disturbing it, such as with a pole. A sheen caused by an oil will remain intact and move in a swirl pattern; a sheen caused by bacteria or plant-based oils will separate or fracture and appear “blocky”. Bacterial and plant-based oil sheen is not a pollutant but should be noted.

Observations such as the following can indicate a potential connection of a sanitary sewer to the storm drain system, which is an illicit discharge.

- Indications of sanitary sewage, including fecal matter or sewage odors
- Foaming, such as from detergent
- Optical enhancers, fluorescent dye added to laundry detergent

Each catch basin should be cleaned and inspected annually at a minimum. Catch basins in high-use areas may require more frequent cleaning. Performing scheduled street sweeping will reduce the amount of sediment, debris, and organic matter entering the catch basins, ultimately reduce the frequency with which structures need to be cleaned.

Cleaning Procedure

Catch basin inspection cleaning procedures should address both the grate opening and the basin's sump. Document any and all observations about the condition of the catch basin structure and water quality on the Catch Basin Inspection Form (attached).

Catch basin inspection and cleaning procedures include the following:

1. Work upstream to downstream.
2. Clean sediment and trash off grate.
3. Visually inspect the outside of the grate.
4. Visually inspect the inside of the catch basin to determine cleaning needs.
5. Inspect catch basin for structural integrity.
6. Determine the most appropriate equipment and method for cleaning each catch basin.
    a. Manually use a shovel to remove accumulated sediments, or
    b. Use a bucket loader to remove accumulated sediments, or
    c. Use a high pressure washer to clean any remaining material out of catch basin while capturing the slurry with a vacuum.
    d. If necessary, after the catch basin is clean, use the Rodder/Jetter of the vacuum truck to clean downstream pipe and pull back sediment that might have entered downstream pipe.
7. If contamination is suspected, chemical analysis will be required to determine if the materials comply with the Massachusetts DEP Hazardous Waste Regulations, 310 CMR 30.000 (http://www.mass.gov/dep/service/regulations/310cmr30.pdf). Chemical analysis required will depend on suspected contaminants. Note the identification number of the catch basin on the sample label, and note sample collection on the Catch Basin Inspection Form.
8. Properly dispose of collected sediments. See following section for guidance. Collected sediments are brought to the DPW yard on Stevens Street. A waste hauling/disposal contractor is hired and responsible for proper disposal of the sediments.
9. If illicit discharges are observed or suspected, notify the Department of Public Works.
10. At the end of each day, document location and number of catch basins cleaned, amount of waste collected, and disposal method for all screenings.
11. Report additional maintenance or repair needs to the Department of Public Works.

Disposal of Screenings

Catch basin cleanings from storm water-only drainage systems may be disposed at any landfill that is permitted by MassDEP to accept solid waste. MassDEP does not routinely require stormwater-only catch basin cleanings to be tested before disposal, unless there is evidence that they have been contaminated by a spill or some other means.

Screenings may need to be placed in a drying bed to allow water to evaporate before proper disposal. In this case, ensure that the screenings are managed to prevent pollution.

Attachments

1. Catch Basin Inspection Form

Standard Operating Procedures

Town of Stoneham, Massachusetts

Department of Public Works

Snow Removal and De-Icing

Issue Date:
July 2019

APPROVED BY:

_____

Brett F. Gonsalves
Director of Public Works

MA SMALL MS4 PERMIT REQUIREMENT SUMMARY:

Part 2.3.7.a.iii.5.
The permittee shall establish and implement procedures for winter road maintenance including the use and storage of salt and sand; minimize the use of sodium chloride and other salts, and evaluate opportunities for use of alternative materials; and ensure that snow disposal activities do not result in disposal of snow into waters of the United States. For purposes of this MS4 Permit, salt shall mean any chloride-containing material used to treat paved surfaces for deicing, including sodium chloride, calcium chloride, magnesium chloride, and brine solutions.

Personnel

A list of personnel who are responsible for snow and ice removal is on file at the DPW. Employees performing the procedures in this SOP shall attend yearly stormwater pollution prevention training.

Equipment

The municipality owns and maintains ice control and snow removal equipment listed in Table 2. Equipment maintenance shall be conducted consistent with Best Management Practices for pollution prevention for Vehicles and Equipment maintenance activities. The wash bay/ area is located at the Department of Public Works on Pine Street.

Plowing
When conditions warrant, plows are installed on the larger trucks to move snow from the traveled roadway. Average time to install a plow is approximately 30 minutes. Smaller trucks are available for plowing of residential streets and clearing public lots. Approximately 50 private contractors are hired by the Town to supplement the DPW's plowing capacity.

Sand Spreaders
When conditions warrant, sand spreaders are installed on the larger trucks to spread sand on the traveled roadway. Each sand spreader is calibrated once per year, prior to the deicing season. Sand spreaders are calibrated to dispense 250-300 pounds of sand per lane mile.

Salt Spreaders and Pre-Wetting Devices
When conditions warrant, salt spreaders are installed on the larger trucks to spread salt on the traveled roadway. Each salt spreader is calibrated once per year, prior to the deicing season. Salt application shall be calibrated to dispense rates of 250-300 pounds per lane mile.

Six of the trucks are equipped with pre-wetting brine tanks which are calibrated prior to the deicing season. Pre-wetting application shall be calibrated to dispense rates [*enter number e.g. 8*] gallons of pre-wet liquid to 1 ton of salt.

A list of equipment for Winter Maintenance is on file at the DPW.

Materials

The major materials are used in snow and ice control are coarse sand, coarse salt, and calcium chloride. These materials are stockpiled in advance of an event and are immediately available when needed and stocks are replenished between events.

Sand

Sand is used as an abrasive for traction on slick roadways. Approximately **2500 tons** are anticipated to be used per year and are ordered from **[*enter contract*]** prior to each deicing season. Sand is stored in the covered facility located at the DPW yard on Pine Street. Loading areas and yards are swept periodically to prevent sand build-up and run-off.

Salt

Salt is used to expedite the melting of snow and ice from the street surface and also to keep the ice from forming a bond to the street surface. Approximately **1200** tons of salt are anticipated to be used per year and are ordered from **[*enter contract*]** prior to each deicing season. Salt is stored in the covered facility located at the DPW yard on Pine Street. Loading areas and yards are swept periodically to prevent salt build-up and run-off.

Pre-Wetting Chemical

Approximately **[*enter number*]** gallons of Calcium Chloride is estimated to be needed for pre-wetting. These chemicals are stored at the DPW in storage tanks equipped with appropriate spill control.

Procedures

Pre-Wetting Product Application

1. Whenever possible, the pre-wetting product is applied to the roadway prior to the beginning of a storm to prevent snow from bonding to the roadway surface, and also used when heavy frost or black ice is expected to be an issue for commuters. The DPW Director will instruct staff when anti icing is appropriate.
2. Prior to pre-wetting application, equipment will be checked to ensure proper working order and ensure proper calibration of equipment. All fluid levels will be checked and filled to proper levels, all lights must be in working order. A visual walk-around inspection of the truck or equipment must be made. Any repairs must be made and reported to a supervisor or mechanic before leaving the yard.
3. Pre-wetting chemical will be applied town-wide, with pre-wetting chemical first applied in the areas around the schools.
4. Vehicle optimal speed is 20-25 MPH.
5. Before parking any truck or equipment after use, all fluid levels will be checked and filled. All minor repairs will be done by the operator. Any repairs the operator cannot perform will be written up on the proper forms and turned in to the DPW Director. The DPW Director will determine importance and will assign the repairs according to schedule. All deicing chemical will be washed from equipment at the wash bay or designated wash area.

Standard Operating Procedures

Town of Stoneham, Massachusetts

Department of Public Works

Snow Removal and De-Icing

Issue Date: July 2019

Salt and Sand Application

1. Whenever conditions warrant, sand and/or salt is applied to the roadway prior to accumulation of snow to prevent compacted snow from bonding to the roadway surface. The DPW Director will instruct staff when sand/salt application is appropriate.
2. Prior to sand/salt application, equipment will be checked to ensure proper working order and ensure proper calibration of equipment. All fluid levels will be checked and filled to proper levels, all lights must be in working order. A visual walk-around inspection of the truck or equipment must be made. Any repairs must be made and reported to a supervisor or mechanic before leaving the yard.
3. The standard sand/salt application speed is: 20-25 mph.
4. Follow the prioritized route or schedule. This schedule is located on file at the DPW.
5. Before parking any truck or equipment after use, all fluid levels will be checked and filled. All minor repairs will be done by the operator. Any repairs the operator cannot perform will be written up on the proper forms and turned in to DPW Director. The DPW Director will determine importance and will assign the repairs according to schedule. All material will be washed from equipment at the wash bay or designated wash area.

Snow Plowing

1. As the storm develops and 3 inches of snow has accumulated, all of the drivers and available equipment will begin to plow their assigned routes.
2. Prior to plowing operations, equipment will be checked to ensure proper working order. All fluid levels will be checked and filled to proper levels, all lights must be in working order. A visual walk-around inspection of the truck or equipment must be made. Any repairs must be made and reported to a supervisor or mechanic before leaving the yard.
3. Avoid plowing, pushing, blowing or storing excess snow, deicer, or other debris in or near creeks, watercourses or storm drainage systems.
4. Reduce plowing speed in sensitive areas (near creeks, wetlands or other water courses) to prevent snow and deicing materials from entering waterways.
5. The standard plowing speed is: 20-25 mph.
6. Follow the prioritized route or schedule. This schedule is located on file at the DPW.
7. Before parking any truck or equipment after use, all fluid levels will be checked and filled. Blades or bolts, which need replacing, will be taken care of unless told to do otherwise. Chains that need repairs will be repaired. All minor repairs will be done by the operator. Any repairs the operator cannot perform will be written up on the proper forms and turned in to the DPW Director. The DPW Director will determine importance and will assign the repairs according to schedule.

Record Keeping and Documentation

1. Maintain a master schedule of prioritized snow and sanding routes and the miles or roads plowed or sanded. This document is on file at the DPW.
2. Keep copies of manufacturer's recommendations for equipment calibration, plowing speed and salt/sand application rates. These documents are on file at the DPW.
3. Keep records of the amounts of salt, sand, liquid deicer, and salt alternatives applied per season. These records are on file at the DPW.
4. Keep a list of all employees trained in the facility's Stormwater Pollution Prevention binder or computer file. These records are on file at the DPW.

Standard Operating Procedures

Town of Stoneham, Massachusetts
Department of Public Works

Sweeping Streets and Parking Lots

Issue Date:
July 2019

Approved by:

_____

Brett F. Gonsalves
Director of Public Works

Purpose of SOPs:

Procedures for the operation and maintenance of street sweepers, frequency of sweeping, disposal of debris, and recordkeeping to prevent pollution from entering the stormwater sewer systems.

MA Small MS4 General Permit Requirement Summary:

Part 2.3.7.a.iii.3.

The permittee shall establish and implement procedures for sweeping and/or cleaning streets, and permittee-owned parking lots. All streets with the exception of rural uncurbed roads with no catch basins or high speed limited access highways shall be swept and/or cleaned a minimum of once per year in the spring (following winter activities such as sanding). The procedures shall also include more frequent sweeping of targeted areas determined by the permittee on the basis of pollutant load reduction potential, based on inspections, pollutant loads, catch basin cleaning or inspection results, land use, water quality limited or TMDL waters or other relevant factors as determined by the permittee. The permittee shall report in each annual report the number of miles cleaned or the volume or mass of material removed. For rural uncurbed roadways with no catch basins and limited access highways, the permittee shall either meet the minimum frequencies above, or develop and implement an inspection, documentation and targeted sweeping plan with two (2) years of the effective date of the permit, and submit such plan with its year one annual report.

Part 2.3.a.iii.4.

The permittee shall ensure proper storage of catch basin cleanings and street sweepings prior to disposal or reuse such that they do not discharge to receiving waters.

Equipment Inventory:

The following is a list of street sweeping equipment:

Equipment Number	Make	Description	Sweeper Speed (or other notes)
		Elgin Sweeper	

Standard Operating Procedures

Town of Stoneham, Massachusetts

Department of Public Works

Sweeping Streets and Parking Lots

Issue Date:
July 2019

Operations

1. Operate all sweepers and equipment according to the manufacturer's recommended settings, standards, and procedures.

2. While sweeping, drive between the optimal sweeping speed limit, as recorded in the equipment list above.

3. Sweeping will not take place during steady rain.

4. If spills occur or illegal discharges are seen, report to the Department of Public Works.

Maintenance

1. Sweepers will be checked for leaks after each use. Immediately contain and properly clean up any spills.

2. Regular preventative maintenance to prolong equipment use (such as greasing moving parts and minor adjustments) occurs.

3. Parts are replaced as necessary. Brushes are replaced when bristle length is less than 7 inches.

4. Equipment is washed at the DPW yard on Pine Street to trap grease, oils and sediment.

Schedule

1. Street sweeping will primarily take place on a biannual basis between the months of April and June in the spring, and October and December in the fall.

2. All streets with curbing and/or catch basins shall be swept a minimum of once per year in the spring (following winter activities such as sanding). Streets are swept according to the street list/schedule which is on file at the DPW.

3. Priority roads and parking lots are identified on the basis of pollutant load reduction potential, based on inspections, pollutant loads, catch basin cleaning or inspection results, land use, impaired or TMDL waters or other relevant factors. These roads are swept a minimum of twice per year, and parking lots are swept a minimum of twice per year. A list of priority roads and parking lots is on file at the DPW. The list of priority roads and parking lots will be reassessed every year.

4. The sweeping schedule is assessed once per year and updated as necessary.

5. Events/activities that require special sweeping are parades.

Standard Operating Procedures

Town of Stoneham, Massachusetts

Department of Public Works

Sweeping Streets and Parking Lots

Issue Date:
July 2019

Storage and Disposal

1. Temporary storage of solid sweeping debris is on an impervious surface or in a truck/dumpster that is protected from runoff. The storage location(s) is/are DPW lot on Stevens St.

2. Solid sweeping debris is brought to the DPW lot on Stevens St. for temporary storage. It is then picked up by a third-party contractor for permanent disposal.

3. Decant water is discharged at the DPW garage on Pine Street.

4. Weighing process: The amount of solid sweeping debris will be weighed by the third-party contractor. The contractor provides a receipt to the DPW Director which indicates the amount of sweeping debris hauled away.

Training

1. Employees are trained once per year on this procedure and the proper operation of equipment. Employees are also trained on stormwater pollution prevention, spill and response, and illicit discharge detection and elimination procedures.

Record Keeping

1. Records are kept at the Department of Public Works.

2. Volumes of debris are recorded daily after each sweeping.

3. The number of curb miles swept per year is recorded.

4. A list of employees implementing the SOPs and the completion of their training(s) can be found at the DPW.

Revising the SOPs

1. These procedures are reviewed once per year and updated as needed.

Standard Operating Procedures

Town of Stoneham, Massachusetts

Department of Public Works

MS4 Infrastructure Maintenance

Issue Date:
July 2020

Approved by:

_____

Brett F. Gonsalves
Director of Public Works

Purpose of SOPs:

Procedures for the maintenance of MS4 infrastructure and reporting MS4 infrastructure defects and maintenance issues.

MA Small MS4 General Permit Requirement Summary:

Part 2.3.7.a.iii.1.

The permittee shall establish within two (2) year of the effective date of the permit a written (hardcopy or electronic) program detailing the activities and procedures the permittee will implement so that the MS4 infrastructure is maintained in a timely manner to reduce the discharge of pollutants from the MS4. If the permittee has an existing program to maintain its MS4 infrastructure in a timely manner to reduce or eliminate the discharge of pollutants from theMS4, the permittee shall document the program in the SWMP.

