

**AGREEMENT FOR  
STORM WATER SYSTEM MAINTENANCE**

This Agreement is made on NOV 11, 2028, by Rayconnect, Inc., a Michigan corporation, of 3011 Research Drive, Rochester Hills, MI 48309, ("Developer"), and the CITY OF ROCHESTER HILLS (the "City"), whose address is 1000 Rochester Hills Drive, Rochester Hills, MI 48309.

WHEREAS, Developer owns and proposes to develop the Property described in attached Exhibit A; and

WHEREAS, the proposed development of the Property will alter the natural flow of surface and storm water drainage; and

WHEREAS, Developer has proposed, and the City has approved, a storm water drainage and detention system (the "System") comprised of storm water detention and water quality treatment facilities and devices, pumping system, storm sewer pipe, catch basins, manholes, end-sections, ditches, swales, open water courses and rip-rap, for the Property as described and depicted in the Storm Water System Plan attached as Exhibit B; and

WHEREAS, the parties will benefit from the proper operation, use and maintenance of the System and enter into this agreement to provide for the same.

THEREFORE, the parties agree:

**1. Use of the System:**

Components of the System, including any and all water conveyance, detention and water quality treatment facilities and devices, pumping system, 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, detaining and treating storm and surface drainage on the property until such time as: (i) The City determines and notifies Developer or Developer's successors, grantees or assigns, in writing, that it is no longer necessary to convey, detain or treat the storm and surface drainage; and (ii) An adequate alternative for conveying, detaining and treating 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. Maintenance:**

A. Developer shall be responsible for the proper maintenance, repair and replacement of the System and all parts thereof as detailed in the Maintenance Plan attached as Exhibit C.

B. Proper maintenance of the System shall include, but is not limited to: (i) Removing accumulated sediment, trash and debris from the detention basin and at inlet pipes; (ii) Managing deleterious vegetative growth; (iii) Maintaining storm sewer, structures, end-sections and safety features; (iv) Controlling the effects of erosion; (v) Inspection and cleaning of the water quality treatment device; (vi) Inspection of inlet and outlet pipes for structural integrity; (vii) Inspection and replacement of riprap at inlet pipes; (viii) Inspection and cleaning of the storm sewer and catch basins upstream from the detention basin; (ix) Inspection and replacement of stone around the outlet pipe; and (vi) Any other maintenance that is reasonable and necessary to facilitate and continue the proper operation and use of the System.

**3. Action by City:**

If, at any time, Developer or Developer's successors, grantees or assigns neglect or fail to properly maintain the System or any part thereof, the City may notify Developer or Developer's successors, grantees or assigns. The notice shall be in writing and shall list and describe maintenance deficiencies and demand that they be corrected within thirty (30) days.

The notice shall further specify a date and place for a hearing to be held at least fourteen (14) days after the date of the notice before the City Council, or such other board or official as the City Council may designate. At the hearing, the City Council (or other designated board or official) may affirm or modify the list and description of maintenance deficiencies and, for good cause shown, may extend the time for the deficiencies to be corrected.

Thereafter, if the maintenance deficiencies are not corrected within the time allowed, the City may undertake the necessary corrective actions, and the City may maintain the System for up to one (1) year. Such maintenance of the System by the City shall not be construed to be a trespass or a taking of the Property, nor shall the City's actions vest in the public any right to enter or use the Property. Thereafter, if Developer or Developer's successors, grantees or assigns do not properly maintain the System, the City may, after providing similar written notice, schedule and hold another hearing to determine whether the City should maintain the 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 System threatens the public health, safety or general welfare, the City shall have the right to immediately and without notice enter the Property and undertake appropriate corrective action.

4. **Charges:**

The City shall charge to the current owner of the Property the cost of maintenance or other corrective action undertaken by the City under this agreement, plus a ten percent (10%) administrative fee. If not timely paid, the City may place the charges on the City's tax roll, which charges shall be a lien on the real property and shall be collectable and enforceable in the same manner general property taxes are collected and enforced.

5. **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 Rayconnect:

3011 Research Drive  
Rochester Hills, MI 48309  
Attention: Earl Brown

To the City:

City Clerk  
City of Rochester Hills  
1000 Rochester Hills Drive  
Rochester Hills, MI 48309

6. **Successors and Assigns:**

This agreement shall bind and inure to the benefit of the parties and their respective successors, grantees and assigns. The benefits, burdens, rights, obligations and responsibilities hereunder shall run with the land and shall bind all current and future owners of the Property and any divisions thereof.

7. **Recording of Agreement:**

This agreement shall be recorded at the Oakland County Register of Deeds.

By:   
Earl Brown  
Its: President

CITY OF ROCHESTER HILLS

By: \_\_\_\_\_  
Bryan Barnett, Mayor

By: \_\_\_\_\_  
Jane Leslie, Clerk

STATE OF MICHIGAN  
COUNTY OF OAKLAND

This agreement was acknowledged before me on Nov. 11, 2008, by Earl Brown, President of Rayconnect.

