MAINTENANCE AND OPERATION PLAN

MAINTENANCE MANUAL

INTRODUCTION

In accordance with MSD regulations, The Estates of Weidman Manor Homeowners Association is responsible for inspecting and maintaining the stormwater management facilities (SWMFs) as approved by MSD. Research and experience have demonstrated that regular and thorough maintenance is necessary for Stormwater management facilities to perform effectively and reliably. They have also demonstrated that failure to perform such maintenance can lead to diminished performance, deterioration and failure, in addition to a range of health and safety problems including mosquito breeding, vermin, and the potential for drowning.

This maintenance manual contains specific preventative and corrective maintenance tasks for the SWMFs within this subdivision.

SELECTION OF STORMWATER MANAGER

The Estates of Weidman Manor Homeowners Association shall select a Trustee who will be responsible for SWMF maintenance. This person shall be referred to as the stormwater manager. The stormwater manager must be aware of the purpose of the SWMFs and consequences of facility failure, particularly those failures caused by inadequate maintenance.

STORMWATER MANAGEMENT FACILITIES

There are a total of 3 storm SWMFs within this subdivision.

DETENTION POND

The detention ponds located in the west and southeast corners of the site will provide detention for the 2 year and 100 year 24 hour storms along with providing the 1year 24 hour extended detention for channel protection.

WATER QUALITY Area 1 and 2

Prior to entering the detention area, a majority of the surface runoff tributary to the detention area will pass through one of two water quality and pretreatment areas. The storm water is piped to a diversion structure which will allow the low flows to enter the basin via a 12'" concrete pipe. When flows restricted by the 12" pipe reach the Water Quality storage volume elevation water will crest and flow over the weir inside the diversion structure and be carried to the detention area via the by pass storm sewer. The pretreatment section of each water quality area is sized to store 25% of the WQ volume and is designed to trap course materials and debris and is separated from the main area by means of a gabion basket wall which serves as a filter. Water then enters the main portion of the basin where a sand filter will remove additional pollutants prior to entering the detention area. The sand filters consists of a 3" top layer of decorative rock on a 15" thick layer of clean washed sand which rests on a bottom layer of pea gravel. The lower layer of pea gravel rests on the earth bottom which is sloped towards the perforated drain pipe. Each of these layers is enclosed and separated by geotextile fabric. The approximate time necessary for the pond to completely drain is 24hours.

PREVENTATIVE MAINTENANCE

The purpose of preventative maintenance is to assure that the SWMFs remain operational and safe at all times, while minimizing the need for emergency and corrective maintenance.

1. Grass Cutting

A regularly scheduled program of mowing and trimming of grass at SWMFs during the growing season will help to maintain a tightly knit turf, and will also help to prevent diseases, pests and the intrusion of weeds. The actual mowing requirements of an area should be tailored to the specific site conditions, grass type, and seasonal variations in the climate. In general, grass should not be allowed to grow more than 1 to 2 inches between cuttings. Allowing the grass to grow more than this amount prior to cutting it may result in damage to the grass' growing points and limit its continued healthy growth.

2. Grass Maintenance

Grassed areas require periodic fertilizing, de-thatching and soil conditioning in order to maintain healthy growth. Additionally, provisions should be made to re-seed and re-establish grass cover in areas damaged by sediment accumulation, storm water flow, maintenance, repair or other causes.

3. Removal and Disposal of Trash and Debris

A regularly scheduled program of debris and trash removal form SWMFs will reduce the chance of outlet structures, trash racks and other components becoming clogged and inoperable during storm events. Additionally, removal of trash and debris will prevent possible damage to 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.

4. Sediment Removal and Disposal

Accumulated sediment should be removed before it threatens the operation or storage volume of a SWMF. Disposal of sediment must comply with all local, county, state, and federal regulations, Only suitable disposal sites should be utilized. The sediment removal program in infiltrations facilities must also include provisions for monitoring the porosity of the sub-base, and replacement or cleansing of the pervious materials as necessary.

5 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 the source of a large mosquito population. Ponded water in areas such as open cans and bottles, debris and sediment accumulations, and areas of ground settlement provide ideal locations for mosquito breeding. A maintenance program dedicated to eliminating potential breeding areas is certainly preferable to controlling the health and nuisance effects of flying mosquitoes.

