

STORMWATER MANAGEMENT OPERATION AND MAINTENANCE MANUAL

For

Mavis Tire Supply, LLC

Proposed Automotive Service and Retail Center

***Block 105, Lot 64.01
460 Prospect Avenue
Township of West Orange, Essex County, NJ***

Prepared by:



**DYNAMIC
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A handwritten signature in black ink, appearing to read 'RR Ritchie', is written over a horizontal line.

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- Maintenance Work Order & Checklist
- Maintenance Log
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PROJECT DETAILS

A. Introduction and Description of Facilities

The purpose of this report is to provide guidelines and information regarding the required maintenance for the proposed stormwater management facilities to be constructed in association with the redevelopment of Block 105, Lot 64.01, located in the Township of West Orange, Essex County, New Jersey. According to the Township of West Orange Zoning Map, the site is located in the (B-2) General Business District. The proposed property consists of 0.74 acres (+/-32,118 SF) and is located on Prospect Avenue (County Route #677), West Orange Township.

The site is currently developed with an existing realtor's office consisting of a two (2) story building, parking, sidewalks, lighting and other site amenities. The proposed project will replace the existing 3,338 SF (GFA) building east of Prospect Avenue to be redeveloped with an Automotive Service and Retail Center. The proposed building will include a total footprint of approximately 6,205 SF. The overall development will result in approximately 0.04 acres of new impervious surfaces and approximately 0.8 acres of land disturbance. Moreover, the proposed development will reduce existing motor vehicle surfaces by approximately 0.009 acres. Additional site improvements include modifications to the associated parking areas, landscaping, lighting, signage, and utilities as reflected on the accompanying Site Plan drawings.

The facility will require periodic inspections and maintenance. The following information can be considered a guideline for the continued maintenance including suggested inspection scheduling as well as performance objectives.

B. Project Contacts:

The applicant is responsible for maintaining a detailed log of all preventative and corrective maintenance actions for the constructed stormwater facilities incorporated into the design, including record of all inspections and copies of all maintenance-related work orders.

The applicant is also responsible for maintenance to evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and deed as needed. The applicant shall retain a copy of this report onsite should a public entity request this report or documentation of said maintenance in the future.

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C. Proposed Best Management Practices:**Above-ground Bioretention Basin & Underground Detention Basin**

The stormwater management design utilizes one (1) above-ground bioretention basin and one (1) underground detention basin. The above-ground bioretention basin accepts stormwater runoff from the proposed parking lots, paved areas, and other open space areas which are designed to convey overland flow directly to the basin via a 4' wide curb cut and riprap swale. The proposed underground detention basin accepts stormwater runoff from the proposed building, collected by roof drains along the rear of the building. Stormwater will be released at a controlled rate through the outlet control structure from the proposed underground detention basin.

Stormwater runoff that is detained within the basins shall drain within 72 hours. If significant increases or decreases in this draining time are observed, a qualified licensed Professional Engineer shall be contacted to evaluate possible corrective measures that may be required.

INSPECTION AND MAINTENANCE:**A. Routine Inspection and Maintenance of the Stormwater Management Facilities:**

The stormwater management basin has been designed to control stormwater and reduce flooding and degradation of water quality. Without proper routine inspection and maintenance, the basin may lose some or all of its capability to function at its full capacity. Lack of adequate maintenance at these facilities could lead to system failures.

A consulting Professional Engineer should perform regularly scheduled maintenance inspections of the stormwater facilities at least four (4) times each year. The primary purpose of these inspections is to ascertain the operational condition and safety of the facilities, particularly the condition of the outlet structures, trash racks, and other safety-related aspects. Inspections will provide information on the effectiveness of regularly scheduled Preventative Maintenance Procedures and help to identify where changes in the extent and schedule of the procedures are warranted. Finally, the facility inspections should also be used to determine the need for and timing of Corrective Maintenance procedures.

