500 West Big Beaver
Troy, MI 48084
troymi.gov

CITY COUNCIL AGENDA ITEM

Date: October 14, 2025

To: Frank Nastasi, City Manger

From: Robert J. Bruner, Deputy City Manager
Chris Wilson, Assistant City Manager
G. Scott Finlay, City Engineer
Larysa Figol, Sr. Right-of-Way Representative

Subject: Stormwater Management Operations and Maintenance Agreement, Tableau By Mondrian, LLC, Sidwell #88-20-22-301-007, -008 & -009

History:
Tableau By Mondrian, LLC, is developing the Troy Trail South development located on the east side of Livernois Road between Big Beaver and Wattles roads. The 30-unit development was granted preliminary site plan approval on November 22, 2023.

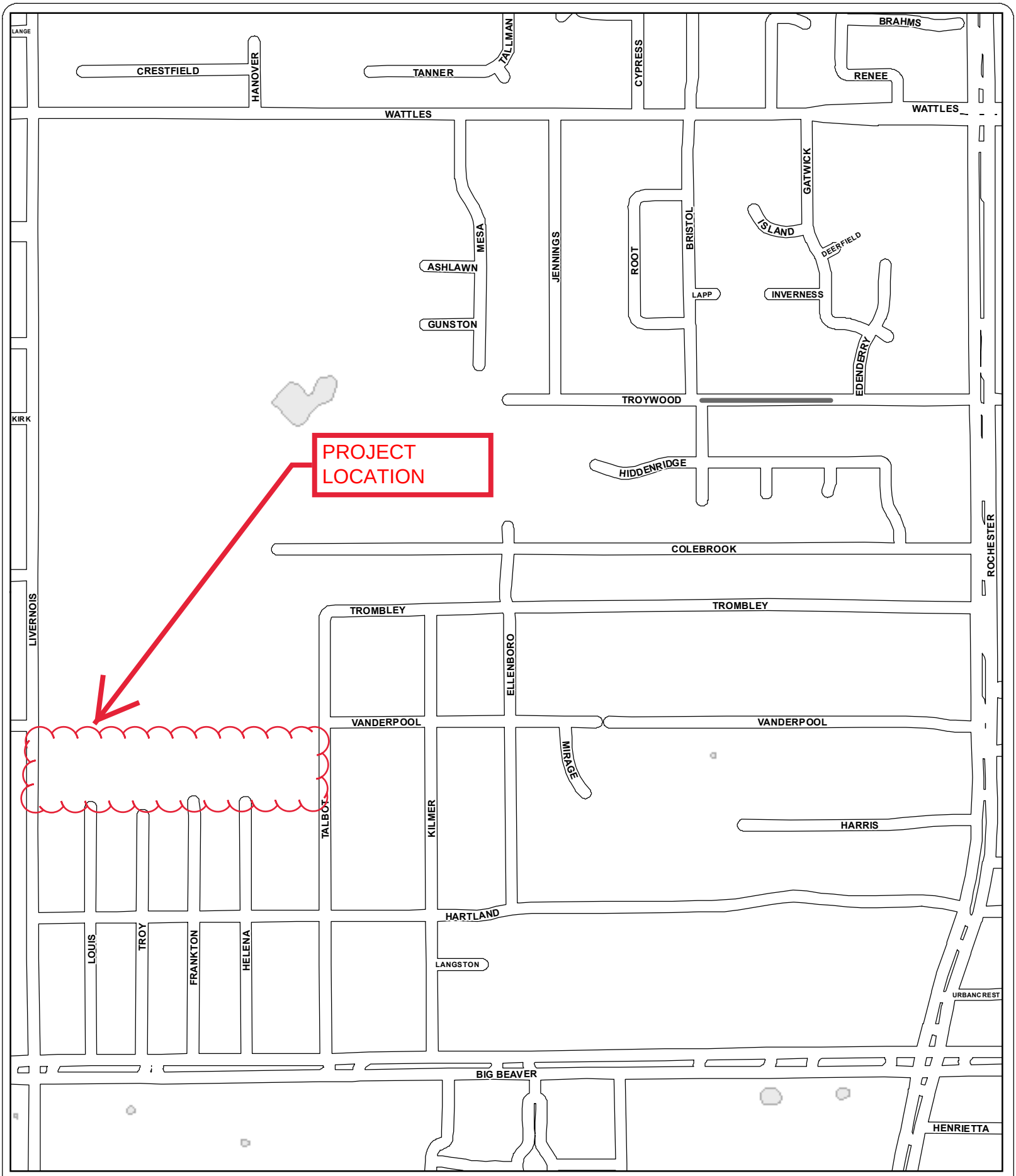
Stormwater standards required by the Oakland County Water Resource Commissioner require the property owner to enter into a Stormwater Management Operations and Maintenance Agreement with the City of Troy. This Agreement outlines a plan to install, maintain and operate the private stormwater system and underground detention facility on the property.

At the onset of a new development or project, the property owners execute a Stormwater Management Operations and Maintenance Agreement, but it's not sent to City Council for approval until after the actual construction of the stormwater facilities, which are now complete.

Financial
There are no financial consideration with this item.

Recommendation
City Management recommends that City Council approve the *Stormwater Management Operations and Maintenance Agreement*.

