VILLAS AT SHADOW PINES
STORM SEWER SYSTEM MAINTENANCE AGREEMENT

THIS STORM SEWER SYSTEM MAINTENANCE AGREEMENT is made this 20th day of October, 2017 by and between the City of Rochester Hills, a Michigan municipal corporation (the "City), whose address is 1000 Rochester Hills Drive, Rochester Hills, Michigan 48309, and VASP, Inc., a Michigan Corporation ("Developer"), whose address is 14955 Technology Dr., Shelby Township, MI 48315.

RECITALS:

A. Developer is the owner of certain real property located in the City of Rochester Hills, Oakland County, Michigan, which real property is more particularly described in Exhibit A attached hereto and incorporated herein (the "Property").

B. Developer intends to develop the Property as a residential community to be known as Villas at Shadow Pines, a residential condominium development (hereinafter known as the "Development").

C. The Development will alter the natural flow of surface and storm water drainage.

D. Developer desires to extend to the future condominium unit owners within the Development the right to utilize and benefit from the storm water detention facilities and to provide a permanent method for the support and upkeep of said detention facilities.

E. Developer has proposed and the City has approved a storm water drainage and detention system (the "Storm Sewer System") as shown in Exhibit B attached hereto and incorporated herein (the "Approved Plan") and both the Developer and the City will benefit from the proper operation, use and maintenance of the Storm Sewer System and desire to enter into this binding contract relative to the use and governance of the areas described and fully delineated in the condominium Development site plan (the "Condominium Subdivision Plan").

F. Developer also intends to bind the condominium unit owners in the Development to this Agreement so this Agreement is intended to run with the land;

NOW, THEREFORE, in consideration of the approval by the City of the Condominium Subdivision Plan and of the mutual promises contained herein, the parties hereto agree as follows:

1. **Storm Sewer System.** Pursuant to the Condominium Subdivision Plan, Developer hereby makes available and will grant to each of the condominium unit owners in the Development the right to utilize, maintain, replace and repair the Storm Sewer System, including but not limited to the detention basin areas and the storm sewer lines existing within the Development and delineated in the Condominium Subdivision Plan. Components of the Storm Water System, including any and all water conveyance, detention facilities and devices, storm sewer pipe, catch basins, manholes, end-sections, ditches, swales, open water courses and rip-rap, shall be used solely for the purpose of conveying and detaining storm and surface drainage in the Development until such time as: (i) the City determines and notifies the Developer or Developer's successors and assigns, including the Association (as defined below), in writing that it is no longer necessary to convey, or detain the storm and surface drainage; and (ii) an adequate alternative for conveying and detaining storm and surface drainage has been provided which is acceptable to the City and which includes the granting of any easements to the City or third parties as may be required or necessary for the alternative drainage system.

2. **Condominium Association for Villas at Shadow Pines.** Control and jurisdiction over the Storm Sewer System shall be vested in the Villas at Shadow Pines Association (hereinafter referred to as "Association"). The Association is organized as a nonprofit corporation for a perpetual term under the laws of the State of Michigan. The Association was incorporated on December 2, 2016. Membership in the Association shall be mandatory for all of the condominium unit owners in the Development. The Association shall be responsible at its sole expense for the proper maintenance of the Storm Sewer System and for compliance with the terms of this Agreement. The Bylaws of the Association shall provide for a Board of Directors of no less than three (3) members and no more than five (5).

The Association members shall each bear their prorata share of the total costs of maintaining the Storm Sewer System (including without limitation, the real and personal property taxes assessed against it, if any, and insurance policies maintained with respect to it), which shall constitute a lien against each member's condominium unit. The prorated share of the cost shall be based on each condominium unit owner's percentage of value as set forth in the Master Deed for Villas at Shadow Pines. Each Association member shall be entitled to vote in accordance with the Master Deed for Villas at Shadow Pines.

The Association shall have the authority to make and enforce regulations pertaining to the use and maintenance of the Storm Sewer System, which regulations shall be binding upon all members of the Association.