Routine maintenance of this facility should be identified as Functional Maintenance. Functional Maintenance is further broken down into two (2) categories: Preventative and Corrective. Listed

below are the Preventative and Corrective Maintenance Procedures to be performed on a routine basis:

1. Preventive Maintenance Procedures:

The purpose of Preventative Maintenance is to maximize the effectiveness of the stormwater management aspects of the basin so that it remains operational and safe as often as practicable and to minimize the need for emergency or corrective maintenance. These procedures are as follows:

a) Removal and Disposal of Trash/Debris and Sediment:

All stormwater management components expected to receive and/or trap debris and sediment must be inspected for clogging and excessive debris and sediment accumulation at least four times annually as well as after every storm exceeding one inch of rainfall. Such components may include the basin, stormwater conveyance network (piping & inlet), and outlet control structure.

These stormwater management components shall be visually inspected for the accumulation of excessive sediment as well as damage in the form of cracking, erosion, and rutting. Sediment build-up within the stormwater conveyance network shall be removed with the use of flushing. Sediment-laden water is to be captured with the use of a pipe plug, or approved equal, prior to the basin and simultaneously pumped out with the use of a pump with a sediment bag. Sediment should be disposed of in accordance with all applicable local, state, and federal regulations.

Removal of trash and debris will prevent possible damage to trash racks and outlet structure openings and eliminate potential mosquito breeding habitats. Debris and trash must be properly hauled off the site and transferred to an approved disposal site.

The basin should also be evaluated for excessive deposition of sediment. Accumulated sediment should be removed utilizing light-weight equipment to avoid soil compaction before it threatens the storage volume of the basin. Before de-sedimentation activities are performed, consideration should be given to evacuating all standing water from the basin. This may be accomplished by clearing any blocked openings of the outlet structure or by mechanical means (pumping). Disposal of discharged water and sediment must comply with all local, county, state, and federal regulations. Only suitable disposal sites should be utilized. If stable soil conditions exist on site, sediment deposition should not be an excessive maintenance issue. Should a recurrent stabilization situation develop, the inspector should identify the upstream sources of sediment and recommend required stabilization measures. Access has been provided for inspection and maintenance of the basin and its components.

b) Elimination of Potential Mosquito Breeding Habitats:

The most effective mosquito control program is one that eliminates potential breeding habitats. Almost any stagnant pool of water can be attractive to mosquitoes and may become the source of a large mosquito population. A maintenance program dedicated to eliminating potential breeding areas is preferable to chemical means of controlling mosquitoes. The most important maintenance function is the removal of all obstructions to natural flow patterns before stagnant water conditions can develop. In addition to the maintenance program, the basins are designed to completely drain within 72 hours after each rain event. This aids in the goal of preventing stagnate pools of water, resulting in the elimination of potential mosquito breeding habits.

c) Parking Lot Maintenance:

This management measure involves employing pavement cleaning practices, such as parking lot sweeping on a regular basis, to minimize pollutant export to the stormwater conveyance system/basin and downstream of the basin discharge. These cleaning practices are designed to remove sediment, debris, and other pollutants from access drive and parking lot surfaces that are a potential source of pollution impacting urban waterways. Mechanical machines that use vacuum-assisted dry sweeping to remove particulate matter shall be utilized as these have the ability to remove finer sediment particles. Parking lots and access drives shall be swept/vacuumed at least once a month. The disposal of the swept material must be properly hauled off the site and transferred to an approved disposal site.

d) Observation After Rainfall:

This management measure involves monitoring the amount of time the basin takes to drain to ensure it is working properly. The basin should drain in less than 72 hours after each rain event. If significant increases or decreases are observed in the drawdown time, a qualified licensed Professional Engineer shall be contacted to evaluate the basin's bottom surface, subsoil, and both groundwater and tailwater elevations to determine what corrective measures may need to be implemented.