Legal Review
This item was submitted to the City Attorney for review pursuant to City Charter Section 3.17.



City of Troy

Section 22

Date: 7/13/2022

Stormwater Management Operations and Maintenance Agreement

This Agreement is made on October 30th, 2024, by and between the CITY OF TROY, a Michigan municipal corporation, (hereinafter "City of Troy") whose address is 500 West Big Beaver, Troy, MI 48084 and Tableau by Mondrian, whose address is 5015 Schoenherr Rd, Troy, MI 48315 (hereinafter "Owner"). City of Troy and Owner agree as follows:

Article I. The Subject Property.

1.1 Owner owns the property located at and commonly known as Troy Trail South, Troy, MI 48083 (hereinafter the "Subject Property"). The legal description of the Subject Property is set forth at ***Exhibit A***.

Article II. The Stormwater System.

2.1 Owner, in accordance with Oakland County Stormwater Standards and State Municipal Separate Storm Sewer System permit requirements, agrees to install and maintain a Stormwater System on the Subject Property in accordance with approved plans and conditions. The Stormwater System is set forth at ***Exhibit B***.

2.2 After construction has been verified and accepted by the City of Troy for the Stormwater System, the Owner shall file with the City of Troy the "as-built" documents showing the design and construction details and shall reference this Agreement.

2.3 The Stormwater System will be governed by the terms and conditions in this Agreement.

Article III. The Stormwater O&M Plan.

3.1 The Owner shall be solely responsible for the installation, maintenance, and repair of the Stormwater System, drainage easements, and associated landscaping identified in Exhibit B in accordance with the Stormwater Management Operations and Maintenance Plan, hereinafter the "Stormwater O&M Plan" set forth at ***Exhibit C*** to this Agreement.

3.2 The Stormwater O&M plan is subject to approval by the City of Troy.

3.3 The Owner agrees that the Stormwater O&M Plan is intended to and will serve the Subject Property in perpetuity

3.4 The Owner, at its expense, shall secure from any affected owners of land all easements and releases of right-of-way necessary for implementation of the Stormwater O&M Plan and shall record them with the Oakland County Register of Deeds. These easements and releases of rights- of-way shall not be altered, amended, vacated, released, or abandoned without prior written approval of the City of Troy.

3.5 No alterations or changes to the Stormwater O&M Plan shall be permitted unless they are deemed to comply with this Agreement and are approved in writing by the City of Troy.

3.6 The Owner shall retain the services of a qualified inspector as described in Exhibit C – Maintenance Requirement 1) to operate and ensure the maintenance of the Stormwater O&M Plan.

3.7 The Owner shall annually, by December 30th, provide to the City of Troy records (logs, invoices, reports, data, etc.) of inspections, maintenance, and repair of the Stormwater System in compliance with the Stormwater O&M Plan.

3.8 The City of Troy agrees to enforce compliance with the annual inspection, maintenance and repair records as set forth in 3.7 above, such enforcement may require an ordinance.

Article IV. Access and Enforcement.

4.1 The City of Troy or its designee is authorized to access the property as necessary to conduct inspections of the Stormwater System, implication of the Stormwater O&M Plan, or drainage easements to ascertain compliance with the intent of this Agreement.

4.2 Upon written notification by the City of Troy or their designee of required maintenance or repairs, the Owner shall complete the specified maintenance or repairs within a reasonable time frame determined by the City of Troy. The Owner shall be liable for the failure to undertake any maintenance or repairs so that the public health, safety and welfare shall not be endangered nor the road improvement damaged.

4.3 If the Owner does not keep the Stormwater System in reasonable order and condition, or complete maintenance activities in accordance with the Stormwater O&M Plan, or the reporting required in 3.7 above, the City of Troy is authorized, but not required, to perform the specified inspections, maintenance or repairs in order to preserve the intended functions of the Stormwater System and prevent the Stormwater System from becoming a threat to public health, safety, general welfare or the environment.

4.4 In the case of an emergency, as determined by the City of Troy, no notice shall be required prior to the City of Troy performing emergency maintenance or repairs. The City of Troy may levy the costs and expenses of such inspections, maintenance or repairs against the Owner.

4.5 The City of Troy, at the time of entering upon said Stormwater System for the purpose of maintenance or repair, may file a notice of lien in the office of the Register of Deeds of Oakland County upon the property affected by the lien. If said costs and expenses are not paid by the Owner, the City of Troy may pursue the collection of same through appropriate court actions and in such a case, the Owner shall pay in addition to said costs and expenses all costs of litigation, including attorney fees.

4.6 The Owner shall provide the City of Troy a permanent easement for Stormwater and drainage purposes for the inspection, maintenance and repair thereof, should the Owner fail to properly inspect, maintain and repair the Stormwater System. The permanent easement shall be binding upon and inure to the benefit of the parties, their heirs, representatives, successors and assigns and shall run with the land. The permanent easement shall be recorded with the Oakland County Register of Deeds.

Article V. Term and Covenants.

5.1 The Owner agrees that this Agreement shall bind all current and future owners of the property.
The Owner agrees in the event that the Subject Property is sold, transferred, or leased to provide information to the new owner, operator, or lessee regarding proper inspection, maintenance and repair of the Stormwater System and Stormwater O&M Plan. The information shall accompany the first deed transfer and include Exhibits B and C and this Agreement. The transfer of this information shall also be required with any subsequent sale, transfer or lease of the Subject Property.