3. **Maintenance of Storm Sewer System.** The Association shall be responsible for the proper maintenance, repair and replacement of the Storm Water System and all parts thereof as detailed in the Maintenance Plan attached hereto as Exhibit C (the "Maintenance Plan"). Proper maintenance of the Storm Water System shall include, but is not limited to, (i) keeping the bottom of the detention basis and at inlet pipes free from silt and debris; (ii) removing harmful algae; (iii) managing deleterious vegetative growth; (iv) maintaining the Storm Water System structures, end-sections and safety features; (v) controlling the effects of erosion; (vi) inspection of inlet and outlet pipes for structural integrity; (vii) inspection and replacement of rip-rap at inlet pipes; (viii) inspection and cleaning of storm sewer and catch basins upstream from the detention basin; (ix) inspection and replacement of stone around the outlet pipe; and (x) any other maintenance that is reasonable and necessary to facilitate and continue the proper operation of the Storm Water System. In no event shall the detention basin areas be utilized for any purpose other than detention of surface water without the prior written consent of the Association.

4. **Failure to Maintain Storm Sewer System.** In the event the Association fails at any time to maintain the Storm Sewer System (including without limitation the detention basins) in reasonable order and condition, the City may serve written notice upon the Association or upon its members setting forth the manner in which the Association has failed to maintain the Storm Sewer System in a reasonable condition and such notices shall include a demand that deficiencies of maintenance be cured within thirty (30) days thereof. The notice shall further state the date and place of a hearing thereon before the City Council or other such board, body or official to whom the City shall delegate such responsibility, which shall be held at least fourteen (14) days after the date of the notice. At such hearing, the City Council or other designated board, body or official may affirm or modify the list and description of maintenance deficiencies and, for good cause shown, may give an extension of the time within they shall be cured.

Thereafter, if the deficiencies set forth in the original notice, or in the modification thereof, shall not be cured within the time allowed, the City may maintain the same for a period of one (1) year. Such maintenance by the City shall not be construed as a trespass, constitute a taking of the Storm Sewer System, nor vest in the public any rights to use or enter the Storm Water System. Thereafter, if the Association does not properly maintain the Storm Water System, the City may, after providing similar written notice, schedule and hold another hearing to determine whether the City should maintain the Storm Water System for another year, and subject to a similar notice, hearing and determination in subsequent years.

In the event the City determines an emergency condition caused by or relating to the Storm Water System threatens the public health, safety or general welfare, the City shall have the right to immediately and without notice enter the Storm Water System and undertake appropriate corrective action.

5. Charges. The cost of any maintenance by the City, plus a ten percent (10%) administrative fee, shall be assessed against the Association and, if not timely paid, added to the tax rolls, which charges shall be a lien on the Storm Sewer System and shall be collectable and enforceable in the same manner general property taxes are collected and enforced. The City shall be, at its option, subrogated to the right of the Association against its members to the extent of that cost and administrative charge, if the City shall, by an official resolution, give thirty (30) days written notice to each member of the Association of the City's election to be subrogated.

The Association members shall bear their prorata share of the total costs of maintaining the Storm Sewer System, which prorata share of the cost shall constitute a lien against each member's condominium unit and if not paid, the City shall have the right to add it to the tax rolls and collect it in the same manner as provided above. The prorated share of the cost shall be based on each condominium unit owner's percentage of value as set forth in the Master Deed for Villas at Shadow Pines. The cost of maintenance by the City shall be assessed against the Association or the Association members at the City's discretion.

In the event the City declares the existence of an emergency upon, caused by or relating to the Storm Sewer System, and the City takes appropriate corrective action, the City shall have the right to charge and collect the costs for such corrective action, as provided herein.

6. Notice. Any notices required under this Agreement shall be sent by certified mail to the address for each party set forth below, or to such other addresses as such party may notify the other parties in writing;

To the Developer:	VASP, Inc. 14955 Technology Dr. Shelby Township, MI 48315
To the City:	City Clerk City of Rochester Hills 1000 Rochester Hills Drive Rochester Hills, MI 48309
To the Association:	Villas at Shadow Pines Association 14955 Technology Dr. Shelby Township, MI 48315

7. **Successors.** This Agreement shall constitute restrictions and covenants running with the Property. The parties hereto make this Agreement on behalf of themselves and their respective successors and assigns, and hereby warrant that they have the authority and capacity to make this contract.