[Signature]  
\_\_\_\_\_  
\_\_\_\_\_, Notary public  
Oakland County, Michigan  
My commission expires: 12-12-11

NOTARY PUBLIC, STATE OF MI  
COUNTY OF OAKLAND  
NOTARY PUBLIC EXPIRES ON 12-12-2011  
11/11/08

STATE OF MICHIGAN  
COUNTY OF OAKLAND

This agreement was acknowledged before me on \_\_\_\_\_, by Bryan Barnett, Mayor, and Jane Leslie, Clerk, of the City of Rochester Hills, on behalf of the City.

Drafted By:

\_\_\_\_\_  
\_\_\_\_\_, Notary public  
\_\_\_\_\_, County, Michigan  
My commission expires: \_\_\_\_\_

When Recorded Return to:  
City Clerk  
City of Rochester Hills  
1000 Rochester Hills Drive  
Rochester Hills, MI 48309

**APPROVED**

*By Michael at 3:08 pm, Nov 14, 2008*

**EXHIBIT 'A'**

LEGAL DESCRIPTION: (see Exhibit 'A' of the Storm Water Maintenance Agreement)  
(Per Warranty Deed recorded in Liber 10352, Page 405, OCR.)

**PARCEL 1**

A part of Lot 1, SUPERVISOR'S PLAT NO. 9, as recorded in Liber 59 of plats, on Page 13, Oakland County Records, being a part of the West 1/2 of the SE 1/4 of Section 29, Town 3 North, Range 11 East, Avon Township, Oakland County, Michigan, more particularly described as: Beginning at the SW corner of said lot, thence N01°01'10"E, 125.12 feet along the West line of said Lot 1, also being the centerline of a 60 foot wide easement for roadway; thence N88°31'00"E, 348.61 feet; thence S00°58'05"W, 125.11 feet to a point on the South line of said Lot 1; thence S88°31'00"W, 348.72 feet along the South lot line to the Point of Beginning. Parcel No: 15-29-452-028

AND

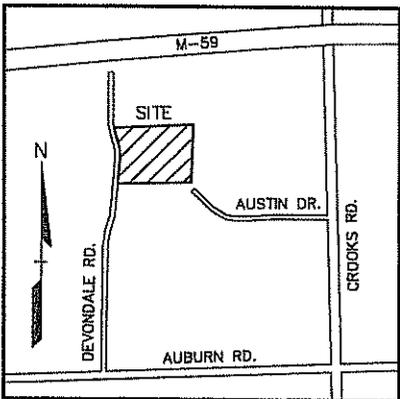
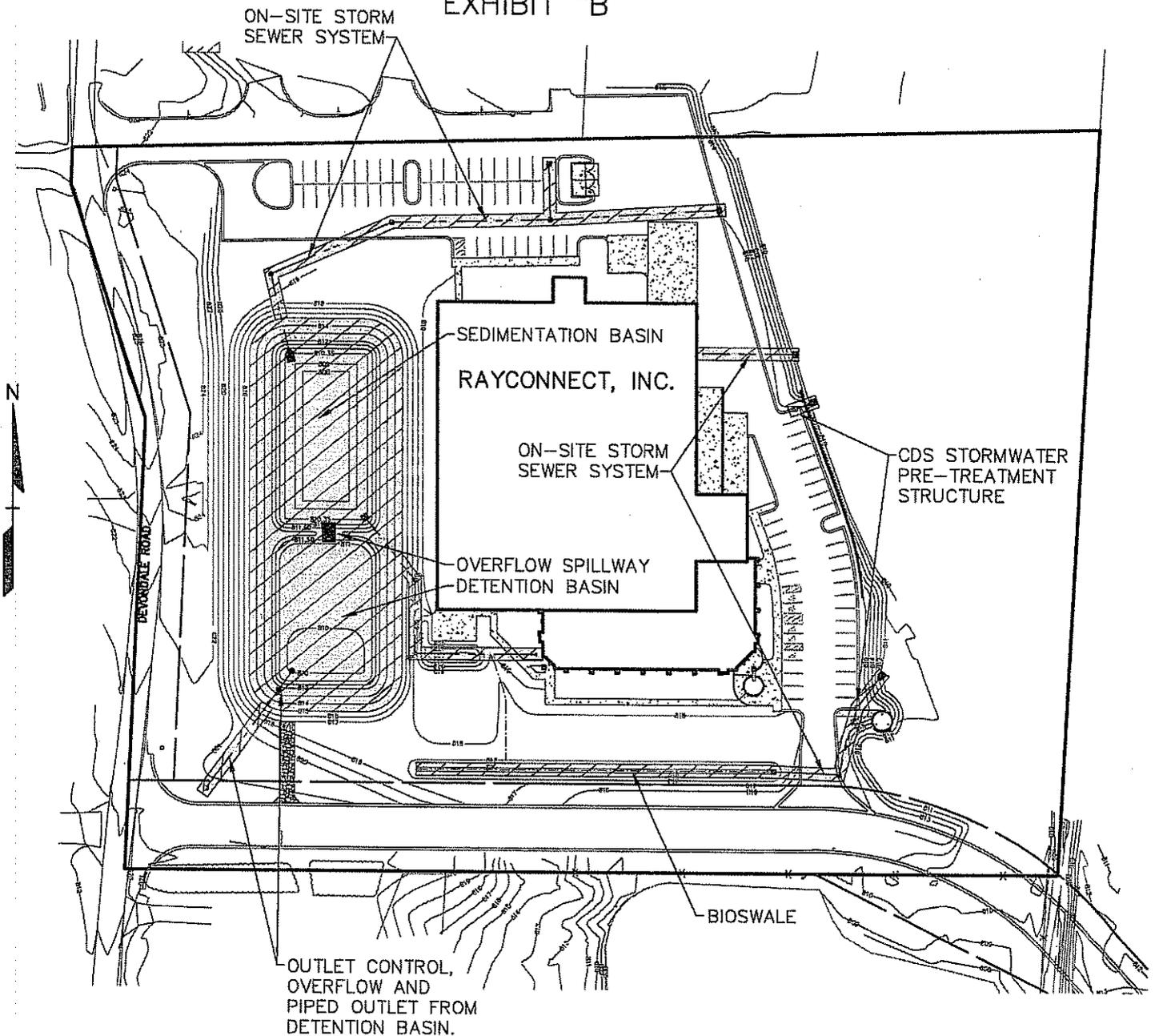
**PARCEL 2**