5.2 The Owner agrees that the rights, obligations and responsibilities hereunder shall commence upon execution of the Agreement.

Article VI. The Memorandum.

6.1 The Owner shall record with the Oakland County Register of Deeds a Memorandum of Stormwater Management Operations and Maintenance Agreement which serves as notice of this Agreement in a title search, the template for which is set forth at ***Exhibit D*** to this Agreement.

Article VII. Claims and Authority.

7.1 The Owner, its agents, representatives, successors and assigns shall defend, indemnify and hold City of Troy harmless from and against any claims, demands, actions, damages, injuries, costs or expenses of any nature whatsoever, hereinafter "Claims", fixed or contingent, known or unknown, arising out of or in any way connected with the design, construction, use, maintenance, repair or operation (or omissions in such regard) of the Stormwater System, appurtenances, connections and attachments thereto which are the subject of this Agreement. This indemnity and hold harmless shall include any costs, expenses and attorney fees incurred by City of Troy in connection with such Claims or the enforcement of this Agreement.

7.2 The parties whose signatures appear below hereby represent and warrant that they have the authority and capacity to sign this agreement and bind the respective parties hereto.

IN WITNESS WHEREOF, the Owner and Community have executed this agreement on the day and year first above written.

OWNER

By: _____*

Its: Manager

STATE OF MICHIGAN)
)ss.
OAKLAND COUNTY)

The foregoing instrument was acknowledged before me on this 30th day of October, 2024, by Joseph Maniaci, manager of Tableau by Mondrian

ANITA KHZOUZ
Notary Public - State of Michigan
County of Macomb
My Commission Expires Dec 5, 2029
Acting in the County of Oakland

_____*
Notary Public, Oakland County, Michigan My Commission Expires Dec 5, 29 Acting in Oakland County, Michigan

[SIGNATURES AND ACKNOWLDEGMENTS ON NEXT PAGE]

City of Troy,
a Michigan municipal corporation

By: _____
Ethan D. Baker
Its: Mayor

By: _____
M. Aileen Dickson,
Its: City Clerk

STATE OF MICHIGAN)
)ss.
OAKLAND COUNTY)

The foregoing instrument was acknowledged before me on this_____day of _____, 2024, by Ethan D. Baker, Mayor and M. Aileen Dickson, City Clerk of the City of Troy, a Michigan municipal corporation, on behalf of the municipal corporation.