2. Corrective Maintenance Procedures:

a) Removal of Debris and Sediment:

Sediment, debris, and trash that threaten the discharge capacity of the basin should be removed immediately with the use of light-weight equipment to avoid soil compaction and properly disposed of. As noted previously, it is recommended that all water be evacuated from the basin with a pump before any significant amount of sediment, settled debris, or trash is removed from the basin. The lack of an available disposal site should

not delay the removal of trash, debris, and sediment. Temporary disposal sites should be utilized if necessary.

b) Structural Repairs:

Structural damage to outlet and inlet structures, trash racks, access hatches, roadways and walls as a result of vandalism, flood events, settlement, or other causes must be repaired promptly. The urgency of the repairs will depend upon the nature of the damage and its effects on the safety and operation of the facility. The analysis of structural damage and the design and performance of structural repairs should only be undertaken by the consulting Professional Engineer.

c) Extermination of Mosquitoes:

If neglected, basins can become an ideal mosquito breeding area. The extermination of mosquitoes will usually require the services of the County Mosquito Commission. If mosquito control in the facility becomes necessary, the preventative maintenance program should be re-evaluated, and more emphasis should be placed on control of mosquito breeding habitats.

d) Snow and Ice Removal:

Accumulations of snow and ice can threaten the functioning of the inlets and outlets. Provision of the equipment, material, and personnel to monitor and remove snow and ice from critical areas will ensure the function of the facility during the winter months.

3. Recording and Logging of all Maintenance Activities:

The recording of all maintenance work and inspections provides valuable data on the facility's condition. A review of this information will also help to establish more efficient and beneficial maintenance procedures and practices. All recorded information should be directed to the owner of the basin for review and subsequent follow-up on recommendations. Data obtained from informal inspections should be retained; however, this data does not have to be submitted to NJDEP. A copy of all records and logs of maintenance activities shall be submitted to the Township Engineer annually for review.

4. Summary of Maintenance Procedures:

Preventative Maintenance

- a) Removal and Disposal of Trash/Debris and Sediment
- b) Elimination of Potential Mosquito Breeding Habitats
- c) Parking Lot Maintenance

- d) Observation After Rainfall

Corrective Maintenance

- a) Removal of Debris and Sediment
- b) Structural Repairs
- c) Extermination of Mosquitoes
- d) Snow and Ice Removal

B. Maintenance Equipment and Materials:

1. Transportation Equipment

- a) Trucks for Transportation of Materials
- b) Trucks for Transportation of Equipment
- c) Vehicles for Transportation of Personnel

2. Debris, Trash and Sediment Removal Equipment

- a) Loader
- b) Backhoe
- c) Grader
- d) Dredging equipment
- e) Portable pump for dewatering with sediment bag

3. Miscellaneous Equipment

- a) Shovels
- b) Rakers
- c) Picks
- d) Wheel Barrows
- e) Painting Equipment
- f) Gloves
- g) Brooms

4. Standard Mechanics Tools

5. Tools for Maintenance of Equipment

6. Parking Maintenance Equipment

- a) Sweeping/Vacuuming Equipment
- b) Snow Plowing Equipment

- c) Snow Shovels

C. Checklist and Logs:

The Appendix of this report contains sample checklists and logs regarding various aspects of the basin maintenance and inspection. A brief description of the use of each form is listed below:

1. "Maintenance Work Order and Checklist" – a comprehensive form outlining both required and completed maintenance work.
2. "Maintenance Log" – a summary table for recording all maintenance work at the site.
3. "Inspection Log" – a summary table for recording the results of all inspections of the basin.
4. "Inspection Checklist" – a comprehensive form outlining required inspection work.

D. Estimated Maintenance Costs and Tasks:

The following is a summary of the required maintenance tasks and associated costs in written and tabular form:

- Inspections to be performed by a consulting engineer on an annual basis. - **\$4,000.00.**
- Inspections to be performed by the property owner and/or a maintenance designee on a monthly basis and/or after a storm event exceeding 1 inch of rainfall – **Minimal cost associated – Owner's responsibility - \$500.00.**
- Stormwater conveyance system and outlet control structure access for debris removal to be performed on an annual basis and/or as inspection routine dictates - **\$2,000.00.**
- Surface debris removal including garbage and organic matter to be performed in conjunction with grounds maintenance, including leaf removal in the Fall and removal of excessive amounts of snow, if necessary, in the Winter. These tasks are encouraged as necessary to maintain safe operating conditions (twice a month from Spring through Winter recommended or on a needed basis) - **\$1,000.00.**

