

STORMWATER MANAGEMENT FACILITIES OPERATION AND MAINTENANCE MANUAL

for

**Altera Development Company, LLC
Phase I
Proposed Site Improvements**

**Block 166.15, Lot 9
769 Northfield Avenue (CR 508)
Township of West Orange
Essex County, NJ**

Prepared by:



245 Main Street, Suite 110
Chester, NJ 07930

A handwritten signature in dark ink, appearing to read 'RJC', is positioned above a horizontal line.

**Robert J. Colucco, PE
NJ Professional Engineer License #55851**

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TABLE OF CONTENTS

PART I: PROJECT DETAILS		Page No.
A.	Introduction and Description of Facilities	2
B.	Project Contacts	2
C.	Proposed Best Management Practices	3
 PART II: INSPECTION & MAINTENANCE		
A.	Routine Inspection and Maintenance of Stormwater Management Facilities	4
	1. Preventative Maintenance Procedures	4
	2. Corrective Maintenance Procedures	7
	3. Summary of Maintenance Procedures	8
B.	Checklists & Logs	9
 PART III: APPENDIX		
•	Drainage & Utility Plan	
•	Estimated Maintenance Costs	
•	Maintenance Equipment and Materials	
•	Maintenance Work Order and Checklist	
•	Maintenance Log	
•	Inspection Checklist	
•	Inspection Log	

PART I: PROJECT DETAILS

A. Introduction and Description of Facilities:

The project site is comprised of Block 166.15, Lot 9 in the Township of West Orange, Essex County, New Jersey and is located at 769 Northfield Avenue (CR 508). The subject site consists of 4.88 acres and is presently fully developed with a multi-story building and associated parking areas. The proposed Phase I site improvements include the renovation of the existing office building, modifications to the existing parking lot to satisfy current ADA regulations and other associated site improvements. Proposed stormwater management improvements under Phase I are limited to an underground piped detention basin beneath the proposed parking area expansion area.

This manual consists of three parts: Part I includes the introduction, project description and a list of project contacts; Part II provides the operation and maintenance instructions for the facility and equipment. Part III provides information regarding the inspection and maintenance activities. This manual shall run with the property and be recorded as part of the deed.

B. Project Contacts:

The owner is responsible to maintain a detailed log of all preventative and corrective maintenance for the structural stormwater measures incorporated into the design, including record of all inspections and copies of all maintenance-related work orders. The owner is also responsible to evaluate the effectiveness of the maintenance plan at least once per year, and adjust the plan and deed as needed. The owner shall be responsible for the maintenance plan, and shall retain a copy of this report should a public entity request this report or documentation of said maintenance in the future.

Applicant
Altera 769, LLC 5910 N. Central Expressway, Suite 1360 Dallas, TX 75206
Municipal Engineer
CME Associates 849 W. Bay Avenue, Suite 7 Barnegat, NJ 08005 Attn: John J. Hess (732) 410-2650
Property Owners
Block 166.15, Lot 6 Altera 769, LLC 5910 N. Central Expressway, Suite 1360 Dallas, Texas 75206
Design Engineer
Dynamic Engineering Consultants, P.C. 245 Main Street, Suite 110 Chester, NJ 07930 Attn: Robert J. Colucco, PE (908) 879-9229
Party Responsible for Maintaining Stormwater Management Facility
Altera 769, LLC 5910 N. Central Expressway, Suite 1360 Dallas, Texas 75206 Attn: Eddie Tillman (972) 897-4961

C. Proposed Best Management Practices:

Underground Detention Basin

Stormwater runoff generated from the proposed parking area is collected by an inlet and conveyed to the underground detention basin. The underground detention basin contains an outlet structure that serves to detain and release stormwater runoff, at a controlled rate, to satisfy the stormwater runoff rate requirements set forth by NJAC 7:8. The stormwater is then routed to the existing stormwater management system located within the property.

PART II: 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 downstream impact. Without proper routine inspection and maintenance, the basin may lose some or all of its capability to function to its full capacity. Lack of adequate maintenance at this facility could lead to system failures.