_____
*
Notary Public, Oakland County, Michigan
My Commission Expires_____
Acting in Oakland County, Michigan

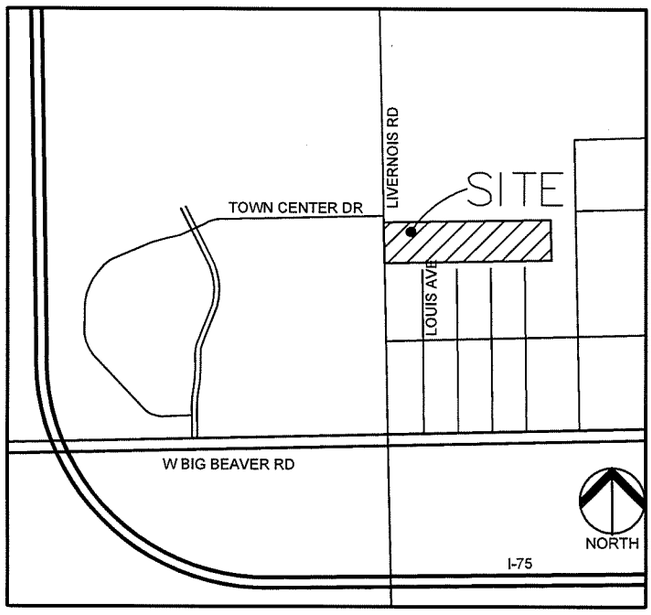
Prepared by:
_____
_____
_____

Return to: City Clerk
City of Troy
500 W. Big Beaver Road
Troy, MI 48084

STORM WATER MANAGEMENT OPERATION AND MAINTENANCE PLAN

TROY TRAIL SOUTH
3364 LIVERNOIS ROAD
TROY, OAKLAND COUNTY, MICHIGAN

EXHIBIT A



LOCATION MAP
NO SCALE

LIVERNOIS SOUTH, LLC
50215 SCHOENHERR
SHELBY TWP., MICHIGAN 48315

NO SCALE

~~JULY 25, 2024~~
2021-0451 OCTOBER 25, 2024

PEA GROUP
t: 844.813.2949
www.peagroup.com

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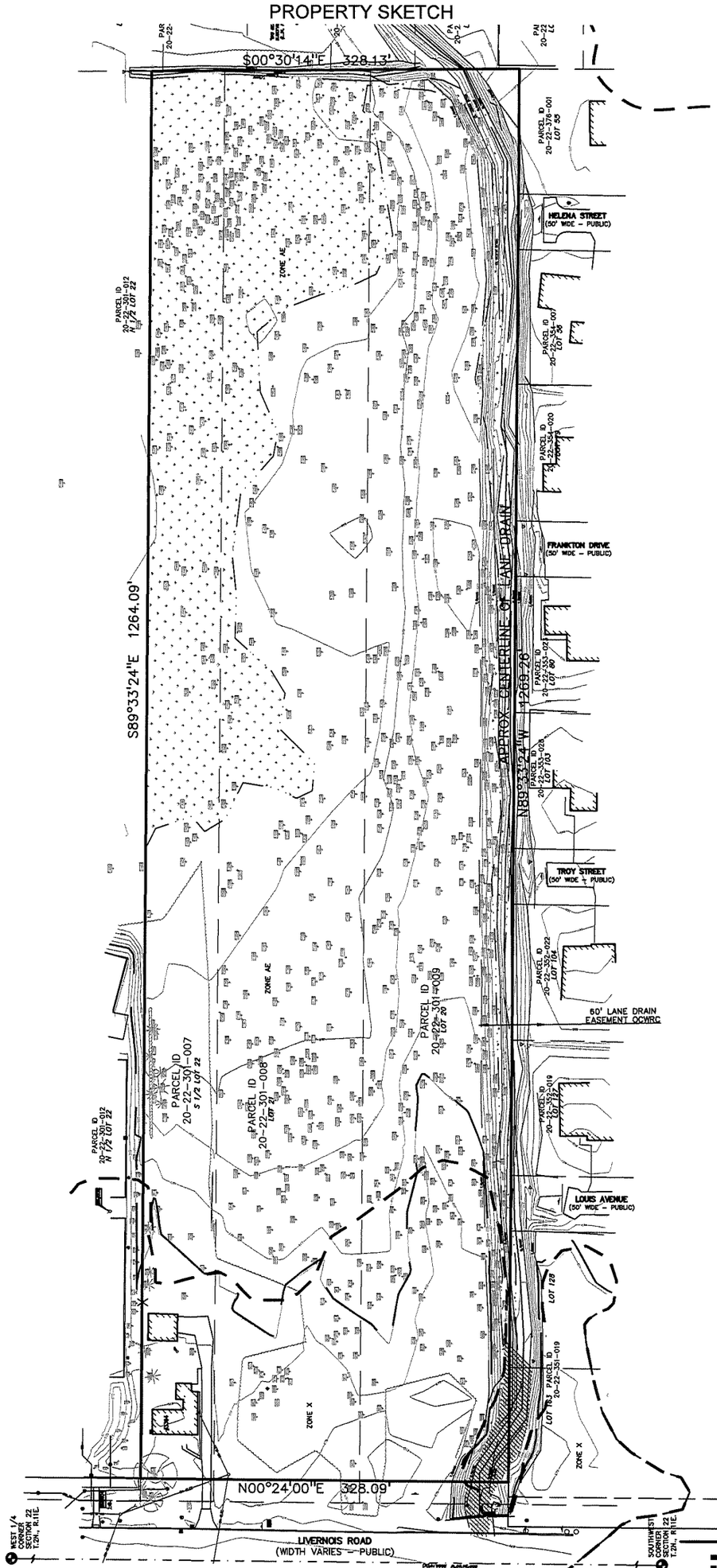
EXHIBIT A

PROPERTY SKETCH



LIVERNOIS SOUTH, LLC
50215 SCHOENHERR
SHELBY TWP., MICHIGAN 48315

0 60 120

SCALE: 1" = 120'

~~JULY 25, 2024~~
2021-0451 OCTOBER 25, 2024

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S:\PROJECTS\2021\2021-0451 HOMESTEAD\DWG\CONSTRUCTION\STORM WATER MAINTENANCE\SWMP-EXA-210451.dwg; KFP

EXHIBIT A
PROPERTY DESCRIPTION

LEGAL DESCRIPTION
(Overall Property as surveyed by PEA Group)

OVERALL PARCEL (PARCEL ID 20-22-301-013 & PARCEL ID 20-22-301-009)
All of Lots 20 and 21 together with the south half of Lot 22, except the west 20 feet of said Lots, of "Supervisor' Plat No. 26" as recorded in Liber 57, Page 59, Oakland County Records, being part of the Southwest 1/4 of Section 22, Town 2 North, Range 11 East, City of Troy, Oakland County, Michigan, and more particularly described as:
Commencing at the West 1/4 Corner of said Section 22; thence along the west line of said section S00°24'00"W, 1047.66 feet to the westerly extension of the south line of said Lot 20, also being the extension of the north line of "Eysters Beaver Gardens" as recorded in Liber 26, Page 14, Oakland County Records; thence along said line, S89°33'24"E, 73.00 feet to the east line of Livernois Road, 73 feet half width and the POINT OF BEGINNING;
thence along said east line N00°24'00"E, 328.09 feet to the north line of the south half of said Lot 22, as previously established;
thence along said north line S89°33'24"E, 1264.09 feet to the east line of said "Supervisor's Plat No. 26";
thence along said east line S00°30'14"E, 328.13 feet to the southeast corner of said Lot 20, also being the northeast corner of Lot 55 of said "Eysters Beaver Gardens";
thence along the south line of said Lot 20, also being the north line of said "Eysters Beaver Gardens" N89°33'24"W, 1269.26 feet to the aforementioned east line of Livernois Road and the POINT OF BEGINNING.
Containing 9.54 acres of land, more or less.