6. Inspections

Regularly scheduled inspections of the facility should be performed by qualified inspectors. The primary purpose of the inspections is to ascertain the operational condition and safety of the facility, particularly the condition of embankments, outlet structures, and other safety-related aspects. Inspections will also provide information on the effectiveness of regularly scheduled Preventative and Aesthetic 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. It should be noted that, in addition to regularly scheduled inspections, an informal inspection should be performed during every visit to a SWMF by maintenance or supervisory personnel.

7 Reporting:

The recording of all maintenance work and inspections provide valuable data on the facility condition. Review of this information will also help to establish more efficient and beneficial maintenance procedures and practices. Along with the written reports, a chain of command for reporting and solving maintenance problems and addressing maintenance needs should be established. From field personnel to the stormwater manager, everyone should be encouraged to report any problems or suggest any changes to the maintenance program.

CORRECTIVE MAINTENANCE

Corrective maintenance is required basis to correct problems or malfunctions and to restore the intended operation and safe condition of a SWMF. Corrective maintenance can be performed on a routine or non-scheduled basis as site conditions dictate.

1. Removal of Debris and Sediment

Accumulation of sediment, debris or trash which impedes the operation and/or discharge capacity of a SWMF should be removed and properly disposed of in a timely manner. Normal household garden tools are appropriate for removal of debris, trash and minor accumulations of sediment. A qualified landscape contractor should be employed for the removal of large sediment accumulations. The lack of an available disposal site should not delay the removal of trash debris and/or sediment. A temporary disposal sites may be utilized if necessary.

2. Dam, Embankment, and Slope Repairs

Any damage to dams, embankments, and side slopes must be repaired promptly. This damage can be the result of heavy rain or flooding, vandalism, animals, vehicles, or neglect. Typical minor problems include surface and/or rutting can be handled with the use of household garden tools. Minor problems that reoccur frequently may require the services of a contractor or landscaper to establish a permanent repair. Major damage such as seepage, embankment failure or sliding and severe cracking will require the services of a qualified contractor or landscaper with the equipment and personal necessary to complete necessary to complete the repairs. In some cases it may be necessary to employ a geotechnical engineer to review the damage and make recommendations for the proper repair work. The immediacy of the repairs will depend upon the nature of the damage and it's effects on the operation and safety of the facility.

3. Dewatering

It may be necessary to remove ponded water from within a malfunctioning SWMF. This ponding may be the result of a blocked principal outlet (detention facility), inoperable low level outlet (retention facility), loss of infiltration capacity (infiltration facility) or poor bottom drainage. Portable pumps may be necessary to remove the ponded water temporarily until a permanent solution can or repair be implemented. Water should be pimped to an existing storm sewer or drainage facility.

4. Extermination of Mosquitoes

If neglected, a SWMF can readily become an ideal mosquito breeding area. Extermination of mosquitoes will usually require the services of an expert, such as the local Mosquito Extermination Commission. Proper procedures carried out by trained personnel can control the mosquitoes with a minimum of damage or disturbance to the environment. If mosquito control in a facility becomes necessary, the preventative maintenance program should also be re-evaluated, and more emphasis placed on control of mosquito breeding habitats.

5. Erosion Repair

Vegetative cover or other protective measures are necessary to prevent the loss of soil from the erosive forces of wind and water. Where a re-seeding program has not been effective in maintaining a non–erosive vegetative cover, or other factors have exposed soils to erosion, corrective steps should be initiated to prevent further loss of soil and any subsequent danger to the stability of the facility. Soil loss can be controlled by a variety of materials and methods, including riprap, sod, seeding, and re-grading. The local Soil Conservation District can provide valuable assistance in recommending materials and methodologies to control erosion.

6. Elimination of Trees, Brush, Roots and Animal Burrows

The stability of dams, embankments, and side slopes can be impaired by large roots and animal burrows. Additionally, burrows can present a safety hazard for maintenance personnel. Trees and brush with extensive, woody root systems should be completely removed from dams and embankments to prevent their destabilization and the creation of seepage routes. Roots should also be completely removed to prevent their decomposition within the dam or embankment. Root voids and burrows should be plugged by filling with material similar to the existing material, and capped just below grade with stone, concrete or other material, If plugging of the burrows does not discourage the animals from returning, further measures should be taken to either remove the animal population or to make critical areas of the facility unattractive to them.