8. **Recording.** This Agreement shall be recorded at the Oakland County Register of Deeds.

[Signatures and Acknowledgements on Following Page]

IN WITNESS WHEREOF, the parties have executed this agreement on the date first written above.

VASP, Inc.

By: _____
Mark Gesuale, President

CITY OF ROCHESTER HILLS

By: _____
Bryan K Barnett, Mayor

By: _____
Tina Barton, City Clerk

STATE OF MICHIGAN
COUNTY OF Macomb

The foregoing instrument was acknowledged before me this 20th day of October, 2017, by Mark Gesuale, President of VASP, Inc., a Michigan corporation, on behalf of and by authority of the corporation.

KRISTIE WHITCOMB
Notary Public, State of Michigan
County of Macomb
My Commission Expires 10-17-2021
Acting In the County of Macomb

Kristie Whitcomb
, Notary Public
State of Michigan, County of Macomb
My commission expires: 10-17-2021
Acting in the County of Macomb

STATE OF MICHIGAN
COUNTY OF _____

The foregoing instrument was acknowledged before me this _____ day of _____, 2018, by Bryan Barnett, Mayor and Tina Barton, City Clerk, of the City of Rochester Hills, on behalf of and by authority of the City.

_____
, Notary Public
State of Michigan, County of _____
My commission expires: _____
Acting in the County of _____

John Staran
Approved 11/29/17

"EXHIBIT A"

DESCRIPTION OF EXHIBIT "A" PARCEL DESCRIPTION

A PARCEL OF LAND BEING A PART OF THE SOUTHEAST 1/4 OF SECTION 31, T.3N., R.11E., CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MICHIGAN, MORE PARTICULARLY DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTH 1/4 CORNER OF SAID SECTION 31; THENCE N.90°00'00"E., 1485.50 FT. RECORDED, (MEASURED AS N.90°00'00"E., 1485.86 FT.) ALONG THE SOUTH LINE OF SAID SECTION 31 AND THE CENTERLINE OF SOUTH BLVD. (WIDTH VARIES) TO THE POINT OF BEGINNING; THENCE N.08°33'45"W., 1222.70 FT. RECORDED, (MEASURED AS N.08°23'50"W., 1222.98 FT.); THENCE N.90°00'00"E., 500.00 FT. (RECORDED & MEASURED); THENCE S.08°33'45"E., 987.07 FT. RECORDED, (MEASURED AS S.07°47'11"E., 511.08 FT. & S.08°58'16"E., 263.47 FT.); THENCE S.82°25'39"W., 411.87 FT.; THENCE S.08°23'50"E., 393.22 FT. TO A POINT ON THE SOUTH LINE OF SAID SECTION 31 AND THE CENTERLINE OF SOUTH BLVD. (WIDTH VARIES); THENCE ALONG SAID SOUTH LINE OF SECTION 31, S.90°00'00"W., 80.87 FT. TO THE POINT OF BEGINNING. CONTAINING 9.825 ACRES OR 427,977 SQ.FT. SUBJECT TO THE RIGHTS OF THE PUBLIC OVER SOUTH BOULEVARD AND ANY OTHER EASEMENTS, RESTRICTIONS, OR RIGHTS-OF-WAY OF RECORD, IF ANY.