(Per Oakland County On-line tax assessing)

PARCEL ID 20-22-301-007
T2N, R11E, SECTION 21 & 22 SUPERVISOR'S PLAT NO. 26, SOUTH 1/2 OF LOT 22 EXCEPT WEST 20 FEET

PARCEL ID 20-22-301-008
T2N, R11E, SECTION 21 & 22 SUPERVISOR'S PLAT NO. 26, LOT 21 EXCEPT WEST 20 FEET

PARCEL ID 20-22-301-009
T2N, R11E, SECTION 21 & 22 SUPERVISOR'S PLAT NO. 26, LOT 20 EXCEPT WEST 20 FEET

* PARCELS 007 & 008 HAVE BEEN COMBINED INTO NEW PARCEL No. 20-22-301-013

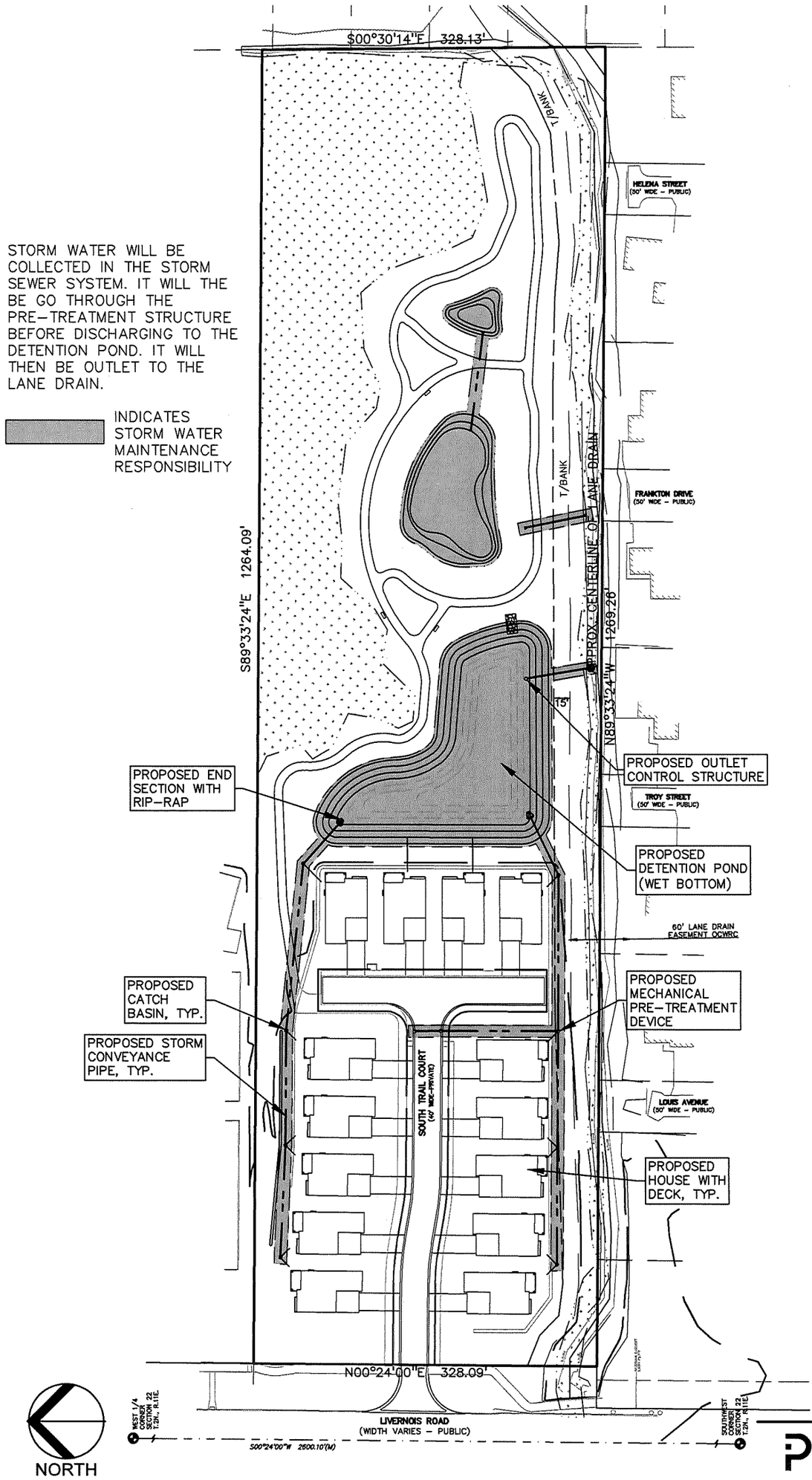
LIVERNOIS SOUTH, LLC
50215 SCHOENHERR
SHELBY TWP., MICHIGAN 48315

PEA GROUP
t: 844.813.2949
www.peagroup.com

~~JULY 25, 2024~~
2021-0451 OCTOBER 25, 2024

EXHIBIT B

OVERALL STORMWATER MANAGEMENT SYSTEM SKETCH



LIVERNOIS SOUTH, LLC
50215 SCHOENHERR
SHELBY TWP., MICHIGAN 48315

0 60 120
SCALE: 1" = 120'

SHEET 1 OF 2
~~JULY 25, 2024~~
2021-0451 OCTOBER 25, 2024

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EXHIBIT 'C'

OPERATIONS AND MAINTENANCE MANUAL

TROY TRAIL SOUTH – 3364 LIVERNOIS ROAD, TROY, MI 48085

PARCEL I.D. 20-22-301-013 & 20-22-301-009

STORMWATER MAINTENANCE PLAN

PROPERTY OWNER:

LIVERNOIS SOUTH, LLC
50215 SCHOENHERR SHELBY TWP., MI 48315

Prepared by:
PEA GROUP
1849 Pond Run
Auburn Hills, Michigan 48326
Phone: (248) 689-9090
Contact: John B. Thompson, P.E.