Maintenance Schedule Summary:

Task Identification	Task Frequency	Task Estimated Cost
Inspection by licensed professional consulting engineer	Four (4) times per year	\$1,000.00/Each
Inspection by property owner and/or maintenance designee	Once (1) per month (or after a storm event exceeding 1 inch of rainfall)	\$500.00/Each
Debris removal from stormwater conveyance system (inlets, pipes, manholes, and outlet control structure)	Once (1) per year	\$2,000.00
Surface debris removal (garbage & organic matter) including leaves in the Fall and snow in the Winter	Twice (2) per month (or on needed basis)	\$1,000.00/Each

APPENDIX

MAINTENANCE WORK ORDER & CHECKLIST

**MAINTENANCE WORK ORDER AND CHECKLIST
FOR STORMWATER MANAGEMENT FACILITIES**

NAME OF FACILITY: _____
 LOCATION: _____ DATE: _____
 WEATHER: _____ WORK STARTED: _____
 MAINTENANCE PERFORMED BY: _____ WORK COMPLETED: _____

A. PREVENTATIVE MAINTENANCE			
WORK ITEMS	ITEMS REQUIRED	ITEMS DONE	COMMENTS AND SPECIAL INSTRUCTIONS
1. GRASS CUTTING			
A. BOTTOMS			
B. EMBANKMENTS AND SIDE SLOPES			
C. PERIMETER AREAS			
D. ACCESS AREAS AND ROADS			
E. OTHERS			
2. GRASS MAINTENANCE			
A. FERTILIZING			
B. RE-SEEDING			
C. DE-THATCHING			
D. PEST CONTROL			
E. OTHERS			
3. VEGETATIVE COVER			
A. FERTILIZING			
B. PRUNING			
C. PEST CONTROL			
D. POISONOUS PLANTS			
E. OTHERS			
4. TRASH AND DEBRIS REMOVAL			
A. BOTTOMS			
B. EMBANKMENTS AND SIDE SLOPES			
C. PERIMETER AREAS			
D. ACCESS AREAS AND ROADS			
E. INLETS			
F. OUTLETS AND TRASH RACKS			
G. OTHERS			
5. SEDIMENT REMOVAL			
A. INLETS			
B. OUTLETS AND TRASH RACKS			
C. LOW FLOW CHANNELS			
D. BOTTOMS			
E. OTHERS			
6. PEST CONTROL			
A. GEESE			
B. MOSQUITO BREEDING			
C. RODENTS / RODENT HOLES			
D. OTHERS			
7. STRUCTURAL REPAIRS			
A. VALVES			
B. SLUICE GATES			
C. PUMPS			
D. FENCE GATES			
E. LOCKS			
F. ACCESS HATCHES			
G. OTHER:			
8. POND MAINTENANCE			
A. AERATION EQUIPMENT			
B. DEBRIS AND TRASH REMOVAL			
C. WEED REMOVAL			
D. OTHER:			
9. OTHER PREVENTIVE MAINTENANCE			
A. PARKING LOT SWEEPING			
B. EMPTYING TRASH RECEPTACLES			
C. PUMPS AND VALVES			
D. ELECTRICAL PANEL AND WIRING			
E. DEWATERING			
F. GRAFFITI REMOVAL			
E. OTHER:			

B. CORRECTIVE MAINTENANCE			
WORK ITEMS	ITEMS REQUIRED	ITEMS DONE	COMMENTS AND SPECIAL INSTRUCTIONS
1. REMOVAL OF DEBRIS AND SEDIMENT			
2. STRUCTURAL REPAIRS			
3. EMBANKMENTS AND SIDE SLOPES			
4. DEWATERING			
5. BASIN MAINTENANCE			
6. CONTROL OF MOSQUITOES			
7. EROSION REPAIR			
8. FENCE REPAIR			
9. SNOW AND ICE REMOVAL			
10. SAND LAYER REPLACEMENT			
11. OTHER			