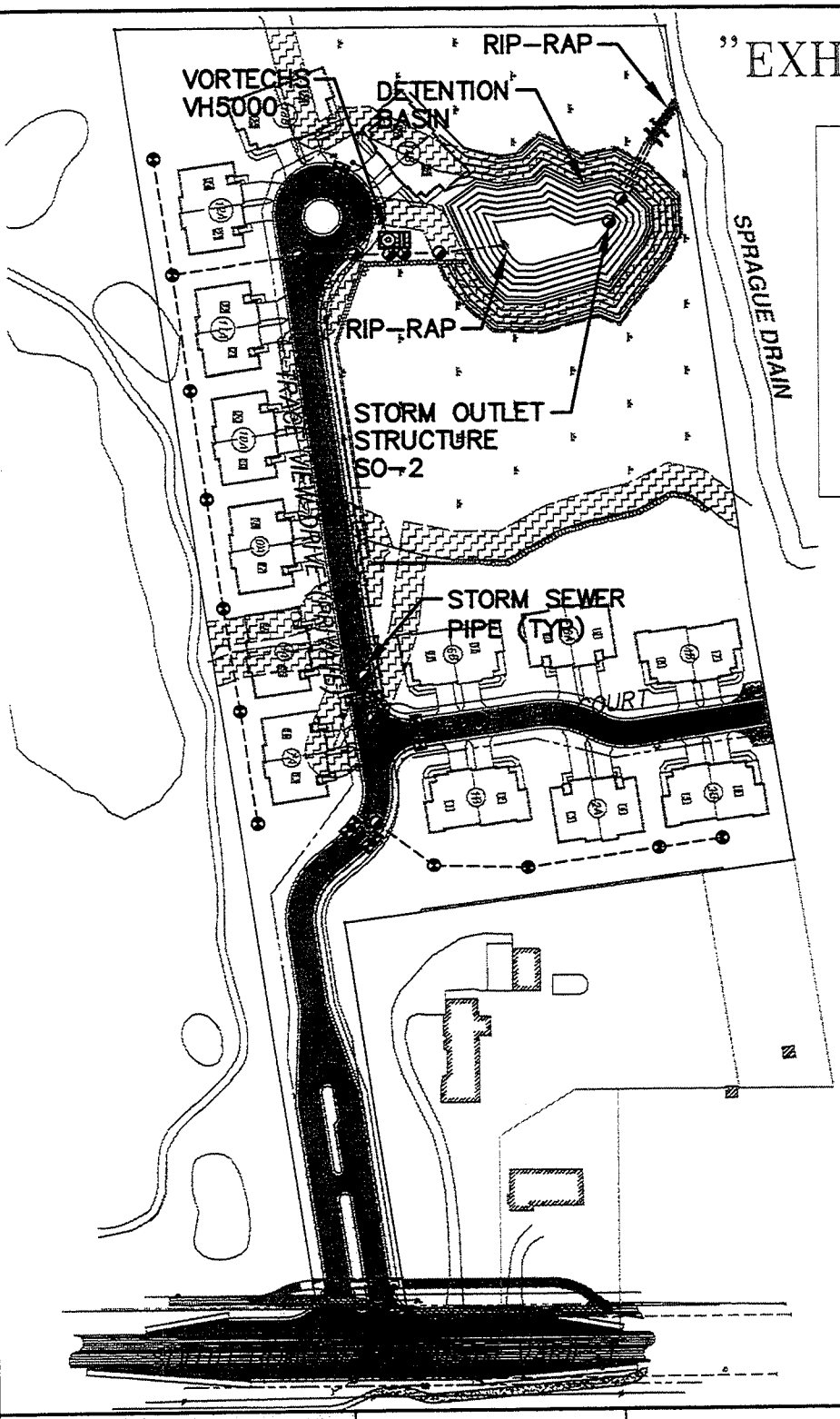
EXCEPT THE FOLLOWING AREA TO BE REMOVED AND DEDICATED AS RIGHT-OF-WAY TO OAKLAND COUNTY ROAD COMMISSION, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

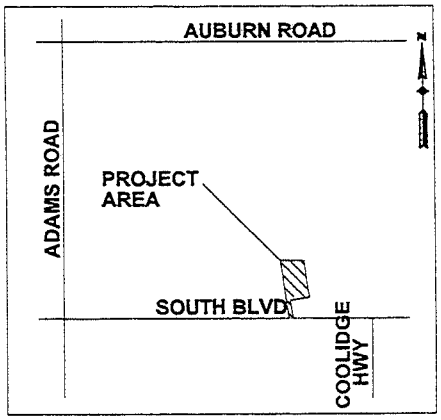
COMMENCING AT THE SOUTH 1/4 CORNER OF SAID SECTION 31; THENCE N.90°00'00"E., 1485.50 FT. RECORDED, (MEASURED AS N.90°00'00"E., 1485.86 FT.) ALONG THE SOUTH LINE OF SAID SECTION 31 AND THE CENTERLINE OF SOUTH BLVD. (WIDTH VARIES) TO THE POINT OF BEGINNING; THENCE N.08°23'50"W. 60.65 FT.; THENCE N.90°00'00"E., 80.87 FT.; THENCE S.08°23'50"E. 60.65 FT.; THENCE N.90°00'00"W. 80.87 FT. TO THE POINT OF BEGINNING.,