A consulting Professional Engineer should perform regularly scheduled maintenance inspections of the stormwater facilities at least (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 outlet structures and other safety-related aspects. Inspections will also provide information on the effectiveness of regularly scheduled Preventative Maintenance Procedures, and will help to identify where changes in the extent and scheduling 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 Functional Maintenance is required to insure the safe and effective operation of the storm water management facility and is further broken down into two (2) categories: Preventative and Corrective. It is important to note that a successful Functional Maintenance program will emphasize regularly scheduled Preventative Maintenance over emergency-based Corrective Maintenance. Listed below are the Preventative and Corrective Maintenance Procedures to be performed on a routine basis:

1. Preventative Maintenance Procedures:

The purpose of Preventative Maintenance is to assure that the basin remains operational and safe at all times, while minimizing the need for emergency or corrective maintenance. These procedures are as follows:

a) Removal and Disposal of Trash and Debris

All storm water 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 and inlet), flared end sections, bottoms, riprap or gabion aprons, trash racks and inflow points.

Removal of trash and debris will prevent possible damage to trash racks and outlets, vegetated areas and eliminate potential mosquito breeding habitats. Disposal of debris and trash must comply with all local, county, state, and federal waste flow control regulations. Only suitable disposal and recycling sites should be utilized.

b) Sediment Removal and Disposal

The basin should also be evaluated for excessive deposition of sediment. Accumulated sediment should be removed 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 such as pumping. 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.

c) Mechanical Components

Mechanical components such as valves, sluice gates, pumps, fence gates, locks, and access hatches, should remain functional at all times. Regularly scheduled maintenance should be performed in accordance with the manufactures' recommendations. Additionally, all mechanical components should be operated at least once every three months to assure their continued performance.

d) 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/detention basins and eventually the receiving waters. 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. Other parking lot maintenance features include the use of on-site trash receptacle. These receptacles should be located in strategic areas where the majority of the pedestrian traffic occurs. These receptacles should be emptied daily. The disposal of the solid

waste must be properly hauled off the site and transferred to an approved disposal site.

e) Observation After Rainfall

This management measure involves monitoring the amount of time the detention basin takes to drain to ensure the basin is working properly. The detention basin should drain to the bottom in less than 72 hours. 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.

f) Inspection and Reporting

Regularly scheduled inspections of the facility should be performed by a consulting Professional Engineer. The primary purpose of the inspections is to ascertain the operational condition and safety of the facility. Inspections will also provide information on the effectiveness of regularly scheduled Preventative Maintenance procedures. It should be noted that, in addition to regularly scheduled inspections, an informal inspection should be performed during every visit to stormwater management facilities by maintenance or supervisory personnel.

The recording of all maintenance work and inspections provides valuable data on the condition of the stormwater management facilities. 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 facility for review and subsequent follow-up on recommendations. Inspection and maintenance checklists and logs are included in the Appendix of this manual.

2. Corrective Maintenance Procedures:

Corrective Maintenance is required on an emergency or non-routine basis to correct problems or malfunctions and to restore the intended operation and safe condition of the basin.

a) Removal of Debris and Sediment

Sediment, debris and trash which threaten the discharge capacity of the basin should be removed immediately and properly disposed. 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 headwalls 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) Dewatering

It may be necessary to remove ponded water from within a malfunctioning basin. This ponding may be the result of a blocked principal outlet or poor bottom drainage. Portable pumps may be necessary to remove the ponded water temporarily until a permanent solution can be implemented.

d) Snow and Ice Removal

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

e) Basin Drain Time

The basin is an underground detention basin. In accordance with the Stormwater Management Summary, the amount of time for the basin to drain and reach the base elevation is less than 72 hours.

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.

3. Summary of Maintenance Procedures

Preventative Maintenance

- a. Removal and Disposal of Trash and Debris
- b. Sediment Removal and Disposal
- c. Mechanical Components
- d. Parking Lot Maintenance
- e. Observation After Rainfall
- f. Inspection and Reporting

Corrective Maintenance

- a. Removal of Debris and Sediment
- b. Structural Repairs
- c. Dewatering
- d. Snow and Ice Removal
- e. Basin Drain Time

B. Checklists 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. “Drainage, & Utility Plan” – a plan identifying stormwater management facilities on- site.
2. “Estimated Maintenance Costs” – an estimate of the approximate cost to maintain the proposed stormwater management system on an annual basis.
3. “Maintenance Equipment and Materials” – a comprehensive list of equipment and materials typically required for stormwater management facility maintenance.
4. “Maintenance Work Order and Checklist” – a comprehensive form outlining both required and completed maintenance work.
5. “Maintenance Log” – a summary table for recording of all maintenance work at the site.
6. “Inspection Checklist” – a comprehensive checklist of the items to be inspected.
7. “Inspection Log” – a summary table for recording the results of all inspections.