A part of Lot 1 and Lot 2, of "SUPERVISOR'S PLAT NO. 9", as recorded in Liber 59 on Page 13, of Plats, Oakland County Records, being a part of the West 1/2 of the Southeast 1/4 of Section 29, Town 3 North, Range 11 East, Avon Township, Oakland County, Michigan, more particularly described as: Commencing at the Southwest corner of said Lot 1, thence N01°01'10"E, 125.12 feet along the West line of said Lot 1, to the Point of Beginning, thence the following three courses along said West line of Lot 1, also the centerline of a 60 foot wide easement for roadway; (1) N01°01'10"E, 229.55 feet, and (2) N19°01'20"W, 193.76 feet, and (3) N01°04'48"E, 28.01 feet to the Northwest corner of said Lot 1; thence N87°01'10"E, 801.69 feet along the North line of said Lot 1 and 2, also being the centerline of a 60 foot wide easement for roadway as platted; thence S01°35'30"W, 588.87 feet along the East line of said Lot 2; thence S88°31'00"W, 379.46 feet along the South line of said Lot 2; thence N00°58'05"E, 125.11 feet; thence S88°31'00"W, 348.61 feet to the Point of Beginning, and containing 8.893 acres. Subject to the rights of any easements, restrictions of rights of way either recorded.

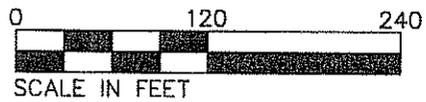
**APPROVED**

By Michael at 3:08 pm, Nov 14, 2008

EXHIBIT "B"



LOCATION MAP NOT TO SCALE



RAYCONNECT STORM SEWER SYSTEM  
MAINTENANCE RESPONSIBILITY



No.	By	Ch.	Revisions (Description)	Date
<b>RAYCONNECT, INC.</b> 3011 RESEARCH DRIVE ROCHESTER HILLS, MICHIGAN, 48309				
<b>EXHIBIT 'B' STORM WATER SYSTEM PLAN</b> <b>RAYCONNECT, INC.</b> DEVONDALE ROAD FACILITY ROCHESTER HILLS, MICHIGAN				
DES.	RLS	SUR	N/A	SCALE 1" = 120'
DN.	PB	F.M.	DNH	DATE 11-07-08
			JOB NO. 2008027	DWG. NO. EXH B



PROFESSIONAL  
ENGINEERING  
ASSOCIATES  
2430 Rochester Ct. Suite 100  
Troy, MI 48063-1872  
(248) 688-9090

**EXHIBIT 'C'**  
**OPERATIONS AND MAINTENANCE MANUAL**

**RAYCONNECT INDUSTRIAL BUILDING  
STORMWATER MAINTENANCE PLAN  
ROCHESTER HILLS, MICHIGAN**

**PRELIMINARY COPY**

**PROPERTY OWNER:  
RAYCONNECT, INC.  
3011 RESEARCH DRIVE  
ROCHESTER HILLS, MI, 48309  
Phone: (248) 537-3237  
Contact: Mr. Earl Brown**

Prepared by:  
Professional Engineering Associates, Inc  
2430 Rochester Court, Suite #100  
Troy, Michigan, 48083-1872  
Phone: (248) 689-9090  
Contact: Rachel Sugden, P.E.