7. Snow and Ice Removal

Accumulations of snow and ice can threaten the functioning of a SWMF, particularly at inlets, outlets, and emergency spillways. Providing the equipment, materials and personnel to monitor and remove snow and ice from these critical areas is necessary to assure the continued functioning of the facility during the winter months.

MAINTENANCE ACCESS

All storm water management facilities are an integral part of this project. Access to the storm water management facilities shall be restricted for maintenance purposes only. The storm water management facilities are **not** to be considered as playgrounds or used for recreational activities. All signage identifying the designated storm water management facilities and areas shall be maintained. All access restrictions shall be enforced by the subdivision trustees.

SANDFILTER MAINTENANCE

All sand filter components must be inspected for clogging and excessive debris and sediment accumulation at least four times annually as well as after every storm exceeding 1 inch of rainfall. Such components include inlets and diversion structures, pre-treatment areas, sand beds and overflow.

Sediment removal should take place when all runoff has drained from the sand bed and the sand is reasonably dry. In addition, the inflow shall be blocked so that the stormwater will bypass the sandfilter until such time as the sand bed is operational.

When establishing or restoring vegetation, bi-weekly inspections of vegetation health should be performed during the first growing season or until vegetation is established. Once established, inspections should be performed at least 4 times annually. If vegetation has greater than 50% damage, the area should be re-established in accordance with the original specifications and the inspection requirements presented above.

All use of fertilizers, mechanical treatments, pesticides and other means to assure optimum vegetation health must not compromise the intended purpose of the sandfilter.

The normal drain or drawdown time should be used to evaluate the filter's actual performance. If significant increases or decreases in the normal drain time are observed, the filter's sand bed, underdrain system, and tailwater levels must be evaluated and appropriate measures taken to comply with the maximum drain time requirements and maintain the proper functioning of the filter. If the water fails to infiltrate 72 hours after the end of a storm, corrective measures must be taken.

ANNUAL REPORTING

Annual trustee certification and reporting of performance of required maintenance, operation, and repairs shall commence upon MSD construction approval of detention facilities. An annual report shall be submitted to the Metropolitan St. Louis Sewer District Engineering Department, Design Division, Development Review at 2350 Market St., St. Louis, MO, 63103.

MAINTENANCE AND INSPECTION LOGS

Attached below is an example of typical checklist and log for maintenance and inspections. Additional items can be added if necessary.

Once maintenance logs are completed, they should not simply be filed away. They should be periodically reviewed to determine the effectiveness of the overall maintenance program for the subdivision.

Maintenance and
Inspection Checklist
for

Stormwater Management Facilities

Name of Facility:_____

Location:_____ Date:_____

Inspector:_____ Weather_____

Facility Item	O.K.	Routine[2]	Urgent[3]	Comments[4]	Needed Maintenance/ Repair completed
1 .Embankments and Side Slopes					
A. Vegetation					
B. Erosion					
C. Settlement					
D. Sloughing (Failure)					
E. Trash and Debris					
F. Seepage					
G. Aesthetics					
H. 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 . Water Quality Areas					
A. Vegetation/Ground Cover					
B. Sand Filter					
C. Pre Filter					
D. Settlement					
E. Standing Water					
F. Trash and Debris					
G. Sediment					
H. Other					

Facility Item	O.K.	Routine[2]	Urgent[3]	Comments[4]	Needed Maintenance/ Repair completed
4 . Ponds (Retention)					
A. Vegetation					
B Shoreline Erosion					
C Trash and Debris					
D. Sediment					
E Water Quality					
G. Other					
5. Diversion Structure					
A. Condition of Structure					
B. Trash & Debris					
C. Sediment					
D. Aesthetics					
E. Other:					
6. Outlet Structure (Detention & Retention					
A. Condition of Structure					
B. Erosion					
C. Trash & Debris					
D. Sediment					
E. Mechanical Components					
F. Aesthetics					
G. Other:					
7. Spillways					
A. Vegetation					
B. Lining					
C. Erosion					
D. Trash & Debris					
E. Other:					
8. Perimeter					
A. Vegetation					
B. Erosion					
C. Trash & Debris					
D. Fences & Gates					
E. Aesthetics:					
F. Other					
9. Access Paths					
A. Vegetation					
B Fence & Gates					
C. Erosion					
D. Aesthetics					
E. Other:					