Operations & Inspection Programs

1. Catch basin cleaning: Annually, Town's catch basins are inspected and cleaned by a vendor in accordance with the DPW's schedule as required by the MS4. The schedule of catch basins to be cleaned is updated based on sediment levels observed. Through this cleaning work, any observed issues with catch basin frames, covers, and structures are reported to DPW. Sediment levels are also recorded and catch basins with high sediment levels are reported to the DPW.
2. Illicit Discharge Detection & Elimination Program: As inspectors are inspecting outfalls, manholes, catch basins, and assessing related infrastructure during inspections, observed infrastructure issues are documented and reported to the DPW.
3. Street Sweeping: Street sweeping occurs in accordance with the DPW's schedule and as required by the MS4 permit. Any issues found with the drainage structures during this work is reported to the DPW.
4. Good Housekeeping Program: Audits at municipal facilities were performed in 2020 and any issues with drainage at these facilities were reported to DPW. Additionally, municipal stormwater treatment BMPs were inventoried and mapped during this time period. These structures will be maintained in accordance with maintenance procedures outlined in the MA Stormwater Handbook, as funding allows. Issues with drainage structures on municipal sites will also be recorded and submitted to the DPW with the required annual or quarterly good housekeeping inspection.

Maintenance and Repair

1. CCTV of pipes will be performed on an as-needed basis when any of the above inspection programs indicates a potential problem exists with drainage piping, and as funding allows.
2. The DPW typically sets aside funding for drainage system repairs in the annual DPW budget. The repair program also includes separate programmatic funds set aside for resetting and replacing frames and covers. Repair program work is prioritized and completed annually, with funds available.
3. Larger repair or replacement projects identified through the above inspection programs are prioritized and developed as capital contracts on an as-needed basis and as funding allows.

Standard Operating Procedures

Town of Stoneham, Massachusetts

Department of Public Works

MS4 Infrastructure Maintenance

Issue Date:
July 2020

Schedule

1. A schedule will be put together on an as-needed basis and as funding allows for issues identified.

Storage and Disposal

1. Temporary storage of solid debris removed from any drainage infrastructure is on an impervious surface or in a truck/dumpster that is protected from runoff. The storage location is ***Stevens Street Recycling Center at 48 Stevens Street, Stoneham, MA.***
2. Broken drainage structures will be temporarily held at ***Stevens Street Recycling Center at 48 Stevens Street, Stoneham, MA.***

Training

1. Select municipal employees (e.g. facility managers, DPW foremen, etc.) will be trained on good housekeeping and inspection programs annually, as required by the MS4 permit, and as funding allows.

Record Keeping

1. Records of drainage infrastructure maintenance and repairs are kept ***at the Stoneham Department of Public Works.***

Appendix F: Municipal Structural Best Management Practices (BMP)

Proposal No. 608756-100743

Rinker MATERIALS™

THE STORMCEPTOR® SYSTEM

Owner's Manual

A00803 - 115

Stormceptor® Owner's Manual Contents

Rev. 3/2006

Thank You!

We want to thank you for selecting the Stormceptor System to use in your efforts in protecting the environment. Stormceptor is one of the most effective and maintenance friendly storm water quality treatment devices available. If you have any questions regarding the operation and maintenance of the Stormceptor System, please call your local Rinker Materials representative, or the Stormceptor Information Line at (800) 909-7763.

1. *Stormceptor Overview*

The Stormceptor System is a water quality device used to remove total suspended solids (TSS) and free oil (TPH) from storm water run-off. Stormceptor takes the place of a conventional manhole or inlet structure within a storm drain system. Rinker Materials manufactures the Stormceptor System with precast concrete components and a fiberglass disc insert. A fiberglass Stormceptor can also be provided for special applications.

The Stormceptor System product line consists of four patented designs:

- The In-Line (Conventional) Stormceptor, available in eight model sizes ranging from 900 to 7200 gallon storage capacity.
- An In-Line (Series) Stormceptor is available in three model sizes ranging from 11,000 to 16,000 gallon storage capacity.
- The Submerged Stormceptor, an in-line system designed for oil and sediment removal in partially submerged pipes, available in all models sizes ranging from 450*i* to 16,000 gallon storage capacity.
- The Inlet Stormceptor is a 450 gallon unit designed for small drainage areas.

Stormceptor removes free oil and suspended solids from storm water preventing hazardous spills and non-point source pollution from entering downstream lakes and rivers. Rinker Materials and its affiliates market and manufacture the Stormceptor System in the United States and Australia. Several thousand Stormceptor Systems have been installed in various locations throughout North America, Australia and the Caribbean since 1990.

In the Stormceptor, a fiberglass insert separates the treatment chamber from the by-pass chamber. The different insert designs are illustrated in Figures 1 and 2. These designs are easily distinguishable from the surface once the cover has been removed.

There are four versions of the in-line disc insert: single inlet/outlet, multiple inlet, in-line series insert and submerged designs. In the non-submerged "disc" design you will be able to see the inlet pipe, the drop pipe opening to the lower chamber, the weir, a 6" oil inspection/cleanout pipe, a large 24" riser pipe opening offset on the outlet side of the structure, and the outlet pipe from the unit. The weir will be around the 24" outlet pipe on the multiple inlet disc insert and on large diameter pipe applications.

The STC *(*series) Stormceptors consist of two chambers comprised of similar fiberglass inserts. These units also contain a 6" oil/inspection cleanout pipe and 24" outlet riser pipes.

The submerged disc insert has a higher weir and a second inlet drop pipe. In the inlet design you will be able to see an inlet drop pipe and an outlet riser pipe as well as a central oil inspection/cleanout port.

2. *Stormceptor System Operation*

The Stormceptor consists of a lower treatment chamber, which is always full of water, and a by-pass chamber. Storm water flows into the by-pass chamber via the storm sewer pipe or grated inlet (Inlet Stormceptor). Normal flows are diverted by a weir and drop pipe arrangement into a treatment chamber. Water flows up through the submerged outlet pipe based on the head at the inlet weir and is discharged back into the by-pass chamber downstream of the weir. The treated storm water continues down stream via the storm sewer system.

Oil and other liquids with a specific gravity less than water rise in the treatment chamber and become trapped under the fiberglass insert. Sediment will settle to the bottom of the chamber by gravity. The circular design of the treatment chamber is critical to prevent turbulent eddy currents and to promote settling.

During infrequent high flow conditions, storm water will by-pass the weir and be conveyed to the outlet sewer directly. The by-pass is an integral part of the Stormceptor since other oil/grit separators have been noted to scour during high flow conditions (Schueler and Shepp, 1993).

For further details please refer to *The Stormceptor System Technical Manual*.

The key benefits of Stormceptor include:

- Capable of removing more than 80% of the total sediment load when properly applied as a source control for small drainage areas
- Removes free oil from storm water during normal flow conditions
- Will not scour or resuspend trapped pollutants
- Ideal spill control device for commercial and industrial developments
- Vertical orientation facilitates maintenance and inspections
- Small foot print

3. *Identification of Stormceptor*

All In-Line (including Submerged) Stormceptors are provided with their own frame and cover. The cover has the name STORMCEPTOR clearly embossed on it to allow easy identification of the unit. The name Stormceptor is not embossed on the inlet models due to the variability of inlet grates used/approved across North America. You will be able to identify the Inlet Stormceptor by looking into the grate since the insert will be visible.

Once you have located a unit, there still may be a question as to the size of the unit. Comparing the measured depth from the water level (bottom of insert) to the bottom of the tank with Table 1 should help determine the size of the unit.

Table 1. Stormceptor Dimensions*	
Model	**Pipe Invert to Top of Base Slab**
450*i*	60"
900	55"
1200	71"
1800	105"
2400	94"
3600	134"
4800	128"
6000	150"
7200	134"
11000*s*	128"**
13000*s*	150"**
16000*s*	134"**

** Depths are approximate*

*** Depths per structure*

Starting in 1996, a metal serial number tag has been affixed to the fiberglass insert. If the unit does not have a serial number, or if there is any uncertainty regarding the size of the Stormceptor using depth measurements, please contact the Rinker Materials Stormceptor information line at (800) 909-7763 for assistance.

4. *Stormceptor Maintenance Guidelines*

The performance of all storm water quality measures that rely on sedimentation decreases as they fill with sediment (See Table 2 for Stormceptor capacities). An estimate of performance loss can be made from the relationship between performance and storage volume. Rinker Materials recommends maintenance be performed when the sediment volume in the unit reaches 15% of the total storage. This recommendation is based on several factors:

- Sediment removal is easier when removed on a regular basis (as sediment builds up it compacts and solidifies making maintenance more difficult).
- Development of a routine maintenance interval helps ensure a regular maintenance schedule is followed. Although the frequency of maintenance will depend on site conditions, it is estimated that annual maintenance will be required for most applications; annual maintenance is a routine occurrence which is easy to plan for and remember.
- A minimal performance degradation due to sediment build-up can occur.

In the event of any hazardous material spill, Rinker Materials recommends maintenance be performed immediately. Maintenance should be performed by a licensed liquid waste hauler. You should also notify the appropriate regulatory agencies as required.

Table 2. Stormceptor Capacities			
Model	**Sediment Capacity ft³ (L)**	**Oil Capacity US gal (L)**	**Total Holding Capacity US gal (L)**
450*i*	45 (1276)	86 (326)	470 (1779)
900	75 (2135)	251 (950)	952 (3604)
1200	113 (3202)	251 (950)	1234 (4671)
1800	193 (5470)	251 (950)	1833 (6939)
2400	155 (4387)	840 (3180)	2462 (9320)
3600	323 (9134)	840 (3180)	3715 (14063)
4800	465 (13158)	909 (3441)	5059 (19150)
6000	609 (17235)	909 (3441)	6136 (23227)
7200	726 (20551)	1059 (4009)	7420 (28088)
11000*s*	942 (26687)	2797 (10588)*	11194 (42374)
13000*s*	1230 (34841)	2797 (10588)*	13348 (50528)
16000*s*	1470 (41632)	3055 (11564)*	15918 (60256)

** Total both structures combined*

4.1 *Recommended Maintenance Procedure*

For the "disc" design, oil is removed through the 6" inspection/cleanout pipe and sediment is removed through the 24" diameter outlet riser pipe. Alternatively, oil could be removed from the 24" opening if water is removed from the treatment chamber, lowering the oil level below the drop pipes.

The depth of sediment can be measured from the surface of the Stormceptor with a dipstick tube equipped with a ball valve (Sludge Judge®). It is recommended that maintenance be performed once the sediment depth exceeds the guideline values provided in Table 3 for the reasons noted in Section 4.0 Stormceptor Maintenance Guidelines.

Table 3. Sediment Depths Indicating Required Maintenance	
Model	**Sediment Depth***
450*i*	8" (200 mm)
900	8" (200 mm)
1200	10" (250 mm)
1800	15" (375 mm)
2400	12" (300 mm)
3600	17" (425 mm)
4800	15" (375 mm)
6000	18" (450 mm)
7200	15" (375 mm)
11000*s*	17" (425 mm)**
13000*s*	20" (500 mm)**
16000*s*	17" (425 mm)**

** Depths are approximate*

*** In each structure*

No entry into the unit is required for routine maintenance of the Inlet Stormceptor or the smaller disc insert models of the In-Line Stormceptor. Entry to the level of the disc insert may be required for servicing the larger disc insert models. Any potential obstructions at the inlet can be observed from the surface. The fiberglass insert has been designed as a platform for authorized maintenance personnel in the event that an obstruction needs to be removed.

Typically, maintenance is performed by the Vacuum Service Industry, a well established sector of the service industry that cleans underground tanks, sewers, and catch-basins. Costs to clean a Stormceptor will vary based on the size of the unit and transportation distances. If you need assistance for cleaning a Stormceptor unit, contact your local Rinker Materials representative, or the Stormceptor Information Line at (800) 909-7763.

Figures 1 and 2 will help illustrate the access point for routine maintenance of Stormceptor.

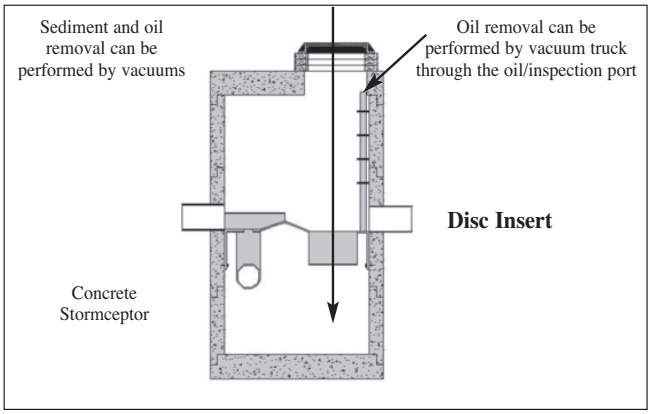


Figure 1 Single Inlet/Outlet "Disc" Insert
In-Line Stormceptor

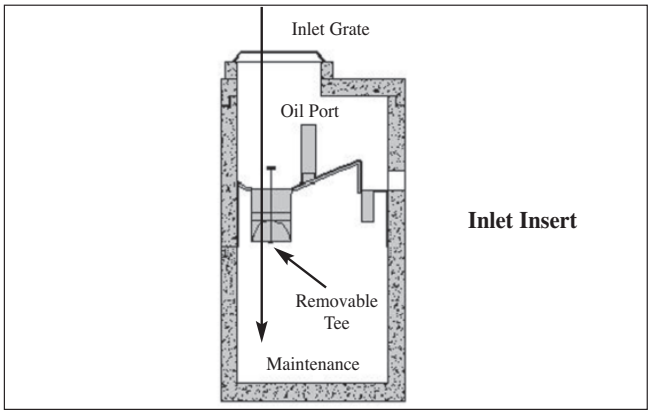


Figure 2 STC 450*i*
Inlet Stormceptor

4.2 *Disposal of Trapped Material from Stormceptor*

The requirements for the disposal of material from Stormceptor are similar to that of any other Best Management Practices (BMP). Local guidelines should be consulted prior to disposal of the separator contents.

In most areas the sediment, once dewatered, can be disposed of in a sanitary landfill. It is not anticipated that the sediment would be classified as hazardous waste. In some areas, mixing the water with the sediment will create a slurry that can be discharged into a trunk sanitary sewer. In all disposal options, approval from the disposal facility operator/agency is required. Petroleum waste products collected in Stormceptor (oil/chemical/fuel spills) should be removed by a licensed waste management company.

What if I see an oil rainbow or sheen at the Stormceptor outlet?

With a steady influx of water with high concentrations of oil, a sheen may be noticeable at the Stormceptor outlet. This may occur because a rainbow or sheen can be seen at very small oil concentrations (< 10 ppm). Stormceptor will remove over 95% of all free oil and the appearance of a sheen at the outlet with high influent oil concentrations does not mean that the unit is not working to this level of removal. In addition, if the influent oil is emulsified, the Stormceptor will not be able to remove it. The Stormceptor is designed for free oil removal and not emulsified or dissolved oil conditions.

5.0 *Recommended Safety Procedures*

Rinker Materials strongly recommends that any person who enters a Stormceptor System follow all applicable OSHA regulations for entry in permit required confined spaces, as outlined in 29 CFR 1910.146. A permit required confined space consists of a space that:

- Is large enough and so configured that an employee can bodily enter and perform assigned work.
- Has limited or restricted means for entry and exit.
- Is not designed for continuous employee occupancy.
- Contains or has one of the following:
  - a potential to contain a hazardous atmosphere.
  - a material that has the potential for engulfing an entrant.
  - any other recognized serious safety hazard.