November 7, 2008

## **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 and bioswales as incorporated into and detailed on the approved Construction Plans as prepared by Professional Engineering Associates, Inc. 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. Earl Brown, President  
Rayconnect  
3011 Research Drive  
Rochester Hills, Michigan, 48309  
Phone: (248) 537-3237

### **PROPERTY INFORMATION:**

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

**LEGAL DESCRIPTION:** (see Exhibit 'A' of the Storm Water Maintenance Agreement)  
(Per Warranty Deed recorded in Liber 10352, Page 405, OCR.)

#### **PARCEL 1**

A part of Lot 1, SUPERVISOR'S PLAT NO. 9, as recorded in Liber 59 of plats, on Page 13, Oakland County Records, being a part of the West 1/2 of the SE 1/4 of Section 29, Town 3 North, Range 11 East, Avon Township, Oakland County, Michigan, more particularly described as: Beginning at the SW corner of said lot, thence N01°01'10"E, 125.12 feet along the West line of said Lot 1, also being the centerline of a 60 foot wide easement for roadway; thence N88°31'00"E, 348.61 feet; thence S00°58'05"W, 125.11 feet to a point on the South line of said Lot 1; thence S88°31'00"W, 348.72 feet along the South lot line to the Point of Beginning. Parcel No: 15-29-452-028

AND

#### **PARCEL 2**

A part of Lot 1 and Lot 2, of "SUPERVISOR'S PLAT NO. 9", as recorded in Liber 59 on Page 13, of Plats, Oakland County Records, being a part of the West 1/2 of the Southeast 1/4 of Section 29, Town 3 North, Range 11 East, Avon Township, Oakland County, Michigan, more particularly described as: Commencing at the Southwest corner of said

Rayconnect, Inc.  
Rochester Hills, Michigan

Lot 1, thence N01°01'10"E, 125.12 feet along the West line of said Lot 1, to the Point of Beginning, thence the following three courses along said West line of Lot 1, also the centerline of a 60 foot wide easement for roadway; (1) N01°01'10"E, 229.55 feet, and (2) N19°01'20"W, 193.76 feet, and (3) N01°04'48"E, 28.01 feet to the Northwest corner of said Lot 1; thence N87°01'10"E, 801.69 feet along the North line of said Lot 1 and 2, also being the centerline of a 60 foot wide easement for roadway as platted; thence S01°35'30"W, 588.87 feet along the East line of said Lot 2; thence S88°31'00"W, 379.46 feet along the South line of said Lot 2; thence N00°58'05"E, 125.11 feet; thence S88°31'00"W, 348.61 feet to the Point of Beginning, and containing 8.893 acres. Subject to the rights of any easements, restrictions of rights of way either recorded.

### **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
- Detention Basin
- Bioswale
- Pre-Treatment Device (CDS 2015)

### **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 of ten (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. Stormwater 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 stormwater 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 can not 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:**

#### **Parking Lot Sweeping:**

Routine sweeping of all paved surfaces provides a more attractive appearance and removes accumulations of sediment and trash that tend to migrate into stormwater 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. Requirements for grasses in bioswales will vary see the applicable section below. 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 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.

**Stormwater System Maintenance Items:**

The following narratives give an overview of the maintenance requirements of the different components of the stormwater 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.

Bioswale:

The bioswale should be kept free of dead leaves and vegetation, trash, debris or any other foreign matter that would inhibit infiltration of runoff. The swale outlet control structure should be checked for structural integrity as mentioned above for the storm sewer structures, and any visible signs of erosion or flow bypassing the structure. The bioswale itself will trap sediment under normal conditions, so the amount of sediment should be monitored over time, and removed when the accumulated depth reaches 3"-4" total. The planted vegetation within the bioswale should conform to that shown on the construction plans, and any invasive species should be removed from the swale. Regular lawn fertilizing and mowing should not occur within the bioswale at all. Mowing should cease at the top of bank for the bioswale. The operation of the bioswale and the outlet control structure should be observed during a wet weather event to ensure the proper functioning of the swale. A civil engineer should be retained if problems are thought to exist. 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.

Stormwater Pre-Treatment Device (CDS 2015):

Refer to the attached maintenance manual from the manufacturer for all inspection and maintenance requirements for the CDS 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 build up 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 CDS stormwater treatment structure.