APPENDIX

DRAINAGE & UTILITY PLAN

ESTIMATED MAINTENANCE COSTS

Estimated Maintenance Costs

An estimated total cost of approximately **\$6,200** will be incurred to maintain the proposed stormwater management system on an annual basis. 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.
- 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
- Stormwater conveyance system and outlet control structure access for debris removal to be performed on an annual basis and/or as inspection routine dictates.
- Surface debris removal including garbage and organic matter to be performed in conjunction with lawn and grounds maintenance, includes removal of leaves in the Fall and removal of excessive amounts of snow (as 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 as-needed basis)

Maintenance Schedule Summary

Task Identification	Task Frequency	Estimated Cost	Annual Cost
Inspection by licensed professional consulting engineer	Once (1) per year	\$1,500.00	\$1,500.00
Inspection by property owner and/or maintenance designee	Once (1) per month (or after a storm event exceeding 1 inch of rainfall)	Minimal Cost	Minimal Cost
Debris removal from conveyance system (inlets, pipes, manholes, and outlet control systems)	Twice (2) per year	\$1,750.00	\$3,500.00
Surface debris removal (garbage & organic matter) including leaves in the Fall and snow in the Winter	Twice (2) per month (or on as-needed basis)	\$50.00	\$1,200.00

MAINTENANCE EQUIPMENT AND MATERIALS

Maintenance Equipment and Materials

A. Transportation Equipment

1. Trucks for Transportation of Materials
2. Trucks for Transportation of Equipment
3. Vehicles for Transportation of Personnel

B. Debris, Trash and Sediment Removal Equipment

1. Vac Truck
2. Portable Pump for Dewatering
3. Sweeping/Vacuuming Equipment
4. Trash Receptacles

C. Miscellaneous Equipment

1. Rakes
2. Picks
3. Painting Equipment
4. Gloves
5. Standard Mechanics Tools
6. Tools for Maintenance of Equipment
7. Safety Equipment
8. Tools for Concrete Work (Mixers, Form Materials, etc.)
9. Welding Equipment (for Repair of Trash Racks, etc.)

D. Materials

1. Spare Parts for Equipment
2. Concrete

E. Parking Lot Maintenance Equipment

1. Sweeping/Vacuuming Equipment
2. Trash Receptacles
3. Snow Plowing Equipment
4. Snow Shovels

MAINTENANCE WORK ORDER AND 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. TRASH AND DEBRIS REMOVAL					
A. BOTTOMS					
B. ACCESS AREAS					
C. INLETS					
D. OUTLETS					
E. OTHERS					
2. SEDIMENT REMOVAL					
A. INLETS					
B. OUTLETS					
C. BOTTOMS					
D. OTHERS					
3. PEST CONTROL					
A. MOSQUITO BREEDING					
B. RODENTS / RODENT HOLES					
C. OTHERS					
4. STRUCTURAL REPAIRS					
A. VALVES					
B. LOCKS					
C. PIPES					
D. INLETS					
E. MANHOLES					
F. OUTLET CONTROL STRUCTURES					
G. ACCESS AREA					
H. ACCESS HATCHES					
I. OTHERS					
5. OTHER PREVENTIVE MAINTENANCE					
A. PARKING LOT SWEEPING					
B. EMPTYING TRASH RECEPTACLES					
C. DEWATERING					
D. OTHERS					

B. CORRECTIVE MAINTENANCE			
WORK ITEMS	ITEMS REQUIRED	ITEMS DONE	COMMENTS AND SPECIAL INSTRUCTIONS
1. REMOVAL OF DEBRIS AND SEDIMENT			
2. STRUCTURAL REPAIRS			
3. DEWATERING			
4. BASIN MAINTENANCE			
5. OTHER			

GENERAL NOTES AND REMARKS:

MAINTENANCE COMPLETED AND BASED ON ALL AREAS VISIBLE AND ACCESSIBLE AT THE TIME OF INSPECTION.