Storm water and wastewater systems fall under OSHA guidelines for a permit required confined space. Failure to follow OSHA guidelines for entry and work in a permit required confined space can result in serious injury or death. Please exercise extreme caution and follow appropriate safety procedures when entering any confined space.

Two square pick holes in the cover vent the Stormceptor, allow for removal of the cover, and provide sampling ports for air quality monitoring before the cover is removed. If you must enter the Stormceptor, please note that if the disc insert inside is wet, it can be slippery.

Recognizing that every work site is different, the responsibility for safety falls on the contractor. The contractor must ensure that all employees and subcontractors follow established safety procedures and OSHA regulations for working in and around permit required confined spaces as well as for any other safety hazard that may be present on that particular site.

6.0 *Stormceptor Monitoring Protocol*

If monitoring of your Stormceptor System is required, we recommend you follow the procedures outlined below by the Rinker Materials Stormceptor office. If you have any questions regarding monitoring please contact the Rinker Materials Stormceptor Product Manager at (800) 909-7763.

6.1 *Pollutants to be Monitored*

Table 4 indicates the pollutants to be monitored during the storm events and the minimum acceptable detection limit for each pollutant to be analyzed. Approved federal or state laboratory analysis methodologies are to be used for the analysis.

The optional metals indicated in Table 4 refer to the Resource Conservation Recovery Act and may be covered by a generic metals scan. Bacteria monitoring will not be required unless explicitly requested elsewhere.

Two sediment samples are to be extracted from the monitored Stormceptor at the end of the study and analyzed for the particle size distribution and water content. A minimum of 8 U.S. sieve sizes should be used to determine the particle size distribution. Sieves that are used must include, but are not limited to 35, 60, 100, 140, 200, 270 and 400. Three clay particle sizes must be analyzed to denote particle sizes between 5 and 25 μm. The particle size distributions should be plotted on a standard grain size distribution graph.

Table 4. Monitoring Pollutants	
Pollutant	**Minimum Detection Limit (MDL)**
Total Suspended Solids (TSS)	5 mg/l
Total Phosphorus (P)	0.02 mg/l
Total Kjeldahl Nitrogen (TKN)	0.1 mg/l
Copper (Cu)	0.001 mg/l
Cadmium (Cd)	0.005 mg/l
Lead (Pb)	0.05 mg/l
Zinc (Zn)	0.01 mg/l
Chromium (Cr)	0.01 mg/l
Total Petroleum Hydrocarbons (TPH)	1 mg/l
Conductivity	0.1 μmho/cm
Fecal Coliform*	1/100 ml
Additional Metals (optional)	
Arsenic (As)	0.005 mg/l
Barium (Ba)	0.01 mg/l
Mercury (Hg)	0.0005 mg/l
Selenium (Se)	0.005 mg/l
Silver (Ag)	0.01 mg/l

* Only if explicitly requested in Terms of Reference

6.2 *Monitoring Methodology*

The following monitoring protocol should be followed to ensure reasonable monitoring results and interpretation:

- Monitoring protocols should conform to **EPA 40 CFR Part 136.**
- The **EPA guideline of 72 hours dry period** prior to a monitoring event should be used. This will ensure that there is sufficient pollutant build-up available for wash-off during the monitored event.
- Flow proportional monitoring must be conducted for the parameters indicated in Table 1. Samples should be analyzed separately for the first flush versus the remainder of the storm event. Monitoring need not extend longer than an 8-hour period after the start of the storm event (composite).
- **Sediment sampling** (measuring the sediment depth in the unit at the beginning and end of the monitoring period) must be conducted. The water content of the sediment layer must be analyzed to determine the dry volume of suspended solids. Sediment depth sampling will indicate the rate of pollution accumulation in the unit, provide confirmation that the unit is not scouring and confirm the flow proportional monitoring results. A mass balance using the sediment sampling should be calculated to validate the flow proportional sampling.

- **Grab sampling** (just taking samples at the inlet and outlet) is an unacceptable methodology for testing the performance of the Stormceptor during wet weather conditions unless it is flow weighted (flow weighted composite sample from numerous grab samples) over the entire storm.
- The oil containment area underneath the insert should be inspected via the vent pipe for dry weather spills capture once a month during the monitoring period since the flow rate of a dry weather spill may not trigger the automated samplers.
- A tipping bucket rain gauge should be installed on-site to record the distribution of storm intensities and rainfall volume during the monitored events.
- Results that are within the laboratory error (both inlet and outlet) or are representative of relatively clean water should be discarded. Typical concentrations of pollutants in storm water are:

TSS	100 mg/L
Total P	0.33 mg/L
TKN	1.50 mg/L
Total Cu	34 μg/L
Total Pb	144 μg/L
Total Zn	160 μg/L

A threshold first flush/composite TSS value of 50 mg/L at the inlet to the Stormceptor should be used as the lower limit of an acceptable storm for reporting event efficiency. Monitoring results where the influent TSS concentration is less than 50 mg/L should only be used in mass load removal calculations over the entire monitoring period with other storms where the influent concentration is greater than 50 mg/L. The results should not be analyzed if the influent TSS concentrations during all monitored storms are less than 50 mg/L. Storms where the influent TSS concentration is less than 10 mg/L should be discarded from all analyses.

- A threshold storm event volume equal to 1.5 times the storage volume of the Stormceptor being monitored should be used as the lower limit of an acceptable storm for monitoring.
- Sampling at the outlet of the Stormceptor should be conducted within the 24" outlet riser pipe to accurately define event performance.
- The personnel monitoring the Stormceptor should record incidental information in a log file. Information such as weather, site conditions, inspection and maintenance information, monitoring equipment failure, etc. provide valuable information that can explain anomalous results.
- Laboratory results of monitored samples should be analyzed within 10 days of being submitted to the lab.
- Weekly inspections of the sampling tubes, flow meter, rain gauge, and quality samplers should be conducted to ensure proper operation of the monitoring equipment. Debris and sediment that collects around the sampling intakes should be cleaned after each event.
- During the installation of automated quality samplers, care should be exercised to ensure that representative samples will be extracted (placement of intakes, ensuring that tubing is not constricted or crimped).
- Sampling should be conducted for a minimum of 6 storms. Ideally 15 storms should be sampled if the budget allows.

Call the Stormceptor Information Line (800-909-7763) for more detailed information and test results.

TECHNICAL INFORMATION:

- Stormceptor CD ROM
- Stormceptor Technical Manual
- Stormceptor Installation Guide
- Stormceptor Brochure

TEST RESULTS:

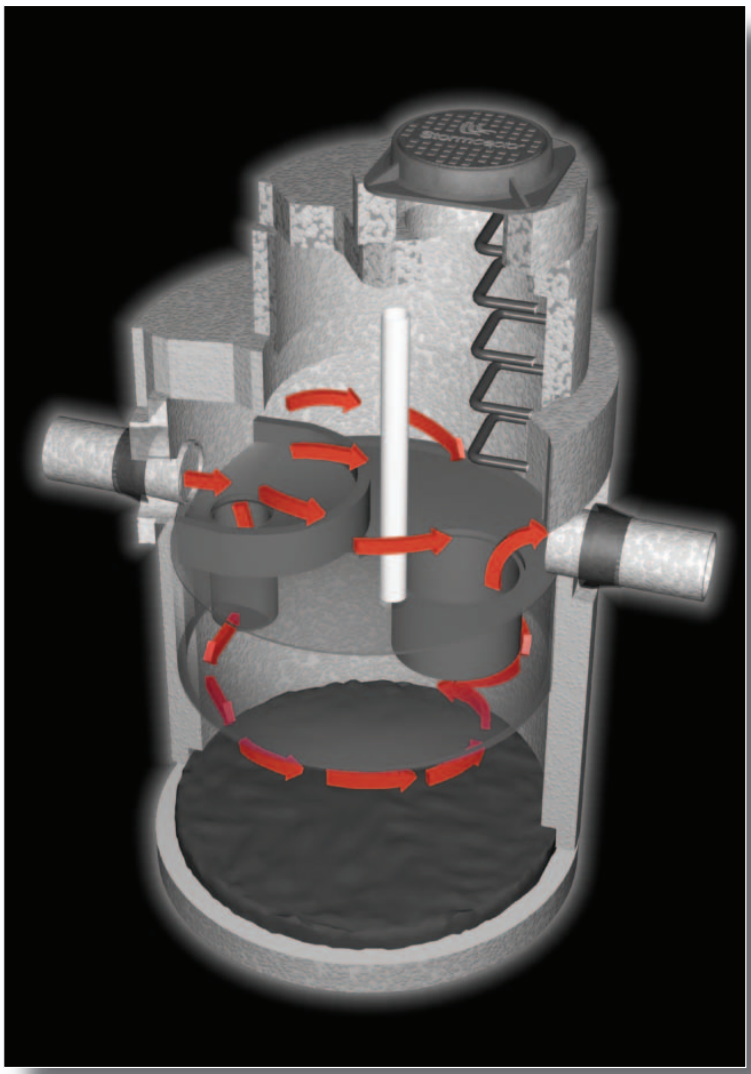
- STEP Report (Independent Verification)
- University of Coventry Study
- ETV Canada (Federal Verification)
- National Water Research Institute Test
- Westwood, MA Field Monitoring Study
- Edmonton, Canada Field Monitoring Study
- Seattle Field Monitoring
- Como Park, MN Field Monitoring Study
- Florida Atlantic University Submerged Stormceptor Testing
- Oil Removal Field Validation
- Sludge Analyses and Particle Size Analyses

Rinker MATERIALS™

6560 Langfield Rd., Bldg. 3
Houston, TX 77092
Phone: 832-590-5300
Fax: 832-590-5399
Toll Free: 800-909-7763
www.rinkerstormceptor.com

Rev. 3/2006

Rinker MATERIALS™



THE STORMCEPTOR® SYSTEM

Technical Manual

Rinker MATERIALS

Stormceptor®

Stormceptor® Summary

Stormceptor is a patented water quality treatment structure for storm drain systems. Stormceptor removes free oil and suspended solids from storm water preventing spills and non-point source pollution from entering downstream lakes and rivers. The key benefits of implementing Stormceptor include:

- Capable of removing more than 80% of the annual sediment load when properly applied as a source control for small areas
- Captures free oil from storm water during normal flow conditions
- Prevents scouring or re-suspension of trapped pollutants
- Can be implemented as part of a treatment train (ex. prevents groundwater contamination in recharge measures, extends the maintenance period for other storm water quality measures)
- Excellent hydrocarbon spills control device for commercial and industrial developments
- Simple to design and specify
- Easy to install in new or retrofit situations
- Easy to maintain (vacuum truck)
- Can be used as a bend structure
- Pre-engineered for traffic loading
- Does not require a large drop in storm drain elevation for implementation (1" for single inlet, 3" for multiple inlet)
- STORMCEPTOR clearly marked on the cover (excluding inlet designs)

Although Stormceptor is extremely versatile, users of this document should keep in mind several key constraints:

- Only the STC 450*i* Stormceptor is specifically designed as a storm drain inlet
- The difference between the inlet pipe invert elevation and the outlet pipe elevation must be 1" for a one inlet/one outlet configuration and 3" for a multiple inlet, STC 450*i* and STCs (series) configuration
- The largest standard inlet/outlet size that can be accommodated without customization is 42" I.D. RCP (excluding the STC 450*i*)
- There is a minimum requirement for 24" of cover above the crown of the pipe (inside top of pipe) to grade for the concrete Stormceptor

Rev. 3/2006

Stormceptor Technical Manual Contents

1.0 Stormceptor Overview

The Stormceptor System is a water quality treatment device used to remove total suspended solids (TSS) and free oil (TPH) from storm water run-off. Stormceptor takes the place of a conventional junction or inlet structure within a storm drain system. Rinker Materials manufactures the Stormceptor System with precast concrete components and a fiberglass disc insert. A fiberglass Stormceptor can also be provided for special applications. Thousands of Stormceptor Systems have been installed in various locations throughout North America, Australia and the Carribbean since 1990.

Stormceptor follows the philosophy of treating pollution at its source. Treating pollution at the source is the preferred methodology for water quality control since the dilution of pollutants in storm water becomes problematic in terms of effective treatment as the drainage area increases.

The Stormceptor System product line consists of four patented designs:

- The In-Line (Conventional) Stormceptor, available in eight model sizes ranging from 900 to 7200 gallon storage capacity.
- An In-Line (Series) Stormceptor is available in three model sizes ranging from 11,000 to 16,000 gallon storage capacity.
- The Submerged Stormceptor, an in-line system designed for oil and sediment removal in partially submerged pipes, available in all models sizes ranging from 450 to 16,000 gallon storage capacity.
- The Inlet Stormceptor is a 450 gallon inlet (or in-line) structure designed for small drainage areas.

The key advantage of Stormceptor compared to other water quality controls in a storm drain is the patented internal by-pass (no external by-pass required) which prevents the resuspension and scouring of settled material during subsequent storm events.

1.1 Stormceptor Applications

Stormceptor is applicable in a variety of development situations including:

- storm water quality retrofits for existing developments
- industrial and commercial parking lots
- automobile service stations
- airports and military installations
- vehicle loading and unloading areas
- areas susceptible to spills of material lighter than water (bus depots, transfer stations, etc.)
- new residential developments, re-development in the urban core
- pre-treatment (as part of a treatment train)

Existing Development Retrofits

Existing developed areas generally provide numerous constraints to the implementation of water quality enhancement. Surrounding properties define the grading of the development (or else berms and expensive retaining walls are required) and existing sewer inverts and locations define the minor system drainage route. These constraints generally limit the number and type of options available to the storm water management professional with respect to water quality enhancement.

In retrofit applications, Stormceptor is an attractive solution due to its vertical orientation, low life cycle costs, ease of installation and maintenance and compatibility with the existing drainage system.

Potential Spill Areas

Parking lots, streets, and industrial areas that are subject to high volumes of traffic and/or transfer of hydrocarbon materials are potential spill areas. Generally, the area of land draining to the storm drains in these instances is small.

Stormceptor is recommended for these types of land use regardless of whether other water quality control techniques are proposed. The spills protection provided by Stormceptor prevents water resources from damaging spills which have toxic effects on the instream aquatic resources.

Re-development/Intensification

Re-development/intensification can be classified as new construction or re-development on an existing developed parcel of land. This can be an addition to an existing development, or the replacement of the entire development with a similar or new type of land use.

In these situations, surface treatment techniques are generally not feasible, meaning that any treatment system must conform to the existing storm drain. The implementation of large underground systems (such as tanks, underground sand filters, etc.) can be problematic in ultra-urban areas due to the proximity of other underground utilities, the configuration of the existing storm drain, and long term maintenance.

Most redevelopment situations are small in size. Surface storm water quality techniques for these areas would result in a loss of developable land that could jeopardize the economic feasibility of small urban areas.

Pre-Treatment

Stormceptor is not intended to replace natural storm water management system solutions (wet ponds, wetlands) for large residential subdivisions. However, Stormceptor is effective as part of the treatment train approach in these developments. The use of Stormceptor for street drainage can help to offset long-term maintenance costs if catch-basin sumps are eliminated.

In these situations, maintenance is centralized at Stormceptor locations reducing the time and cost of storm drain maintenance.

1.2 Stormceptor System Operation

The Stormceptor consists of a lower treatment chamber, which is always full of water, and a by-pass chamber. Storm water flows into the by-pass chamber via the storm drain or grated inlet (Inlet Stormceptor). Normal flows are diverted by a weir and drop pipe arrangement into a treatment chamber. Water flows up through the submerged outlet pipe based on the head at the inlet weir and is discharged back into the by-pass chamber downstream of the weir. The downstream section of the pipe is connected to the outlet storm drain pipe.