October 25, 2024

OPERATION AND MAINTENANCE MANUAL

INTRODUCTION:

This manual identifies the ownership, operation and maintenance responsibilities for all storm water management systems including the storm drain conveyance system, restricted outlet, underdrains, landscaping, and mechanical pre-treatment device as incorporated into and detailed on the approved Construction Plans as Prepared by PEA Group. In order to comply with the local best management practices (BMP) requirements, this manual should serve as a minimum performance standard. This manual should be retained intact and read in its entirety by all parties responsible for the operations and maintenance of the on-site BMP's.

OWNER:

LIVERNOIS SOUTH, LLC
50215 SCHOENHERR SHELBY TWP., MI 48315

PROPERTY INFORMATION:

This Operations and Maintenance Manual covers the storm water systems located at the following subject property:

(Overall Property as surveyed by PEA Group)
OVERALL PARCEL (PARCEL ID 20-22-301-013 & PARCEL ID 20-22-301-009)
All of Lots 20 and 21 together with the south half of Lot 22, except the west 20 feet of said Lots, of "Supervisor' Plat No. 26" as recorded in Liber 57, Page 59, Oakland County Records, being part of the Southwest 1/4 of Section 22, Town 2 North, Range 11 East, City of Troy, Oakland County, Michigan, and more particularly described as:
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thence along the south line of said Lot 20, also being the north line of said "Eysters Beaver Gardens" N89°33'24"W, 1269.26 feet to the aforementioned east line of Livernois Road and the POINT OF BEGINNING.
Containing 9.54 acres of land, more or less.

(Per Oakland County On-line tax assessing)
PARCEL ID 20-22-301-007
T2N, R11E, SECTION 21 & 22 SUPERVISOR'S PLAT NO. 26, SOUTH 1/2 OF LOT 22 EXCEPT WEST 20 FEET

PARCEL ID 20-22-301-008
T2N, R11E, SECTION 21 & 22 SUPERVISOR'S PLAT NO. 26, LOT 21 EXCEPT WEST 20 FEET

PARCEL ID 20-22-301-009
T2N, R11E, SECTION 21 & 22 SUPERVISOR'S PLAT NO. 26, LOT 20 EXCEPT WEST 20 FEET

* PARCELS 007 & 008 HAVE BEEN COMBINED INTO NEW PARCEL No. 20-22-301-013

STORMWATER MAINTENANCE EXHIBIT:

Exhibit 'B' of the Storm Water Maintenance Agreement is the Storm Water System which indicates all components of the storm water system. This system is subject to the long-term operation and maintenance responsibilities detailed in this manual. The system includes:

- Storm Sewer Pipes
- Storm Sewer Collection System & Structures (swales, manholes, inlets, catch basins, etc.)
- Outlet Control Structure
- Flow Diversion Structures
- Pre-Treatment Devices (Contech Cascade Model CS-6)

INSPECTIONS:

The frequency of system inspections outlined in the manual and attached exhibits should be considered the minimum. Certain events may warrant additional inspections. The regularity of inspections should be adjusted as needed as system specific conditions and the rate at which certain maintenance operations need to be performed are better known. Maintenance Inspection Checklists are provided for each of the BMP's in this system. Inspections should be performed by personnel responsible for maintenance and, depending on the component being inspected, may need to be certified for confined space entry. Operation of the definition system, outlet control structures, and pre- treatment devices may need to be inspected by a practicing civil engineer familiar with their operation.

Records of all routine inspections and any work performed on the system for maintenance, repair, or replacement should be maintained by the owner and kept for a minimum of ten (10) years. A copy of all records should be provided to the City of Troy Engineering Division and should include this manual, all inspection sheets, approved construction plans and as-built documents, a maintenance log of work performed to the system(s) and contact information for the system inspector, civil engineer, landscape architect, geotechnical engineer and contractor involved with the system.

STORM WATER SYSTEMS MAINTENANCE:

Regular inspection and maintenance of BMP's are necessary if these facilities are to consistently perform up to expectations. Stormwater systems are expected to perform quality and quantity control functions for as long as the land use they serve exists. Failure to maintain these systems can create the following adverse impacts:

- Increased pollutants to surrounding surface water features
- Potential property damage resulting from excessive flooding.
- Potential loss of life or property resulting from catastrophic failure of the facility
- Aesthetic or nuisance conditions, such as mosquitos or reduced property values due to a degraded facility appearance.

The most common cause of stormwater system failure is the lack of adequate operation, inspection, maintenance, and management. Most of the impacts can be avoided through proper and timely inspection and maintenance which will be necessary to live up to the expectations of the general public regarding the quality of life provided by construction of these systems.

Good design and construction can reduce maintenance needs and costs, but they cannot eliminate the need altogether. Maintenance requires a long term commitment of time, money, personnel, and equipment. Monitoring the overall performance of the stormwater management system is a major aspect of any maintenance program.