#15-31-400-020

Mike Taunt
Approved 9/13/16

"EXHIBIT B"





LOCATION MAP

NOT TO SCALE

Mike Taunt
Approved 8/24/16

CHIPPEWA CONSULTING
ENGINEERED EXCELLENCE
Certified Minority Owned
Native American-Hispanic Women

8140 PACTON
SHELBY TOWNSHIP, MI 48317
PH: (586)737-7993
FAX: (586)737-7994
www.chippewaconsultingllc.com

CALL MISS DIG 72 HOURS (3 WORKING DAYS) BEFORE YOU DIG 1-800-482-7171 or 811
CALL811.COM (TOLL FREE)

JOB NAME: RH14051.EXB	JOB NO: RH14-051
DRAWN BY: M. O'CONNOR	DATE: 6/26/16
SCALE: 1" = 150'	SHEET: 1 OF 1
SECTION 31 TOWN 3 NORTH RANGE 11 EAST	
CITY/TOWN: ROCHESTER HILLS OAKLAND COUNTY, MI	

EXIHIBIT 'C'

OPERATIONS AND MAINTENANCE MANUAL

VILLAS AT SHADOW PINES
STORMWATER MAINTENANCE PLAN
ROCHESTER HILLS, MICHIGAN

FINAL COPY

PROPERTY OWNER:
VASP, Inc.
14955 TECHNOLOGY DRIVE
SHELBY TOWNSHIP, MI 48315
Phone: (586) 219-2212

Prepared by:
Chippewa Consulting LLC
8140 Pacton Drive
Shelby Township, Michigan 48317
Phone: (586)737-7993
Contact: Mitchell P. O'Connor, P.E.

July 28, 2016

OPERATION AND MAINTENANCE MANUAL

INTRODUCTION:

This manual identifies the ownership, operation and maintenance responsibilities for all stormwater management systems including the sedimentation and detention basins, underground storm sewer system, mechanical pre-treatment devices, as incorporated into and detailed on the approved Construction Plans as prepared by Chippewa Consulting In order to comply with the local best management practices (BMP) and 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:

Mr. Mark Gesuale, Managing Partner
VASP, Inc.
14955 Technology Drive
Shelby Township, Michigan 48315
Phone: (586) 219-2212

PROPERTY INFORMATION:

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

A parcel of land being a part of the southeast 1/4 Of section 31, T.3N., R.11E., City of Rochester Hills, Oakland County, Michigan, more particularly described as follows: Commencing at the south 1/4 corner of said section 31; thence N.90°00'00"E., 1485.50 ft. recorded, (measured as N.90°00'00"E., 1485.86 ft.) along the south line of said Section 31 and the centerline of South Blvd. (width varies) to the point of beginning; thence N.08°33'45"W., 1222.70 ft. recorded, (measured as N.08°23'50"W., 1222.98 ft.); thence N.90°00'00"E., 500.00 ft. (recorded & measured); thence S.08°33'45"E., 987.07 ft. recorded, (measured as S.07°47'11"E., 511.08 ft. & S.08°58'16"E., 263.47 ft.); thence S.82°25'39"W., 411.87 ft.; thence S.08°23'50"E., 393.20 ft. to a point on the south Line Of said section 31 and the centerline of South Blvd. (width varies); thence along said south line of section 31, S.90°00'00"W., 80.87 ft. to the point of beginning. containing 9.825 acres Or 427,977 sq.ft subject to the rights of the public over South Boulevard and any other easements, restrictions, or rights-of-way of record, if any.