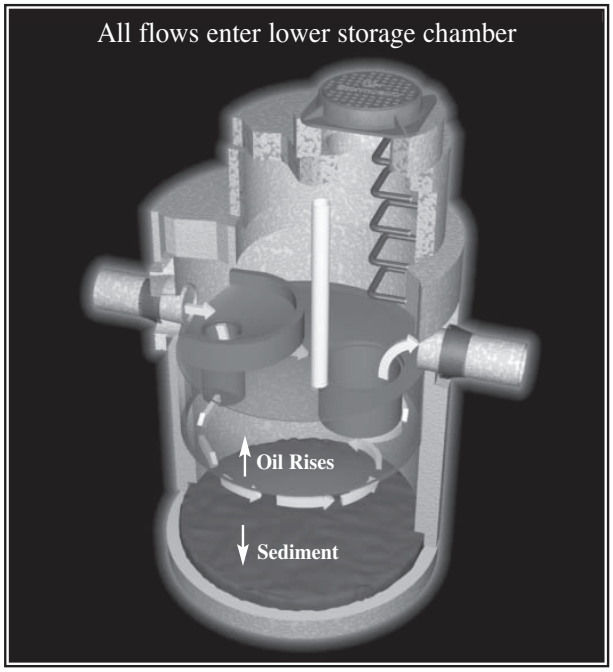


Figure 1. Stormceptor Operation During Normal Flow Conditions

Oil and other liquids with a specific gravity less than water will rise in the treatment chamber and become trapped under the fiberglass weir, since the outlet pipe is submerged. Sediment will settle to the bottom of the chamber by gravity. The circular design of the treatment chamber helps to prevent turbulent eddy currents and to promote settling.

During infrequent high flow conditions, storm water will by-pass the weir and be conveyed to the outlet storm drain directly (Figure 2). Water, which overflows the weir, creates a backwater effect on the outlet pipe (head stabilization between the inlet drop pipe and outlet riser pipe) ensuring that excessive flow will not be forced into the treatment chamber which could scour or resuspend the settled material. The by-pass is an integral part of the Stormceptor since other oil/grit separators have been noted to scour during high flow conditions (Schueler and Shepp, 1993).

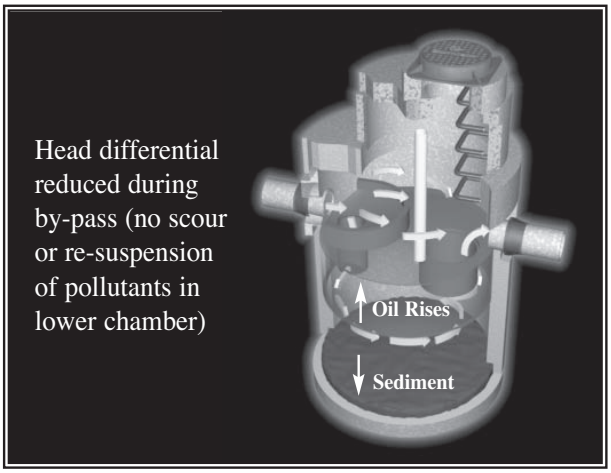


Figure 2. Stormceptor Operation During High Flow Conditions

Stormceptor comes complete to the job site with its own frame and cover. The cover (excluding the inlet design) has the name STORMCEPTOR clearly embossed on it to allow easy identification of the unit in the field for maintenance.

1.3 Stormceptor Testing

At Rinker Materials and Stormceptor Corporation testing the effectiveness of the Stormceptor System goes far beyond the controlled laboratory environment. Since its introduction in 1990, numerous independent field test and studies detailing the effectiveness of Stormceptor have been completed.

Detailed reports from these studies are available from the Rinker Materials Stormceptor office at (800) 909-7763. The major findings of many of these studies are summarized as follows:

- Laboratory testing at the University of Coventry indicated that over 97% of oil, 83% of sand, and 73% of peat are removed at a flow rate of 0.32 cfs (9 L/s) in a 6 foot diameter Stormceptor
- The NWRI laboratory testing (with 150μm synthetic sand) indicated that 90% removal would be achieved at a flowrate of ≤ 0.21 cfs (6 L/s)
- Negligible scouring of settled material occurred in the NWRI laboratory testing under high flow conditions
- The TSS removal rate for the unit in Westwood, Massachusetts (1997) was consistent with state requirements (>80%).
- Captured sediment particle size distribution indicate that 85% of the sediment collected by Stormceptor is smaller than 100 μm in size

- Numerous spills have been captured by units in operation (US Peace Bridge Authority, City of Edmonton, City of Toronto, Canadian Forces Base, City of Madison)
- The Stormceptor can remove approximately 20-30% of the Total Phosphorus from influent storm water (Madison, Wisconsin study; Como Park, Minnesota study).
- The headloss through the Stormceptor unit is approximately equal to a 60˚ bend at a manhole (loss coefficient K ≅ 1.3) (single inlet design)

2.0 Design Information

The Stormceptor System is designed based on the total annual rainfall (using historical rainfall data), total drainage area and the percent of impervious area. Small frequent storms account for a majority of annual rainfall and for a majority of the sediment loading.

Storm sewers are designed to convey a specific flow generated by the design storm. The design storm is typically the highest flow event that may be encountered for a specific period of time, measured in years. Typical design storms are the 2 year, 5 year and 10 year storms.

These design principles are impractical when they are applied for stormwater quality. By definition, design storms occur infrequently and typically account for a very small fraction of the annual rainfall volume. Designing for stormwater quality using principles for sizing sewers becomes impracticable and uneconomical in that BMP's would have to be designed to contain a large volume of runoff created by a design storm which would in turn be needed on a very infrequent basis.

2.1 Sizing Guidelines

Stormceptor sizing is based on computer simulation of suspended solids removal within the Stormceptor. A computer model was developed based on the USEPA SWMM Version 4.3. Solids build-up, wash-off and settling calculations were added to the hydrology code to estimate suspended solids capture by the Stormceptor. For the complete Stormceptor Sizing Program, please contact your local area representative or the Rinker Materials Stormceptor office at (800) 909-7763.

Stations across the United States were selected based on location, period of record, data resolution and completeness within the period of record. Fifteen minute data were utilized recognizing the small time of concentration that would typically be encountered in most Stormceptor applications. The model uses an internal 5 minute timestep at all times regardless of the rainfall timestep.

SWMM models catchments and conveyance systems are based on input rain, temperature, wind speed and evaporation data. Only rain data is used in the model. The default SWMM daily evaporation value (0.1"/day) was used. The Horton equation was chosen for infiltration. The method of infiltration chosen is unimportant due to the level of imperviousness of Stormceptor applications (mainly parking lots, etc.). Values of SWMM parameters used in the model are shown in Table 1.

Table 1. SWMM Area Parameters	
Area - acre	variable
Imperviousness	99%
Width - feet	variable*
Slope	2%
Impervious Depression Storage - inches	0.19
Pervious Depression Storage - inches	0.02
Impervious Manning's n	0.015
Pervious Manning's n	0.25
Maximum Infiltration Rate - inches/hour	2.46
Minimum Infiltration Rate - inches/hour	0.39
Decay Rate of Infiltration (s^{-1})	0.00055

* The width of catchment is assumed equal to twice the square root of the area.

The distribution of pollutant load is important for measures that incorporate a high-flow by-pass (commonly known as "first flush" measures). Accordingly, build-up/wash-off calculations are employed to correctly distribute the pollutant load with flow recognizing the need to optimize the sizing of small-site storm water quality measures.

In the model, solids build-up and wash-off are both approximated using an exponential distribution. The distribution of solids build-up is a function of antecedent dry days according to equation 1 (Sartor and Boyd, 1972).

The choice of particle size distribution and settling velocities are a key part of the modeling exercise. Different settling velocities can be applied to the same particle size distribution based on the specific gravity of the particles, or to account for the effect of non-ideal settling or the effect of flocculation on settling. Two particle size distributions can be selected in the model. A fine particle size distribution can be selected that reflects the fines in storm water (USEPA, 1983; Minton, 1999). This particle size distribution is given in Table 2. The distribution given in Table 2 is commonly accepted by most regulatory agencies in North America. A coarse particle size distribution can also be selected which reflects material larger than or equal to 150 μm. This distribution is given in Table 3. The coarse distribution is provided to allow comparisons with competitors that size their devices based on only the larger particles.

Settling velocities were then assessed for each of the particle sizes provided in Tables 2 and 3. The calculation of settling velocities is based on Stokes' law.

A specific gravity of 2.65 is commonly associated with sand-size particles whereas the fines in storm water are commonly associated with a lower specific gravity due to the organic content.

Research indicates that there is a high potential for coagulation amongst the smaller particles (Ball and Abustan, 1995) which will increase settling velocities and TSS removal rates. Furthermore, historical settling velocity calculations have been based on discrete particle methodologies (vertical settling column tests) that do not account for potential coagulation or flocculation. Numerous field tests on the Stormceptor (Labatiuk, 1996; Ontario MOE, 1999; Bryant, 1995) have shown that a significant percentage of the solids collected in the Stormceptor are fine. In recognition of this, a flocculation equation was used to determine the settling velocity for particles equal to or smaller than 20 μm.

Table 2. Typical Storm Water Particle Size Distribution

Particle Size (μm)	Percent by mass (%)	Specific Gravity	Settling Velocity (m/s)
20	20	*	0.00035
60	20	1.8	0.00158
150	20	2.2	0.01070
400	20	2.65	0.06500
2000	20	2.65	0.28700

* Flocculated settling velocity based on $V_s = 0.35 + 1.77\ P_s$

Where: V_s = Settling Velocity (mm/s)

P_s = Particle Size (μm)

Table 3. Coarse Storm Water Particle Size Distribution

Particle Size (μm)	Percent by mass (%)	Specific Gravity	Settling Velocity (m/s)
150	60	2.65	0.01440
400	20	2.65	0.06500
2000	20	2.65	0.28700

The influent pollution is distributed uniformly in the flow such that during by-pass conditions the amount of pollution in the by-pass is proportional to the flow being by-passed. The total load to the Stormceptor, load removed by the Stormceptor, and load by-passing the Stormceptor are calculated at the end of the simulation to provide an estimate of overall TSS removal. The total volume of water coming to the Stormceptor and by-passing the Stormceptor for the period of record are used to calculate the percentage of annual runoff treated by the Stormceptor.

Figure 3 indicates that the model provides reasonable estimates of TSS removal when compared with actual monitoring performance.

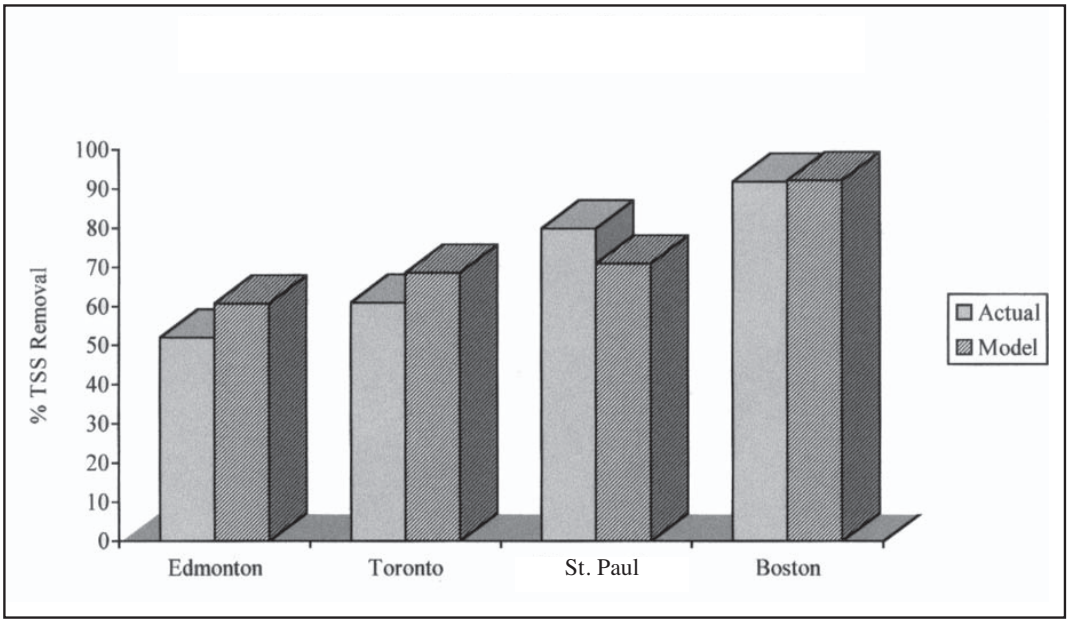


Figure 3. Comparison of Model Results to Field Monitoring

Free Oil (Spills) Capture

The results from the National Water Research Institute in Burlington indicate that free oil is retained in the Stormceptor for both dry weather spills and during minor storms (Marsalek, 1994). In a dry weather spill the latter portion of the spill will remain in the drop pipe. This oil will be purged into the Stormceptor during subsequent inflow to the separation chamber.

Based on API style calculations with a 150 μm oil globule (rise velocity of 0.005 ft/s) the oil will rise anywhere from 5" to 12" during peak flow conditions in the separation chamber depending on the size of unit implemented. These distances are based on the assumption that only half of the storage volume in the separator is used in the flow through zone. As such, the calculations and laboratory tests indicate that oil will be readily trapped since the outlet riser is the same elevation as the inlet riser.

2.2 Configuration of the Storm Drain System

The configuration of the storm sewer system is important since Stormceptor works most efficiently for small drainage areas and one influent pipe.

Inlet Configuration

The STC 450*i* is the smallest Stormceptor and is designed to replace a catch-basin (Figure 4). It has an open grate at the surface to allow water to enter the unit from above.

All of the other Stormceptor units are designed to replace a junction structure in a storm drain system (require a horizontal inlet pipe).

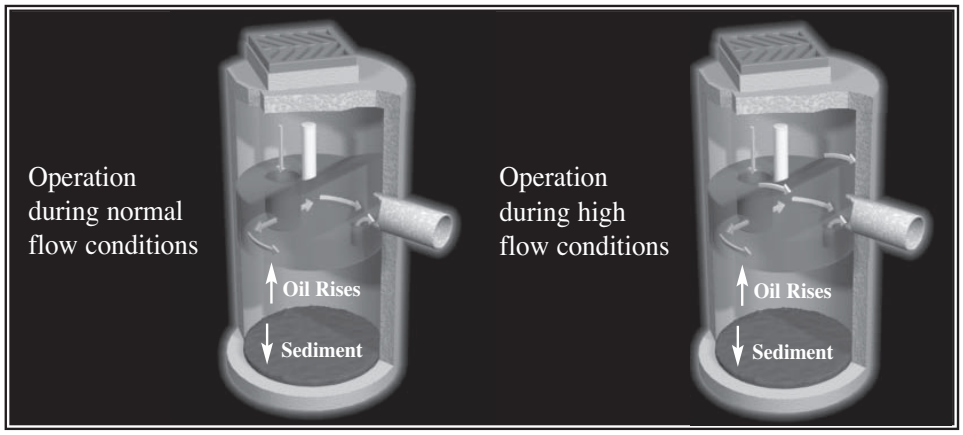


Figure 4 450*i* Inlet Stormceptor

In-Line Configuration

Stormceptor recommends that a one influent pipe - one outlet pipe arrangement be used in new development applications of the separator (Figure 5). This may require junction manholes upstream of the separator to provide this arrangement. The Stormceptor can be used as a bend structure as shown in Figure 6 without compromising oil and sediment removal effectiveness. Although additional hydraulic losses will occur as result of the bend, the hydraulics in the lower chamber will not be affected.