# STORMWATER SEWER SYSTEM

DATE/TIME OF INSPECTION: \_\_\_\_\_

INSPECTOR: \_\_\_\_\_

## STORMWATER SEWER SYSTEM MAINTENANCE TASKS AND SCHEDULE

POST CONSTRUCTION

MAINTENANCE ACTIVITIES  
MONITORING/INSPECTION

SYSTEM COMPONENTS	Catch Basins, Inlets, and Manholes	Storm Sewer Pipes	Rip Rap	Buffer Strip	FREQUENCY	COMMENTS
Inspect for Sediment Accumulation	X	X			Annually	
Inspect for Floatables, dead vegetation and debris	X	X		X	Annually and after major rainfall	
Inspect for erosion			X	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	
PREVENTATIVE MAINTENANCE						
Remove accumulated sediment	X	X			Annually or as needed	
Remove floatables, dead vegetation and debris	X	X		X	Annually or as needed	
REMEDIAL ACTIONS						
Repair/stabilize areas of erosion			X	X	As Needed	
Structural Repairs	X	X			As Needed	
Make adjustments/repairs to ensure proper functioning	X	X	X		As Needed	

## SUMMARY:

INSPECTORS REMARKS: \_\_\_\_\_

OVERALL CONDITION OF FACILITY: \_\_\_\_\_

RECOMMENDED ACTIONS NEEDED: \_\_\_\_\_

DATES ANY MAINTENANCE MUST BE COMPLETED BY: \_\_\_\_\_

No.		By		Date		Revisions (Description)	
RAYCONNECT, INC. 3011 RESEARCH DRIVE ROCHESTER HILLS, MICHIGAN, 48309							
STORM SEWER SYSTEM INSPECTION CHECKLIST RAYCONNECT, INC. DEVONDALE ROAD FACILITY ROCHESTER HILLS, MICHIGAN							
DES.	RLS	SUR	N/A	SCALE	NONE	JOB NO.	2008027
DN.	PB	P.M.	DNH	DATE	11-10-08	DWG. NO.	CHKLST



**PROFESSIONAL  
ENGINEERING  
ASSOCIATES**

2430 Rochester Ct. Suite 100  
Troy, MI 48063-1872  
(248) 689-6080

# BIOSWALE

DATE/TIME OF INSPECTION: \_\_\_\_\_

INSPECTOR: \_\_\_\_\_

## BIOSWALE MAINTENANCE TASKS AND SCHEDULE

### POST CONSTRUCTION

### MAINTENANCE ACTIVITIES MONITORING/INSPECTION

SYSTEM COMPONENTS	SYSTEM COMPONENTS				FREQUENCY	COMMENTS
	Outlet Structure	Storm Sewer Pipe	Bioswale Plantings	Buffer Strip		
Inspect for Sediment Accumulation	X	X	X	X	Annually	
Inspect for Floatables, dead vegetation and debris	X	X	X	X	Annually and after major rainfall	
Inspect for erosion			X	X	Annually	
Inspect all components during wet weather and compare to as-built plans	X	X			Annually	
Inspect inside of structure and pipes for cracks, spalling, joint failure, settlement, sagging and misalignment.	X	X			Annually	
Inspect for invasive plant species			X	X	Annually	
<b>PREVENTATIVE MAINTENANCE</b>						
Remove accumulated sediment	X	X	X	X	Annually or as needed	
Remove floatables, dead vegetation and debris	X	X	X	X	Annually or as needed	
Professional application of herbicide for invasive species that maybe present			X	X	Annually or as needed	
<b>REMEDIAL ACTIONS</b>						
Repair/stabilize areas of erosion			X	X	As Needed	
Structural Repairs	X	X			As Needed	
Make adjustments/repairs to ensure proper functioning	X	X	X		As Needed	

## SUMMARY:

INSPECTORS REMARKS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

OVERALL CONDITION OF FACILITY: \_\_\_\_\_

RECOMMENDED ACTIONS NEEDED: \_\_\_\_\_

DATES ANY MAINTENANCE MUST BE COMPLETED BY: \_\_\_\_\_

No.		By		Date		Revisions (Description)	
<b>RAYCONNECT, INC.</b> 3011 RESEARCH DRIVE ROCHESTER HILLS, MICHIGAN, 48309							
<b>BIOSWALE INSPECTION CHECKLIST</b> <b>RAYCONNECT, INC.</b> DEVONDALE ROAD FACILITY ROCHESTER HILLS, MICHIGAN							
DES.	RLS	SUR	N/A	SCALE	NONE	JOB NO.	2008027
DN.	PB	P.M.	DNH	DATE	11-10-08	DWG. NO.	CHKLST