STORMWATER MAINTENANCE EXHIBIT:

Exhibit 'B' of the Storm Water Maintenance Agreement is the Storm Water System Plan which provides a clear presentation of 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 structures (manholes, inlets, catch basins etc.)
- Sedimentation Basin
- Pre-Treatment Device (Vortechs)

INSPECTIONS:

The frequency of system inspections outlined in the manual and attached exhibits should be considered the minimum, if no events warrant additional inspections. The frequency of inspections should be fine-tuned over time as system specific conditions are better known and the rate at which certain maintenance operations need to be performed is better understood. Maintenance Inspection Checklists are provided for each of the BMP's in this system. Inspections should be performed by personnel responsible for maintenance and may need to be certified for confined space entry, depending on the component being inspected. Operation of the detention basin, sediment basin, 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 often (10) years. A copy of all records should be provided to the City of Rochester Hills Engineering Division. The records 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. Storm water systems are expected to perform quality and quantity control functions 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 loss of life or property resulting from catastrophic failure of the facility

· Aesthetic or nuisance conditions, such as mosquitoes or reduced property values due to a degraded facility appearance.

Most of these impacts can be avoided through proper and timely inspection and maintenance. A major concern associated with these impacts is the general public's expectations related to the quality of life provided, in part, by construction of these systems. Inadequate maintenance means the general public may have a false sense of security. The most common cause of storm water system failure is the lack of adequate and proper operation, inspection, maintenance and management.

Good design and construction can reduce subsequent maintenance needs and costs, but they cannot eliminate the need for maintenance 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 in perpetuity. If maintenance of the system is not performed, the City of Rochester Hills reserves the right to enter the property and perform all necessary work at the property owners' cost. Refer to the *Agreement for Storm Water System Maintenance* for additional details.

General Maintenance Items:

Street Sweeping:
Routine sweeping of all paved surfaces provides a more attractive appearance and remove accumulations of sediment and trash that tend to migrate into storm water management systems during rainfall events. Parking lot sweeping should be performed quarterly or as necessary to limit sediment and trash build-up.

Grass Mowing and Maintenance:
Mowing requirements at a facility 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, storm water 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 property 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.

Storm Water System Maintenance Items:
The following narratives give an overview of the maintenance requirements of the different components of the storm water system. The inspection checklists attached to this report offer a more complete listing of what should be inspected, when inspection should occur and the likely frequency of maintenance activities.

Storm Sewer and Structures:

Catch basins, inlets, manholes and 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 based on observed conditions. Structural repairs or maintenance should occur as needed based on observed conditions such as 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 Device (Vortech):

Refer to the attached maintenance manual from the manufacturer for all inspection and maintenance requirements for the Vortech structure.

Detention Basin Outlet Control Structure and Overflow Structure:

Both the outlet control and overflow structures and connecting pipes should be inspected for sediment accumulation, floatable debris, trash and any other foreign matter that may impede flow or restrict the devices from working properly. The stone jacket surrounding the outlet control structure should be inspected for sediment build *up,* and the holes at the base of the outlet control structure should be inspected to make sure they do not become blocked. The grates of the two structures should be inspected for structural integrity and buildup of debris. The outlet control system should be inspected during a wet weather event to ensure all components are functioning properly. A civil engineer should be retained if problems are thought to exist.

Maintenance will include the removal of any debris, trash or sediment from the structures and/or pipe, cleaning of the stone jacket on the outlet control structure and removal of debris from the structure grates. The stone jacket may need replacement if cleaning does not adequately remove sediment build-up.

Detention Basin and Sedimentation Basin:

The inlet pipes to the basins should be inspected for structural integrity (pipes cracked, broken, spalled) and that the grates are free from debris. The area around and immediately downstream

of the inlet pipes should be inspected for sediment build-up, erosion and the riprap should be inspected for integrity and sedimentation. Maintenance of the inlet pipes would include removal of any sediment build-up and debris, repair or replacement of any components that are in need of attention and to restore any areas that have eroded.

The basins should be inspected for healthy grass growth, side slope erosion, and excessive sedimentation in both basins. The riprap spillway between the basins should be inspected for sedimentation, erosion and overall integrity. The sedimentation basin should trap sediment when working as designed and as such will need regular inspection and removal of sediment once the total sediment depth is 6"-12" or if sediment re-suspension is observed during a rain event. The basins should be inspected during a wet weather event to ensure all aspects of the basin are functioning correctly. A civil engineer should be retained if problems are thought to exist or if the inspection personnel are not familiar with the operating conditions of the basins. The planted vegetation within the basins should conform to that shown on the construction plans, and any invasive species should be removed from the swale. The vegetation should be inspected for healthy growth by a landscape architect if the inspection personnel are not familiar with the specific plantings inside the basins.