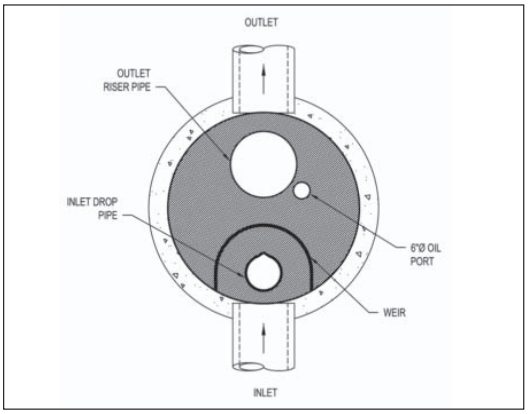


Figure 5 Typical Stormceptor Configuration

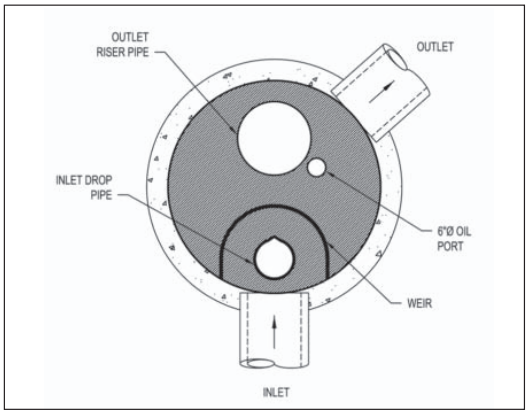


Figure 6 Stormceptor as a Bend Structure

In situations where it is not feasible to have one inlet pipe to the Stormceptor (i.e. existing storm drain applications, location of other infrastructure/utilities, etc.), it is possible to accommodate several influent pipes with a modified diversion/by-pass configuration (Figure 7). The elevation difference between the inlet and outlet pipes for the multiple inlet design is 3". It is recommended that a maximum of two inlet pipes be implemented into a Stormceptor in a new development application.

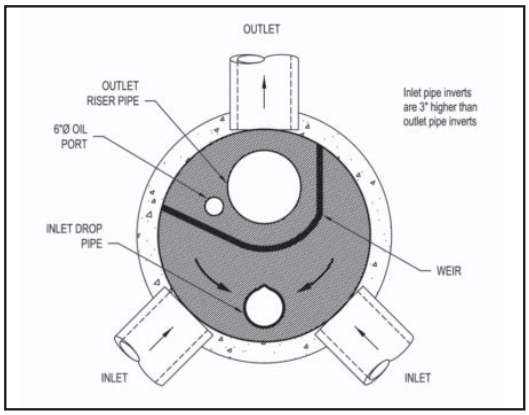


Figure 7. Multiple Inlets to Stormceptor

Series Configuration

The series Stormceptor configuration requires a one inlet - one outlet pipe arrangement. The series Stormceptor is able to treat larger drainage areas by splitting the flow into two circular structures. If the series Stormceptor is to be used as a bend structure then only the outlet pipe in the second unit can be deflected to accomplish the change in direction.

Submerged Configuration

Stormceptor also has a design that can accommodate a partially or fully submerged pipe application. Submergence is common in areas close to lakes, coastal areas and areas with high groundwater tables. The insert in these applications has a custom weir height and second drop pipe as shown in Figure 8. Both the weir height and height of the second drop pipe are site specific depending on the level of submergence. The second drop pipe elevation corresponds to the actual submergence elevation while the weir is built to be 9" higher than the submergence elevation.

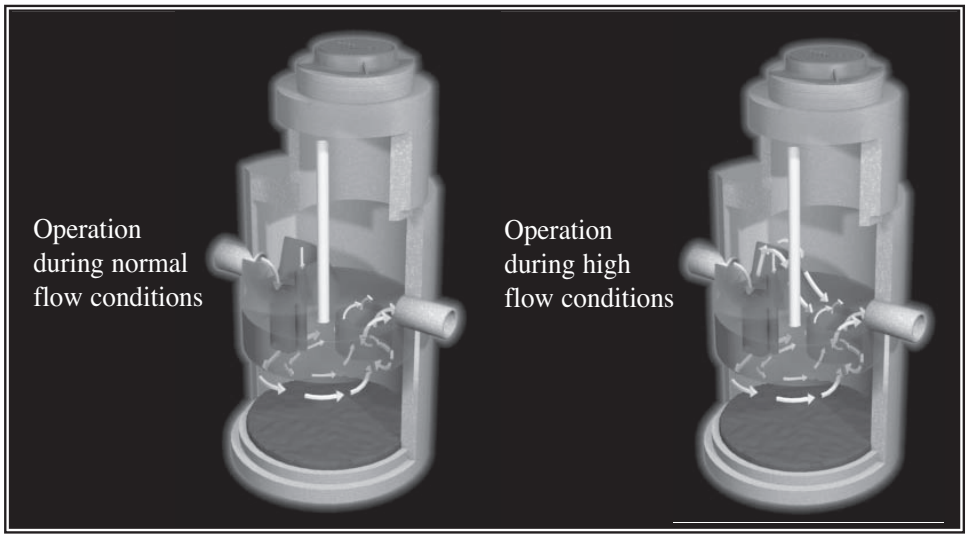


Figure 8. Submerged Stormceptor Design

By-Pass Chamber

The by-pass chamber is available in two diameters 6' diameter and 8' diameter. Table 4 indicates the maximum pipe diameters that can be implemented with the two by-pass chamber sizes currently being manufactured. The largest pipe that can currently be accommodated in the 8' diameter by-pass chamber is a 60" I.D. concrete pipe. These pipes represent what can physically fit into the Stormceptor and are considerably larger than the pipe sizes that would be used if properly sized for new development applications (i.e. retrofit). Pipes with an inside diameter greater than 42" require customization of the 6' diameter insert.

Table 4. Influent and Effluent Pipe Diameters (Concrete)

Insert Size	**One influent and one effluent pipe 180˚ apart**	**Two influent pipes 90˚ apart and one effluent pipe**	
Insert Diameter	Pipe Diameter	Influent Diameter	Effluent Diameter
4'	24"	18"	24"
6'	42"	33"	42"
8'	60"	42"	60"

2.3 Location in the Storm Drain System

Stormceptor is designed to accommodate everyday flows. These frequent flows are the most important since all storm water events contribute pollution. The frequency of the magnitude of a flow rate is dependent on the upstream drainage area and the level of imperviousness of that drainage area. If the drainage area is too large, the Stormceptor will by-pass more frequently. Accordingly, it is better that the Stormceptor unit is implemented on local or lateral storm drains rather than trunk storm sewers for new development applications (Figure 9).

This may not be possible for many retrofit or redevelopment designs, and in these cases a reduction in water quality performance must be accepted. The implementation of a Stormceptor in retrofit and redevelopment applications is important, since they can provide significant enhancement (i.e. to remove storm water bedload sediments) at a small cost in situations where there are few economical options for treatment.

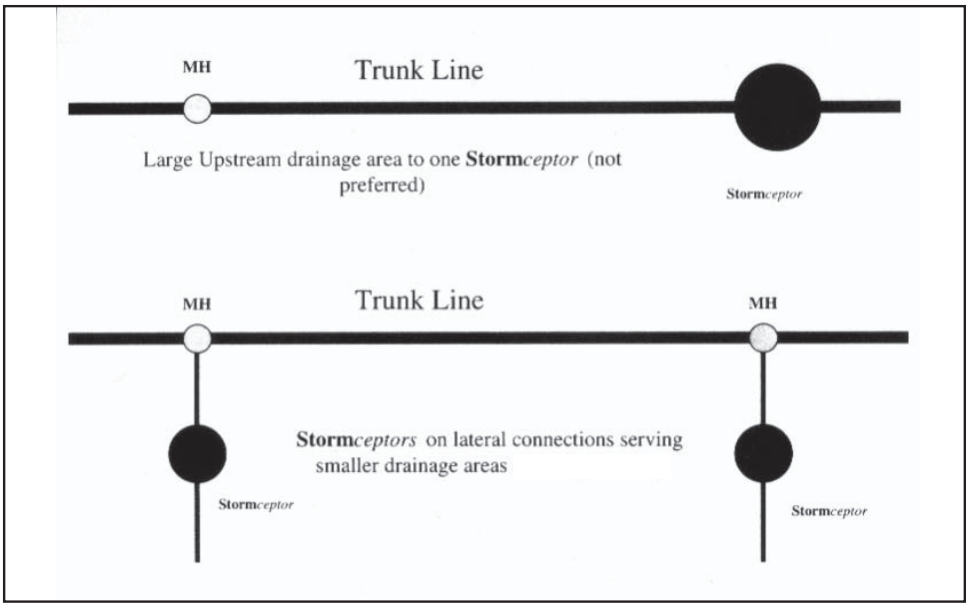


Figure 9. Stormceptor Location

2.4 Technical Specifications

The Stormceptor dimensions vary with the size of unit that is specified. Dimensions of the concrete Stormceptor units are provided in Table 5.

Table 5. Stormceptor Dimensions *

Model	Treatment Chamber Diameter	Pipe Invert to Bottom of Base Slab
450*i*	4'	68"
900	6'	63"
1200	6'	79"
1800	6'	113"
2400	8'	104"
3600	8'	144"
4800	10'	140"
6000	10'	162"
7200	12'	148"
11000*s***	10'	140"
13000*s***	10'	162"
16000*s***	12'	148"

* Depths are approximate
** Two vertical structures

Storage capacities for Stormceptor are provided in Table 6. The STCs series consists of two vertical structures, storage capacities represent the total storage for both chambers.

Table 6. Stormceptor Capacities

Model	Down Pipe Orifice	*Sediment Capacity (ft^3)	Oil Capacity (US Gal.)	Total (US Gal.)
450*i*	6	9	86	470
900	6	19	251	952
1200	6	25	251	1234
1800	6	37	251	1833
2400	8	49	840	2462
3600	8	75	840	3715
4800	10	101	909	5059
6000	10	123	909	6136
7200	12	149	1059	7420
11000*s*	10	224**	2797**	11194**
13000*s*	10	268**	2797**	13348**
16000*s*	12	319**	3055**	15918**

* Capacity prior to recommended maintenance
** Total both structures combined

The different flow rates are achieved by manipulating the down pipe orifice diameter. The weir directing the flow through the lower treatment chamber is manufactured at a constant height of 8" for all of the units. Since the outlet is 1" lower than the inlet, a total potential head of 9" is available to convey flow through the lower treatment chamber before overflow conditions occur. The orifice diameter for each size of Stormceptor is shown in Table 6.

The by-pass flow rate is simply a function of head over the overflow weir.

Table 7. By-Pass Flow Rate

Head (in)	STC 450*i* (cfs)	STC 900-7200 (cfs)	STC 11000*s*-16000*s* (cfs)
1	0.20	0.36	0.56
2	0.55	1.01	1.56
4	1.54	2.87	4.45
6	2.85	5.35	8.31
8	4.44	8.37	13.05
10	6.27	11.90	18.60
12	8.33	15.91	24.94
15	11.82	22.79	35.87
18	15.74	30.67	48.47
21	20.06	39.53	62.73

Digital AutoCad drawings for all of the Stormceptor models are available from the Rinker Materials Stormceptor office at (800) 909-7763 or at www.rinkerstormceptor.com.

2.5 Design Parameters

There are some standard design parameters that must be provided in any storm drain design with a Stormceptor installation.

Inlet / Outlet Elevation Difference

Inlet Stormceptor
There is a three inch difference in elevation between the inlet invert and outlet invert in the Inlet Stormceptor (450i).

In-Line Stormceptor:
There is a one inch difference in elevation between the inlet invert and the outlet invert in an In-Line Stormceptor designed for one inlet. There is a three inch difference in elevation between the inlet invert and the outlet invert in an In-Line Stormceptor designed for multiple inlets. Storm drain designs must accommodate this elevation difference.

Series Stormceptor
The STCs Series Stormceptor consists of two treatment chambers connected by piping. Each circular chamber has a one inch difference in elevation between the inlet invert and the outlet invert. Additionally, there is a one inch drop between each structure, for a total drop of three inches.

Influent and Effluent Pipe Diameter

In most cases, flexible rubber boots are used to facilitate the installation of the influent/effluent pipes to the Stormceptor. These boots are installed in the by-pass chamber section at the Rinker Materials manufacturing facility. Boots are available for pipe sizes with an O.D. (outside diameter) up to 44" (36" concrete I.D.).

The influent/effluent pipes can be grouted/mortared in the concrete Stormceptor if desired. Pipes up to 24" in diameter can be grouted without any special preparation. Larger pipe diameters will need to be modified to fit the curvature of the Stormceptor.

Head Loss Through the Stormceptor

The measured head loss through the Stormceptor is approximately equal to a 60˚ bend at a manhole. An appropriate K value to use in calculating minor losses through the storm drain system for a Stormceptor unit would be 1.3 (Minor Loss = $1.3\ v^2/2g$).

Installation Depth

There is a minimum inlet crown (inside top of pipe) to grade elevation required to physically implement the In-Line Stormceptor due to the modular construction of the structure. The minimum crown to grade elevation is 24", depending on pipe size and material. Flexible couplings cannot be supplied for shallow concrete Stormceptor applications. The maximum installation depth (from finish grade to influent pipe invert) for the precast concrete Stormceptor is 33 feet.

Stormceptor installations at depths greater than those noted above will require custom manufacturing. Rinker Materials should be consulted for recommendations in these instances.

3.0 Installation Procedures

The installation of the concrete Stormceptor should conform in general to state highway, provincial or local specifications for the construction of manholes. Selected sections of a general specification that are applicable are summarized in the following sections.

Excavation

Excavation for the installation of the Stormceptor should conform to state highway, provincial or local specifications. Topsoil that is removed during the excavation for the Stormceptor should be stockpiled in designated areas and should not be mixed with subsoil or other materials. Topsoil stockpiles and the general site preparation for the installation of the Stormceptor should conform to state highway, provincial or local specifications.

The Stormceptor should not be installed on frozen ground. Excavation should extend a minimum of 12" from the precast concrete surfaces plus an allowance for shoring and bracing where required. If the bottom of the excavation provides an unsuitable foundation additional excavation may be required. In areas with a high water table, continuous dewatering should be provided to ensure that the excavation is stable and free of water.

Backfilling

Backfill material should conform to state highway, provincial or local specifications. Backfill material should be placed in uniform layers not exceeding 12" in depth and compacted to state highway, provincial or local specifications.

Stormceptor Installation Sequence

The concrete Stormceptor is installed in sections in the following sequence:

1. aggregate base
2. base slab
3. treatment chamber section(s)
4. transition slab (if required)
5. by-pass section
6. connect inlet and outlet pipes
7. riser section and/or transition slab (if required)
8. maintenance riser section(s) (if required)
9. frame and access cover

The precast base should be placed level at the specified grade. The entire base should be in contact with the underlying compacted granular material. Subsequent sections, complete with joint seals, should be installed in accordance with the licensed precast concrete manufacturer's recommendations.

Adjustment of the Stormceptor can be performed by lifting the upper sections free of the excavated area, re-leveling the base, and re-installing the sections. Damaged sections and gaskets should be repaired or replaced as necessary.

Down Pipe and Riser Pipe

Once the by-pass section has been attached to the lower treatment chamber, the inlet down pipe, and outlet riser pipe must be attached. Pipe installation instructions and required materials are provided with the insert.