**PROFESSIONAL ENGINEERING ASSOCIATES**  
 2430 Rochester Ct. Suite 100  
 Troy, MI 48063-1872  
 (248) 888-8090

# OUTLET CONTROL AND OVERFLOW STRUCTURES

DATE/TIME OF INSPECTION: \_\_\_\_\_

INSPECTOR: \_\_\_\_\_

## OUTLET CONTROL AND OVERFLOW MAINTENANCE TASKS AND SCHEDULE

POST CONSTRUCTION

MAINTENANCE ACTIVITIES  
MONITORING/INSPECTION

SYSTEM COMPONENTS	STRUCTURES				FREQUENCY	COMMENTS
	Structures	Outlet Pipes	Rip Rap	Grates		
Inspect for Sediment Accumulation	X	X	X		Annually	
Inspect for Floatables, dead vegetation and debris	X	X	X	X	Annually and after major rainfall	
Inspect for erosion			X		Annually	
Inspect all components during wet weather and compare to as-built plans*	X	X	X	X	Annually	
Inspect inside of structures and pipes for cracks, spalling, joint failure, settlement, sagging and misalignment.	X	X			Annually	
PREVENTATIVE MAINTENANCE						
Remove accumulated sediment	X	X	X		Annually or as needed	
Remove floatables, dead vegetation and debris	X	X	X	X	Annually or as needed	
Replace or wash/clean stone filter jacket	X				As needed	
REMEDIAL ACTIONS						
Repair/stabilize areas of erosion			X		As Needed	
Structural Repairs	X	X			As Needed	
Make adjustments/repairs to ensure proper functioning	X	X	X	X	As Needed	

\*A civil engineer should be retained to observe basin operation

## SUMMARY:

INSPECTORS REMARKS: \_\_\_\_\_

OVERALL CONDITION OF FACILITY: \_\_\_\_\_

RECOMMENDED ACTIONS NEEDED: \_\_\_\_\_

DATES ANY MAINTENANCE MUST BE COMPLETED BY: \_\_\_\_\_

No.		By		Date	
RAYCONNECT, INC. 3011 RESEARCH DRIVE ROCHESTER HILLS, MICHIGAN, 48309					
OUTLET CONTROL & OVERFLOW STRUCTURE INSPECTION CHECKLIST RAYCONNECT, INC. DEVONDALE ROAD FACILITY ROCHESTER HILLS, MICHIGAN					
DES.	RLS	SUR. N/A	SCALE	NONE	JOB NO. 2008027
DN.	PB	P.M. DNH	DATE	11-10-08	DWG. NO. CHKLIST



**PROFESSIONAL  
ENGINEERING  
ASSOCIATES**

2430 Rochester Ct. Suite 100  
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(248) 889-9090

# SEDIMENTATION AND DETENTION BASINS

DATE/TIME OF INSPECTION: \_\_\_\_\_

INSPECTOR: \_\_\_\_\_

## SEDIMENTATION AND DETENTION BASINS MAINTENANCE TASKS AND SCHEDULE

POST CONSTRUCTION

MAINTENANCE ACTIVITIES  
MONITORING/INSPECTION

SYSTEM COMPONENTS	SYSTEM COMPONENTS					FREQUENCY	COMMENTS
	Riprap at Inlets	Overflow Spillway	Sideslopes & Banks	Buffer Strip	Basins		
Inspect for Sediment Accumulation	X	X			X	Annually	
inspect for Floatables, dead vegetation and debris	X	X	X	X	X	Annually and after major rainfall	
inspect for erosion	X	X	X	X	X	Annually	
Inspect all components during wet weather and compare to as-built plans*	X	X			X	Annually	
Inspect for invasive plant species			X	X	X	Annually	
PREVENTATIVE MAINTENANCE							
Remove accumulated sediment	X	X			X	Annually or as needed	
Remove floatables, dead vegetation and debris	X	X	X	X	X	Annually or as needed	
Professional application of herbicide for invasive species that maybe present			X	X	X	Annually or as needed	
Repair Erosion and/or reseed bare areas	X	X	X	X	X	Annually or as needed	
REMEDIAL ACTIONS							
Repair/stabilize areas of erosion	X	X	X	X	X	As Needed	
Structural Repairs	X	X				As Needed	
Make adjustments/repairs to ensure proper functioning	X	X			X	As Needed	
Excavate and reshape Sed. Basin after major sediment removal (once sediment accumulates to 6"-12" or re-suspension of sediment is observed)*					X	As Needed	

\*A civil engineer should be retained to observe basin operation

### SUMMARY:

INSPECTORS REMARKS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

OVERALL CONDITION OF FACILITY: \_\_\_\_\_

RECOMMENDED ACTIONS NEEDED: \_\_\_\_\_

DATES ANY MAINTENANCE MUST BE COMPLETED BY: \_\_\_\_\_

No.		By		Ch.		Revisions (Description)		Date	
<b>RAYCONNECT, INC.</b> 3011 RESEARCH DRIVE ROCHESTER HILLS, MICHIGAN, 48309									
SEDIMENTATION & DETENTION BASIN INSPECTION CHECKLIST <b>RAYCONNECT, INC.</b> DEVONDALE ROAD FACILITY ROCHESTER HILLS, MICHIGAN									
DES.	RLS	SUR.	N/A	SCALE	NONE	JOB NO.	2008027	 PROFESSIONAL ENGINEERING ASSOCIATES 2400 Rochester Ct Suite 100 Troy, MI 48063-1872 (248) 689-9090	
DN.	PB	P.M.	DNH	DATE	11-10-08	DWG. NO.	CHKLST		

**OPERATIONS AND MAINTENANCE GUIDELINES**  
**For the CDS Technologies Models PMSU, PSW & PSWC**  
**CONTINUOUS DEFLECTIVE SEPARATION UNIT**  
**Located at**

**INTRODUCTION**

The CDS unit is an important and effective component of your storm water management program and proper operation and maintenance of the unit are essential to demonstrate your compliance with local, state and federal water pollution control requirements.