Any resident complaints regarding the basins' aesthetics or operation should be investigated during inspections and wet weather operations.

The following pages include inspection checklists for the various devices and components listed above as well as the manufacturer's manual for the Vortech storm water treatment structure.

MAINTENANCE INSPECTION CHECKLIST:
DETENTION SYSTEM – VILLAS OF SHADOW PINES

Rochester Hills, Michigan

Date:

BMP Device #:

Time:

Weather Conditions:

MAINTENANCE INSPECTION CHECKLIST:	Items Inspected	Checked Yes/No	Maintenance Required Yes/No	Comments
Annually	Inspect inside of structures			
After large rain events	Inspect inside of structures			
After large rain events	Inspect orifice for debris or sediment			
Annually	Visually inspect storage pipe for alignment			
Annually	Inspect ground surface for sink holes			
Annually	Monitor maintenance accessibility			
Annually	Visually inspect outlet pipe for alignment			

EXHIBIT "C"

STORMWATER MANAGEMENT SYSTEM – PERMANENT MAINTANANCE

DATE/TIME OF INSPECTION: _____

INSPECTOR: _____

STORMWATER MANAGEMENT SYSTEM
MAINTENANCE TASKS AND SCHEDULE

POST CONSTRUCTION

MAINTENANCE ACTIVITIES MONITORING/INSPECTION	SYSTEM COMPONENTS: Catch Basins, Inlets, Manholes, and Outlet Control Structures	Storm Sewer & Detention Chambers	Rip Rap	Bioswale Plantings	Buffer Strip	FREQUENCY	COMMENTS
INSPECT FOR SEDIMENT ACCUMULATION	X	X	X	NA	X	Annually	
INSPECT FOR FLOATABLES, DEAD VEGETATION AND DEBRIS	X	X	X	NA	X	Annually	
INSPECT FOR EROSION			X	NA	X	Annually	
INSPECT ALL COMPONENTS DURING WET WEATHER AND COMPARE TO AS–BUILT PLANS	X	X				Annually	
INSPECT INSIDE OF STRUCTURES AND PIPES FOR CRACKS, SPALLING, JOINT FAILURE, SETTLEMENT, SAGGING AND MISALIGNMENT.	X	X				Annually	
INSPECT FOR INVASIVE PLANT SPECIES				NA	X	Annually	
PREVENTATIVE MAINTENANCE							
REMOVE ACCUMULATED SEDIMENT	X	X	X	NA	X	Annually or as needed	
REMOVE FLOATABLES, DEAD VEGETATION AND DEBRIS	X	X	X	NA	X	Annually or as needed	
PROFESSIONAL APPLICATION OF HERBICIDE FOR INVASIVE SPECIES THAT MAY BE PRESENT				NA	X	Annually or as needed	
REMEDIAL ACTIONS							
REPAIR/STABILIZE AREAS OF EROSION			X	NA	X	As Needed	
STRUCTURAL REPAIRS	X	X				As Needed	
MAKE ADJUSTMENTS/REPAIRS TO ENSURE PROPER FUNCTIONING	X	X	X	X		As Needed	

SUMMARY:

INSPECTORS REMARKS: _____

_____

_____

OVERALL CONDITION OF FACILITY: _____

RECOMMENDED ACTIONS NEEDED: _____

DATES ANY MAINTENANCE MUST BE COMPLETED BY: _____

CHIPPEWA CONSULTING
ENGINEERED EXCELLENCE
Certified Minority Owned
Native American-Hispanic Women

8140 PACTON
SHELBY TOWNSHIP, MI 48317
PH: (586)737–7993
FAX: (586)737–7994
www.chippewaconsultingllc.com

JOB NAME: RH14051.EXC	JOB NO: RH14–051
DRAWN BY: M. O'CONNOR	DATE: 6/26/16
SCALE: NONE	SHEET: 1 OF 1
SECTION 31 TOWN 3 NORTH RANGE 11 EAST	
CITY/TOWN: ROCHESTER HILLS OAKLAND COUNTY, MI	

Vortechs® Maintenance

The Vortechs system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit, e.g., unstable soils or heavy winter sanding will cause the swirl chamber to fill more quickly but regular sweeping will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant deposition and transport may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. Inspections should be performed twice per year (i.e. spring and fall) however more frequent inspections may be necessary in equipment washdown areas and in climates where winter sanding operations may lead to rapid accumulations. It is useful and often required as part of a permit to keep a record of each inspection. A simple inspection and maintenance log form for doing so is provided on the following page, and is also available on contechstormwater.com.