WORK PERFORMED BY: _____

SIGNED: _____ DATE: _____

MAINTENANCE LOG

**MAINTENANCE LOG
FOR STORMWATER MANAGEMENT FACILITIES**

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

A. PREVENTATIVE MAINTENANCE					
WORK ITEMS	ITEMS REQUIRED	DATE REQUIRED	ITEMS DONE	DATE DONE	COMMENTS AND SPECIAL INSTRUCTIONS
1. TRASH AND DEBRIS REMOVAL					
A. BOTTOMS					
B. ACCESS AREAS					
C. INLETS					
D. OUTLETS					
E. OTHERS					
2. SEDIMENT REMOVAL					
A. INLETS					
B. OUTLETS					
C. BOTTOMS					
D. OTHERS					
3. PEST CONTROL					
A. MOSQUITO BREEDING					
B. RODENTS / RODENT HOLES					
C. OTHERS					
4. STRUCTURAL REPAIRS					
A. VALVES					
B. LOCKS					
C. PIPES					
D. INLETS					
E. MANHOLES					
F. OUTLET CONTROL STRUCTURES					
G. ACCESS AREA					
H. ACCESS HATCHES					
I. OTHERS					
5. OTHER PREVENTIVE MAINTENANCE					
A. PARKING LOT SWEEPING					
B. EMPTYING TRASH RECEPTACLES					
C. DEWATERING					
D. OTHERS					

B. CORRECTIVE MAINTENANCE					
WORK ITEMS	ITEMS REQUIRED	DATE REQUIRED	ITEMS DONE	DATE DONE	COMMENTS AND SPECIAL INSTRUCTIONS
1. REMOVAL OF DEBRIS AND SEDIMENT					
2. STRUCTURAL REPAIRS					
3. DEWATERING					
4. BASIN MAINTENANCE					
5. OTHER					

GENERAL NOTES AND REMARKS:

MAINTENANCE COMPLETED AND BASED ON ALL AREAS VISIBLE AND ACCESSIBLE AT THE TIME OF INSPECTION.

WORK PERFORMED BY: _____

SIGNED: _____ DATE: _____

INSPECTION CHECKLIST

**INSPECTION LOG
FOR
STORMWATER MANAGEMENT FACILITIES**

NAME OF FACILITY: _____

LOCATION: _____

DATE:

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FACILITY ITEM	INDICATE CONDITION (i.e. 1, 2, OR 3)							
1. BOTTOMS (DETENTION AND INFILTRATION)								
A. STANDING WATER								
B. TRASH AND DEBRIS								
C. BOTTOMS								
D. OTHER:								
2. INLET STRUCTURE								
A. CONDITION OF STRUCTURE								
B. TRASH AND DEBRIS								
C. SEDIMENT								
D. AESTHETICS								
E. OTHER:								
3. OUTLET STRUCTURE								
A. CONDITION OF STRUCTURE								
B. TRASH AND DEBRIS								
C. SEDIMENT								
D. MECHANICAL COMPONENTS								
E. OTHER:								
4. MISCELLANEOUS								
A. EFFECTIVENESS OF EXIST. MAINT. PROGRAM								
B. POTENTIAL MOSQUITO HABITATS								
C. 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: _____

INSPECTION LOG

**INSPECTION LOG
FOR
STORMWATER MANAGEMENT FACILITIES**

NAME OF FACILITY: _____

LOCATION: _____

DATE:

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FACILITY ITEM	INDICATE CONDITION (i.e. 1, 2, OR 3)							
1. BOTTOMS (DETENTION AND INFILTRATION)								
A. STANDING WATER								
B. TRASH AND DEBRIS								
C. BOTTOMS								
D. OTHER:								
2. INLET STRUCTURE								
A. CONDITION OF STRUCTURE								
B. TRASH AND DEBRIS								
C. SEDIMENT								
D. AESTHETICS								
E. OTHER:								
3. OUTLET STRUCTURE								
A. CONDITION OF STRUCTURE								
B. TRASH AND DEBRIS								
C. SEDIMENT								
D. MECHANICAL COMPONENTS								
E. OTHER:								
4. MISCELLANEOUS								
A. EFFECTIVENESS OF EXIST. MAINT. PROGRAM								
B. POTENTIAL MOSQUITO HABITATS								
C. 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: _____