The CDS technology features a patented non-blocking, indirect screening technique developed in Australia to treat water runoff. The unit is highly effective in the capture of suspended solids, fine sands and larger particles. Because of its non-blocking screening capacity, the CDS unit is un-matched in its ability to capture and retain gross pollutants such as trash and debris. In short, CDS units capture a very wide range of organic and in-organic solids and pollutants that typically result in tons of captured solids each year such as: Total suspended solids (TSS) and other sedimentitious materials, oil and greases, trash, and other debris (including floatables, neutrally buoyant, and negatively buoyant debris). These pollutants will be captured even under very high flow rate conditions.

CDS units are equipped with conventional oil baffles to capture and retain oil and grease. Laboratory evaluations show that the CDS units are capable of capturing up to 70% of the free oil and grease from storm water. CDS units can also accommodate the addition of oil sorbents within their separation chambers. The addition of the oil sorbents can ensure the permanent removal of 80% to 90% of the free oil and grease from the storm water runoff.

**OPERATIONS**

The CDS unit is a non-mechanical self-operating system and will function any time there is flow in the storm drainage system. The unit will continue to effectively capture pollutants in flows up to the design capacity even during extreme rainfall events when the design capacity may be exceeded. Pollutants captured in the CDS unit's separation chamber and sump will be retained even when the units design capacity is exceeded.

**CDS UNIT CLEANOUT**

The frequency of cleaning the CDS unit will depend upon the generation of trash and debris and sediments in your application. Cleanout and preventive maintenance schedules will be determined based on operating experience unless precise pollutant loadings have been determined. The unit should be periodically inspected to determine the amount of accumulated pollutants and to ensure that the cleanout frequency is adequate to handle the predicted pollutant load being processed by the CDS unit. The recommended cleanout of solids within the CDS unit's sump should occur at 75% of the

sump capacity. However, the sump may be completely full with no impact to the CDS unit's performance.

Access to the CDS unit is typically achieved through two manhole access covers – one allows inspection and cleanout of the separation chamber (screen/cylinder) & sump and another allows inspection and cleanout of sediment captured and retained behind the screen. The PSW & PSWC off-line models have an additional access cover over the weir of the diversion vault. For units possessing a sizable depth below grade (depth to pipe), a single manhole access point would allow both sump cleanout and access behind the screen.

CDS Technologies Recommends The Following:

**NEW INSTALLATIONS** – Check the condition of the unit after every runoff event for the first 30 days. The visual inspection should ascertain that the unit is functioning properly (no blockages or obstructions to inlet and/or separation screen), measuring the amount of solid materials that have accumulated in the sump, the amount of fine sediment accumulated behind the screen, and determining the amount of floating trash and debris in the separation chamber. This can be done with a calibrated “dip stick” so that the depth of deposition can be tracked. Refer to the “Cleanout Schematic” (**Appendix B**) for allowable deposition depths and critical distances. Schedules for inspections and cleanout should be based on storm events and pollutant accumulation.

**ONGOING OPERATION** – During the rainfall season, the unit should be inspected at least once every 30 days. The floatables should be removed and the sump cleaned when the sump is 75-85% full. If floatables accumulate more rapidly than the settleable solids, the floatables should be removed using a vactor truck or dip net before the layer thickness exceeds one to two feet.

Cleanout of the CDS unit at the end of a rainfall season is recommended because of the nature of pollutants collected and the potential for odor generation from the decomposition of material collected and retained. This end of season cleanout will assist in preventing the discharge of pore water from the CDS® unit during summer months.

**USE OF SORBENTS** – It needs to be emphasized that the addition of sorbents is not a requirement for CDS units to effectively control oil and grease from storm water. The conventional oil baffle within a unit assures satisfactory oil and grease removal. However, the addition of sorbents is a unique enhancement capability special to CDS units, enabling increased oil and grease capture efficiencies beyond that obtainable by conventional oil baffle systems.

Under normal operations, CDS units will provide effluent concentrations of oil and grease that are less than 15 parts per million (ppm) for all dry weather spills where the volume is less than or equal to the spill capture volume of the CDS unit. During wet weather flows, the oil baffle system can be expected to remove between 40 and 70% of the free oil and grease from the storm water runoff.

CDS Technologies only recommends the addition of sorbents to the separation chamber if there are specific land use activities in the catchment watershed that

could produce exceptionally large concentrations of oil and grease in the runoff, concentration levels well above typical amounts. If site evaluations merit an increased control of free oil and grease then oil sorbents can be added to the CDS unit to thoroughly address these particular pollutants of concern.