The Vortechs system should be cleaned when inspection reveals that the sediment depth has accumulated to within 12 to 18 inches (300 to 450 mm) of the dry-weather water surface elevation. This determination can be made by taking two measurements with a stadia rod or similar measuring device; one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. 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. 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.

Cleaning

Cleaning of the Vortechs system should be done during dry weather conditions when no flow is entering the system. Clean-out of the Vortechs system with a vacuum truck is generally the most effective and convenient method of excavating pollutants from the system. If such a truck is not available, a "clamshell" grab may be used, but it is difficult to remove all accumulated pollutants using a "clamshell".

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, an oil or gasoline spill should be cleaned out immediately. 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 adsorbent pads to solidify the oil since these pads are usually much easier to remove from the unit individually and less expensive to dispose of than the oil/water emulsion that may be created by vacuuming the oily layer. Floating trash can be netted out if you wish to separate it from the other pollutants.

Cleaning of a Vortechs system is typically done by inserting a vacuum hose into the swirl chamber and evacuating this chamber of water and pollutants. As water is evacuated, the water level outside of the swirl chamber will drop to a level roughly equal to the crest of the lower aperture of the swirl chamber. The water outside the swirl chamber should remain near this level throughout pumping as the bottom and sides of the swirl chamber are sealed to the tank floor and walls. This "water lock" feature prevents water from migrating into the swirl chamber, exposing the bottom of the baffle wall and creating excess pump-out volume. Floating pollutants will decant into the swirl chamber as the water level is drawn down. This allows most floating material to be withdrawn from the same access point above the swirl chamber. Floating material that does not decant into the swirl chamber during draw down should be skimmed from the baffle chamber. If maintenance is not performed as recommended, sediment may accumulate outside the swirl chamber. If this is the case, it may be necessary to pump out other chambers. It is advisable to check for sediment accumulation in all chambers during inspection and maintenance.

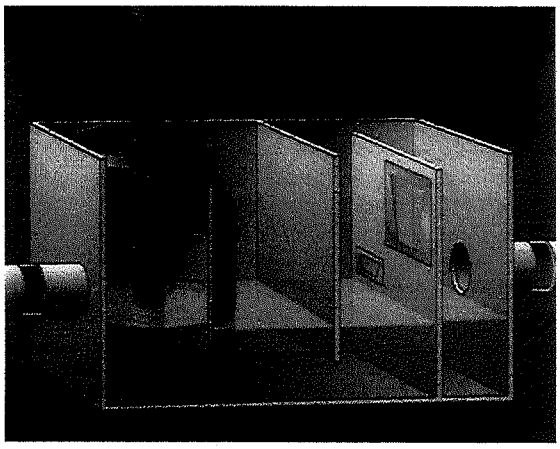
These maintenance recommendations apply to all Vortechs systems with the following exceptions:

1. It is strongly recommended that when cleaning systems larger than the Model 16000 the baffle chamber be drawn down to depth of three feet prior to beginning clean-out of the swirl chamber. Drawing down this chamber prior to the swirl chamber reduces adverse structural forces pushing upstream on the swirl chamber once that chamber is empty.
2. Entry into a Vortechs system is generally not required as cleaning can be done from the ground surface. However, if manned entry into a system is required the entire system should be evacuated of water prior to entry regardless of the system size.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure proper safety precautions. If anyone physically enters the unit, Confined Space Entry procedures need to be followed.

Disposal of all material removed from the Vortechs system should 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.

For assistance with maintaining your Vortechs system, contact us regarding the CONTECH Maintenance Compliance Certification Program.



Vortechs Inspection & Maintenance Log

Vortech Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than eighteen inches the system should be cleaned out. **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.