Inlet and Outlet Pipes

Inlet and outlet pipes should be securely set into the by-pass chamber using grout, boots, or approved pipe seals so that the structure is watertight. Boots are normally used and installed at the precast concrete plant prior to shipping. Boots are applicable for pipes with an outside diameter up to 44". Installation of the boots should follow the manufacturer's recommendations. The following procedure should be followed to attach the inlet and outlet pipes at the Stormceptor:

1. Center the pipe in the boot opening
2. Lubricate the outside of the pipe and/or inside of the boot if the pipe outside diameter is the same as the inside diameter of the boot
3. Position the pipe clamp in the groove of the boot with the screw at the top
4. Tighten the pipe clamp screw per manufacturers requirement
5. On minimum outside diameter installations lift the boot such that it contacts the bottom of the pipe while tightening the pipe clamp to ensure even contraction of the rubber.
6. Move the pipe horizontally and/or vertically to bring it to grade

Frame and Cover Installation

Precast concrete adjustment units should be installed to set the frame and cover at the required elevation. The adjustment units should be laid in a full bed of mortar with successive units being joined using sealant recommended by the manufacturer. Frames for the cover should be set in a full bed of mortar at the elevation specified. Orientation of the frame and cover must allow access to the 24" oulet riser pipe as well as the oil inspection port.

4.0 Stormceptor Maintenance Guidelines

The performance of all storm water quality measures decrease as they fill with sediment. Although the maintenance frequency will be site specific, Rinker Materials generally recommends annual maintenance be performed or when the sediment volume in the unit reaches 15% of the total storage. This recommendation is based on several factors:

- Minimal performance degradation due to sediment build-up.
- Sediment removal is easier when removed on a regular basis (as sediment builds up it compacts and solidifies making maintenance more difficult).
- Development of a routine maintenance interval helps ensure a regular maintenance schedule is followed. Although the frequency of maintenance will depend on site conditions, it is estimated that annual maintenance will be required for most applications; annual maintenance is a routine occurrence which is easy to plan for and remember.

Hydrocarbon Spills

In the event of any hazardous material spill, Rinker Materials recommends maintenance be performed immediately. Maintenance should be performed by a licensed liquid waste hauler. You should also notify the appropriate regulatory agencies as required.

4.1 Recommended Maintenance Procedure

Oil is removed through the 6" inspection/oil port and sediment is removed through the 24" diameter outlet riser pipe. Alternatively, oil could be removed from the 24" opening if water is removed from the treatment chamber, lowering the oil level below the drop pipes.

The depth of sediment can be measured from the surface of the Stormceptor with a dipstick tube equipped with a ball valve (Sludge Judge®). Rinker Materials recommends maintenance be performed once the sediment depth exceeds the guideline values provided in Table 8.

Table 8. Sediment Depths Indicating Required Maintenance*

Model	Sediment Depth
450*i*	8" (200 mm)
900	8" (200 mm)
1200	10" (250 mm)
1800	15" (375 mm)
2400	12" (300 mm)
3600	17" (425 mm)
4800	15" (375 mm)
6000	18" (450 mm)
7200	15" (375 mm)
11000*s*	17" (425 mm)**
13000*s*	20" (500 mm)**
16000*s*	17" (425 mm)**

* *Depths are approximate*

** *Depths in each structure*

No entry into the unit is required for routine maintenance of the Inlet Stormceptor or the smaller disc insert models of the In-Line Stormceptor. Entry to the level of the by-pass may be required for servicing the larger in-line models. Any potential obstructions at the inlet can be observed from the surface. The by-pass chamber has been designed as a platform for authorized maintenance personnel, in the event that an obstruction needs to be removed, drain flushing needs to be performed, or camera surveys are required.

Typically, maintenance is performed by the Vacuum Service Industry, a well established sector of the service industry that cleans underground tanks, sewers, and catch-basins. Costs to clean a Stormceptor will vary based on the size of the unit and transportation distances. If you need assistance for cleaning a Stormceptor unit, contact your local Rinker Materials representative, or the Rinker Materials Stormceptor Information Line at (800) 909-7763.

Disposal

The requirements for the disposal of material from a Stormceptor are similar to that of any other Best Management Practices (BMPs). Local guidelines should be consulted prior to disposal of the separator contents.

In most areas the sediment, once dewatered, can be disposed of in a sanitary landfill. It is not anticipated that the sediment would be classified as hazardous waste. In some areas, mixing the water with the sediment will create a slurry that can be discharged into a trunk sanitary sewer. In all disposal options, approval from the disposal facility operator/agency is required. Petroleum waste products collected in Stormceptor (oil/chemical/fuel spills) should be removed by a licensed waste management company.

Appendix A
Stormceptor CAD Drawings

CAD drawings are a typical representation for the Stormceptor Systems. Although design modifications are rare, they do occur. For the latest CAD drawings, please visit our website at www.rinkerstormceptor.com or by calling (800) 909-7763.
Rev. 3/2006

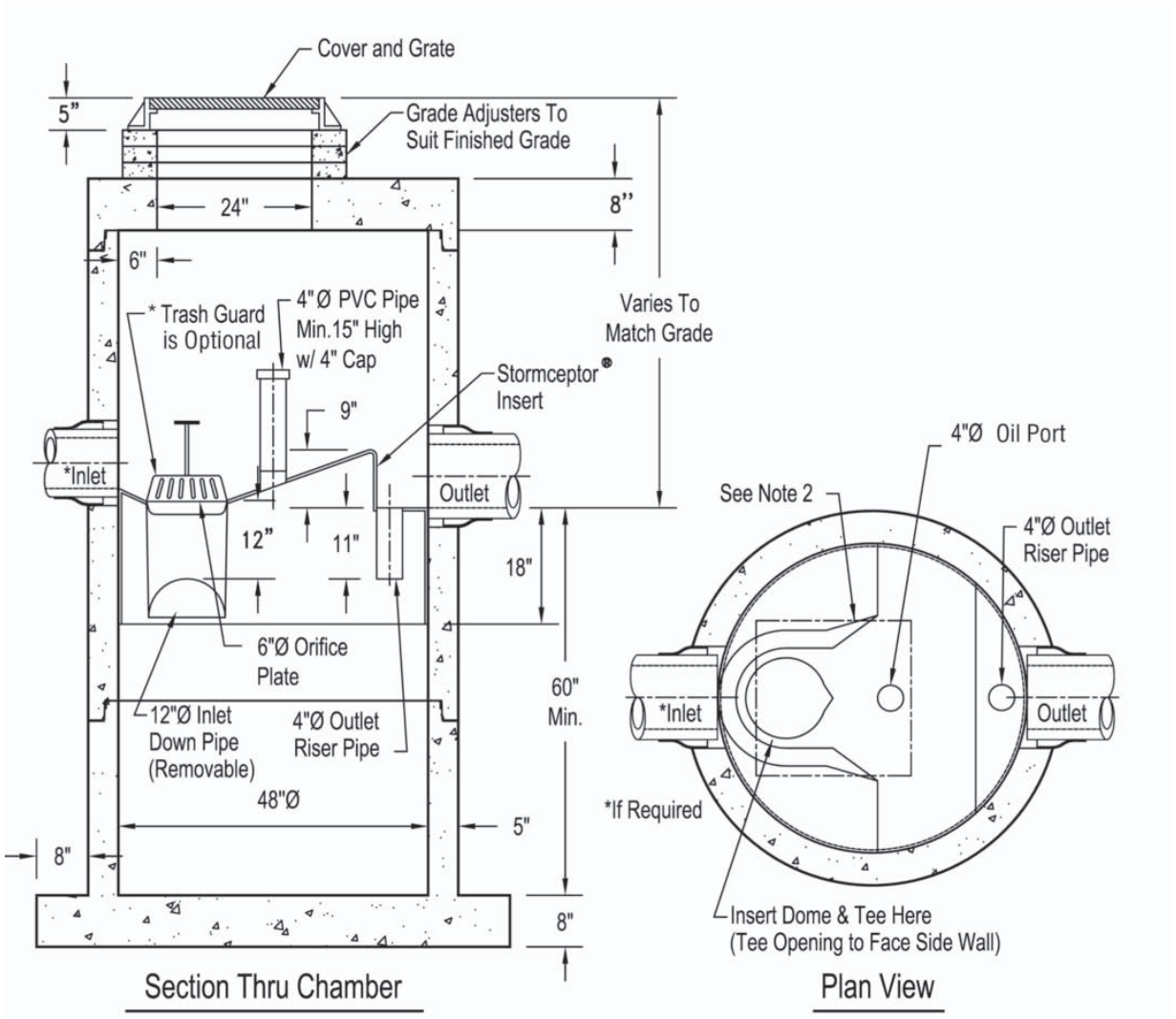
Appendix B
Stormceptor Weights

Appendix C
Stormceptor Patent Information

Appendix A

STC 450*i* Precast Concrete Stormceptor®

(450 US Gallon Capacity)



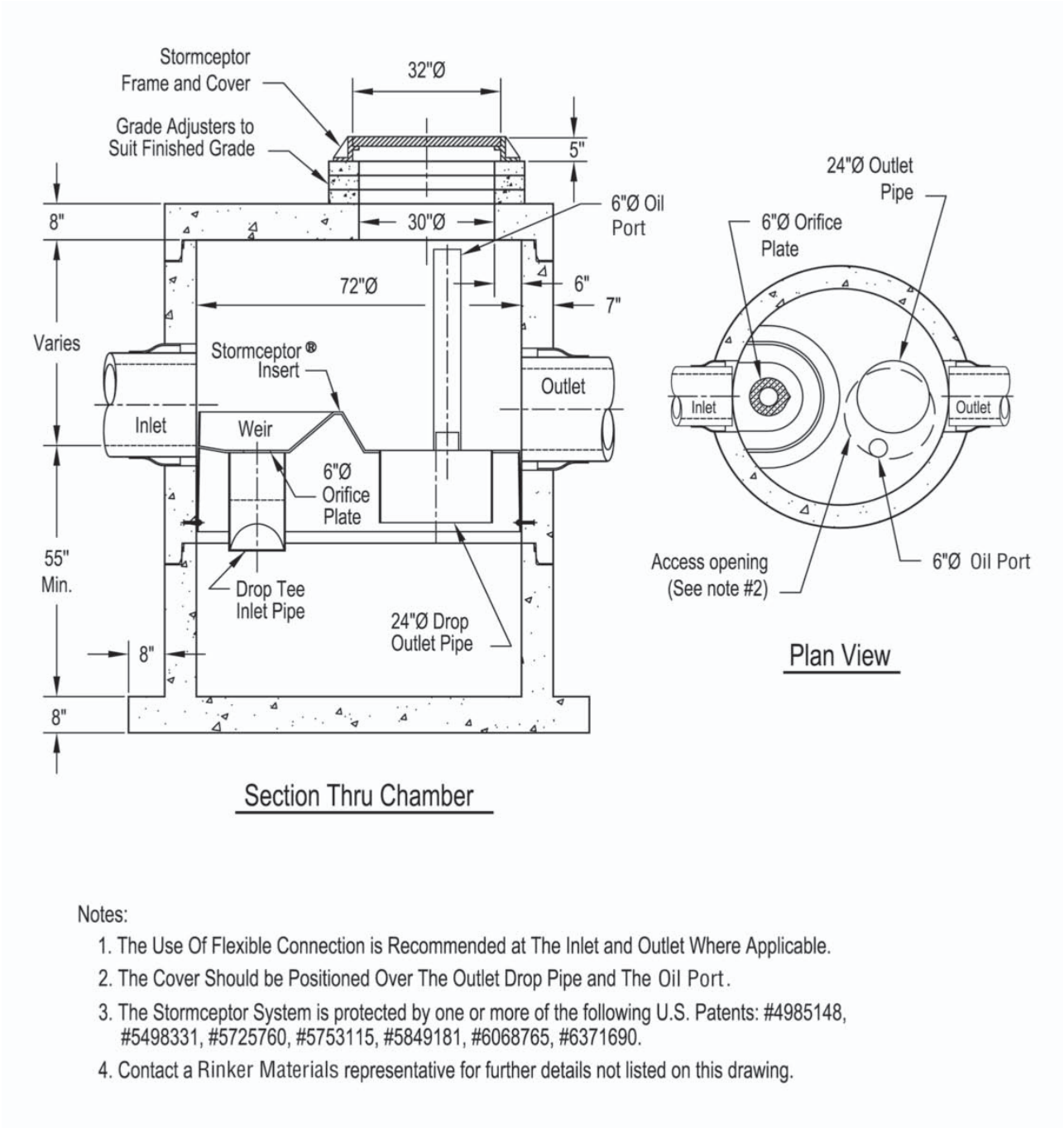
Notes:

1. The Use Of Flexible Connection is Recommended at The Inlet and Outlet Where Applicable.
2. The Cover Should be Positioned Over The Inlet Drop Pipe and The Oil Port.
3. The Stormceptor System is protected by one or more of the following U.S. Patents: #4985148, #5498331, #5725760, #5753115, #5849181, #6068765, #6371690.
4. Contact a Rinker Materials representative for further details not listed on this drawing.

Appendix A

STC 900 Precast Concrete Stormceptor®

(900 US Gallon Capacity)



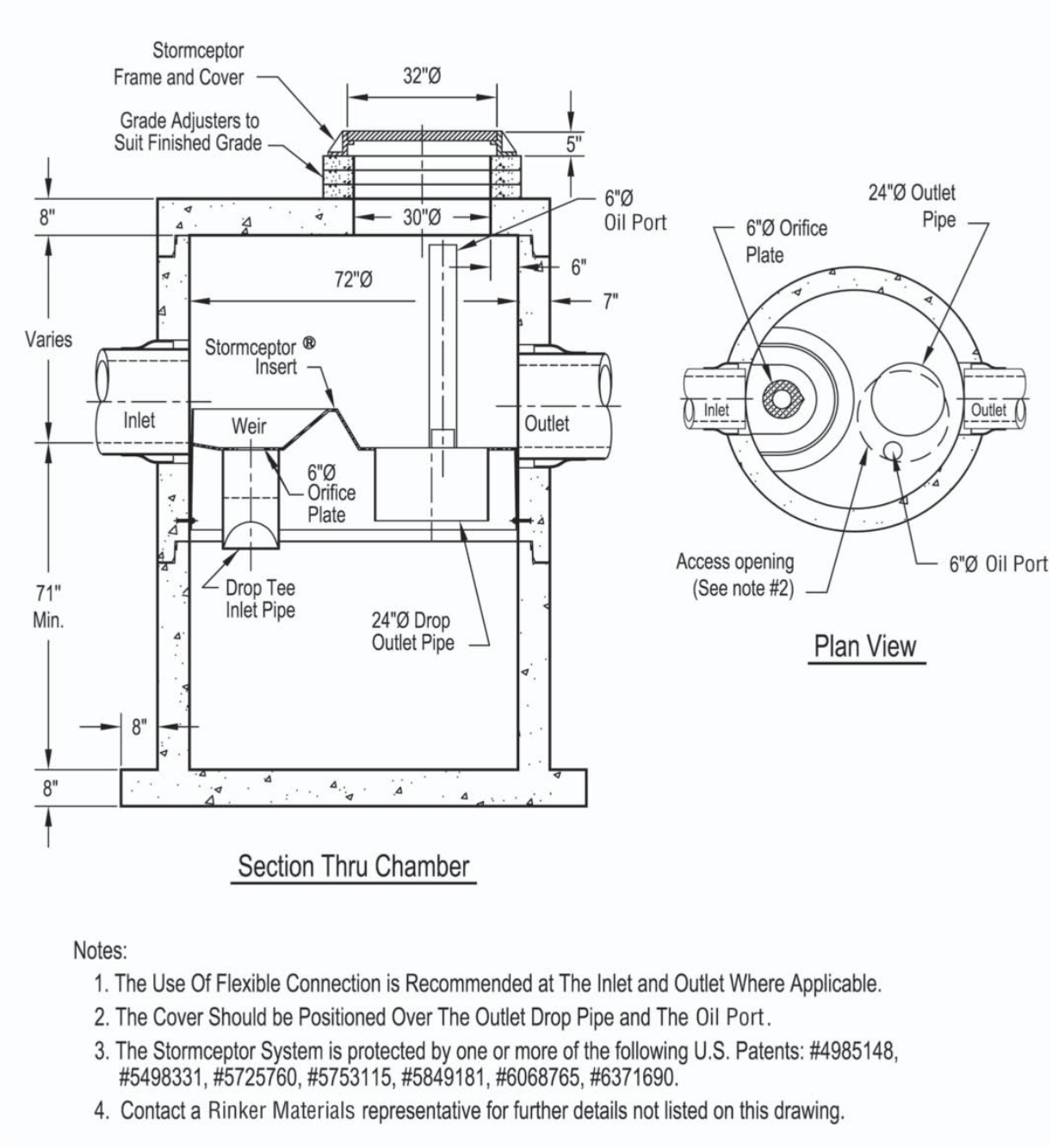
Notes:

1. The Use Of Flexible Connection is Recommended at The Inlet and Outlet Where Applicable.
2. The Cover Should be Positioned Over The Outlet Drop Pipe and The Oil Port.
3. The Stormceptor System is protected by one or more of the following U.S. Patents: #4985148, #5498331, #5725760, #5753115, #5849181, #6068765, #6371690.
4. Contact a Rinker Materials representative for further details not listed on this drawing.