C. AESTHETIC MAINTENANCE			
WORK ITEMS	ITEMS REQUIRED	ITEMS DONE	COMMENTS AND SPECIAL INSTRUCTIONS
1. GRAFFITI REMOVAL			
2. GRASS TRIMMING			
3. WEEDING			
4. OTHERS			

GENERAL NOTES AND REMARKS:

WORK ORDER PREPARED BY: _____

WORK COMPLETED BY: _____

MAINTENANCE LOG

MAINTENANCE LOG FOR STORMWATER MANAGEMENT FACILITIES

NAME OF FACILITY: _____
LOCATION: _____

[illegible]

						A. PREVENTIVE MAINTENANCE						
WORK ITEM				(N) COMPLETED								
1. GRASS CUTTING												
A. BOTTOMS												
B. EMBANKMENTS AND SIDE SLOPES												
C. PERIMETER AREAS												
D. ACCESS AREAS AND ROADS												
E. OTHERS												
2. GRASS MAINTENANCE												
A. FERTILIZING												
B. RE-SEEDING												
C. DE-THATCHING												
D. PEST CONTROL												
E. OTHERS												
3. VEGETATIVE COVER												
A. FERTILIZING												
B. PRUNING												
C. PEST CONTROL												
D. POISONOUS PLANTS												
E. OTHERS												
4. TRASH AND DEBRIS REMOVAL												
A. BOTTOMS												
B. EMBANKMENTS AND SIDE SLOPES												
C. PERIMETER AREAS												
D. ACCESS AREAS AND ROADS												
E. INLETS												
F. OUTLETS AND TRASH RACKS												
G. OTHERS												
5. SEDIMENT REMOVAL												
A. INLETS												
B. OUTLETS AND TRASH RACKS												
C. LOW FLOW CHANNELS												
D. BOTTOMS												
E. OTHERS												
6. PEST CONTROL												
A. GEESE												
B. MOSQUITO BREEDING												
C. RODENTS / RODENT HOLES												
D. OTHER:												
7. MECHANICAL COMPONENTS												
A. VALVES												
B. SLUICE GATES												
C. PUMPS												
D. FENCE GATES												
E. LOCKS												
F. ACCESS HATCHES												
G. OTHER:												
8. POND MAINTENANCE												
A. AERATION EQUIPMENT												
B. DEBRIS AND TRASH REMOVAL												
C. WEED REMOVAL												
D. OTHER:												
9. OTHER PREVENTIVE MAINTENANCE												
A. PARKING LOT SWEEPING												
B. EMPTYING TRASH RECEPTACLES												
C. PUMPS AND VALVES												
D. ELECTRICAL PANEL AND WIRING												
E. DEWATERING												
F. GRAFFITI REMOVAL												
E. OTHER:												

B. CORRECTIVE MAINTENANCE											
WORK ITEM	(✓) COMPLETED										
1. REMOVAL OF DEBRIS AND SEDIMENT											
2. STRUCTURAL REPAIRS											
3. EMBANKMENTS AND SIDE SLOPES											
4. DEWATERING											
5. BASIN MAINTENANCE											
6. CONTROL OF MOSQUITOES											
7. EROSION REPAIR											
8. FENCE REPAIR											
9. SNOW AND ICE REMOVAL											
10. SAND LAYER REPLACEMENT											
11. OTHER											

C. AESTHETIC MAINTENANCE											
FACILITY ITEM	(✓) COMPLETED										
1. GRAFFITI REMOVAL											
2. GRASS TRIMMING											
3. WEEDING											
4. OTHERS											

GENERAL NOTES AND REMARKS (REFER TO ITEM NUMBER IF APPLICABLE)

INSPECTION LOG

INSPECTION LOG FOR STORMWATER MANAGEMENT FACILITIES

NAME OF FACILITY: _____
LOCATION: _____

[illegible][illegible]