The maintenance responsibilities for these systems lie with the current property owner and transfer with the property. If maintenance of the system is not performed, the City of Troy reserves the right to enter property and perform all necessary work at the property owners' cost. Refer to the *Stormwater Management Operations and Maintenance Agreement* for additional details.

General Maintenance Items:

Road Sweeping:

Routine sweeping of all paved surfaces provides a more clean appearance and removes accumulations of sediment and trash that tend to migrate into stormwater management systems during rainfall events. Road sweeping should be performed quarterly or as necessary to limit sediment and trash build-up.

Grass Mowing and Maintenance:

Mowing requirements within the right-of-way should be designed to the specific site conditions, grass types and seasonal variations in climate. Grassed areas require periodic fertilizing, de-thatching and soil conditioning in order to maintain healthy growth. Provisions will need to be made to reseed and reestablish grass cover in areas damaged by sediment accumulation, stormwater flow, erosion or other causes. Dead turf will need to be replaced after being discovered. Inspection of the grass areas and other landscaping features should be made annually.

Trash and Debris Removal:

Removal of trash and debris from all areas of the right-of-way should be performed monthly. Removal of these items will prevent damage to vegetated areas and eliminate their potential to inhibit the operation of any of the stormwater management systems. Sediment, debris, and trash that are removed and collected should be disposed of according to local, State and Federal regulations at suitable disposal and/or recycling centers.

Stormwater System Maintenance Items:

The following narratives give an overview of the maintenance requirements for the components of the

stormwater system. The inspection checklists attached to this report includes a more complete explanation of what should be inspected, when inspections should occur, and the generally how often maintenance activities will be required to occur.

Storm Sewer, Structures, Underground Detention and Sedimentation Control Structures:

Catch basins, inlets, manholes, outlet control structures, flow control manholes, and storm sewer pipes should be inspected to check for sediment accumulation and clogging, floatable debris, dead vegetation, etc. The structures and sewers should also be observed during a wet weather event to ensure their proper operation. Accumulated sediment and debris should be removed on an annual basis or as needed by observed conditions. Structural repairs or maintenance should occur as needed. Some possible issues can be cracks, spalling, joint failure, leakage, misalignment, or settlement of structures. A civil engineer should be retained if problems are thought to exist.

Stormwater Pre-Treatment Devices:

Refer to the attached maintenance manuals from the manufacturer for all inspection and maintenance requirements for the pre-treatment structures.

The following pages include inspection checklists for the various devices and components listed above as well as the manufacturer's manuals for the stormwater pre-treatment structures.

EXHIBIT C
STORM WATER MANAGEMENT SYSTEM LONG-TERM MAINTENANCE PLAN

Property Information: TROY TRAIL SOUTH
3364 LIVERNOIS ROAD
CITY OF TROY, OAKLAND COUNTY, MICHIGAN

Applicant/Property Owner: LIVERNOIS SOUTH, LLC
50215 SCHOENHERR
SHELBY TWP, MI 48315
CONTACT: JOSEPH MANIACI
PHONE: 586.726.7350
EMAIL: JMANIACI@MONDRIANPROPERTIES.COM

Long-Term Maintenance Plan and Schedule

Table 1 identifies the maintenance activities to be performed, organized by category (monitoring/inspections, preventative maintenance, and remedial actions). Table 1 also identifies site-specific work needed to ensure that the storm water management system functions properly as designed.

MAINTENANCE ACTIVITIES	Catch Basins, Inlets & Storm Sewers	Swales	Basin Inlets, Outlets & Gratings	Mechanical Pre-Treatment & Detention Basin	Outlet Control Structures	Riprap	Buffer Strips	Pavement Areas	FREQUENCY
MONITORING/INSPECTION									
Inspect for sediment accumulation**/clogging of stone filter	X	X	X	X	X				Annually
Inspect for erosion and integrity of banks and berms		X	X	X		X	X		Annually and after major events
Inspect for floatables, dead vegetation and debris	X	X	X	X	X	X	X		Annually and after major events
Inspect all components during wet weather and compare to as-built plans	X	X	X	X	X	X	X	X	Annually
Monitor plantings/vegetation		X		X			X		2 times a year
Ensure means of access for maintenance remain clear/open	X	X	X	X	X	X	X		Annually
PREVENTIVE MAINTENANCE									
Mowing		X		X			X		Up to 2 times/year*
Remove accumulated sediment	X	X	X	X	X				As needed**
Remove floatables, dead vegetation and debris	X	X	X	X	X				As needed
Replace or wash/reuse stone riser debris					X				Every 3 years; more frequently if needed***
Remove invasive plant species		X		X			X		Annually
Sweeping of pavement surfaces (streets and parking areas)								X	As needed
REMEDIAL ACTIONS									
Repair/stabilize areas of erosion		X	X	X		X	X		As needed
Replace dead plantings, bushes, trees		X		X			X		As needed
Reseed bare areas		X		X			X		As needed
Structural repairs or replacement in kind	X		X	X	X	X		X	As needed
Make adjustments/repairs to ensure proper functioning	X	X	X	X	X	X	X	X	As needed
Oil and gasoline spills								X	Immediately

* NOT TO EXCEED THE LENGTH ALLOWED BY CITY ORDINANCE.