Appendix A

STC 1200 Precast Concrete Stormceptor®

(1200 US Gallon Capacity)



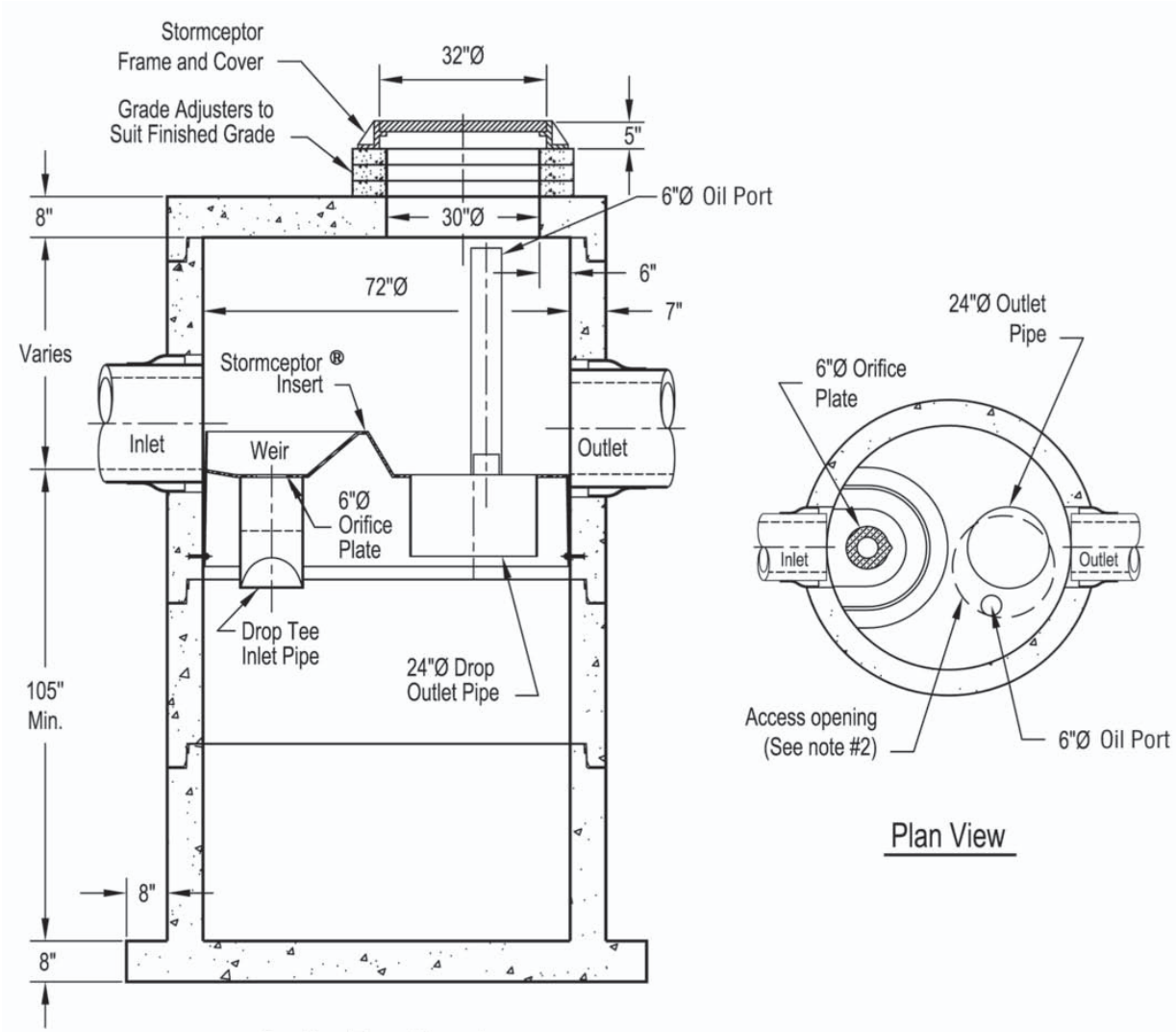
Notes:

1. The Use Of Flexible Connection is Recommended at The Inlet and Outlet Where Applicable.
2. The Cover Should be Positioned Over The Outlet Drop Pipe and The Oil Port.
3. The Stormceptor System is protected by one or more of the following U.S. Patents: #4985148, #5498331, #5725760, #5753115, #5849181, #6068765, #6371690.
4. Contact a Rinker Materials representative for further details not listed on this drawing.

Appendix A

STC 1800 Precast Concrete Stormceptor®

(1800 US Gallon Capacity)



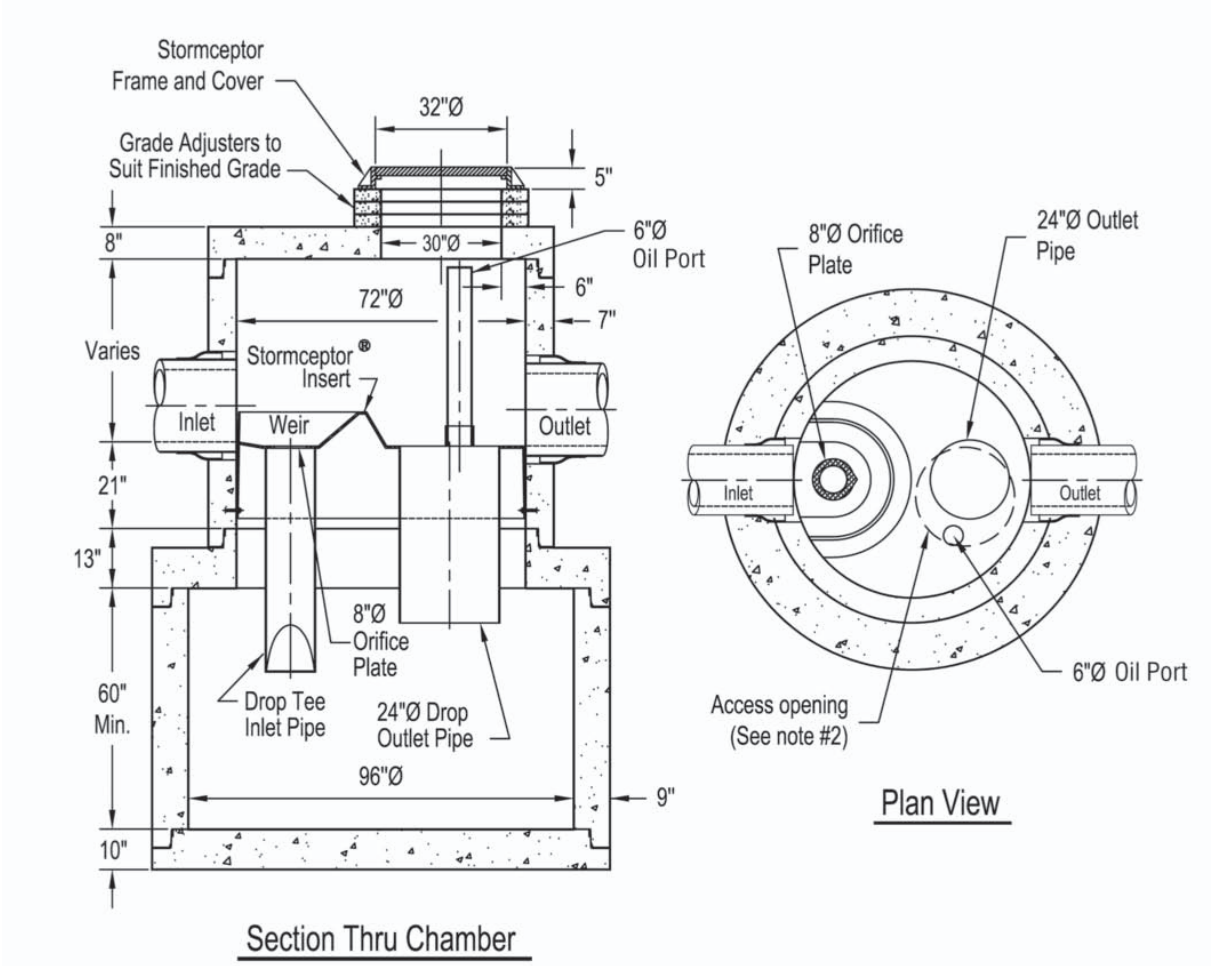
Notes:

1. The Use Of Flexible Connection is Recommended at The Inlet and Outlet Where Applicable.
2. The Cover Should be Positioned Over The Outlet Drop Pipe and The Oil Port.
3. The Stormceptor System is protected by one or more of the following U.S. Patents: #4985148, #5498331, #5725760, #5753115, #5849181, #6068765, #6371690.
4. Contact a Rinker Materials representative for further details not listed on this drawing.

Appendix A

STC 2400 Precast Concrete Stormceptor®

(2400 US Gallon Capacity)



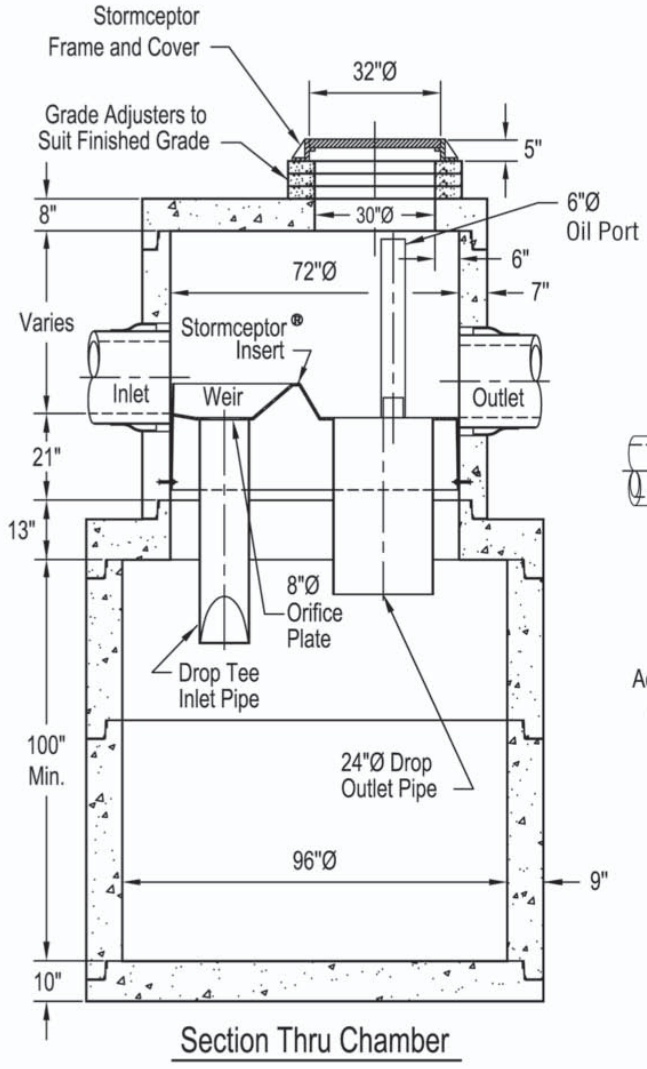
Notes:

1. The Use Of Flexible Connection is Recommended at The Inlet and Outlet Where Applicable.
2. The Cover Should be Positioned Over The Outlet Drop Pipe and The Oil Port.
3. The Stormceptor System is protected by one or more of the following U.S. Patents: #4985148, #5498331, #5725760, #5753115, #5849181, #6068765, #6371690.
4. Contact a Rinker Materials representative for further details not listed on this drawing.

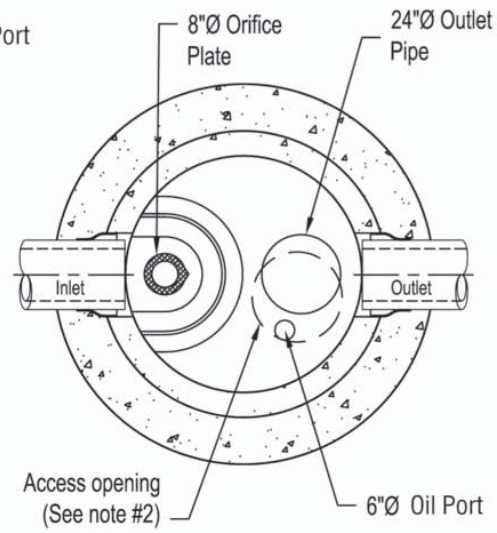
Appendix A

STC 3600 Precast Concrete Stormceptor®

(3600 US Gallon Capacity)