#### **Recommended Oil Sorbents**

Rubberizer® Particulate 8-4 mesh or OARS™ Particulate for Filtration, HPT4100 or equal. Rubberizer® is supplied by Haz-Mat Response Technologies, Inc. 4626 Santa Fe Street, San Diego, CA 92109 (800) 542-3036. OARS™ is supplied by AbTech Industries, 4110 N. Scottsdale Road, Suite 235, Scottsdale, AZ 85251 (800) 545-8999.

The amount of sorbent to be added to the CDS separation chamber can be determined if sufficient information is known about the concentration of oil and grease in the runoff. Frequently the actual concentrations of oil and grease are too variable and the amount to be added and frequency of cleaning will be determined by periodic observation of the sorbent. As an initial application, CDS recommends that approximately 4 to 8 pounds of sorbent material be added to the separation chamber of the CDS units per acre of parking lot or road surface per year. Typically this amount of sorbent results in a ½ inch to one (1") inch depth of sorbent material on the liquid surface of the separation chamber. The oil and grease loading of the sorbent material should be observed after major storm events. Oil Sorbent material may also be furnished in pillow or boom configurations.

The sorbent material should be replaced when it is fully discolored by skimming the sorbent from the surface. The sorbent may require disposal as a special or hazardous waste, but will depend on local and state regulatory requirements.

#### **CLEANOUT AND DISPOSAL**

A vactor truck is recommended for cleanout of the CDS unit and can be easily accomplished in less than 30-40 minutes for most installations. Standard vactor operations should be employed in the cleanout of the CDS unit. Disposal of material from the CDS unit should be in accordance with the local municipality's requirements. Disposal of the decant material to a POTW is recommended. Field decanting to the storm drainage system is not recommended. Solids can be disposed of in a similar fashion as those materials collected from street sweeping operations and catch-basin cleanouts.

#### **MAINTENANCE**

The CDS unit should be pumped down at least once a year and a thorough inspection of the separation chamber (inlet/cylinder and separation screen) and oil baffle performed. The unit's internal components should not show any signs of damage or any loosening of the bolts used to fasten the various components to the manhole

structure and to each other. Ideally, the screen should be power washed for the inspection. If any of the internal components is damaged or if any fasteners appear to be damaged or missing, please contact CDS Technologies to make arrangements to have the damaged items repaired or replaced:

CDS Technologies, Inc.  
16360 Monterey Road, Suite 250  
Morgan Hill, CA 95037-5406

Phone, Toll Free: (888) 535-7559  
Fax: (408) 782-0721

The screen assembly is fabricated from Type 316 stainless steel and fastened with Type 316 stainless steel fasteners that are easily removed and/or replaced with conventional hand tools. The damaged screen assembly should be replaced with the new screen assembly placed in the same orientation as the one that was removed.

### **CONFINED SPACE**

The CDS unit is a confined space environment and only properly trained personnel possessing the necessary safety equipment should enter the unit to perform particular maintenance and/or inspection activities beyond normal procedure. Inspections of the internal components can, in most cases, be accomplished by observations from the ground surface.

### **RECORDS OF OPERATION AND MAINTENANCE**

CDS Technologies recommends that the owner maintain annual records of the operation and maintenance of the CDS unit to document the effective maintenance of this important component of your storm water management program. The attached **Annual Record of Operations and Maintenance** form (see **Appendix A**) is suggested and should be retained for a minimum period of three years.

APPENDIX A  
ANNUAL RECORD OF  
OPERATIONS & MAINTENANCE

**CDS TECHNOLOGIES  
ANNUAL RECORD  
OF  
OPERATION AND MAINTENANCE**

OWNER \_\_\_\_\_  
 ADDRESS \_\_\_\_\_  
 OWNER REPRESENTATIVE \_\_\_\_\_ PHONE \_\_\_\_\_

**CDS INSTALLATION:**

MODEL DESIGNATION \_\_\_\_\_ DATE \_\_\_\_\_  
 SITE LOCATION \_\_\_\_\_  
 DEPTH FROM COVER TO BOTTOM OF SUMP \_\_\_\_\_  
 VOLUME OF SUMP \_\_\_\_\_ CUYD VOLUME/INCH DEPTH \_\_\_\_\_ CUYD

**INSPECTIONS:**

DATE/INSPECTOR	SCREEN INTEGRITY	FLOATABLES DEPTH	SEDIMENT VOLUME	SORBENT DISCOLORATION

OBSERVATIONS OF FUNCTION: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**CLEANOUT:**

DATE	VOLUME FLOATABLES	VOLUME SEDIMENTS	METHOD OF DISPOSAL OF FLOATABLES, SEDIMENTS, DECANT AND SORBENTS

OBSERVATIONS:  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**SCREEN MAINTENANCE:**

DATE OF POWER WASHING, INSPECTION AND OBSERVATIONS: \_\_\_\_\_  
 \_\_\_\_\_

CERTIFICATION:  
 DATE: \_\_\_\_\_

TITLE: \_\_\_\_\_