** MECHANICAL PRE-TREATMENT UNIT AND DETENTION BASIN TO BE CLEANED WHENEVER SEDIMENT ACCUMULATES TO A DEPTH OF 6-12 INCHES OR IF SEDIMENT RESUSPENSION IS OBSERVED

*** REPLACE STONE IF IT CAN NOT BE ADEQUATELY CLEANED.

NOTE:
WHILE PERFORMING MAINTENANCE, CHEMICALS SHOULD NOT BE APPLIED TO THE MECHANICAL PRE-TREATMENT UNIT, DETENTION BASIN, BUFFER STRIP OR WATERCOURSES

LIVERNOIS SOUTH, LLC
50215 SCHOENHERR
SHELBY TWP., MICHIGAN 48315

~~JULY 25, 2024~~
2021-0451 OCTOBER 25, 2024

PEA GROUP
t: 844.813.2949
www.peagroup.com

CONTECH®
ENGINEERED SOLUTIONS

Cascade Separator® Inspection and Maintenance Guide

CASCADE
separator®

Maintenance

The Cascade Separator® system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects sediment and debris will depend upon on-site activities and site pollutant characteristics. For example, unstable soils or heavy winter sanding will cause the sediment storage sump to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (i.e. spring and fall). However, more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment wash-down areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

A visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet chamber, flumes or outlet channel. The inspection should also quantify the accumulation of hydrocarbons, trash and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided in this Inspection and Maintenance Guide.

Access to the Cascade Separator unit is typically achieved through one manhole access cover. The opening allows for inspection and cleanout of the center chamber (cylinder) and sediment storage sump, as well as inspection of the inlet chamber and slanted skirt. For large units, multiple manhole covers allow access to the chambers and sump.

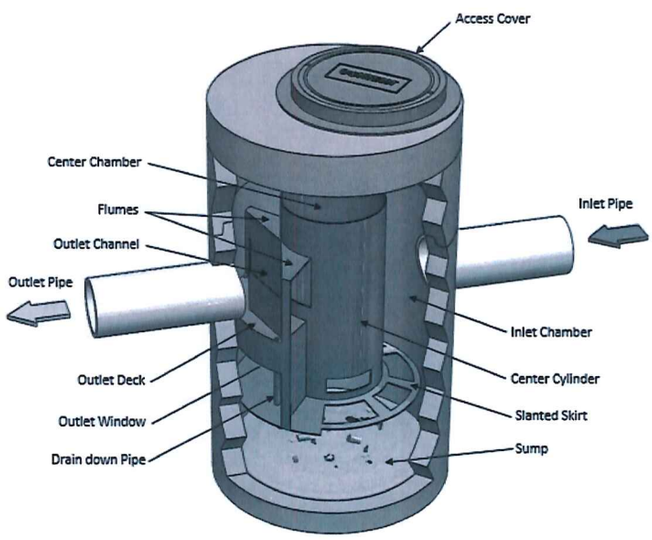
The Cascade Separator system should be cleaned before the level of sediment in the sump reaches the maximum sediment depth and/or when an appreciable level of hydrocarbons and trash has accumulated. If sorbent material is used, it must be replaced when significant discoloration has occurred. Performance may be impacted when maximum sediment storage capacity is exceeded. Contech recommends maintaining the system when sediment level reaches 50% of maximum storage volume. The level of sediment is easily determined by measuring the distance from the system outlet invert (standing water level) to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Finer, silty particles at the top of the pile typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the chart in this document to determine if the height of the sediment pile off the bottom of the sump floor exceeds 50% of the maximum sediment storage.

Cleaning

Cleaning of a Cascade Separator system should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole cover and insert the vacuum tube down through the center chamber and into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The areas outside the center chamber and the slanted skirt should also be washed off if pollutant build-up exists in these areas.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. Then the system should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and to ensure proper safety precautions. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the Cascade Separator system must be done in accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal. If any components are damaged, replacement parts can be ordered from the manufacturer.



Cascade Separator® Maintenance Indicators and Sediment Storage Capacities

Model Number	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CS-3	3	0.9	1.5	0.5	0.4	0.3
CS-4	4	1.2	2.5	0.8	0.7	0.5
CS-5	5	1.3	3	0.9	1.1	0.8
CS-6	6	1.8	3.5	1	1.6	1.2
CS-8	8	2.4	4.8	1.4	2.8	2.1
CS-10	10	3.0	6.2	1.9	4.4	3.3
CS-12	12	3.6	7.5	2.3	6.3	4.8

Note: The information in the chart is for standard units. Units may have been designed with non-standard sediment storage depth.

A Cascade Separator unit can be easily cleaned in less than 30 minutes.

A vacuum truck excavates pollutants from the systems.

Cascade Separator® Inspection & Maintenance Log

Cascade Model:			Location:		
Date	Depth Below Invert to Top of Sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The depth to sediment is determined by taking a measurement from the manhole outlet invert (standing water level) to the top of the sediment pile. Once this measurement is recorded, it should be compared to the chart in the maintenance guide to determine if the height of the sediment pile off the bottom of the sump floor exceeds 50% of the maximum sediment storage. Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.
2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

SUPPORT

- **Drawings and specifications are available at www.ContechES.com.**
- **Site-specific design support is available from our engineers.**

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