Section Thru Chamber



Plan View

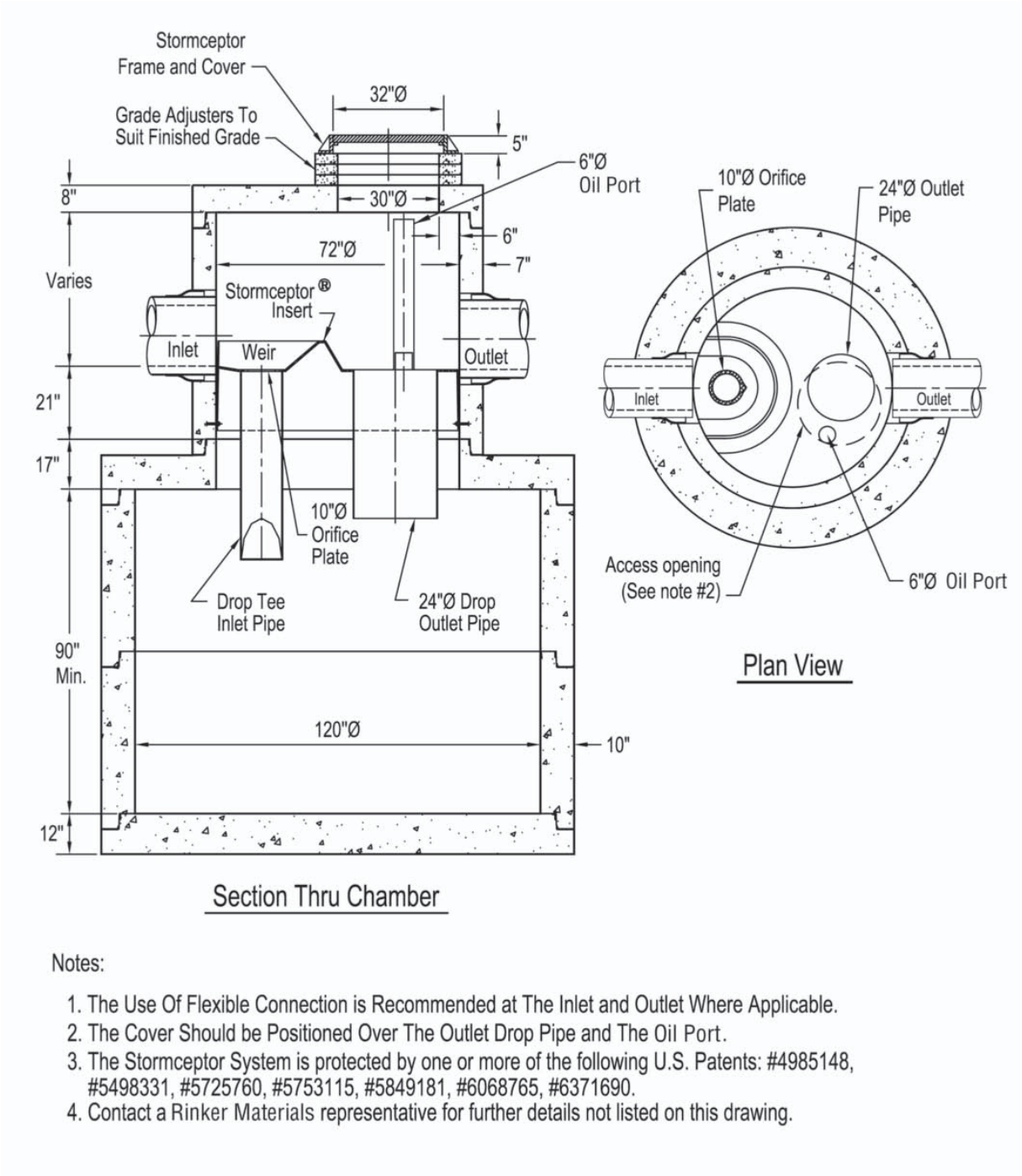
Notes:

1. The Use Of Flexible Connection is Recommended at The Inlet and Outlet Where Applicable.
2. The Cover Should be Positioned Over The Outlet Drop Pipe and The Oil Port.
3. The Stormceptor System is protected by one or more of the following U.S. Patents: #4985148, #5498331, #5725760, #5753115, #5849181, #6068765, #6371690.
4. Contact a Rinker Materials representative for further details not listed on this drawing.

Appendix A

STC 4800 Precast Concrete Stormceptor®

(4800 US Gallon Capacity)



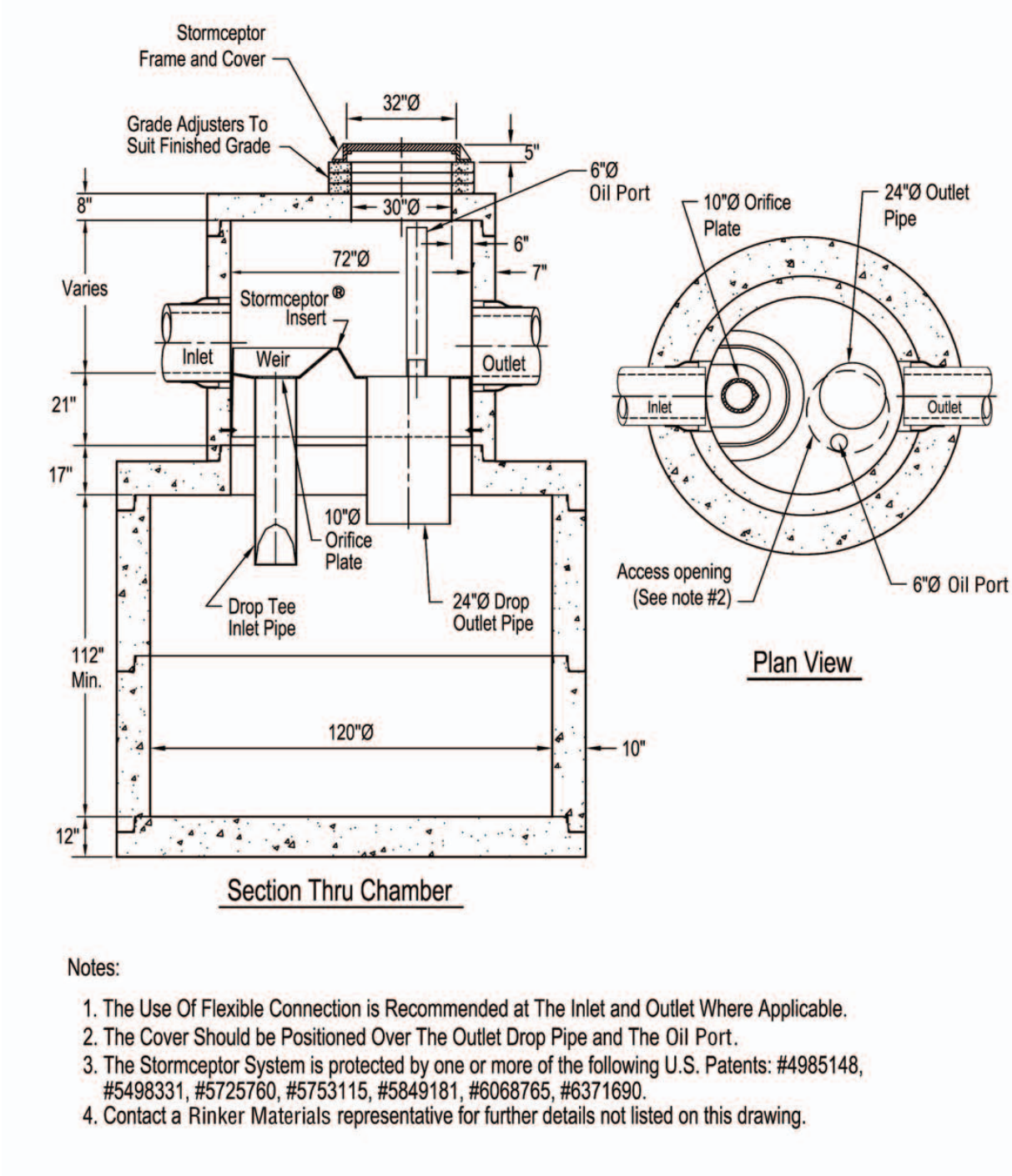
Notes:

1. The Use Of Flexible Connection is Recommended at The Inlet and Outlet Where Applicable.
2. The Cover Should be Positioned Over The Outlet Drop Pipe and The Oil Port.
3. The Stormceptor System is protected by one or more of the following U.S. Patents: #4985148, #5498331, #5725760, #5753115, #5849181, #6068765, #6371690.
4. Contact a Rinker Materials representative for further details not listed on this drawing.

Appendix A

STC 6000 Precast Concrete Stormceptor®

(6000 US Gallon Capacity)



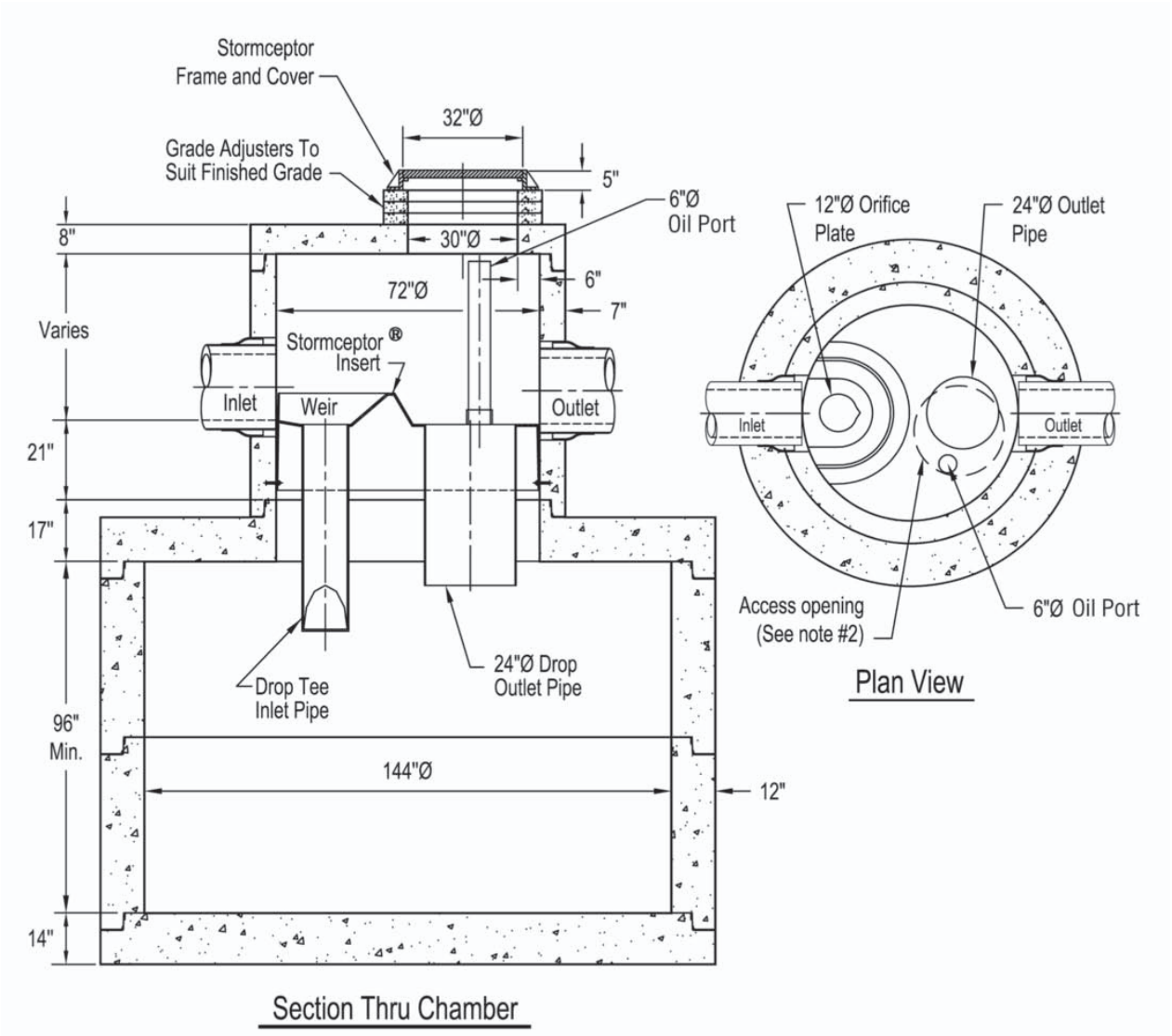
Notes:

1. The Use Of Flexible Connection is Recommended at The Inlet and Outlet Where Applicable.
2. The Cover Should be Positioned Over The Outlet Drop Pipe and The Oil Port.
3. The Stormceptor System is protected by one or more of the following U.S. Patents: #4985148, #5498331, #5725760, #5753115, #5849181, #6068765, #6371690.
4. Contact a Rinker Materials representative for further details not listed on this drawing.

Appendix A

STC 7200 Precast Concrete Stormceptor®

(7200 US Gallon Capacity)



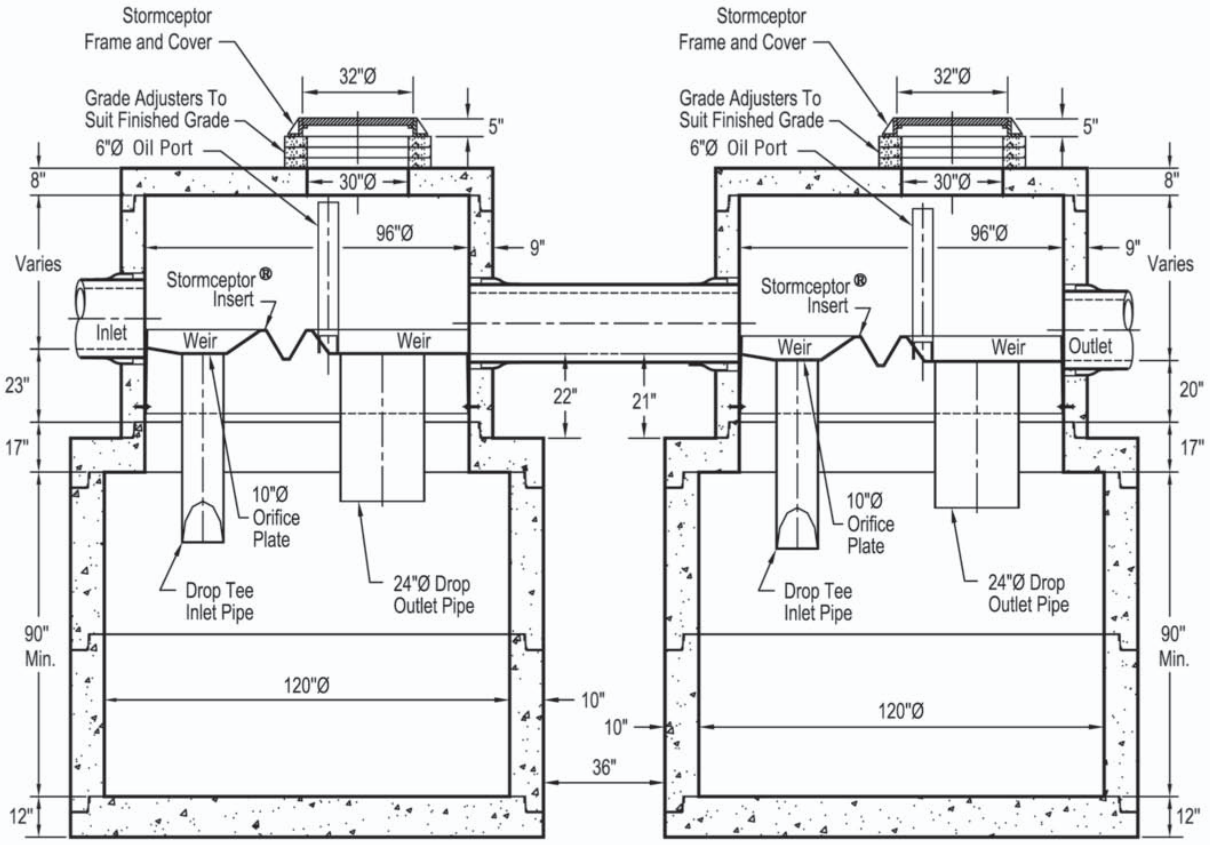
Notes:

1. The Use Of Flexible Connection is Recommended at The Inlet and Outlet Where Applicable.
2. The Cover Should be Positioned Over The Outlet Drop Pipe and The Oil Port.
3. The Stormceptor System is protected by one or more of the following U.S. Patents: #4985148, #5498331, #5725760, #5753115, #5849181, #6068765, #6371690.
4. Contact a Rinker Materials representative for further details not listed on this drawing.

Appendix A

STC 11000*s* Precast Concrete Stormceptor®
(11000 US Gallon Capacity)

(See plan view page 34.)



Section Thru Chambers

Notes:

1. The Use Of Flexible Connection is Recommended at The Inlet and Outlet Where Applicable.
2. The Cover Should be Positioned Over The Outlet Drop Pipe and The Oil Port.
3. The Stormceptor System is protected by one or more of the following U.S. Patents: #4985148, #5498331, #5725760, #5753115, #5849181, #6068765, #6371690.
4. Contact a Rinker Materials representative for further details not listed on this drawing.

Arcadis U.S., Inc.

500 Edgewater Drive

Suite 511

Wakefield, Massachusetts 01880

Tel 781 224 4488

Fax

www.arcadis.com