[illegible][illegible][illegible]

A. EFFECTIVENESS OF EXIST. MAINT. PROGRAM									
B. DAM INSPECTIONS									
C. POTENTIAL MOSQUITO HABITATS									
D. MOSQUITOES									

- GENERAL NOTES AND REMARKS (REFER TO ITEM NUMBER IF APPLICABLE)

[illegible]

INSPECTION CHECKLIST

**INSPECTION CHECKLIST
FOR
STORMWATER MANAGEMENT FACILITIES**

NAME OF FACILITY: _____
 LOCATION: _____
 WEATHER: _____ DATE: _____

FACILITY ITEM	O.K. ¹	ROUTINE ²	URGENT ³	COMMENTS
1. EMBANKMENTS AND SIDE SLOPES				
A. VEGETATION				
B. LININGS				
C. EROSION				
D. SETTLEMENT				
E. SLOUGHING				
F. TRASH AND DEBRIS				
G. SEEPAGE				
H. AESTHETICS				
I. OTHER:				
2. BOTTOMS (DETENTION AND INFILTRATION)				
A. VEGETATION				
B. EROSION				
C. STANDING WATER				
D. SETTLEMENT				
E. TRASH AND DEBRIS				
F. SEDIMENT				
G. AESTHETICS				
H. OTHER:				
3. LOW FLOW CHANNELS (DETENTION)				
A. VEGETATION				
B. LININGS				
C. EROSION				
D. SETTLEMENT				
E. STANDING WATER				
F. TRASH AND DEBRIS				
G. SEDIMENT				
H. OTHER:				
4. PONDS (RETENTION)				
A. VEGETATION				
B. SHORELINE EROSION				
C. AERATION EQUIPMENT				
D. TRASH AND DEBRIS				
E. SEDIMENT				
F. WATER QUALITY				
G. OTHER:				
5. INLET STRUCTURE				
A. CONDITION OF STRUCTURE				
B. EROSION				
C. TRASH AND DEBRIS				
D. SEDIMENT				
E. AESTHETICS				
F. OTHER:				
6. OUTLET STRUCTURE				
A. CONDITION OF STRUCTURE				
B. EROSION				
C. TRASH AND DEBRIS				
D. SEDIMENT				
E. MECHANICAL COMPONENTS				
F. AESTHETICS				
G. OTHER:				

7. EMERGENCY SPILLWAY

A. VEGETATION				
B. LINING				
C. EROSION				
D. TRASH AND DEBRIS				
E. OTHER:				

8. PERIMETER

A. VEGETATION				
B. EROSION				
C. TRASH AND DEBRIS				
D. FENCES AND GATES				
E. AESTHETICS				
G. OTHER:				

9. ACCESS ROADS

A. VEGETATION				
B. ROAD SURFACE				
C. FENCES AND GATES				
D. EROSION				
E. AESTHETICS				
F. OTHER:				

10. MISCELLANEOUS

A. EFFECTIVENESS OF EXIST. MAINT. PROGRAM				
B. DAM INSPECTIONS				
C. POTENTIAL MOSQUITO HABITATS				
D. MOSQUITOES				

- (1) ITEM CHECKED IS IN GOOD CONDITION, AND THE MAINTENANCE PROGRAM IS ADEQUATE.
- (2) ITEM CHECKED REQUIRES ATTENTION, BUT DOES NOT PRESENT AN IMMEDIATE THREAT TO THE FUNCTION OR OTHER FACILITY COMPONENTS.
- (3) THE ITEM CHECKED REQUIRES IMMEDIATE ATTENTION TO KEEP THE FACILITY OPERATIONAL OR TO DAMAGE TO OTHER FACILITY COMPONENTS.
- (4) PROVIDE EXPLANATION AND DETAILS IF COLUMNS 2 OR 3 ARE CHECKED.

GENERAL NOTES AND REMARKS (REFER TO ITEM NUMBER IF APPLICABLE)



INSPECTOR: _____